



# HANDBOOK OF SUSTAINABLE BUILDING POLICIES

*Composing Building Blocks*

UNITED NATIONS ENVIRONMENT PROGRAMME

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# Executive Summary

UNEP's longstanding efforts to promote sustainable building approaches and policies have recently focused on the development of a practical decision support pack to aid policy makers and experts in developing countries. The objective of the Sustainable Building Policies in Developing Countries (SPoD) project is to enable authorities at national and local levels to analyse existing policies affecting the building sector, and to identify packages of policy instruments for sustainable buildings, which can be adapted to fit local conditions.

## Why Buildings?

Buildings are at the centre of our economic and social lives, providing shelter, work places, and spaces for commerce and leisure. Yet buildings also put a tremendous strain on the environment. Globally, buildings generate approximately:

- o 40% of energy use
- o 20% of water use
- o 30% of solid waste
- o 20% of wastewater

The building sector is also the source of more than 30% of global greenhouse gas (GHG) emissions. On the other hand, buildings also represent one of the few sectors where significant mitigation can be achieved at little or no

cost to society. Sustainable energy use, which encompasses reduction in energy consumption, enhancement of energy efficiency and GHG emissions mitigation, is the privileged means to achieve this objective. Experience has shown that designing appropriate energy policies for sustainable buildings can promote innovation, generate economic opportunities and support the creation of green jobs, reduce maintenance and operation costs over the life of the building, raise the overall standard of living, and improve human well-being, comfort and health.

## Why SPoD?

The origin of the SPoD project stems from UNEP's Sustainable Buildings and Climate Initiative (UNEP-SBCI), a partnership launched in 2006 to identify policy instruments to promote sustainable buildings and to develop tools to assist policy makers in selecting the appropriate measures. In October 2007, partnering with the Marrakech Task Force on Sustainable Buildings and Construction, UNEP worked with the Central European University to issue a report entitled: *Assessment of Policy Instruments for Reducing Greenhouse Gas Emissions from Buildings*. One of the report's key conclusions was that policy instruments deliver better results when combined in a package that is tailored to the local context. To build on the results of this work,

the SPoD project was launched by UNEP in 2009, funded by the Government of Finland.

In order to support policy-makers in developing the appropriate policy packages, UNEP partnered with the Central European University (CEU) to provide two specific tools: the Quick Scan Tool (QST), and the Handbook of Sustainable Building Policies, which is presented in the current document. The SPoD tools create an enabling environment for sustainable buildings, focusing mainly on energy efficiency, but also factoring in building materials, renewable energy solutions, water resources and social issues.

### **Laying the Groundwork: the Quick Scan Tool**

The Quick Scan Tool (QST) is a web-based questionnaire which assists experts and policy makers to understand how the building sector can influence sustainable development in that country, and what barriers and opportunities exist for adopting policy tools in support of sustainable buildings and construction. The QST takes the user through a process from determining the policy goals and focus areas, through identifying barriers and characteristics of the policy environment, to defining a set of policy instruments that are appropriate to the local context. The tool considers the levels of policy making, target areas, policy goals, local policy background, barriers, capacities, resources, industry and market conditions and other local factors. A comprehensive automatised algorithm analyzes the given answers and generates a proposal of several alternative, locally tailored policy packages.

### **Developing the Policy Package: The Handbook of Sustainable Building Policies**

The current document, the Handbook of Sustainable Building Policies, gives the user the opportunity to review and construct coherent policy packages composed of individual instruments (i.e. policy building blocks) whose relevance has been assessed using either the Quick Scan Tool, or other evaluation methods. The Handbook details 25 different policy instruments in the following categories:

- o Regulatory-normative (e.g. building codes and standards)
- o Regulatory-informative (e.g. certification and labelling programs)
- o Economic and market-based (e.g. preferential mortgages or carbon market mechanisms)
- o Fiscal instruments and incentives (e.g. taxes, subsidies or loans)
- o Support, information and voluntary action (e.g. public leadership programs, awareness-raising)



The Handbook considers each individual policy instrument as a policy building block which can be combined with others to successfully constitute a policy package. While a single policy instrument can rarely deliver long-term change, particularly when addressing complex policy goals and barriers, multiple policy instruments can reinforce, mitigate and neutralize each other, depending upon whether their combined introduction multiplies, reduces or has no effect at all on the impact and cost effectiveness of the instruments. The appropriate combination of instruments in a policy package takes these interactions into account, in order to provide an enhanced response to a set of policy goals.

Over 40 policy instruments are used worldwide to promote sustainable energy use in buildings. The Handbook's twenty-five policy instruments have been selected based on their cost-effectiveness and capacity to contribute to successful national and local priorities in a developing country context. Some of these instruments are widely used, while others may be novel in some policy contexts. The Handbook also includes a Worksheet to enable users to compare various individual building blocks and determine which instruments should be included in the final policy package, as well as to develop an implementation roadmap. The Handbook can also be used as a reference manual and training tool for experts (architects, engineers, planners) to build capacity in sustainability practices.

### **The Decision Support Tools at Work: Successful Field Studies in Africa**

Field studies conducted in Kenya and Burkina Faso have proven that utilizing the QST and the Handbook can produce results. In each country, a team of local experts cited assistance in policy development as one of the pre-requisites for improving energy efficiency

in the building sector, and welcomed the opportunity to test the tools after conducting a detailed situation review. The tools were used to select policy instruments that would improve building energy performance, while responding to social, environmental and economic priorities. Following the process to its logical conclusion, local partners developed a policy strategy which they hope to implement in the near future. The results of these field studies will soon be released as a set of best practices, enabling other authorities to benefit from this experience.

### **Creating Communities of Practice**

While originally tested in a limited geographical area, the SPoD tools can also be used worldwide, and are now available to all interested practitioners. Users are encouraged to send feedback on the tools, either through feedback forms, or directly to the UNEP Built Environment Unit ([built.environment.unit@unep.org](mailto:built.environment.unit@unep.org)). This process will ensure that the tools are kept updated and relevant, that a regional/international dialogue on sustainable building policies is created and nurtured, and that all countries are able to benefit from users' best practices and lessons learned.

It is hoped that the present Handbook and its companion tool, the Quick Scan Tool, will prove to be valuable resources for authorities at the national and local levels, and inspire them to consider the development of a policy package not just as a one-time exercise, but rather as the beginning of a long term commitment to environmental, social and economic sustainability.

# 1

## Introduction

### 1.1 PURPOSE AND SCOPE OF THE HANDBOOK OF SUSTAINABLE BUILDING POLICIES

The **Handbook of Sustainable Building Policies** is a policy formulation support tool primarily addressed to policy-makers and experts who plan to formulate national or local policies to increase the sustainability of energy use in buildings.

The main scope of this Handbook is sustainable energy policies for the buildings sector, with due consideration given to other sustainable policy areas, such as water conservation, construction materials, air pollution and social issues.

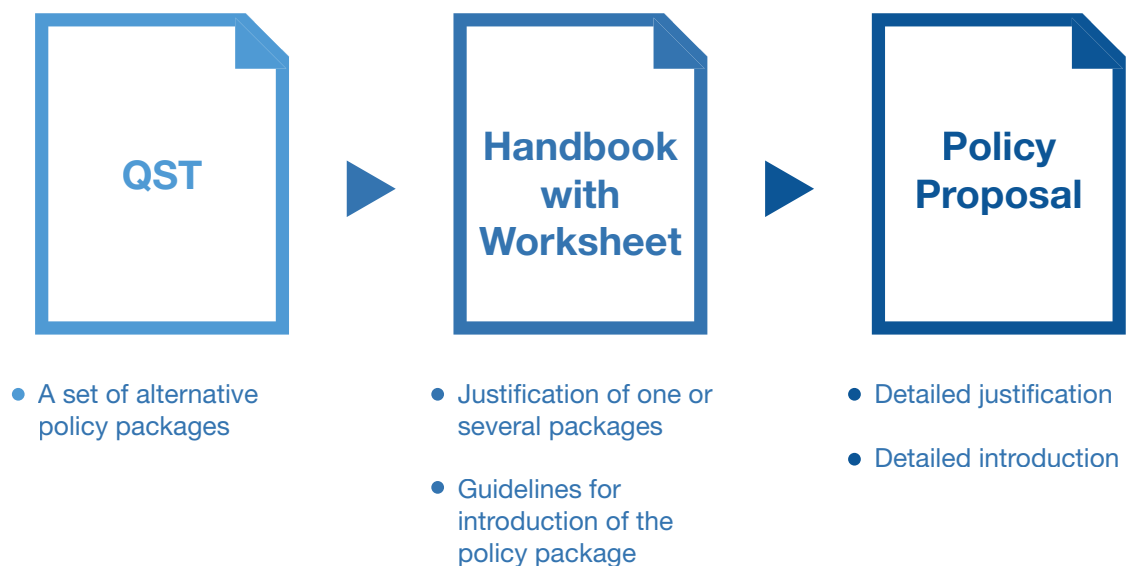
A single policy instrument rarely delivers long-term change, particularly when contending with multiple and complex policy goals and barriers. However, policy instruments can interact by reinforcing, mitigating and neutralising each other, depending upon whether their combined introduction multiplies, reduces or has no effect on the impact and cost-effectiveness of the instruments. The appropriate combination of instruments in a policy package takes these interactions into consideration in order to provide an enhanced response to a set of policy goals.

This Handbook considers each individual policy instrument as a policy building block which can be combined with others to successfully constitute a policy package. **The purpose of this Handbook is to support decision-makers in reviewing prospective or existing policy, assessing policy building blocks to justify their suitability to the local context, and obtaining guidance on the relevance of their inclusion in a policy package designed to increase the sustainability of energy use in the building sector.** Policy makers and experts can also use the Handbook as a reference manual, as each policy instrument is described in an individual chapter, including how the instrument interacts with other policy building blocks.

## 1.2 OVERVIEW

The **Handbook** is part of a decision-support pack, which also includes the web-based **Quick Scan Tool**<sup>1</sup>, designed to identify a set of alternative policy packages appropriate to the local circumstances. The Handbook can be used to review and construct policy packages composed of individual instruments whose relevance has been assessed using either the Quick Scan Tool (Figure 1), or other evaluation methods.

Each instrument included in the Handbook is presented according to impacts, conditions, steps for implementation, and interaction with other instruments. The Handbook prepares the introduction of the policy package by providing policy makers and experts with requirements and steps for implementing each policy instrument, and helping them to decide how and under what conditions to achieve optimal results.



**Figure 1: SPoD policy formulation process**

The proposed policy formulation process utilising the Handbook of Sustainable Building Policies in combination with the Quick Scan Tool. Users may choose to use the Handbook separately to assess pre-selected policy instruments and policy packages.

<sup>1</sup> The Quick Scan Tool (QST) is available at: <http://www.sustainable-buildings-policy-assessment-tools.net/>

# 2

## How to use the Handbook

### 2.1 POLICY INSTRUMENTS IN THIS HANDBOOK

Multiple policy instruments are used worldwide to promote sustainable energy use in buildings. The Handbook presents twenty-five policy instruments (Table 1), selected based on their cost-effectiveness and capacity to contribute to successful national and local policies. Some of these instruments are widely used, while others may be novel in some policy contexts. Each instrument is presented individually, in Part 3, chapters 1 to 23, according to the structure presented in 2.2.

<b>Regulatory-normative</b>	1. Product standards 2. Building codes 3. Sustainable procurement obligations 4. Policy roadmaps and targets
<b>Regulatory-informative</b>	5. Mandatory certification of buildings * 6. Certification and labelling of renewable energy solutions 7. Mandatory labelling of products * 8. Mandatory audit programs 9. Smart meter roll-outs
<b>Economic and market-based</b>	10. ESCO market promotion 11. Energy efficiency obligations/White Certificates 12. Carbon trading projects
<b>Fiscal instruments and incentives</b>	13. Energy or carbon taxes 14. Tax exemptions and reductions 15. Public benefits charges 16. Grants 17. Soft loans 18. Preferential mortgages
<b>Support, information and voluntary action</b>	19. Net-metering (renewable energy) 20. Voluntary agreements 21. Public leadership programs 22. Awareness raising, education and information campaigns 23. Feedback programs 24. Voluntary certification of buildings (ch. 5)* 25. Voluntary labelling of products (ch. 7)*

**Table 1: Classification of policy instruments presented in the Handbook\*\***

\*Each instrument is allocated a specific chapter, except labelling of products and certification of buildings: for these instruments, voluntary and mandatory variants are covered in the same chapter.

\*\*The classification is based on: Üрге-Vorsatz, D. & Koeppl, S., 2007. Assessment of Policy Instruments for Reducing Greenhouse Gas Emissions from Buildings. Budapest: Central European University - United Nations Environment Programme. Available at <http://www.unep.fr/scp/publications/details.asp?id=WEB/0126/PA>

## 2.2 ASSESSING INDIVIDUAL POLICY BUILDING BLOCKS: STRUCTURE OF THE CHAPTERS

### Section 1: Overview

**Purpose:** to ensure a common understanding of the instrument.

The section presents general information on the instrument, including alternative denominations, objective, definition and variations.

### Section 2: Relevance

**Purpose:** to justify the coherence of the instrument with the policy context.

This section presents the aspects of the instrument that need to be assessed:

- o The levels of policy making at which the instrument may be introduced
- o How it addresses specific target areas
- o How it can help overcome specific barriers to energy sustainability in buildings
- o How it responds to specific policy goals.

### Section 3: Preconditions and recommendations

**Purpose:** to identify the conditions necessary for the successful implementation of the instrument.

The section presents the national/local preconditions which should be in place for the introduction of a specific policy instrument. Recommendations to prepare the processes for future implementation of the instrument are presented for cases where these preconditions do not exist.

### Section 4. Implementation steps

**Purpose:** to understand the sequential implementation steps of each policy instrument.

The Handbook presents the implementation steps for the instruments, to be followed once the necessary preconditions are in place.

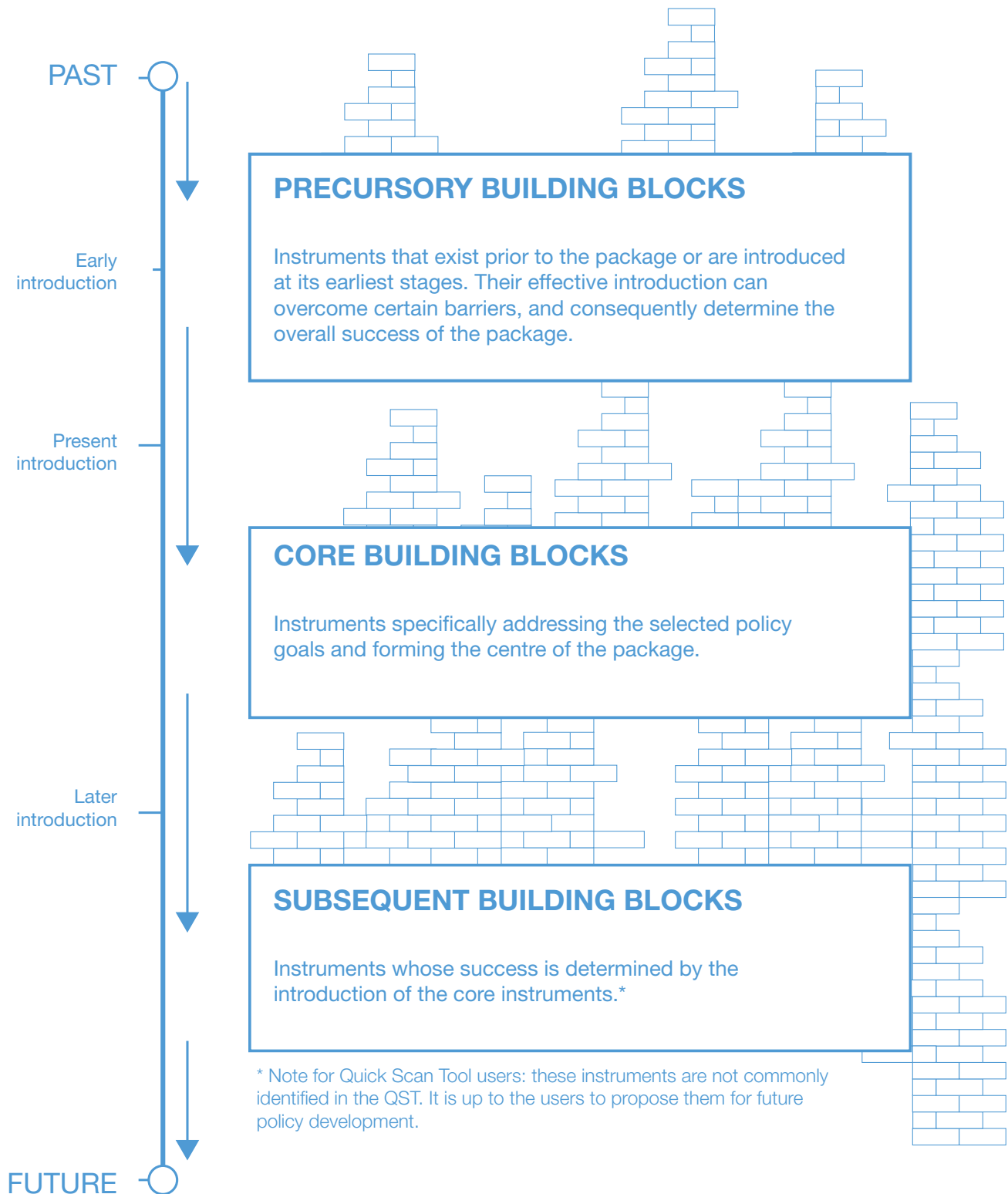
### Section 5: Combination with other policy building blocks

**Purpose:** to understand the interactions between the policy building block object of a chapter and other potential building blocks, as well as to decide how to order the implementation steps of the constituting building blocks, and therefore of the overall package.

This section presents graphically how an individual instrument fits within a series of potential policy building blocks. Reinforcement and mitigation effects are identified through the colour code of blue and red, respectively. Three classes of building blocks are presented according to their causal/temporal relationship, from top to bottom, with the other building blocks that compose the package. Figure 2 presents these three categories.

### Section 6: Additional information

This section provides information sources on the instrument and/or links to useful tools.



**Figure 2: Categories of building blocks**

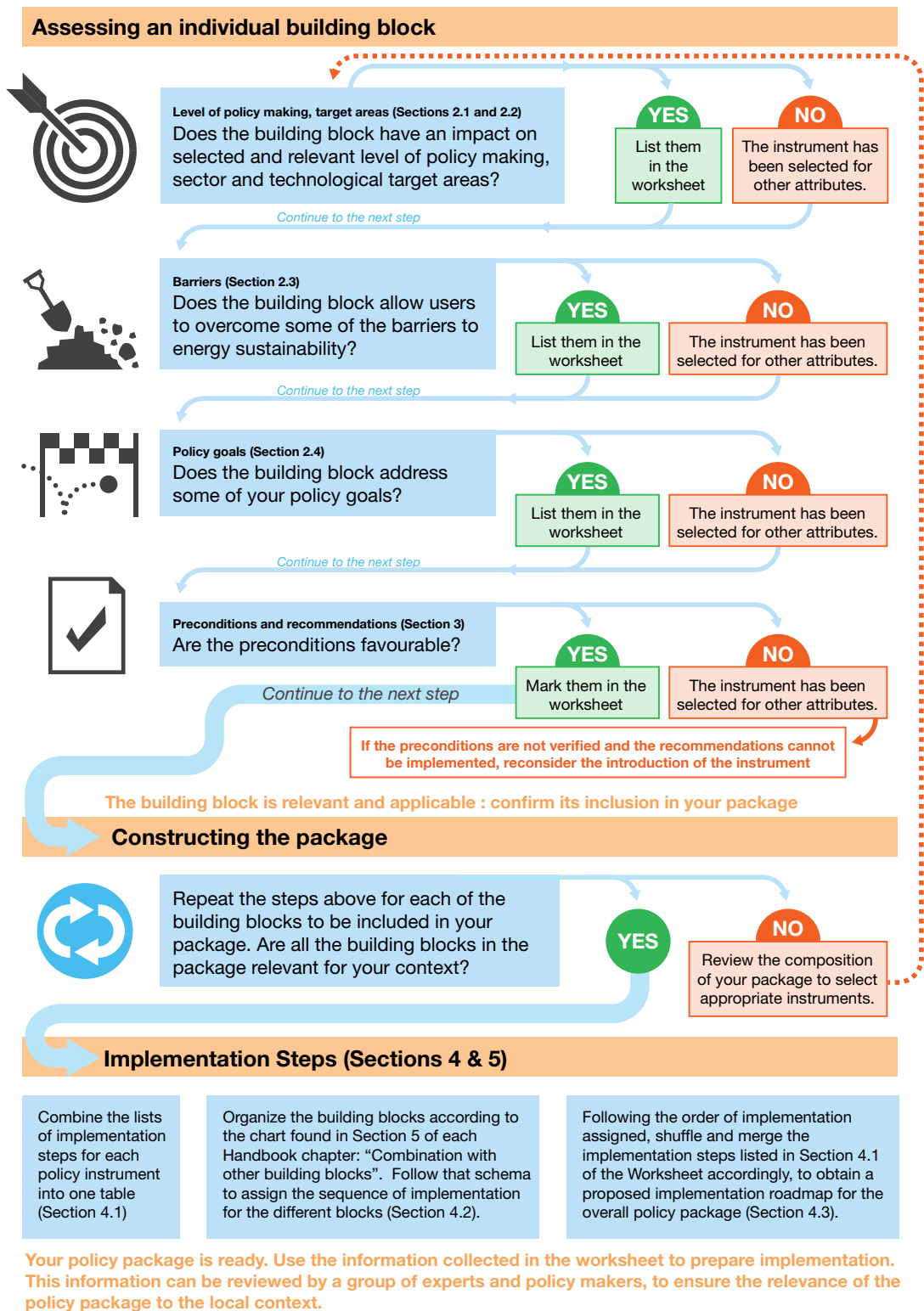
Categories of building blocks according to their temporal / causal relationships within the package.

### **2.3 DEVELOPING THE POLICY PACKAGE USING THE WORKSHEET**

The Handbook is completed by a Worksheet that can be used to gather information about each policy building block and ultimately about the overall policy package, including:

- o Review of each instrument's relevance and expected impacts
- o Assessment of recommendations for implementation
- o Identification of implementation steps for each instrument
- o Generation of an implementation roadmap for the overall package.

The Worksheet can be used to compare various individual building blocks (researched in the Handbook or selected through the Quick-Scan Tool), to determine which instruments should be included in the final policy package, and to develop an implementation roadmap. The following figure presents the steps of this process.



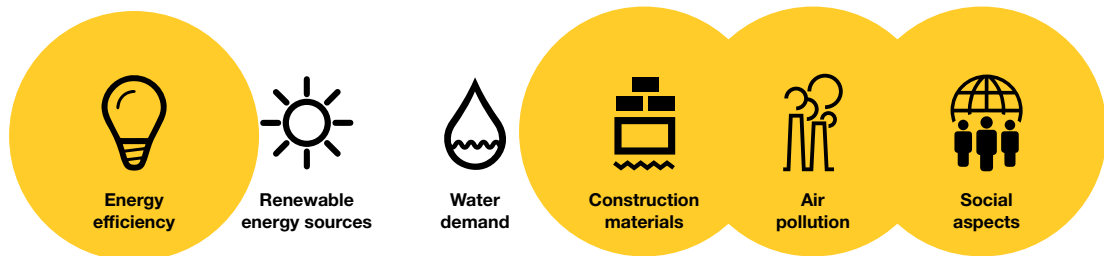
**Figure 3: Policy packages assessment and development steps**  
Steps to be taken for the assessment and development of a policy package<sup>1</sup>

<sup>1</sup> Policy packages generated through the use of the Quick Scan Tool (QST) are based on a specific set of priorities, goals and challenges. When these policy packages are reviewed using the Handbook and Worksheet, it is important that the same set of criteria be used as the basis for the assessment.



# 3 Policy instruments

## 1 PRODUCT STANDARDS



### 1.1 OVERVIEW OF THE INSTRUMENT

#### 1.1.1 Alternative names

Standards; appliance and equipment efficiency standards; technical regulations; Minimum Energy Performance Standards (MEPS); phasing out of underperforming technologies.

The term *product* in this Handbook refers to appliances and equipment that are part of or are contained in a building. They may be purchased or rented independently from the building and installed without the need for technical expertise. Their lifetime is typically below 15-20 years. Thus, *product* applies to household appliances, office equipment, and to some elements of building systems (air conditioning, heating and lighting systems).

#### 1.1.2 Objective

The objective of product standards is to improve the performance of a group of products by setting a minimum acceptable performance in technical terms, thus excluding the least sustainable products from the market. Requirements may be related to one or multiple sustainability areas: energy, water, resource consumption, durability, etc.

#### 1.1.3 Definition

Product standards are minimum performance requirements established by a recognized public authority for appliances and equipment (e.g. energy efficiency requirements). Performance is monitored, with an enforcement scheme ensuring compliance. Legal requirements are reviewed periodically. Product standards are usually applied both to nationally manufactured and imported products.

## 1.1.4 Variations

Product standards are typically defined at national level (e.g. Ghana, Egypt, Argentina, Brazil or India), at state level (e.g. California) or at supranational level (e.g. the European Union). There are, however, examples of additional implementation efforts conducted at local level (e.g. Chinese cities of Jiangsu, Shandong, Sichuan and Shanghai).

Product standards are typically mandatory. However, there are successful examples of voluntary programs, which reflect an agreement between the authority and the industry.

Although product standards can address any type of resource consumption, they have mainly been used to address energy consumption, in particular for electrical products. The following products are typically targeted through product standards: electric appliances, office equipment, information and communication technologies, lighting, heating and cooling devices, motors and drivers. Moreover, product standards are increasingly used to improve the water efficiency of specific products, including: washing machines, dishwashers, toilets, urinals, shower heads, faucets and rinse valves.

## 1.2 RELEVANCE



## 1.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making	Relevance		
	Introduction	Implementation	Comment
National level (country or independent regional unit within/ with jurisdiction over the country)	😊	😊	The legal basis needs to be introduced at national level. Complementary efforts may be conducted at local level, such as surveillance or collaboration with retailers.
Local level (city or lower level)	😐	😊	

- 😊 The instrument is typically introduced/implemented at this policy level.
- 😐 The introduction/implementation of the instrument at this level is atypical.
- IF The instrument may be introduced/implemented at this policy level if certain conditions apply.
- 😞 It is practically impossible to introduce/implement the instrument at this policy level.

 1.2.2 **Target areas**

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance
<b>Buildings</b>	Existing buildings		☹️
	New buildings		☹️
	Public	Non-residential buildings	☹️
		Residential buildings	☹️
	Private	Non-residential buildings	☹️
		Residential buildings	☹️
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	☹️*
		Residential buildings	😊*
	Private	Non-residential buildings	☹️*
		Residential buildings	😊*
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊



The instrument has a positive effect.



The instrument may have a positive effect, if certain conditions apply.


















The instrument is not applicable, has very little effect, or no effect at all.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 1.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>		By excluding the least performing products, the consumers' purchasing decision will necessarily be oriented towards more sustainable products, without the need to provide additional information.
	Insufficient information or awareness among target actors		
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		Preference for mass products results in limited stocking of efficient products and high performances bundled into premium products, thereby hindering the market penetration of high-performance products. Market actors will be oriented towards more sustainable products when lesser performing products have been eliminated.
	High initial costs of sustainable solutions		Product standards do not generally result in a significant increase in the products' cost. The increased distribution of efficient products (namely through the development of economies of scale) can lead to a market shift towards more sustainable products.
	Fragmented market structure <sup>3</sup>		Product standards enable the improvement of overall building performance, without involving multiple stakeholders and fragmented decision processes in the construction and commercialization stages.
	Limitations in the typical building design process <sup>4</sup>		Product standards operate independently from the building design process.
	Split incentives <sup>5</sup>		Standards focus on products, which will typically be purchased and used by the same actor (tenant). Thus, the tenant may bear the additional cost of purchasing an efficient product, but will also reap the benefits of its use (including financial savings).
	High transaction costs <sup>6</sup>		Product standards have low transaction costs for the government, in terms of implementation and enforcement, as well as for manufacturers (as there is no drastic technological change). In addition, producers may transfer the additional costs to the product consumer or recover these costs from a higher market share for instance.
	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Product standards are relatively easy to design, and to keep updated (for example by adopting and adapting pre-existing standardization systems). In addition, monitoring and control activities commonly concern only a limited number of actors, such as importers and manufacturers.
	Utility theft or non-payment		Product standards operate independently of these practices.

-  The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

### 1.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	*By prioritizing products predominantly used during peak times, the peak consumption may be reduced along with the demand for energy generation.  **The instrument may potentially tackle any environmental and resource-related performance directly as well as regulating the use of materials during production.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	😊*		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😞		
	Increasing the sustainability of local resource use	IF**		
	Limiting land use in urban areas (including indirect land use)	😞		
	Reducing air pollution	IF**		
Supporting climate change adaptation	😞			
<b>Social</b>	Reducing utility costs for the population	😊	Product standards remove inefficient products from the market, thereby ensuring a reduced operation cost for the consumer.  *Different groups may be supported through the selection of targeted products.  **Product standards improve services at a zero or negative costs.	
	Supporting a specific target group	Public institutions		😊*
		Small and medium enterprises		😊*
		Low-income consumers		😊*
Improving comfort, services and housing conditions	😊**			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊*	*The strengthening of product standard has been recognized as a catalyst for promoting innovation and increasing the competitiveness and production of national industries. This may in turn increase labour demand.  **The introduction of product standards involves an intensification of the control on imported, registered and sold products.  ***Standards do not directly impact consumers' knowledge or awareness.	
	Creating new employment opportunities	😞*		
	Supporting Research and Development (R&D) activities for technological innovation	😊		
	Eliminating/tackling informal market	😞**		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😊*		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😞***		
<b>Political</b>	Improving energy security <sup>2</sup>	😊		
	Making politics of sustainable development credible	😞		
	Releasing budgets from public bodies	😞		
	Reducing corruption	😞		



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

IF

The instrument may contribute to this goal, according to some conditions.



The instrument has a negative effect on this goal.

<sup>1</sup> That is to say, increasing the utilization of renewable energy sources.

<sup>2</sup> Energy security is here defined as supplying more consumers with the same production capacity.

### 1.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
Existence of a legitimate, credible and capable leading organization that develops the scheme at national level.	😊	Continue to the next precondition.
	😞	A government agency should be created or appointed to lead the process, which will need strong collaborative efforts with other agencies and the private sector. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Existence of a complete and coherent policy framework that permits the enactment of product standards (including brand registration and recognition, enforcement of border control and inspection of imported goods).	😊	Continue to the next precondition.
	😞	The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.
The leading government agency is able to develop a strong communication strategy, and to initiate an open, transparent and collaborative process with the industry.	😊	Continue to the next precondition.
	😞	It may be convenient to strengthen the capacity of the leading government agency through specialized training. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Successful experience(s) of cooperation between the private and public sector.	😊	Continue to the next precondition.
Absence of a strong lobby opposing the program.	😞	It may be convenient to introduce at a first stage a product labelling regime or voluntary agreements. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Existence of technical capacity (trained experts, facilities, etc.) to develop and update testing protocols, select products and enforce testing.	😊	Continue to the next precondition.
Existing check and control capacity, preferably including a testing facility to monitor products.	😞	A capacity building effort will be necessary. It may be convenient to check the availability of international collaboration for the design of the program. In all cases, regional cooperation is highly recommended. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Inspection capacity at public administration level: although requiring relatively limited technical capacity and man-hours, the instrument needs qualified experts to consistently monitor implementation and ensure correct enforcement.	😊	Continue to implementation steps (section 1.4).
		If hiring and/or training the necessary personnel are not possible, consider introducing voluntary schemes (such as voluntary product labelling, voluntary agreements or a preliminary voluntary product standard) or test the standard on a limited number of products before a full-scale enforcement of product standards. If this is feasible, continue to Implementation steps (section 1.4). If not, reconsider the introduction of the instrument.

😊 The precondition exists - move to the next precondition.

😞 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

1 A wide array of analyses (technical, techno-economic and engineering/economic) suitable for most circumstances is described in Wiel, S. & McMahon, J.E. (2005). Energy Efficiency Labels and Standards: A Guidebook for Equipment, Appliances and Lighting. <http://www.clasonline.org/ResourcesTools/Resources/StandardsLabelsGuidebook>.

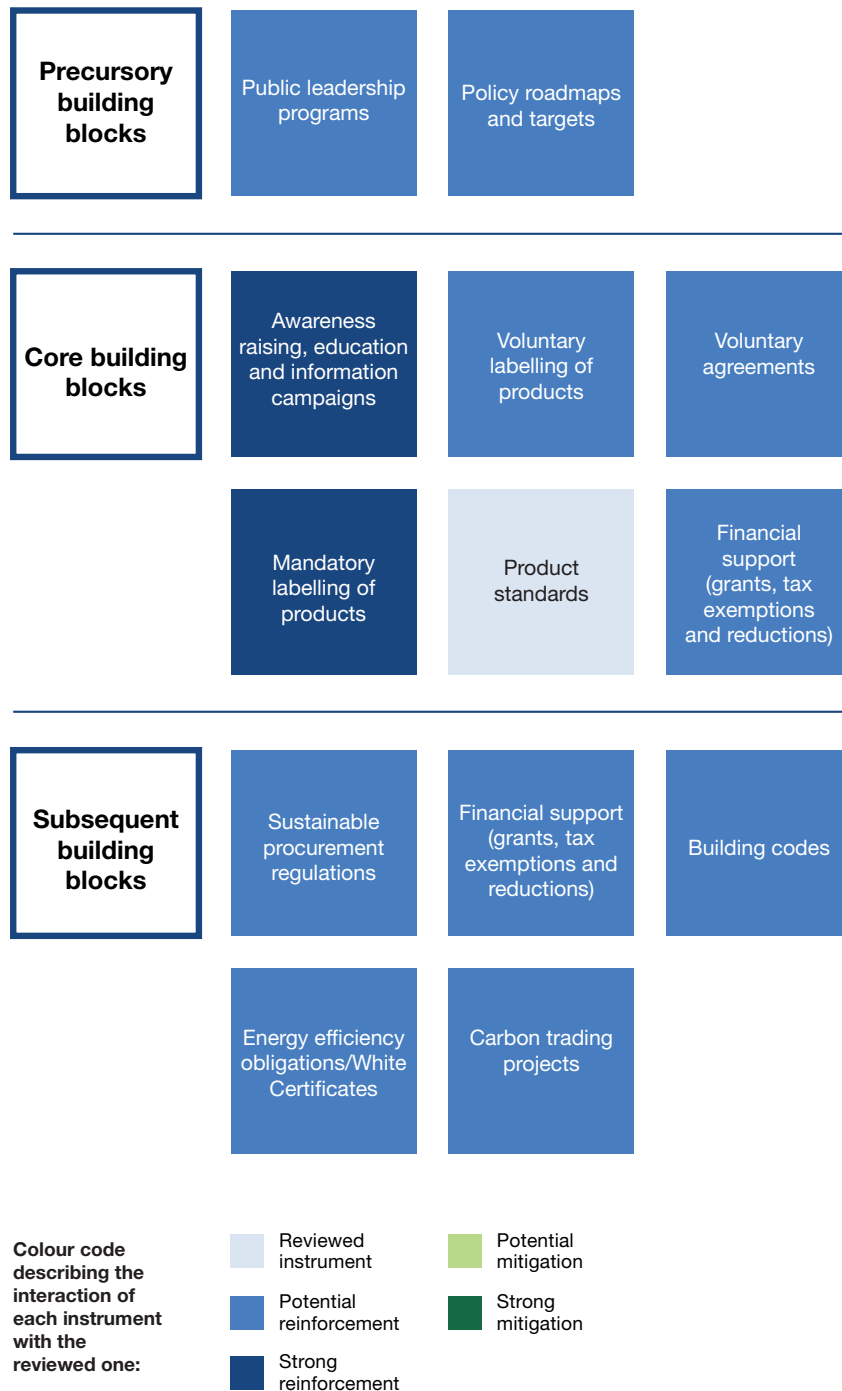
## 1.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Communicate clearly on the objectives of this instrument and involve stakeholders	Stakeholders to be included are: government agencies, standardization institutes, certification and accreditation bodies, test laboratories, manufacturers and importers of equipment, consumer organizations and NGOs, technological research institutes and product distributors.
2	Design the standard according to a robust analysis: select target products and areas for performance improvement	The standard should focus on selected products or product groups, identified as most relevant. The optimum efficiency level for the products should be carefully defined. In order to set the level of the performance requirements (in terms of technological improvements, efficiency level, or other <sup>1</sup> ), consider both: <ul style="list-style-type: none"> <li>• The expected sustainability benefits (e.g. reduction of energy and/or water consumption, reduction of greenhouse gas emissions)</li> <li>• The impacts of the standards' implementation on consumers and manufacturers (namely financial impacts related to a potential increase in production/purchasing costs and expected savings).</li> </ul> Considering related experiences at the regional level and using international and regional collaboration can provide information to appropriately select target products and define required improvements.
3	Introduce a legislative instrument to enforce the product standards	The legislative instrument should define the roles and mandates of government agencies in charge of program design, enforcement, testing, monitoring and verification, as well as the penalties for noncompliance. The implementation of the instrument should allow sufficient time for government and the industry to set up all procedures before full enforcement of product standards.
4	Consider the combined introduction of a mandatory or voluntary labelling of products regime	A labelling regime can provide a transition to the enforcement of standards. Producers should be informed of the duration of this transition. It is also important to consider whether the labelling will remain in place after the introduction of the standard. The transition period while allowing for industry adaptation should not be too long, in order to avoid having out-of-date standard requirements.
5	Develop testing infrastructure and monitoring methods	Facilities for testing regulated product classes should exist, to enable manufacturers to test their products before entering the market (i.e. <b>development testing</b> ). Testing may be conducted by government agencies, or by commercial facilities (certified and accredited private laboratories). The procedures for monitoring compliance must also be defined. These should include <b>verification testing</b> (testing of marketed products conducted in testing facilities) and <b>in-store measurements</b> .
6	Train government officials	Members of the implementing agencies should be trained on the use of the testing facilities, protocols, and monitoring procedures, either to enforce these procedures or to supervise their implementation by commercial agencies.
7	Carry out testing and full enforcement	Enforcement should be conducted through the infrastructure and procedures developed (see step 5).
8	Update product standards and verification procedures	The performance requirements should be continuously reviewed to account for technological improvements and innovation.
9	Extend the product standards program	The product standard can be extended to target additional products, which should be selected following instructions in step 2.

## 1.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).





### 1.5.1 Precursory building blocks

Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:

- o **Public leadership** increases the expected acceptance of product standards.
- o **Policy roadmaps and targets** enable mandated agencies and experts to set appropriate performance targets, and to communicate the upcoming requirements to the private sector.
- o **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable products to regular ones.
- o **Awareness raising, education and information campaigns** increase the expected acceptance of product standards and reduce the risk of a rebound effect.<sup>1</sup>
- o **Voluntary labelling of products** allows the government and sector actors to develop technical capacity. This instrument also creates the conditions for better acceptance of product standards

<sup>1</sup> The “rebound effect” is a situation whereby the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from the reduced consumption of a product (and therefore from lower energy costs) and compensate for this reduction by purchasing and/or using additional products, leading to a stability or an increase in the overall consumption.

by consumers and reduces the risk of a rebound effect.

- o **Voluntary agreements** may be convenient to engage the actors in the development of the instrument, for instance in the definition of appropriate performance levels, and therefore secure compliance.

### 1.5.2 Core building blocks

Instruments specifically addressing the selected policy goals and forming the centre of the package:

- o **Mandatory labelling of products** has a similar function to voluntary product labelling. In addition, by introducing mandatory labelling along with product standards, the enforcing mechanisms are shared. Product standards and different labelling schemes introduced jointly are typically presented as Standard and Labelling schemes (S&L) which have a “push and pull” market effect.
- o **Financial support (grants, tax exemptions and reductions)** can assist manufacturers in investing in research and development to ensure compliance with current and future product standards, or can aid consumers in the early replacement of inefficient products.

### 1.5.3 Subsequent building blocks

Instruments whose success is determined by the introduction of the core instruments:

- o **Sustainable procurement obligations, financial support (grants, tax exemptions and reductions) and energy efficiency obligations/ White Certificates.** These instruments particularly benefit from the existence of product standards associated to a labelling

scheme. Furthermore, these building blocks reinforce the market shift towards sustainable products and form the basis for more stringent standards.

- o **Carbon trading projects.** The introduction of more stringent product standards may serve as the means for demonstrating carbon emission reductions beyond business as usual, as required by carbon certification schemes.
- o **Building codes.** Whether subsequently or simultaneously introduced with product standards, building codes build on developed technical and administrative expertise. However, overlaps between product standards and building codes should be avoided.

## 1.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument: Collaborative Labelling & Appliance Standards Programme (CLASP), 2011. *Making Appliance Energy Efficiency the New Global Standard*. <http://www.clasponline.org>.

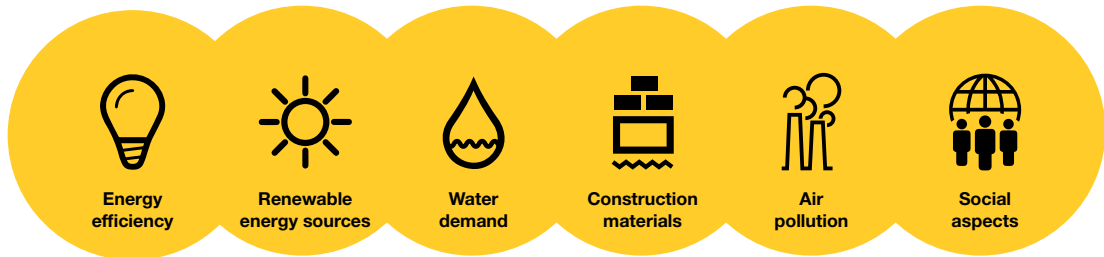
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Wiel, S. & McMahon, J.E., 2005. *Energy Efficiency Labels and Standards: A Guidebook for Equipment, Appliances and Lighting*. <http://www.clasponline.org/ResourcesTools/Resources/StandardsLabelsGuidebook>.

## 2 BUILDING CODES



### 2.1 OVERVIEW OF THE INSTRUMENT

#### 2.1.1 Alternative names

Building standards, building regulations.

#### 2.1.2 Objective

The objective of building codes is to establish technical or performance requirements for buildings which will result in their improved sustainability.

#### 2.1.3 Definition

Building codes are regulations that set minimum requirements for parameters such as energy performance, use of resources, environmental and health impacts, and/or comfort levels. The codes can be applicable either to entire buildings or for specific building systems (e.g. whole systems of heating, cooling, and/or ventilation). Building codes can address both new and/or existing buildings. Performance requirements are usually revised periodically.

Building codes are probably the most widely used policy instruments in both developed and developing countries. Often, however, existing building codes do not correspond to modern needs, and require revision. While original building codes were focused on safety and durability, present day codes need to address a wide array of social and environmental aspects, including energy and water consumption.

#### 2.1.4 Variations

Building codes are usually set up for new buildings, where enforcement and monitoring are more straightforward. However, there is a tendency to extend building codes to existing buildings when they undergo renovation or are sold/rented. Conditions for compliance may vary and are typically linked to the issuance of permits for the construction or renovation of a building. Building code requirements generally vary according to the function, type and size of the buildings to which they apply. Their formulation may also allow exceptions (e.g. historic buildings).

Requirements can be specified at overall or at component levels. The difference is particularly clear in the case of energy and resource-related performance codes:

- o Overall performance-based building codes define the minimum performance level for the entire building, for instance in terms of annual energy consumption (expressed e.g. in kWh/year/m<sup>2</sup>).
- o Prescriptive building codes establish technical specifications which define the minimum performance level of individual building components and systems, such as windows or air-conditioning systems.

*Overall performance-based building codes demand more technical expertise than prescriptive codes, but enable larger scale innovation and tailoring for local needs.*

## 2.2. RELEVANCE



### 2.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
National level (country or independent regional unit within/with jurisdiction over the country)	😊	😊	Although local governments rarely introduce building codes, they play an important role in their enforcement, e.g. by issuing building permits.
Local level (city or lower level)	😞	😊	

- 😊 The instrument is typically introduced/implemented at this policy level.
- 😞 The introduction/implementation of the instrument at this level is atypical.
- IF The instrument may be introduced/implemented at this policy level if certain conditions apply.
- 😞 It is practically impossible to introduce/implement the instrument at this policy level.



### 2.2.2 Target areas












The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance
<b>Buildings</b>	Existing buildings		😊
	New buildings		😊
	Public	Non-residential buildings	😊
		Residential buildings	😊*
	Private	Non-residential buildings	😊
		Residential buildings	😊*
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊*
	Private	Non-residential buildings	😊
		Residential buildings	😊*
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😞
		Residential buildings	😞
	Private	Non-residential buildings	😞
		Residential buildings	😞

- 😊 The instrument has a positive effect.
- 😊 The instrument may have a positive effect, if certain conditions apply.
- 😞 The instrument is not applicable, has very little effect, or no effect at all.


 2.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>		Cultural and behavioural barriers can be overcome if building codes are appropriately designed to respect cultural preferences. The normative nature of the instrument obliges all actors to keep informed about new codes and their compliance.
	Insufficient information or awareness among target actors		
	High rates of illiteracy among target actors		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		The instrument leads to a market shift, removing underperforming technologies, thus prioritizing more sustainable ones. At initial stages the low availability of sustainable technologies may hinder the success of the instrument.
	High initial costs of sustainable solutions		Building codes generally result in the elimination of the cheapest solutions, raising the overall cost of buildings. However, the eventual costs are borne by consumers, who will recover the additional costs from reduced operational costs. In addition, the mainstreaming of more sustainable solutions through the development of economies of scale leads to decreases in price.
	Fragmented market structure <sup>3</sup>		The instrument's normative nature ensures that all market actors are equally responsible for compliance, even in a fragmented market.
	Limitations in the typical building design process <sup>4</sup>		The normative nature of appropriately designed building codes ensures that design processes take into account more sustainable and holistic solutions.
	Split incentives <sup>5</sup>		The instrument, due to its normative nature, is effective even when split incentives exist.
	High transaction costs <sup>6</sup>		Transaction costs are low for government bodies and practically nil for developers and owners. Appropriate building codes simplify and give coherence to the regulatory context, thus reducing red tape and costs for public and private actors.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Compliance may be restricted by corruption practices at the stages of surveillance and permit issuance.
	Utility theft or non-payment		Building codes operate independently of these practices.



The instrument modifies the policy context, reducing the magnitude of this barrier.



The instrument overcomes this barrier, or operates regardless of this barrier.



The instrument partially overcomes this barrier.



The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.

### 2.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	The instrument may potentially deal with any resource consumed for building construction and operation.  *Life-cycle considerations with regard to the sustainability of local resource use and on land use are usually outside the scope of building codes.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	😐		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😐		
	Increasing the sustainability of local resource use	IF*		
	Limiting land use in urban areas (including indirect land use)	IF*		
	Reducing air pollution	😊		
	Supporting climate change adaptation	IF		
<b>Social</b>	Reducing utility costs for the population	😊	Building users benefit from improved comfort and performance conditions.  *Codes may regulate specific types of buildings and thus support specifically prioritized groups.	
	Supporting a specific target group	Public institutions		😊*
		Small and medium enterprises		😊*
		Low-income consumers		😊*
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	The introduction of building codes can be a catalyst for market-driven initiatives. This is particularly true for more stringent building codes, which are presented as a building block of a policy package including mandatory audits and/or certification of buildings.	
	Creating new employment opportunities	😐		
	Supporting Research and Development (R&D) activities for technological innovation	😐		
	Eliminating/tackling informal market	😐		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😊		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😐		
<b>Political</b>	Improving energy security <sup>2</sup>	😊	*Restrictive building codes may be used to show the government's commitment, combined with awareness raising, education and information campaigns.  **By simplifying the administrative burden, building codes foster effective and transparent processes.	
	Making politics of sustainable development credible	😐*		
	Releasing budgets from public bodies	😐**		
	Reducing corruption	😐**		

















- 😊 The instrument has a positive effect on this goal.
- 😐 The instrument has no or almost no effect on this goal.
- IF The instrument may contribute to this goal, according to some conditions.
- ☹ The instrument has a negative effect on this goal.

1 That is to say, increasing the utilization of renewable energy sources.

2 Energy security is here defined as supplying more consumers with unchanged production capacity.

## 2.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
<b>High rate of formal construction and/ or renovation in the building sector</b>		Continue to the next precondition.
		The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.
<b>Traditional compliance with regulations</b>		Continue to the next precondition.
		Introduce a voluntary scheme (e.g. voluntary certification of buildings or voluntary agreements) prior to proceeding with the instrument. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Availability of the necessary materials, technological solutions, systems, etc.</b>		Continue to the next precondition.
		Building codes will increase the demand for green technologies. Additional efforts should be conducted in the supply area, such as agreements with the manufacturing industry. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Availability of technical capacity and a monitoring body able to verify compliance</b>		Continue to the next precondition.
		Allocate sufficient efforts to institutional development and capacity building. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Prepared and educated construction industry</b>		Continue to the next precondition.
		Negotiate a transition period, which may involve the introduction of a voluntary certification of buildings scheme and/or voluntary agreements, during which capacity building efforts will be introduced. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Absence of significant levels of corruption at the administrative level</b>		Continue to the next precondition.
		Make sure that additional efforts will be conducted to secure the transparency of the inspection and auditing processes. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Building owners/users are aware of the implications of building performance</b>		Continue to Implementation steps (section 2.4).
		Support the instrument with awareness raising, education and information campaigns, energy efficiency obligations, feedback programs, etc., to minimize rebound effect. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Affordability of sustainable construction materials, systems and measures needed for regulated buildings to meet the code</b>		Continue to Implementation steps (section 2.4).
		Introduce instruments providing financial support to developers and owners, e.g. ESCO market promotion, soft loans, preferential mortgages, etc. If this is feasible, continue to Implementation steps. If not, reconsider the introduction of the instrument.

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

## 2.4 IMPLEMENTATION STEPS

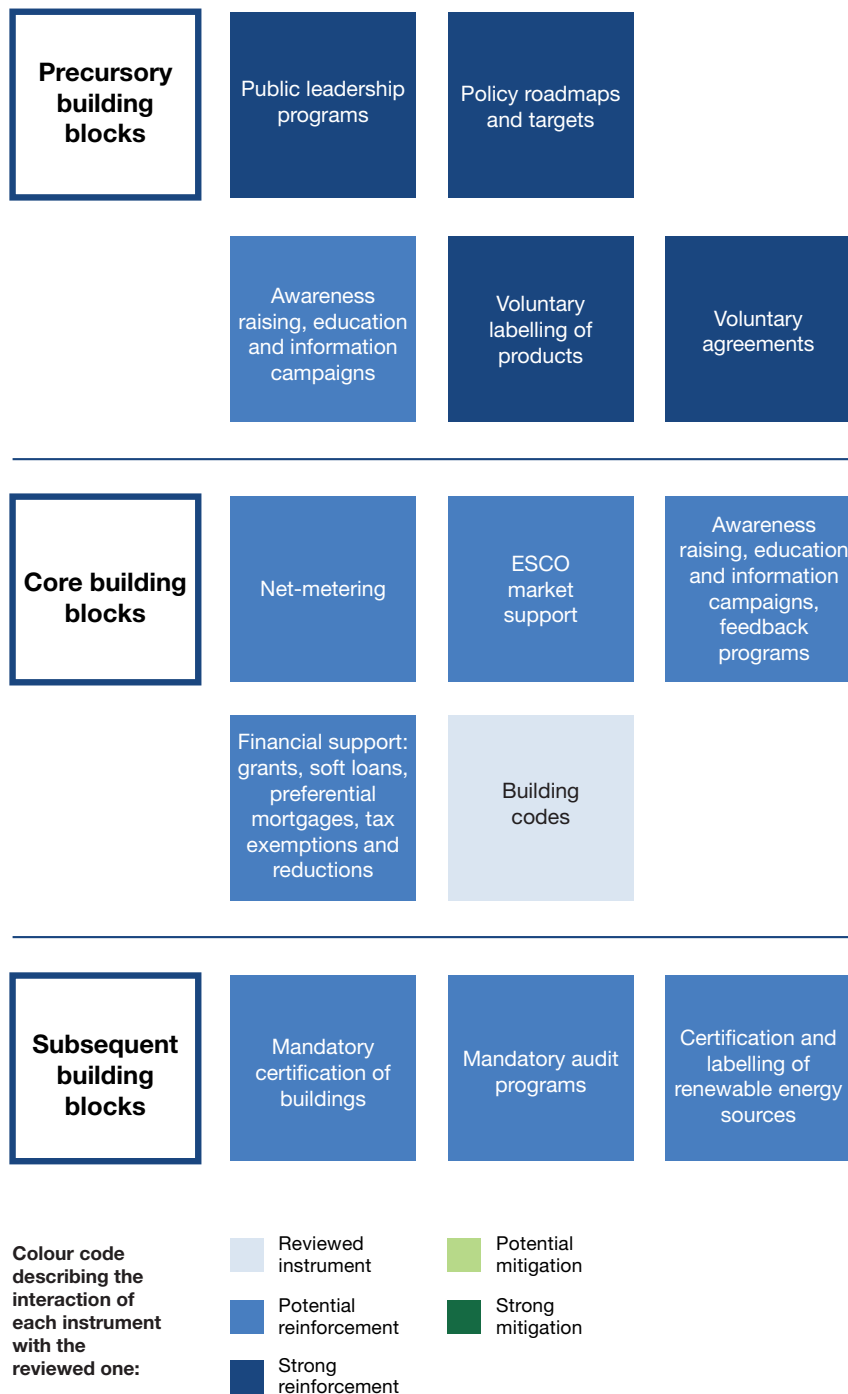
This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Advertise the government commitment and goals	Building sector actors should be informed and consulted on upcoming requirements to be prepared to meet them.
2	Set targets	The coverage and stringency of the instrument should reflect the current level of building performance, as well as the desired level. The latter needs to be ambitious yet realistic, considering the capacities in the sector.
3	Adapt the instrument to the context and legal framework	In countries with a successful tradition of voluntary measures, consider introducing first a voluntary program. In countries where low compliance is an issue, or where a large share of the sector is informal, make sure that the instrument is simple (prefer prescriptive variants) and that control mechanisms are in place. In any case, it is of the utmost importance to harmonize building codes with other regulations on overall buildings, systems and products.
4	Select the target groups	The group of buildings holding the highest cost-effective potential varies depending on the region and country, according to factors such as climate type, share of building types and age of buildings. The presence of informal buildings, typically in the residential sector, may require further action.
5	Design the instrument	Adopt or adapt preferably one of the building code systems internationally available. Appropriate design determines successful enforcement: <ul style="list-style-type: none"> <li>• Prefer simple designs, as these minimize administrative costs.</li> <li>• Target buildings holding the greatest potential.</li> <li>• Include a regular inspection mechanism.</li> <li>• Set the stringency to achievable levels for all applicable buildings, for instance by relating stringency to size or budget.</li> <li>• Describe the applicable penalties, which should be high enough to prevent noncompliance.</li> <li>• Introduce mechanisms against corruption.</li> <li>• Plan for regular updates after the design of the instrument.</li> </ul>
6	Identify the resources that will fund the implementation	The implementation of the instrument may require introducing additional instruments to support the sector – e.g. voluntary agreements, ESCO market support or financial instruments. Also, it will be necessary to allocate resources to harmonize the legal setting (e.g. review energy subsidies or existing building regulations), to conduct inspections and to apply penalties.
7	Initiate the development of technical expertise	Regular training and capacity building for public and private actors must be initiated and continued during the implementation of the instrument.
8	Enforce the instrument	Ensure that there is sufficient collaboration between central and local authorities in order to carry out enforcement. In addition, the processes of inspection and of application of penalties need to be transparent.
9	Initiate monitoring and evaluation	Appropriate monitoring will measure the level of compliance as well as the sustainability improvements of the buildings targeted by the instrument. This information will contribute to the process of updating the instrument and will allow to observe successes and failures, as well as the need for additional actions.
10	Update the building code every five to ten years.	Regularly updated codes promote a constant improvement of building sustainability. Updates should be advertised well in advance.
11	Extend the program	The requirements may be extended to additional types of buildings not considered in the initial phase.



## 2.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



### 2.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public leadership programs** increase the expected acceptance of building codes.
- o **Policy roadmaps and targets** enable mandated agencies and experts to set appropriate performance targets, and to communicate the upcoming requirements to the private sector.
- o **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable buildings to regular ones.
- o **Awareness raising, education and information campaigns** increase the expected acceptance of building codes and reduce the risk of a rebound effect.<sup>2</sup>

- o **Voluntary certification of buildings** allows the government and sector actors to develop their technical capacity. This instrument also creates the conditions for the acceptance of building codes. In addition, by increasing the informative efforts, it reduces the risk of a rebound effect.
- o **Voluntary agreements** may be convenient to engage the actors in the development of building codes, for instance in the definition of appropriate performance levels, and therefore ensure compliance.

### 2.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Net-metering, ESCO market support, feedback programs and general awareness raising, education and information campaigns** may be necessary to avoid or reduce the rebound effect.
- o **Financial support instruments (grants, soft loans, preferential mortgages, tax exemptions and reductions)** can be necessary for the success of voluntary agreements with the building sector or can increase the cost-effectiveness of building codes for developers, owners and energy consumers.

<sup>2</sup> The “rebound effect” is a situation where the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from the reduced consumption of a product (and therefore from lower energy costs) and compensate this reduction by purchasing and/ or using additional products, leading to a stability or an increase in the overall consumption.

### 2.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **Mandatory certification of buildings and mandatory audit programs** benefit from the expertise developed within the government and the private sector and provide information on building performance which complements the code. They also provide a whole array of benchmarks which may in turn feed into the process of updating the building codes.
- o **Certification and labelling of renewable energy sources** benefit from the expertise developed within the government and the private sector. In addition these instruments provide benchmarks which simplify the inclusion of renewable energy source requirements in the codes.

## 2.6 ADDITIONAL INFORMATION

The following references may be helpful to design and implement the instrument:

International Code Council (ICC), 2010. *Free Resources*. <http://www.iccsafe.org/content/pages/freeresources.aspx>.

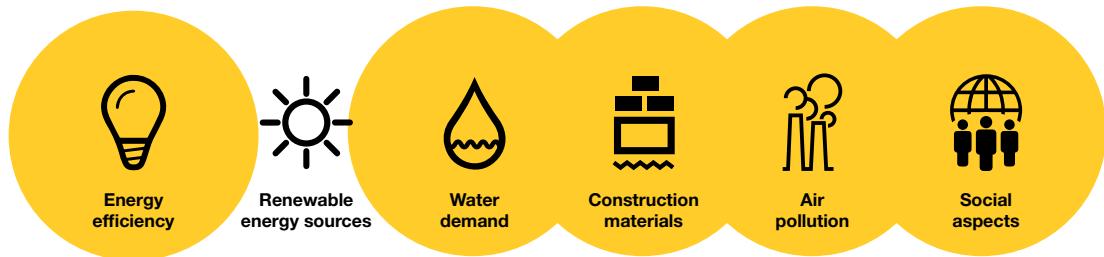
Kumar, S. et al., 2010. *Developing an Energy Conservation Building Code Implementation Strategy in India*. Energy Conservation and Commercialization (ECO-III). <http://www.coolrooftoolkit.org/knowledgebase/developing-an-energy-conservation-building-code-implementation-strategy-in-india/>.

Liu, F., 2010. *Mainstreaming Building Energy Efficiency Codes in Developing Countries: Global Experiences and Lessons from Early Adopters*. Washington, D.C: The World Bank.

National Institute of Building Sciences, 2011. *Green Building Standards and Certification Systems*. <http://www.wbdg.org/resources/gbs.php#rcas>.

Subedi, J. & Mishima, N., 2008. *Handbook on Building Code Implementation Learning from Experience of Lalitpur Sub-Metropolitan City, Nepal*. United Nations Centre for Regional Development Disaster Management Planning Hyogo Office (UNCRD)& Lalitpur Sub-Metropolitan City. 3Sustainable procurement regulations

## 3 SUSTAINABLE PROCUREMENT REGULATIONS



### 3.1 OVERVIEW OF THE INSTRUMENT

#### 3.1.1 Alternative names

Public procurement (programs or schemes), energy efficient procurement, green public procurement, and sustainable public procurement.

#### 3.1.2 Objective

The objective of sustainable procurement regulations is to increase the sustainability of the buildings owned or used by public authorities, or used for the provision of public services. Due to the large share of energy and resources consumed by the public sector, public procurement processes can have a direct, significant impact on the overall sustainability of the building sector and activate the supply of sustainable products and services.<sup>3</sup>

#### 3.1.3 Definition

Sustainable procurement regulations can be defined as the organized purchase by public bodies following pre-set regulations which include provisions for sustainability. These regulations ensure that sustainability criteria are met by suppliers and considered in public purchasing decisions.

#### 3.1.4 Variations

Public procurement may address the energy performance of buildings (“energy efficient public procurement”), the reduction of overall environmental impacts (“green public procurement”) or the integration of a whole array of environmental, social and economic considerations (“sustainable public procurement”). In this Handbook “sustainable public procurement” is used in an inclusive manner, i.e. regardless of all the sustainability criteria taken into account in a program.

Additional variations of sustainable procurement regulations are described below, based on the level of centralization, choice between voluntary and mandatory approaches, type of decision-support tools and scope of the regulation.

<sup>3</sup> In addition, the public sector may set an example for other consumers. The leading role of the public sector is described in a specific instrument-chapter: Public sector leadership.

**1 Degree of centralization of tendering procedures.** Centralization has the benefit of economies of scale and may reduce administrative costs. However, a high degree of centralization may hamper competition and increase prices.

**2 Voluntary or mandatory approaches.** The choice is related to the required speed and scale of implementation, as well as the expected level of enforcement. For instance, Chinese national procurement policy was issued as a notification instead of a regulation, which resulted in a quick implementation, but a limited enforcement. Different obligations for different types of public bodies – e.g. mandatory procedures for ministries and voluntary guidelines for local bodies – are another possible approach.

**3 Decision-support tools.** The choice of decision support tools (e.g. lists of authorised products, systems and materials (per brand and model), guidelines, calculation tools and training), determines the accuracy of the selection as well as the stages of the procurement process which will require the greatest level of technical and administrative efforts (e.g. ensuring transparency).

**4 Scope.** Regulations may address over-all buildings (design, construction, renting and/or purchase), the procurement of ‘in house’ products, systems, materials or services (electric appliances, building materials, office supplies, maintenance services, etc.), or the selection of utility companies (e.g. by specifying the ratio of renewable energy in the purchased electricity).<sup>4</sup>

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<sup>4</sup> Renewable energy certification, whose function is to guarantee the renewable origin of the energy, falls beyond the scope of this Handbook.

## 3.2 RELEVANCE



### 3.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	The instrument may be introduced at either level. In cases where national procurement legislation does not require that public procurement weigh sustainability criteria or operational costs against initial costs, the operational margin for local programs remains limited.
<b>Local level (city or lower level)</b>	😊	😊	

- 😊 The instrument is typically introduced/implemented at this policy level.
- 😐 The introduction/implementation of the instrument at this level is atypical.
- IF The instrument may be introduced/implemented at this policy level if certain conditions apply.
- 😞 It is practically impossible to introduce/implement the instrument at this policy level.



### 3.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😊	Only the direct effects of sustainable procurement regulations have been considered. Its multiplicative effect on the private sector is considered in the chapter allocated to public sector leadership.
	New buildings		😊	
	Public	Non-residential buildings	😊	* Social housing units are included in public buildings, regardless of whether they are privately owned and/or constructed. The same applies for other privately owned buildings providing public services.
		Residential buildings	😊*	
	Private	Non-residential buildings	😞	
Residential buildings		😞*		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊*	
	Private	Non-residential buildings	😞	
		Residential buildings	😞*	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😞	
	Private	Non-residential buildings	😞	
		Residential buildings	😞	

- 😊 The instrument has a positive effect.
- 😐 The instrument may have a positive effect, if certain conditions apply.
- 😞 The instrument is not applicable, has very little effect, or no effect at all.


 3.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>	😊+	The impact of information barriers can be reduced through an increased attention to the dissemination of informative guidelines and the provision of training to officials.
	Insufficient information or awareness among target actors	😊+	
	High rates of illiteracy among target actors	😊	
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable	😊+	By consistently requesting higher standards than the common average, government consumption fosters development of sustainable technologies in the market.
	High initial costs of sustainable solutions	😊+	Sustainable procurement does not necessarily imply higher initial costs. Moreover, by promoting economies of scale, appropriate regulation may lead to lower initial costs.
	Fragmented market structure <sup>3</sup>	😊	Public bodies combining the roles of development, ownership and use of a building may have an integral approach to the building cycle. However, in some cases the public sector reflects the fragmentation of the private sector and the introduction of the instrument may add a level of complexity to the decision-making process.
	Limitations in the typical building design process <sup>4</sup>	😊	
	Split incentives <sup>5</sup>	😊	Utility costs may be covered by the public body using a building, in which case the split incentive barrier may be overcome. However, they may be covered by a central body, in which case the barrier is not overcome.
	High transaction costs <sup>6</sup>	😞	Establishing a sustainable procurement system can be costly.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption	😐	Sustainable procurement regulations can be an opportunity to address corruption through the enforcement of training and legal requirements, including transparent decision processes.
	Utility theft or non-payment	😞	

- 😊+ The instrument modifies the policy context, reducing the magnitude of this barrier.
- 😊 The instrument overcomes this barrier, or operates regardless of this barrier.
- 😐 The instrument partially overcomes this barrier.
- 😞 The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.

### 3.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	The instrument may potentially address any resource consumed for the building construction and operation.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	😊		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😊		
	Increasing the sustainability of local resource use	😊		
	Limiting land use in urban areas (including indirect land use)	😊		
	Reducing air pollution	😊*		
	Supporting climate change adaptation	😊		
<b>Social</b>	Reducing utility costs for the population	😊	*The instrument releases public bodies' budgets.	
	Supporting a specific target group	Public institutions	😊*	
		Small and medium enterprises	😞	**Low income consumers benefit particularly for programs involving social housing, as well as public service buildings such as education and health.
		Low-income consumers	😊**	
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	*The innovative approach favoured by the instrument can result in the creation of new jobs for experts and researchers.	
	Creating new employment opportunities	😊*		
	Supporting Research and Development (R&D) activities for technological innovation	😞		
	Eliminating/tackling informal market	😞		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😊		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😞		
<b>Political</b>	Favouring energy security <sup>2</sup>	😊	*Through legal enforcement and the use of transparent decision processes, sustainable procurement regulations can be an opportunity to reduce corruption.	
	Making credible politics of sustainable development	😊		
	Releasing budgets from public bodies	😊		
	Reducing corruption	😊*		



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.



The instrument may contribute to this goal, according to some conditions.



The instrument has a negative effect on this goal.















<sup>1</sup> That is to say, increasing the utilization of renewable energy sources.

<sup>2</sup> Energy security is here defined as supplying more consumers with the same production capacity.



### 3.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations		
<b>Strong political commitment and motivation to promote sustainability in buildings</b>		Continue to the next precondition.		
		The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.		
<b>At local level. Absence of national procurement norms which conflict with sustainability criteria</b>		Continue to the next precondition.		
		The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.		
<b>At national level. Absence of normative obstacles that lead to the exclusion of operational costs and sustainability considerations from the process</b>		Continue to the next precondition.		
		Operational costs and other criteria need to be weighed against initial costs. An institutional transformation may be necessary to convince financial bodies. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.	If not, reconsider the introduction of the instrument.
If this is feasible, continue to the next precondition.				
If not, reconsider the introduction of the instrument.				
<b>Existence of a conventional procurement norm in use at the reference level of policy-making</b>		The norm needs to be updated to take into account sustainability criteria and operational costs. Make sure that training efforts are introduced to modify procurement habits. Continue to the next precondition.		
		Make sure that the specific expertise is made available to supervise the introduction of a working procurement system. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.	If not, reconsider the introduction of the instrument.
If this is feasible, continue to the next precondition.				
If not, reconsider the introduction of the instrument.				
<b>Availability of specific technical, legal and management skills at the administrative level.</b>		Continue to the next precondition.		
		Make sure that additional training and communication efforts are introduced. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.	If not, reconsider the introduction of the instrument.
If this is feasible, continue to the next precondition.				
If not, reconsider the introduction of the instrument.				
<b>Existence of a national background for the development of selection criteria, either:</b>		Continue to the next precondition.		
<ul style="list-style-type: none"> <li>• Availability of decision-support tools (e.g. life-cycle cost calculation tools) or</li> <li>• Availability of national reference systems (e.g. labelling of products, certification of buildings).</li> </ul>		Either first introduce the policy instruments that will serve as benchmarks (mainly labelling and certification instruments) or make sure to develop the capacity to: a) create and regularly update a list of selection criteria b) create and regularly update a list of products or c) use life-cycle cost calculation tools. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.	If not, reconsider the introduction of the instrument.
	If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.				
<b>Absence or limited presence of corruption practices in the administrative procurement processes</b>		Continue to Implementation steps (section 3.4).		
		Initiate an awareness raising and training campaign. Make sure that the purchasing processes are transparent and sufficient control mechanisms are in place. Strengthen the legal provisions against corruption. <table border="1"> <tr> <td>If this is feasible, continue to Implementation steps.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to Implementation steps.	If not, reconsider the introduction of the instrument.
If this is feasible, continue to Implementation steps.				
If not, reconsider the introduction of the instrument.				



The precondition exists - move to the next precondition.



The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

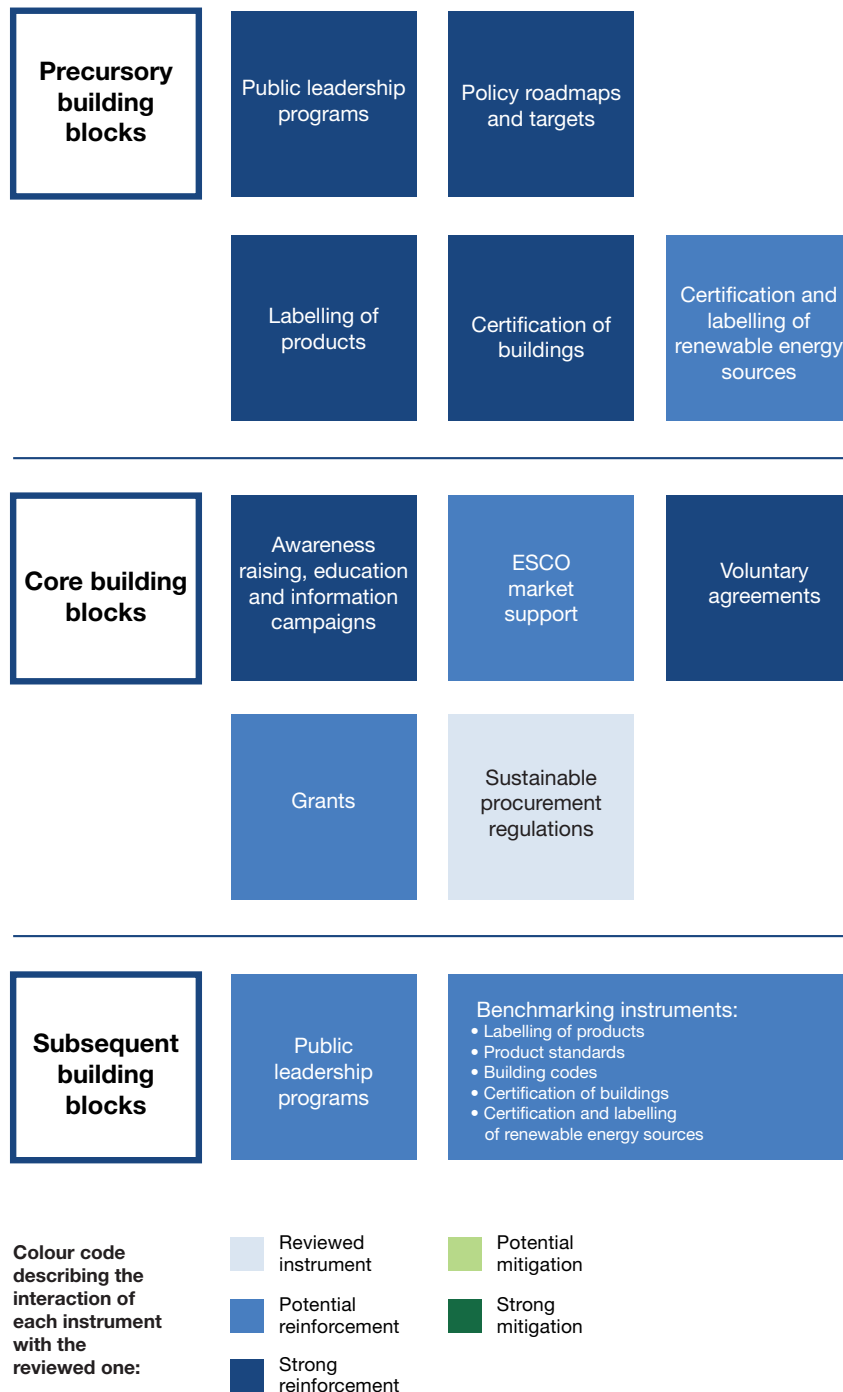
### 3.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Make sure that the decision to introduce the instrument emanates from a top level decision	An undisputed political decision provides a clear mandate, identifying the government areas and bodies, as well as the procurement processes which will need to be regulated. These are preferably regulated in policy roadmaps and targets.
2	Design the legal setting	Experts and actors from the administration and suppliers should collaborate in this process to decide what instrument variants are more feasible and hold the highest potential. The design should include procedural considerations. The procurement bill needs to clearly oppose corruption and plan ahead for updates (thus giving adequate signals to suppliers).
3	Design tendering procedures and criteria	Tender procedures need to comprehend the following areas: Procuring organizations must implement quality processes. Representatives of the relevant expert areas need to be involved in the preparation and evaluation of the tenders. Mechanisms for transparency need to be introduced in the bidding process.
4	Select or develop decision-support tools	Decision-support tools vary according to the level of complexity and accuracy, including for example: life cycle costing (LCC) tools, lists of criteria and weighting methods, lists of admissible products, references to product labelling and certification of building schemes, etc.
5	Elaborate information materials	Information materials should be made publicly available, for instance online.
6	Set a baseline and targets	Setting baselines and targets is a motivating factor and assists in the assessment of sustainability improvements as well as savings. Publishing this information is fundamental to initiating a public leadership program.
7	Train government officials	General information on the underlying reasons for the regulation, as well as technical training should be provided to technical, administrative and financial staff dealing with the new procedures.
8	Monitor and evaluate	Monitoring and evaluation will enable the exchange of experience and information with other administrations, the development of public leadership programs and provide the grounds for regular updates.
9	Update on a regular basis	Updates should reflect technological development but also increased capacities and awareness within the administration.
10	Extend the program	The program may be extended to additional procurement processes.

### 3.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



### 3.5.1 Precursory policy building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public leadership programs** increase the expected acceptance of sustainable procurement regulations. Previous public leadership actions can be used as examples during the communication processes leading to the formulation and implementation of sustainable procurement regulations, thus enabling a better understanding of the government purposes.
- o **Policy roadmaps and targets** enable mandated agencies and experts to set appropriate performance targets, and to communicate the upcoming requirements within the public administration and to the private sector.
- o **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones.
- o **Benchmarking instruments<sup>5</sup> (labeling of products, certification of buildings and certification and labeling of renewable energy sources).** Whether mandatory or voluntary, the pre-existence of these benchmarking instru-

ments allows both government and the private sector to develop their technical capacity.

### 3.5.2 Core policy building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Awareness raising, education and information campaigns** increase the expected acceptance of the regulations and reduce the risk of a rebound effect.<sup>6</sup>
- o **Voluntary agreements** may be necessary to engage the public actors in the implementation of voluntary schemes as well as to support providers to update their products and services.
- o **ESCO market support and financial support instruments (grants)** may be necessary to support voluntary agreements or to increase the cost-effectiveness of sustainable procurement regulations for public actors.

### 3.5.3 Subsequent policy building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **Public leadership programs** typically utilize sustainable procurement regulations as a basis for improving the sustainability of public buildings, thus enabling public bodies to demonstrate their sustainability efforts.

<sup>5</sup> Here understood as a reference value or set of characteristics, which can be used for evaluating the performance of a certain type of building or product.

<sup>6</sup> The "rebound effect" is a situation whereby the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from the reduced consumption of a product (and therefore from lower energy costs) and compensate for this reduction by purchasing and/or using additional products, leading to a stability or an increase in the overall consumption.

- o Benchmarking instruments (**labelling of products, product standards, building codes, certification of buildings, certification and labelling of renewable energy sources**). Public demand for sustainable products fosters innovation and increases the market availability of these instruments, enabling faster updates.

### 3.6 ADDITIONAL INFORMATION

The following references may be helpful to design and implement the instrument:

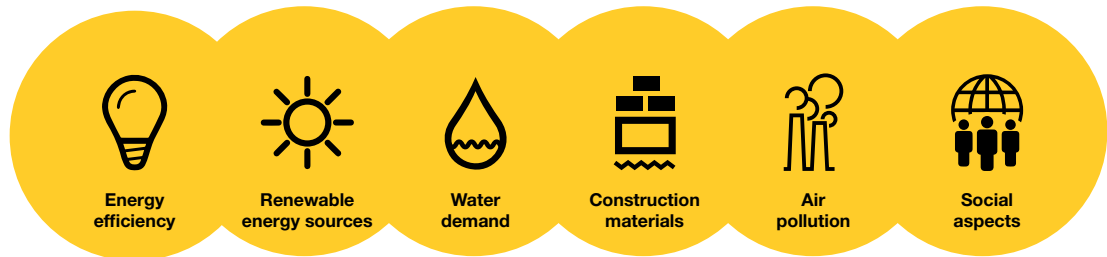
European Commission, 2012. Green Public Procurement. [http://ec.europa.eu/environment/gpp/index\\_en.htm](http://ec.europa.eu/environment/gpp/index_en.htm).

Government of Belgium, 2012. Guide to Sustainable Procurement. <http://www.gidsvoorduurzameaankopen.be/>.

SCI-NETWORK, 2011. Smart SPP: Life Cycle Costing and CO2 Assessment Tool. [http://www.sci-network.eu/fileadmin/templates/sci-network/files/Resource\\_Centre/Tools/SMART\\_SPP\\_LLC-CO2\\_tool.pdf](http://www.sci-network.eu/fileadmin/templates/sci-network/files/Resource_Centre/Tools/SMART_SPP_LLC-CO2_tool.pdf).

United Nations Environment Programme (UNEP), 2012. Sustainable Public Procurement Implementation Guidelines, Paris, France: United Nations Environment Programme (UNEP). <http://www.unep.fr/scp/procurement/docsres/ProjectInfo/UNEPImplementationGuidelines.pdf>.

## 4 POLICY ROADMAPS AND TARGETS



### 4.1 OVERVIEW OF THE INSTRUMENT

#### 4.1.1 Alternative names

Targets and action plans; commitments; pledges.

#### 4.1.2 Objective

The objective of designing a policy road map or setting targets is to clearly and publicly announce a political commitment to certain sustainability goals. The announcement allows mainstreaming the given goal(s) in relevant actions, and can also trigger a similar change in other fields or by other stakeholders. The main result of such a declaration is the establishment of a confident climate for investment and the provision of an example to be followed.

#### 4.1.3 Definition

When the authority publicly announces its commitment to sustainability and adopts a transparent strategy to achieve its goals, these commitments take the form of policy roadmaps and targets. The authority may set quantitative or qualitative targets, and/or adopt a specific set of actions or measures.

Policy roadmaps and targets can act as a precursory building block for most policy instruments, as the public authority will need to introduce or develop specific policy instruments to achieve the stated targets. Since no precise

measures are prescribed, policy roadmaps and targets allow to take a flexible approach and to select locally the most cost effective measures.

#### 4.1.4 Variations

Targets and policy roadmaps may be introduced in combination or separately. They differ in their level of specificity. Targets are typically quantitative and are compared to a previous state or baseline, whereas policy roadmaps prescribe future action in a qualitative way.

Targets and policy roadmaps:

Can be binding or indicative;

Can be expressed in absolute or relative terms. They can be defined in comparison to a moving or fixed baseline, be measured against a benchmark, or be transactional in nature;

Can relate to actions covering the whole economy or selected sectors or sub-sectors, and can be geographically limited in scope;

Can measure results in the areas of final or primary energy, water use, greenhouse gas emissions, social issues, sustainability indexes, etc.;

Cover implementation periods typically ranging between four and 20 years, and are often linked to electoral cycles.

## 4.2 RELEVANCE



### 4.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument can be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level ((country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	The instrument may be introduced and implemented at any level of government. It typically specifies the responsibilities of the underlying policy-making levels.
<b>Local level (city or lower level)</b>	😊	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.



The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 4.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😊	The instrument may cover any or all technological areas and types of buildings. These may be specified in the instrument or left to underlying decision levels, especially in the case of targets.
	New buildings		😊	
	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
Residential buildings		😊		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	



The instrument has a positive effect.



The instrument may have a positive effect, if certain conditions apply.



The instrument is not applicable, has very little effect, or no effect at all.

### 4.2.3 Barriers

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>	😊+	The instrument is in itself a communication tool which enables multiple actors to identify national or local government priorities and to understand the underlying reasons for increasing the sustainability of buildings.  *Although expressed in a written document format, the instrument is typically mainstreamed into the public debate.
	Insufficient information or awareness among target actors	😊+	
	High rates of illiteracy among target consumers	😊*	
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable	😊+	The instrument gives basic signals to the sector to supply more sustainable solutions.
	High initial costs of sustainable solutions	😞	
	Fragmented market structure <sup>3</sup>	😊	The instrument gives basic signals to the building sector and the industry to deliver expected improvements. Although policy roadmaps may directly include collaborative requirements, the fragmentation of the building sector may hinder their success.
	Limitations in the typical building design process <sup>4</sup>	😞	
	Split incentives <sup>5</sup>	😞	
	High transaction costs <sup>6</sup>	😊+	The instrument (especially targets) gives public agencies and local authorities the freedom to choose the most cost-effective measures in their own context.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption	😊+	As the instrument focuses on measures appropriate to the local context, there can be an increase in implementation rate and impact on sustainability policies.
	Utility theft or non-payment	😞	

- 😊+ The instrument modifies the policy context, reducing the magnitude of this barrier.
- 😊 The instrument overcomes this barrier, or operates regardless of this barrier.
- 😊 The instrument partially overcomes this barrier.
- 😞 The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.



#### 4.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect	
<b>Environment/ resources</b>	Increasing energy efficiency	😊	
	Reducing water demand	😊	
	Reducing waste-water generation	😊	
	Reducing energy peak demand	😊	
	Increasing access to high quality water in buildings	😊	
	Decarbonising the energy supply <sup>1</sup>	😊	
	Increasing the sustainability of local resource use	😊	
	Limiting land use in urban areas (including indirect land use)	😊	
	Reducing air pollution	😊	
	Supporting climate change adaptation	😊	
<b>Social</b>	Reducing utility costs for the population	😊	
	Supporting a specific target group	Public institutions	😊
		Small and medium enterprises	😊
		Low-income consumers	😊
Improving comfort, services and housing conditions	😊		
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	
	Creating new employment opportunities	😊	
	Supporting Research and Development (R&D) activities for technological innovation	😊	
	Eliminating/tackling informal markets	😊	
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊	
	Creating new business opportunities by market transformation	😊	
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😊	
<b>Political</b>	Improving energy security <sup>2</sup>	😊	
	Making politics of sustainable development credible	😊	
	Releasing budgets from public bodies	😊*	
	Reducing corruption	IF**	



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

**IF**

The instrument may contribute to this goal, according to some conditions.













The instrument has a negative effect on this goal.

<sup>1</sup> That is to say, increasing the utilization of renewable energy sources.


<sup>2</sup> Energy security is here defined as supplying more consumers with the same production capacity.

### 4.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
<b>Adherence to commitments, regulations and laws (at least to a certain degree).</b>		Continue to the next precondition.
		Large leadership and capacity building efforts are necessary to increase compliance with regulatory measures. Alternatively, consider the potential of non-regulatory instruments. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Sufficient political commitment to set the target, establish an implementation committee, publicly endorse the target and/or policy roadmaps, and ensure compliance of the instrument by relevant actors.</b>		Continue to the next precondition.
		A study of the underlying reasons for non-commitment needs to be conducted and this issue should be addressed. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Government and involved government bodies judged to be credible by the relevant target groups.</b>		Continue to the next precondition.
		Introduce a public leadership program, which may include a reorganization of the personnel and/or the government bodies. If this is feasible, continue to the next precondition, If not, reconsider the introduction of the instrument.
<b>Resources available to widely inform the public and relevant stakeholders about the commitment, and experience in related information actions.</b>		Continue to the next precondition.
		Communicate with target groups and try to involve them in a collaborative process. An awareness raising, information and education campaign may increase the success of the instrument, especially in a context of existing awareness. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Existence of a baseline, monitoring methodology, correct indicators, technical and human capacity to conduct monitoring, etc.</b>		Continue to Implementation steps (section 4.4).
		Assess the current context to establish a baseline and develop a monitoring strategy (methodology, indicators, training for monitoring) If this is feasible, continue to Implementation steps (section 4.4). If not, reconsider the introduction of the instrument.

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

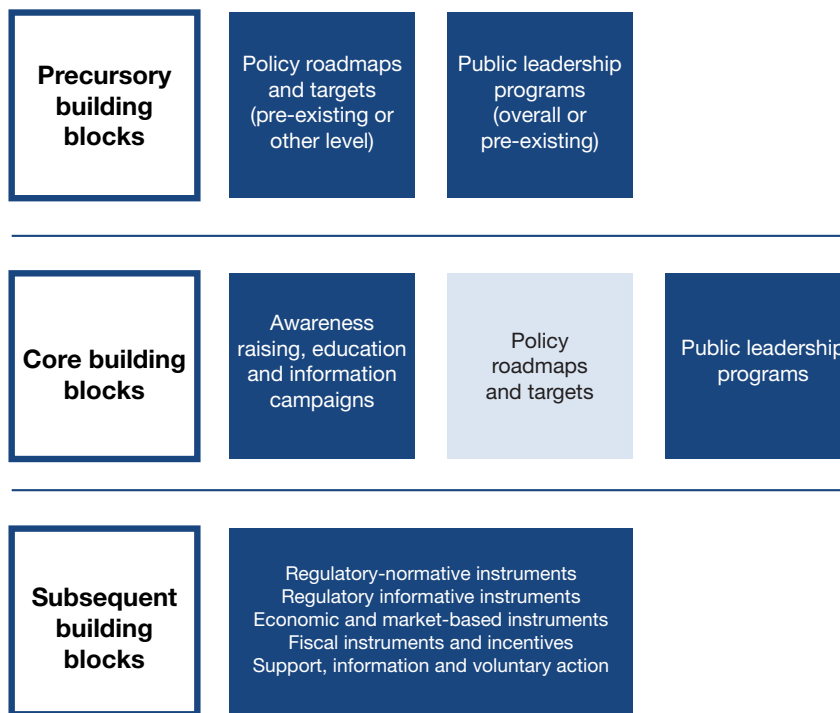
## 4.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Ensure (top-level) political support	Top level political support will determine whether the instrument leads to concrete changes or remains only a declaration of intent.
2	Assemble an interdepartmental committee to:	Describe the instrument in respect to other policies Decide on the sustainability criteria addressed through the instrument (energy consumption, water, cost, greenhouse gas emissions, etc.) Communicate the draft and gather further support Request technical studies Supervise the implementation progress.
3	Carry out research	Identify the technical and policy areas with the largest improvement potential, which should be at the core of the target. Identify the baseline (or reference scenario). Identify any other area to be addressed in the policy road map. Decide on the optimum target level or a level that can be an acceptable compromise. Describe the budgetary implications as well as all the benefits.
4	Communicate government purpose and goals	Insufficient stakeholder involvement as well as insufficient communication with the public is a major cause of failure. Early communication helps stakeholders develop investment plans and market strategies in accordance with the future target.
5	Design the policy	Establish the target level, its timeframe and nature. The target needs to be ambitious but achievable. Continuous collaboration with the stakeholders is important to secure reasonable targets and ensure compliance. Define the scope of the action plan as well as the underlying measures to a certain level of detail, as well as the budget, the source of the budget, expected improvements, responsible bodies, monitoring methodologies, etc. Establish simple and effective monitoring processes and identify the monitoring body's responsibilities. Establish control mechanisms, and consider rewards/penalties for compliance/noncompliance.
6	Organize a consultation	The success of the instrument will be highly related to the cooperation with the stakeholders. Thus, advertise the (draft) policy road map and/or target and organise expert, stakeholder and/or public consultations.
7	Make sure that the government and the involved public bodies publicly endorse the instrument	It is very important that the target groups perceive how serious the government is about the instrument and the sustainability goals addressed.
8	Enforce the instrument	Whether included in the policy road map or left to subsidiary bodies, subsequent building blocks will need to be developed or strengthened and enforced.
9	Monitor implementation	Use simple, efficient and cost-effective methods and monitoring processes.
10	Communicate the results	Disseminate information about the results to the general public. Exchange experiences, nationally, internationally or within the specific government unit.
11	Take corrective measures	Identify failures and mainstream improvements to the instruments. Increase the stringency of the target; update the list of measures and actors. Improve the monitoring process and methods.

## 4.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



**Colour code describing the interaction of each instrument with the reviewed one:**

<span style="display: inline-block; width: 15px; height: 15px; background-color: #d9e1f2; border: 1px solid #000; margin-right: 5px;"></span> Reviewed instrument	<span style="display: inline-block; width: 15px; height: 15px; background-color: #c6e0b4; border: 1px solid #000; margin-right: 5px;"></span> Potential mitigation
<span style="display: inline-block; width: 15px; height: 15px; background-color: #99c2ff; border: 1px solid #000; margin-right: 5px;"></span> Potential reinforcement	<span style="display: inline-block; width: 15px; height: 15px; background-color: #669966; border: 1px solid #000; margin-right: 5px;"></span> Strong mitigation
<span style="display: inline-block; width: 15px; height: 15px; background-color: #336699; border: 1px solid #000; margin-right: 5px;"></span> Strong reinforcement	

#### 4.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

Overall and pre-existing **public leadership programs** and pre-existing, other level or different **policy roadmaps and targets** conducted to date largely set the blueprint for the package, determine the credibility of the government measures as well as the capacity to enforce the instrument. The instrument must be coherent with pre-existing policy roadmaps and targets in the same policy area. It will be therefore necessary to adjust the instrument or to repeal pre-existing rulings. Policy roadmaps and targets in relevant policy areas may complicate the design of the instrument, e.g. an existing emission target will be influenced by the establishment of an energy efficiency target and may complicate the identification of scope, sectoral coverage, and reporting.

#### 4.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Awareness raising, education and information campaigns** are used to raise the general acceptance of the instrument. Specific communication activities need to be conducted between public bodies, and with the stakeholders concerned by the measure.
- o **Public leadership programs** may help the implementing bodies increase compliance.

- o **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones.

#### 4.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

Even if not mentioned explicitly, policy roadmaps and targets exist as building blocks of almost every policy package, and are usually developed for the implementation of individual instruments. Appropriately introduced policy roadmaps and targets involve an assessment of all the actions in progress, of the possibilities to achieve existing and renewed goals, and the potential for renewal of cooperation agreements. While the articulation and stringency of policy roadmaps and targets often depend on previous experience with policy formulation, these instruments can also serve as a stepping stone for future policy instrument prioritization and design.

## 4.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Efficiency Valuation Organization (EVO), 2007. *International Performance Measurement & Verification Protocol*. [www.evo-world.org](http://www.evo-world.org).

European Council for an Energy Efficient Economy (ECEEE), 2011. *Target Setting - New ECEEE Snapshot Report on Target Setting and New Policy Pages*. [www.eceee.org/press/Target\\_setting](http://www.eceee.org/press/Target_setting).

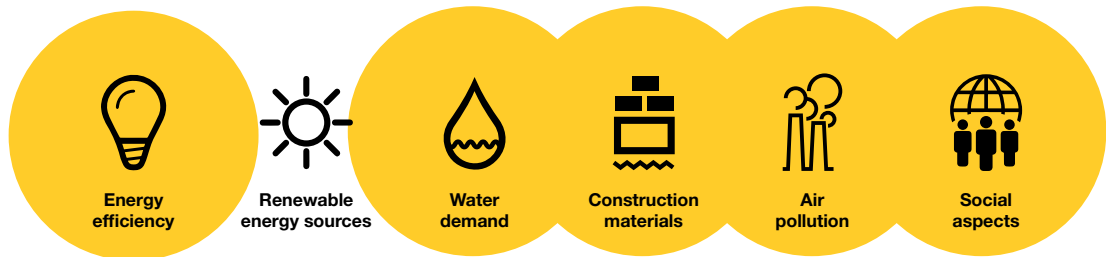
Lawrence Berkeley National Laboratory, 2012. *Key M&V Documents*. <http://mnv.lbl.gov/keyMnVDocs>

US Environmental Protection Agency, 2012. *Calculating Energy Savings*. <http://epa.gov/statelocalclimate/state/activities/measuring-savings.html>.

Wade, J. et al., 2011. *National Energy Efficiency and Energy Saving Targets - Further Detail on Member States*. *European Council for an Energy Efficient Economy*. [http://www.Wade et al..org/Policy/Targets/Targets\\_Country\\_Specific\\_Information.pdf](http://www.Wade et al..org/Policy/Targets/Targets_Country_Specific_Information.pdf).

Wuppertal Institute, 2012. *Evaluate Energy Savings*. *Evaluation Tools*. [http://www.evaluate-energy-savings.eu/emeees/en/evaluation\\_tools/index.html](http://www.evaluate-energy-savings.eu/emeees/en/evaluation_tools/index.html).

## 5 CERTIFICATION OF BUILDINGS



### 5.1 OVERVIEW OF THE INSTRUMENT

#### 5.1.1 Alternative names

Labelling of buildings and/or building-integrated systems, building rating systems, building labels, building energy labels, national home energy rating systems.

#### 5.1.2 Objective

The objective of building certification is to publicize the sustainability performance of buildings, thus enabling owners and tenants to take informed decisions. Overall, building certification generates a pull effect on the building market towards the transformation of the building stock.

#### 5.1.3 Definition

Building certification rates the sustainability performance of individual (new and/or existing) buildings according to a credible set of criteria. The regulation covers provisions for the extent and content of the assessment, as well as for the disclosure of the certificate (Figure 4).

#### 5.1.4 Variations

Certification can refer either to entire buildings or to building-integrated systems. In both cases, the rating can consider multiple or single attributes (examples are available in Section 5.6: “Additional information”).

The instrument can encompass certification alone or a combination with a label. The scheme can specify the terms for the assessment of the building only, or include the publication and disclosure of the results, e.g. display of the label.

While certification schemes can focus solely on building evaluation, a higher impact can be achieved by combining them with a set of recommendations, including the most cost-effective options for improvement. These recommendations are more cost-effective when produced at an early stage (e.g. the design phase) than when produced for existing buildings.

Another crucial decision at the stage of designing the instrument concerns the regulatory nature of the scheme:

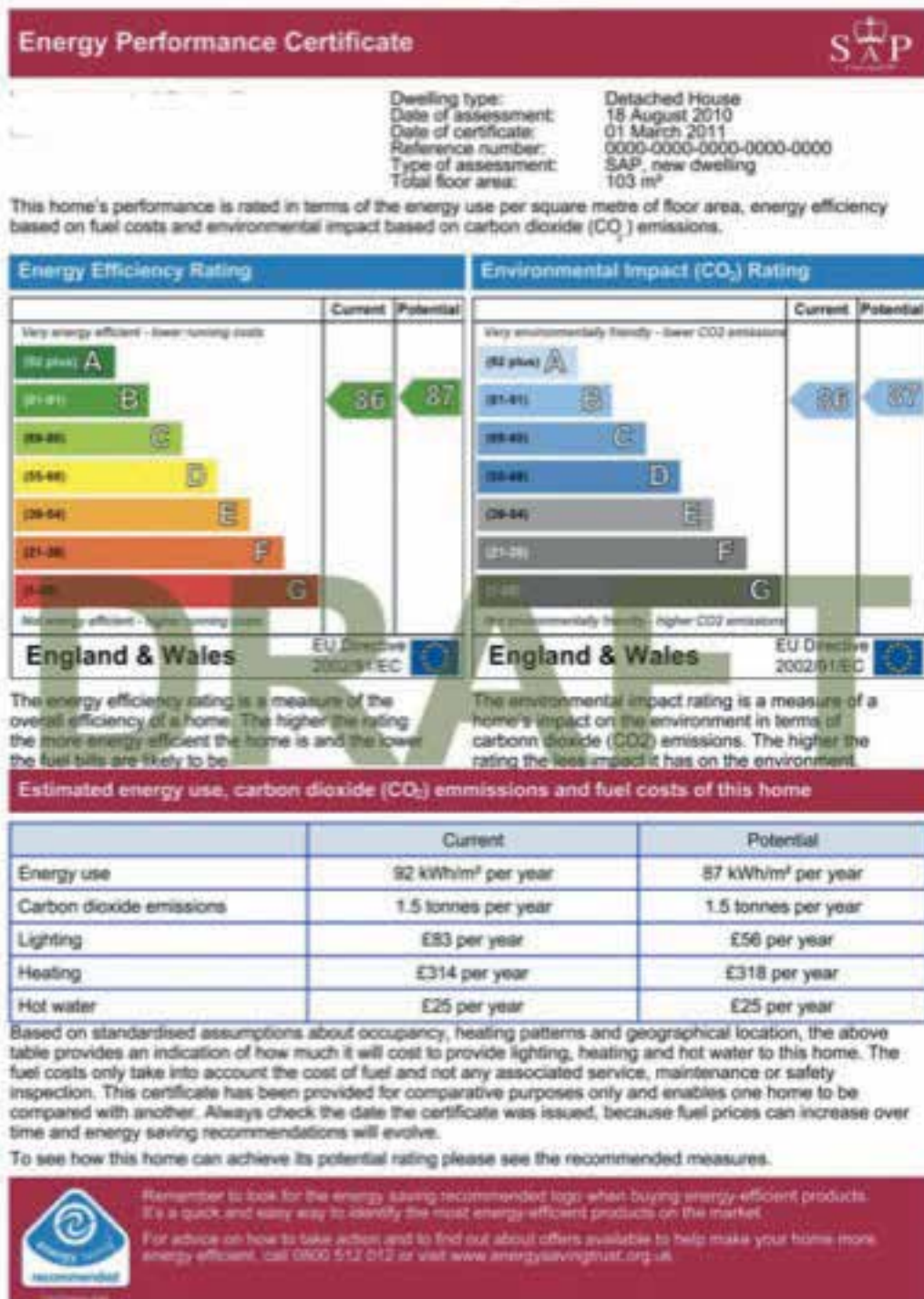
- o **Mandatory building certification** is a regulatory instrument established by the government, which applies to all buildings within the scope of the regulation. Mandatory approaches have a higher

improvement potential than voluntary schemes, particularly in countries with a tradition of compliance, and coherent legal-normative environments.

- o **Voluntary building certification** is an informative instrument. The use of the certification/label will depend on the engagement of owners. This can be successful if there are numerous buildings whose owners want to demonstrate their commitment to sustainability, or if the certification adds to the market value of the property. They can be introduced by the building sector (self-regulation) or by the government, typically with a threat of regulation. Usually the authority establishes a mutually beneficial agreement (i.e. the authority offers services, publicity, subsidies, etc. for those that join the programme).

Evaluation and certification processes can be conducted by government agencies or by independent entities (e.g. green building councils, associations, NGOs, research centres, etc.). Voluntary schemes can use various strategies, including the challenge of a competition, thus giving the programmes potential for greater impact and visibility. Voluntary schemes are preferable in countries with a tradition of voluntary cooperation between private stakeholders and the authority (i.e. having a high level of awareness, and in the presence of actors willing to demonstrate their achievements). Different degrees of sectoral self-regulation may be preferred, especially when the government lacks the enforcement capacity for a regulatory scheme.





**Figure 4: EU energy performance certificate**

Example of an EU energy performance certificate. The current and potential performances are indicated for energy efficiency (in kWh/m<sup>2</sup> per year) and CO<sub>2</sub> emissions (tonnes per year). The costs associated to lighting, heating and hot water are also expressed in monetary units (GBP/ year). This certificate is accompanied by a set of recommendations. Source: National Standard Assessment Procedure Assessments. [www.nationalsaps.co.uk](http://www.nationalsaps.co.uk).

## 5.2 RELEVANCE



### 5.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	The introduction of mandatory schemes requires the attributions and capacities of a national authority. However implementation can be carried out at the local level. *Voluntary variations may be introduced and implemented at local or national levels.
<b>Local level (city or lower level)</b>	😊*	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.

IF

The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 5.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😊	The instrument can target all types of buildings and building-integrated systems.  In the case of existing buildings, the requirement for mandatory certification is typically restricted to a certain building size and/or a market action (selling or renting). On the other hand, voluntary certification is usually not linked to an action, but is based on the owner's or user's interest.
	New buildings		😊	
	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
Residential buildings		😊		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😞	
		Residential buildings	😞	
	Private	Non-residential buildings	😞	
		Residential buildings	😞	



The instrument has a positive effect.














The instrument may have a positive effect, if certain conditions apply.



The instrument is not applicable, has very little effect, or no effect at all.


 5.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>		Building certification can influence the behaviour of multiple actors by making sustainability criteria available and mainstreaming their use in building assessment. Moreover, building certification can provide the industry with the means to respond to an increasingly aware and informed demand for high-rated buildings, thus reducing the potential impact of behavioural barriers.
	Insufficient information or awareness among target actors		Certificates enable actors to compare the performance of similar buildings and to become aware of the relevance of performance attributes used in a certification system.
	High rates of illiteracy among target consumers		Although the core content of the certificates and recommendations for improvement are issued in written form, their content can be made available to illiterate actors
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		Certificates generate a demand for sustainable solutions by increasing the market value of sustainable buildings. This in turn can result in the increased availability of sustainable technologies. However, the low availability of certain technologies at initial stages may hinder the success of the instrument, or require the setting of less ambitious scales/benchmarks.
	High initial costs of sustainable solutions		High initial costs may hinder the success of the instrument, as stakeholders may not improve performance in spite of the certificate's value.
	Fragmented market structure <sup>3</sup>		By providing a complete framework for measuring buildings' sustainability—which typically impact the building's market value—certificates showcase the stakeholders' goals, setting the ground for a new collaborative approach.
	Limitations in the typical building design process <sup>4</sup>		
	Split incentives <sup>5</sup>		Certificates enable tenants to compare the operational costs and comfort of similar buildings and to negotiate the rent.
	High transaction costs <sup>6</sup>		a) An immediate update of existing practices and building stock is not required. b) The additional cost of buildings can be limited to a certification fee, equal for high and low performing buildings. c) Administrative costs can be neutral.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		a) Voluntary variants can be introduced with little or no coordination in connection with the pre-existing legal and normative setting. b) By providing an incentive for improvement, certification schemes are complementary to regulatory instruments (e.g. building codes). c) Certification can motivate certain actors to obtain higher building grades. Therefore, transparent processes must be in place.
	Utility theft or non-payment		



The instrument modifies the policy context, reducing the magnitude of this barrier.



The instrument overcomes this barrier, or operates regardless of this barrier.



The instrument partially overcomes this barrier.



The instrument does not overcome this barrier.

1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.

2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.

3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.

4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.

5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.

6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 5.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	The instrument can potentially address performance in any environmental and resource-related area through the selection of assessment criteria. The most common criteria focus on energy and water consumption, as well as greenhouse gas emissions.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	😊		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😊		
	Increasing the sustainability of local resource use	😊		
	Limiting land use in urban areas (including indirect land use)	😊		
	Reducing air pollution	😊		
	Supporting climate change adaptation	😊		
<b>Social</b>	Reducing utility costs for the population	😊	By improving the overall quality and performance of buildings, certification benefits building users and/or those bearing the cost of utilities.  *Certificates can be specifically designed to address specific building types and uses.	
	Supporting a specific target group	Public institutions		😊*
		Small and medium enterprises		😊*
		Low-income consumers		😊*
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊*	*The increased demand for sustainable solutions invigorates the green market. The magnitude of these impacts is generally higher in mandatory schemes.  ** Certificates contribute to technological development and increased supply of sustainable solutions only indirectly.  ***Mandatory certification can foster the regulation of informal constructions, provided additional efforts are made.	
	Creating new employment opportunities	😊*		
	Supporting Research and Development (R&D) activities for technological innovation	😞**		
	Eliminating/tackling informal market	IF***		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊*		
	Creating new business opportunities by market transformation	😊*		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😊		
<b>Political</b>	Improving energy security <sup>2</sup>	😊*	*In the case of voluntary schemes, the magnitude of the (direct) impact is relatively low, as only high-performing buildings are certified.  **Investments in sustainability reduce life-cycle costs. However, due to the demonstration use of building certification, public initiatives tend to introduce solutions that go beyond optimal cost effectiveness.  ***Irregular certification may be in the interest of certain actors.	
	Making politics of sustainable development credible	😊**		
	Releasing budgets from public bodies	😊**		
	Reducing corruption	😞***		













- 😊 The instrument has a positive effect on this goal.
- 😞 The instrument has no or almost no effect on this goal.
- IF The instrument may contribute to this goal, according to some conditions.
- 😞 The instrument has a negative effect on this goal.


1 That is to say, increasing the utilization of renewable energy sources.


2 Energy security is here defined as supplying more consumers with the same production capacity.

### 5.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations				
<b>Existence of high rates of construction, reconstruction, selling and/or renting.</b>		Continue to the next precondition.				
		<table border="1"> <tr> <td>Program design should consider additional communication and enforcement efforts (in the case of mandatory schemes), to adapt certification to the industry's decision-making processes.</td> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td></td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	Program design should consider additional communication and enforcement efforts (in the case of mandatory schemes), to adapt certification to the industry's decision-making processes.	If this is feasible, continue to the next precondition.		If not, reconsider the introduction of the instrument.
Program design should consider additional communication and enforcement efforts (in the case of mandatory schemes), to adapt certification to the industry's decision-making processes.	If this is feasible, continue to the next precondition.					
	If not, reconsider the introduction of the instrument.					
<b>Tradition of compliance with regulatory instruments, or successful collaborative record between the public sector, the building industry and/or building owners.</b>		A mandatory scheme may be preferable.				
<b>Capacity and willingness of building sector actors to collaborate in the design and implementation of the instrument.</b>		<table border="1"> <tr> <td>- Voluntary schemes require lower enforcement efforts, especially if self-regulated, but require voluntary agreements and awareness raising, education and information campaigns.</td> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>- For mandatory certification, additional enforcement efforts will be necessary.</td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	- Voluntary schemes require lower enforcement efforts, especially if self-regulated, but require voluntary agreements and awareness raising, education and information campaigns.	If this is feasible, continue to the next precondition.	- For mandatory certification, additional enforcement efforts will be necessary.	If not, reconsider the introduction of the instrument.
	- Voluntary schemes require lower enforcement efforts, especially if self-regulated, but require voluntary agreements and awareness raising, education and information campaigns.	If this is feasible, continue to the next precondition.				
- For mandatory certification, additional enforcement efforts will be necessary.	If not, reconsider the introduction of the instrument.					
<b>Awareness of the various actors concerning the different sustainability issues related to buildings.</b>		Continue to the next precondition.				
		<table border="1"> <tr> <td>A low impact is expected, particularly for voluntary schemes. To improve results, introduce awareness raising, education and information campaigns and/or public sector leadership.</td> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td></td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	A low impact is expected, particularly for voluntary schemes. To improve results, introduce awareness raising, education and information campaigns and/or public sector leadership.	If this is feasible, continue to the next precondition.		If not, reconsider the introduction of the instrument.
A low impact is expected, particularly for voluntary schemes. To improve results, introduce awareness raising, education and information campaigns and/or public sector leadership.	If this is feasible, continue to the next precondition.					
	If not, reconsider the introduction of the instrument.					
<b>Availability of technical capacity (1) within the industry, to conduct audits and implement recommendations and (2) within the public administration, to control and secure the enforcement of the instrument.</b>		Continue to the next precondition.				
		<table border="1"> <tr> <td>It may be preferable to introduce a self-regulated voluntary scheme. A threat of regulation can add strength.</td> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td></td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	It may be preferable to introduce a self-regulated voluntary scheme. A threat of regulation can add strength.	If this is feasible, continue to the next precondition.		If not, reconsider the introduction of the instrument.
It may be preferable to introduce a self-regulated voluntary scheme. A threat of regulation can add strength.	If this is feasible, continue to the next precondition.					
	If not, reconsider the introduction of the instrument.					
<b>Low corruption at administration level as well as public trust in the processes initiated by the public sector.</b>		Continue to the next precondition.				
		<table border="1"> <tr> <td>Consider the benefits of a private sector self-regulated scheme. Alternatively, public sector involvement will require a public sector leadership program.</td> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td></td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	Consider the benefits of a private sector self-regulated scheme. Alternatively, public sector involvement will require a public sector leadership program.	If this is feasible, continue to the next precondition.		If not, reconsider the introduction of the instrument.
Consider the benefits of a private sector self-regulated scheme. Alternatively, public sector involvement will require a public sector leadership program.	If this is feasible, continue to the next precondition.					
	If not, reconsider the introduction of the instrument.					
<b>Coherence in the legal-normative framework and sufficient horizontal collaboration among legislative-normative bodies to be able to review new rules introduced.</b>		Continue to Implementation steps (section 5.4).				
		<table border="1"> <tr> <td>A public sector leadership program can increase collaboration among government bodies and ultimately improve the coherence of the regulatory framework. A voluntary scheme is an opportunity for policy learning.</td> <td>If this is feasible, continue to Implementation steps (Section 5.4).</td> </tr> <tr> <td></td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	A public sector leadership program can increase collaboration among government bodies and ultimately improve the coherence of the regulatory framework. A voluntary scheme is an opportunity for policy learning.	If this is feasible, continue to Implementation steps (Section 5.4).		If not, reconsider the introduction of the instrument.
A public sector leadership program can increase collaboration among government bodies and ultimately improve the coherence of the regulatory framework. A voluntary scheme is an opportunity for policy learning.	If this is feasible, continue to Implementation steps (Section 5.4).					
	If not, reconsider the introduction of the instrument.					

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

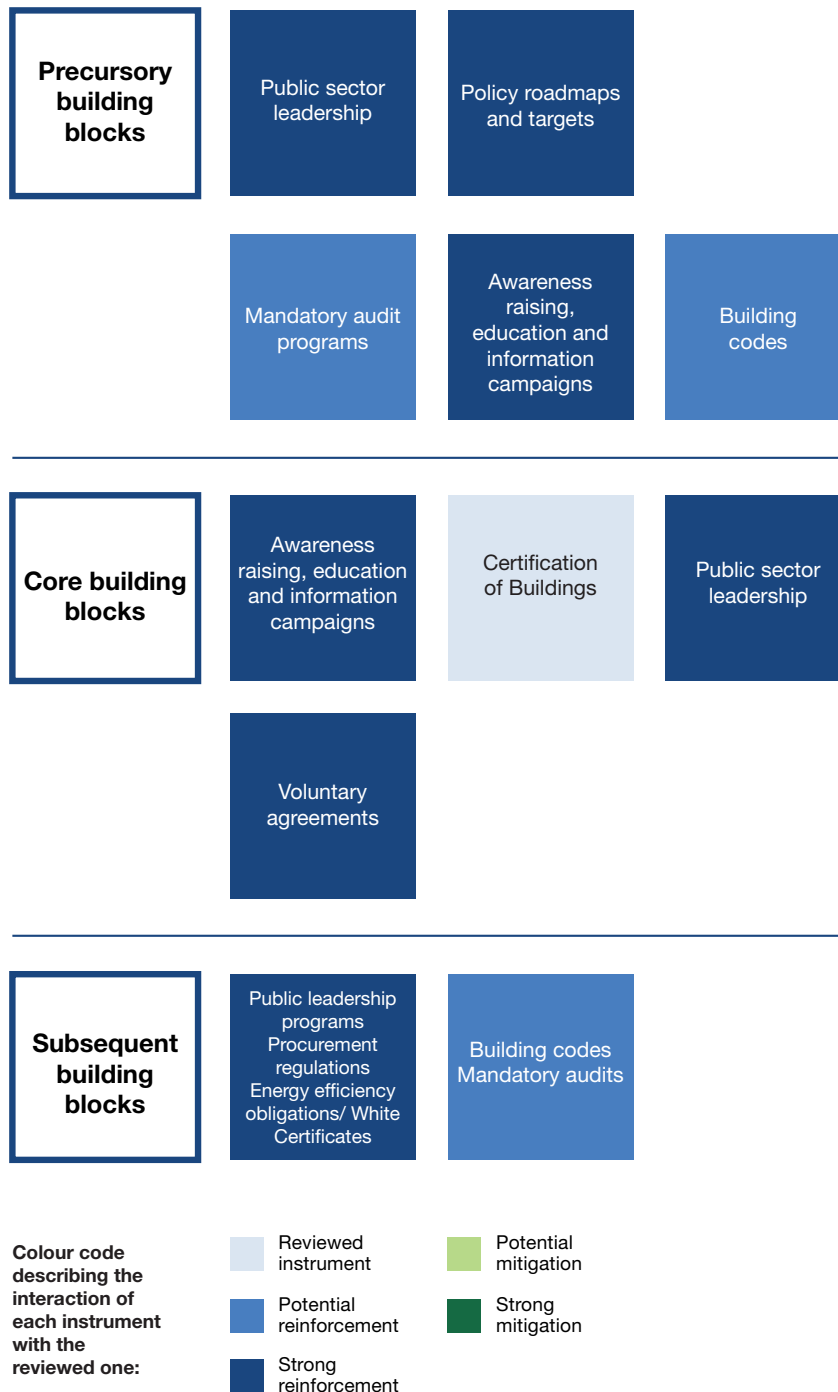
## 5.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users can summarize them in section 4.1. of the Worksheet.

1	Select sustainability criteria and identify participants	Prioritize those criteria and participants whose activities and types of buildings have the largest potential for improvement.
2	Draft policy roadmaps and targets	This step is preferably conducted in collaboration with the participants selected in step 1. The success of this step will inform decisions on the regulatory character of the instrument.
3	Decide on the need for additional building blocks to engage the building sector	Additional blocks may include training, financial support or awareness raising, education and information campaigns. The latter is necessary for the success of voluntary schemes.
4	Design the instrument	Policy makers can adapt a suitable international system in keeping with their local context or develop their own: <ul style="list-style-type: none"> <li>• Aim at a normal distribution of the building stock in the ranking system.</li> <li>• Prioritize actions at the design phase of the building.</li> <li>• Prefer simple policy designs, as these minimize costs.</li> <li>• Indicate who will conduct the assessments and their costs.</li> <li>• Include an inspection mechanism.</li> <li>• Describe the applicable penalties, which should be strict enough to secure compliance.</li> <li>• Decide on the obligation of exhibiting the certificate.</li> <li>• Specify who may carry out assessments and whether they need to be registered and pay registration fees.</li> <li>• Plan ahead for updates.</li> </ul>
5	Harmonise the legal-normative framework (mandatory schemes)	If appropriate, introduce a voluntary program first, to generate policy learning. Carefully review the regulations on products and (obsolete) building regulations. Take into account the existence of informal constructions (certificates may not have impacts on these buildings).
6	Initiate the development of technical capacities	Technical capacity should be developed within both the administration and the industry. Regular capacity building must continue during the implementation of the program.
7	Enforce the instrument	Government agencies or independent services are responsible for assessing performance, classifying the building and issuing the certificate. Building owners should receive a set of recommendations. Inspection should be conducted and penalties applied in the case of noncompliance.
8	Monitor and evaluate	Level of compliance/rate of participation. Overall performance improvement in targeted buildings. Increased awareness in the general/target public. Distribution of buildings in performance categories.
9	Update (every five to ten years)	Performance categories should be strengthened/updated before too many buildings achieve the highest performance category, in order to maintain stringency and motivate continuous performance improvements. Updates should be published well in advance. It is common to upgrade voluntary and mandatory schemes in parallel.
10	Extend the program	To building types not covered in the previous phase.

## 5.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



### 5.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- **Public sector leadership** increases the expected acceptance of the reviewed instrument as well as its informative and awareness raising impact.
- **Policy roadmaps and targets** enable mandated agencies and experts to set appropriate performance targets, and to communicate the upcoming (certification) requirements to the building sector.
- **Building codes.** Their introduction prior to the reviewed instrument allows the government and the private sector to develop technical capacity, and guarantees coherence in the regulatory environment. Building codes and certificates complement each other by generating a push and a pull effect on the building market.
- **Awareness raising, education and information campaigns** maximize the impact of the instrument by reinforcing the social responsibility of building owners and tenants, and generating interest for assessing performance criteria. These outreach campaigns are particularly pertinent for the success of voluntary schemes.
- **Mandatory audits.** The presence of mandatory audits guarantees the availability of technical assessment and monitoring capacity.
- **Energy and water subsidies.** This instrument is not directly addressed in

this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones.

### 5.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- **Public sector leadership** can multiply the impact of certificates and provide the public sector with the means for demonstrating its achievements. Public sector leadership may be necessary, especially for mandatory schemes, to increase the coherence of the normative system in parallel to the introduction of the instrument.
- **Awareness raising,** education and information campaigns can be specifically designed to boost the impact of the instrument. They can target building sector actors or the general public. This is fundamental for the success of voluntary building certification.
- **Voluntary agreements** are typically introduced to engage a reluctant building industry in a voluntary building certification program. In addition to the competitive advantage of active engagement in the certification process, collaborating stakeholders (or the overall sector) receive training, and fiscal or financial advantages.
- **Variants of the reviewed instrument.** Voluntary building certification



can contribute to the success of mandatory certification schemes in various ways. Introducing voluntary certification beforehand can generate the capacity needed to subsequently facilitate the establishment of mandatory schemes. In a regulated environment, voluntary certification for specific sectors such as high-performing buildings can provide an alternative to the rigidity of mandatory schemes, and prepare the sector for the next update. Finally, voluntary schemes have a potential on their own to change values and behaviour in the building market.

#### 5.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **Building codes and mandatory audits** benefit from the increased capacity in government bodies and in the private sector. In particular, building codes introduced after the successful enforcement of building certification schemes can be more restrictive.
- o **Public leadership programs, procurement regulations and energy efficiency obligations/White Certificates** typically use existing certification systems to simplify and justify investment decisions as well as to demonstrate performance achievements. The primary role of public leadership programs is to inform the general public about these systems and their results.

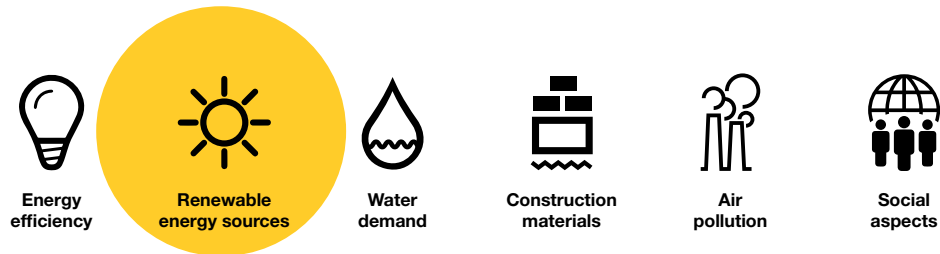
## 5.6 ADDITIONAL INFORMATION

The following references may be helpful to design and implement the instrument:

International Energy Agency (IEA). 2010. *Energy Performance Building certification*. Paris, France: OECD Publishing. [http://www.iea.org/publications/freepublications/publication/buildings\\_certification-1.pdf](http://www.iea.org/publications/freepublications/publication/buildings_certification-1.pdf).

Vierra, Stephanie. 2012. *Green Building Standards and Certification Systems*. WBDG, National Institute of Building Sciences. <http://www.wbdg.org/resources/gbs.php>.

## 6 CERTIFICATION AND LABELLING OF RENEWABLE ENERGY SOLUTIONS



### 6.1 OVERVIEW OF THE INSTRUMENT

#### 6.1.1 Alternative names

Certification of renewable energy technology (RET) products, certification of RET installation and maintenance engineers, accreditation for installers.

#### 6.1.2 Objective

The objective of certification and labelling of renewable energy solutions is to relate information on the performance of renewable energy solutions, ensuring their harmonization with safety, efficiency and other quality requirements. Certification and labelling of renewable energy solutions enables consumers to make informed purchase decisions and therefore increases the motivation of manufacturers to improve the performance of their renewable technologies.

#### 6.1.3 Definition

Certification and labelling of renewable energy solutions (henceforth, certification and labelling of RES) refers to rating or benchmarking systems assessing the capacity of the building-integrated renewable energy technologies to meet their expected performance, functionality, and durability.<sup>7</sup>

#### 6.1.4 Variations

The instrument can specifically address either all renewable energy sources (e.g. solar, wind, heat-pumps, biogas technologies, etc.), or cover selected technologies. In addition, certification and labelling differentiate between products (e.g. solar panels) and related installation processes (e.g. installation of solar panels). In particular, product testing may address the final products or the overall manufacturing processes. The instrument can respond to a mandatory or a voluntary formulation.



**Figure 5: Certification labels examples - China and UK**

The Golden Sun Label, China (left), and two examples of a British certification mark: product (centre) and services provider (right). Sources: China General Certification Center (<http://www.cgc.org.cn/>), and Microgeneration Certification Standards, UK ([www.microgenerationcertification.org](http://www.microgenerationcertification.org))

<sup>7</sup> The instrument reviewed in this chapter should not be confused with "renewable energy certification", whose function is to guarantee the renewable origin of the energy, and falls beyond the scope of this Handbook. However, the "certification and labelling of renewable energy solutions" may ease the process of certifying the generated energy. In addition, the certification of renewable energy may be considered as a purchasing criterion in sustainable procurement programs.

## 6.2 RELEVANCE



### 6.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
National level (country or independent regional unit within/ with jurisdiction over the country)	😊	😊	The instrument is typically introduced at national level. Local governments rarely add implementation efforts, but may reinforce the instrument through e.g. sustainable procurement regulations, public sector leadership, awareness raising, education and information campaigns, etc.
Local level (city or lower level)	😞	😞	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.

IF

The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 6.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😞*	The instrument applies to building-integrated solutions. *Building-integrated solutions are most cost-effective when introduced at the design phase and may not be relevant for existing buildings.
	New buildings		😊	
	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
Residential buildings		😊		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊	Renewable energy solutions can refer to technological systems and related processes of installation and maintenance.
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😞	Renewable energy solutions can refer to technologies considered as products due to their movable nature and easy installation, e.g. some photovoltaic panels, micro-windmills, biodigesters, solar heaters, etc.
		Residential buildings	😊	
	Private	Non-residential buildings	😞	
		Residential buildings	😊	



The instrument has a positive effect.














The instrument may have a positive effect, if certain conditions apply.







The instrument is not applicable, has very little effect, or no effect at all.


 6.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>		The instrument does not directly address this barrier.
	Insufficient information or awareness among target actors		The instrument enables (potential) RES consumers to make informed decisions.
	High rates of illiteracy among target consumers		The instrument may involve the use of pictographic labels, which, combined with additional information, can allow illiterate RES consumers to compare alternatives.
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		By removing information barriers, the instrument promotes an increased demand for RES and increases trust in the selected technology.
	High initial costs of sustainable solutions		The instrument can contribute to the reduction of the initial costs for RES through economies of scale if it achieves a market transformation.
	Fragmented market structure <sup>3</sup>		The instrument does not address this barrier.
	Limitations in the typical building design process <sup>4</sup>		The instrument enables manufacturers, importers, real estate developers, constructors and owners to assess the interest of introducing RES and, if feasible, to determine which range of performance is coherent with their demand and purchasing capacity.
	Split incentives <sup>5</sup>		It enables owners and tenants to evaluate the financial returns of RES and therefore to consider them in the rental agreement.
	High transaction costs <sup>6</sup>		The instrument is cost-effective for governments as the control activity can be limited to random checks. Although certification may include standardization processes (removing underperforming solutions from the market), in general it does not require (immediate) action from the sector.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		The instrument can be introduced with a minimum amount of coordination in connection with the pre-existing legal and normative structure, and its implementation can be self-regulated. The physical presence of a label helps authorities in their efforts to control illegally marketed solutions.
	Utility theft or non-payment		

-  The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- 1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- 2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- 3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- 4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- 5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- 6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.

 6.2.4 **Policy goals**

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.











Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency		* The instrument can reduce energy peak demand provided it succeeds in promoting energy technologies able to generate energy during peak demand hours.	
	Reducing water demand			
	Reducing waste-water generation			
	Reducing energy peak demand	IF*	** The instrument can address the adequate (re)utilization of local resources, both during production processes and during RES operations, e.g. biodigesters.	
	Increasing access to high quality water in buildings			
	Decarbonising the energy supply <sup>1</sup>		*** The instrument may help to reduce the need of constructing new power stations.	
	Increasing the sustainability of local resource use	**		
	Limiting land use in urban areas (including indirect land use)	IF***	**** The instrument can contribute to climate change adaptation by increasing the autonomy of buildings.	
	Reducing air pollution			
	Supporting climate change adaptation	****		
<b>Social</b>	Reducing utility costs for the population		By assuring the performance of renewable energy technologies, the instrument benefits energy consumers. The choice of the solutions to be certified and the combination with other, e.g. financial instruments, determines the beneficiaries.	
	Supporting a specific target group	Public institutions		
		Small and medium enterprises		
		Low-income consumers		
Improving comfort, services and housing conditions				
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry		The increased demand for renewable energy technologies has favourable effects on the economy.	
	Creating new employment opportunities			
	Supporting Research and Development (R&D) activities for technological innovation	IF*	*The instrument promotes but does not contribute directly to technological development.	
	Eliminating/tackling informal market	IF**		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits		**The certification process can foster the regulation of technologies and services currently offered by an informal market.	
	Creating new business opportunities by market transformation			
	Increasing energy market transparency: enhancing knowledge and awareness of consumers			
<b>Political</b>	Improving energy security <sup>2</sup>		*Renewable energy technologies have a high demonstration capacity and are typically included in public leadership programs.	
	Making politics of sustainable development credible	*		
	Releasing budgets from public bodies			
	Reducing corruption			


- The instrument has a positive effect on this goal.
- The instrument has no or almost no effect on this goal.
- IF The instrument may contribute to this goal, according to some conditions.
- The instrument has a negative effect on this goal.

1 That is to say, increasing the utilization of renewable energy sources.  
 2 Energy security is here defined as supplying more consumers with the same production capacity.

### 6.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
<b>Enforcement capacity and will of public bodies to introduce a strict and regularly updated regulation.</b>		Continue to the next precondition.
		<p>A mandatory approach may not be adequate at this stage. Compare the costs and benefits of a) encouraging the sector to introduce a (self-regulated) voluntary approach, with a threat of regulation, or b) developing capacities within the public bodies.</p> <p>If this is feasible, continue to the next precondition.</p> <p>If not, reconsider the introduction of the instrument.</p>
<b>Existence of sufficient technical capacity within the public bodies and/or within the building sector to design and implement the instrument.</b>		Continue to the next precondition.
		<p>Additional efforts in capacity building will be necessary. Whenever adopting international protocols, ensure that they are suitable for the local conditions.</p> <p>If this is feasible, continue to the next precondition.</p> <p>If not, reconsider the introduction of the instrument.</p>
<b>Existence of an accreditation and testing infrastructure, such as an accredited certification organization and specialized laboratories for testing the technologies and, if relevant, auditing the manufacturing facilities.</b>		Continue to the next precondition.
		<p>Either develop, or collaborate with neighbouring countries in developing the necessary infrastructure — especially if the local industry is to be promoted.</p> <p>If this is feasible, continue to the next precondition.</p> <p>If not, reconsider the introduction of the instrument.</p>
<b>High-quality relationship between the government and the sector stakeholders (manufacturers, installers, retailers, installers).</b>		Continue to the next precondition.
		<p>Building a collaborative relationship with the sector is advised beginning with the design stage, for both mandatory and voluntary schemes.</p> <p>If this is feasible, continue to the next precondition.</p> <p>If not, reconsider the introduction of the instrument.</p>
<b>Capacity and willingness of the sector to contribute to policy design.</b>		Continue to the next precondition.
		<p>Offer collaboration and training to the sector. The penalties for non-compliance must be clearly stated and proportionate to deter non-compliance, both in mandatory and voluntary schemes.</p> <p>If this is feasible, continue to the next precondition.</p> <p>If not, reconsider the introduction of the instrument.</p>
<b>Credibility of government initiatives for users and a tradition of adequate communication of these initiatives to the general public.</b>		Continue to implementation steps (Section 6.4).
		<p>Transparent processes and a communication strategy should secure the credibility of the instrument and generate interest among the general public for certified and labelled RES.</p> <p>If this is feasible, continue to the next precondition (Sec.6.4).</p> <p>If not, reconsider the introduction of the instrument.</p>

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

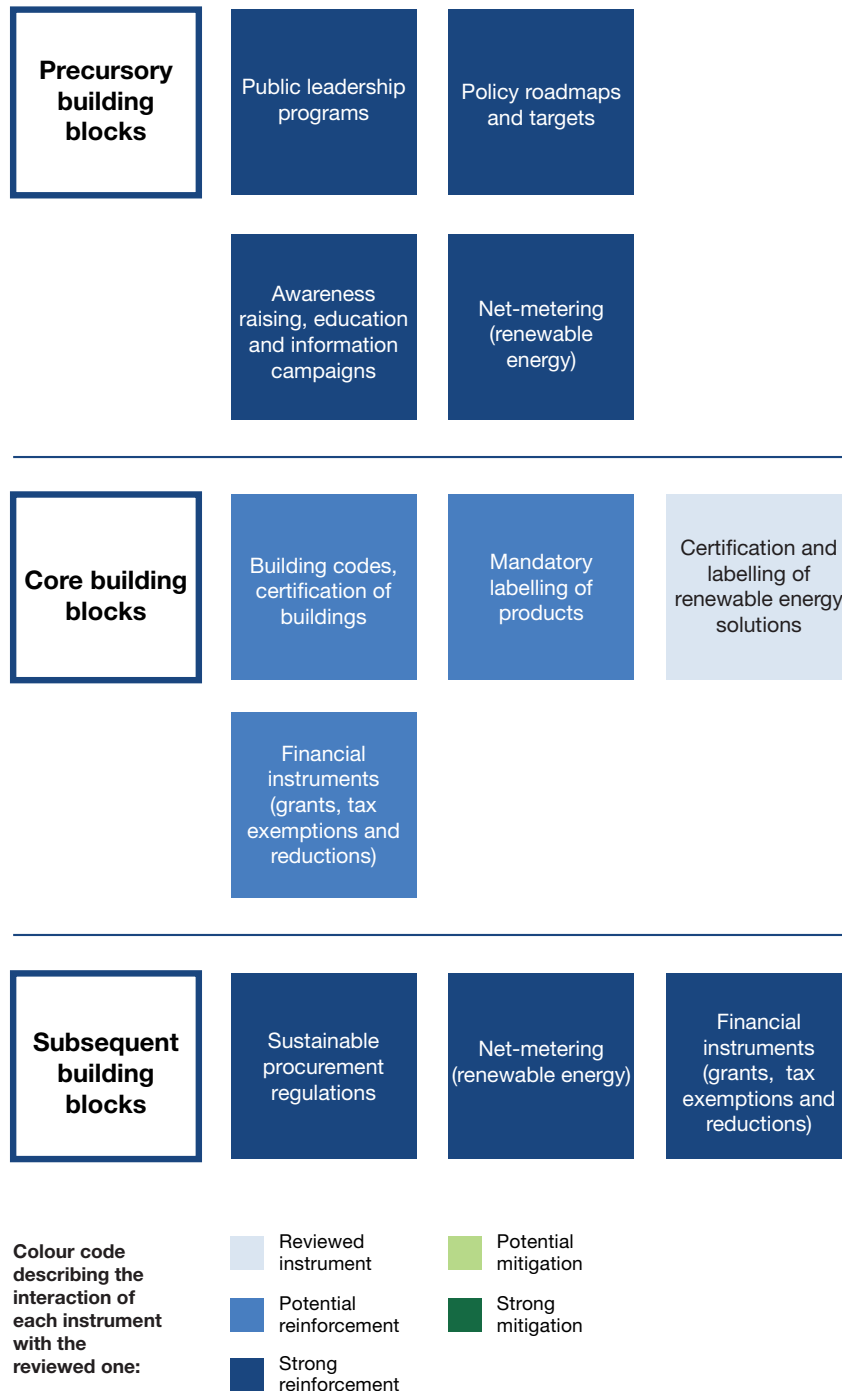
## 6.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Select the target technologies	Include at least the most widespread RES. Prioritize those technologies with the greatest potential.
2	Appoint a leading body and approach the industry for collaboration	Select a public or private body with the expertise and credibility to lead the process. Plan for involvement of manufacturers, importers, service providers and all other interested stakeholders. Benefiting from their expertise and involving them in decisions can significantly reduce assessment and enforcement costs.
3	Analyse the potential effects of different alternative settings	Ideally, an impact assessment should be carried out to study the potential impacts and costs of different alternatives based on the following criteria: voluntary vs. mandatory, comparative vs. endorsement, inclusion of different RES. A mandatory scheme will probably have a higher impact, but may require greater governmental efforts. A voluntary scheme may be preferable until the capacities are developed and the sector is ready for a more ambitious program.
4	Identify the resources necessary	The necessary resources should be identified for introducing and operating the program (including the capacity building and institutional expansion which would be required).
5	Design the label	The design should be catchy and simple. Consider adapting an existing design to the local conditions (culture, knowledge, reading style). Take into account other labels that are already in place. Ideally, each technological and process-oriented solution should be regulated by one or two labels to avoid overloading consumers with information. Make sure that high performing solutions are recognized in the label. If resources are insufficient, a voluntary scheme can complement the mainstream program (whether voluntary or mandatory), with an endorsement component to differentiate top-of-the-class products.
6	Initiate a communication campaign by announcing the government plans	A communication campaign should be initiated by announcing the government plans to the entire building sector as well as to potentially concerned consumers. Ideally this step should be part of an overall communication strategy that secures credibility, informs, raises awareness and generates interest on the benefits of renewable energies, and in particular, of those accredited by the program.
7	Identify, and if necessary create, the accreditation and testing body and/or infrastructure	Establishing an accreditation infrastructure requires a legal mandate, budgetary provisions and efforts on capacity building. The country's accredited organization should be capable of testing RES, auditing manufacturing facilities and conducting certification according to national or international standards.
8	Adopt and publish a common solution testing procedure for each major RES	Make sure that testing facilities and protocols are certified to guarantee the credibility of the results. Whenever possible, adopt internationally recognized test and capacity-measurement procedures. Simplified versions of internationally recognized protocols may lower the costs. Their publication will enable manufacturers, importers and service providers to adapt their processes, to report results, to request waivers and exceptions, etc.
9	Enforce inspection as well as a monitoring and evaluation system	Monitoring and evaluation are needed to secure compliance as well as to quantify the impacts and the areas with greatest potential for improvement.
10	Update the scheme	The scheme should be updated regularly based on evaluations according to ongoing technological improvements, and increased capacities.

## 6.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).





### 6.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public leadership programs** increase the expected acceptance of the instrument in the sector and its overall credibility.
- o **Policy roadmaps and targets** enable mandated agencies and experts to set specific performance targets, and to communicate the upcoming requirements to the sector.
- o **Awareness raising, education and information campaigns** increase the expected acceptance of the instrument within the industry as well as the potential interest of the consumers for RES and for quality assurance.
- o **Net-metering (renewable energy)** functions as an incentive for energy consumers to consider the introduction of RES. It gives strong signals to the sector about the relevance of RES for the government, and its serious interest in introducing certification and labelling of RES.
- o **Subsidized energy prices.** Although not an instrument directly addressed in this Handbook, subsidized energy prices deserve a mention. Their presence reduces the coherence and credibility of the policy setting and counteracts efforts to introduce ambitious certification and labelling of RES, which become less cost-effective to the energy consumer as a result of the subsidies.

### 6.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Awareness raising, education and information campaigns** are important at every stage of implementation of the instrument to increase impact on the consumers of RES and to maintain the engagement of the sector.
- o **Financial instruments (grants, soft-loans, public benefits charges, tax exemptions and reductions)** may be necessary to make RES available to target groups, like low-income classes or public institutions.
- o **Building codes and certification of buildings.** The introduction of certified and labelled renewable energy solutions can be the means to comply with building codes or achieve a certain level of performance in a certification system. All three instruments require similar resources, especially with regard to the labelling of products. Pooling these resources to introduce two or more mandatory instruments makes them more cost-effective.

### 6.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **Sustainable procurement regulations, as well as financial instruments (grants, soft-loans, public benefits charges, tax exemptions and reductions)** benefit from the presence of the reviewed instrument, which is used as a reference criteria for justifying the decisions they involved and to demonstrate the achievements.

o **Net-metering (renewable energy).**

The reviewed instrument enables energy consumers to purchase technology whose performance is reliable and therefore to participate in net-metering programs. In addition, net-metering regulations may require certification of renewable energy solutions as a prerequisite for participation.

## 6.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Azom, 2012. *Faster Certification for Solar Panel Manufacturers Speeds Time to Market*. <http://www.azom.com/news.aspx?newsID=17412>

Cerpass Group, 2012. *China Energy Conservation Product Certification Center (CECP) Energy Conservative Certification*. [http://www.cerpass.com.tw/en-US/china\\_cecp.aspx](http://www.cerpass.com.tw/en-US/china_cecp.aspx)

China General Certification Center, 2010. *Golden Sun Certification For Solar Water Heater Photovoltaic*. Photovoltaic product. [http://www.cgc.org.cn/eng/news\\_show.asp?SortId=11](http://www.cgc.org.cn/eng/news_show.asp?SortId=11)

Davis, G., MacKay, R., MacRae, M., Nicolson, L. et al., 2011. *Supporting Community Energy Development in Malawi*. Community Energy Scotland, IOD PARC, University of Malawi Polytechnic, University of Strathclyde. [www.scotland.gov.uk/Resource/Doc/107396/0122148.docx](http://www.scotland.gov.uk/Resource/Doc/107396/0122148.docx).

Microgeneration Certification Scheme (MCS), 2013. *Microgeneration Certification Scheme*. <http://www.microgenerationcertification.org/about-us/about-us>.

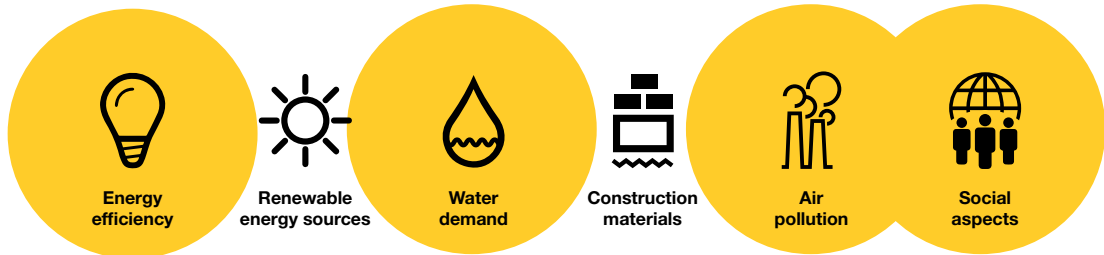
PowerMark Corporation, 2012. *Photovoltaic Module and Component Certification Program*. <http://www.powermark.org/benefits.htm>

Renewable Energy Focus, 2012. *Certifying Solar for the UK market*. Renewable Energy Focus: Market, 13(2), March/April 2012: pp. 26-27.

SAI Global, 2011. *Guide to Standards - Solar Panels*. <http://infostore.saiglobal.com/store/>

TÜV Rheinland, 2012. *Photovoltaic Modules Testing & Certification*. [http://www.tuv.com/en/usa/services\\_usa/product\\_testing/photovoltaic\\_2/photovoltaic\\_modules/photovoltaic\\_modules.jsp](http://www.tuv.com/en/usa/services_usa/product_testing/photovoltaic_2/photovoltaic_modules/photovoltaic_modules.jsp)

## 7 LABELLING OF PRODUCTS



### 7.1 OVERVIEW OF THE INSTRUMENT

#### 7.1.1 Alternative names

Labelling of appliances and office equipment; eco-labelling; energy efficient appliance labelling; energy labels. Many labels have specific names, such as the “Blue angel” (Der Blaue Engel), the “Green Dot” (Der Grüne Punkt) or Energy Star.

#### 7.1.2 Objective

The objective of product labelling is to enable consumers to make informed product purchasing decisions, thus increasing the interest of manufacturers and intermediary actors in raising the sustainability performance of the products they offer.

#### 7.1.3 Definition

Products (appliances and equipment) are labelled according to their sustainability performance (e.g. energy consumption) in a standardized manner, according to a set scale or classification of performance. Labels may be compulsory or voluntarily adopted by producers or retailers, and apply to any product within the regulated product type on the market.

The distinction between products and building systems is not always straightforward. As a rule of thumb, products can be purchased, moved and installed by the user (e.g. light bulbs, as compared to lighting systems). Whenever products need to be connected to utility networks, they operate as plug-and-play, i.e., they can be installed without the need for specialized knowledge or considerable additional investments.

#### 7.1.4 Variations

Product labelling instruments vary according to their regulatory nature: they can be mandatory or voluntary. In the first case, all marketed products within a regulated type (e.g. all washing-machines) must be tested and identified with the label. Voluntary labelling systems are adopted by the sector through its own initiative, usually to highlight a specific product feature (e.g. produced with recycled materials) or the high performance of certain products.

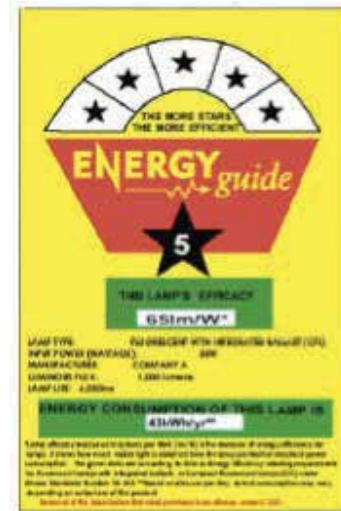
Depending on the reference system used, product labels may be comparative or endorsing:

- o **Comparative labels** assess products against a predetermined, open-ended performance scale, which may be continuous or have distinct categories. Comparative labels motivate manufacturers to

supply more efficient products than their competitors. This is the most widespread type of mandatory labels.

- o **Endorsement labels** are granted only to those products that reach a specific level of quality (e.g. CFC free) or are in the top range of performance, usually in the upper 15-25%. Endorsement labels do not incentivize quality above the endorsement threshold, and are widespread among voluntary labels. There are also cases of negative endorsements, such as a product label that indicated underperforming products in South Korea, for example, which was used as a preliminary step to standardisation.
- o **Eco-labels** are a type of endorsement label that reflect the fulfilment of a series of criteria, which may in turn be assessed comparatively.

Example: Fuel efficient cooking stoves have been broadly developed and tested during the past decades. However, internationally and nationally accepted labelling systems, indicating fuel consumption or indoor pollution, have not been consolidated.



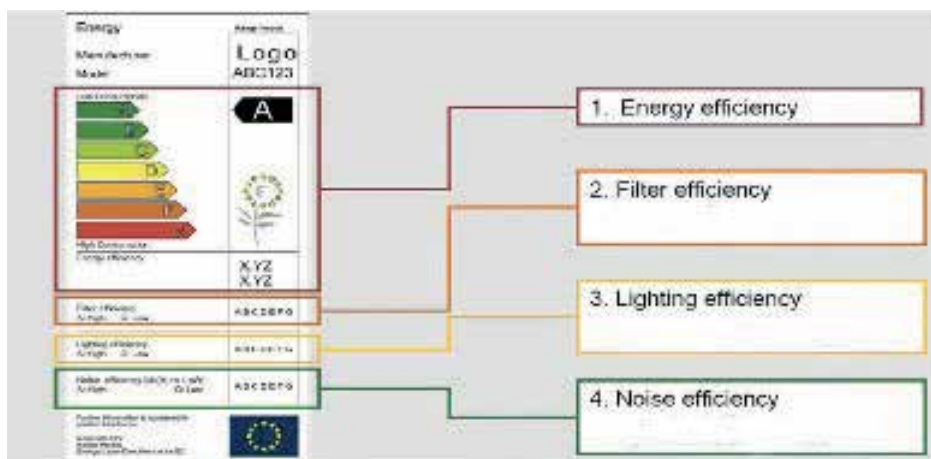
**Figure 6: 5 Star comparative energy label - Ghana**

The 5 Star comparative energy label of Ghana.



**Figure 7: Energy efficiency endorsement label - India**

The Indian energy efficiency endorsement label.



**Figure 8: Comparative EU label**

The comparative EU label exemplifies how the information provided relates to the interest of consumers.

## 7.2 RELEVANCE



### 7.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	Mandatory product labelling is appropriate for national level introduction because products are marketed at this level. At the local level it may be possible to introduce a voluntary scheme or to amplify existing national schemes through, for instance, increased surveillance, and collaboration with producers, importers and retailers.
<b>Local level (city or lower level)</b>	😞	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.

IF

The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 7.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😞	Product labelling is not applicable to whole buildings.
	New buildings		😞	
	Public	Non-residential buildings	😞	
		Residential buildings	😞	
	Private	Non-residential buildings	😞	
Residential buildings		😞		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😞	Regulations on buildings and on products must be harmonised. Building systems are typically covered by building regulations. However, some whole-building regulations do not consider building systems.
		Residential buildings	😞	
	Private	Non-residential buildings	😞	
		Residential buildings	😞	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	



The instrument has a positive effect.














The instrument may have a positive effect, if certain conditions apply.







The instrument is not applicable, has very little effect, or no effect at all.


 7.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>		The instrument does not directly address this barrier.
	Insufficient information or awareness among target actors		The instrument enables purchasers to make informed decisions. In addition, labels often express performance in comparative or monetary terms, thus enabling consumers to better understand the implications of increased sustainability performance.
	High rates of illiteracy amongst target consumers		The instrument may involve the use of pictographic labels, which, combined with additional information, can allow illiterate product purchasers to compare among alternatives.
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		Manufacturers and retailers are motivated to improve their products in order to satisfy a better informed demand and to avoid having their product be perceived as an inferior brand.
	High initial costs of sustainable solutions		The instrument does not address this barrier directly. However, in the long term, the instrument contributes to mainstreaming high-performing products and to reducing their costs through economies of scale.
	Fragmented market structure <sup>3</sup>		The instrument does not address this barrier.
	Limitations in the typical building design process <sup>4</sup>		Manufacturers, importers and owners prefer higher rated products in order to satisfy an increasingly informed demand and to avoid being perceived as less competitive actors.
	Split incentives <sup>5</sup>		Due to the movable nature and short lifetime of products, in many cases it is the energy consumer who invests in products.
	High transaction costs <sup>6</sup>		Transaction costs for manufacturers are limited because they are not required to take immediate action or to modify their base-technology. For consumers, the higher costs upfront, if any, are compensated by the benefits from the reduced cost of operation.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		The instrument can be introduced with little or no coordination with the pre-existing legal and normative setting, and its implementation can be self-regulated. The physical presence of a label (under a mandatory scheme) helps authorities in their efforts to control illegally marketed products. For instance, comparative labels were an effective way for Ghana product purchasers to distinguish between legally traded bulbs and illegally imported ones (Bonney 2008).
	Utility theft or non-payment		

-  The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- 1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- 2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- 3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- 4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- 5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- 6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 7.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	* The instrument can address any resource-related performance area. The use of voluntary labels is more widespread in the management of wastewater or solid waste (e.g. the German Grüne Punkt certifies that the producer has paid for the collection, sorting and recovery of the packaging – cf. <a href="http://www.gruener-punkt.de">http://www.gruener-punkt.de</a> .)  ** Products used during peak periods may be prioritized by the scheme.  *** The potential of labelling cooking technologies remains largely untapped.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊*		
	Reducing energy peak demand	IF**		
	Increasing access to high quality water in buildings	😞		
	Decarbonising the energy supply <sup>1</sup>	😞		
	Increasing the sustainability of local resource use	IF*		
	Limiting land use in urban areas (including indirect land use)	😞		
	Reducing air pollution	😊***		
	Supporting climate change adaptation	😞		
<b>Social</b>	Reducing utility costs for the population	😊*	* Different types of consumers benefit from the increased sustainability performance, depending on the targeted products.  **Labels may contain information about multiple comfort aspects e.g. noise, safety, duration, etc.	
	Supporting a specific target group	Public institutions		😊
		Small and medium enterprises		😊
		Low-income consumers		😊
Improving comfort, services and housing conditions	😊**			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊*	*Comparative labels motivate manufacturers to supply more efficient products than their competitors, while endorsement labels promote compliance to criteria defining a minimum in expected performance.  **Labels can be easily used as performance benchmarks in sustainable procurement regulations, energy efficiency obligations, financial mechanisms, etc.	
	Creating new employment opportunities	😊		
	Supporting research and development (R&D) activities for technological innovation	😊*		
	Eliminating/tackling informal market	😊		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊**		
	Creating new business opportunities by market transformation	😊*		
	Increasing energy market transparency: increasing knowledge and awareness of consumers	😊		
<b>Political</b>	Improving energy security <sup>2</sup>	😊	* Due to the visibility of the measure, labels make the requirements tangible (through clear, assessed criteria), e.g. creating monetization of energy consumption.	
	Making politics of sustainable development credible	😊*		
	Releasing budgets from public bodies	😞		
	Reducing corruption	😞		



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.



IF The instrument may contribute to this goal, according to some conditions.



The instrument has a negative effect on this goal.













1 That is to say, increasing the utilization of renewable energy sources.


2 Energy security is here defined as supplying more consumers with the same production capacity.




### 7.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
Existence of sufficient technical capacity within the public bodies and/or within the building sector to design and implement the instrument.		Continue to the next precondition.
		Capacity building will be necessary. Whenever adopting international protocols, make sure they are applicable. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Existence of a quality-testing infrastructure, such as a technical organization able to design and implement testing procedures, and to communicate on the performance of products.		Continue to the next precondition.
		Develop, or collaborate with neighbouring countries in developing this infrastructure (fundamental to support local manufacturing). Otherwise, the industry should be able to certify product performance abroad. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Sufficient enforcement capacity and will of public bodies to introduce a strict and regularly updated regulation.		Continue to the next precondition.
		<b>A voluntary scheme may be preferable.</b> Consider the costs and benefits of supporting the sector to introduce a voluntary, self-regulated scheme, ideally with a threat of regulation, versus developing these capacities within the public bodies. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
High-quality relationship between the government and the sector stakeholders (manufacturers, installers, retailers, installers); Capacity and willingness of the sector to contribute to policy design.		Continue to the next precondition.
		<b>A mandatory scheme may be preferable.</b> However, building a collaborative relationship with the sector is advised starting from the design stage of the policy, for both mandatory and voluntary schemes. Penalties for non-compliance must be proportionate and clearly communicated. If agree, continue to the next precondition. If not, reconsider the introduction of the instrument.
Absence of energy and water subsidies (when present, these subsidies distort the market and lengthen the time it takes to show returns on investment for products developed according to sustainability performance criteria)		Continue to the next precondition.
		Additional efforts in securing legal and normative coherence will be necessary. If agree, continue to the next precondition. If not, reconsider the introduction of the instrument.
Credibility of government initiatives for energy consumers and product purchasers.		Continue to implementation steps (section 7.4).
		Transparent processes and a communication strategy are necessary. Engage stakeholders. Self-regulation may be preferable. If this is feasible, continue to the next precondition (section 7.4). If not, reconsider the introduction of the instrument.

 The precondition exists- move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

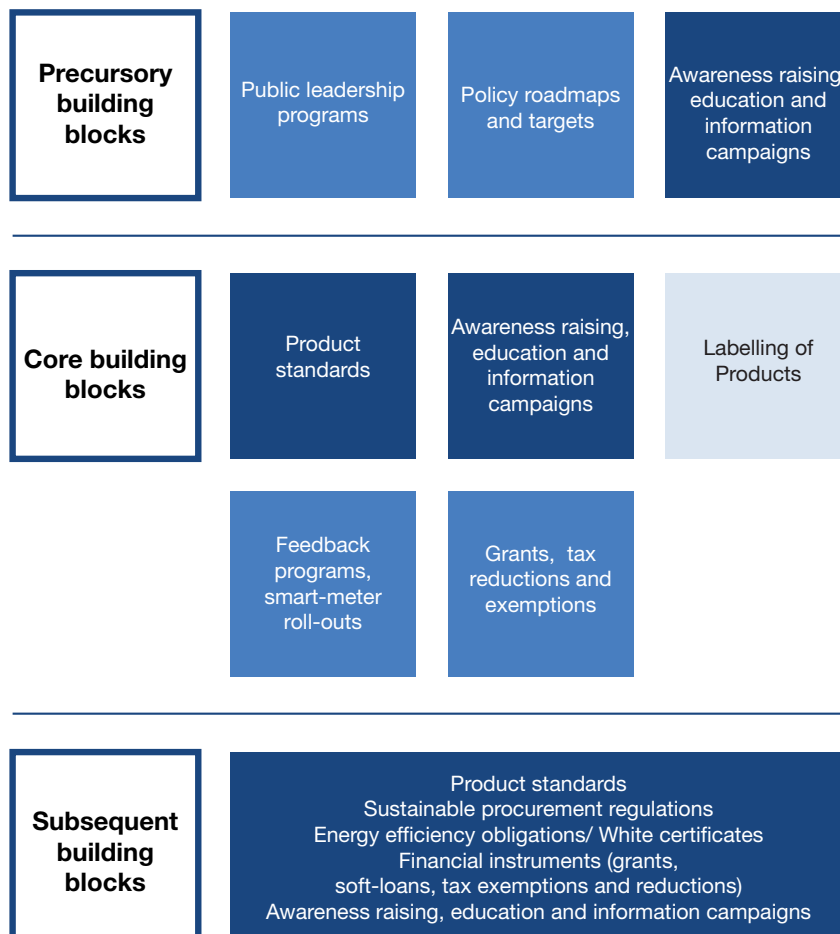
## 7.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Select the target products	Include at least the most widespread products. Base the selection on local research on the potential savings to be achieved by targeting different products.
2	Approach the industry for collaboration	Plan for the involvement of manufacturers, importers and retailers. Benefiting from their expertise and involving them in decisions can significantly reduce assessment and enforcement costs.
3	Analyse the potential effects of different alternative settings	Ideally, an impact assessment should be carried out to study the potential impacts and costs of different alternatives policy settings: voluntary vs. mandatory, comparative vs. endorsement, inclusion of different products. A mandatory scheme will probably have a higher impact, but may require greater governmental efforts. A voluntary scheme may be preferable until the capacities are developed and the sector is ready for a more ambitious program.
4	Identify the resources necessary	Resources need to be identified for introducing and operating the program.
5	Design the label	The design should be catchy and simple. Consider adapting an existing design to the local conditions (culture, knowledge, reading style). Take into account other labels that are already in place. Ideally, each product should be regulated by one or two labels to avoid overloading the consumers with information. Make sure that high performing products are recognized through the label. If resources are insufficient, a voluntary scheme can complement the mainstream program (whether voluntary or mandatory), with an endorsement component to differentiate top-of-the-class products.
6	Initiate a communication campaign by announcing the government plans	A communication campaign should be initiated by announcing the government plans to the entire building sector as well as to potential product purchasers. Ideally this step should be part of an overall communication strategy that ensures the credibility of the instrument, informs and raises awareness on sustainability performance.
7	Identify, and if necessary create, the quality testing infrastructure	A quality testing infrastructure requires a legal mandate, budgetary provisions and efforts on capacity building. Regional collaboration, label harmonization and self-certification by producers minimize the need and costs for this institutional setting. The country should have accredited organizations to test the products which are able to conduct certification according to national or international standards.
8	Adopt and publish the product-testing procedures	Make sure that the testing facilities and protocols are certified to guarantee the credibility of the results. Whenever possible, adopt internationally recognized testing and capacity-measurement procedures. Simplified versions of internationally recognized protocols can lower the costs. Their publication will enable manufacturers, importers and service providers to adapt their processes, to report results, to request waivers and exceptions, etc. Cooperating with neighbouring countries can also reduce costs.
9	Enforce inspection as well as a monitoring and evaluation system	Regular and strict inspection is paramount to ensure compliance. Monitoring the impacts is necessary to quantify the effect and to indicate the areas with greatest potential for improvement.
10	Update the scheme	Updates may concern stricter requirements for already covered product groups and/or the incorporation of new groups. These should be based on evaluations of ongoing technological improvements and increased capacities. Updates should be introduced prior to the obsolescence of designated label classes, in order to maintain stringency and motivate continuous performance improvement. A voluntary endorsement program can respond to capacity-building needs while rewarding pioneering products.

## 7.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



Colour code describing the interaction of each instrument with the reviewed one:



### 7.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- **Public leadership programs** increase the expected acceptance of the instrument in the sector and its overall credibility.
- **Policy roadmaps and targets** enable the mandated agencies and experts to set specific performance targets, and to communicate the upcoming requirements to the sector.
- **Awareness raising, education and information campaigns** increase the expected acceptance of the instrument within the industry, as well as purchasers' potential interest and understanding of product performance and quality assurance.
- **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable products to regular ones.

### 7.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- **Product standards.** Their introduction in parallel or prior to product labelling allows the government and the private sector to develop their technical capacities, and to improve the coherence of the regulatory environment. Product standards and product labelling complement each other by generating a push and a pull effect on the products' markets.
- **Financial instruments (grants, tax exemptions and reductions)** enable the introduction of high-performing products and ensure that they are available to specific target groups, like low-income groups or public institutions.
- **Awareness raising, education and information campaigns** increase the expected acceptance of the instrument within the industry as well as purchasers' potential interest and understanding of product performance and quality assurance.
- **Feedback programs and smart-meter roll-outs** enable energy consumers to identify and to evaluate the consumption associated with the operation of products, and therefore to become aware of the benefits of high-performing (labelled) products.
- **Variants of the reviewed instrument.** Voluntary product labelling can contribute to the success of mandatory labelling schemes in various ways. Introducing voluntary product labelling beforehand can generate the capacity needed to subsequently facilitate the establishment of

mandatory schemes. In a regulated environment, voluntary labelling for specific sectors such as high performing classes can provide an alternative to the rigidity of mandatory schemes, and prepare the sector for the next update. The presence of more than two labels, especially when not designed to complement each other, can be confusing for the purchasers.

### 7.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **Product standards.** The reviewed instrument allows the government and the private sector to develop their technical and institutional capacities prior to introducing this strict regulatory instrument. In addition, the presence of product labelling may increase the acceptance of the instrument among consumers and within the industry.
- o **Sustainable procurement regulations, energy efficiency obligations/ White certificates and financial instruments (grants, soft-loans, public benefits charges, tax exemptions and reductions).** Their introduction may be facilitated by using existing labelling systems to simplify and justify investment decisions, and to demonstrate performance achievements, e.g. through the introduction of labelling of high-performing products.
- o **Awareness raising, education and information campaigns** may use product labelling to exemplify the benefits of sustainable consumption.

## 7.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Australian Government, 2011. *Water Efficiency Labelling and Standards (WELS) Scheme*. Water Efficiency Labelling and Standards (WELS) Scheme home page. <http://www.waterrating.gov.au/index.html>

Bonney, E., 2008. *Illegal Energy Lamps Flood the Market*. CLASP S & L Document Library. <http://www.clasponline.org/clasp.online.resource.php?disdoc=592>

Collaborative Labeling and Appliance Standard Program (CLASP), 2011. *Making Appliance Energy Efficiency the New Global Standard*. <http://www.clasponline.org>

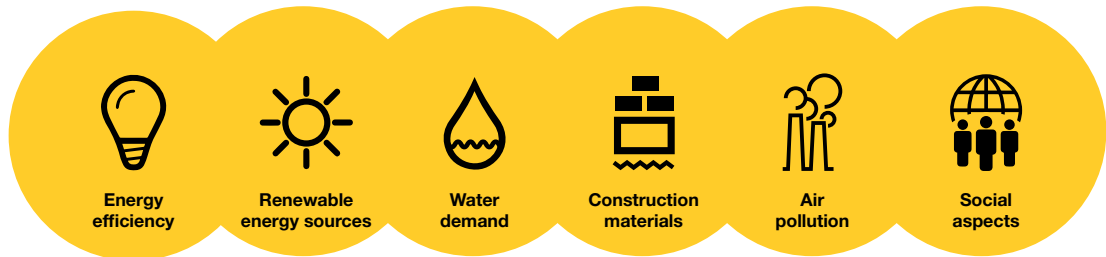
Government of New Zealand, 2012. *Understanding Ecolabels and Sustainability Claims*. Business.govt.nz. <http://www.business.govt.nz/laws-and-regulations/the-environment/understanding-ecolabels-and-sustainability-claims>

International Energy Agency (IEA), 2010. *Transforming Global Markets for Clean Energy Products: Energy Efficient Equipment, Vehicles and Solar Photovoltaic*. Paris. [http://www.iea.org/papers/2010/global\\_market\\_transformation.pdf](http://www.iea.org/papers/2010/global_market_transformation.pdf)

International Energy Agency (IEA), 2010. *Monitoring, Verification and Enforcement. Improving Compliance within Equipment Energy Efficiency Programmes*. Paris, France: OECD Publishing. [http://www.environmentportal.in/files/costperf\\_ccs\\_powergen.pdf](http://www.environmentportal.in/files/costperf_ccs_powergen.pdf)

Wiel, S. & McMahon, J.E., 2005. *Energy Efficiency Labels and Standards: A Guidebook for Equipment, Appliances and Lighting*. <http://www.clasponline.org/ResourcesTools/Resources/StandardsLabelsGuidebook>.

## 8 MANDATORY AUDIT PROGRAMS



### 8.1 OVERVIEW OF THE INSTRUMENT

#### 8.1.1 Alternative names

Mandatory benchmarking; energy audit obligation; energy conservation audits; energy balance audits; energy and water audits; indoor air quality audits; building waste audits, etc.

#### 8.1.2 Objective

The objective of mandatory audit programs is to prepare a high quality, technically sound assessment of the current and potential sustainability performance of buildings, and to recommend a set of cost-effective options to improve performance.

#### 8.1.3 Definition

Mandatory audits measure the performance of buildings in the areas of energy and water consumption, as well as in other sustainability-related areas. Audits also identify potentially cost-effective improvements, ensuring that informed decisions are made.

#### 8.1.4 Variations

Mandatory audit programs can vary in their stringency, according to the presence of cer-

tain mandatory elements and to the requirements attached to compliance:

- o **Regularity of the audit.** Audits may be compulsory at regular intervals or only upon the occasion of sale, rental or renovation.
- o **Building size.** Generally, only buildings above a certain size are targeted. Other criteria may be occupancy and energy consumption (typical in cross-sectoral regulations).
- o **Building type.** Audit regulations typically differentiate between public and private buildings, as well as residential and non-residential buildings (and even commercial and industrial buildings). Some regulations also address specific building uses, e.g. hospitals, schools, etc.
- o **Certification.** Audits may be requested as part of a building's certification instrument.
- o **Reporting and publication.** The instrument may include the obligation to inform on the audit outcome, for instance through a publicly available database. Reporting requirements may lead to a regular release of information (e.g. through monthly measurements), or only request the publication of information for

interested parties at specific occasions, e.g. at the time of sale, lease or rent.

- o **Obligation to implement the improvement measures recommended through the audit.** This option largely increases the potential effects of the measure, but also increases the transaction costs for the industry.
- o **Mandatory accreditation of auditors.** In general, mandatory accreditation is favoured to guarantee the quality and transparency of the audits.
- o **Benchmarking.** Audits may use as a reference a) a set of model buildings selected by the program, against which buildings with a similar size and occupancy are compared, or b) pre-established benchmarks (e.g. data from certification schemes).
- o **Level of detail.** The requirement set determines the audit-associated costs and the targeted level of improvement. Preliminary, walkthrough or simple audits follow the simplest methodology and involve the lowest cost. Single purpose or standard audits aim at auditing only certain elements or systems of the building. Comprehensive or complex audits examine the overall building against the selected assessment criteria. Comprehensive audits are the most complex and costly, usually requiring computer simulation. However, they can lead to the most important sustainability improvements, as they provide detailed results.

## 8.2 RELEVANCE



### 8.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument can be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	The introduction of mandatory audits is possible at national and local levels. Given that mandatory audits do not require a benchmark system at the national level, their introduction at the sub-national level may be simpler than building certification or building codes.
<b>Local level (city or lower level)</b>	😊	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.

IF

The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 8.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		The instrument can be designated for all types of buildings and building-integrated systems.	
	New buildings			
	Public	Non-residential buildings		😊
		Residential buildings		😊
	Private	Non-residential buildings		😊
		Residential buildings		😊
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	Comprehensive or complex audits may encompass the building and all its contents, e.g. information and communication technological products in commercial buildings. However, many audits only address building structures and systems, e.g. heating or lighting.	
		Residential buildings		😊
	Private	Non-residential buildings		😊
		Residential buildings		😊



The instrument has a positive effect.



The instrument may have a positive effect, if certain conditions apply.


















The instrument is not applicable, has very little effect, or no effect at all.




 8.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>		Mandatory audit programs can influence the behaviour of multiple actors by making sustainability criteria available and mainstreaming their use in building assessment. Moreover, mandatory audits can provide the industry with the means to respond to an increasingly aware and informed demand for high-rated buildings, thus reducing the potential impact of behavioural barriers.
	Insufficient information or awareness among target actors		Mandatory audits enable actors to compare the performance of similar buildings and to become aware of the relevance of the performance attributes used in an audit system.
	High rates of illiteracy among target consumers		The content of the audit and recommendations for improvement are issued in written form.
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		Certificates generate a demand for sustainable solutions by increasing the market value of sustainable buildings. This in turn can result in the increased availability of sustainable technologies. However, the low availability of certain technologies at initial stages may hinder the success of the instrument, or require the setting of less ambitious obligations (see 8.1.4 - Variations).
	High initial costs of sustainable solutions		High initial costs may hinder the success of the instrument. However audits may recommend behavioural changes, e.g. through the introduction of building energy management, in which case the instrument can operate regardless of this barrier.
	Fragmented market structure <sup>3</sup>		By providing a complete framework for measuring buildings' sustainability — which influences building market values—mandatory audits showcase the stakeholders' goals, setting the ground for a new collaborative approach.
	Limitations in the typical building design process <sup>4</sup>		
	Split incentives <sup>5</sup>		Audits enable tenants to compare the operational costs and the comfort of similar buildings and to negotiate the rent.
	High transaction costs of sustainability programs <sup>6</sup>		a) An immediate update of existing practices and building stock is not required. b) The additional cost of buildings may be limited to the audit fee, equal for high and low performing buildings. c) Administrative costs can be neutral.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		a) Mandatory audit programs require little coordination with the existing political setting. b) By providing an incentive for improvement, audits are complementary to other regulatory instruments (e.g. building codes). c) Auditing is typically conducted by independent auditors. d) Since the desire to obtain positive assessments can give rise to certain corruption practices, it is essential to put in place transparent processes.
	Utility theft or non-payment		

- + The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 8.2.4 **Policy goals**

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect	Potential effect	
<b>Environment/ resources</b>	Increasing energy efficiency	😊	The instrument can potentially address sustainability in any environmental and resource-related area included in the assessment requirements. The most common criteria are energy consumption and energy balance, with the latter encompassing renewable energy generation. Other areas which are commonly assessed are water consumption, indoor air quality, and comfort aspects, e.g. accessibility.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	😊		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😊		
	Increasing the sustainability of local resource use	😊		
	Limiting land use in urban areas (including indirect land use)	😊		
	Reducing air pollution	😊		
	Supporting climate change adaptation	😊		
<b>Social</b>	Reducing utility costs for the population	😊	By improving the overall quality and performance of buildings, mandatory audits benefit building users and/or those bearing the utility costs. *Mandatory audits can be designed to address specific building types and uses.	
	Supporting a specific target group	Public institutions		😊*
		Small and medium enterprises		😊*
		Low-income consumers		😊*
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊*	*The increased demand for sustainable solutions invigorates the green market. The magnitude of these impacts is generally higher in schemes requiring the implementation of the recommendations derived from the audit. However, mandatory audits contribute to technological development and increased supply of sustainable solutions only indirectly. ** Mandatory audits can foster the regulation of informal constructions, provided additional efforts are pooled.	
	Creating new employment opportunities	😊*		
	Supporting Research and Development (R&D) activities for technological innovation	😊*		
	Eliminating/tackling informal market	IF**		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊*		
	Creating new business opportunities by market transformation	😊*		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😊		
<b>Political</b>	Improving energy security <sup>2</sup>	😊*	*Particularly in schemes where implementation of the recommendations is mandatory. ** Particularly in schemes requiring the publication of audit results. ***It is common that the introduction of audits in public buildings leads to reduced operational costs. **** Irregular certification may be in the interest of certain actors.	
	Making politics of sustainable development credible	😊**		
	Releasing budgets from public bodies	😊***		
	Reducing corruption	😊****		

😊 The instrument has a positive effect on this goal.

😊 The instrument has no or almost no effect on this goal.

IF The instrument may contribute to this goal, according to some conditions.













😊 The instrument has a negative effect on this goal.


<sup>1</sup> That is to say, increasing the utilization of renewable energy sources.


<sup>2</sup> Energy security is here defined as supplying more consumers with the same production capacity.

### 8.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Implementation requirements
<b>Existence of high rates of construction, reconstruction, selling and/or renting</b>		Continue to the next precondition.
		The program design should include additional communication and enforcement efforts. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Tradition of high compliance with regulatory instruments, or record of successful collaboration between the public sector and the building industry</b>		Continue to the next precondition.
		In addition to a clear commitment from the administration, a balance is recommended between outreach (awareness raising, education and information campaigns, voluntary agreements), and the necessary controls and proportionate sanctions. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>The different actors are aware of the different sustainability issues related to buildings.</b>		Continue to the next precondition.
		A low impact is expected, particularly when the implementation of recommendations is not obligatory. Consider: increasing penalties and the stringency of the obligation, as well as introducing awareness raising, education and information campaigns, public sector leadership and voluntary agreements. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Availability of technical capacity (1) within the industry, to conduct audits (including when a list of certified auditors is required) and implement recommendations and (2) within the public administration, to control and secure the enforcement of the instrument.</b>		Continue to the next precondition.
		Limited enforcement capacity may be compensated by limiting the stringency of the obligations (see section 8.1.4). Technical capacity can be progressively developed (with a capacity building effort). If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Availability of national benchmarks (certificates, building codes or model buildings) for the regulated building types.</b>		Continue to the next precondition.
		Additional technical capacity will be required for developing the auditing system and processes. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Existence of low corruption levels in the public administration.</b>		Continue to Implementation steps (section 8.4).
		Ensure that the processes are clearly defined, data is transparently available and penalties are defined. Design a simple data collection system based on the cadastre to control the auditing process from a centralized bureau. If this is feasible, continue to Implementation steps (section 8.4). If not, reconsider the introduction of the instrument.

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

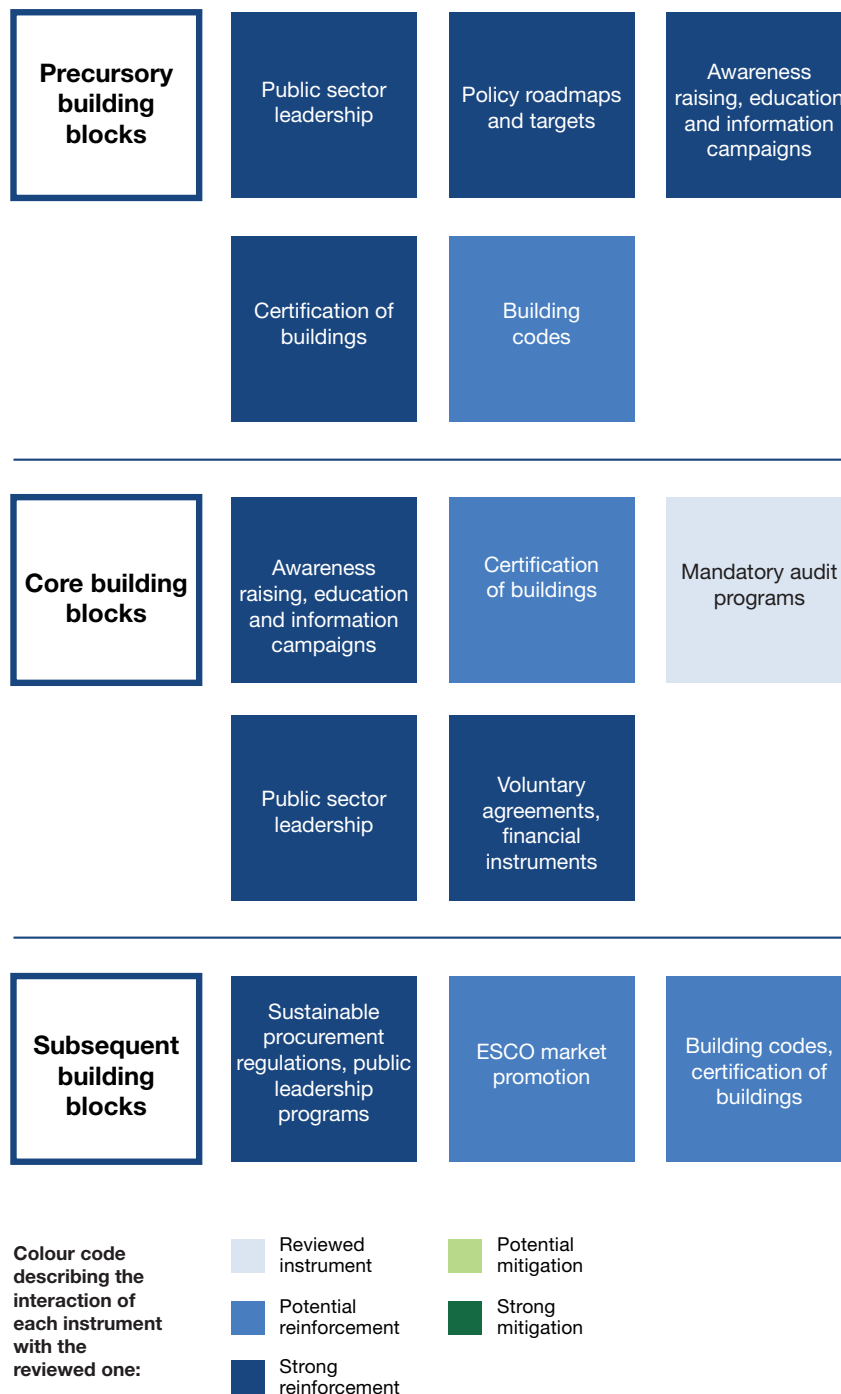
## 8.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Appoint a leading body, select the sustainability criteria and identify participants	Prioritize those criteria and participants whose activities and types of buildings have the largest potential.
2	Draft policy roadmaps and targets	A collaborative process will determine the decisions on the stringency of the instrument and the need for additional actions (e.g. training) or building blocks (financial support for voluntary agreements, awareness raising, education and information campaigns, etc. - see section 8.3). Assess data availability to determine the most suitable variants of the audit.
3	Design the instrument	<ul style="list-style-type: none"> <li>• Decide what will be the most adequate variant according to the description (section 8.1.4) and recommendations (section 8.3).</li> <li>• Prefer simple designs, as these minimize costs.</li> <li>• Indicate who will conduct the audits, what will be audited and who will bear the costs.</li> <li>• Describe the penalties related to noncompliance.</li> <li>• Specify who can carry out assessments, and whether they need to be registered and pay registration fees.</li> <li>• Include a mechanism for inspection and to monitor the quality of audits.</li> <li>• Decide on the need of establishing a central database.</li> </ul>
4	Harmonise the legal-normative framework	Take into account the existence of informal constructions, upon which this instrument will have little impact.
5	Capacity building: train and certify auditors, building managers, etc.	In some cases a registration fee covers the cost of organizing the training program. A certain degree of technical capacity and awareness should be developed both within the public administration and within the industry. Regular capacity building should continue during the program implementation.
6	Enforce the instrument	<ul style="list-style-type: none"> <li>• Obligation is communicated to building owners.</li> <li>• Buildings are audited.</li> <li>• Building owners receive the audit and a set of recommendations.</li> <li>• Building owners can/are obligated to implement the recommendations.</li> <li>• Building is reassessed.</li> <li>• Results are published according to the instrument design.</li> <li>• Building is inspected and penalties applied in case of noncompliance.</li> <li>• The leading government body records the action and its results.</li> </ul>
7	Monitor and evaluate	Level of compliance. Overall performance improvement in targeted buildings. Increased awareness of the general/target public.
8	Update (every five to ten years)	Adapt benchmarks to ongoing technological improvements, e.g. reference to new model buildings or to a certification system.
9	Extend the program	In general, assess the interest of increasing the stringency or obligations of the program, e.g. by extending it to building types not covered in the previous phase, by reducing the size of targeted buildings, by including residential buildings when only commercial buildings were regulated, by introducing the obligation to publish, etc. (see section 8.1.4).

### 8.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



### 8.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- **Public sector leadership** increases the expected acceptance of the reviewed instrument as well as its impact on changing values, attitudes, and actions through information and awareness raising campaigns.
- **Policy roadmaps and targets** enable mandated agencies and experts to set appropriate and responsive targets for the instrument, and to communicate the upcoming (auditing) requirements to the building sector.
- **Awareness raising, education and information campaigns** maximize the impact of the instrument by reinforcing the social responsibility of building owners and tenants, and generating interest for assessing performance criteria. These outreach campaigns are particularly relevant in the absence of an obligation to implement the audit recommendations.
- **Certification of buildings.** The presence of building certification prior to audits guarantees the existence of benchmarks and the availability of technical assessment and monitoring capacity. Although the combined presence of certificates and audits —particularly when both are mandatory— may entail double efforts, adequately designed programs share actions (e.g. awareness raising campaigns and collaboration with the building sector) and capacities and produce a “push and pull” market effect.

- **Building codes.** Their introduction prior to the reviewed instrument allows the government and the private sector to develop their technical capacity. Building codes and mandatory audits complement each other by generating a “push and a pull” effect on the building market.

- **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived price of energy, and may therefore impact the assessment of costs and benefits in preferring sustainable solutions to regular ones.

### 8.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- **Public sector leadership** may be introduced along with the reviewed instrument, multiplying the impact of the audits and providing the public sector with the means for demonstrating its achievements. Public sector leadership may be necessary, especially for mandatory schemes, to increase the coherence of the normative system.
- **Awareness raising, education and information campaigns** may be specifically designed to boost the impact of the reviewed instrument and thus be addressed to building sector actors or to the general public. This is fundamental for the success of mandatory audit programs.

- o **Voluntary agreements** are typically introduced to motivate a reluctant building industry to engage in the program.
- o **Financial instruments (grants, tax reductions and exemptions, soft loans)** are useful in promoting sustainability improvements as recommended by audits.
- o **Certification of buildings.** Promoting the introduction of voluntary certification programs provides high-performing buildings with additional visibility, further increasing the general public's interest in sustainability improvements.

#### 8.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **ESCO market promotion, building codes and certification of buildings** benefit from the capacities developed. ESCO market promotion schemes use audits to determine the technical and financial feasibility of the promoted projects.
- o **Public leadership programs and sustainable procurement regulations** benefit from the early introduction and mainstreaming of audits to simplify and justify investment decisions.

## 8.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

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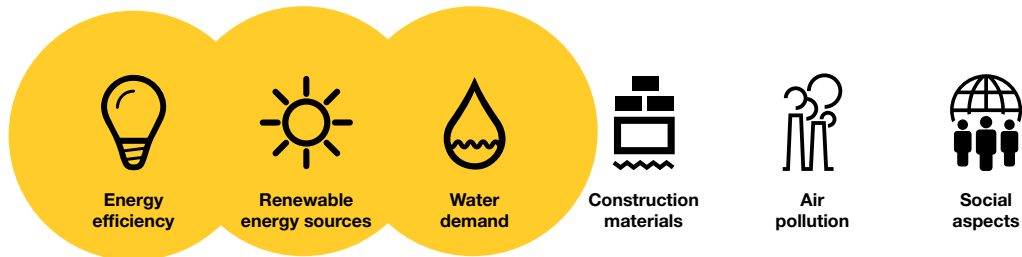
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## 9 SMART METER ROLL-OUTS



### 9.1 OVERVIEW OF THE INSTRUMENT

#### 9.1.1 Alternative names

Intelligent metering; Automated Meter Reading (AMR); Advanced Metering Infrastructure (AMI); or Automated Meter Management (AMM).

Smart meters are technological devices that record utility (electricity, water, or gas) consumption in (near) real-time and remotely communicate this information to the utility provider. Smart meter roll-out refers to the wide-scale installation of smart meters. When smart meters are used to provide consumption feedback and are accompanied by tailored information on how to reduce it, they can be considered as “direct feedback” (see also Chapter 23: “Feedback programs”).

#### 9.1.2 Objective

The objective of smart meter roll-outs is two-fold. First of all, smart meters enable consumers to understand their utility consumption, to become aware of saving opportunities, to actively reduce consumption and, through specific systems, to connect renewable micro-utility generation systems to the grid. Through smart meters, consumers receive more accurate bills, better service, and can compare suppliers.

At the same time, the use of smart meters allows utility suppliers to reduce utility-theft and to develop advanced services to better respond to demand, detect defaults quickly and allow for faster reparations, thereby reducing complaints. Smart meters also enable utility companies to anticipate demand, and to respond through grid interconnections and peak-consumption lowering actions (e.g. feedback or variable pricing), which can in turn reduce the need for an expansion of supply capacity. The program has to be carefully designed to respond to the demands of both consumers and utility companies. In some cases, consumer associations have claimed that smart meter roll-outs are mostly designed with the interests of utilities in mind.



### 9.1.3 Definition

Smart meter roll-outs are the obligatory take-up of intelligent meters for measuring the consumption of electricity, gas, water and/or other utilities. The meters may have additional functionalities, such as automatic reading or real-time information on consumption for the users.

The introduction of time-of-use tariffs (lower rates are set for consumption at off-peak times) is a common result of the roll-out of smart meters. While reducing peak demand, these tariffs may or may not be advantageous for consumers, depending on the willingness and ability of the utility to provide additional services. It is essential from a social standpoint to ensure that consumers are provided with services that allow them to reduce their total consumption. Examples include informative billing, tailored advice, and financial bonuses related to reducing consumption.

### 9.1.4 Variations

Smart meter roll-out programmes can be:

- o mandatory or voluntary (a voluntary approach is only effective when there is sufficient interest from consumers and utilities to guarantee uptake)
- o full scale or limited to certain consumer groups or geographic areas
- o initiated in any of the following ways:
  - industry led (by utility companies: the government's role is to standardize and ensure consumer protection and the obligation to secure consumer benefits through obligatory feedback)
  - legislation driven (the government's role includes additional responsibilities, which could give rise to industry opposition)
  - requested by consumers
- o used for energy, water, or other utilities. Smart meters are usually used (and perceived as appropriate) for electricity metering. However, smart meter devices can also be used to measure, for instance, natural gas, heat or water consumption.
- o distinguished by the type of feedback attached to the programme (see also Chapter 23: "Feedback programs").

## 9.2 RELEVANCE



### 9.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/ with jurisdiction over the country)</b>	😊	😊	Smart meters can be introduced at both levels, provided utility companies are willing to introduce them. However, as the introduction of smart meters may impact consumers' rights, mandatory programmes may have to be implemented at the national level.
<b>Local level (city or lower level)</b>	😊	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.



IF The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 9.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance
<b>Buildings</b>	Existing buildings		😊*
	New buildings		😊*
	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
Residential buildings		😊	
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊



The instrument has a positive effect.



The instrument may have a positive effect, if certain conditions apply.














The instrument is not applicable, has very little effect, or no effect at all.


<sup>1</sup> Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.


 9.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>		By receiving timely information on their consumption patterns, consumers become aware of the monetary implications of utility consumption and savings.
	Insufficient information or awareness among target actors		Smart meters enable consumers to adapt their consumption based on the information/feedback from the meter. General awareness is raised, as well as understanding of the benefits of resource savings.
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		
	High initial costs of sustainable solutions		
	Fragmented market structure <sup>3</sup>		
	Limitations in the typical building design process <sup>4</sup>		
	Split incentives <sup>5</sup>		
	High transaction costs <sup>6</sup>		Smart meter roll-outs require a relatively high initial investment in the devices. Because smart meters have been proven to provide benefits to utilities (e.g. reduced costs of generation to satisfy high demand peaks, reduced workforce needed for meter reading, fewer bill complaints, possibility to detect faults remotely), they can finance the investment provided regulations allow recovery through a price increase in utility bills.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Smart meter roll-outs require little government capacity, as they are mostly implemented by the utilities. Once introduced, the instrument operates regardless of the presence of corruption. However, their introduction may be criticized as responding more to utility company concerns than to consumer demand.
	Utility theft or non-payment		Through smart meters, the utility is able to detect theft, to remotely read consumption, and if needed to disconnect users.

 The instrument modifies the policy context, reducing the magnitude of this barrier.

 The instrument overcomes this barrier, or operates regardless of this barrier.

 The instrument partially overcomes this barrier.

 The instrument does not overcome this barrier.

1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.

2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.

3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.

4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.

5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.

6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 9.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect	
<b>Environment/ resources</b>	Increasing energy efficiency	😊*	
	Reducing water demand	😊*	
	Reducing waste-water generation	😐	
	Reducing energy peak demand	😊	
	Increasing access to high quality water in buildings	😐	
	Decarbonising the energy supply <sup>1</sup>	😊**	
	Increasing the sustainability of local resource use	😐	
	Limiting land use in urban areas (including indirect land use)	😐	
	Reducing air pollution	😐	
	Supporting climate change adaptation	😐	
<b>Social</b>	Reducing utility costs for the population	IF*	
	Supporting a specific target group	Public institutions	😐
		Small and medium enterprises	😐
		Low-income consumers	😞
Improving comfort, services and housing conditions	😐		
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😐	
	Creating new employment opportunities	😊*	
	Supporting Research and Development (R&D) activities for technological innovation	😐	
	Eliminating/tackling informal market	😐	
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊	
	Creating new business opportunities by market transformation	😐	
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😊	
<b>Political</b>	Improving energy security <sup>2</sup>	😊	
	Making politics of sustainable development credible	😊*	
	Releasing budgets from public bodies	😐	
	Reducing corruption	😐	

- 😊 The instrument has a positive effect on this goal.
- 😐 The instrument has no or almost no effect on this goal.
- IF The instrument may contribute to this goal, according to some conditions.
- 😞 The instrument has a negative effect on this goal.

<sup>1</sup> That is to say, increasing the utilization of renewable energy sources.

<sup>2</sup> Energy security is here defined as supplying more consumers with the same production capacity.

### 9.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations			
<b>Access to digital information is common. Target groups are familiar with digital devices (mobile phones, smart phones, tablets, computers, etc.), able and willing to use the new devices.</b>	☺	Continue to the next precondition.			
	☹	The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.			
<b>Connection to the grid:</b> <ul style="list-style-type: none"> <li>• The target group is connected to the grid/system or,</li> <li>• It is possible to connect the target group.</li> </ul>	☺	Continue to the next precondition.			
	☹	The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.			
<b>Individual metering exists in most of the target areas.</b>	☺	Continue to the next precondition			
	☹	<table border="1"> <tr> <td>It is possible to cover the costs related to developing individual metering on the grid.</td> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td></td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	It is possible to cover the costs related to developing individual metering on the grid.	If this is feasible, continue to the next precondition.	
It is possible to cover the costs related to developing individual metering on the grid.	If this is feasible, continue to the next precondition.				
	If not, reconsider the introduction of the instrument.				
<b>A sufficient level of awareness about sustainability exists among target groups, and target consumers show interest in information on their consumption patterns.</b>	☺	Continue to the next precondition			
	☹	<table border="1"> <tr> <td>Introduce an awareness raising, education and information campaign, either before the smart meter roll-out or along with it.</td> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td></td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	Introduce an awareness raising, education and information campaign, either before the smart meter roll-out or along with it.	If this is feasible, continue to the next precondition.	
Introduce an awareness raising, education and information campaign, either before the smart meter roll-out or along with it.	If this is feasible, continue to the next precondition.				
	If not, reconsider the introduction of the instrument.				
<ul style="list-style-type: none"> <li>• <b>Competitive energy market (utilities consider improving the quality of service as a competitive advantage)</b></li> <li>• <b>Existence of a tradition of collaboration with utilities, which are willing to participate in government programs.</b></li> </ul>	☺	Continue to the next precondition.			
	☹	<table border="1"> <tr> <td>A collaborative approach is preferable. However, the government may need to introduce a threat of supply market restructuring.</td> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td></td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	A collaborative approach is preferable. However, the government may need to introduce a threat of supply market restructuring.	If this is feasible, continue to the next precondition.	
A collaborative approach is preferable. However, the government may need to introduce a threat of supply market restructuring.	If this is feasible, continue to the next precondition.				
	If not, reconsider the introduction of the instrument.				
<b>There is sufficient technical and financial capacity to purchase and install meters (i.e. it is cost-effective for utilities to make this effort). It is important to restrict or avoid a transfer of cost from utilities to users, depending upon whether or not the users have the ability to absorb these extra costs.<sup>1</sup></b>	☺	Continue to the next precondition.			
	☹	<table border="1"> <tr> <td>Support capacity building at the utility company level. Carry out a cost-benefit analysis for all parties. Consider establishing grants or soft loans for vulnerable groups. Recover costs through time-based pricing.</td> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td></td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	Support capacity building at the utility company level. Carry out a cost-benefit analysis for all parties. Consider establishing grants or soft loans for vulnerable groups. Recover costs through time-based pricing.	If this is feasible, continue to the next precondition.	
Support capacity building at the utility company level. Carry out a cost-benefit analysis for all parties. Consider establishing grants or soft loans for vulnerable groups. Recover costs through time-based pricing.	If this is feasible, continue to the next precondition.				
	If not, reconsider the introduction of the instrument.				
<b>There is capacity to provide individual feedback based on the individualized information from smart meters.</b>	☺	Continue to implementation steps (section 9.4).			
	☹	<table border="1"> <tr> <td>The provision of feedback is an opportunity to multiply the impacts of smart meter roll-outs. Capacity on both the technical and financial level should therefore be developed.</td> <td>If this is feasible, continue to Implementation steps (section 9.4).</td> </tr> <tr> <td></td> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	The provision of feedback is an opportunity to multiply the impacts of smart meter roll-outs. Capacity on both the technical and financial level should therefore be developed.	If this is feasible, continue to Implementation steps (section 9.4).	
The provision of feedback is an opportunity to multiply the impacts of smart meter roll-outs. Capacity on both the technical and financial level should therefore be developed.	If this is feasible, continue to Implementation steps (section 9.4).				
	If not, reconsider the introduction of the instrument.				

☺ The precondition exists - move to the next precondition.

☹ The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

<sup>1</sup> The cost of smart meters is still rather high and will most probably be borne by the consumers. On the other hand, the benefit for consumers is highly dependent on the quality of the scheme, mostly on the feedback received based on smart metering, and the ability and willingness of consumers to respond to the information.

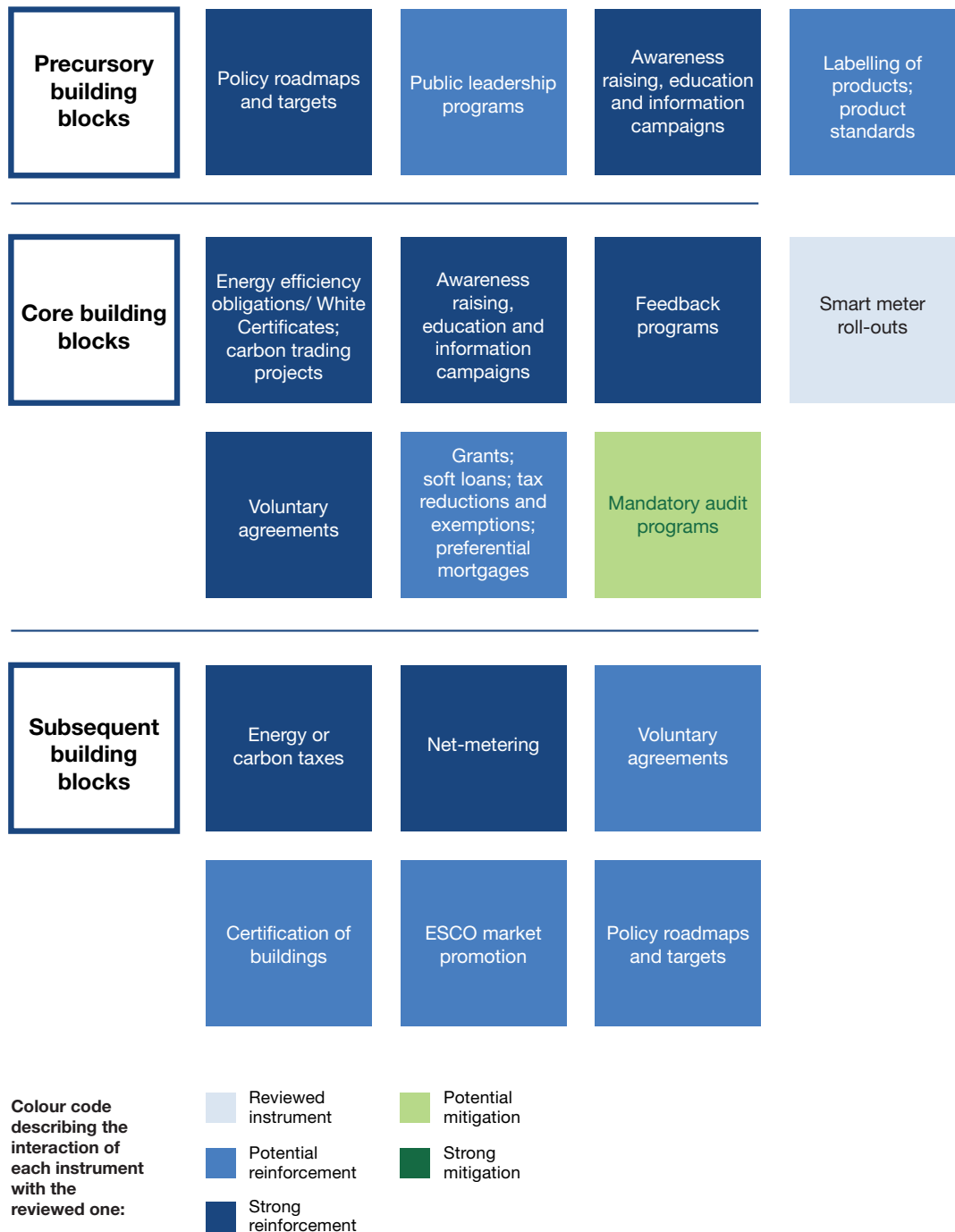
## 9.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Evaluate the readiness of the market	Some relevant questions include: Is the grid well developed? Should the programme be limited to selected target group(s)? Can the utilities roll-out smart meters themselves or would a government-driven approach be more appropriate? Are consumers ready? What kind of feedback is the most appropriate? Is the meter manufacturing industry prepared? Will meters be imported or could the local industry be strengthened?
2	Consult the industry and inform market actors at an early stage	The industry needs to be deeply involved in a smart meter roll-out, and a long period of time to prepare. Meter manufacturers need to establish or ramp up production lines. Supplier utilities need to recruit and train installation staff, procure meters and amend their systems and processes to support smart metering. Therefore it is crucial to involve them from the beginning and to decide on the core elements of the programme as early as possible.
3	Establish roll-out milestones	Take into consideration the consultation results, in order to maximise compliance: Specify the functional requirements of the meters, the feedback type, and the targets to be achieved through the roll-out. Describe consumer protection targets and guidelines. Appoint a responsible organisation. Emit licences and regulatory changes to set out the obligations and commercial arrangements under the new regime. In particular, remove regulatory barriers to enabling or mandating the introduction of smart meters.
4	Conduct pilot and cost benefit analysis	A massive roll-out may hinder the capacity to achieve an optimal solution. An adequately monitored and evaluated pilot significantly reduces this risk.
5	Carry out policy development preparations	Establish or adapt existing standards to ensure the compatibility of devices and the possibility for accommodating technological development. Set up requirements that ensure full consumer benefits, if necessary, prioritizing them over supplier benefits. Establish budgetary implications and identify the source of funds for financial support, if provided.
6	Communicate with the public and with the target group	Timely information to the public, involvement of the stakeholders, accountability and transparency determine the success of these programs.
7	Design policy: clearly set the rules and timeline, finalize technical specifications, and identify monitoring body and processes	Decide whether the program should be mandatory or voluntary, industry led or government driven (cf. section 9.1.4). Describe the timeline (staged or full establishment). Staged introduction provides for a period of demonstration and development of interest, while full scale introduction secures savings from the beginning. Introduce requirements and verification mechanisms for consumer protection, including data protection and ensuring consumer benefits. Plan for the introduction of other policies such as: financial instruments, time-based pricing, feedback programs, and awareness raising, education and information campaigns.
8	Organise a public consultation	Advertise the planned actions and organise public consultations. Pay special attention to the views of the selected target groups.
9	Implement the program	
10	Monitor the implementation and adjust the programme	Re-evaluate the need for financial intervention, and aim for reducing the regulatory push to slowly move to market-driven development. Assess the impact on consumption reduction, behavioural change, and investment decisions, identifying ways to boost impacts in terms of savings: a) introduce or re-introduce programmes to motivate behavioural change (awareness raising, education and information campaigns, or feedback programs) b) provide financial incentives for implementing improvements.

### 9.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



### 9.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- **Policy roadmaps and targets** enable mandated agencies and experts to set appropriate performance targets, and to communicate the upcoming requirements to the utilities.
- **Public leadership programs and awareness raising, education and information campaigns.** These instruments increase the general level of awareness and information among the population, thus increasing the interest in timely information about consumption and in tailored information on the potential and means to reduce consumption.
- **Labelling of products, and product standards** enable consumers who are informed through smart meter roll-outs to replace their products by more efficient ones.
- **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived price of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions and actions to regular ones.

### 9.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- **Feedback programs.** It is crucial to combine smart meter roll-outs with additional feedback to produce energy/water savings, either directly through display (and general awareness raising) or through feedback elaborated by the utility based on individual use patterns.
- **Awareness raising, education and information campaigns.** Transparent and realistic awareness raising, education and information campaigns are important for increasing the acceptance of smart meter roll-outs. The continuous dissemination of information and targeted messages increases the impact of the information provided through smart meters and the additional feedback provided by utility bills (e.g. detailed billing –cf. Chapter 23:“Feedback programs”).
- **Voluntary agreements** between the government and utilities serve to support a collaborative design and implementation. For example, the government can provide capacity building, support in fighting utility theft, or the dissemination of meters. In return, the utility can introduce a smart meter roll-out scheme that promotes building sustainability, and is beneficial to consumers.
- **Energy efficiency obligations/White Certificates and carbon trading projects** serve to engage utilities in consumption reduction, which leads utilities to introduce smart metering.



- o **Grants, soft loans, tax exemption and reductions, preferential mortgages.** These financial instruments are among the main measures that the government (or the utility in the case of programs driven by a saving obligation such as energy efficiency obligations/White Certificates, or carbon trading projects) introduces to support informed consumers in replacing products and in refurbishing buildings. Tax exemptions can be used to support the purchase of meters. However, the introduction of smart meters usually delivers financial savings to the utility companies and not necessarily to consumers. Therefore, financial support should be carefully designed and aimed at specific target groups in need.
- o **Mandatory audit programs.** The introduction of mandatory audit programs, addressed to the same target groups, may lead to a duplication of efforts, as this instrument already provides consumption feedback.
- o **Net-metering (renewable energy).** The presence of smart-meters can provide additional advantages and simplify net-metering programmes (by already providing improved feedback and lowering the cost of operation through frequent readings). It is not recommended that conventional meters be introduced for renewable energy metering if smart-metering has already been implemented. If consumption is monitored through basic meters, the cost-effectiveness of replacement by smart meters should be evaluated.
- o **Energy or carbon taxes, pricing.** Complex pricing and taxation structures can be introduced, based on the use of smart meters, to penalise high or peak-time consumption, and weigh variables such as household size or income, thus avoiding an additional burden on large or economically-vulnerable families.
- o **ESCO market promotion.** The transaction costs of ESCOs are largely reduced as data collection is simplified. Smart meter roll-outs also reduce the transaction costs of voluntary agreements, certification of buildings and policy roadmaps and targets, and increase the motivation of target groups to increase building sustainability through these instruments.

### 9.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o The information and increased awareness achieved through smart meter roll-outs can increase the acceptance and impact of most other policy instruments, as this instrument has both a behavioural effect and a technological impact, while also reducing the risk of a rebound effect.<sup>8</sup>

<sup>8</sup> The "rebound effect" is a situation where the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from the reduced consumption of a product (and therefore from lower energy costs) and compensate this reduction by purchasing and/ or using additional products, leading to stability or an increase in the overall consumption.

## 9.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Alliance for Natural Health. 2013. *Smart Meters: Say "NO" to Protect Health, Privacy and Security!* [http://anh-europe.org/sites/default/files/130215\\_ANH\\_Intl\\_smart\\_meters\\_campaign\\_PR\\_FIN.pdf](http://anh-europe.org/sites/default/files/130215_ANH_Intl_smart_meters_campaign_PR_FIN.pdf).

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Miranda, Luis. 2012. *The Bio-hazard of Smart Meters: Dirty Energy and Centralized Control*. <http://planet.infowars.com/health/the-bio-hazard-of-smart-meters-dirty-energy-and-centralized-control>.

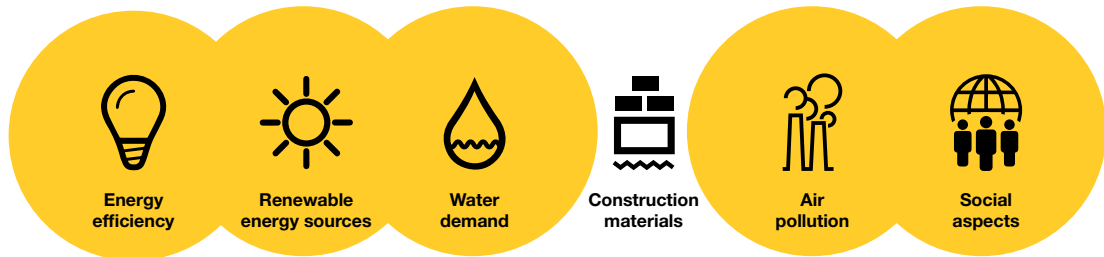
Novikova, Aleksandra, Hermann Amecke, Karsten Neuhoff, Kateryna Stelmakh, Bernadett Kiss, Clemens Rohde, Elisa Dunkelberg, Kaisa Matschoss, and Sarah Darby. 2011. *Information Tools for Energy Demand Reduction in Existing Residential Buildings*. Climate Policy Initiative (CPI). <http://www.econstor.eu/handle/10419/65873>.

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— — —. 2011b. *Smart Metering - What It Means for Britain's Homes*. <http://www.ofgem.gov.uk/Media/FactSheets/Documents1/consumersmartmeteringfs.pdf>.

Which? 2013. *Smart Meter Roll-out: Smart Meters and Energy Monitors Explained*. ('Which?' is a consumers association in the UK). <http://www.which.co.uk/energy/creating-an-energy-saving-home/guides/smart-meters-and-energy-monitors-explained/smart-meter-roll-out/>.

## 10 ESCO MARKET PROMOTION



### 10.1 OVERVIEW OF THE INSTRUMENT

#### 10.1.1 Alternative names

Support to Energy Service Companies (ESCO); promotion of an energy services market.

Energy Service Companies (ESCOs) are profit oriented firms that offer energy efficiency improvement or other energy/sustainability improvement services, which have financial implications. The remuneration of ESCOs is typically linked to the performance of their projects (for example to the amount of energy saved). Energy services typically include several or all of the following: energy audits, energy management, energy or equipment supply, and the provision of services, such as space heating or cooling. These may also include the provision of financing. There are at least two parties involved: the client and the ESCO, or service provider.

#### 10.1.2 Objective

The objective of ESCO market promotion is to support the development of an energy service market, able to carry out financially viable projects. There are various types of policy instruments that can be useful to promote this market.

#### 10.1.3 Definition

ESCO market promotion is a selection of policy instruments introduced by public authorities or agencies to support energy services companies (ESCO) in developing energy efficiency projects. Since the ESCO guarantees that savings will exceed the costs of the solution, consequently, building occupants or owners do not take a risk when investing in sustainable solutions.

Measures that support the ESCO market include a range of local and national policy instruments, such as the elaboration of feasibility studies. Most of the relevant measures are discussed in separate chapters of this Handbook as individual policy instruments, including: awareness raising, education and information campaigns (e.g. educating potential clients, training engineers on sustainability benefits), mandatory audit programs, grants, soft loans, public leadership programs and sustainable procurement regulations. One prime example of a policy action that is crucial to the development of an ESCO market is making an adjustment to legislation hindering ESCO market development (e.g. procurement regulations, or energy subsidies).

#### 10.1.4 Variations

ESCO projects result in an improvement of building performance, as well as in energy/

utility cost savings. The latter are allocated to recovering the investment costs, to generate benefits for the ESCO and savings for the client. The initial agreement on how the cost savings are eventually allocated will determine which of the various ESCO modalities will be implemented:

- o **Energy service provision:** the client pays a fixed fee to the service supplier, who does not assume (technical or financial) risk in the case of underperformance.
- o **Energy Performance Contracting (EPC):** the project's investments are repaid on the basis of a contractually agreed level of improvement (a guarantee is provided by the ESCO).
- o **Third-party financing (TPF)** involves a third party, in addition to the service provider and the client, that provides the capital for the project. The third party may or may not be an ESCO.

## 10.2 RELEVANCE

### 10.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
National level (country or independent regional unit within/with jurisdiction over the country)	😊	😊	ESCO market promotion can be conducted at national or local levels. However, supplementary actions may be necessary to enable the start of an ESCO market at the national level.
Local level (city or lower level)	IF	😊	

- 😊 The instrument is typically introduced/implemented at this policy level.
- 😐 The introduction/implementation of the instrument at this level is atypical.
- IF The instrument may be introduced/implemented at this policy level if certain conditions apply.
- 😞 It is practically impossible to introduce/implement the instrument at this policy level.

### 10.2.2 Target areas












The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.





Technological areas	Types of buildings according to use and ownership		Relevance
<b>Buildings</b>	Existing buildings		😊
	New buildings		😐*
	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
Residential buildings		😐**	
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊
		Residential buildings	😐***
	Private	Non-residential buildings	😊
		Residential buildings	😊
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😐****
		Residential buildings	😐****
	Private	Non-residential buildings	😐****
		Residential buildings	😐****

- 😊 The instrument has a positive effect.
- 😐 The instrument may have a positive effect, if certain conditions apply.
- 😞 The instrument has a negative effect.


**10.2.3 Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>		The ESCO industry will conduct the necessary efforts to communicate with target groups to counteract low levels of information and awareness about the feasibility of utility cost savings and the viability of ESCO projects. These efforts are limited to the audiences targeted by ESCO projects.
	Insufficient information or awareness among target actors		
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		
	High initial costs of sustainable solutions		ESCOs finance projects directly or through a third-party, whose financial costs are reduced by the ESCO guarantee of utility saving costs. However, ESCO services have a cost that can vary, essentially according to the ability of ESCOs to negotiate a decreased price for the chosen solutions.
	Fragmented market structure <sup>3</sup>		Building owners, managers and developers lack the technical knowledge and consensus to invest in building sustainability. Therefore, ESCOs are a suitable solution to provide technical and/or financial support. On the other hand, the building stakeholders may not seek a solution and/or trust the ESCO solution, due to lack of consensus.
	Limitations in the typical building design process <sup>4</sup>		ESCO projects rarely involve new buildings.
	Split incentives <sup>5</sup>		
	High transaction costs <sup>6</sup>		ESCOs can implement energy efficiency/sustainability projects in a more cost effective way and cover the project investment. However, ESCOs usually need third parties to finance projects. ESCOs can obtain public or private funding. In the latter case, treasury efforts are significantly reduced. Government support through grants or soft loans may be needed at the first stages of the program, along with support towards the development and education of the banking sector on sustainable energy use in buildings. In the case of residential building renovation, where transaction costs are higher, public support may be required over a longer period.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Efforts to review the legal and political context may vary depending on the policy environment. These include: a) revision of public procurement rules, b) revision of the mechanisms of energy budget allocation to local governments and government agencies, to incentivise energy efficiency investments, c) revision of energy subsidies, and d) establishing a competitive energy supply market.
	Utility theft or non-payment		

-  The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- 1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- 2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- 3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- 4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- 5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- 6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 10.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	* It is in the interest of an ESCO to use local materials if they are less costly or better adapted to the local needs.  ** ESCO projects typically favour holistic solutions, according to profitability. Therefore, sustainability improvements aim at reducing the utility costs or increasing the value of the building. The limitation of land use is typically not a priority, unless it increases profitability.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	😊		
	Increasing access to high quality water in buildings	😐		
	Decarbonising the energy supply <sup>1</sup>	😊		
	Increasing the sustainability of local resource use	IF*		
	Limiting land use in urban areas (including indirect land use)	😞**		
	Reducing air pollution	😐		
	Supporting climate change adaptation	😐		
<b>Social</b>	Reducing utility costs for the population	IF*	*ESCOs rarely target residential buildings. Therefore, their impact on the population is limited. However, when they do so, for example due to a supporting policy, they help to reduce utility costs.	
	Supporting a specific target group	Public institutions		😊
		Small and medium enterprises		😊
		Low-income consumers		😞
Improving comfort, services and housing conditions	IF*			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊		
	Creating new employment opportunities	😊		
	Supporting Research and Development (R&D) activities for technological innovation	😐		
	Eliminating/tackling informal market	😐		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😊		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😐		
<b>Political</b>	Improving energy security <sup>2</sup>	😊		
	Making politics of sustainable development credible	😐		
	Releasing budgets from public bodies	😊		
	Reducing corruption	😐		



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

IF

The instrument may contribute to this goal, according to some conditions.



The instrument has a negative effect on this goal.

<sup>1</sup> That is to say, increasing the utilization of renewable energy sources.

<sup>2</sup> Energy security is here defined as supplying more consumers with the same production capacity.

### 10.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
<ul style="list-style-type: none"> <li>Individual metering of utility consumption is applied in the potential client's premises</li> <li>The energy/utility costs are high, creating a pressure on building owners.</li> </ul>	☺	Continue to the next precondition.
	☹	The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.
The potential ESCO clients are able and willing to engage in long term contracts (i.e. public bodies are able to sign a contract that covers multiple election cycles).	☺	Continue to the next precondition.
	☹	The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.
It is easy to establish the baseline consumption of the targeted buildings (the premises of potential ESCO clients), thus reducing the transaction costs and time required for data collection.	☺	Continue to the next precondition.
	☹	Consider developing data collection guidelines, introducing data collection systems (smart meters, mandatory audits), and/or establishing benchmarks (certificates, labels, audits, etc). If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Existence of sufficient research on the current state of the ESCO market and the barriers to its initiation/development.	☺	Continue to the next precondition.
	☹	Carry out comprehensive research to understand the barriers that limit the development of the ESCO market. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Adequate legislative and regulatory framework for the establishment/development of ESCO projects: <ul style="list-style-type: none"> <li>public procurement mechanisms are swift, and include operational costs as a criterion</li> <li>public budgets are flexible, allowing movements across asset and operational budgets</li> <li>simplified building decision mechanisms exist.</li> </ul>	☺	Continue to the next precondition.
	☹	Introduce legislative and regulatory changes to overcome these limitations. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<ul style="list-style-type: none"> <li>The banking sector has sufficient resources, is well developed and open to new business possibilities</li> <li>ESCOs are able to finance projects from their own equity funds.</li> </ul>	☺	Continue to the next precondition.
	☹	Support a call for funding from international sources Support the creation of a public bank, able to provide funds to ESCOs Establish a dedicated grant or soft loan scheme. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Potential clients trust ESCO offers and are willing to outsource energy/utility management.	☺	Continue to implementation steps (section 10.4).
	☹	Introduce awareness raising, education and information campaigns targeting potential clients, demonstrate ESCO feasibility through public sector leadership actions, publish standard contracts, and establish a quality assurance system. If this is feasible, continue to Implementation steps (section 10.4). If not, reconsider the introduction of the instrument.

☺ The precondition exists - move to the next precondition.

☹ The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.



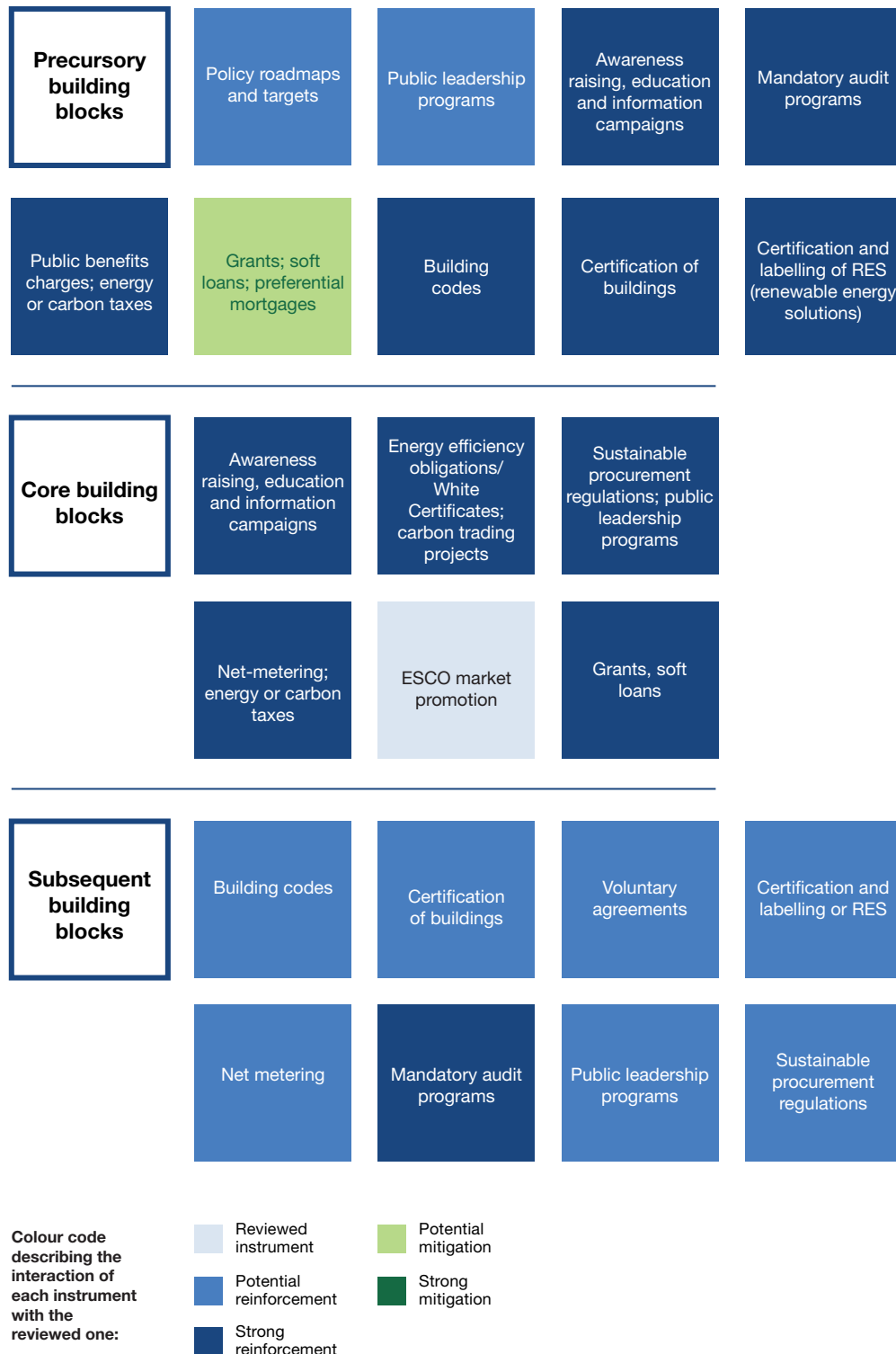
## 10.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Commission research on the current status of the ESCO market, in order to:	<ul style="list-style-type: none"> <li>• Identify existing and potential ESCOs.</li> <li>• Understand the barriers to the introduction of ESCOs.</li> <li>• Identify target sectors and technologies, based on their potential for sustainability improvements and savings.</li> </ul>
2	Depending on the research results, See two scenarios below:	
3	If the ESCO market is large and stable, or small but growing:	Promote an ESCO association; create a code of conduct; establish an ESCO standard and publish the list of qualified companies.
4	If there are no ESCOs, and/or the market is in an embryonic state:	Commission demonstration sites; establish a public ESCO; publish standard documents, such as standard contracts.
5	Consult the existing ESCOs about the development potential of the market	Establish a consultation group (e.g. an existing ESCO association) to explore the possibilities for development of the ESCO market and to support policy design.
6	Identify the possible intervention package	<ul style="list-style-type: none"> <li>• Based on points 1 and 2, select the best suited policy instruments.</li> <li>• Identify the economic costs, savings and other co-benefits.</li> </ul>
7	Communicate government objectives and goals to ESCOs and potential clients	<ul style="list-style-type: none"> <li>• Involve all stakeholders, and provide general information to the public. Accountability and transparency are critical for success.</li> <li>• Communicate (as early as possible) with the potential clients, ESCOs, technology suppliers, utilities, etc. to enable them to develop their investments plans and market strategies.</li> </ul>
8	Policy design	<ul style="list-style-type: none"> <li>• Based on the research, consultation and cost-benefit analysis, select a policy package.</li> <li>• Design each policy instrument in detail using the specific chapters of this handbook.</li> </ul>
9	Public consultation	Advertise the policy package and organise a public consultation. A stakeholder consultation serves to increase links and trust between the ESCO sector and the potential clients.
10	Implementation and enforcement	The exact details depend on the selected policy instruments. Use the relevant chapters in this Handbook.
11	Monitor ESCO market development	<ul style="list-style-type: none"> <li>• Establish the market transformation impact of ESCO market promotion and the resulting energy and cost savings in the building sector.</li> <li>• Identify new target groups, or need for further strengthening of those targeted previously.</li> </ul>
12	Adjust the policy package	<ul style="list-style-type: none"> <li>• Aim at slowly moving towards market-based development.</li> <li>• If there are target groups with sufficient potential not yet engaged in the ESCO market, establish a dedicated grant or soft loan for the under-represented market segment (note: the residential sector will need continuous financial support to cover high transaction costs).</li> <li>• Carry out awareness raising, education and information campaigns addressed to the under-represented market segment.</li> <li>• Carry out/support feasibility studies.</li> </ul>

### 10.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



#### 10.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public leadership programs and awareness raising, education and information campaigns.** These programs increase the general level of awareness and information among the population, thus increasing the interest in investing on improving building sustainability.
- o **Policy roadmaps and targets** enable mandated agencies and experts to set appropriate performance targets, and to communicate the upcoming government actions to the building industry and owners.
- o **Certification of buildings, building codes and certification and labelling of RES** work as benchmarks. They allow ESCOs to more easily compare levels of performance and related potential savings, as well as to communicate this information to potential clients. In addition, certification of buildings generates an interest in increased sustainability, which may be achieved through ESCO projects.
- o **Energy or carbon taxes and public benefits charges** increase the economic pressure on consumers to reduce consumption, and collected funds can be used to support ESCOs.
- o **Mandatory audit programs** create capacity, on the market, to assess buildings' sustainability potential and to identify potential clients, i.e. building owners informed about the sustainability improvement potential of their buildings.

- o **Grants, soft loans and preferential mortgages.** These instruments need to be revised to ensure that they do not compete with ESCOs. However, grants can be useful in supporting ESCOs, in cases where their repayment is programmed to come from ESCO projects.
- o **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived price of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions and actions to regular ones.

#### 10.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Awareness raising, education and information campaigns.** As a core building block, campaigns should be used to increase interest and trust in improving building sustainability through ESCOs.
- o **Sustainable procurement and public leadership programs.** These are crucial instruments for the development of an ESCO industry. As government bodies are important clients of ESCOs, procurement regulations usually require adjustment to support/enable contracts. Public sector engagement and demonstrations generate trust in ESCOs.
- o **Energy efficiency obligations/White Certificates and carbon trading projects** serve to engage utility companies in consumption reduction actions, which can be supported by ESCO projects.

- o **Net-metering (renewable energy)** increases the cost-effectiveness of renewable energy micro-generation (by providing resale opportunities, namely through grid connection). ESCOs can include cost-effective micro-generation investments as part of their portfolio.
- o **Energy or carbon taxes** increase the cost-effectiveness of ESCO projects.
- o **Grants, soft loans.** These financial instruments are among the main measures that the government introduces to either support ESCOs directly, or to encourage building owners to ask for ESCO support. Grants and soft loans have to be appropriately designed to avoid being in competition with ESCOs.

#### 10.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **Sustainable procurement regulations and public leadership programs.** Government efforts to implement sustainability improvements through ESCO projects and to publicize them to promote ESCOs can be used to further promote sustainable buildings.
- o **Net-metering.** Successful ESCO market development will increase the presence of renewable energy micro-generation and increase interest in connecting these energy sources to the grid, consequently ensuring interest in net-metering programmes.

#### 3.10.6 Additional information

The following references may be helpful in the design and implementation of the instrument:

Australasian Energy Performance Contracting Association. 2000. *Best Practice Guide to Energy Performance Contracts*. Australasian Energy Performance Contracting Association, Australian Department of Industry Science and Resources.

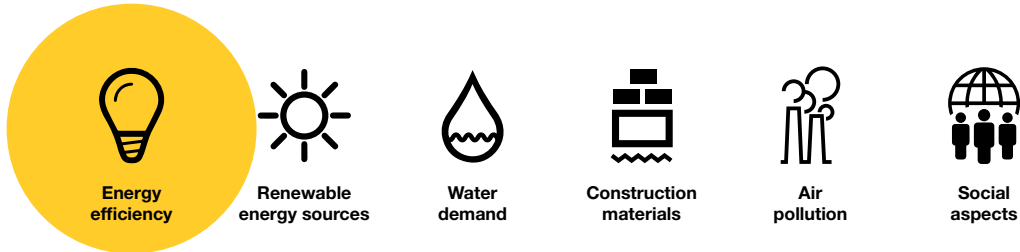
Change Best (Project). 2012a. *Energy Efficiency Services Good Practice Business Models and Successful Market Developments*. <http://www.changebest.eu/>.

European Energy Service Initiative. 2009. *European Energy Service Initiative: Eurocontract Toolbox*. <http://www.european-energy-service-initiative.net/eu/toolbox/eurocontract-toolbox.html>.

Marino, Angelica, Paolo Bertoldi, Silvia Rezessy, and Benigna Boza-Kiss. 2010. *Energy Service Companies Market in Europe. Status Report 2010*. Ispra, Italy: Joint Research Centre of the European Commission. <http://bookshop.europa.eu/en/latest-development-of-energy-service-companies-across-europe-pbLBNA22927/>.

Ürge-Vorsatz, Diana, Sonja Köppel, Chunyu Liang, Benigna Kiss, Gireesh Goopalan Nair, and Gamze Celikyilmaz. 2007. *An Assessment of on Energy Service Companies (ESCOs) Worldwide*. Central European University, World Energy Council, ADEME. [http://www.worldenergy.org/documents/esco\\_synthesis.pdf](http://www.worldenergy.org/documents/esco_synthesis.pdf).

## 11 ENERGY EFFICIENCY OBLIGATIONS/WHITE CERTIFICATES



### 11.1 OVERVIEW OF THE INSTRUMENT

#### 11.1.1 Alternative names

Supplier obligations; savings obligations; (energy efficiency) obligation schemes; transactional targets; (energy efficiency) certificates; White Certificates (WhC).

#### 11.1.2 Objective

The objective of energy efficiency obligations is to promote widespread, standardized energy efficiency actions on the premises of small consumers, thus reducing transaction costs, and fostering market change.

#### 11.1.3 Definition

Energy efficiency obligations are mandates given to energy suppliers and/or retailers to achieve a defined amount of energy savings in a given period on the consumer premises. This instrument presumes monitoring and verification of energy savings and can be accompanied by certification (usually referred as White Certificates).

The following features define an energy efficiency obligation/White Certificate:

- **Regulatory character and assigned targets:** the government sets a quantified energy saving obligation.
- **Restrictive set of actions allowed:** the means to achieve the energy savings is defined (i.e. which technologies and actions can contribute to the attainment of the target, in which premises they can be introduced, whether actions which increase the profit of the obliged party are allowed (e.g. selling energy efficient bulbs), etc.
- **Pragmatic assessment:** the improved performance or savings are usually assessed indirectly, based on transactional records, levels of investment and technical estimates.

#### 11.1.4 Variations

The instrument may vary according to the following variables: targeted (obliged) actors, certification, tradability (of certificates) and cost recovery:

- **Obligated actors:** these are usually suppliers and retailers, but the instrument may also target network owners.
- **Certification:** a White Certificate is an accounting tool which guarantees that a certain amount of energy has been saved (responding to the obligation) and has not been accounted for elsewhere. The certi-

fied savings can be obtained, depending on the instrument's design, by the targeted parties or by authorized third parties (e.g. energy service companies).

- o **Tradability** allows market actors to choose the most cost-effective technological options. It requires the control and registration of savings. Although trading may be allowed in the absence of formal certification, certificates enable and add a layer of credibility to the trade.<sup>9</sup> Trading limitations may include the restriction to trade with parties not targeted, e.g. ESCOs.
- o **Cost recovery** may be permitted, or a policy of fixed prices may be introduced to protect consumers, thus limiting large investments.
- o **Deemed agreements:** each energy saving measure has a specific amount of savings assigned ex-ante, which is calculated through technical analyses, simulations or modelling.
- o **Engineering approach:** similar to deemed agreements, this approach also involves field measurements of key parameters, for which the information may be scarce.
- o **Energy monitoring** requires measuring and comparing consumption before and after the energy saving measures are implemented.

Three main evaluation approaches are commonly used by existing energy efficiency obligation schemes to satisfy the requirement for a pragmatic assessment:

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<sup>9</sup> Non tradable energy efficiency obligations are rare and exist only in the Belgian Flemish region and Denmark.

## 11.2 RELEVANCE



### 11.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	The introduction and implementation of the instrument typically takes place at the national level. However there are conditions that enable municipalities to establish energy saving obligations, e.g. when a local utility operates the local distribution network on concession.
<b>Local level (city or lower level)</b>	😞	😞	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.

IF

The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 11.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance
<b>Buildings</b>	Existing buildings		😊
	New buildings		😊*
	Public	Non-residential buildings	😊**
		Residential buildings	😊
	Private	Non-residential buildings	😊**
Residential buildings		😊	
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊**
		Residential buildings	😊
	Private	Non-residential buildings	😊**
		Residential buildings	😊
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊**
		Residential buildings	😊
	Private	Non-residential buildings	😊**
		Residential buildings	😊



The instrument has a positive effect.














The instrument may have a positive effect, if certain conditions apply.







The instrument is not applicable, has very little effect, or no effect at all.


 11.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>		The instrument changes the position of energy efficiency and corporate image in the obliged parties' business strategies. At the household level, mistrust in new technologies is reduced by coming into direct contact with the introduced energy-saving actions, as well as by awareness raising, education and information campaigns.
	Insufficient information or awareness among target actors		Awareness raising, education and information campaigns are an essential component to ensure the success of the action.
	High rates of illiteracy among target consumers		Direct energy-saving actions on user premises and the provision of individualized advice can overcome the barrier in illiteracy.
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		Utility companies which are able to benefit from economies of scale are in a position to make solutions available.
	High initial costs of sustainable solutions		The initial costs of these actions are reduced by mainstreaming a set of standardized actions, and promoting the selection of the most cost-effective local options, thus benefiting from economies of scale.
	Fragmented market structure <sup>3</sup>		The instrument ensures that the interest of the obliged parties (utilities and retailers) coincides with those of the users.
	Limitations in the typical building design process <sup>4</sup>		The instrument does not usually address new buildings and therefore has little influence on the design phase.
	Split incentives <sup>5</sup>		The instrument ensures that the interests of the obliged parties (utilities and retailers) coincide with those of the users.
	High transaction costs of sustainability programs <sup>6</sup>		By targeting energy companies, governments can tackle actions with otherwise high transaction costs, due to their small individual weight and distribution on the premises of multiple consumers. Furthermore, the instrument, especially its non-tradable variant, is relatively simple and therefore has low administration requirements. The higher costs involved in trading, both for utilities and government, are compensated by easier access to "low-hanging fruit" <sup>7</sup>
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Implementation efforts and costs are either allocated to utility companies, or recovered through utility prices or taxation (e.g. public benefits charges). However, a certain regulatory capacity is necessary to supervise and control the energy-saving actions as well as to avoid high-level corruption.
	Utility theft or non-payment		High rates of utility theft or non-payment may jeopardize the capacity of obliged parties to invest in energy savings and to reach illegal energy users.

-  The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.
- "Low-hanging fruits" are potential energy savings which can be easily attained through actions that are highly cost-effective and require low transaction costs. These are the actions initially preferred by market actors engaged in sustainability improvements.




 11.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect	
<b>Environment/ resources</b>	Increasing energy efficiency	😊	
	Reducing water demand	😐	
	Reducing waste-water generation	😐	
	Reducing energy peak demand	😐	
	Increasing access to high quality water in buildings	😐	
	Decarbonising the energy supply <sup>75</sup>	IF*	
	Increasing the sustainability of local resource use	😐	
	Limiting land use in urban areas (including indirect land use)	😐	
	Reducing air pollution	😊**	
	Supporting climate change adaptation	😐	
<b>Social</b>	Reducing utility costs for the population	😞*	
	Supporting a specific target group	Public institutions	IF**
		Small and medium enterprises	IF**
		Low-income consumers	😊***
Improving comfort, services and housing conditions	😊		
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	
	Creating new employment opportunities	😊	
	Supporting research and development (R&D) activities for technological innovation	😊	
	Eliminating/tackling informal market	😐	
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊	
	Creating new business opportunities by market transformation	😊	
	Increasing energy market transparency: improving knowledge and raising awareness of consumers	😐	
<b>Political</b>	Improving energy security <sup>76</sup>	😊	
	Making the politics of sustainable development credible	😊	
	Releasing budgets from public bodies	😊	
	Reducing corruption	😐	

😊 The instrument has a positive effect on this goal.

😐 The instrument has no or almost no effect on this goal.

IF The instrument may contribute to this goal, according to some conditions.















😞 The instrument has a negative effect on this goal.


<sup>1</sup> That is to say, increasing the utilization of renewable energy sources.


<sup>2</sup> Energy security is here defined as supplying more consumers with the same production capacity.

### 11.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations	
<b>Ability of the government to set challenging obligations due to independence from energy lobbies.</b>		Continue to the next precondition.	
		The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.	
<b>Competition in the energy supply market.</b>		Continue to the next precondition.	
		It may be necessary to liberalize the market. In case of publicly owned companies and infrastructures, a concession system may be preferable to negotiate obligations. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<b>Low rates of utility theft or non-payment.</b>		Continue to the next precondition.	
		Penalize or offer government support (penalties, awareness raising education and information campaigns, or financial support to the poor) to ensure compliance. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<b>Existence of:</b> <ul style="list-style-type: none"> <li>• national actors dealing with energy efficiency and supervising utility activities</li> <li>• capacity for supervising policy implementation</li> <li>• national benchmarks (e.g. building certification or product labelling systems).</li> </ul>		Continue to the next precondition.	
		Capacity building, including institutional development and training, will be required for developing and implementing the instrument. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<b>Tradition of high compliance with regulatory instruments, or record of successful collaboration between the public sector and the building industry.</b>		Continue to the next precondition.	
		Although clear governmental commitment and strict implementation can bolster compliance, in a context without a tradition of regulatory compliance, it may be successful to begin with voluntary agreements. Voluntary agreements can prepare the way for more stringent obligations. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<b>Availability of technical and human capacity within the industry to monitor and supervise the enforcement.</b>		Continue to the next precondition.	
		A capacity building effort will be necessary. <table border="1"> <tr> <td>If agree, continue to the next precondition,</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If agree, continue to the next precondition,
If agree, continue to the next precondition,			
If not, reconsider the introduction of the instrument.			
<b>Low corruption at administrative level.</b>		Continue to Implementation steps (section 11.4).	
		Ensure that processes and penalties are clearly defined, and data is transparently available. An awareness raising, education and information campaign can be supportive to minimize corruption. <table border="1"> <tr> <td>If this is feasible, continue to Implementation steps (section 11.4).</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to Implementation steps (section 11.4).
If this is feasible, continue to Implementation steps (section 11.4).			
If not, reconsider the introduction of the instrument.			

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

## 11.4 IMPLEMENTATION STEPS

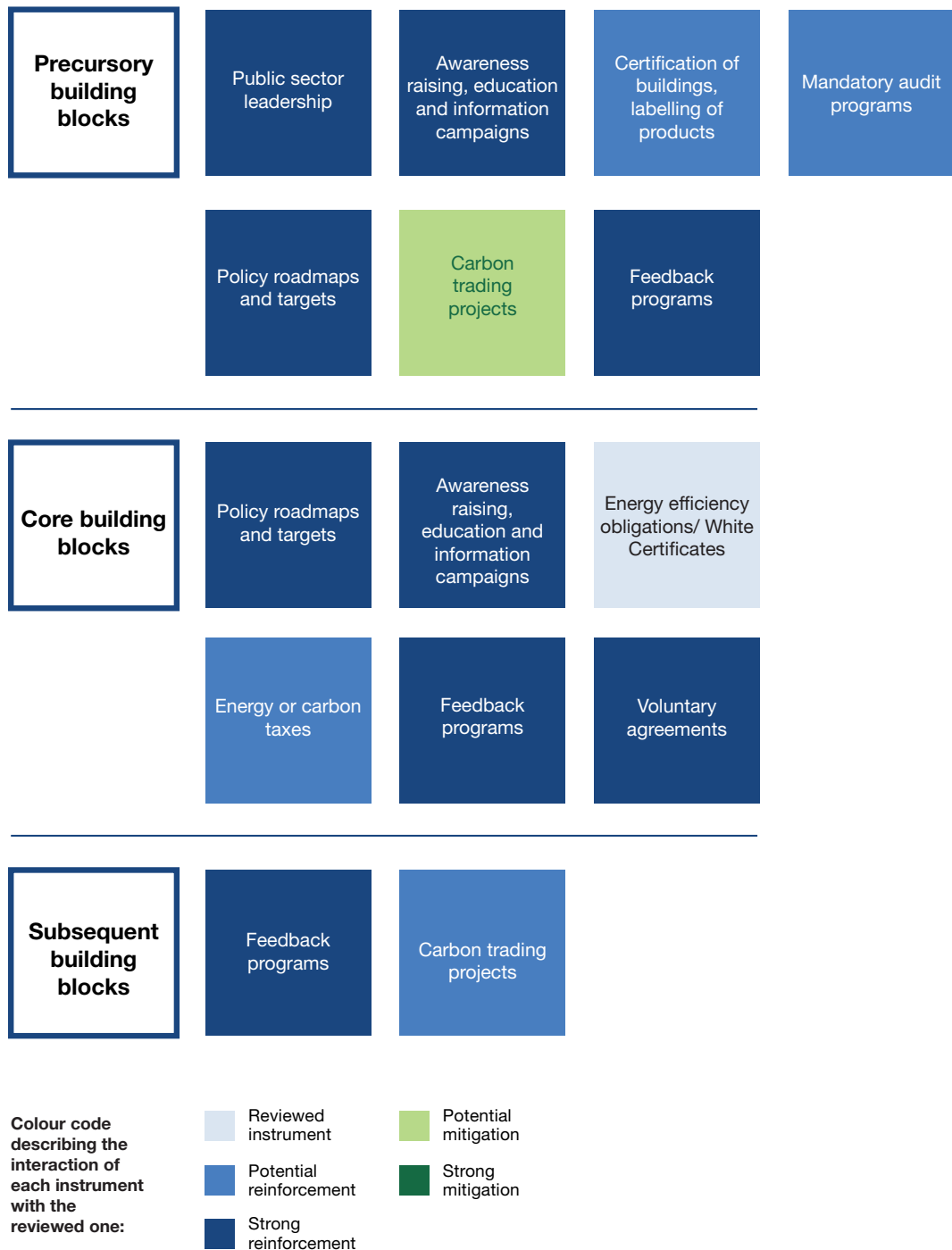
This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Draft policy roadmaps and targets	
2	Select target social groups, and types of buildings	Target groups and buildings with sufficient savings potential, which respond to government policy goals, and whose dispersed consumption is preferably addressed through utility-driven actions.
3	Appoint a leading body, and identify the potential participants in the policy process	A public supervisory body should be put in place. Utilities, as well as the national actors dealing with energy efficiency, should participate in the process.
4	Design the instrument	<ul style="list-style-type: none"> <li>• <b>Make sure it is sufficiently challenging</b> (both in required savings and in terms of actions concerned).</li> <li>• <b>Set a clear, binding target, and the rate at which the target will increase</b>, to reduce uncertainties for market actors.</li> <li>• <b>Keep the design simple</b>, in order to reduce administrative costs and ease the collection of information.</li> <li>• <b>Decide whether White Certificates and a trading market will be introduced.</b> If so, set up transparent rules and procedures.</li> <li>• <b>Describe a clear (and simple) system for measuring energy savings and tracking certificates.</b> A database will be required: decide who will manage it.</li> <li>• <b>Decide what will be the penalties for non-compliance</b>, which should be proportionate and credible.</li> <li>• <b>Introduce a system for detecting and penalizing non-compliance</b>, including who will inspect the actual implementation of reported actions.</li> <li>• <b>Keep the rules technologically neutral</b> to enable competition among energy efficiency technologies.</li> <li>• <b>Consider the introduction of a cost recovery mechanism versus fixed energy prices</b>, according to the policy goals.</li> </ul>
5	Harmonise the legal-normative framework	Harmonize the legal-normative framework, especially regarding utility theft and non-payment, and market competition.
6	Introduce the system for measurement and monitoring of energy savings, and the tracking of certificates	Measurement, monitoring and tracking reduce the risk of double-counting as well as transaction costs. It should include a baseline for determining the additionality <sup>1</sup> of the actions. If necessary, contract third party auditing.
7	Establish a system for detecting and penalizing non-compliance	To mitigate price volatilities To provide correct market signals in advance To let obliged parties develop investment plans and further market strategies
8	If agreed in the design, enable the creation of a well-functioning market for certificate trading	To increase market liquidity and keep compliance costs low To create incentives to innovate
9	Raise and extend the obligation	This can be done by amending the required savings or the actions concerned. In addition, the obligation can be extended to other market actors or include additional targets.

<sup>1</sup> "Additionality refers to certification of genuine and durable increases in the level of energy efficiency beyond what would have occurred in the absence of the energy efficiency intervention, for instance only due to technical and market development trends and policies in place" (Bertoldi et al. 2010).

### 11.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



### 11.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public sector leadership**, combined with policy roadmaps and targets, demonstrate that the government is committed to sustainability, increase the expected acceptance of the reviewed instrument, and enable mandated agencies and experts to set appropriate and responsive targets, and to negotiate the requirements with the energy industry.
- o **Awareness raising, education and information campaigns** increase the general understanding of the benefits of service provision as opposed to energy provision, and of the social responsibility of the energy industry, thus generating acceptance and demand for adequate energy saving actions, thus easing the introduction and implementation of the instrument.
- o **Certification of buildings, labelling of products.** The presence of both building blocks prior to the reviewed instrument guarantees the existence of benchmarks and energy efficient technologies, facilitating the selection, introduction, reporting and evaluation of the selected actions.
- o **Mandatory audit programs and feedback programs.** The early implementation of these instruments enables the existence of a baseline, and a certain degree of awareness among the stakeholders.
- o **Carbon trading mechanisms.** The introduction of trading of energy efficiency

obligations in the presence of carbon trading mechanisms requires increasing the complexity of the scheme and may cause double-counting, due to the differences in measurement methods. Combination with Joint Implementation mechanisms can avoid this pitfall and also be cost effective, provided the instrument is wisely designed.

- o **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones.

### 11.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Policy roadmaps and targets** demonstrate that the government is truly committed to sustainability.
- o **Feedback programs and awareness raising, education and information campaigns** may be used by the obliged parties as actions to attain the targeted energy savings.
- o **Voluntary agreements** are typically introduced in combination with the reviewed instrument to engage a reluctant energy sector.
- o **Energy or carbon taxes**, in combination with the reviewed instrument, generate positive market effects and promote

innovation towards more energy-efficient technologies.

#### 11.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **Feedback programs.** The introduction of the reviewed instrument may be an opportunity to introduce feedback programs, which enable and demonstrate savings.
- o **Carbon trading projects.** When introduced after the reviewed instrument and coordinated with these actions, carbon trading projects can benefit from the capacities developed. Parties targeted by energy efficiency obligations may claim carbon credits after carbon emission reduction, provided the additionality<sup>10</sup> of the overall program is demonstrated.

## 11.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Bertoldi, P. & Rezessy, S., 2009. *Energy Saving Obligations and Tradable White Certificates*. Ispra, Italy: Joint Research Centre of the European Commission.

International Energy Agency (IEA), 2006. *Market mechanisms for White Certificate Trading*. Paris, France: International Energy Agency (IEA).

Municipalities and Energy Efficiency in a Liberalised System (MEELS). 2003. *Guidelines for Municipalities: Adapting to New Roles in a Liberalised Market, Energie -Cités*. [http://www.energy-cities.eu/IMG/pdf/meels\\_guidelines\\_en.pdf](http://www.energy-cities.eu/IMG/pdf/meels_guidelines_en.pdf)

Oikonomou, V., 2010. *Interactions of White Certificates for Energy Efficiency with Other Energy and Climate Policy Instruments*. Groningen, the Netherlands: University of Groningen.

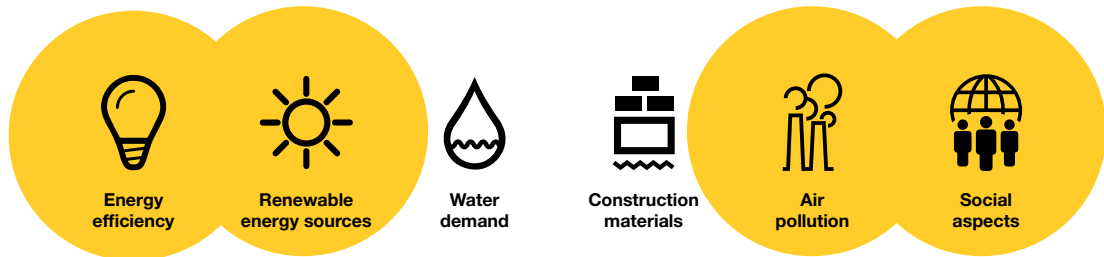
Steuwer, S., 2009. *Energy Saving Obligation and Tradable White Certificates: Purposes and Outcomes*. Munster: University of Munster. <http://www.uni-muenster.de/imperia/md/content/transpose/publikationen/steuwer.pdf>

Vine, E. & Hamrin, J., 2008. *Energy Savings Certificates: A Market-based Tool for Reducing Greenhouse Gas Emissions*. *Energy Policy*, (36), pp.467-476.

Wade, J., Guertler, P., Croft, D. Sunderland, L. 2011. *National Energy Efficiency and Energy Saving Targets - Further Detail on Member States*. European Council for an Energy Efficient Economy. [http://www.Wade et al.org/Policy/Targets/Targets\\_Country\\_Specific\\_Information.pdf](http://www.Wade et al.org/Policy/Targets/Targets_Country_Specific_Information.pdf)

<sup>10</sup> *ibid.*

## 12 CARBON TRADING PROJECTS



### 12.1 OVERVIEW OF THE INSTRUMENT

#### 12.1.1 Alternative names

Cap-and-Trade; emission regulations; emission trading; international cooperation mechanisms.

#### 12.1.2 Objective

The objective of carbon trading projects is to allow targeted parties to choose the most cost effective method of limiting the total amount of greenhouse gas (GHG) emissions. Carbon trading projects internalize the costs of carbon emissions into carbon emitting activities, including the development of GHG emission savings projects outside the country of origin. The instrument's flexibility results in a net societal gain, since it achieves environmental benefits without imposing an obligation to use a specific technology or process.

#### 12.1.3 Definition

Carbon trading projects can be integrated into a virtual carbon trading market (e.g. an emission trading scheme), or run as an independent program, when public authorities develop greenhouse gas mitigation projects under flexible mechanisms, such as the Clean

Development Mechanism(CDM), or the Joint Implementation mechanism (JI).

A carbon market is created when an emission cap is defined for a set of emitters. An emissions allowance is then passed down to the regulated entities or activities. If the total carbon emissions produced by an entity exceeds its allowance, then it must purchase credits either from other regulated actors emitting below their allowance, or from offset projects reducing emissions in either unregulated activities or through carbon sequestration; this transfer is known as carbon trade. The market price of emissions then becomes a driving force to invest in energy efficiency and renewable energy sources.

#### 12.1.4 Variations

Carbon trading projects occur in the presence of a carbon market, which can be organized on a regulated or voluntary basis:

**Regulated scheme:** The main global carbon market is regulated by the Kyoto Protocol and Flexibility Mechanisms. Its major feature is the setting of binding targets for the reduction of GHG emissions for 37 industrialized countries and the European Union. In each of the targeted countries (identified as Annex I countries), the public authority can distribute allocations to targeted entities, which can then participate in the trading of emissions.

The scheme consists of three main mechanisms<sup>11</sup>:

- o *The Emission Trading Scheme (ETS)* is a policy instrument which allows entities that have “unused” emission allowances to sell this excess to entities emitting beyond their allowance. This trade can be done at the national level (between nationally regulated entities) or at the international level (between signatory countries).
- o *The Clean Development Mechanism (CDM)* allows entities with a greenhouse gas reduction commitment (in Annex-I countries) to invest in GHG emission reduction projects in Non-Annex-I countries.

- o *Joint Implementation (JI)* projects are emission reduction or sequestration projects, under which a donor country implements a project in a host country, in exchange for emission reduction credits to be held against its own emission reduction targets.

**Voluntary or unregulated schemes:**

Unregulated parties and non-Annex I countries, e.g. industries in non-ratifying countries or individual entities worldwide, may participate in a growing voluntary trading market.

National and subnational schemes usually result from joining a regulated or a voluntary scheme. California, China, Australia, New Zealand, South Korea, Thailand, Vietnam and the European Union have set obligations and trading schemes within their borders.

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<sup>11</sup> During the Doha Climate Change Conference (November 2012), the Parties discussed the introduction of two new mechanisms currently under development: the Framework for Various Approaches (FVA) and the New Market Mechanism (NMM).



## 12.2 RELEVANCE

### 12.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument can be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	The introduction and implementation of carbon markets typically takes place at the national level.
<b>Local level (city or lower level)</b>	😊*	😊	*However, local authorities can promote carbon reduction/trading projects.

- 😊 The instrument is typically introduced/implemented at this policy level.
- 😐 The introduction/implementation of the instrument at this level is atypical.
- IF The instrument may be introduced/implemented at this policy level if certain conditions apply.
- 😞 It is practically impossible to introduce/implement the instrument at this policy level.

### 12.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.












Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😊	The instrument can target all types of buildings, systems and resource-using products. However, policy instruments (e.g. product standards or voluntary agreements with the manufacturing industry) may be required to facilitate the scale-up of emission reductions, particularly for systems and resource-using products.
	New buildings		😊	
	Public	Non-residential buildings	😊	
		Residential buildings	😐	
	Private	Non-residential buildings	😊	
Residential buildings		😐		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😐	
		Residential buildings	😐	
	Private	Non-residential buildings	😐	
		Residential buildings	😐	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😐	
		Residential buildings	😐	
	Private	Non-residential buildings	😐	
		Residential buildings	😐	





- 😊 The instrument has a positive effect.
- 😐 The instrument may have a positive effect, if certain conditions apply.
- 😞 The instrument is not applicable, has very little effect, or no effect at all.



### 12.2.3 Barriers

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. Handbook users may assess in the Worksheet whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>		Although the instrument does not overcome this barrier, the specific projects implemented may address these areas.
	Insufficient information or awareness among target actors		Although the instrument does not overcome this barrier, the specific projects implemented may address these areas.
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		The market price of emissions can become a driving force to invest in sustainable technologies. In addition, the specific projects implemented may address this barrier by supporting the selection of specific technologies.
	High initial costs of sustainable solutions		The barrier is overcome because the instrument allows market actors to select the most cost-effective solutions. In addition, the credits generated compensate additional costs.
	Fragmented market structure <sup>3</sup>		
	Limitations in the typical building design process <sup>4</sup>		
	Split incentives <sup>5</sup>		
	High transaction costs <sup>6</sup>		Transaction costs for the industry are reduced by the trading mechanism. Self-regulation in the market reduces costs for the administration. However, it may be difficult to cover the transaction costs of small-scale projects (usually CDMs) with small emission reduction volumes, even under simplified instrument modalities.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Due to its regulatory character, the cap and trade system establishes beforehand the desired sustainability improvement, thus reducing performance risks. The market, which is typically self-regulated, reduces the burden for the government.
	Utility theft or non-payment		

-  The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- 1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- 2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- 3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- 4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- 5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- 6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 12.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect	
<b>Environment/ resources</b>	Increasing energy efficiency	😊	
	Reducing water demand	😐	
	Reducing waste-water generation	😐	
	Reducing energy peak demand	😊*	
	Increasing access to high quality water in buildings	😐	
	Decarbonising the energy supply <sup>1</sup>	😊	
	Increasing the sustainability of local resource use	😐	
	Limiting land use in urban areas (including indirect land use)	😐	
	Reducing air pollution	😊	
	Supporting climate change adaptation	😊	
<b>Social</b>	Reducing utility costs for the population	IF	
	Supporting a specific target group	Public institutions	IF
		Small and medium enterprises	IF
		Low-income consumers	IF
Improving comfort, services and housing conditions	IF		
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	
	Creating new employment opportunities	😊	
	Supporting Research and Development (R&D) activities for technological innovation	😊	
	Eliminating/tackling informal market	😐	
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊	
	Creating new business opportunities by market transformation	😊	
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😊	
		😊	
<b>Political</b>	Improving energy security <sup>2</sup>	😊	
	Making politics of sustainable development credible	😐	
	Releasing budgets from public bodies	😊	
	Reducing corruption	😐	



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

IF

The instrument may contribute to this goal, according to some conditions.



The instrument has a negative effect on this goal.

<sup>1</sup> That is to say, increasing the utilization of renewable energy sources.

<sup>2</sup> Energy security is here defined as supplying more consumers with the same production capacity.

## 12.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and otherwise, what correction measures, i.e. recommendations should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
<b>Strong political commitment and motivation to promote sustainability in buildings at the national and at the local levels, preferably associated to policy roadmaps and targets.</b>	😊	Continue to the next precondition.
	😞	Create, communicate and implement policy roadmaps and targets, and increase policy coherence. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Existence of national actors dealing with sustainability, such as national energy agencies, which can support the implementation of carbon trading projects.</b>	😊	Continue to the next precondition.
	😞	Institutional development will be necessary. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<ul style="list-style-type: none"> <li>• Developed financial sector and a stock exchange system.</li> <li>• Readiness of the banking sector to invest in carbon trading projects in buildings.</li> <li>• Availability of initial investment resources for project implementation.</li> </ul>	😊	Continue to the next precondition.
	😞	International support may be necessary. The sector may need government guarantees to request international and/or national financial resources. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<ul style="list-style-type: none"> <li>• Potential and availability of sustainable solutions on the market, such as energy-efficient products, building systems, and construction materials, as well as renewable energy technologies.</li> <li>• Availability of national benchmarks, such as Certification and labelling of renewable energy sources, Certification of buildings, Product standards and labels.</li> </ul>	😊	Continue to the next precondition.
	😞	Consider developing an adequate technological environment prior to instrument introduction. Introducing benchmarks may be an opportunity for obtaining international carbon credits. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Existing capacity for data collection, and availability of calculation methodologies and tools for the evaluation of projects, which are able to:</b>	😊	Continue to the next precondition.
	😞	Methodological standardization is needed. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Tradition of compliance with targets/regulations.</b>	😊	Continue to implementation steps (section 12.4).
	😞	An enforcement effort may be necessary. Consider the introduction of voluntary agreements and/or opt (at first) for a voluntary market. If this is feasible, continue to Implementation steps (section 12.4). If not, reconsider the introduction of the instrument.

😊 The precondition exists - move to the next precondition.

😞 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

1 A baseline is the (theoretical) level of emissions that would have been verified, at a specific place and time, if the carbon reduction project had not been implemented (also called the "business-as-usual" scenario).

## 12.4 IMPLEMENTATION STEPS

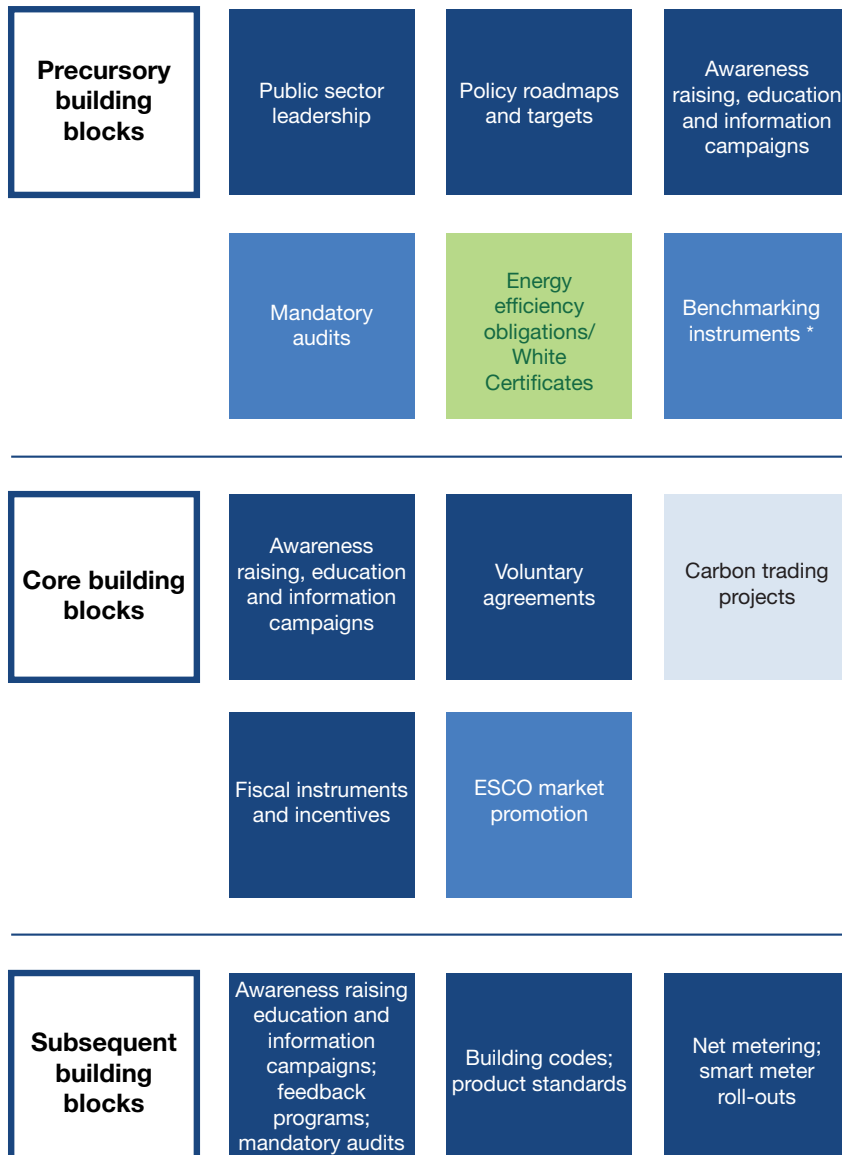
This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Join or establish a cap (and trade) mechanism	The caps can be established per sector or per individual emitters. Setting a cap will provide stakeholders with an incentive to initiate carbon reduction projects. Establishing a trading mechanism will support flexibility in the achievement of targets.
2	Support private parties to develop the overall design of the carbon trading project	<ul style="list-style-type: none"> <li>• Define the (GHG) boundaries of the project.</li> <li>• Calculate the baseline emissions and the expected reductions.</li> <li>• State the crediting period.</li> <li>• Adjust for leakages (make sure that the project boundary comprises all GHG sources that are attributable to the project).</li> <li>• It is advisable to ensure that certain target groups in need benefit from these measures, to minimize free-ridership.</li> <li>• Describe the monitoring plan of the achieved GHG emission reductions, the analysis of environmental impacts, the feedback from stakeholders and a description of the additional environmental benefits.</li> <li>• Describe the calculations and quality assurance measures.</li> <li>• Project design should be described in the Project Design Document (PDD), which should be submitted for validation to the operational entity<sup>1</sup> (UN 2003).</li> </ul>
3	Ensure that projects go through validation and registration processes	<ul style="list-style-type: none"> <li>• The operational entity requires confirmation from the host Party (Government) that the project assists in achieving sustainable development and that participation is voluntary. This confirmation will be made public and opened for comments.</li> <li>• The operational entity evaluates and validates the proposed project, using the following criteria: <ul style="list-style-type: none"> <li>- The project is voluntary and approved by the host country</li> <li>- The project complies with the Marrakech Accords and subsequent decisions</li> <li>- The expected GHG emission reductions is above and beyond the business as usual scenario</li> <li>- It includes stakeholder comment;</li> <li>- It includes an environmental impact analysis</li> <li>- It has been adjusted for leakages</li> <li>- The baseline methodology complies with previously approved methods</li> <li>- The CDM Executive Board or the JI Supervisory Committee receives the validation from the operational entity and formally accepts (registers) the project.</li> </ul> </li> </ul>
4	Make sure that project parties implement measures for GHG emission reductions	Verify that the measures included in the project and described in the PDD are implemented.
5	Ensure the monitoring of the achieved GHG emission reductions	Monitoring methodologies must comply with previously approved methods.
6	Comply with verification procedures	<ul style="list-style-type: none"> <li>• The operational entity reviews the monitored emissions, makes on-site inspections (optional), interviews stakeholders, collects measurements, observes practices, and tests the accuracy of monitoring equipment prior to providing a certification that the stated emission reductions have been achieved in the specified period.</li> <li>• The operational entity certifies that the Certified Emission Reductions (CERs in the case of CDM), or Emission Reduction Units (ERUs in the case of JI), are legitimate.</li> <li>• CERs and or ERUs are issued and distributed to the project participants.</li> </ul>

<sup>1</sup> Operational entities are domestic or international legal entities that carry out CDM reporting and mediating functions (see annex II for standards for accreditation). Operational entities must first be designated by the Executive Board (UN 2003).

## 12.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



Colour code describing the interaction of each instrument with the reviewed one:

- Reviewed instrument
- Potential reinforcement
- Strong reinforcement
- Potential mitigation
- Strong mitigation

\* Certification of buildings, labelling of products, certification and labelling of renewable energy solutions.

#### 12.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- **Public sector leadership**, combined with **policy roadmaps and targets**, demonstrates that the government is committed to sustainability, enabling the industry to make investment decisions.
- **Awareness raising, education and information campaigns** addressed either to the industry or to the general public generate interest in the reviewed instrument, and increase the potential success of the specific projects introduced.
- **Benchmarking instruments (certification of buildings, labelling of products, certification and labelling or renewable energy solutions) and mandatory audit programs**: their presence guarantees the existence of a baseline, energy efficient technologies, technical capacity to monitor energy savings, and a certain degree of awareness among stakeholders, thus facilitating the design, implementation and monitoring of carbon trading projects.
- **Energy and water subsidies**. This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones.

- **Energy efficiency obligations/White Certificates**. The introduction of carbon trading mechanisms in the presence of energy efficiency obligations (allowing trade) requires to increase the complexity of the scheme and may cause double-counting due to the differences in measurement methods. Combination with Joint Implementation mechanisms can avoid this pitfall and also be cost effective, provided the instrument is wisely designed.

#### 12.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- **Fiscal instruments and incentives (energy or carbon taxes, tax exemptions and reductions, public benefits charges, grants, soft loans, preferential mortgages)**. Financial and fiscal support for carbon trading projects (particularly CDMs) can play a role in capacity building and in mobilizing institutional set-up and project development. Targeted capacity building programmes have been successful. However, financial assistance has been more effective when addressing overall project development. Consequently, subsidies are a necessary but insufficient condition for supporting CDM/JI projects. The implementation of energy or carbon taxes can compensate the costs of carbon market transactions. Nevertheless, this may entail high administrative costs for the tax collection.
- **Awareness raising, education and information campaigns**. The reviewed instrument calls for a high level of awareness-raising, education and information campaigns, due to the complexity and diverse structure of the mechanisms. A

greater awareness among carbon trading stakeholders and project developers is important to ensure high involvement. Capacity building through public campaigns and educative tools promotes the expansion of the carbon market with greater speed and increased effectiveness.

- o **Voluntary agreements** are typically introduced in combination with the reviewed instrument to engage reluctant participants who require an economic compensation earlier than the carbon trading project can guarantee.

#### 12.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o Carbon trading projects can support the introduction of multiple instruments, which are by these means financed by the carbon credit system. These may be introduced or updated. In particular, net-metering, together with the reviewed instrument, can support the deployment of renewable energy solutions.

## 12.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Green Clean Guide. 2013. *Want to Earn Carbon Credits but Confused About the Future of Carbon Markets?* <http://greencleanguide.com/2010/12/25/cdm-projects-statistics/>

Khalila, H., Cohenb, C., Salem Szklo, A. 2006. *How to Use the Clean Development Mechanism in the Residential Sector: the Case of Brazilian Refrigerators*. *Energy Policy*, 34 (2006): 2150–2160

Müller, R., Zerkawy, F., Wirth, A. 2010. *Feasibility of CDM Funding for Households and Community Level Projects with Examples from Caucasus and Central Asia*. [https://www.atmosfair.de/fileadmin/user\\_upload/Medienecke/Downloadmaterial/feasibility\\_household\\_CDM\\_atmosfair.pdf](https://www.atmosfair.de/fileadmin/user_upload/Medienecke/Downloadmaterial/feasibility_household_CDM_atmosfair.pdf)

Nishida, Y., Hua, Y. 2011. *Motivating Stakeholders to Deliver Change: Tokyo's Cap-and-Trade Program*. *Building Research and Information*, 39(5): 518–533. <http://www.tandfonline.com/doi/full/10.1080/09613218.2011.596419>

Okubo, Y., Michaelowa, A. 2010. *Effectiveness of Subsidies for the Clean Development Mechanism: Past Experiences with Capacity Building in Africa and LDCs*. *Climate and Development*, 2 (1): 30-49. <http://www.ingentaconnect.com/content/earthscan/cdev/2010/00000002/00000001/art00004>

Putti, V.R., 2007. *Kyoto Protocol and Carbon Market Drivers*. Washington: World Bank. [http://siteresources.worldbank.org/BELARU-SEXTN/Resources/1-Introduction\\_to\\_the\\_Kyoto\\_Protocol\\_and\\_Market\\_Drivers.pdf](http://siteresources.worldbank.org/BELARU-SEXTN/Resources/1-Introduction_to_the_Kyoto_Protocol_and_Market_Drivers.pdf)



United Nations Framework Convention on Climate Change (UNFCCC). 2012. *Emissions Trading*. [http://unfccc.int/kyoto\\_protocol/mechanisms/emissions\\_trading/items/2731.php](http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php)

United Nations Framework Convention on Climate Change (UNFCCC). 2013. *CDM Loan Scheme*. <http://www.cdmloanscheme.org/>

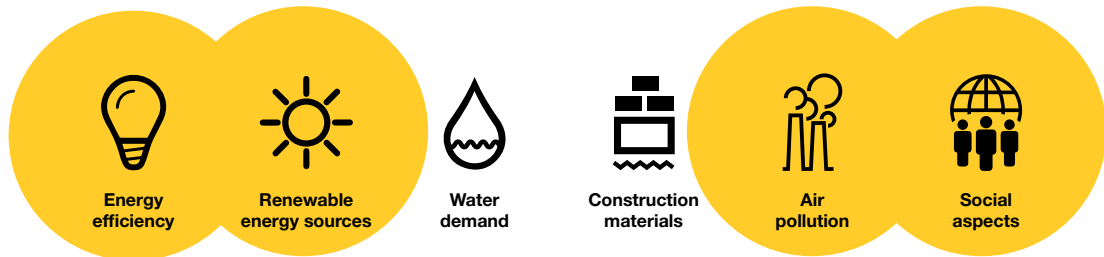
United Nations Environment Programme, World Meteorological Organization, Intergovernmental Panel on Climate Change, and Potsdam-Institut für Klimafolgenforschung. 2012a. *Renewable Energy Sources and Climate Change Mitigation: Special Report of the Intergovernmental Panel on Climate Change*. New York: Cambridge University Press.

Union of the Electricity Industry (Eurelectric). 2005. *Manual on Joint Implementation (JI) and Clean Development Mechanism (CDM) Projects*. [www.eurelectric.org/Download/Download.aspx?DocumentID=17130](http://www.eurelectric.org/Download/Download.aspx?DocumentID=17130)

United Nations Conference on Trade and Development (UNCTD). 2003. *An Implementation Guide to the Clean Development Mechanism*. United Nations Conference on Trade and Development, Geneva. [http://unctad.org/en/Docs/ditcted20031\\_en.pdf](http://unctad.org/en/Docs/ditcted20031_en.pdf)

Winkler, H., D van Es. 2007. *Energy Efficiency and the CDM in South Africa: Constraints and Opportunities*. Journal of Energy in Southern Africa, 18 (1). <http://www.erc.uct.ac.za/jesa/volume18/18-1jesa-winkler.pdf>

## 13 ENERGY OR CARBON TAXES



### 13.1 OVERVIEW OF THE INSTRUMENT

#### 13.1.1 Alternative names

Environmental taxes; ecological taxes; climate change levies; emission taxes; green taxes.

#### 13.1.2 Objective

The objective of energy or carbon taxes is to discourage energy consumption and, especially in the case of carbon taxes, to promote renewable energy solutions by increasing the price per unit of energy consumed.

#### 13.1.3 Definition

Energy or carbon taxes are levied directly on the consumption of fossil fuels and/or on energy using products, based on their energy demand and/or their carbon content respectively. The increased (relative) price of polluting energy sources or less sustainable products is expected to cause a decrease in consumption. The collected funds are not usually earmarked.

Carbon and energy taxes are increasingly popular fiscal instruments. The use of energy taxes is widespread in developed and developing countries, while carbon taxes are slowly being adopted by developing countries. In

order to increase the sustainability impact of the instrument, it may be better to earmark at least a portion of the income, as governments are often motivated more by fund-raising than by encouraging energy savings. The introduction of energy and carbon taxes could raise social issues and send mixed messages if fossil fuel energy subsidies are used in parallel.

#### 13.1.4 Variations

The tax liability for carbon taxes is based on the carbon content or related CO<sub>2</sub> emissions of fossil fuels, while in the case of energy taxes, the tax liability is based on overall energy demand. Thus, carbon taxes go a step further than energy taxes, promoting the development of clean energy sources as well as motivating energy savings.

Energy or carbon taxes can be charged directly on fossil fuels, on the services and products obtained from them, and on energy-consuming products. One example of an energy or carbon tax is the earmarked tax or levy, which influences investment and consumption behaviour by increasing the cost of the taxed goods and services, and by reinvesting the collected revenue in sustainability investments.

## 13.2 RELEVANCE



### 13.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument can be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	The introduction of the instrument at the local level requires that certain competencies are transferred to that level.
<b>Local level (city or lower level)</b>	😞	😞	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.



IF The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 3.13.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance
<b>Buildings</b>	Existing buildings		😊
	New buildings		😊
	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
Residential buildings		😊	
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊



The instrument has a positive effect.














The instrument may have a positive effect, if certain conditions apply.







The instrument is not applicable, has very little effect, or no effect at all.


**13.2.3 Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>		Energy or carbon taxes do not address these barriers directly.
	Insufficient information or awareness among target actors		
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		The instrument can result in an increased demand of sustainable technologies, thus promoting their supply.
	High initial costs of sustainable solutions		Although the instrument may generate a raise in initial costs, it compensates in the long run through economies of scale <sup>3</sup> , thus reducing the life cycle costs of sustainable solutions, when compared with less sustainable alternatives.
	Fragmented market structure <sup>4</sup>		The instrument works well to influence the decisions in the overall market, regardless of its fragmentation.
	Limitations in the typical building design process <sup>5</sup>		The instrument influences design decisions but requires additional instruments and strong government signals to transform them into improved design processes.
	Split incentives <sup>6</sup>		The instrument provides incentives to those bearing energy costs to reduce energy consumption and to rely on sustainable energy solutions, but does not have an impact on building owners. Therefore split incentives remain a barrier.
	High transaction costs <sup>7</sup>		Although the introduction of the instrument requires limited investment efforts, costs must be carefully assessed for the overall economy, and especially with regard to groups in need. Transaction costs may be beyond their means, obliging them to reduce their access to services in order to avoid an increase in utility costs.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Energy or carbon taxes are relatively straightforward to design and enforce. Substituting other taxes (e.g. VAT or income tax) with energy or carbon tax eases tax collection efforts. An adequate design and implementation is needed to oppose corruption and avoid increasing tax obligations, particularly for the poor.
	Utility theft or non-payment		Renewable energy incentives and additional resources increase the amount of funds obtained from energy consumption, thereby increasing the capacity to control utility consumption and tax compliance, which in turn can result in reduced illegal behaviour.

-  The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- Earmarked taxes or levies allocated to stipulated areas of sustainability may be addressed to specifically overcome additional barriers, such as need of investment in Research and Development (R&D) and behavioural change.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 13.2.4 Policy goals

The following table identifies the policy goals that the instrument may contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect	
<b>Environment/ resources</b>	Increasing energy efficiency	😊	
	Reducing water demand	😞*	
	Reducing waste-water generation	😞*	
	Reducing energy peak demand	😐	
	Increasing access to high quality water in buildings	😞*	
	Decarbonising the energy supply <sup>1</sup>	😊**	
	Increasing the sustainability of local resource use	😐	
	Limiting land use in urban areas (including indirect land use)	😞	
	Reducing air pollution	😊	
	Supporting climate change adaptation	😐	
<b>Social</b>	Reducing utility costs for the population	😞	
	Supporting a specific target group	Public institutions	😞
		Small and medium enterprises	😞
		Low-income consumers	😞
Improving comfort, services and housing conditions	😞		
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	
	Creating new employment opportunities	😐*	
	Supporting Research and Development (R&D) activities for technological innovation	😐*	
	Eliminating/tackling informal market	😊	
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊	
	Creating new business opportunities by market transformation	😊	
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😐	
<b>Political</b>	Improving energy security <sup>2</sup>	😊	
	Making politics of sustainable development credible	😊*	
	Releasing budget from public bodies	😐**	
	Reducing corruption	😐	



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

IF

The instrument may contribute to this goal, according to some conditions.















The instrument has a negative effect on this goal.


<sup>1</sup> That is to say, increasing the utilization of renewable energy sources.


<sup>2</sup> Energy security is here defined as supplying more consumers with the same production capacity.

### 13.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and otherwise, what correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
<b>Relevant administration level has fiscal powers to tax the type of energy targeted.</b>		Continue to the next precondition.
		If not, reconsider the introduction of the instrument.
<b>Market characterized by high price elasticity (i.e. the consumption varies according to energy prices)<sup>1</sup>.</b>		Continue to the next precondition.
		Awareness raising, education and information campaigns should be introduced to inform target groups how to reduce their energy consumption and the corresponding costs. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Existence of political will and independence from energy lobbies</b>		Continue to the next precondition.
<b>Sufficient information available on the consumer side, particularly in situations of low credibility of the government and low awareness among energy users.</b>		Substantial efforts in awareness raising, education and information campaigns, public leadership programs should be conducted prior to the introduction of the instrument. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Availability of financial resources on the consumer side.</b>		Continue to the next precondition.
		Consider combining taxes with tax exemptions or reductions for low-income consumers, or adequate incremental taxation. Additional control against corruption is necessary when introducing these measures. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Absence of corruption or low levels of corruption within the administration at the implementation level (national or local).</b>		Continue to the next precondition.
		Introduce a clear and transparent system of tax collection (and distribution of the collected funds). The introduction of a transparently administered close loop levy may minimize the effect of corruption. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Available human capacity for administrating sustainable policies, e.g. monitoring of policy implementation at the administrative level, particularly in the case of earmarked taxes.</b>		Continue to Implementation steps (section 13.4).
		· Increase the enforcement capacity to control the irregular energy market (e.g. fuel imports), and verify the statements from energy suppliers, e.g. about the carbon content of their electricity. · In the case of earmarked taxes, consider creating a specific department. If this is feasible, continue to Implementation steps. If not, reconsider the introduction of the instrument.

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

<sup>1</sup> Prior to the introduction of the instrument, an assessment is needed to calculate the level of elasticity, which depends, among other factors, on the tax-to-GDP ratio.

### 13.4 IMPLEMENTATION STEPS

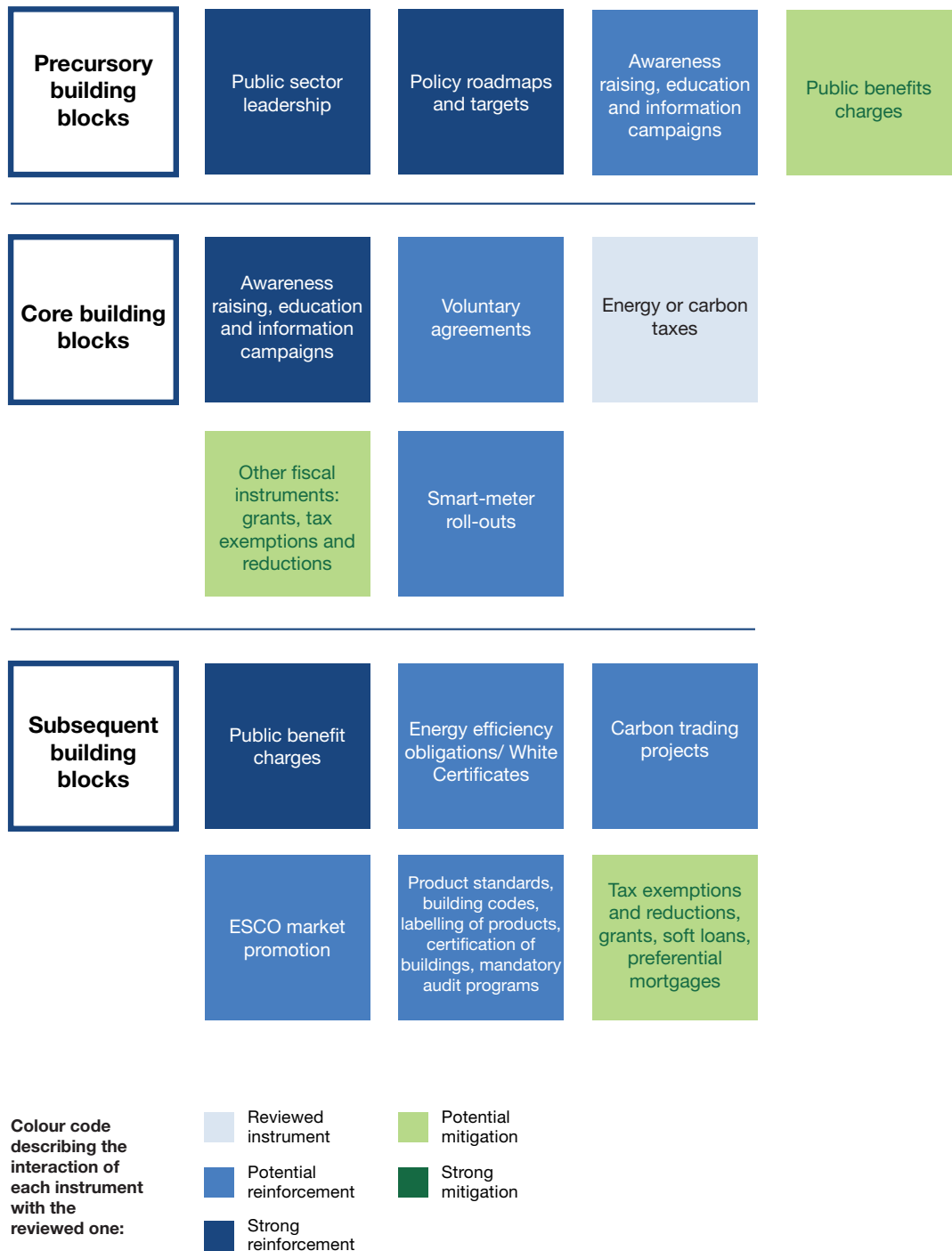
This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Consider context of policy, market and institutional conditions	Some areas that will need to be assessed are: existing energy subsidies, risk of removing them, existence of fuel poverty, price elasticity, and administration capacity. It is also very important to make sure that the government can act independently from energy lobbies and that there is sufficient political capital to communicate the new instrument to the population.
2	Select target social groups and buildings	<ul style="list-style-type: none"> <li>• Identify groups that may need some type of fiscal alleviation (e.g. tax exemptions and reductions).</li> <li>• Identify information and awareness raising needs.</li> </ul>
3	Design and enforce a communication strategy	<ul style="list-style-type: none"> <li>• Awareness raising, education and information campaigns should be combined with an irreproachable administrative conduct, as even traces of corruption in the administration are a typical motivation for opposing the instrument.</li> <li>• Besides information campaigns and awareness raising on environmental and energy conservation, the mechanisms to reallocate tax pressure and to compensate or alleviate the pressure on certain groups should be clearly described.</li> </ul>
4	Design: decide on the major features of the instrument	<ul style="list-style-type: none"> <li>• Include the relevant actors. The process should be as inclusive as possible with civil society and the energy and building sectors. Also, make sure to enlist the collaboration of financial departments and Ministries.</li> <li>• Calculate the implicit tax rate (ITR), i.e. the ratio of total tax revenues of a certain tax category (e. g. consumption, labour, or energy-related environmental taxes) to a proxy of the potential tax base. This tax rate is defined as energy tax revenues in relation to final energy consumption (e.g. USD per ton of oil equivalent, deflated according to final demand).</li> <li>• Decide whether earmarking<sup>1</sup> should be part of the policy.</li> <li>• Decide on the need and magnitude of tax exemptions for certain groups as well as on the need for grants to promote specific technologies and actions.</li> <li>• Decide what measures can engage utilities in the process, e.g. collaboration in reducing rates of utility theft and non-payment.</li> <li>• Define a system for detecting and penalizing non-compliance.</li> </ul>
5	Adapt the financial framework	<ul style="list-style-type: none"> <li>• Reduce tax pressure on other fiscal areas.</li> <li>• Describe the tax collection and control mechanisms.</li> <li>• Draft and publicize the legal instrument.</li> </ul>
6	Enforce the instrument	<ul style="list-style-type: none"> <li>• Introduce tax collection. Tax exemptions should be handled preferably through the energy suppliers' billing and payment systems.</li> <li>• Make sure to implement the compensating measures described and communicated in previous steps.</li> </ul>
7	Monitor the utilities and control the collected funds	<ul style="list-style-type: none"> <li>• An eventual reduction in funds is expected if the instrument is successful. Therefore, plan ahead how this reduction of government funds will be compensated.</li> <li>• Maintain a mechanism of control to ensure that the reported carbon contents of the electricity are correct and that the collected funds are transferred to the government.</li> </ul>
8	Update the instrument and communicate targets and action plans	<ul style="list-style-type: none"> <li>• To mitigate price volatilities</li> <li>• To provide correct market signals in advance (e.g. to let targeted parties develop their investment plans and market strategies).</li> </ul>

<sup>1</sup> Earmarked taxes or levies are to be reinvested in stipulated areas of sustainability, thereby overcoming additional barriers, such as the need for investment in Research and Development (R&D) and behavioural change.

### 13.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).





### 13.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public sector leadership**, combined with **policy roadmaps and targets**, demonstrates that the government is committed to sustainability, therefore increasing the potential acceptance of the instrument and enabling sectoral investments to make a sound shift from intensive (fossil fuel) energy use to energy efficient and renewable energy options.
- o **Awareness raising, education and information campaigns** addressed to the general public increase the capacity to understand the underlying reasons for the introduction of the instrument.
- o **Public benefits charges**. In the presence of a working public benefits charges scheme, it is preferable to strengthen and/or to expand it than to introduce an energy or carbon tax.
- o **Energy and water subsidies**. Although not an instrument directly addressed in this Handbook, energy subsidies deserve a mention because their presence may reduce the coherence and credibility of this instrument. Maintaining them counteracts the efforts addressed to reducing (fossil fuel) energy consumption.

### 13.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Awareness raising, education and information campaigns**. It is essential to communicate the underlying reasons for the introduction of the reviewed instrument, as well as the fiscal mechanisms that will be introduced to avoid increasing fiscal obligations and/or to alleviate pressure on the social and economic groups in need. Once the instrument is introduced, its success is greatly improved when users are informed about how to save energy, while maintaining reasonable comfort and expense levels.
- o **Voluntary agreements** are typically introduced in combination with the reviewed instrument to engage reluctant actors. In the case of the energy industry, the agreements can involve collaboration in controlling energy theft and non-payment, for instance through support for smart-meter roll-outs.
- o **Fiscal instruments and incentives (tax exemptions and reductions, grants, soft loans, preferential mortgages)** can be effective in promoting the introduction of technological improvements. Introducing too many fiscal instruments, however, can result in missed opportunities. Funds allocated to alleviate the short term pressure on specific social groups could be better employed to generate a longer lasting impact, both on the social groups' well-being and in terms of reducing energy consumption (through, e.g. direct investment or awareness raising, education and information campaigns).

### 13.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o Any regulatory<sup>12</sup>, informative<sup>13</sup> or market-based<sup>14</sup> instruments described in this Handbook can benefit from the introduction beforehand of energy and carbon taxes, which make the sustainability improvements promoted more cost-effective to the energy consumers and to the other market actors involved. The existence of energy or carbon taxes can facilitate the introduction of certain fiscal instruments and incentives (grants, soft loans and preferential mortgages). However, a thorough review of the fiscal system should be conducted to avoid the multiplication of fiscal instruments. In the case of an earmarked scheme, the collected funds can be earmarked for the implementation of these instruments. The introduction of public benefit charges can be seen as a significant advance in fiscal policy towards a transparent allocation of energy and carbon tax funds.

<sup>12</sup> Ibid.

<sup>13</sup> Informative instruments addressed in this Handbook are: net-metering (renewable energy), voluntary agreements, voluntary labelling of products, voluntary certification of buildings, public leadership programs, awareness raising, education and information campaigns, and feedback programs.

<sup>14</sup> Market-based instruments addressed in this Handbook are: ESCO market promotion, energy efficiency obligations/White Certificates, carbon trading projects.

## 13.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Carbon Tax Center. 2013. *Pricing Carbon Efficiently and Equitably*. Carbon Tax Center. <http://www.carbontax.org/>.

Ekins, Paul, and Simon Dresner. 2004. *Reducing the Impact of 'Green' Taxes and Charges on Low-income Households* | Joseph Rowntree Foundation. <http://www.jrf.org.uk/publications/reducing-impact-green-taxes-and-charges-low-income-households>.

Gass, Philip, and Dave Sawyer. 2012. *IISD Submission to the British Columbia Carbon Tax Review*. IISD. [http://www.iisd.org/pdf/2012/bc\\_carbon\\_tax.pdf](http://www.iisd.org/pdf/2012/bc_carbon_tax.pdf).

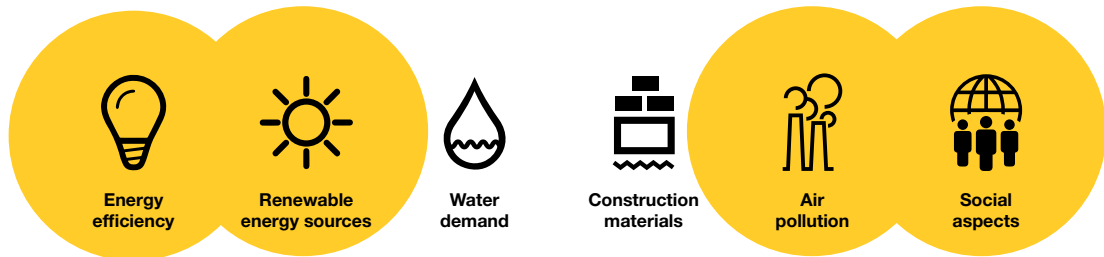
Hoeller, Peter, and Markku Wallin. 1991. *Energy Prices, Taxes and Carbon Dioxide Emissions*. 17. Economic Studies. OECD. [www.oecd.org/eco/greeneco/34258255.pdf](http://www.oecd.org/eco/greeneco/34258255.pdf).

Johannsen, K.S. 2002. *Combining Voluntary Agreements and Taxes – an Evaluation of the Danish Agreement Scheme on Energy Efficiency in Industry*. *Journal of Cleaner Production* 10 (2) (April): 129–141. doi:10.1016/S0959-6526(01)00031-2.

Neuhoff, K. 2008. *Tackling Carbon. How to Price Carbon for Climate Policy*. University of Cambridge, EPRG Group. [http://www.eprg.group.cam.ac.uk/wp-content/uploads/2009/03/tackling-carbon\\_final\\_3009081.pdf](http://www.eprg.group.cam.ac.uk/wp-content/uploads/2009/03/tackling-carbon_final_3009081.pdf).

PricewaterhouseCoopers. 2008. *Review of Energy Efficiency Policy Options for the Residential and Commercial Building Sectors*. [http://s3.amazonaws.com/zanran\\_storage/www.eraa.com.au/ContentPages/53670070.pdf](http://s3.amazonaws.com/zanran_storage/www.eraa.com.au/ContentPages/53670070.pdf).

## 14 TAX EXEMPTIONS AND REDUCTIONS



### 14.1 OVERVIEW OF THE INSTRUMENT

#### 14.1.1 Alternative names

Tax incentives; fiscal incentives; tax refunds; tax rebates. Similar instruments: subsidies and accelerated depreciation.

#### 14.1.2 Objective

The objective of tax exemptions and reductions is to encourage sustainable building practices in one of two ways:

by lowering the investment costs for sustainable solutions (for example, reducing the costs of energy efficient solutions to ensure their selection is cost-effective compared to the price of purchasing energy)

by alleviating the financial burden of energy or carbon taxes for a specific target group.

#### 14.1.3 Definition

Tax exemptions and reductions represent a transfer of wealth from one group (e.g. the society at large) to another group, typically investors in sustainability measures. The public authority (or public agency) offers tax exemptions, reductions, or fiscal incentives to promote: a selected type of investment, the use of specific types of products or materials, or to support a specific target group. These tax exemptions or

reductions result in indirectly reducing the cost of sustainability investments.

Tax reductions or exemptions can be provided as part of a larger energy or carbon tax scheme or in the form of tax credits and tax deductions tied to specific sustainable solutions.

#### 14.1.4 Variations

There are two main variations depending on the type of tax to which the instrument applies:

- o **Reduction or exemption from indirect taxes:** a reduction or an exemption from VAT, custom duties or other indirect taxes. Although relatively straight forward to implement, indirect tax reductions or exemptions may be less effective when applied in informal markets, especially with regard to service costs.
- o **Reduction of direct taxes or provision of tax credits:** the investments in designated technological solutions are deducted from taxable revenues. Their introduction can be complex and could be ineffective in countries with high tax evasion rates.

The visibility and interest generated by each variation differs significantly depending on cultural and market factors: e.g. capacity of the sector to advertise the advantage when newly introduced formality of both the market and tax revenue collection mechanisms, etc.

## 14.2 RELEVANCE



### 14.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	The introduction of the instrument at the local level is possible only for taxes collected at this level. For instance, revenue tax, VAT and customs duties are collected at the national level, while property and certain sales taxes are collected at the local level).
<b>Local level (city or lower level)</b>	😊	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.



IF The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 14.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😊	The instrument can target all types of buildings and technologies.
	New buildings		😊	
	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
Residential buildings		😊		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	



The instrument has a positive effect.














The instrument may have a positive effect, if certain conditions apply.







The instrument is not applicable, has very little effect, or no effect at all.


 14.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>		The instrument itself does not address these barriers directly, and requires communication tools to ensure sufficient transparency and interest from the potential beneficiaries.
	Insufficient information or awareness among target actors		
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		The instrument promotes an increased demand of specific (sustainable) technologies, thus promoting their supply.
	High initial costs of sustainable solutions		The instrument reduces the initial costs of sustainable solutions.
	Fragmented market structure <sup>3</sup>		By reducing the cost of sustainable solutions, the instrument influences the preferences of multiple actors, and their design decisions. However, additional policy building blocks and strong government signals are needed for the instrument to have a direct influence on building design.
	Limitations in the typical building design process <sup>4</sup>		
	Split incentives <sup>5</sup>		By reducing the cost of sustainable solutions, the instrument reduces the gap between owners (those responsible for sustainability improvement) and tenants (those bearing the energy costs).
	High transaction costs of sustainability programs <sup>6</sup>		The direct introduction of the instrument results in a reduction of treasury funds, which should be compensated by a reallocation of fiscal obligations. The instrument helps overcome transaction costs incurred by private parties.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		The instrument is relatively straightforward to design and enforce, particularly in the case of indirect tax advantages. However, tax credits may be unsuccessful in cases where tax evasion exists.
	Utility theft or non-payment		

-  The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- 1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- 2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- 3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- 4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- 5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- 6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 14.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect	Potential effect	
<b>Environment/ resources</b>	Increasing energy efficiency	😊	*The instrument can be applied to water consumption and treatment solutions. However, it is more commonly used for energy solutions.	
	Reducing water demand	😊*		
	Reducing waste-water generation	😊*		
	Reducing energy peak demand	😊		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😊		
	Increasing the sustainability of local resource use	😊		
	Limiting land use in urban areas (including indirect land use)	😊		
	Reducing air pollution	😊		
	Supporting climate change adaptation	😊		
<b>Social</b>	Reducing utility costs for the population	😊	Impacts depend on the coverage of the tax reduction and the presence of additional mechanisms to select the beneficiaries (e.g. according to income or fiscal status).	
	Supporting a specific target group	Public institutions		😊
		Small and medium enterprises		😊
		Low-income consumers		😊
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing local energy efficiency and renewable energy industry	😊	*The instrument sends strong signals to the market to promote employment and R&D in the area of building sustainability. However, it must be introduced for sufficiently long periods to achieve these goals.  ** Additional communication building blocks need to be in place to ensure transparency.	
	Creating new employment opportunities	😊*		
	Supporting Research and Development (R&D) activities for technological innovation	😊*		
	Eliminating/tackling informal markets	😊		
	Facilitating market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😊*		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😊**		
<b>Political</b>	Improving energy security <sup>2</sup>	😊	*The instrument is not costly to implement and can reduce tax collection costs. Nevertheless, measures may have to be taken to compensate for decreased tax revenues resulting from a successful reduction in energy consumption.  **Indirect tax advantages are less subject to corruption practices than tax credits.	
	Making politics of sustainable development credible	😊		
	Releasing budgets from public bodies	😊*		
	Reducing corruption	😊**		

- 😊 The instrument has a positive effect on this goal.
- 😊 The instrument has no or almost no effect on this goal.
- IF The instrument may contribute to this goal, according to some conditions.
- 😊\*\* The instrument has a negative effect on this goal.

1 That is to say, increasing the utilization of renewable energy sources.

2 Energy security is here defined as supplying more consumers with the same production capacity.

### 14.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
<ul style="list-style-type: none"> <li>• Fiscal power of relevant administrative level to tax</li> <li>• Well-functioning taxation system: i.e. high tax collection rates at the relevant level (direct or indirect taxation)</li> <li>• Dynamic construction market and economy (the instrument performs poorly in economies in recession or in transition)</li> <li>• Targeted sustainable solutions substantially more expensive than conventional solutions</li> <li>• Availability of financial resources and will of the administration to use them for the promotion of sustainable solutions.</li> </ul>	😊	If this is feasible, continue to the next precondition.
	😞	If not, reconsider the introduction of the instrument.
Availability of sustainable solutions on the market.	😊	Continue to the next precondition.
	😞	<p>The instrument promotes the innovation and uptake of new/ imported solutions. However, it may be preferable to have these available on the market prior to the introduction of the instrument, e.g. by announcing it to the sector well in advance.</p> <p>If this is feasible, continue to the next precondition.</p> <p>If not, reconsider the introduction of the instrument.</p>
Capacity to administrate sustainable policies, from design to monitoring: avoiding free-ridership, establishing an accurate list of eligible technologies, assessing objectively the adequacy of the instrument, and introducing a control system to avoid corruptive practices.	😊	Continue to the next precondition.
	😞	<p>Certain capacity building efforts may be necessary to ensure success and avoid irregularities in the delivery of advantages.</p> <p>If this is feasible, continue to the next precondition.</p> <p>If not, reconsider the introduction of the instrument.</p>
<ul style="list-style-type: none"> <li>• Credibility of the government and receptivity of the target groups (to achieve the necessary interest and level of investment)</li> <li>• Existence of a tradition of transparency and communication of government purposes and new instruments.</li> </ul>	😊	Continue to the next precondition.
	😞	<p>Make an additional effort to communicate the purpose and commitment of the government, as well as to specify the duration of the program expected to generate the necessary market change.</p> <p>If this is feasible, continue to the next precondition.</p> <p>If not, reconsider the introduction of the instrument.</p>
Absence or low levels of corruption within the administration at the implementation level (national or local).	😊	Continue to Implementation steps (section 14.4).
	😞	<p>Introduce a clear and transparent system to determine the allocation of tax exemptions and reductions.</p> <p>If this is feasible, continue to Implementation steps.</p> <p>If not, reconsider the introduction of the instrument.</p>

😊 The precondition exists - move to the next precondition.

😞 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

## 14.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

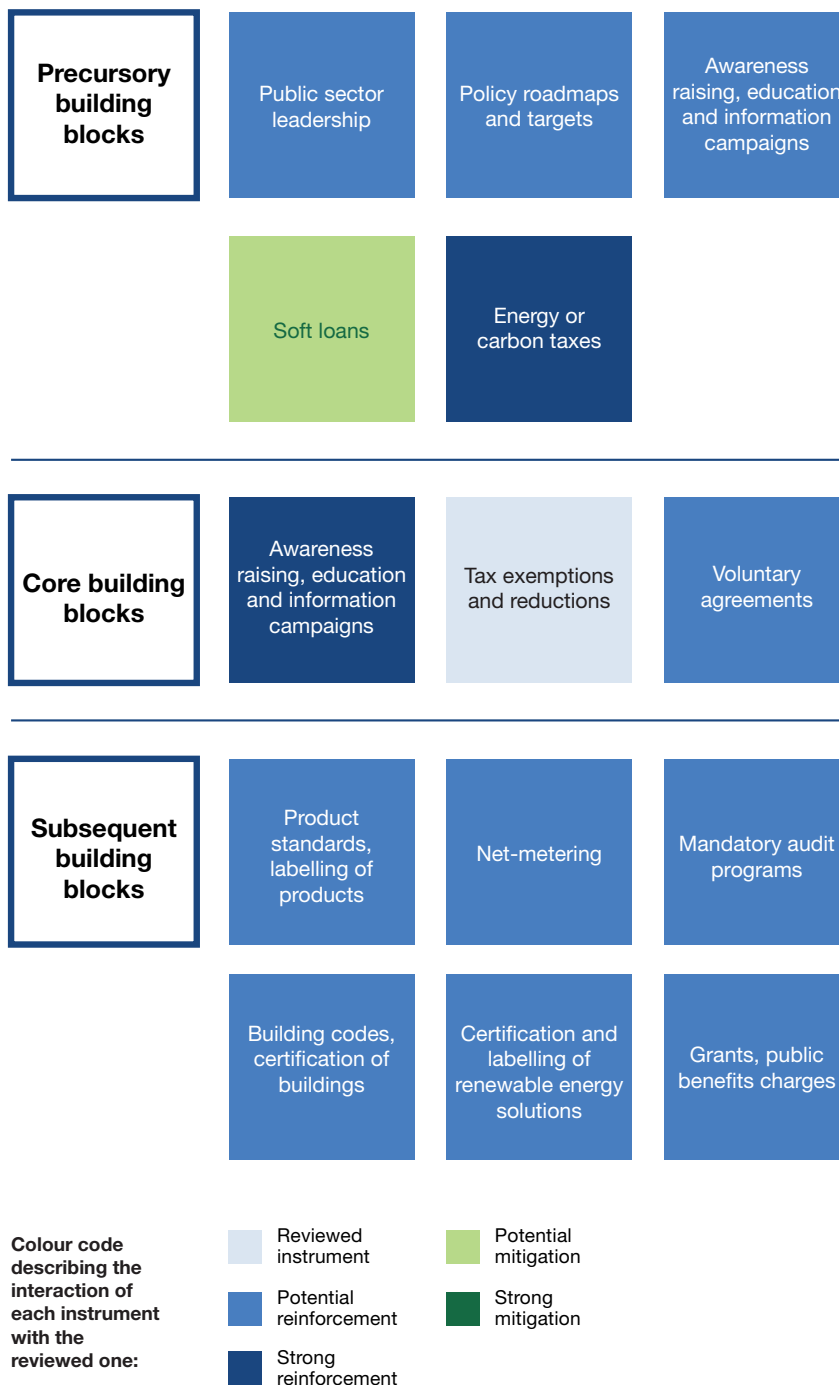
1	Select solutions/technologies and social groups to be supported	<ul style="list-style-type: none"> <li>Identify the sustainable solutions/technologies that are socially beneficial but whose uptake requires financial support.</li> <li>Identify social groups unable to invest in sustainable solutions due to the additional costs.</li> </ul>
2	Consider policy, market and institutional context	Some areas that will need to be assessed are: existing energy and water subsidies, fiscal areas that can be addressed from the relevant level of government, effectiveness of the taxation system in the taxation area addressed (e.g. sales, property, revenue, etc.), differences in initial costs and payback periods between sustainable and conventional solutions, financial capacity of target groups, availability of sustainable solutions on the market.
3	Communicate government purpose and goals to the target groups	Communicate the government plans well in advance, as this will help potential beneficiaries to develop their investments plans and further market strategies.
4	Policy design	<ul style="list-style-type: none"> <li>Consider existing instruments, in particular other financial incentives, and maximize their coherence with the new instrument.</li> <li>Introduce additionality criteria to the assignment of tax reductions in order to avoid free-ridership<sup>1</sup>, which increases societal costs. In the absence of a strong assessment capacity, support the low income population or introduce deposit refunds or rebate programs.</li> <li>Establish a list of eligible technologies and equipment.</li> <li>Define a system for detecting and penalizing non-compliance. Establish penalties against irregular practices (for example, contractors may inflate technology costs instead of service costs in order to reduce their taxable income and increase the fiscal benefits for their customers).</li> </ul>
5	Mobilize financial resources	<ul style="list-style-type: none"> <li>Take into consideration that the success of the instrument largely depends on the strength of the signals sent and on the duration of the program, which will influence how market actors adapt their processes.</li> </ul>
6	Adapt the financial framework	<ul style="list-style-type: none"> <li>If necessary, reallocate tax obligations to other areas.</li> <li>Describe the tax collection and control mechanisms.</li> </ul>
7	Design and enforce a communication strategy	<ul style="list-style-type: none"> <li>Provide clear and transparent information guidelines describing the eligibility and operation of the program (including payment method).</li> <li>Generate awareness on the importance of appropriate operation of sustainable technologies (i.e. promote behavioural changes) as the instrument will only cover the purchase phase.</li> </ul>
8	Enforce the instrument	<ul style="list-style-type: none"> <li>Assess the tax reduction claims against objective eligibility criteria described in the legal instrument and guidelines.</li> </ul>
9	Monitor the implementation	Focus particularly on avoiding corruptive practices and detecting free-ridership.
10	Adjust the program based on the information obtained from monitoring and evaluation processes	Adjust the program to optimize the use of resources: <ul style="list-style-type: none"> <li>Reduce the size of the tax advantages, if necessary.</li> <li>Modify eligibility criteria to avoid free-ridership.</li> <li>Make sure that newly developed technologies are included in the program through its list of eligible solutions.</li> </ul>

<sup>1</sup> Free-ridership or free rider problem refers in this context to the support provided by fiscal instruments to beneficiaries who would have implemented the same actions in the absence of the program (did not require financial support), but who use this opportunity to receive the incentives (free riders).



### 14.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



#### 14.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public sector leadership**, combined with **policy roadmaps and targets**, demonstrate that the government is committed to sustainability, and create a climate of confidence enabling sectoral investments to shift from conventional to sustainable solutions.
- o **Awareness raising, education and information campaigns** addressed to the general public increase the interest in investing in sustainable solutions, according to the instrument's scheme.
- o The presence of **soft loans** and other financial instruments needs to be carefully assessed prior to the introduction of the reviewed building block, to avoid sending confusing messages and adding unnecessary complexity to the financial system.
- o **Energy or carbon taxes** are useful in collecting additional taxes, which the reviewed building block redistributes.
- o **Energy and water subsidies**. This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones.

#### 14.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Awareness raising, education and information campaigns**. The reviewed building block requires transparent communication of the eligibility of solutions and mechanisms with regard to the fiscal advantage. In addition, a campaign promoting the appropriate use of technological solutions through advantageous taxation schemes can modify behavioural patterns, thus multiplying the impact.
- o **Voluntary agreements**. Tax exemptions and reductions are a typical constituent of voluntary agreements between the industry and government.

#### 14.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

Tax exemptions and reductions are an adequate means of promoting more sustainable solutions, in addition to encouraging renewable energy options. Therefore, a wide variety of instruments promoting these technological improvements benefit from the presence of the reviewed building block.

## 14.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Building Performance Institute Europe (BPIE). 2010. Financing Energy Efficiency (EE) in Buildings Background Paper. Brussels, Belgium: BPIE. <http://www.bpie.eu/documents/BPIE/BPIE%20background%20paper.pdf>.

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Clement, David, Matthew Lehman, Jan Hamrin, and Ryan Wiser. 2005. International Tax Incentives for Renewable Energy: Lessons for Public Policy. San Francisco, California: Energy Foundation China Sustainable Energy Program, Center for Resource Solutions. [http://www.resource-solutions.org/lib/librarypdfs/IntPolicy-Renewable\\_Tax\\_Incentives.pdf](http://www.resource-solutions.org/lib/librarypdfs/IntPolicy-Renewable_Tax_Incentives.pdf).

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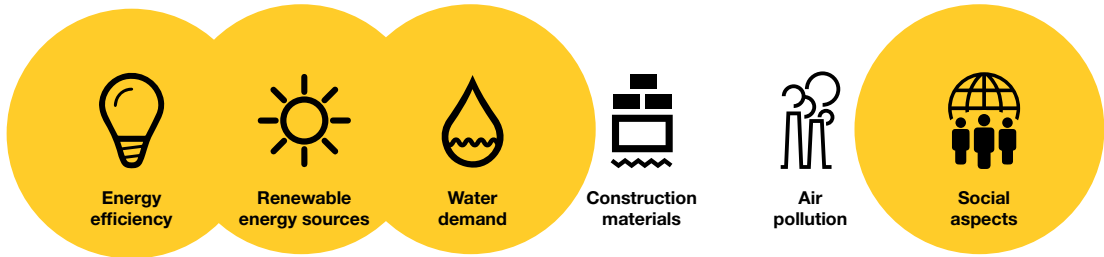
KPMG. 2011. Making Green Greener – Tax Incentives for Energy Sustainability. <http://www.kpmg.com/US/en/IssuesAndInsights/ArticlesPublications/Documents/energy-sustainability.pdf>.

Missauri, Rafik, and Adel Mourtada. 2010. Instruments and Financial Mechanisms of Energy Efficiency Measures in Building Sector. WEC-ADEME. [http://www.worldenergy.org/documents/ee\\_case\\_study\\_financing.pdf](http://www.worldenergy.org/documents/ee_case_study_financing.pdf).

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PricewaterhouseCoopers. 2008. Review of Energy Efficiency Policy Options for the Residential and Commercial Building Sectors. [http://s3.amazonaws.com/zanran\\_storage/www.eraa.com.au/ContentPages/53670070.pdf](http://s3.amazonaws.com/zanran_storage/www.eraa.com.au/ContentPages/53670070.pdf).

## 15 PUBLIC BENEFITS CHARGES



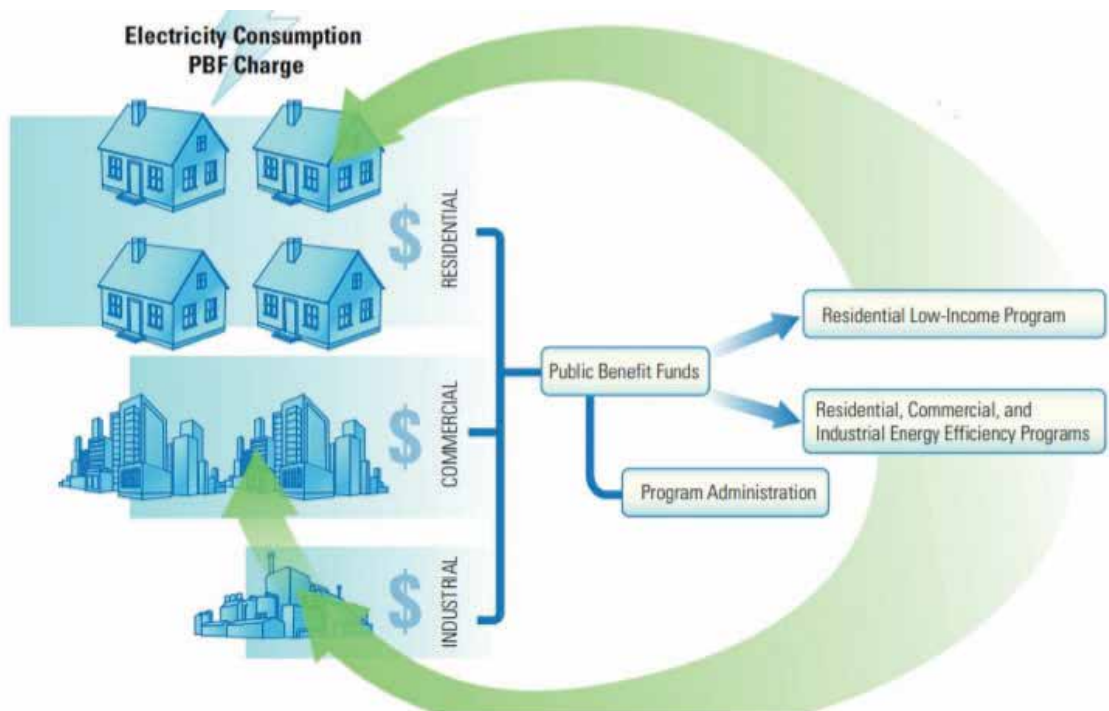
### 15.1 OVERVIEW OF THE INSTRUMENT

#### 15.1.1 Alternative names

Public benefit funds; system benefit charges; wire charges.

#### 15.1.2 Objective

The objective of public benefit charges is to raise funds through taxing services, in order to redistribute/reinvest the collected budget in sustainable projects, and/or to provide utility services to low-income groups. The redistributive process is described in Figure 1.



**Figure 9: Public benefit charges' system**

Collection and redistribution of funds under a public benefit charges' system. Source: Sandy, 2010

### 15.1.3 Definition

Public benefits charges are billed to consumers along with utility costs. The collected funds are earmarked for projects that improve sustainability (e.g. energy or water performance, use of renewable energy technologies). Public benefit charges are most commonly raised and redistributed in the energy sector, but water supply, waste water discharge and solid waste management can also be areas of application.

When applied to energy consumption, public benefits charges resemble an earmarked energy or carbon tax, whose revenues are typically invested in actions to improve energy efficiency and other sustainability aspects of buildings (e.g. renovation of building envelopes or awareness raising, education and information campaigns). Public benefit charges on energy bills are quantified in “mills per kilowatt-hour”, with one mill equal to one-thousandth of a currency unit, i.e., 0.001\$.

### 15.1.4 Variations

The schemes may be formulated on a mandatory or voluntary basis.

- o Mandatory public benefits charges are the most popular option, because they result in the collection of large financial resources, at no substantial costs to the end-user. However, mandatory schemes do not target specific target groups (and therefore may penalize low-income households). This can be compensated by carefully redistributing benefits to those in need, using the projects financed through revenue generated by the charges.
- o Voluntary approaches are less cost-effective than mandatory options, as participation may be influenced by cultural habits, economic welfare and level of information of the participants about the instrument. Reusing the collected tax to the benefit of the same actors and adopting a strong communication strategy may be crucial to the program’s success, at least in the initial stages.

## 15.2 RELEVANCE

### 15.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument can be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
National level (country or independent regional unit within/with jurisdiction over the country)	☺	☺	The instrument cannot be introduced at the local level. Provided the instrument exists at the national level local governments can: train project developers, assessors and government officers, organize awareness campaigns; and prioritize local actions. Alternatively, local governments can opt for creating investment funds or tax exemptions and reductions.
Local level (city or lower level)	☹	☺	

- ☺ The instrument is typically introduced/implemented at this policy level.
- ☹ The introduction/implementation of the instrument at this level is atypical.
- IF The instrument may be introduced/implemented at this policy level if certain conditions apply.
- ☹ It is practically impossible to introduce/implement the instrument at this policy level.

### 15.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		☺	The instrument is designed to tax the consumption of all types of buildings, (including all building categories, systems installed and products). The collected revenue can also be invested in all types of buildings.
	New buildings		☺	
	Public	Non-residential buildings	☺	
		Residential buildings	☺	
	Private	Non-residential buildings	☺	
Residential buildings		☺		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	☺	
		Residential buildings	☺	
	Private	Non-residential buildings	☺	
		Residential buildings	☺	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	☺	
		Residential buildings	☺	
	Private	Non-residential buildings	☺	
		Residential buildings	☺	

- ☺ The instrument has a positive effect.
- ☹ The instrument may have a positive effect, if certain conditions apply.
- ☹ The instrument is not applicable, has very little effect, or no effect at all.


 15.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>	😊+	These barriers are typically overcome, and the policy context modified, through the reinvestment of funds in awareness raising, education and information campaigns, feedback programs and other information instruments.
	Insufficient information or awareness among target actors	😊+	
	High rates of illiteracy among target consumers	😊	
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable	😊+	This barrier is typically overcome, and the policy context modified through the reinvestment of funds in promoting sustainable solutions (directly or indirectly), including direct investment on refurbishments or financing of efficient products. The instrument can result in an increased demand for sustainable technologies, thus promoting their supply.
	High initial costs of sustainable solutions	😊+	Increased liquidity as a result of the instrument enables the administration to invest in the sustainable building sector.
	Fragmented market structure <sup>3</sup>	😞	The instrument provides a breeding ground for the sustainable building sector to develop through the direct reinvestment of the funds in sustainable actions, e.g. refurbishments.
	Limitations in the typical building design process <sup>4</sup>	😞	
	Split incentives <sup>5</sup>	😊	The instrument overcomes this barrier through the direct reinvestment of the funds in sustainable actions, e.g. refurbishments.
	High transaction costs of sustainability programs <sup>6</sup>	😊	The associated transaction costs are low for public bodies and practically nil for utility companies.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption	😊+	Public benefits charges are simple and straightforward mechanisms, particularly when a mandatory scheme is chosen. The instrument is typically a closed loop system with earmarked funds, and only one authority responsible for both collection and investments, thus increasing transparency.
	Utility theft or non-payment	😊+	The funds raised through these charges can be utilized, according to government priorities, to increase the enforcement capacity and to guarantee the success of the program.



The instrument modifies the policy context, reducing the magnitude of this barrier.



The instrument overcomes this barrier, or operates regardless of this barrier.



The instrument partially overcomes this barrier.



The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 15.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect	
<b>Environment/ resources</b>	Increasing energy efficiency	😊	The instrument can tackle indiscriminately any environmental and resource-related performance directly. As an example, adding a charge to the price creates the incentive to decrease consumption of the target resource, whether it is energy, water or another resource.
	Reducing water demand	😊	
	Reducing waste-water generation	😊	
	Reducing energy peak demand	😊	
	Increasing access to high quality water in buildings	😊	
	Decarbonising the energy supply <sup>1</sup>	😊	
	Increasing the sustainability of local resource use	😊	
	Limiting land use in urban areas (including indirect land use)	😊	
	Reducing air pollution	😊	
	Supporting climate change adaptation	😊	
<b>Social</b>	Reducing utility costs for the population	😞*	* Although utility costs will be reduced long term, the instrument will initially result in increased utility costs.
	Supporting a specific target group	Public institutions	😊
		Small and medium enterprises	😊
		Low-income consumers	😊**
Improving comfort, services and housing conditions	😊	** The instrument may charge higher-income groups and redistribute revenue to lower-income groups. Mandatory approaches initially have a higher cost for low-income groups.	
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	* The funds may also be used for R&D activities. However this is not a typical use of funds.
	Creating new employment opportunities	😊	** Additional communication building blocks need to be in place to ensure transparency.
	Supporting Research and Development (R&D) activities for technological innovation	IF	
	Eliminating/tackling informal market	😞	
	Facilitating market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊	
	Creating new business opportunities by market transformation	😊	
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😊*	
<b>Political</b>	Improving energy security <sup>2</sup>	😊	
	Making politics of sustainable development credible	😞	Information and awareness campaigns are needed to communicate the purpose and benefits of the program.
	Releasing budgets from public bodies	😊	The instrument makes funds directly available.
	Reducing corruption	😞	Closed-loop systems, earmarked funds and single-handed fund collection and investments increase transparency.



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

IF

The instrument may contribute to this goal, according to some conditions.



The instrument has a negative effect on this goal.















1 That is to say, increasing the utilization of renewable energy sources.


2 Energy security is here defined as supplying more consumers with the same production capacity.




## 15.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
<ul style="list-style-type: none"> <li>• Fiscal powers to tax at relevant administrative level.</li> <li>• Readiness of the administration to allocate the collected charges to sustainability projects and to provide services to social groups currently excluded.</li> </ul>		If this is feasible, continue to the next precondition.
		If not, reconsider the introduction of the instrument.
Availability of sustainable solutions on the market.		Continue to the next precondition.
		It may be preferable to promote sustainable solutions prior to the introduction of the instrument.
Coherence of the taxation system.		Continue to the next precondition.
		The charge should be temporary or compensated either by a reduction of other fiscal obligations, or by subsidies.
Low levels of utility theft and of non-payment of bills among the targeted groups.		Continue to the next precondition.
		Introduce additional measures to ensure payment of utility services.
Availability of capacity within the administration for administering and distributing collected funds.		Continue to the next precondition.
		Allocate sufficient resources to train officials. Creating an independent department with adequate technical and administrative capacity would be ideal.
<ul style="list-style-type: none"> <li>• Credibility of the government and receptivity of target groups;</li> <li>• Existence of a tradition of transparency and communication of government plans and new policy instruments.</li> </ul>		Continue to the next precondition.
		Make an additional effort to communicate information about the instrument: purpose, cost per household, who will bear the costs, duration of the scheme, benefits it will generate in the long term, etc.
Low corruption at administrative level (corruption can hamper the success of the program, and also cause its questioning by concerned households).		Continue to Implementation steps (section 15.4).
		Make sure to increase budgetary transparency. Make sure funds will not be used to cover pre-existing debts. Show commitment with public leadership actions.

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

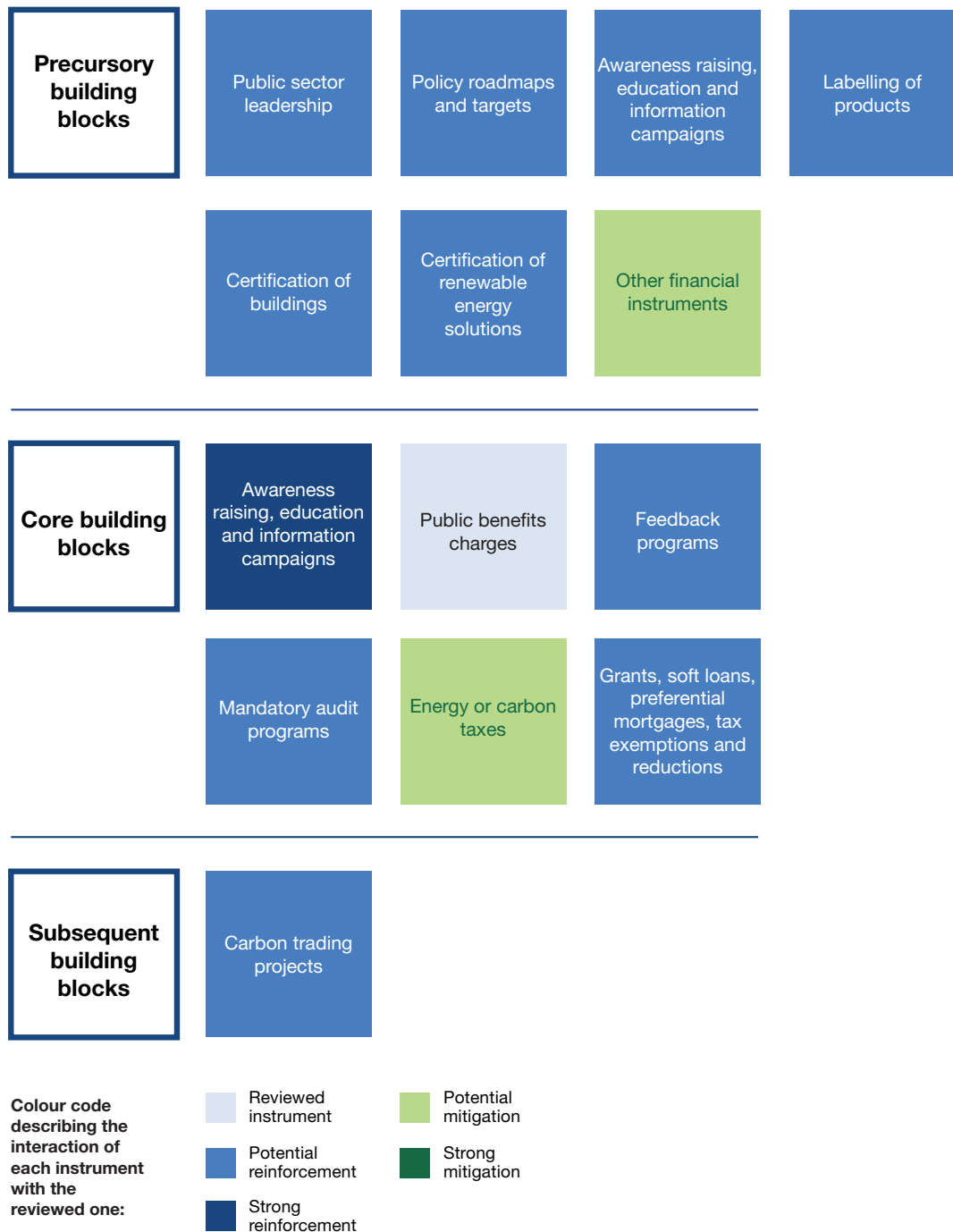
## 15.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Select target solutions and social groups	<ul style="list-style-type: none"> <li>Identify sustainable solutions for which implementation requires financial support.</li> <li>Identify social groups unable to invest in sustainable solutions and/or to access utility services.</li> </ul>
2	Define a target and set adequate surcharge levels - based on evaluations	A high charge could cause financial difficulties to some groups and raise economic concerns, which would generate mistrust in the program. On the other hand, a small charge may be insufficient to deliver change. The charges should be proportionate to the economic level of the participants.
3	Design the program	<ul style="list-style-type: none"> <li>Ensure coherence with existing instruments, in particular with other financial instruments.</li> <li>Organize the legal setting to ensure that revenue is earmarked — the use of a separate account is recommended.</li> <li>The legal setting should specify the goals of the instrument (e.g. energy efficiency, renewable energy sources), target groups (low income, SMEs, etc.), and the instruments that the charge will finance (e.g. grants, direct implementation by the public body, awareness raising, education and information campaigns, etc.), as well as the conditions for the selection of beneficiaries.</li> <li>Avoid double incentives (in the case where public benefit charge incentives compete with pre-existing instruments) and make provisions against utility theft.</li> <li>Clearly allocate program responsibility to an independent body (existing or new), to collect the funds, select the adequate investments and implement them, and report to the relevant government body.</li> <li>Clearly specify the collection mechanism, as well as the penalties for non-payment.</li> <li>Include mechanisms to protect or support low-income consumers.</li> </ul>
4	Communicate government purpose and goals to the target groups	Communicate the government plans well in advance to both targeted and potential beneficiary groups, and generate awareness about the importance of behaviour and of the appropriate use of sustainable technologies.
5	Adapt the financial framework	<ul style="list-style-type: none"> <li>If necessary, reallocate tax obligations to other areas.</li> <li>Introduce new collection and distribution mechanisms.</li> </ul>
6	Enforce the instrument	<ul style="list-style-type: none"> <li>Make a careful selection of investment projects and follow up on project outcomes.</li> <li>Avoid double incentives. Checking the context of past and ongoing public policies and programs when selecting investments can highlight investment areas neglected by previous programs which should be prioritized.</li> <li>Fight theft and non-payment by enforcing the law, and bolster efforts further by offering favourable alternatives to low-income participants.</li> </ul>
7	Monitor the implementation	Establish a monitoring and review mechanism to perform system checks regularly and to adjust the program based on experience. An independent audit system should guarantee the adequate management of funds.
8	Extend the program	Extend the program to different implementation areas such as building type, target groups not considered in previous programs and/or restricted types of investment. (Avoid low-hanging fruit already tackled in previous actions.)

## 15.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



#### 15.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public sector leadership**, combined with **policy roadmaps and targets**, demonstrates that the government is committed to sustainability, generating trust among those facing charges imposed by the instrument, and enabling the industry to take the necessary steps (e.g. supplying sustainable solutions for the funded programs).
- o **Awareness raising, education and information campaigns** addressed to the general public increase the potential acceptance and success of the technological and non-technological actions promoted through the public benefits charges.
- o The presence of **financial instruments, such as grants, soft loans and preferential mortgages** needs to be carefully assessed prior to the introduction of the reviewed building block, to avoid sending confusing messages, adding unnecessary complexity to the financial system and generating double incentives.
- o **Energy and water subsidies**. This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones.

#### 15.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Awareness raising, education and information campaigns**. The reviewed building block requires transparent communication concerning the instrument itself as well as with regard to sustainability matters, to promote building sustainability.
- o **Awareness raising, education and information campaigns, feedback programs, mandatory audit programs, grants, soft loans, preferential mortgages and tax exemptions and reductions** are typically financed through public benefits charges to achieve additional energy savings.
- o **Energy or carbon taxes**. It may be more convenient to tax different energy sources through energy or carbon taxes, than to collect funds through public benefit charges. Nevertheless, the extension of public benefit charges should be favoured over that of energy or carbon taxes.

## 15.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **Carbon trading projects.** In addition to public benefit charges, revenue can be generated through the sale of unused carbon emission allowances, or credits obtained through investments in energy and carbon saving projects<sup>15</sup>.
- o **Any instrument** can benefit from the redistribution of funds, whether channelled through policy instruments or direct public investment.

## 15.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Center for Climate and Energy Solutions. 2012. *Public Benefit Funds*. <http://www.c2es.org/us-states-regions/policy-maps/public-benefit-funds>.

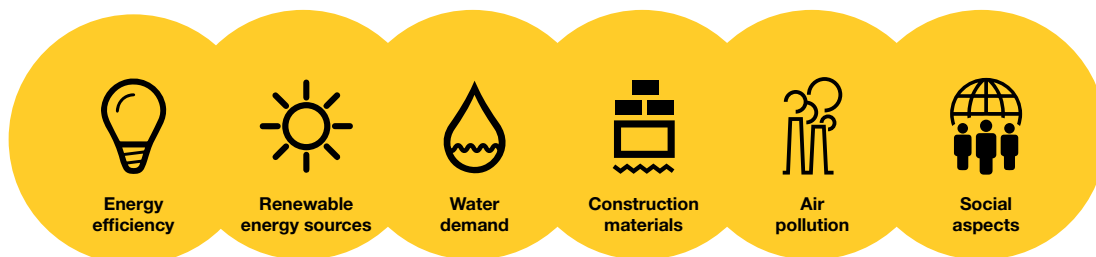
Glatt, Sandy. 2010. Public Benefit Funds. *State Policy Series: Impacting Industrial Energy Efficiency*. U.S. Department of Energy. <http://www1.eere.energy.gov/manufacturing/states/pdfs/publicbenefitfunds.pdf>.

North Carolina State University. 2011. *Database of State Incentives for Renewables and Efficiency (DSIRE)*. <http://www.dsireusa.org/>.

Renewable Energy and Energy Efficient Partnership (REEEP). 2008. *Case Study Brazil's Public Benefit Wire-Charge Mechanism: Fuelling Energy Conservation*. <http://electricitygovernance.wri.org/files/egi/Case%20Study%20Brazil%27s%20wire-change%20mechanism.pdf>.

15 See for instance the COELBA project in Brazil (Broc, J-S and Bourges, B. 2010. Measures Focused on Low Income Households WEC-ADEME Case Studies on Energy Efficiency Measures and Policies. World Energy Council-ADEME [http://www.worldenergy.org/documents/ee\\_case\\_study\\_for\\_low\\_income\\_households.pdf](http://www.worldenergy.org/documents/ee_case_study_for_low_income_households.pdf))

## 16 GRANTS



### 16.1 OVERVIEW OF THE INSTRUMENT

#### 16.1.1 Alternative names

Capital incentives; financial incentives; subsidies; financial aid; allowance.

#### 16.1.2 Objective

The objective of grants is to reduce the cost of investments in sustainable technologies by directly providing capital to the investors.

#### 16.1.3 Definition

Grants and subsidies are a form of financial assistance provided by the public administration to companies or individuals, in order to support sustainability investments and projects, when the barrier to investment is the lack of access to capital or financing opportunities.

In developing countries, where the investment risk is typically higher than in developed countries, subsidies are usually a more effective means to encourage investment in energy efficiency technologies than indirect tax incentives.

Grants are particularly expensive support instruments for the improvement of sustainability, and are to be considered when limited access to capital hinders attainment of the optimal level of investment in sustainable solutions. In contexts characterized by high investment risks, grants can be a more effective means to encourage sustainability investments than tax exemptions and reductions. Grants have an advantage over soft loans and preferential loans in the case of an underdeveloped

banking sector, or if the eligible projects are too small or risky for commercial banks.

#### 16.1.4 Variations

The most common grants support:

- o Development and commercialization of sustainable solutions, or
- o Provision of training or of awareness raising, education and information campaigns.

Grant eligibility can be calculated according to:

- o Eligible investment, through a fixed payment or as a percentage of the total investment (usually capped), or
- o Amount of saved energy (a performance-based approach).

“Rebates” (not to be confused with tax rebates), which is an alternative name for tax reductions or exemptions, are commonly introduced to avoid free-ridership<sup>16</sup> and a rebound effect<sup>17</sup>. Rebates require beneficiaries to demonstrate that the new technology is introduced to replace an older, underperforming technology, which is then eliminated from the market.

<sup>16</sup> Free ridership or free rider problem refers in this context to the support provided by fiscal instruments to beneficiaries who would have implemented the same actions in the absence of the program (did not require financial support), but who use this opportunity to receive the incentives (free riders).

<sup>17</sup> The “rebound effect” is a situation whereby the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from the reduced consumption of a product (and therefore from lower energy costs) and compensate for this reduction by purchasing and/or using additional products, leading to a stability or an increase in the overall consumption.

## 16.2 RELEVANCE



### 16.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
National level (country or independent regional unit within/with jurisdiction over the country)	😊	😊	Grants can be introduced and implemented at any level of governance.
Local level (city or lower level)	😊	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.



The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 16.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😊	
	New buildings		😊	
	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	
	<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊
			Residential buildings	😊
Private		Non-residential buildings	😊	
		Residential buildings	😊	



The instrument has a positive effect.














The instrument may have a positive effect, if certain conditions apply.




The instrument is not applicable, has very little effect, or no effect at all.


 16.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>		Grants can be used to support organisations through the provision of information and/or training programs, in which case they could contribute to overcoming these barriers.
	Insufficient information or awareness among target actors		
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		The instrument, if designed appropriately, can result in an increased demand for sustainable technologies, thus promoting their supply. By specifically targeting a given gap in the market, grants have the advantage of sending a clear message to actors in the market, influencing both demand and supply.
	High initial costs of sustainable solutions		The instrument increases liquidity in the industry, enabling investments in the sustainable building sector. Through increased consumption, the instrument can promote economies of scale and lower costs for sustainable solutions.
	Fragmented market structure <sup>3</sup>		
	Limitations in the typical building design process <sup>4</sup>		
	Split incentives <sup>5</sup>		
	High transaction costs <sup>6</sup>		The introduction of grants, although costly in financial terms, does not have particularly high administrative costs, as the necessary capacities are typically already developed at most administration levels. However, efforts in fighting corruption can be important in some cases.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Although grants are simple and straightforward mechanisms to design and enforce, additional measures should be taken to fight corruption as this may hinder the success of grant programs.
	Utility theft or non-payment		

 The instrument modifies the policy context, reducing the magnitude of this barrier.

 The instrument overcomes this barrier, or operates regardless of this barrier.

 The instrument partially overcomes this barrier.

 The instrument does not overcome this barrier.

1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.

2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.

3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.

4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.

5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.

6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.




 16.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect	
<b>Environment/ resources</b>	Increasing energy efficiency	😊	
	Reducing water demand	😊	
	Reducing waste-water generation	😐	
	Reducing energy peak demand	😐	
	Increasing access to high quality water in buildings	😊	
	Decarbonising the energy supply <sup>1</sup>	😊	
	Increasing the sustainability of local resource use	😊	
	Limiting land use in urban areas (including indirect land use)	😐	
	Reducing air pollution	😊	
	Supporting climate change adaptation	😊	
<b>Social</b>	Reducing utility costs for the population	😊	
	Supporting a specific target group	Public institutions	😊
		Small and medium enterprises	😊
		Low-income consumers	😊*
Improving comfort, services and housing conditions	😊		
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	
	Creating new employment opportunities	😊	
	Supporting Research and Development (R&D) activities for technological innovation	😊*	
	Eliminating/tackling informal market	😊	
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊	
	Creating new business opportunities by market transformation	😊	
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😊**	
<b>Political</b>	Improving energy security <sup>2</sup>	😊	
	Making politics of sustainable development credible	😐	
	Releasing budget from public bodies	😞	
	Reducing corruption	😐	



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

IF

The instrument may contribute to this goal, according to some conditions.



















The instrument has a negative effect on this goal.

1 That is to say, increasing the utilization of renewable energy sources.

2 Energy security is here defined as supplying more consumers with the same production capacity.

## 16.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
Fiscal powers to provide grants at the relevant administrative level.		Continue to the next precondition.
		If not, reconsider the introduction of the instrument.
<ul style="list-style-type: none"> <li>Investment in sustainable solutions hindered by insufficient access to capital.</li> <li>The government has access to financial resources for these specific purposes.</li> </ul>		Continue to the next precondition.
		If not, reconsider the introduction of the instrument.
Possibility to minimize (non-targeted) energy or water subsidies, at least in the domains related to the grant scheme.		Continue to the next precondition.
		Grants in combination with non-targeted energy or water subsidies may overload public finances. Reconsider these subsidies. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Targeted sustainable solutions are: 1.available on the target market and, 2.substantially more expensive than conventional solutions.		Continue to the next precondition.
		1.Promote the market introduction or proliferation of sustainable solutions, e.g. by communicating the government's purpose. If this is feasible, continue to the next precondition. 2.Consider which barriers hamper the uptake of sustainable solutions and reconsider grants accordingly. If not, reconsider the introduction of the instrument.
Strong political commitment and motivation to promote sustainability in buildings.		Continue to the next precondition.
		Commitment is necessary to mobilize financial resources and to achieve a long lasting impact. Consider introducing public leadership programs. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Capacity within the administration to administer and distribute grants.		Continue to the next precondition.
		Grants are relatively simple instruments, but may require increasing enforcement capacity through hiring and targeted training, e.g. to minimize irregularities in the distribution of grants. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<ul style="list-style-type: none"> <li>Credibility of the government and receptivity of target groups.</li> <li>Sufficient communication capacity within the relevant government bodies.</li> </ul>		Continue to the next precondition.
		Make an additional effort in communicating the government's commitment, the grants' purposes, duration, assignment criteria, etc. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<ul style="list-style-type: none"> <li>Low corruption within the administration.</li> <li>Existence of clear regulations to frame the use of government funds.</li> </ul>		Continue to Implementation steps (section 16.4).
		Increase budgetary transparency by describing the priority areas and grant application/selection criteria as well as adequate control mechanisms. If this is feasible, continue to Implementation steps. If not, reconsider the introduction of the instrument.



The precondition exists - move to the next precondition.



The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

## 16.4 IMPLEMENTATION STEPS

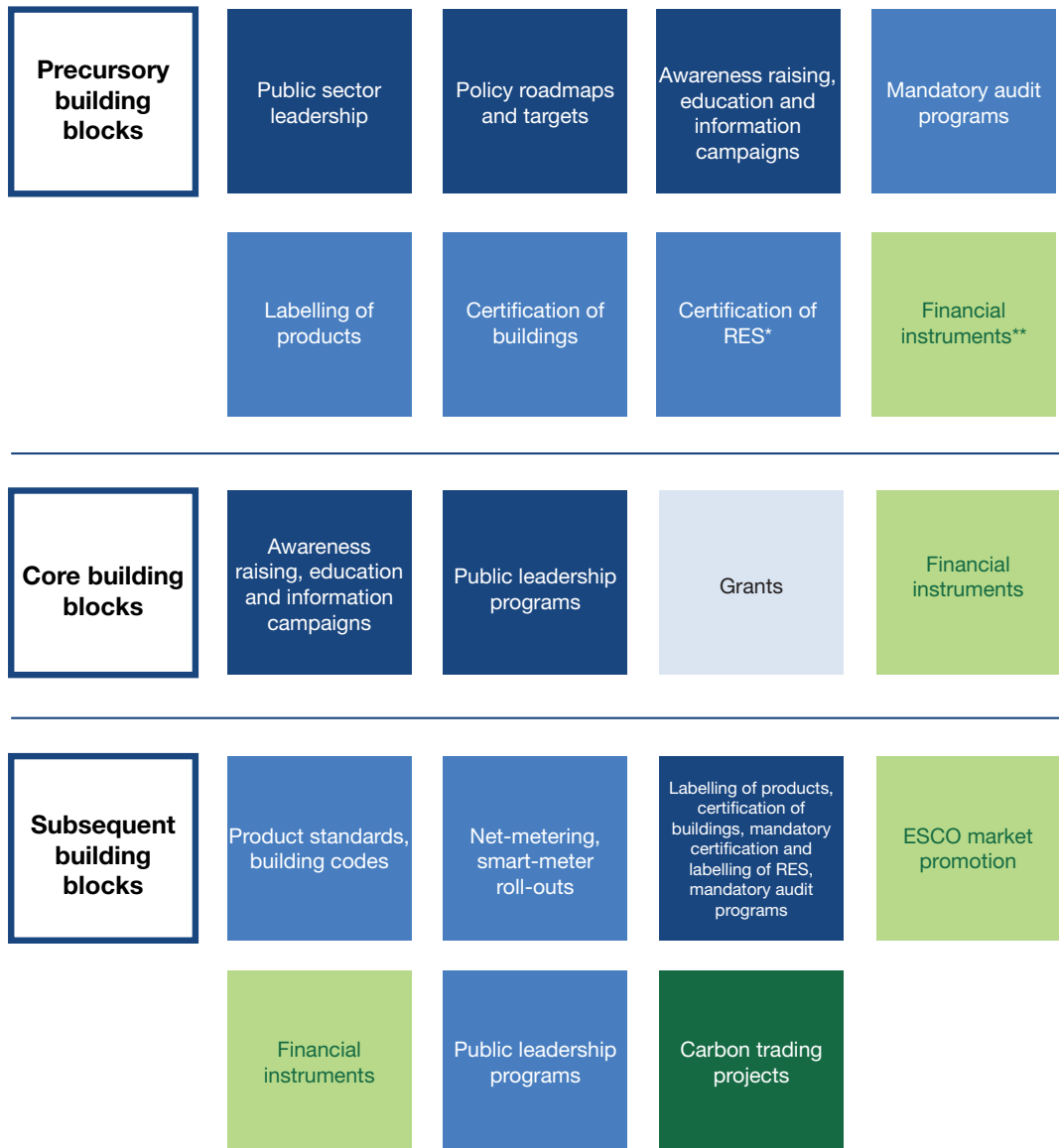
This section presents the general steps recommended for the introduction of the instrument. Users can summarize them in section 4.1. of the Worksheet.

1	Select target solutions and social groups	<ul style="list-style-type: none"> <li>Identify sustainable solutions for which uptake requires financial support; identify social groups unable to invest in sustainable solutions and/or to access utility services.</li> </ul>
2	Consideration is given to policy, market and institutional conditions	<ul style="list-style-type: none"> <li>Consider existing policy instruments, especially financial ones.</li> <li>Analyse grant values to determine an appropriate amount to promote the selected actions (i.e. include other barriers than the economic ones in the analysis).</li> <li>Study the pressure that the instrument will put on public finances, in combination with existing instruments like energy and water subsidies.</li> <li>Consider the temporal impact of the instrument and the distortion of the financial markets that may be generated during the introduction and removal periods.</li> </ul>
3	Policy design	<ul style="list-style-type: none"> <li>The legal setting specify the goals to be addressed by the instrument (e.g. energy efficiency, renewable energy sources), target groups (low income, SMEs, etc), and the conditions for grant assignment.</li> <li>Maximize the coherence of the grant scheme with other financial instruments (namely to avoid unsustainable subsidies and double incentives).</li> <li>Define the duration of the program to provide confidence to the consumer and the suppliers in introduced incentives.</li> <li>Describe the selection of technologies and/or criteria for selection.</li> <li>Consider the possibility of mandating a coordination agency.</li> <li>If possible, define the type of grant (prefer performance-based approaches and/or rebates to minimize free-ridership.<sup>1</sup></li> <li>Establish a simple and effective management system of public subsidies (to minimize administrative burden and transaction costs for beneficiaries).</li> <li>Determine how beneficiaries can demonstrate the results obtained (particularly in performance-based approaches).</li> <li>Describe a simple, effective and cost-effective control mechanism.</li> <li>Establish control mechanisms and penalties against irregular practices.</li> </ul>
4	Establish or select the entity mandated to coordinate the process	The quality and professionalism of the coordination entity that will provide technical support are crucial to the effectiveness of grant programs.
5	Design and enforce a communication strategy	While grants usually do not have a long lasting impact on the market, training and awareness campaigns can compensate for this shortcoming. For instance, an awareness raising, education and information campaign focused on target actors, combined with impeccable administrative conduct, can generate awareness about the use of the technologies. The communication should include clear and transparent information guidelines describing the eligibility and functioning of the program and its duration.
6	Select and train (if necessary) accredited technical operators	Technical operators should be selected and trained according to the needs determined by the selected performance criteria (technical skill, staff, logistical means, financial situation, etc.).
7	Enforce the grant scheme	Grant schemes can be enforced by assessing grant claims against objective eligibility criteria. It is preferable that grants include a requirement for supported projects to prove the impacts achieved.
8	Monitor the implementation	Grants may have a negative impact on the market by leading to an increase in the cost of equipment and to the deployment of poor quality equipment. Focus on fighting corruptive practices and detecting free-ridership.
9	Adjust the program	Actions to adjust the program can include updating the grant value as well as the list of eligible measures, technologies and actors.

<sup>1</sup> Grants should target specific categories of consumers or innovative technologies and/or be restricted to certain types of investments, with a long payback time but high efficiency gains.

## 16.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



**Colour code describing the interaction of each instrument with the reviewed one:**

- Reviewed instrument
- Potential reinforcement
- Strong reinforcement
- Potential mitigation
- Strong mitigation

\* RES: Renewable Energy Solutions.  
 \*\* Soft loans, preferential mortgages, tax exemptions and reductions, energy and carbon taxes, public benefits charges.

#### 16.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public sector leadership and policy roadmaps** and targets demonstrate that the government is committed to sustainability, enabling the industry to confidently take the necessary measures.
- o **Awareness raising, education and information campaigns** addressed to the general public increase the potential acceptance and success of the technological solutions supported by grants.
- o The presence of **financial instruments, such as soft loans, preferential mortgages, energy and carbon taxes, public benefits charges** need to be carefully assessed prior to the introduction of the reviewed building block, to avoid sending confusing messages, adding unnecessary complexity to the financial system and generating double incentives.
- o **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived prices of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones.

- o **Labelling of products, certification of buildings and certification of renewable energy solutions** provide benchmarks for the assignment of grants, therefore simplifying and adding transparency to the granting process.

#### 16.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Awareness raising, education and information campaigns.** The reviewed building block requires transparent communication on the instrument itself as well as on sustainability matters to promote building sustainability. Informed target groups react more positively to smaller grants than uninformed groups.
- o **Public leadership programs.** Grants to public bodies are a common instrument to promote sustainability improvement in public premises. These are preferably combined with a scheme targeting the private sector.
- o **Financial instruments, such as soft loans, preferential mortgages, energy and carbon taxes, public benefits charges** need to be carefully assessed to avoid sending confusing messages, adding unnecessary complexity to the financial system and generating double incentives.

## 16.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o The introduction of **financial instruments, such as soft loans, preferential mortgages, energy and carbon taxes, public benefits charges** needs to be carefully assessed to avoid sending confusing messages, adding unnecessary complexity to the financial system and generating double incentives.
- o **ESCO market promotion and carbon trading projects.** While the presence of large grants may hinder the development of ESCO and of carbon credit markets, appropriately sized grants can initiate their development.
- o **Product standards, building codes, labelling of products, certification of buildings, mandatory certification and labelling of renewable energy sources, net-metering smart-meter roll-outs, mandatory audit programs.** The introduction of these instruments is more successful if certain sustainable solutions, facilitated by the existence of grants, are already available on the market. In addition, grants increase the acceptance of such instruments and can serve to increase their stringency.
- o **Public sector leadership.** Public leadership programs benefit from a coherent policy framework including grants. In addition, public bodies typically benefit from grants, which enable them to introduce sustainability improvements.

## 16.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Chang, Keh-Chin, Wei-Min Lin, Tsong-Sheng Lee, and Kung-Ming Chung. 2011. *Subsidy Programs on Diffusion of Solar Water Heaters: Taiwan's Experience*. *Energy Policy* 39 (2) (February): 563–567. doi:10.1016/j.enpol.2010.10.021.

GreenMax Capital Foundation. 2009. *Lessons Learned From Energy Efficiency Finance Programs in the Building Sector*. New York, USA. <http://www.europeanclimate.org/documents/LessonslearnedfromEEfinance-v2.pdf>.

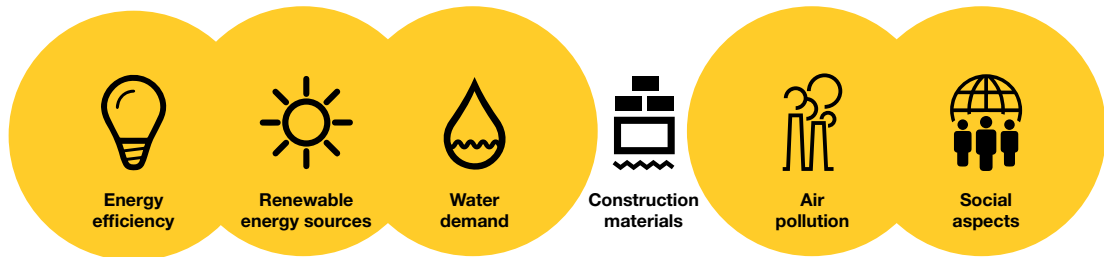
Missauri, Rafik, and Adel Mourtada. 2010. *Instruments and Financial Mechanisms of Energy Efficiency Measures in Building Sector*. WEC-ADEME. [http://www.worldenergy.org/documents/ee\\_case\\_study\\_financing.pdf](http://www.worldenergy.org/documents/ee_case_study_financing.pdf).

Rouleau, T., and C.R. Lloyd. 2008. *International Policy Issues Regarding Solar Water Heating, with a Focus on New Zealand*. *Energy Policy* 36 (6) (June): 1843–1857. doi:10.1016/j.enpol.2008.01.030.

Sarkar, Ashok, and Jas Singh. 2010. *Financing Energy Efficiency in Developing Countries – Lessons Learned and Remaining Challenges*. *Energy Policy* 38 (10) (October): 5560–5571. doi:10.1016/j.enpol.2010.05.001.

T'Serclaes, Philippine de. 2007. *Financing Energy Efficient Homes. Existing Policy Responses to Financial Barriers*. Paris, France: International Energy Agency (IEA). <http://www.iea.org/publications/freepublications/publication/FinancialBarrierBuilding-1.pdf>.

## 17 SOFT LOANS



### 17.1 OVERVIEW OF THE INSTRUMENT

#### 17.1.1 Alternative names

Preferential loans; soft financing; concessional funding; low-interest loans and guarantee funds.

#### 17.1.2 Objective

The objective of soft loans is to provide financial assistance to overcome the high initial costs related to sustainability improvements. Soft loans are suitable when the investment is expected to generate income (such as through energy cost savings), which can be used to repay the loan.

#### 17.1.3 Definition

Soft loans are publicly supported loans offered by government agencies or banks, at low interest rates, to finance sustainability measures. In most cases, loans are offered through a public-private partnership. The public administration provides a fiscal incentive to the bank, which then offers a preferential interest rate to customers undertaking sustainability investments.

Other flexible arrangements are possible as alternatives to below-market interest rates, such as longer repayment periods or pay-

ment holidays. Soft loan programmes are advantageous to banks, as they can attract new customers.

#### 17.1.4 Variations

Soft loans may be offered as a simple programme that is limited in time, or associated with revolving financing instruments. In the latter case, the government creates an initial fund to provide soft loans to eligible projects. The repayments replenish the fund which is then reused to continue financing new projects. The introduction of a refund<sup>18</sup> mechanism may be recommended to avoid free-ridership<sup>19</sup> and a rebound effect.<sup>20</sup>

<sup>18</sup> Refund mechanisms require beneficiaries to demonstrate that the new technology is introduced to replace an older, underperforming technology, which is therefore eliminated from the market.

<sup>19</sup> In this context, free ridership or free rider problem refers to the support provided by fiscal instruments to beneficiaries who would have implemented the same actions in the absence of the program, but who use the opportunity to benefit from the incentives (free riders).

<sup>20</sup> The "rebound effect" is a situation where the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from a reduced consumption and compensate for this reduction by consuming additional services, leading to stability or an increase in the overall consumption.

## 17.2 RELEVANCE



### 17.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	Soft loans may be introduced and implemented at any level of governance. Local programs may respond better to specific local circumstances and saving potential.
<b>Local level (city or lower level)</b>	😊	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.



IF The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 17.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance
<b>Buildings</b>	Existing buildings		😊
	New buildings		😊
	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
Residential buildings		😊	
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊



The instrument has a positive effect.



The instrument may have a positive effect, if certain conditions apply.















The instrument is not applicable, has very little effect, or no effect at all.






 17.2.3 **Barriers**


The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>		Soft loans may be used to support organisations for the provision of information and/or training programs, in which case they can contribute to overcoming these barriers.
	Insufficient information or awareness among target actors		
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		The instrument, if designed appropriately, can support an increased demand for sustainable technologies, thus promoting their supply. By targeting a specific technology gap in the market, soft loans can send a clear message to market actors, influencing both demand and supply.
	High initial costs of sustainable solutions		The instrument increases access to capital and reduces its cost for those willing to invest in sustainability improvements. Also, through increased consumption, the instrument can promote economies of scale and lower costs of sustainable solutions.
	Fragmented market structure <sup>3</sup>		
	Limitations in the typical building design process <sup>4</sup>		
	Split incentives <sup>5</sup>		
	High transaction costs <sup>6</sup>		Soft loans are the most cost-effective when in the form of revolving funds. However, these require a strong institutional capacity to manage and control the funds (in comparison to grants, for example). Considerable efforts to fight corruption may be required in certain cases.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Soft loans are simple and straightforward to design and enforce. Their introduction in collaboration with banks, which provide their expertise and infrastructure, can restrict the need for government capacities. Additional measures may be necessary to ensure the transparency of the program, as corruption may hinder the success of the scheme.
	Utility theft or non-payment		The non-payment of utility bills makes a party non-eligible for government support, thus introducing an incentive for paying arrears.

+ The instrument modifies the policy context, reducing the magnitude of this barrier.

 The instrument overcomes this barrier, or operates regardless of this barrier.

 The instrument partially overcomes this barrier.

 The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 17.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	* Renewable energy technologies, especially building-integrated solutions, can be eligible for soft loans.  **Soft loans can be used to promote improved cooking technologies, such as chimney stoves, smoke hoods, and improved ventilation systems, as well as cleaner types of fuel, such as natural gas or modified biomass fuel (briquettes), which can improve air quality.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	😞		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😊*		
	Increasing the sustainability of local resource use	😊		
	Limiting land use in urban areas (including indirect land use)	😞		
	Reducing air pollution	😊**		
	Supporting climate change adaptation	😞		
<b>Social</b>	Reducing utility costs for the population	😊	It is possible to select the target beneficiaries directly or through the eligible projects.	
	Supporting a specific target group	Public institutions		😊
		Small and medium enterprises		😊
		Low-income consumers		😊
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	The instrument ensures a broader uptake of sustainable solutions, boosting a sustainable economy, creating jobs and beginning the transition to a low-carbon economy.	
	Creating new employment opportunities	😊		
	Supporting Research and Development (R&D) activities for technological innovation	😊		
	Eliminating/tackling informal market	😊		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😊		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😞		
<b>Political</b>	Improving energy security <sup>2</sup>	😊	Prior to introducing a soft loan scheme, efforts should be conducted to minimize corruption.	
	Making politics of sustainable development credible	😞		
	Releasing budgets from public bodies	😞		
	Reducing corruption	😞		



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

IF

The instrument may contribute to this goal, according to some conditions.



















The instrument has a negative effect on this goal.

1 That is to say, increasing the utilization of renewable energy sources.

2 Energy security is here defined as supplying more consumers with the same production capacity.

### 17.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
Insufficient) access to capital hinders investment in sustainable solutions.		Continue to the next precondition.
		The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.
Government has access to financial resources and/or the banking sector is able and willing to finance sustainability improvements in buildings.		Continue to the next precondition.
		Assess the availability of financial support from external funders (World Bank, European Union, regional development banks, etc). If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Impossibility to minimize non-targeted energy or water subsidies, at least in the areas related to the soft loan scheme.		Continue to the next precondition.
		Soft loans in combination with non-targeted subsidies may overload public finances. Reconsider these subsidies. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Eligible sustainability solutions are: • 1.available and, • 2.substantially more expensive than conventional solutions.		Continue to the next precondition.
		1.Start by promoting sustainable solutions, e.g. by communicating the government's objectives. 2.Determine which barriers hamper the uptake of sustainable solutions and redesign the scheme accordingly. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Strong political commitment and motivation to promote sustainability in buildings.		Continue to the next precondition.
		Commitment is necessary to mobilize financial resources and to achieve a long lasting impact. Consider introducing public leadership programs. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
Availability of capacity within the administration for programme administration, and within the banking sector for the assignment of soft loans and the collection of instalments.		Continue to the next precondition.
		An additional effort is needed to train government officials and participating contractors (banks) to ensure the credibility of the program and the achievement of sustainability improvements. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
• Credibility of the government and receptivity of the target groups • Sufficient communication capacity within the relevant government bodies • Familiarity of target beneficiaries with loan programs.		Continue to the next precondition.
		Make an additional effort in communicating the government's commitment, the soft loan scheme's objectives, duration, eligibility criteria, etc. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
• Low corruption at administrative level, • Existence of clear regulations on the use of government funds.		Continue to Implementation steps (section 17.4).
		Increase budgetary transparency, describe the eligible projects and assignment criteria, as well as control mechanisms. If this is feasible, continue to Implementation steps. If not, reconsider the introduction of the instrument.



The precondition exists - move to the next precondition.



The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

## 17.4 IMPLEMENTATION STEPS

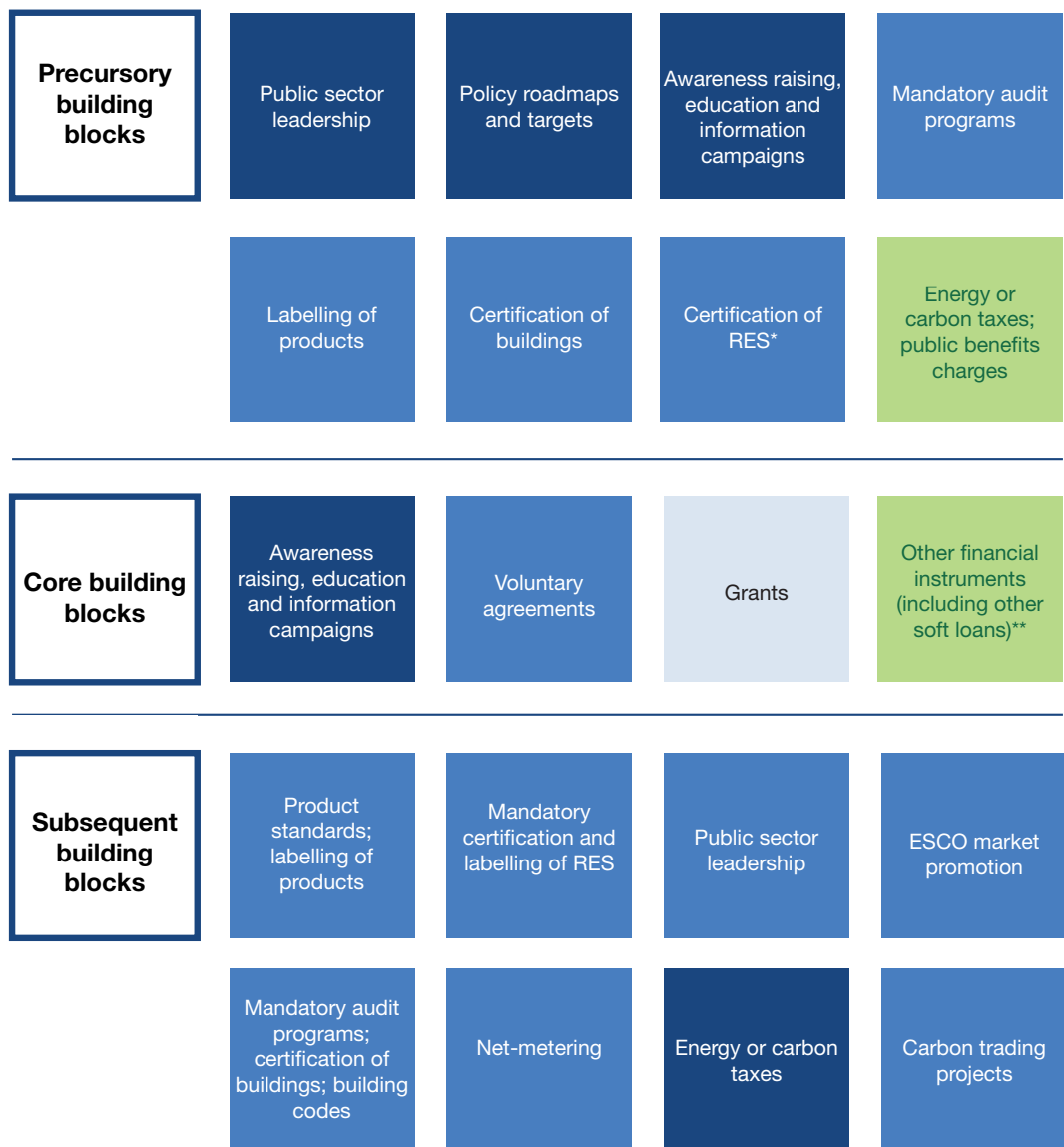
This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Select target solutions and social groups	<ul style="list-style-type: none"> <li>• Identify sustainable solutions that require financial support.</li> <li>• Identify social groups unable to invest in sustainable solutions and/or access to utility services, and who may be interested in obtaining a soft loan.</li> </ul>
2	Take into consideration policy, market and institutional conditions	<ul style="list-style-type: none"> <li>• In certain contexts, e.g. developing countries, the implementation of soft loan programs may require addressing the following: low banking rates of households, lack of banks' interest in this market and high investment risks.</li> <li>• Consider existing policy instruments, especially financial ones.</li> <li>• Study the pressure that the instrument will put on public finances and the possibility to secure financial backing (it will be necessary to establish a credit guarantee scheme to ensure the support of the banking sector).</li> <li>• Consider the temporal impact of the instrument and the distortion of the financial markets that it will generate.</li> </ul>
3	Initiate collaboration with the banking industry	<ul style="list-style-type: none"> <li>• Without access to private capital, there will be limited funding.</li> <li>• An adequate collaboration should guarantee that the loans meet the uniformity and standards necessary for private lenders to evaluate risk, and are packaged within portfolios made available on the secondary market.</li> </ul>
4	Design policy	<ul style="list-style-type: none"> <li>• Maximize the coherence of the loan scheme with other financial instruments (e.g. to avoid counter-effective subsidies, double incentives and free-ridership<sup>1</sup>).</li> <li>• Design the program according to its target audience.</li> <li>• Make the eligibility criteria very clear (preferably new technologies with low market share, and measures which will result in significant improvements, e.g. reduction of energy poverty).</li> <li>• Specific credit lines may target different solutions.</li> <li>• The interest rate for such loans should be kept low (usually lower than market average), and other possible incentives should be considered (such as long repayment terms or interest holidays).</li> <li>• Establish a simple and effective loan management system (e.g. consider collecting the credit reimbursement via electricity bills, ensure relatively low costs of credit distribution through banks, etc.).</li> <li>• Define if and how beneficiaries will demonstrate the results obtained.</li> <li>• Establish control mechanisms and penalties against irregular practices.</li> </ul>
5	List the eligible technologies and projects	<ul style="list-style-type: none"> <li>• Prioritize new technologies with small market share as well as low cost technologies not accessible to low income households.</li> </ul>
6	Design and enforce a communication strategy	<ul style="list-style-type: none"> <li>• A transparent information and awareness raising campaign focused on target actors, combined with impeccable administrative conduct, generates awareness about the use of the technology.</li> <li>• Provide clear and transparent information guidelines describing the eligibility and functioning of the program and its duration.</li> </ul>
7	Select partners and provide the necessary training	<ul style="list-style-type: none"> <li>• Partners (private banks) should be selected on the basis of performance criteria (technical skill, staff, logistical means, financial situation, etc.).</li> </ul>
8	Enforce the loan scheme	<ul style="list-style-type: none"> <li>• In close collaboration with the banking institutions, ensure that all claims are assessed against the eligibility criteria.</li> </ul>
9	Monitor implementation	<ul style="list-style-type: none"> <li>• Observe possible negative impacts, such as cost increases of the eligible technologies or the deployment of poor quality technologies.</li> <li>• Focus on detecting free-ridership and corruption.</li> </ul>
10	Adjust the program	<ul style="list-style-type: none"> <li>• Update the list of eligible measures and target groups, by adding new, low-market-share technologies and measures which will result in significant energy savings.</li> <li>• Ensure that application procedures and eligibility criteria are clear and transparent.</li> </ul>

1 Free riders are actors who would have implemented energy efficiency measures even in the absence of the program. Soft loans should be targeted to certain categories of consumers and/or restricted to certain types of investments, such as innovative technologies, or schemes with long payback times but high efficiency gains.

## 17.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



Colour code describing the interaction of each instrument with the reviewed one:

- Reviewed instrument
- Potential reinforcement
- Strong reinforcement
- Potential mitigation
- Strong mitigation

\* RES: Renewable Energy Solutions.

\*\* Grants, preferential mortgages, tax exemptions and reductions, energy or carbon taxes, or public benefits charges.

### 17.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- **Public sector leadership and policy roadmaps and targets** demonstrate that the government is serious about its objectives, enabling the building and banking industries to take the necessary steps.
- **Awareness raising, education and information campaigns** addressed to the general public increase the potential interest for introducing technological improvements, which are supported by the reviewed building block.
- **Labelling of products, certification of buildings, certification and labelling of renewable energy sources and mandatory audit programs** establish reference performance levels which provide clear eligibility criteria for the loan system.
- **Labelling of products, certification of buildings and certification of renewable energy solutions** provide benchmarks for the assignment of grants, thereby simplifying and adding transparency to the granting process.
- **Energy or carbon taxes and public benefits charges** typically serve as an ear-marked source of financing for the reviewed building block.
- **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the policy package. Subsidi-

es impact the real and perceived price of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones. They also represent an important pressure on government budgets, leaving fewer funds available for the reviewed instrument, which requires considerable financial resources.

### 17.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- **Awareness raising, education and information campaigns.** The reviewed building block requires transparent communication on sustainability matters, as well as on the instrument itself, to promote building sustainability. Informed target groups may react more positively to small soft loans than non-informed groups. Information about the existence of the instrument should be communicated through collaboration between government and banks.
- **Voluntary agreements.** Soft loans are a typical counterpart in voluntary agreements.
- The presence of **financial instruments, such as grants, preferential mortgages, energy or carbon taxes, or public benefits charges** needs to be carefully assessed prior to the introduction of the reviewed building block to avoid sending mixed messages, adding unnecessary complexity to the financial system, or generating double incentives. On the other hand, soft loans can provide the necessary support and motivation for groups targeted by **public benefits charges or energy or carbon taxes** to invest in sustainability improvements.

### 17.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **ESCO market promotion and carbon trading projects.** Soft loans can serve as an initial funding source for ESCO and carbon trading initiatives. However they must be carefully designed, as they may compete with ESCOs and carbon trading, thus impeding the development of the respective markets.
- o **Product standards, building codes, labelling of products, certification of buildings, mandatory certification and labelling of renewable energy sources and net-metering.** Prior to their introduction, these instruments may require the introduction and dissemination of certain schemes supported by soft loans. Soft loans increase the acceptance of high performing technologies and can serve to increase the stringency of other instruments. Once sufficient renewable energy schemes have been implemented, the introduction of a net-metering program, announced in parallel to the introduction of soft loans, should heighten awareness concerning the benefits of using soft loans for financing renewable energy solutions.
- o **Public sector leadership.** Public leadership programs benefit from a coherent policy framework with soft loans at its core. In addition, public bodies can be the beneficiaries of soft loans, which enable them to introduce sustainability improvements.
- o **Energy or carbon taxes (or the reduction of energy and water subsidies).** The introduction of these unpopular measures can be facilitated by the early introduction of a soft loan program, provided adequate information is shared about its

objectives. Moreover, tax collection can help the government to repay financial institutions that supported the soft loan program.

### 3.17.6 Additional information

The following references may be helpful in the design and implementation of the instrument:

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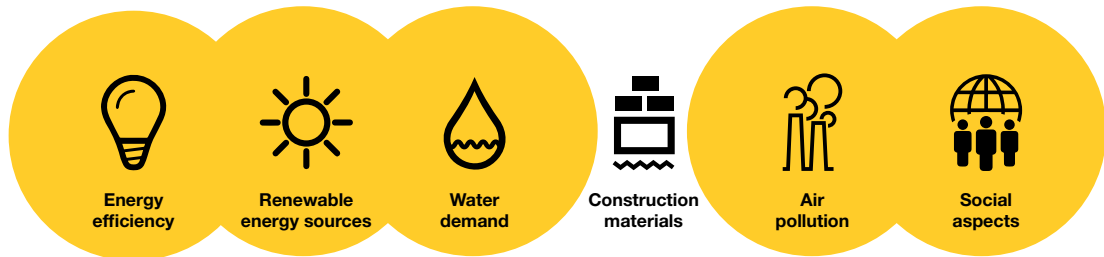
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## 18 PREFERENTIAL MORTGAGES



### 18.1 OVERVIEW OF THE INSTRUMENT

#### 18.1.1 Alternative names

Energy efficient mortgages; energy improvement mortgages; green mortgages.

#### 18.1.2 Objective

The objective of this instrument is to provide financial assistance (at least for the duration of the mortgage) to overcome the high initial costs linked to sustainability improvements which have proved over time to deliver benefits, typically through reduced resource consumption.

#### 18.1.3 Definition

Preferential mortgages are supported by the public authority through providing an incentive to commercial banks. The banks then provide mortgages that allow real estate promoters and/or building owners to benefit from lower interest rates or extended credit options when the investment is related to sustainability. This scheme helps investors to cover the additional upfront costs commonly associated with sustainable construction/renovation.

A sustainability audit is usually sufficient to evaluate the savings that can be expected

from the sustainability improvements, compared to the business as usual scenario.

#### 18.1.4 Variations

There are two main categories of preferential mortgages, depending on whether they are applicable to new or existing buildings.

Preferential mortgages can be given by public or private sources. Public bodies focus on the possible savings as a result of the program, and take into consideration social impacts, such as reducing energy poverty or job generation, while private actors, i.e. commercial banks, are more motivated by the financial outcomes and profits.

Although the instrument was originally introduced by government bodies, the increased demand of financial support for sustainable construction and renovation has generated interest among private market players. The implementation of preferential mortgages is commonly addressed through collaboration between public and private organizations.

## 18.2 RELEVANCE

### 18.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
National level (country or independent regional unit within/with jurisdiction over the country)	😊	😊	Preferential mortgages can be introduced and implemented at any level of governance.
Local level (city or lower level)	😊	😊	

- 😊 The instrument is typically introduced/implemented at this policy level.
- 😐 The introduction/implementation of the instrument at this level is atypical.
- IF The instrument may be introduced/implemented at this policy level if certain conditions apply.
- 😞 It is practically impossible to introduce/implement the instrument at this policy level.

### 18.2.2 Target areas












The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.





Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😊	The instrument can target all types of buildings and systems installed.
	New buildings		😊	
	Public	Non-residential buildings	😐	As preferential mortgages do not overcome the landlord-tenant split incentives, the instrument is not successful in buildings which are mainly allocated to rental, such as social housing. The instrument is more easily applied to private buildings.
		Residential buildings	😐*	
	Private	Non-residential buildings	😊	
Residential buildings		😊		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😐	
		Residential buildings	😐*	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😐	
		Residential buildings	😐	
	Private	Non-residential buildings	😐	
		Residential buildings	😐	

- 😊 The instrument has a positive effect.
- 😐 The instrument may have a positive effect, if certain conditions apply.
- 😞 The instrument is not applicable, has very little effect, or no effect at all.


 18.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>		Preferential mortgages rely on the capacity of commercial banks to promote the instrument. However, the instrument can engender additional actions (e.g. awareness raising, education and information campaigns) to better reach the target groups.
	Insufficient information or awareness among target actors		
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		The instrument, if designed appropriately, can support an increased demand for sustainable solutions, thus promoting their supply. By targeting a specific technology gap, preferential mortgages can send a clear message to market actors, influencing both demand and supply.
	High initial costs of sustainable solutions		The instrument increases access to capital and reduces its cost for those willing to invest in sustainability improvements. Moreover, the instrument may promote economies of scale and lower costs of sustainable solutions through increased consumption.
	Fragmented market structure <sup>3</sup>		
	Limitations in the typical building design process <sup>4</sup>		
	Split incentives <sup>5</sup>		
	High transaction costs <sup>6</sup>		The introduction of preferential mortgages, although costly in financial terms, is generally cheaper than grants. However, increased capacity is required to manage and control the funds, as well as to fight corruption (in certain cases).
<b>Regulatory barriers</b>	<b>Inadequate implementation, e.g. due to limited institutional capacity, including corruption</b>		Preferential mortgages are simple and straightforward to design and enforce. Their introduction in collaboration with banks, which provide their expertise and infrastructure, can reduce the need for government capacities. However, additional measures may be necessary to secure the transparency of the program, as corruption could hinder the success of the scheme.
	Utility theft or non-payment		The non-payment of utility bills makes a party non-eligible for government support, thus introducing an incentive for paying arrears.

-  The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- 1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- 2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- 3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- 4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- 5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- 6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 18.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	By linking preferential credit conditions to the achievement of economic savings, preferential mortgages focus on the promotion of energy efficiency measures and renewable energy solutions. They can also address the reduction of water consumption.  * In theory, any of these conditions can be a requirement to grant a preferential mortgage.	
	Reducing water demand	😊		
	Reducing waste-water generation	😐		
	Reducing energy peak demand	😊		
	Increasing access to high quality water in buildings	😐		
	Decarbonising the energy supply <sup>1</sup>	😊		
	Increasing the sustainability of local resource use	😐*		
	Limiting land use in urban areas (including indirect land use)	😐*		
	Reducing air pollution	😊*		
	Supporting climate change adaptation	😊		
<b>Social</b>	Reducing utility costs for the population	😊	It is possible to select target beneficiaries through the eligibility criteria.	
	Supporting a specific target group	Public institutions		😊
		Small and medium enterprises		😊
		Low-income consumers		😊
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	The instrument ensures broader uptake of sustainable solutions, the boosting of a sustainable economy, creation of jobs and support for the transition to a low-carbon economy.	
	Creating new employment opportunities	😊		
	Supporting Research and Development (R&D) activities for technological innovation	😐		
	Eliminating/tackling informal market	😊		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😊		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😐		
<b>Political</b>	Improving energy security <sup>2</sup>	😊	Prior to introducing a preferential mortgage scheme, efforts should be conducted to minimize corruption.	
	Making politics of sustainable development credible	😐		
	Releasing budgets from public bodies	😞		
	Reducing corruption	😞		



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

IF

The instrument may contribute to this goal, according to some conditions.



The instrument has a negative effect on this goal.

1 That is to say, increasing the utilization of renewable energy sources.

2 Energy security is here defined as supplying more consumers with the same production capacity.

### 18.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
<ul style="list-style-type: none"> <li>• Existence (or need) of a high rate of construction and/or refurbishment.</li> <li>• The insufficient access to capitals hinders investment in sustainable solutions.</li> </ul>	😊	Continue to the next precondition.
	😞	The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.
<ul style="list-style-type: none"> <li>• The government has access to financial resources, and is committed to allocate them to the promotion of sustainability in buildings.</li> <li>• The banking sector is able and willing to finance sustainability improvements in buildings. (If energy prices are highly volatile, the banks will need additional guarantees.)</li> </ul>	😊	Continue to the next precondition.
	😞	Mortgages fully sustained by bank resources are less affordable. Identify additional financial support sources (World Bank, European Union, regional development banks, etc). Provide reasonable guarantees to banks.
Inexistent or low (non-targeted) energy or water subsidies, at least in the domains related to the preferential mortgage scheme.	😊	Continue to the next precondition.
	😞	Non-targeted subsidies overload public budgets and reduce the benefits of preferential mortgages. Reconsider these subsidies.
Eligible sustainability solutions are: <ul style="list-style-type: none"> <li>• 1.available</li> <li>• 2.substantially more expensive than conventional solutions.</li> </ul>	😊	Continue to the next precondition.
	😞	<ol style="list-style-type: none"> <li>1.Communicate the government's objectives well in advance.</li> <li>2.Identify the barriers which hamper the market uptake of sustainable solutions.</li> </ol>
Availability of: <ul style="list-style-type: none"> <li>• government capacity for administration of the program</li> <li>• capacity within the banking sector for the assignment of preferential mortgages and the collection of instalments</li> <li>• capacity to conduct sustainability audits.</li> </ul>	😊	Continue to the next precondition.
	😞	<ul style="list-style-type: none"> <li>Train government officials and participating banks to ensure the credibility of the program.</li> <li>Sufficient capacity to conduct sustainability audits will ease mortgage assignment.</li> </ul>
<ul style="list-style-type: none"> <li>• Credibility of the government and receptivity of the target groups</li> <li>• Availability of communication capacity within the relevant government bodies</li> <li>• Familiarity of the target beneficiaries with (conventional) mortgage programs.</li> </ul>	😊	Continue to the next precondition.
	😞	Make an additional effort in transparency and communication of the program's objectives, duration, eligibility criteria, etc.
<ul style="list-style-type: none"> <li>• Low corruption at administrative level</li> <li>• Existence of clear regulations on the use of government funds.</li> </ul>	😊	Continue to Implementation steps (section 18.4).
	😞	Increase budgetary transparency, and describe the eligible projects and assignment criteria, as well as control mechanisms.

😊 The precondition exists - move to the next precondition.

😞 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

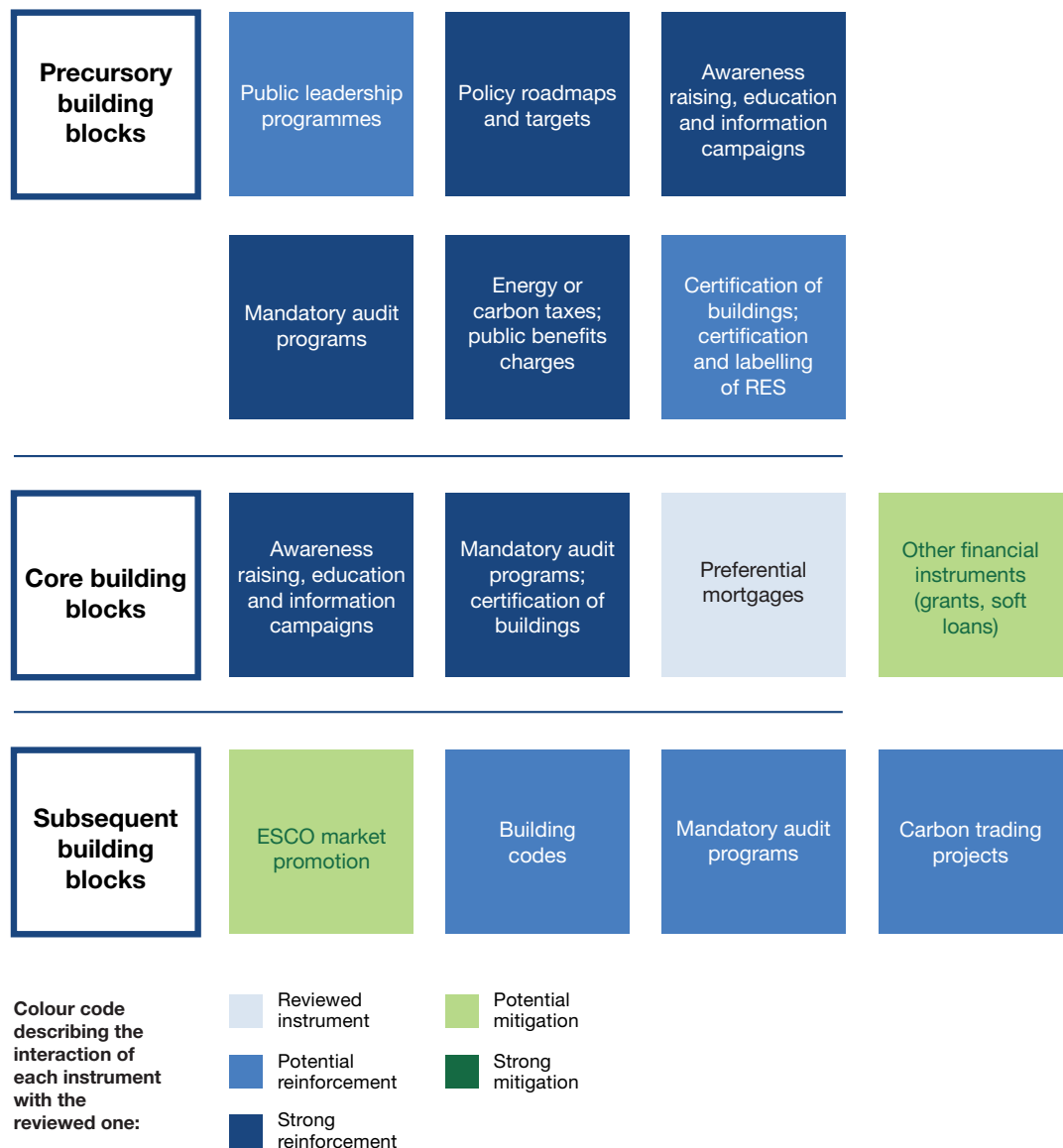
## 18.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Identify potential participating sectors or entities	Select the target sectors/groups that have the greatest improvement potential. Consider that financial barriers, among others, will be tackled by this instrument.
2	Strengthen technical capacity within the administration	Through training or multi-disciplinary collaboration: finance, administration and auditing of sustainable constructions.
3	Identify possible targets and action plans	Based on evaluations of target buildings, entities and groups.
4	Evaluate the financial resources that the government is able to allocate	As a result of a government contribution to the mortgages (public-private partnership with banks), the banks can offer better rates and thus make the offer more attractive to target groups. Public incentives can be reduced overtime when demand for preferential mortgages increases.
5	Communicate the government commitment and goals and initiate negotiations with financial entities	The success of the instrument will largely depend on the success in reaching the target groups and informing them about the financial product. Therefore consider effective communication campaigns as a priority. The product should be developed in close collaboration with banks.
6	Design attractive packages	Consider interest rates lower than for conventional mortgages and/or government incentives.
7	Set explicit goals or requirements for the mortgages	Aspects such as the needs of specific target groups or the expected payback period of the technological improvement must be assessed, based on social, economic and environmental goals.
8	Awareness building and informative campaigns	National and local governments or banks can support preferential mortgages via awareness raising, education and information campaigns that raise interest and disseminate information about the benefits, obligations and risks of the scheme. It is always effective to combine broadcast media and printed publications to target different consumer groups. Ensure clear communication of eligibility and requirements.
9	If necessary, collaborate with banks to increase their capacity to deliver the desired product	Consider the value of training bank employees, to increase technical capacity to review audits, evaluate investment proposals, set optimal interest rates and credit amounts, and provide tailored advice. Special departments, such as "Green banking centers", should be created within the banking structure in order to increase specialization and minimize corruption.
10	Granting of the mortgages	<ol style="list-style-type: none"> <li>1. Mortgages can be granted in combination with conventional loans.</li> <li>2. They require an energy or sustainability audit and further financial incentives to reach optimum effectiveness.</li> <li>3. The client must be eligible for a normal mortgage in the given bank.</li> <li>4. In the case of a retrofit, the client must commission a sustainability audit to evaluate the baseline energy use, provide recommendations for cost-effective retrofits, and assess expected savings. In the case of new buildings, the higher than average expected energy performance must be proven by an auditor or other expert.</li> <li>5. Once a positive eligibility assessment has been obtained, the interest rate should be reduced and/or the amount of loan available to the client increased for the concerned building.</li> <li>6. The physical inspection of the building should be performed by accredited experts after the construction, and if required, an energy report prepared to show compliance with the building codes.</li> <li>7. Money is to be placed in an escrow account by the lender until the improvements are completed. The time period allowed for implementation of improvements is limited, usually to only a few months, to minimize the financial risk for both borrower and lender.</li> </ol>
11	Monitor the implementation of the instrument	Ensure the transparent allocation of mortgages, by responding to criteria previously agreed with the administration.
12	Evaluation	Measure the achieved targets in order to update criteria and justify the allocation of additional public funds.

### 18.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



### 18.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public sector leadership and policy roadmaps and targets** demonstrate that the government is serious about its objectives, enabling the building and the banking industry to take the necessary preparatory steps.
- o **Awareness raising, education and information campaigns** addressed to the general public increase the potential interest for introducing sustainability improvements, which will be financed using the reviewed building block.
- o **Certification of buildings, certification and labelling of renewable energy sources and mandatory audit programs** establish reference performance levels, which support the development of clear eligibility criteria for the loan system. In addition, mandatory audit programs enable the development of the auditing capacity necessary for the assignment of preferential mortgages.
- o **Labelling of products, certification of buildings and certification of renewable energy solutions** provide benchmarks for the assignment of mortgages, therefore simplifying and adding transparency to the granting process.
- o **Energy or carbon taxes and public benefits charges** typically serve as an earmarked source of financing for the reviewed building block.
- o **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water

subsidies are mentioned here as they may reduce the coherence and credibility of the policy package. Subsidies impact the real and perceived price of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones. In addition, they represent a financial burden for the government which may impact the ability to allocate funds for preferential mortgages.

### 18.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Awareness raising, education and information campaigns.** The reviewed building block requires transparent communication on sustainability matters to promote building sustainability, as well as on the instrument itself. Informed target groups react more positively to smaller advantages than non-informed groups. Communicating the existence of the instrument to the target groups should be conducted by government in collaboration with the participating banks.
- o The presence of **financial instruments, such as grants, soft loans, energy or carbon taxes, and public benefits charges** needs to be carefully assessed prior to the introduction of the reviewed building block, to avoid sending mixed messages, adding unnecessary complexity to the financial system and generating double incentives. However, preferential mortgages can provide the necessary support for groups targeted by **public benefits charges or energy or carbon taxes**, to invest in sustainability improvements.



## 18.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **ESCO market promotion.** Preferential mortgages may compete with ESCOs, thus impeding the development of the ESCO market.
- o **Certification of buildings, mandatory certification and labelling of renewable energy sources and building codes.** The reviewed instrument supports the introduction of high performing solutions and can serve to increase the stringency of these instruments.
- o **Energy or carbon taxes (and/or the reduction of energy and water subsidies).** The introduction of these unpopular measures can be facilitated by the early introduction of a preferential mortgage program, provided adequate information is shared about its objectives. Furthermore, tax collection can help the government to repay financial institutions having supported the reviewed building block.

## 18.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

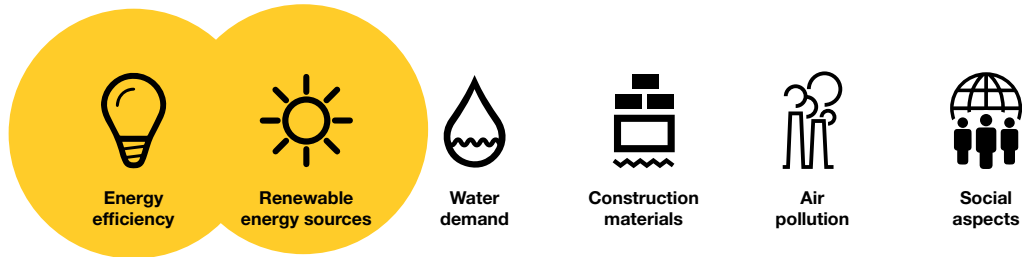
Adisorn, Thomas, Stefan Thomas, and Dagmar Kiyar. 2012. *KfW Energy Efficient Refurbishment and KfW Energy Efficient Construction (KfW)*. [http://www.bigee.net/policy/guide/new-buildings/good\\_practice\\_examples/25/#key-information](http://www.bigee.net/policy/guide/new-buildings/good_practice_examples/25/#key-information).

Gerarden, T. 2008. *Rebuilding Mortgages for Energy Efficiency*. Washington, DC: Federation of American Scientists. <https://fas.org/programs/energy/btech/policy/Rebuilding%20Mortgages%20for%20Energy%20Efficiency.pdf>.

Green Mortgage Company. 2009. *Energy Efficient Homes Are Healthier Homes Too!* <http://www.greenmortgagecompany.com/green-news/energy-efficient-homes-are-healthy-homes.html>.

Infonavit. 2013. *Green Mortgage Program Infonavit-Mexico*. 2011. Accessed April 8. [http://www.ecpamericas.org/data/files/Initiatives/energy\\_efficiency\\_working\\_group/eewg\\_mexico\\_workshop/infonavit.pdf](http://www.ecpamericas.org/data/files/Initiatives/energy_efficiency_working_group/eewg_mexico_workshop/infonavit.pdf).

## 19 NET-METERING (RENEWABLE ENERGY)



### 19.1 OVERVIEW OF THE INSTRUMENT

#### 19.1.1 Alternative names

Net purchase and sale; advanced renewable tariffs; renewable energy payments; and feed-in tariffs can be alternative names to net-metering. However some of them may reflect variations of the instrument.

#### 19.1.2 Objective

The objective of net-metering is to provide incentives for the local generation of energy (on site or integrated into the building) through the operation of renewable energy technologies.

#### 19.1.3 Definition

Net-metering promotes the on-site generation of renewable energy by allowing the sale of the surplus of produced energy, and its feeding into the public distribution grid or system. It is advantageous for participants (e.g. building owners) because they not only generate the energy for their own needs, but have the opportunity to receive 'free' energy from the grid in return during low renewable generation periods. In some net-metering schemes, they may even gain financial benefits from selling the surplus energy. A surplus can be generated constantly or in fluctuation.

In order to maximize income, building owners are motivated to increase energy efficiency first, in order to reduce their own energy needs and to increase the surplus.

#### 19.1.4 Variations

There are several variations of net-metering, depending on the mechanisms employed to reward participants for generation. Examples include:

- o **Roll-over system.** The generated energy is deducted from the participant's energy consumption from the grid. This system utilises a single meter (i.e. net-meter), which is similar to a conventional meter, but able to 'roll over' (i.e. to discount from consumption the energy units fed into the grid) as energy is supplied to the grid, thus offsetting it from the overall consumption. Therefore, roll-over does not require additional accounting efforts.
- o **Net purchase and sale system.** Program participants pay the retail energy rate for the energy consumed from the grid and are paid for the energy supplied by them to the grid, either at its avoided cost or at a premium price to offer incentives for renewable generation (i.e. participants are offered a special feed-in-tariff). The system requires two advanced meters (smart meters), which have the ability to measure hourly consumption

and generation in case of variable hourly tariffs. The difference between avoided cost and premium supply to the grid prices is either subsidized or born by utilities, subject to an obligation to achieve a certain renewable energy quota<sup>21</sup>.

Subsidizing renewable energy is a costly and problematic measure, which distorts the energy market. However it may be necessary to kick-start renewable energy micro-generation. Determining a price which is sufficient to engage participants requires a comprehensive market assessment, including the generation costs and return periods for different renewable energy solutions (RES).

- o **Banking system.** Participants can use an amount of energy from the grid equivalent to the value of the energy surplus they generate at a different time or billing period. These energy credits typically expire after one year. This system has the same technological requirements as the net purchase and sale system.

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<sup>21</sup> Renewable obligations and quotas can be introduced using regulation and market mechanisms, such as 'renewable portfolio standards' (RPS) and 'green certificates'.

## 19.2 RELEVANCE



### 19.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
National level (country or independent regional unit within/with jurisdiction over the country)	😊	😊	The instrument can be introduced and implemented at any level of administration.
Local level (city or lower level)	😊	😊	

- 😊 The instrument is typically introduced/implemented at this policy level.
- 😐 The introduction/implementation of the instrument at this level is atypical.
- IF The instrument may be introduced/implemented at this policy level if certain conditions apply.
- 😞 It is practically impossible to introduce/implement the instrument at this policy level.



### 19.2.2 Target areas












The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance
<b>Buildings</b>	Existing buildings		😊
	New buildings		😊
	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
Residential buildings		😊	
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊

- 😊 The instrument has a positive effect.
- 😐 The instrument may have a positive effect, if certain conditions apply.
- 😞 The instrument is not applicable, has very little effect, or no effect at all.


 19.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>		
	Insufficient information or awareness among target actors		
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		The instrument supports the demand for sustainable technologies, and gives a signal to producers with regard to the governmental commitment to sustainable energy use.
	High initial costs of sustainable solutions		The instrument does not directly overcome the upfront costs of renewable energy investments. However, it significantly reduces the payback time, thus improving the program participants' access to financial resources.
	Fragmented market structure <sup>3</sup>		The instrument overcomes the fragmented market structure for renewable energy solutions, by creating a symbiotic relationship between utilities and energy users.
	Limitations in the typical building design process <sup>4</sup>		
	Split incentives <sup>5</sup>		
	High transaction costs <sup>6</sup>		The instrument entails additional costs for the utilities (e.g., they are required to connect small micro generation sites, the size of which is below the economic threshold), which are eventually transferred to consumers (e.g. through meter installation, increased energy costs, etc.). Some variations of the instrument (e.g. net purchase and sale systems) involve subsidized premium prices for the locally generated energy, which are supported by the government. However, net-metering can also be advantageous under non-subsidized versions.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Performance risks are low, as only the energy that is produced is paid. Only a small input from the administration is required.
	Utility theft or non-payment		Users that participate in the program can be requested to stay current with their utility payments.



The instrument modifies the policy context, reducing the magnitude of this barrier.



The instrument overcomes this barrier, or operates regardless of this barrier.



The instrument partially overcomes this barrier.



The instrument does not overcome this barrier.

1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.

2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.

3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.

4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.

5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.

6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 19.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	Net-metering income for users increases if demand is minimized. Therefore, it is expected that the instrument would lead to energy efficiency investments using renewable energy solutions.  *By encompassing the introduction of multiple hourly tariffs.	
	Reducing water demand	😐		
	Reducing waste-water generation	😐		
	Reducing energy peak demand	IF*		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😊		
	Increasing the sustainability of local resource use	😐		
	Limiting land use in urban areas (including indirect land use)	IF		
	Reducing air pollution	😊		
	Supporting climate change adaptation	😊		
<b>Social</b>	Reducing utility costs for the population	😊		
	Supporting a specific target group	Public institutions		😊
		Small and medium enterprises		😊
		Low-income consumers		😐
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	*As consumers become producers, they become aware of the costs associated with each unit of energy consumption. Therefore, net-metering can work hand in hand with awareness raising and information programs.	
	Creating new employment opportunities	😊		
	Supporting Research and Development (R&D) activities for technological innovation	😊		
	Eliminating/tackling informal market	😐		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😊		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	IF*		
<b>Political</b>	Improving energy security <sup>2</sup>	😊		
	Making politics of sustainable development credible	😐		
	Releasing budgets from public bodies	😐		
	Reducing corruption	😐		



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

IF

The instrument may contribute to this goal, according to some conditions.

















The instrument has a negative effect on this goal.

1 That is to say, increasing the utilization of renewable energy sources.


2 Energy security is here defined as supplying more consumers with the same production capacity.

### 19.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
High local renewable energy potential.		Continue to the next precondition.
		The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.
Dissemination of meters or of special (smart) meters.		Continue to the next precondition.
		The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.
Market availability of sustainable technologies/solutions (mainly renewable but also efficient solutions).		Continue to the next precondition
		Announce well in advance the introduction of the instrument and, if necessary, support the industry directly to make the target solutions available. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<ul style="list-style-type: none"> <li>The structure of the energy market is competitive and energy companies support the introduction of net-metering.</li> <li>Satisfactory track record of cooperation between the administration and the utilities.</li> </ul>		Continue to the next precondition.
		<ul style="list-style-type: none"> <li>Consider the potential of introducing competition in the energy market.</li> <li>Introduce a communication strategy addressed to the demand side (e.g. awareness raising, education and information campaigns, and public leadership programs) and to the supply side (e.g. including voluntary agreements, which may involve support in fighting energy theft.)</li> </ul> If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<ul style="list-style-type: none"> <li>Availability of national benchmarks, e.g. through certification and labelling of renewable energy technologies</li> <li>Significant penetration of installed renewable energy capacity.</li> </ul>		Continue to the next precondition.
		Initiate efforts in training technical experts in design, installation, and maintenance of sustainable solutions. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<ul style="list-style-type: none"> <li>Availability of financial resources in the energy industry, as well as among potential participants (business and individuals)</li> <li>Market-regulated energy prices.</li> </ul>		Continue to the next precondition.
		Combine the building block with grants, soft loans, etc. Energy subsidies should be viewed as reducing the cost-effectiveness of investments in renewable solutions, and putting unjustified pressure on public budgets. If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
The potential clients and the sector are aware and informed of the advantages and potential of sustainable energy use, and of net-metering.		Continue to implementation steps (section 19.4).
		Introduce an awareness raising, education and information campaign. If this is feasible, continue to Implementation steps. If not, reconsider the introduction of the instrument.

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

## 19.4 IMPLEMENTATION STEPS

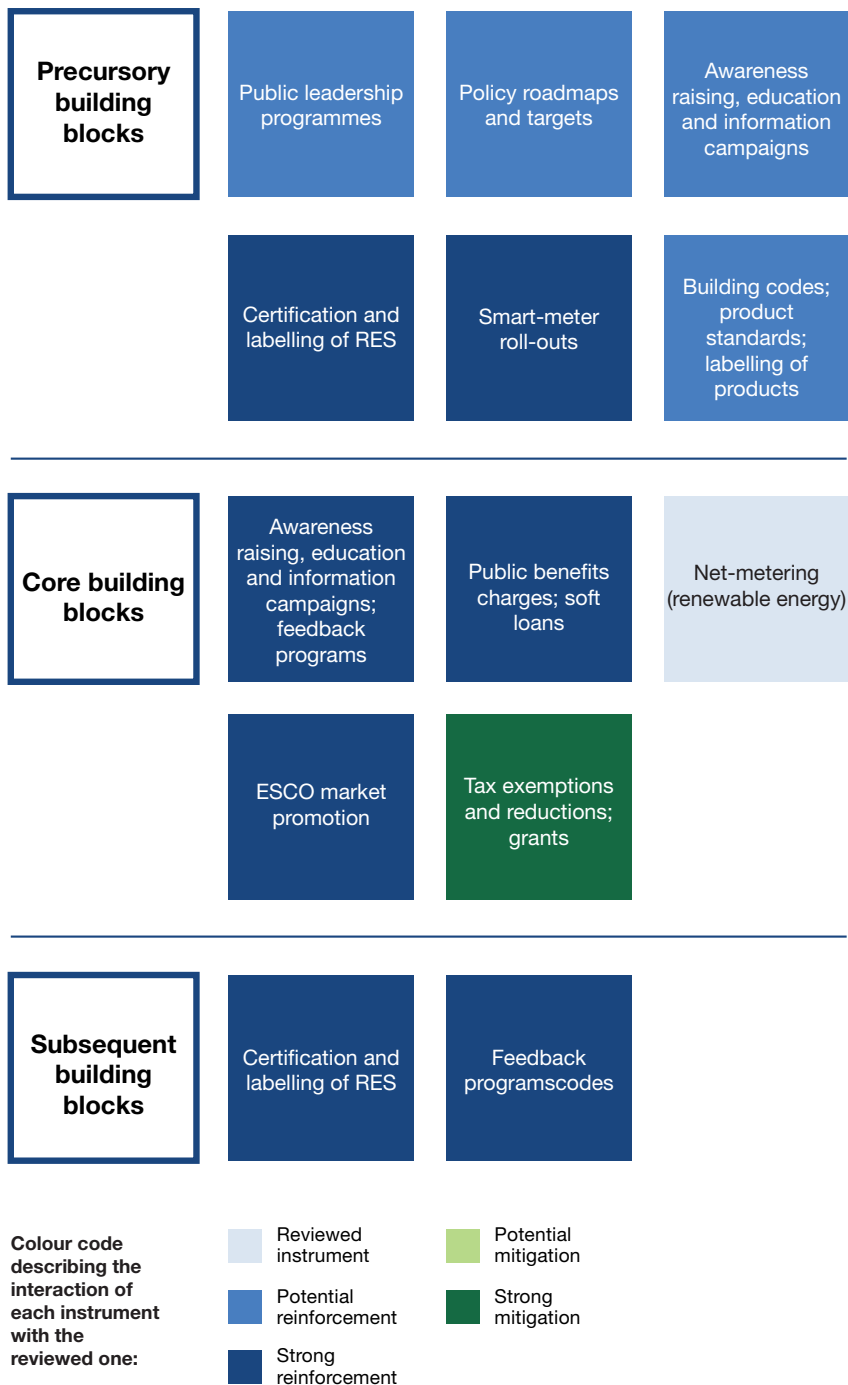
This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Select the target solutions	Identify eligible renewable solutions based on potential generation and potential installation in buildings (additional efforts will be necessary in the absence of certification and labelling of RES).
2	Determine target groups and initiate communication and collaboration with them	<ul style="list-style-type: none"> <li>• Identify the participant classes that are eligible for the net-metering scheme, e.g. according to their type of consumption and generation.</li> <li>• Select a compensation system.</li> <li>• Identify the utilities that will be required to offer net-metering.</li> <li>• Decide penalties for non-compliance.</li> </ul>
3	Introduce preliminary steps depending on the context	<ul style="list-style-type: none"> <li>• Start to mobilise financial resources or to communicate with utilities on the introduction of a renewable quota.</li> <li>• Introduce awareness raising, education and information campaigns, and public leadership programs.</li> </ul>
4	Design the instrument based on a technical assessment	<p>Legal adjustments must be in place to secure compliance:</p> <ul style="list-style-type: none"> <li>• Set minimum and maximum individual system sizes for net metering, (determined by the selected type of participating consumers, sector dynamics, rules and regulations, etc.).</li> <li>• Calculate generation costs and return periods for different RES.</li> <li>• Draft contracts with participants, indicating the obligation of the utility to feed the participants' supply into the grid for a certain period (addressed to guarantee the RES investment recovery by program participants).</li> <li>• Select a method of treatment of excess net electricity generated in order to maximize benefits from the program, and if necessary, decide upon the most adequate tariffs and who will bear the costs. Introduce either a utility obligation, or a subsidy, which can be linked to a public benefit charge or to energy or carbon taxes.</li> <li>• Assign or disallow additional fees for net-metering customers.</li> <li>• Indicate the renewable credit ownership (REC) of the renewable energy system generation.</li> <li>• Indicate the allowance or disallowance of meter aggregation and, in the first case, put reasonable limits to aggregate metering.</li> </ul>
5	Introduce a communication strategy in collaboration with the utilities	<ul style="list-style-type: none"> <li>• Publicize the program, using adequate media channels and informative guidelines (which can be distributed to the target consumer through the utility company).</li> <li>• Provide training to experts.</li> </ul>
6	Monitor the implementation by the utility	<p>The utility is required to:</p> <ul style="list-style-type: none"> <li>• Provide advice to potential and actual program participants</li> <li>• Provide grid connexion for consumers, upon demand</li> <li>• Remunerate participants through a net purchase and sale system, banking or a roll-over system</li> <li>• Report satisfaction level, produced energy and compensation to participants.</li> </ul>
7	Mediate in disagreements between parties	Claims against non-compliance by utilities may arise. A mediation system is efficient in resolving these claims, and should increase trust in the programme while at the same time reducing non-compliance.
8	Evaluate and extend the program	Program evaluation assesses if sufficient interest is generated, if the conditions are adequate and if there is potential for extension to additional target groups (based on geographic or energy consumption criteria). The cost of renewable energy generation should also be compared to energy efficiency achievements (on a per kWh basis).



### 19.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



### 19.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- **Public sector leadership and policy roadmaps and targets** demonstrate that the government is serious about its objectives, enabling the utilities, construction industry and target groups to take the necessary preparatory steps.
- **Awareness raising, education and information campaigns** addressed to the general public increase the potential interest in RES.
- **Certification and labelling of RES, building codes, product standards and labelling of products** provide benchmarks which facilitate the market penetration of sustainable solutions.
- **Smart-meter roll-outs.** The introduction of smart meters provides the technical capacity to measure the energy generated and consumed, using more complex pricing than with conventional meters. Their introduction can be included in agreements with utilities as a counterpart to the introduction of net-metering.
- **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the policy package. Subsidies impact the real and perceived price of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions to regular ones. Subsidies also represent an important pressure on government budgets.

### 19.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- **Awareness raising, education and information campaigns.** Communication on the existence of the instrument must be conducted by government in collaboration with utilities.
- **ESCO market promotion, public benefits charges and soft loans** reduce the initial costs and increase cost-effectiveness for the program participants.
- **Tax exemptions and reductions, grants.** The presence of these financial instruments needs to be carefully assessed prior to the introduction of the reviewed building block to avoid sending mixed messages, adding unnecessary complexity to the financial system or generating double incentives.

### 19.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- **Certification and labelling of RES.** The penetration of RES obtained through net-metering increases cost-effectiveness and reduces the necessity of additional efforts to promote RES.
- **Feedback programs** benefit from the technological improvements (meters) and serve to increase consumer awareness, thus minimising the risk of a rebound effect.<sup>22</sup>

<sup>22</sup> The "rebound effect" is a situation where the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from a reduced consumption and compensate for this reduction by consuming additional services, leading to stability or an increase in the overall consumption.

## 19.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

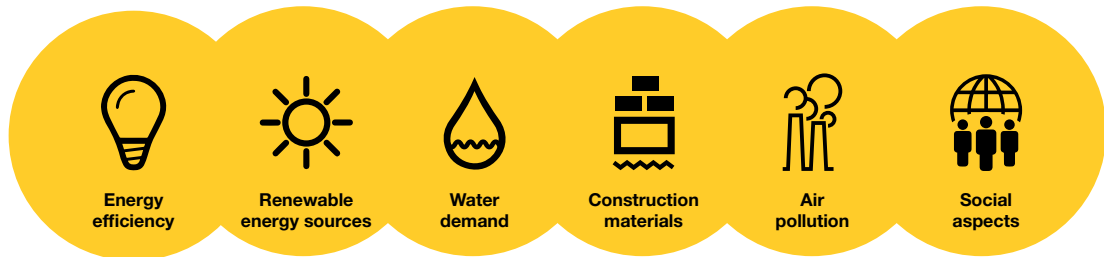
Canadian Wind Energy Association. 2010. *Small Wind Energy*. <http://www.canwea.ca/swe/smallwind.php?id=62&ls=fr>.

GreenBug Energy. 2012. *Net Metering Versus Feed in Tariff Grid Connections*. <http://greenbugenergy.com/get-educated-knowledge/net-metering-and-feed-in-tariff-grid-connections>.

Ministere de l'Énergie de l'Ontario. 2010. *La Facturation Nette En Ontario: Subvenez a Vos Besoins En Électricité Et Gérez Vos Coûts Énergétiques*. (in French). <https://ozone.scholars-portal.info/bitstream/1873/1955/1/257832.pdf>.

Renewable Energy Policy Project. 2010. *Renewable Manufacturing for America*. <http://www.repp.org/>.

## 20 VOLUNTARY AGREEMENTS



### 20.1 OVERVIEW OF THE INSTRUMENT

#### 20.1.1 Alternative names

Negotiated agreements; voluntary energy conservation agreements; industry voluntary agreements; long-term agreements; self-regulation; codes of conduct.

#### 20.1.2 Objective

The objective of voluntary agreements is to provide an alternative to regulatory measures, through an instrument which is both flexible and cost-effective for the authority and for the participants, and which has the potential to result in a more rapid improvement in sustainability.

#### 20.1.3 Definition

Voluntary agreements are tailored contracts concluded by the authority with commercial or public organizations (e.g. developers, housing companies, local authorities), who commit to improving their sustainability performance. These agreements define targets and/or a set of specific measures to reach the goals. The agreements also define the requirements for monitoring, incentives to achieve the targets, and potential penalties in case of non-compliance.

Voluntary agreements were first developed in the industrial sector, and are now becoming popular in the building sector. They address the externalities generated by the signatories, such as high energy or water consumption, emission of greenhouse gases and other pollutants, water and solid waste generation, as well as social aspects. Signatories are typically companies or business groups, but voluntary agreements can be concluded with groups of dwellers or public bodies. The signatories are mainly characterized by their considerable sustainability improvement potential, which motivates the authority to offer a compensation for taking steps to reach an improvement target. Compensation can be in the form of publicity, expert advice, financial and fiscal incentives, collaboration in fighting non-payment, etc.

Voluntary agreements are typically defined by the following elements:

- o No obligation to join the agreement
- o Binding requirements for a party that has decided to join an agreement
- o Quantitative targets and/or a set of specific measures to be achieved by signatories
- o Provisions for reporting, monitoring and evaluation of results
- o Accompanying measures from public authorities (i.e. compensation).

#### 20.1.4 Variations

Voluntary agreements exist in three main versions:

Individually negotiated agreements, which are fully tailored and set based on a mutual agreement between the public authorities and the private participant, mainly from the industrial and commercial sectors. This version is widely used with product manufacturers.

Voluntary agreement programs, which are drawn up for groups of participants, leaving limited flexibility to the potential participants. These programs are suitable for multifamily buildings.

Self-declared targets, generic environmental declarations and other unilateral commitments by business or by owners/users of commercial buildings. Although unilateral commitments are not introduced by the administration, they can reflect a response to a specific policy context determined by government actions.

## 20.2 RELEVANCE



### 20.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
National level (country or independent regional unit within/with jurisdiction over the country)	😊	😊	The instrument can be introduced at either level.
Local level (city or lower level)	😊	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.

IF

The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 20.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😊	The instrument can target all types of buildings.
	New buildings		😊	
	Public	Non-residential buildings	😊	*Targeting residential buildings often requires dealing with large and fragmented target groups, which is not favourable for voluntary agreements. However, it is possible to conduct agreements with entities representing disperse decision makers (with a diffuse sustainability potential), such as representatives of multifamily buildings, social housing corporations, etc.
		Residential buildings	IF*	
	Private	Non-residential buildings	😊	
Residential buildings		IF*		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊	
		Residential buildings	IF*	
	Private	Non-residential buildings	😊	*Targeting residential buildings often requires dealing with large and fragmented target groups, which is not favourable for voluntary agreements. However it is possible to conduct agreements with entities representing disperse decision makers (with a diffuse sustainability potential), such as representatives of multifamily buildings, social housing corporations, etc.
		Residential buildings	IF*	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊	Products are commonly addressed through individually negotiated agreements with the manufacturing industry.
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	



The instrument has a positive effect.














The instrument may have a positive effect, if certain conditions apply.



The instrument is not applicable, has very little effect, or no effect at all.


 20.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>		The participants' awareness of their sustainability potential increases throughout the process leading to the signature of the voluntary agreement.
	Insufficient information or awareness among target actors		During the process leading to the signature of the voluntary agreement, participants receive information on the benefits of improved performance and sustainability.
	High rates of illiteracy among target consumers		The instrument can reach out to illiterate target consumers either through corporate arrangements (e.g. agreements with social housing corporations) or individualized attention (e.g. typical in individually negotiated agreements).
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		The agreements can directly support the development or generalization of sustainable solutions.
	High initial costs of sustainable solutions		The instrument can include financial or fiscal provisions to support early technology movers or developers, allowing the dissemination of sustainable solutions.
	Fragmented market structure <sup>3</sup>		Voluntary agreements are conducted with specific individuals or associations having sufficient sustainability potential. Thus, they operate regardless of market fragmentation.
	Limitations in the typical building design process <sup>4</sup>		
	Split incentives <sup>5</sup>		
	High transaction costs <sup>6</sup>		By promoting self-regulation, the instrument provides a flexible and cost-effective alternative to regulation, for both the government and the signatories, requiring only a small increase in capacities. Voluntary agreements do not necessarily require substantial financial resources, provided economic and fiscal compensation are allocated only in the last phase. However, some form of compensation is usually included in the instrument, making voluntary agreements an expensive option.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		Voluntary agreements can be introduced in the absence of a coherent policy framework, or whenever limited horizontal collaboration between public bodies tends to slow down (or hinder) the introduction of policy instruments. Technical capacity is boosted through cooperation between the public and the private sectors.
	Utility theft or non-payment		



The instrument modifies the policy context, reducing the magnitude of this barrier.



The instrument overcomes this barrier, or operates regardless of this barrier.



The instrument partially overcomes this barrier.



The instrument does not overcome this barrier.

1 Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.

2 Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.

3 A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.

4 The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.

5 Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.

6 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 20.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	Voluntary agreements are highly versatile and able to address indiscriminately any environmental and resource-related externalities, depending on the design of the instrument and the interest of participants.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	IF		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😊		
	Increasing the sustainability of local resource use	😊		
	Limiting land use in urban areas (including indirect land use)	😊		
	Reducing air pollution	😊		
	Supporting climate change adaptation	😊		
<b>Social</b>	Reducing utility costs for the population	IF*	*These target groups typically have an insufficiently concentrated sustainability potential. An aggregation mechanism is required, for example, through the presence of large corporate owners, or housing or trade associations. Alternatively, agreements can be possible with product manufacturers, utilities, etc.	
	Supporting a specific target group	Public institutions		😊
		Small and medium enterprises		IF*
		Low-income consumers		IF*
Improving comfort, services and housing conditions	IF*			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😞	*Tailored measures can address these aspects.	
	Creating new employment opportunities	😊		
	Supporting Research and Development (R&D) activities for technological innovation	IF*		
	Eliminating/tackling informal market	IF*		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	IF*		
	Creating new business opportunities by market transformation	IF*		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😊		
<b>Political</b>	Improving energy security <sup>2</sup>	😊	Tailored, innovative approaches can provide credible examples to the industry and the public.	
	Making politics of sustainable development credible	😊		
	Releasing budgets from public bodies	IF*	*The instrument can contribute to reducing corruption, especially when the agreement does not include financial or economic rewards to participants.	
	Reducing corruption	IF*		



The instrument has a positive effect on this goal.



The instrument has no or almost no effect on this goal.

IF

The instrument may contribute to this goal, according to some conditions.



The instrument has a negative effect on this goal.











1 That is to say, increasing the utilization of renewable energy sources.

2 Energy security is here defined as supplying more consumers with the same production capacity.




## 20.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations	
<b>The potential participants traditionally comply with regulations.</b>		Continue to the next precondition.	
		The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.	
<b>Existence of a successful track record of cooperation between the private sector and the public administration.</b>		Continue to the next precondition.	
		Voluntary agreements can be an opportunity to increase collaboration. However, clear communication to engage participants and to clarify the binding nature of the agreement, as well as strict and transparent inspection processes must be in place. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<b>Availability of technical and human capacity within the administration to conduct inspections, review reports, etc.</b>		Continue to the next precondition.	
		Because the instrument allows self-control, human and technical needs at the administrative level are limited. Nevertheless, a minimum level of capacity is crucial for the success of the instrument. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<b>Availability of financial resources at the administration level.</b>		Continue to the next precondition.	
		This instrument can be implemented with limited financial resources provided the government can motivate the private sector, e.g. with a threat of regulation, training, publicity, political/legal compensation, etc. <table border="1"> <tr> <td>If this is feasible, continue to the next precondition.</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<b>The target groups are aware of the need, potential, and opportunities for sustainability improvement in their buildings.</b>		Continue to implementation steps (section 20.4).	
		A certain level of awareness among the target groups largely reduces the efforts necessary to minimise the rebound effect. Public leadership programs and awareness raising, education and information campaigns help significantly before and during the introduction of voluntary agreements. <table border="1"> <tr> <td>If this is feasible, continue to implementation steps (section 20.4).</td> </tr> <tr> <td>If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to implementation steps (section 20.4).
If this is feasible, continue to implementation steps (section 20.4).			
If not, reconsider the introduction of the instrument.			

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

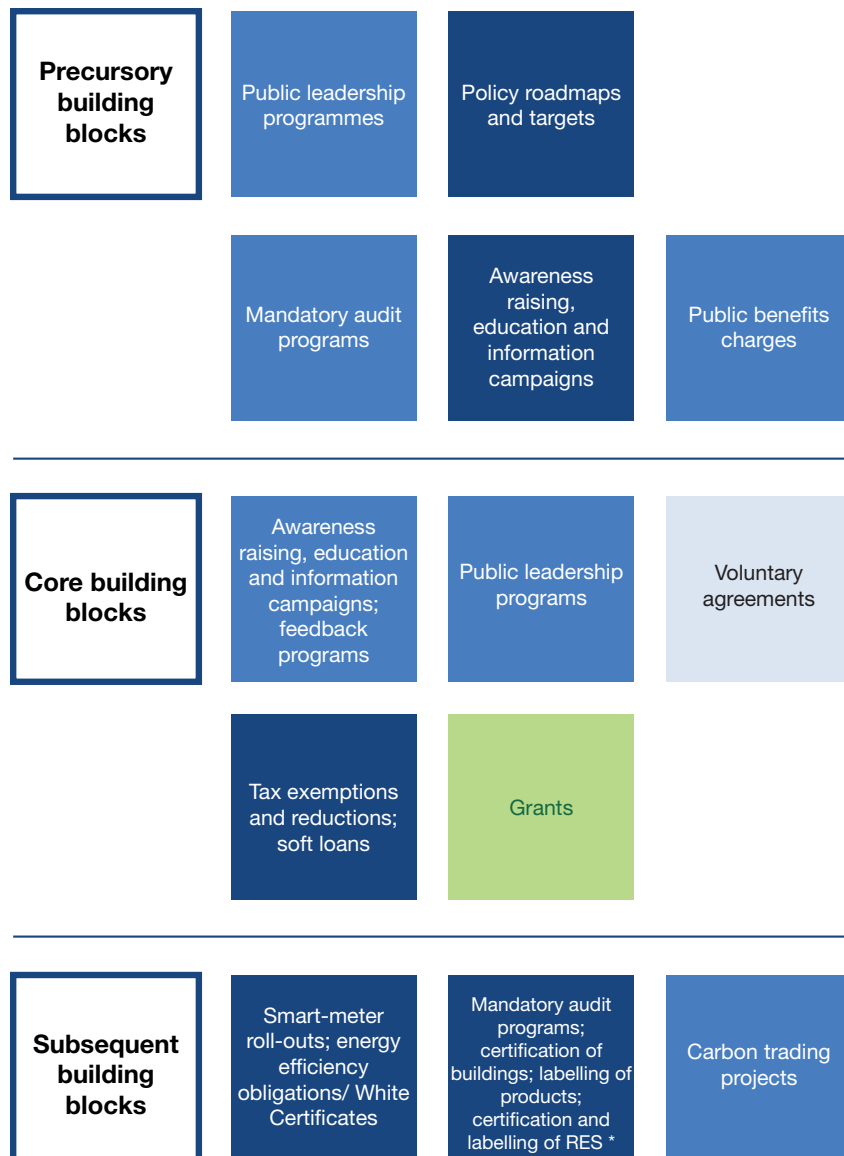
## 20.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Identify the participating sectors or entities	Identify the sectors and actors that have large improvement potential or generate important externalities that should be addressed. If necessary conduct audits for verification.
2	Introduce a mandate and allocate resources for its completion	Ensure that a public body has the capacity and support to lead the negotiation process.
3	Select attractive accompanying measures or compensation packages	List the possible accompanying measures, which should be agreed upon in high instances. In the case of voluntary agreement programs, the compensation packages need to be defined.
4	Develop a communication strategy, including guidelines for each type of participant	Guidelines should be produced and communicated to the target groups, indicating: a) the advantages of subscribing to the contracts and b) the actions or targets that signatories have to respect.
5	A - In the case of individually negotiated agreements:	Call parties to the negotiation. Sustainability improvement of buildings involves cultural variables such as the importance given to prestige, social responsibility and green image in corporate culture. If the conditions are not in place, it may be useful to initiate the process from point 1 and restart the negotiations once they are in place.
6	B - In the case of voluntary agreement programs:	Initiate a participation process to determine the sustainability potential and needs of the sector and target groups.
7	Draft the contracts	Contracts should be flexible and inclusive for voluntary agreement programs, and tailored for negotiated agreements. Adequate technical and legal support is required at this stage, to make sure that the contract specifies: the binding nature of the agreements, the quantitative targets and/or commitments on the side of signatories, the reporting provisions, as well as the compensation on the side of public authorities, including penalties for non-compliance.
8	Enforce the agreements	<ul style="list-style-type: none"> <li>• Review the reports produced by the signatories and verify their reliability through inspection, audit, etc. (this can be conducted by an independent agency).</li> <li>• Provide the compensation (publicity, financial aid, etc.).</li> <li>• Apply the penalties in case of non-compliance.</li> </ul>
9	Update the requirements to enter or close the program	Participants in the previous phase of the voluntary agreement program may be interested in an additional phase. If the program is not renewed, consider introducing a regulatory instrument instead, with similar requirements to those requested in the voluntary agreements. Using this strategy is a way for the government to reward the participants of the previous phase of voluntary agreements.

## 20.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



Colour code describing the interaction of each instrument with the reviewed one:

- Reviewed instrument
- Potential reinforcement
- Strong reinforcement
- Potential mitigation
- Strong mitigation

\* RES: Renewable Energy Solutions

## 20.5.1 Precursory building blocks

*Instruments that may exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- **Public leadership programs and awareness raising, education and information campaigns** increase general interest in the sustainability areas covered by voluntary agreements, as well as draw attention to the social responsibility of the participants. Such outreach efforts increase the interest of the parties in the reviewed instrument, optimize chances for its acceptance, and maximize its informative and awareness raising impact.
- **Policy roadmaps and targets** enable mandated agencies and experts to set appropriate performance targets, and to determine the actions expected from signatories.
- **Mandatory audit programs.** The presence of mandatory audits guarantees the availability of technical assessment and monitoring capacity.
- **Public benefits charges** serve to add a fiscal load to resource consumption, and can be used to finance compensation to participants in voluntary agreements.
- **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived price of energy, and may therefore impact the assessment of costs and benefits of participating in voluntary agreements (and investing in sustainability actions).

## 20.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- **Awareness raising, education and information campaigns.** The provision of information, training and publicity are typical compensations provided to signatories.
- **Public leadership programs.** Actions introduced in private premises under voluntary agreements can be publicized as part of a public leadership program, thus rewarding signatories with an improved public image and providing an example of ways the private sector can improve its sustainability performance.
- **Tax exemptions and reductions, public benefits charges and soft loans** are typically introduced to engage reluctant parties in the voluntary agreement scheme. However, the introduction and assignment of **tax exemptions and reductions or grants**, should be carefully deliberated in terms of pros and cons, as they could entail an important pressure on the treasury which would not necessarily be justified. Adequately tailored accompanying measures can minimize having to use such instruments to engage participants. Voluntary agreements should ensure that participating involves financial benefits regardless of the aid given from the public budget, e.g. through energy cost savings.

## 20.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **Feedback programs, net-metering, smart-meter roll-outs, energy efficiency obligations/ White Certificates** can be more easily introduced, extended or updated when voluntary agreements exist between the government and the utilities.
- o **Certification of buildings, labelling of products** (both voluntary and mandatory variants), certification and labelling of RES and mandatory audit programs can enlist voluntary agreements to help ensure that they are appropriately introduced, extended or updated.
- o **Carbon trading projects.** Greenhouse gas emission reductions achieved through voluntary agreements can be suitable for carbon financing, thus providing an additional incentive to participate in voluntary agreements.

## 20.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

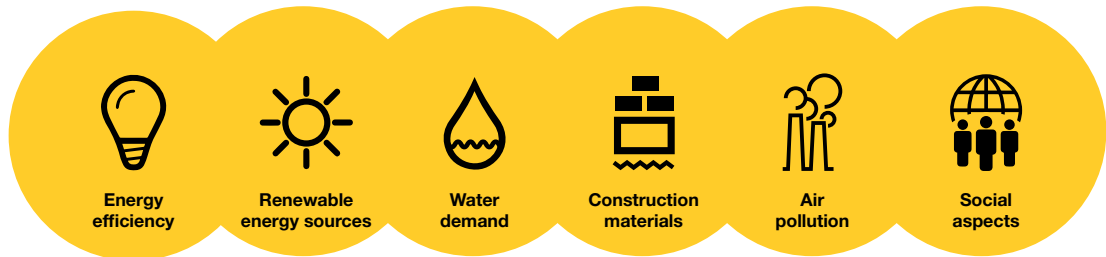
Barth, Regine, Rinaldo Brau, Carlo Carraro, Frank Convery, Birgit Dette, Charles J. Higley, Signe Krarup, and François Lévêque. 1999. *Environmental Voluntary Approaches: Research Insights for Policy-Makers*. Fondazione Eni Enrico Mattei (FEEM). [http://www.feem.it/userfiles/attach/200912211424Environmental\\_Voluntary\\_Approaches.pdf](http://www.feem.it/userfiles/attach/200912211424Environmental_Voluntary_Approaches.pdf).

Carraro, Carlo, and François Lévêque, ed. 1999. *Voluntary Approaches in Environmental Policy*. Fondazione Eni Enrico Mattei (FEEM) Series on Economics, Energy, and Environment ECGY 14. Dordrecht; Boston, Mass: Kluwer Academic Publishers.

David, Maia. 2004. *Les Approches Volontaires comme Instrument de Régulation Environnementale*. *Revue française d'économie* 19 (1): 227–273. [doi:10.3406/rfeco.2004.1545](https://doi.org/10.3406/rfeco.2004.1545). (in French).

Glachant, Matthieu. 1995. *Les Accords Volontaires Dans La Politique Environnementale: Une Mise En Perspective De Leur Nature Et De Leur Efficacité*. *Économie & Prévision* 117 (1): 49–59. [doi:10.3406/ecop.1995.5713](https://doi.org/10.3406/ecop.1995.5713). (in French).

## 21 PUBLIC LEADERSHIP PROGRAMS



### 21.1 OVERVIEW OF THE INSTRUMENT

#### 21.1.1 Alternative names

Exemplary role of the public sector, the government, the administration; public-sector leadership; public sector demonstration effect.

#### 21.1.2 Objective

The objective of public leadership programs is to promote sustainable behaviours and decisions, while creating savings in the public budget, demonstrating the viability of sustainability improvements and substantiating credible policies of sustainable development.

#### 21.1.3 Definition

Public leadership programs are designed to lead by example, undertaking actions to improve the sustainability performance of public buildings, modify user behaviour, and use innovative solutions/technologies. These actions are communicated to relevant stakeholders in order to raise awareness, increase interest in sustainability, and demonstrate the feasibility and benefits of innovative technologies.

The public sector exemplifies sustainability by showcasing the implementation of sustainable practices in buildings owned, rented or used by the government. Examples include: administrative buildings, healthcare facilities,

schools, public service buildings and social housing.

#### 21.1.4 Variations

Public leadership programs are considered as a comprehensive instrument, eligible to be included in most policy packages. The instrument adds consistency and coherence to sustainability policy packages, thus improving the response of target stakeholders. Whether implemented individually or in conjunction with other instruments, public leadership programs imply actions that lead to:

- o improving the sustainability of public buildings beyond minimum requirements
- o monitoring and if possible certifying performance improvements
- o communicating on government actions and results engaging target groups.

Typical components of public leadership programs include: policy roadmaps and targets, sustainable procurement regulations, mandatory audit programs, building certification, and awareness raising, education and information campaigns (e.g. publicly available guidelines, training).

Another important aspect of public leadership programs consists of revisiting existing instruments to maximize coherence with the government's commitments e.g. existing energy subsidies which undermine the effect of sustainability policies.

## 21.2 RELEVANCE



### 21.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	Although a combined action is desirable, public leadership can have positive effects at each level.
<b>Local level (city or lower level)</b>	😊	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.



The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 21.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance
<b>Buildings</b>	Existing buildings		😊
	New buildings		😊
	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
Residential buildings		😊	
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊



The instrument has a positive effect.



The instrument may have a positive effect, if certain conditions apply.



The instrument is not applicable, has very little effect, or no effect at all.


 21.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>	☺+	Public leadership programs are intended to influence social and individual consumption factors such as values and attitudes, as well as purchase and investment preferences, resulting in behaviour change. *Public leadership may influence all target groups, provided appropriate media is utilised.
	Insufficient information or awareness among target actors	☺+	
	High rates of illiteracy among target consumers	☺*	
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable	☺+	The government takes the initiative of proving the benefits and savings which can be achieved through sustainability improvements thereby assuming the risk, in contrast to private interests which typically prioritize investments with higher certainty and shorter payback times. In addition, there can be an increase in availability of technical expertise and sustainable technologies as a result of public investments.
	High initial costs of sustainable solutions	☺+	The involved changes in behaviour and in investment decisions are not necessarily costly. Moreover, the development of economies of scale due to the mainstreaming of more sustainable solutions leads to lower prices.
	Fragmented market structure <sup>3</sup>	☺+ / ☹	Actions targeted to the building sector may increase the importance given to sustainability criteria in the building design stage and in the building market overall.
	Limitations in the typical building design process <sup>4</sup>	☺+ / ☹	
	Split incentives <sup>5</sup>	☺	The split incentive may be addressed by a coherent policy framework catalysed by public leadership.
	High transaction costs <sup>6</sup>	☺	The actions promoted to influence behaviour change do not necessarily imply a transaction cost for target groups. Nevertheless, public leadership actions are often conducted through investments in state-of-the-art, expensive technological improvements.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption	☺+	Public leadership can increase internal institutional capacity and improve both public and private attitudes towards sustainability improvements, resulting in strengthening commitments and reducing irregular practices.
	Utility theft or non-payment	☺+	

- ☺+ The instrument modifies the policy context, reducing the magnitude of this barrier.
- ☺ The instrument overcomes this barrier, or operates regardless of this barrier.
- ☹ The instrument partially overcomes this barrier.
- ☹ The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.




 21.2.4 Policy goals

The following table identifies the policy goals that the instrument may contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	The instrument can tackle indiscriminately any of these sustainability issues directly, if included in the program.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	😊		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😊		
	Increasing the sustainability of local resource use	😊		
	Limiting land use in urban areas (including indirect land use)	😊		
	Reducing air pollution	😊		
	Supporting climate change adaptation	😊		
<b>Social</b>	Reducing utility costs for the population	😊	Public leadership programs help to transform public buildings into healthier, safer, more productive places, while promoting such transformation elsewhere.  * E.g. public-private partnerships.  ** Through investments in social housing or other services targeting low-income households.	
	Supporting a specific target group	Public institutions		😊
		Small and medium enterprises		😊*
		Low-income consumers		😊**
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😊	Greening investments can be linked to a job creation strategy when involving the renovation of buildings at an accelerated rate, and promoting green industry.  By demonstrating sustainable solutions, the public sector influences the market towards the creation of a more sustainable socio-technological system.	
	Creating new employment opportunities	😊		
	Supporting Research and Development (R&D) activities for technological innovation	😊		
	Eliminating/tackling informal market	😞		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😊		
	Increasing energy market transparency: improving knowledge and awareness of consumers	😞		
<b>Political</b>	Improving energy security <sup>2</sup>	😊		
	Making politics of sustainable development credible	😊		
	Releasing budgets from public bodies	😊		
	Reducing corruption	😊		

😊 The instrument has a positive effect on this goal.

😞 The instrument has no or almost no effect on this goal.

IF The instrument may contribute to this goal, according to some conditions.

















😞 The instrument has a negative effect on this goal.


<sup>1</sup> That is to say, increasing the utilization of renewable energy sources.


<sup>2</sup> Energy security is here defined as supplying more consumers with the same production capacity.

## 21.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Implementation requirements	
<b>Existence of political commitment to increase the sustainability of public buildings.</b>		Continue to the next precondition.	
		The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.	
<b>Government capacity to mainstream its sustainability efforts throughout the target government agencies.</b>		Continue to the next precondition.	
		A capacity building effort will be necessary.	If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Existence of qualified and committed human resources at the administrative level.</b>		Continue to the next precondition.	
		A capacity building effort will be necessary.	If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Experience of the administration in developing training and awareness raising programs for the staff.</b>		Continue to the next precondition.	
		A capacity building effort will be necessary, requiring external expertise.	If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Structures available to monitor implementation and to communicate sustainability efforts and results.</b>		Continue to the next precondition.	
		Institutional development will be necessary, e.g. through the creation of public advisory centres.	If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>The capacity and structures in place to effectively exchange information and experience among public bodies (locally, nationally and internationally).</b>		Continue to the next precondition.	
		Improved communication needs to be at the core of institutional development.	If this is feasible, continue to the next precondition. If not, reconsider the introduction of the instrument.
<b>Capacity to establish baselines and to monitor actions and results.</b>		Continue to the next precondition.	
		A consistent set of indicators and monitoring procedures for the instrument should already be selected at the design phase to enable publication of the public sector experience.	If this is feasible, continue to the next precondition, If not, reconsider the introduction of the instrument.
<b>Capacity to inform and communicate about on- going programs and results to target groups.</b>		Continue to implementation steps.	
		Effective communication is fundamental for the instrument to have a broad societal impact.	If this is feasible, continue to Implementation steps. If not, reconsider the introduction of the instrument.

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

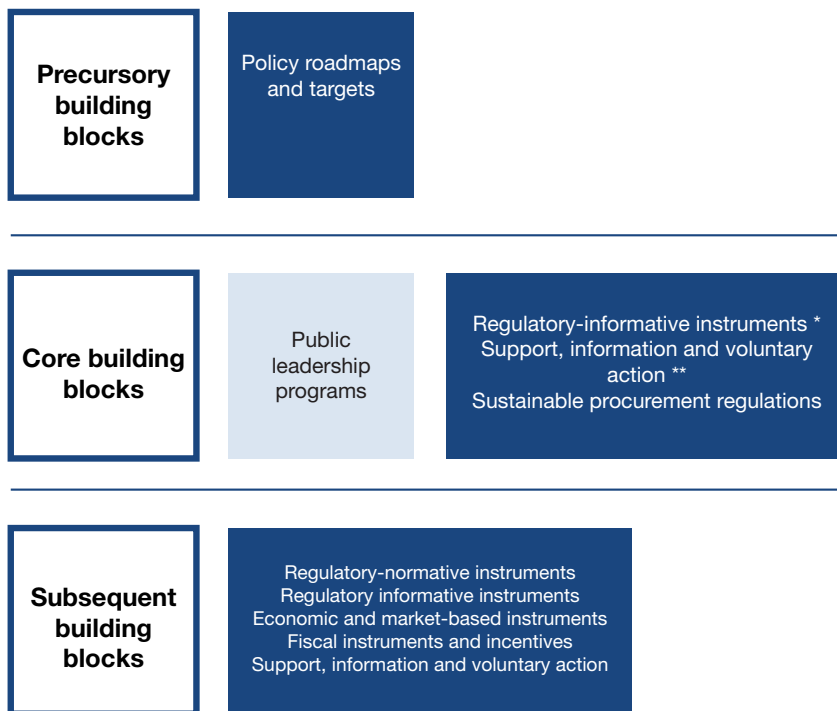
## 21.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Identify the target groups	The target groups are: <ul style="list-style-type: none"> <li>• the stakeholders in the public buildings where sustainability improvements are introduced</li> <li>• the public and private actors whose behaviour, purchasing and investment practices are expected to change as a result of the example of the public sector.</li> </ul>
2	Create a core implementation group	A selected group of public sector representatives will gather the expertise, vision and needs of the different departments and agencies to develop and carry out the program. This collaborative nucleus will eventually take up dissemination roles in the involved departments and agencies.
3	Build communication structures	These structures can be based on pre-existing ones, but in all probability new systems will be need to be created.
4	Communicate the vision underlying the program	Transparency and addressing the needs and interests of the different target groups are crucial at this stage.
5	Draft a strategy	The strategy should include a selection of priority actions and policy instruments capable not only of increasing sustainability in the public building sector, but also of having an impact on target societal groups. The approach to communication and dissemination should also be defined.
6	Set ambitious sustainability targets for public buildings	An ambitious target, for example, would be to transform the status of refurbished structures into high performance buildings. Above average requirements can be related to sustainable procurement regulations, product labelling, building certification, certification of renewable energy sources, mandatory audits, etc.
7	Conduct training and awareness raising actions for the administrative staff	These actions are crucial to inform staff members of the goals and resources of the program, in addition to generating motivation and commitment.
8	Communicate about sustainable actions and mainstream operations across the public sector	Exchange information and experiences among public bodies conducting similar actions (locally, nationally and internationally). Encourage the different agencies to promote these actions and incorporate them in their day-to-day operations.
9	Monitor and evaluate the program	Monitoring and evaluation should allow to clearly communicate the achievements and benefits of sustainability actions.
10	Publicize the experience	Publicizing results is a crucial step. A public leadership program should encourage other actors to follow the example. Sufficient efforts should be made to engage external actors.

## 21.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



Colour code describing the interaction of each instrument with the reviewed one:

- |   |  |
|---|--|
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #d9e1f2; border: 1px solid #000; margin-right: 5px;"></span> Reviewed instrument     | <span style="display: inline-block; width: 15px; height: 15px; background-color: #c6e0b4; border: 1px solid #000; margin-right: 5px;"></span> Potential mitigation |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #4f81bd; border: 1px solid #000; margin-right: 5px;"></span> Potential reinforcement | <span style="display: inline-block; width: 15px; height: 15px; background-color: #2ca02c; border: 1px solid #000; margin-right: 5px;"></span> Strong mitigation    |
| <span style="display: inline-block; width: 15px; height: 15px; background-color: #1f77b4; border: 1px solid #000; margin-right: 5px;"></span> Strong reinforcement    |  |

\* Mandatory building certification, mandatory audit programs, certification and labelling of renewable energy solutions, and mandatory product labelling.  
 \*\* Voluntary building certification, voluntary agreements, awareness raising, education and information campaigns, voluntary product labelling.

#### 21.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Policy roadmaps and targets** enable mandated agencies and experts to set appropriate performance targets, and to communicate the upcoming requirements to the private sector. In addition, responsible leadership enables officials to upgrade targets.

#### 21.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Sustainable procurement regulations** are typically at the core of leadership actions, as the government can specify the performance of products and services and achieve a significant impact on the transformation of the market.
- o The instruments included in the categories **'support, information and voluntary action'** and **'regulatory-informative instruments'** are useful as they lead to the development of benchmarks of building performance. These benchmarks enable authorities to establish minimum performance requirements for the public sector, to demonstrate the progress made, and to communicate the results obtained. Voluntary agreements launched by a central authority are especially useful in motivating government municipalities or departments to introduce high-performing initiatives.
- o **Awareness raising, education and information campaigns** are fundamen-

tal to the dissemination of the government experience.

- o **Achieving coherence between policies** must be at the core of public leadership programs. Public leadership programs choosing to promote energy efficiency, for example, would need to revise non-targeted energy and water subsidies, or risk conveying contradictory messages to the multiple building stakeholders, while at the same time reducing the cost-effectiveness of the sustainability investment.

#### 21.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o Appropriately introduced public leadership is an instrument with the potential to maximize the performance of all other instruments. The commitment shown by the government improves internal processes while at the same time maximizing compliance and further voluntary action.

## 21.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Covenant of Mayors Office. 2012. *Covenant of Mayors*. Available at: [http://www.eumayors.eu/index\\_en.html](http://www.eumayors.eu/index_en.html) [Accessed January 17, 2012].

Harris, J. et al., 2005. *Public Sector Leadership: Transforming the Market for Efficient Products and Services*. In ECEEE 2005 SUMMER STUDY – WHAT WORKS & WHO DELIVERS? Available at: [http://www.eceee.org/conference\\_proceedings/eceee/2005c/Panel\\_4/4248harris/paper](http://www.eceee.org/conference_proceedings/eceee/2005c/Panel_4/4248harris/paper) [Accessed January 17, 2012].

Jackson, C.J., 2009. *Jackson-5 Scales of Revised Reinforcement Sensitivity Theory (r-RST) and their Application to Dysfunctional Real World Outcomes*. *Journal of Research in Personality*, 43(4), pp.556–569.

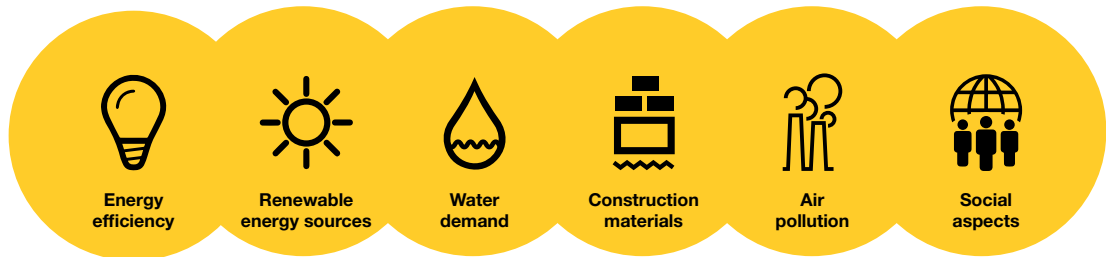
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US Dept. Energy, 2011. *Federal Energy Management Program: About the Program*. Available at: <http://www1.eere.energy.gov/femp/about/about.html> [Accessed January 17, 2012].

US Green Building Council, 2010. *Public Policies Adopting or Referencing LEED*. Available at: <https://www.usgbc.org/ShowFile.aspx?DocumentID=7922> [Accessed December 6, 2011].

## 22 AWARENESS RAISING, EDUCATION AND INFORMATION CAMPAIGNS



### 22.1 OVERVIEW OF THE INSTRUMENT

#### 22.1.1 Alternative names

Antecedent behavioural interventions.

#### 22.1.2 Objective

The objective of awareness raising, education and information campaigns is to induce voluntary behaviour change by influencing individual and organizational perceptions, preferences and abilities (e.g.: consumer choice, building occupant behaviour, design, construction, purchase or renovation preferences of architects, designers, real estate agencies, owners, tenants etc.).

#### 22.1.3 Definition

Awareness raising, education and information campaigns transmit general information and messages on sustainability (e.g. energy savings, water use, availability and use of sustainable solutions) to the general public or to specific target groups. The provision of tailored information (feedback) to the user, including data on the current or historic sustainability performance of buildings, is considered as a subsequent action, covered in Chapter 23: “Feedback programs”.

Changing behaviour is as important as providing the technological and economic means for a shift to sustainability. Targeting users results in an improved use of the occupied buildings, and has an effect on purchasing decisions. The combination of non-technological and technological actions increases the improvement of building performance.

Awareness raising campaigns have a short-term impact on behaviour (2-3 years), while educational campaigns can have a lifelong effect on the targeted audience. Although the impact of awareness raising, education and information campaigns is rarely quantified (and difficult to quantify), these actions are necessary to achieve behavioural change. The lack of such actions may limit the sustainability potential of both existing and future buildings, which is influenced by the behavioural patterns of the targeted generation.

#### 22.1.4 Variations

Campaign types are quite varied, differing in content, scale, target groups, media use, etc. Examples include: information and motivation campaigns; awareness raising programs; educational programs; adult training; and the provision of non-individualized sustainability “tips” or counselling.<sup>23</sup>The message can be

<sup>23</sup> Individually tailored programs, based on data concerning the current or historic sustainability performance of the target group, are considered as subsequent behavioural interventions.

provided through: mass media (radio, television, newspapers and magazines); print media (billboards, posters, handbills, pamphlets, t-shirts and brochures); multimedia (websites, email, social networks, text messages); or one-on-one communication (education, training, counselling).

Interventions can deal with **sustainable behaviour** and **curtailment behaviour**. Sustainable behaviour refers to one-time behaviour activities, (e.g. the purchase of energy efficient products), while curtailment behaviour involves continued efforts, (e.g. consciously setting the thermostat to reduce heating or switching off lights when not in use). Combining a technological improvement with the correct use of the new technology usually results in multiplying the chances for improving sustainability or reducing resource use.



## 22.2 RELEVANCE

### 22.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
National level (country or independent regional unit within/ with jurisdiction over the country)	😊	😊	The instrument can be introduced and implemented at either level.
Local level (city or lower level)	😊	😊	

- 😊 The instrument is typically introduced/implemented at this policy level.
- 😐 The introduction/implementation of the instrument at this level is atypical.
- IF The instrument may be introduced/implemented at this policy level if certain conditions apply.
- 😞 It is practically impossible to introduce/implement the instrument at this policy level.

### 22.2.2 Target areas












The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.





Technological areas	Types of buildings according to use and ownership		Relevance
<b>Buildings</b>	Existing buildings		😊
	New buildings		😊*
	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
Residential buildings		😊	
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊
		Residential buildings	😊
	Private	Non-residential buildings	😊
		Residential buildings	😊

- 😊 The instrument has a positive effect.
- 😐 The instrument may have a positive effect, if certain conditions apply.
- 😞 The instrument is not applicable, has very little effect, or no effect at all.


 22.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>		The instrument is necessary to promote the adoption of sustainability measures that are cost competitive and already have a foothold on the market. By influencing behaviour or decisions, the instrument increases the effectiveness and long-term impact of most other policy instruments, and reduces the likelihood of rebound effects <sup>3</sup> .
	Insufficient information or awareness among target actors		
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		
	High initial costs of sustainable solutions		
	Fragmented market structure <sup>4</sup>		The instrument contributes to a common understanding of sustainability issues and to strengthening the priority given to sustainability criteria by building stakeholders.
	Limitations in the typical building design process <sup>5</sup>		The provision of information and training to building professionals, designers, architects and construction companies provides the tools to understand the benefits of sustainable design. Information and awareness raising addressed to the general public helps to increase the demand for sustainable designs.
	Split incentives <sup>6</sup>		Changes in tenant behaviour do not require investment from owners, and the improved performance results in reduced costs for the tenant.
	High transaction costs <sup>7</sup>		Transaction costs are low for government bodies and, in any case, proportional to the extension and impact desired. The provision of adequate information may help target groups optimise their investments in sustainability.
<b>Regulatory barriers</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption		The instrument is relatively simple to design and implement, and can be implemented with relatively limited human resources. In addition, the instrument operates regardless of the presence of corruption and may help fight it by creating a common understanding of sustainability matters, thus generating disapproval for corruption practices hindering sustainability efforts. However, the credibility of the message(s) may be influenced by the reputation of the responsible organism(s).
	Utility theft or non-payment		The instrument operates regardless of the presence of utility-theft and may help fight it by creating a common understanding of social responsibility and sustainability matters, thus generating disapproval for utility theft practices.

-  The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- The "rebound effect" is a situation where the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from the reduced consumption of a product (and therefore from lower energy costs) and compensate this reduction by purchasing and/or using additional products, leading to stability or an increase in the overall consumption.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 22.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect		
<b>Environment/ resources</b>	Increasing energy efficiency	😊	The instrument can address indiscriminately any environmental and resource-related performance, depending on the instrument design and content.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	IF		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	😊		
	Increasing the sustainability of local resource use	😊		
	Limiting land use in urban areas (including indirect land use)	😊		
	Reducing air pollution	😊		
	Supporting climate change adaptation	😊		
<b>Social</b>	Reducing utility costs for the population	😊	The instrument can address, jointly or separately, multiple target groups.	
	Supporting a specific target group	Public institutions		😊
		Small and medium enterprises		😊
		Low-income consumers		😊
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	IF*	* Campaigns targeting specific industries can increase understanding of: the potential of sustainable solutions; government actions supporting them; and capacity to do business in this area. Campaigns addressed to the general public increase the demand for sustainable solutions.  ** The instrument can provide information and increase awareness on the merits of legally marketed items, which have the advantage of being subject to a certain level of quality control.	
	Creating new employment opportunities	IF*		
	Supporting Research and Development (R&D) activities for technological innovation	IF*		
	Eliminating/tackling informal market	IF**		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😊*		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😊		
<b>Political</b>	Improving energy security <sup>2</sup>	😊	* In particular, campaigns conducted within the public administration, which can be part of sustainable procurement regulations or public leadership programs, can reduce the costs related to resource consumption in the administrative sector. ** The instrument can help fight corruption by creating a common understanding of sustainability matters, thus generating disapproval for corruption practices hindering sustainability efforts.	
	Making politics of sustainable development credible	😊		
	Releasing budgets from public bodies	IF*		
	Reducing corruption	IF**		

😊 The instrument has a positive effect on this goal.

😐 The instrument has no or almost no effect on this goal.

IF The instrument may contribute to this goal, according to some conditions.









☹️ The instrument has a negative effect on this goal.

1 That is to say, increasing the utilization of renewable energy sources.


2 Energy security is here defined as supplying more consumers with the same production capacity.

## 22.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations
The government or the implementing body is credible in the eyes of the target group(s).		Continue to the next precondition.
		<div style="display: flex; justify-content: space-between;"> <div style="width: 65%;">           Conduct efforts towards increasing transparency, engaging stakeholders (in these and other programs), reviewing the quality of the information provided, and communicating the government's sustainability actions (public leadership programs). Alternatively, involve a more credible third party.         </div> <div style="width: 30%;">           If this is feasible, continue to the next precondition.             If not, reconsider the introduction of the instrument.         </div> </div>
The implementing body has data and the capacity to understand the complex interactions between technological use and behaviour. This can be based on previous campaigns or studies, which are ideally country/city specific.		Continue to the next precondition.
		<div style="display: flex; justify-content: space-between;"> <div style="width: 65%;">           Campaign designs need a problem-oriented approach: conduct research to identify the target groups and awareness and information gaps. If possible, introduce a pilot campaign.         </div> <div style="width: 30%;">           If this is feasible, continue to the next precondition.             If not, reconsider the introduction of the instrument.         </div> </div>
The audience (target group) is interested or receptive to sustainability messages.		Continue to the next precondition.
		<div style="display: flex; justify-content: space-between;"> <div style="width: 65%;">           The success of awareness raising, education and information campaigns is largely related to current awareness and information levels, which are linked to the impacts of previous campaigns. It is advisable to:           <ul style="list-style-type: none"> <li>· start with simple messages and increase their complexity gradually</li> <li>· harmonise messages with previous and current campaigns and with other actions to avoid double efforts, and repeat them regularly to reinforce impact</li> <li>· monitor the reception and interest generated and adjust the campaigns accordingly.</li> </ul> </div> <div style="width: 30%;">           If this is feasible, continue to the next precondition.             If not, reconsider the introduction of the instrument.         </div> </div>
The campaign benefits from top level support: government officials believe in the capacity of awareness raising, education and information campaigns to increase building sustainability and support their introduction.		Continue to implementation steps (section 22.4).
		<div style="display: flex; justify-content: space-between;"> <div style="width: 65%;"> <ul style="list-style-type: none"> <li>· Introduce adequate monitoring efforts to be able to demonstrate the potential and actual sustainability impacts of the campaign;</li> <li>· Initiate a campaign within the administration, which could be part of a public leadership program.</li> </ul> </div> <div style="width: 30%;">           If this is feasible, continue to Implementation steps (section 22.4).             If not, reconsider the introduction of the instrument.         </div> </div>

 The precondition exists - move to the next precondition.

 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

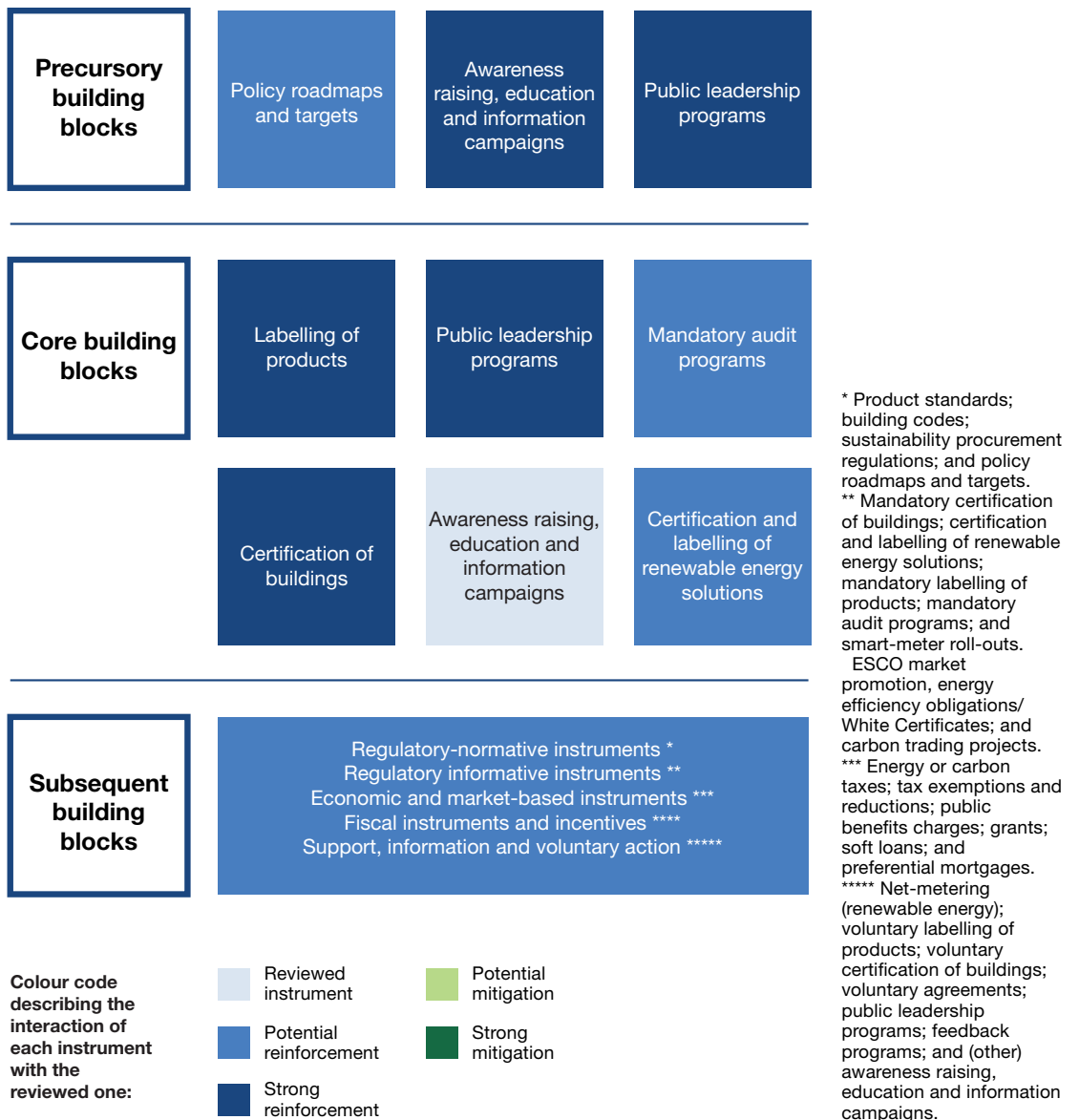
## 22.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Identify the sustainability improvement potential in buildings that can be achieved through behavioural change (i.e. non-technological determinants)	<ul style="list-style-type: none"> <li>• Determine which behavioural (and cultural) factors influence the targeted building sustainability areas.</li> <li>• Map the role of behavioural factors and their interconnections with technological factors (necessary to understand the actual potential of behavioural change).</li> <li>• Integrate the obtained information into modelling and/or scenario analysis.</li> </ul>
2	Appoint an implementing body	The implementing body should be able to conduct the necessary background research, and count on sufficient credibility.
3	Select the target group(s)	Choose groups with the greatest sustainability improvement potential, typically those constituted by individuals consuming more resources and/or with a certain degree of education or awareness on sustainability matters. Campaigns addressed to large groups with low individual consumption can also be highly cost effective when factoring in replication potential, the advantage of economies of scale, and social co-benefits. Always keep in mind the high cost of opportunities missed, before disregarding groups whose immediate potential may be low (e.g. school children) but whose actions during the course of their lifetime will impact the overall future of building sustainability improvements.
4	Design the campaign based on previous research and budgets	<ul style="list-style-type: none"> <li>• Identify appropriate channels (choose the media that is the most utilized by the target group), type of message(s) and language (written or spoken, slang, etc.).</li> <li>• Consider previous and ongoing campaigns in order to estimate the receptiveness of the target groups, to avoid double efforts while reinforcing the message.</li> <li>• Provide regular repetition and ensure a minimum duration of the campaign (necessary to achieve behavioural change).</li> <li>• Awareness raising, education and information campaigns can be effective as a stand-alone instrument, but are more effective in combination with other instruments. Therefore, it is important to integrate the conclusions of point 1 into the design of the instrument to optimise results.</li> <li>• A pilot campaign and/or continuous monitoring and evaluation scheme should be included in the final design.</li> </ul>
5	Implement the campaign	Carry out the campaign carefully according to the plan.
6	Conduct monitoring and evaluation	<p>Adequate monitoring should verify:</p> <ul style="list-style-type: none"> <li>• That the messages(quality and quantity) are being delivered</li> <li>• To what extent the target groups are receiving the messages, and the degree of understanding and receptiveness (their opinion about the messages and the degree to which these have modified their behaviour). Behaviour change is typically measured directly after the finalisation of the campaign, when the highest level of impact is expected. Measuring sustainability over time is usually too costly to pursue.</li> </ul>
7	Adjust the campaign for additional phases	Based on the awareness generated and the information made available in the previous phases or campaigns.

## 22.5 COMBINATION WITH OTHER BUILDING BLOCK

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



### 22.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Policy roadmaps and targets.** Targets enable mandated agencies and experts to set appropriate performance targets for the instrument. Roadmaps enable and support actions in the prioritised sustainability domains as well as in combination with other policy instruments.
- o **Public leadership programs.** The exemplary role played by public bodies increases the credibility and acceptability of the message(s) and their capacity to increase awareness.
- o Previously implemented **awareness raising, education and information campaigns** largely determine the level of information and awareness of the target groups, their interest (and demand) for further information and their capacity to assimilate more complex messages. The success of these campaigns relies mainly on sufficient repetition over a minimum period of time. New campaigns should take advantage of potential synergies and avoid duplication with former programs by using messages which go into greater detail regarding specific sustainability issues, or branch out into other related sustainability domains.

### 22.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Public leadership programs** make the messages delivered through awareness raising, education and information campaigns credible, and serve as a reference for the target groups. The reviewed instrument serves the purpose of communicating government goals, commitments and achievements.
- o **Labelling of products, certification of buildings, certification and labelling of renewable energy solutions, and mandatory audit programs.** Awareness raising, education and information campaigns addressed to the general public generate interest in obtaining information and improve understanding about these programs. In addition, different labels and certificates can be used as practical examples for information and education activities, thus serving as a reference for the target groups.
- o **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. The existence of subsidies can create difficulties to deliver sustainability messages (e.g. the government is subsidizing energy use in some areas and developing a campaign to reduce it in other areas). In addition, subsidies impact the real and perceived price of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions and actions to regular ones.

### 22.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o **Awareness raising, education and information campaigns** should be introduced, explicitly or not, as a building block of almost every policy package, and as a component of individual instruments, in order to: communicate government commitments, plans, and objectives; engage the industry and other target groups; build capacities (training); and, generate interest in the opportunities made available (e.g. information, financing). Instruments introduced in the presence of sufficient information, awareness, education and capacity levels achieve increased technological impacts, have a greater potential to effect behavioural change, and a reduced risk of rebound effect.<sup>24</sup>

## 22.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Changing Behaviour. 2010a. *Recommendations for Policy Makers*. <http://www.energychange.info/deliverables/235-recommendations-for-policy-makers>.

— — —. 2010b. *Make Energy Change Happen Toolkit (MECHAnisms)*. <http://mechanisms.energychange.info/>.

Gardner, Gerald T, and Paul C Stern. 2008. *The Short List: The Most Effective Actions U.S. Households Can Take to Curb Climate Change*. Environment.

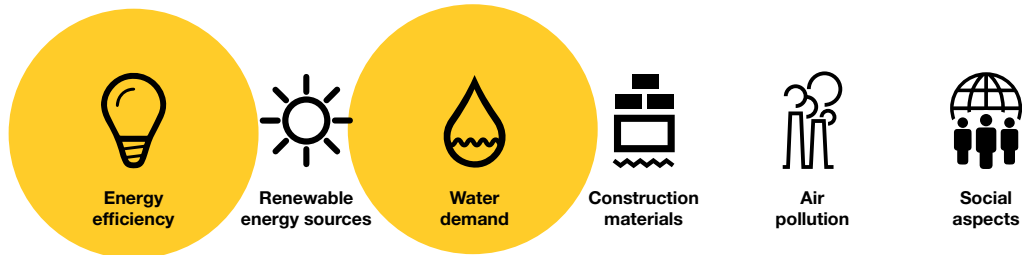
Huber, Andreas, Jaap Kortman, Ana Martín Benito, and Michael Scharp. 2010. *Developing and Implementing Effective Household Energy Awareness Services*. BewarE project. [http://www.izt.de/fileadmin/downloads/pdf/beware/BewareE\\_Manual\\_English\\_20100601.pdf](http://www.izt.de/fileadmin/downloads/pdf/beware/BewareE_Manual_English_20100601.pdf).

Novikova, Aleksandra, Hermann Amecke, Karsten Neuhoff, Kateryna Stelmakh, Bernadett Kiss, Clemens Rohde, Elisa Dunkelberg, Kaisa Matschoss, and Sarah Darby. 2011. *Information Tools for Energy Demand Reduction in Existing Residential Buildings*. Climate Policy Initiative (CPI). <http://www.econstor.eu/handle/10419/65873>.

24 The "rebound effect" is a situation where the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from the reduced consumption of a product (and therefore from lower energy costs) and compensate this reduction by purchasing and/or using additional products, leading to stability or an increase in the overall consumption.



## 23 FEEDBACK PROGRAMS



### 23.1 OVERVIEW OF THE INSTRUMENT

#### 23.1.1 Alternative names

Informative billing; detailed billing; disclosure programs; provision of feedback on energy and water consumption; eco-feedback; disaggregated feedback; subsequent behavioural interventions.

#### 23.1.2 Objective

The objective of feedback programs is to provide information to users on their energy and/or water consumption. Through this instrument, the potential for a reduction of consumption, and means to achieve it, are identified either by the user or by the feedback provider.

#### 23.1.3 Definition

Feedback programs consist of the organized provision of information to users about their energy/water consumption patterns either through their bills, directly on their appliances, or through direct communication. Users may receive tailored recommendations on how to reduce consumption. Since tailored recommendations are based on data related to past consumption (either by the target consumer and/or by similar users), feedback programs are considered “subsequent behavioural

interventions” as opposed to awareness raising, education and information campaigns, which are considered antecedent behavioural interventions.

#### 23.1.4 Variations

Feedback can be provided directly (on the meter, on a specific display, on the products, computer and mobile devices) or indirectly, depending on the level of data complexity. Indirect feedback occurs when the raw consumption data is processed by the utility and sent to the users on paper or in digital format. Usually consisting of an extended, detailed version of the traditionally mailed bill, this type of feedback is also called “informative billing”.

Feedback can have the following features:

- o **Historical feedback** includes energy consumption statistics across different periods, including information for on and off-peak periods, and comparisons along and across the years. This information is available from the utility and can be processed at a small cost. It is a common feature of indirect feedback. Certain direct feedback devices are also able to provide historical feedback.
- o **Comparative and normative feedback** show the consumption of each user as related to similar users (e.g. the average in the same street) or to a

pre-established threshold. The data is only available from the utility, and can be processed at a small cost. This is also a common feature of indirect feedback.

- o **Disaggregated feedback** provides information on the consumption of products or systems. It requires the use of special metering devices. Disaggregated feedback is a possible feature in both direct and indirect feedback provided these devices are in place. Complex, comparative and/or historical approaches are all possible through indirect feedback.

Two specific features of detailed billing have proven to be relevant in promoting sustainable consumption:

- o **Frequency**, which may refer to the frequency of the readings or the provision of feedback (e.g. more frequent bills) and the supply of annual or quarterly consumption reports. It has been suggested, for example, that a quarterly bill, based on real consumption, is a prerequisite for successful behavioural change.
- o **Generation disclosure**, which involves the provision of information on the origin of the energy used, e.g. proportion of renewable energy, or carbon intensity of the electricity supplied by the utility.

## 23.2 RELEVANCE



### 23.2.1 Level of policy making

The following table identifies the levels of policy making at which the instrument may be introduced. The Worksheet enables Handbook users to assess whether the instrument is relevant to the policy making level at which their policy will be developed.

Level of policy making Introduction	Relevance		
	Implementation	Comment	
<b>National level (country or independent regional unit within/with jurisdiction over the country)</b>	😊	😊	Enforcing feedback programs may require regulation at the national level. Nevertheless, a collaborative approach between the utilities and local governments may lead to good results at the local level. Pilot projects can target a specific sector (e.g. industry) or a small residential area.
<b>Local level (city or lower level)</b>	IF	😊	



The instrument is typically introduced/implemented at this policy level.



The introduction/implementation of the instrument at this level is atypical.

IF

The instrument may be introduced/implemented at this policy level if certain conditions apply.



It is practically impossible to introduce/implement the instrument at this policy level.



### 23.2.2 Target areas

The following table identifies the target areas that the instrument can address. The Worksheet enables Handbook users to assess whether the instrument is able to address the types of buildings, building systems and products on which they would like to focus.

Technological areas	Types of buildings according to use and ownership		Relevance	
<b>Buildings</b>	Existing buildings		😊*	* The renovation and replacement of buildings, systems and products that the programs can promote are effective in existing buildings. However, their influence on behaviour may occur in all target areas.  Feedback programs can influence behaviour in all target areas. These programs work better in the residential sector, particularly when the premises are owned by the user, as the instrument does not overcome the (landlord-tenant) split incentive. <sup>1</sup>
	New buildings		😊*	
	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
Residential buildings		😊		
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	
<b>Products (appliances and equipment)</b>	Public	Non-residential buildings	😊	
		Residential buildings	😊	
	Private	Non-residential buildings	😊	
		Residential buildings	😊	



The instrument has a positive effect.



The instrument may have a positive effect, if certain conditions apply.


















The instrument is not applicable, has very little effect, or no effect at all.

<sup>1</sup> Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.


 23.2.3 **Barriers**

The following table summarizes the capacity of the instrument to overcome the barriers in the policy context. The Worksheet enables Handbook users to assess whether the instrument is appropriate to overcome the main local barriers.

Type of barrier	Barrier	Relevance	
<b>Information barriers<sup>1</sup></b>	Cultural and behavioural barriers <sup>2</sup>	 +	The instrument promotes the adoption of sustainable solutions that are cost competitive and already have a foothold on the market. Its influence on behaviour and purchasing decisions reduces the likelihood of a rebound effect <sup>3</sup> . However, a certain degree of awareness is necessary for target groups to pay attention to the messages provided by feedback programs.
	Insufficient information or awareness among target actors	 +	
	High rates of illiteracy among target consumers		
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable		
	High initial costs of sustainable solutions		
	Fragmented market structure <sup>4</sup>		
	Limitations in the typical building design process <sup>5</sup>		
	Split incentives <sup>6</sup>		Changes in tenant behaviour do not require investment from owners, and the improved performance results in reduced costs for the tenant.
	High transaction costs <sup>7</sup>		Transaction costs are low for government bodies and, in any case, proportional to the extension and impact desired. The provision of adequate information will help target groups to optimise their investments in sustainability.
<b>Regulatory barriers</b>	<b>Inadequate implementation, e.g. due to limited institutional capacity, including corruption</b>		The instrument requires a certain degree of capacity to obtain the data (monthly measures), process it and send it out. This may be costly for utilities and therefore requires efforts at government level to introduce the program. Once introduced, the instrument operates regardless of the presence of corruption.
	Utility theft or non-payment	 +	The absence of metering or the presence of a high number of irregular connections to the grid is an important obstacle to the introduction of feedback programs. Government efforts should focus, in collaboration with utilities, on fighting utility theft.

- + The instrument modifies the policy context, reducing the magnitude of this barrier.
-  The instrument overcomes this barrier, or operates regardless of this barrier.
-  The instrument partially overcomes this barrier.
-  The instrument does not overcome this barrier.

- Information about sustainable solutions is often unavailable, incomplete, difficult to obtain and/or unreliable.
- Cultural and behavioural barriers include unsustainable everyday practices and the tendency to ignore opportunities for energy conservation.
- The “rebound effect” is a situation where the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from the reduced consumption of a product (and therefore from lower energy costs) and compensate this reduction by purchasing and/or using additional products, leading to stability or an increase in the overall consumption.
- A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- The typical building design process is linear and sequential instead of being holistic and optimising the building as an integrated system.
- Split incentives arise when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. They become barriers when renting of buildings/dwellings is common.
- Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.


 23.2.4 Policy goals

The following table identifies the policy goals that the instrument can contribute to achieve. The Worksheet enables Handbook users to assess to what extent the instrument contributes to achieving their specific policy goals.

Scope	Goal	Potential effect	Potential effect	
<b>Environment/ resources</b>	Increasing energy efficiency	😊	The instrument can address any environmental and resource-related goals, provided it is or can be related to a utility-supplied good. *Peak demand is commonly addressed with meters able to discern the consumption time. ** The decarbonisation of the energy supply is promoted in programs involving generation disclosure and, indirectly, through reduction of peak demand. *** The information provided can address these areas.	
	Reducing water demand	😊		
	Reducing waste-water generation	😊		
	Reducing energy peak demand	IF*		
	Increasing access to high quality water in buildings	😊		
	Decarbonising the energy supply <sup>1</sup>	IF**		
	Increasing the sustainability of local resource use	😐		
	Limiting land use in urban areas (including indirect land use)	😐		
	Reducing air pollution	IF***		
	Supporting climate change adaptation	IF***		
<b>Social</b>	Reducing utility costs for the population	😊	The instrument benefits the population by overcoming multiple market imperfections.  *Feedback programs can be addressed to specific types of consumers and address multiple needs related to the use of water and energy.	
	Supporting a specific target group	Public institutions		😊*
		Small and medium enterprises		😊*
		Low-income consumers		😊*
Improving comfort, services and housing conditions	😊			
<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry	😐	*Some types of feedback programs can be labour-intensive, e.g. in data collection (reading meters).	
	Creating new employment opportunities	IF*		
	Supporting Research and Development (R&D) activities for technological innovation	😐		
	Eliminating/tackling informal market	😐		
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits	😊		
	Creating new business opportunities by market transformation	😐		
	Increasing energy market transparency: enhancing knowledge and awareness of consumers	😐		
		😐		
<b>Political</b>	Improving energy security <sup>2</sup>	😊	* Feedback programs imply that consumers are able to identify the causes of consumption and the potential for sustainability improvement, therefore increasing the understanding of other government programs.	
	Making politics of sustainable development credible	😊*		
	Releasing budgets from public bodies	😐		
	Reducing corruption	😐		

😊 The instrument has a positive effect on this goal.

😐 The instrument has no or almost no effect on this goal.

IF The instrument may contribute to this goal, according to some conditions.

😞 The instrument has a negative effect on this goal.

1 That is to say, increasing the utilization of renewable energy sources.

2 Energy security is here defined as supplying more consumers with the same production capacity.

## 23.3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of the instrument and if not, which correction measures, detailed as recommendations, should be introduced. The Worksheet enables Handbook users to summarise the presence or absence of the preconditions in their policy context and, if relevant, the recommended actions.

Preconditions	Score	Recommendations	
<b>Target groups are:</b> <ul style="list-style-type: none"> <li>• connected to the grid, and</li> <li>• able to read the information provided, understand the analysis of consumption patterns, or do the analysis themselves.</li> </ul>	😊	Continue to the next precondition.	
	😞	The instrument may not be appropriate given the current situation. Reconsider the introduction of the instrument.	
<b>A sufficient level of awareness about sustainability among target groups results in interest in sustainable consumption messages.</b>	😊	Continue to the next precondition.	
	😞	Introduce an awareness raising, education and information campaign, either before or at the same time, to support the feedback program. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">If this is feasible, continue to the next precondition.</td> </tr> <tr> <td style="width: 50%; padding: 2px;">If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<ul style="list-style-type: none"> <li>• The energy market is competitive. This may be necessary for utilities to consider feedback as an added service and therefore as a competitive advantage.</li> <li>• Existence of a tradition of collaboration with utilities, which are open to participate in government programs.</li> </ul>	😊	Continue to the next precondition.	
	😞	A collaborative approach is preferable. However, the government may introduce a threat of market restructuring to ensure collaboration from the sector. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">If this is feasible, continue to the next precondition.</td> </tr> <tr> <td style="width: 50%; padding: 2px;">If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<b>Technical readiness at the geographic level of implementation, involving capacity to manage databases and presence of operative metering in the targeted buildings.</b>	😊	Continue to the next precondition.	
	😞	Support capacity building within the utilities and/or the roll-out of meters (see Chapter 9: "Smart-meter rollouts") <sup>1</sup> . <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">If this is feasible, continue to the next precondition.</td> </tr> <tr> <td style="width: 50%; padding: 2px;">If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<b>Existence of a leading organisation, i.e. a national actor sufficiently motivated and capable of managing the process.</b>	😊	Continue to the next precondition.	
	😞	Energy agencies, NGOs, research institutions, consumer advocacy groups, and innovative utilities could take this role. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">If this is feasible, continue to the next precondition.</td> </tr> <tr> <td style="width: 50%; padding: 2px;">If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to the next precondition.
If this is feasible, continue to the next precondition.			
If not, reconsider the introduction of the instrument.			
<b>Availability of sufficient human capacity at the administrative level, to monitor utility enforcement, as well as to monitor the sustainability improvement on the premises of consumers.</b>	😊	Continue to implementation steps (section 23.4).	
	😞	To minimize the need for control, include a legal obligation for utilities to provide independent evaluations, which should be completed with random inspections conducted by the administration. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 2px;">If this is feasible, continue to implementation steps (section 23.4).</td> </tr> <tr> <td style="width: 50%; padding: 2px;">If not, reconsider the introduction of the instrument.</td> </tr> </table>	If this is feasible, continue to implementation steps (section 23.4).
If this is feasible, continue to implementation steps (section 23.4).			
If not, reconsider the introduction of the instrument.			

😊 The precondition exists - move to the next precondition.

😞 The precondition does not exist. If recommendations are provided, check whether it is possible to introduce them.

<sup>1</sup> The introduction of conventional meters to enable the provision of feedback may generate a lock-in, delaying the possibility of introducing more effective technologies (smart or net-meters), whose operation increases the quality of the feedback and reduces the need for manual readings.

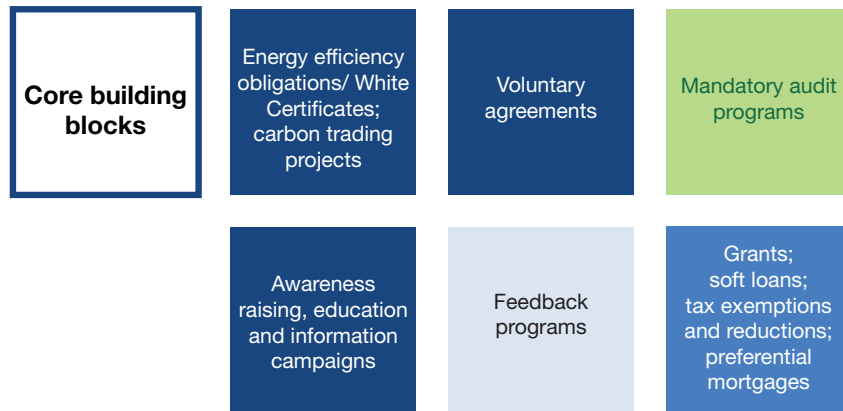
## 23.4 IMPLEMENTATION STEPS

This section presents the general steps recommended for the introduction of the instrument. Users may summarize them in section 4.1. of the Worksheet.

1	Announce the program to the utilities, promoting a collaborative approach	Some utilities may appreciate gaining a competitive advantage. However, a threat of regulation is usually necessary to achieve sufficient collaboration from the sector.
2	Appoint a leading organisation	In the absence of motivated national/local energy agencies able to lead the process, consider involving NGOs, research institutions, consumer advocacy groups, and innovative utilities to take this role.
3	Conduct research	Research on the consumption patterns of target groups, as well as their level of sustainability awareness and interest in information about sustainability consumption, will assist in the designing of the program, and the generation of a baseline.
4	Based on the research results: a - Continue to promote communication with utilities, engage consumers and/or, b- Define sustainability improvement targets	a - Continuous communication with utilities and consumer groups, as well as the introduction of an awareness raising, education and information campaign will increase the possibility of collaboration on the design and implementation of the program. b - Utility reduction targets (e.g. policy roadmaps and targets, or energy efficiency obligations/White Certificates), in combination with feedback programs, have a larger improvement potential than feedback programs alone.
5	Introduce a legal framework	This can be a regulatory requirement or a voluntary agreement, which establishes either: a) the obligation to provide feedback or, b) the obligation to achieve certain savings (e.g. energy efficiency obligations/ White Certificates, or policy roadmaps and targets). The framework should describe penalties for non-compliance, mandate the leading organization and, if necessary, define the support provided by the government (typical in voluntary agreements).
6	Design the program	<ul style="list-style-type: none"> <li>• It is preferable to design the program in collaboration with utilities and consumers groups.</li> <li>• Consider the trade-off with regard to the cost, the level of detail and the frequency of the messages. Increased measurement efforts can be handled through self-measurement (which requires a high level of awareness among target groups), or smart-meters with remote reading.</li> <li>• Adapt the messages to the target groups. Always choose simple and understandable messages, and ensure that the messages and media used (for instance printed charts) are appropriate to the target groups.</li> <li>• Support the program with the necessary actions targeting specific target groups (including the utilities, when necessary).</li> </ul>
7	Monitor implementation	Verify that the messages are relevant for all the targeted groups. The leading agency should be ready to propose modifications to the utilities.
8	Redesign the program	Requirements for the utilities should be regularly updated. Consider the need for new supporting programs/instruments, e.g. financial or informative, normative-informative, etc.

### 23.5 COMBINATION WITH OTHER BUILDING BLOCKS

This section presents the interactions between the reviewed instrument as a policy building block and other instruments. In particular, the following figure represents the interactions according to the sequence of implementation (from top to bottom) and the type of interaction (reinforcement or mitigation), which are further explained at the end of the section. Users may use this section to describe the interactions between building blocks in a pre-selected package and to organize the overall implementation steps of the package in question (sections 4.2 and 4.3 of the Worksheet).



\* Product standards; building codes; sustainability procurement regulations; and policy roadmaps and targets.  
 \*\* Mandatory certification of buildings; certification and labelling or renewable energy solutions; mandatory labelling of products; mandatory audit programs; and smart-meter roll-outs.  
 \*\*\* ESCO market promotion, energy efficiency obligations/ White Certificates; and carbon trading projects.  
 \*\*\*\* Energy or carbon taxes; tax exemptions and reductions; public benefits charges; grants; soft loans; and preferential mortgages.  
 \*\*\*\*\* Net-metering (renewable energy); voluntary labelling of products; voluntary certification of buildings; voluntary agreements; public leadership programmes; feedback programs; and (other) awareness raising, education and information campaigns.

Colour code describing the interaction of each instrument with the reviewed one:

- Reviewed instrument
- Potential reinforcement
- Strong reinforcement
- Potential mitigation
- Strong mitigation



### 23.5.1 Precursory building blocks

*Instruments that exist before the implementation of the package or that are introduced at its earliest stages. Acting to overcome certain barriers, these building blocks determine the success of the package:*

- o **Public leadership programs and awareness raising, education and information campaigns.** These instruments increase the general level of awareness and information of the population, thus increasing the interest in tailored information on the potential and means to reduce consumption.
- o **Policy roadmaps and targets** enable mandated agencies and experts to set appropriate performance targets, and to communicate the upcoming requirements to the utilities.
- o **Smart-meter roll-outs and net-metering (renewable energy).** In the absence of a metering system, the introduction of advanced meters can result in additional advantages, including improved feedback and lower cost of operation (frequent readings). Introducing conventional meters where none exist may lock in a less efficient system and jeopardize the potential for introducing advanced metering in a timely manner. In the presence of conventional meters, the cost-effectiveness of replacement by advanced/smart meters should be evaluated.
- o **Labelling of products, and product standards** enable consumers (which will become informed through feedback programs) to replace their products by more efficient ones.
- o **Energy or carbon taxes and public benefits charges** increase the economic pressure on consumers to reduce consumption while potentially providing

resources to cover the costs of feedback programs.

- o **Energy and water subsidies.** This instrument is not directly addressed in this Handbook. However, energy and water subsidies are mentioned here as they may reduce the coherence and credibility of the implemented policy instruments. Subsidies impact the real and perceived price of energy, and may therefore impact the assessment of costs and benefits in comparing sustainable solutions and actions to regular ones.

### 23.5.2 Core building blocks

*Instruments specifically addressing the selected policy goals and forming the centre of the package:*

- o **Voluntary agreements** between the government and utilities support a collaborative design and implementation process. For example, the government can provide capacity building, the dissemination of meters, or support in fighting utility theft, and in return, the utility can provide feedback to the consumers.
- o **Energy efficiency obligations White Certificates and carbon trading projects** serve to engage utilities in consumption reduction, and can motivate them to introduce feedback programs.
- o **Mandatory audit programs.** The introduction of mandatory audit and feedback programs targeted to the same target groups implies double efforts.
- o **Awareness raising, education and information campaigns.** The continuous supply of general information and awareness-raising messages increases the impact of feedback programs. Furthermore, in addition to feedback (subsequent behavioural intentions), utility bills in detailed billing form can also include

general (antecedent behavioural) messages.

- o **Grants, soft loans, tax exemptions and reductions, preferential mortgages.** These financial instruments are among the main measures that the government introduces to incite informed consumers to replace products and to refurbish buildings. In the case of programs driven by a savings obligation (such as energy efficiency obligations/ White Certificates or carbon trading projects), it is the utility company which provides the incentive to the consumer.

#### 23.5.3 Subsequent building blocks

*Instruments whose success is determined by the introduction of the core instruments:*

- o The information and increased awareness obtained through feedback programs can increase the acceptance and impact of many other policy instruments, combining the impact of behavioural change with technological advances, while reducing the risk of a rebound effect.<sup>25</sup>

## 23.6 ADDITIONAL INFORMATION

The following references may be helpful in the design and implementation of the instrument:

Darby, Sarah. 2006. *The Effectiveness of Feedback on Energy Consumption*. Oxford: Tech. rep., Environmental Change Institute, University of Oxford. <http://www.eci.ox.ac.uk/research/energy/downloads/smart-metering-report.pdf>.

Novikova, Aleksandra, Hermann Amecke, Karsten Neuhoff, Kateryna Stelmakh, Bernadett Kiss, Clemens Rohde, Elisa Dunkelberg, Kaisa Matschoss, and Sarah Darby. 2011. *Information Tools for Energy Demand Reduction in Existing Residential Buildings*. Climate Policy Initiative (CPI). [www.climatepolicyinitiative.org/wp-content/uploads/2011/12/Information-Tools-for-Energy-Demand-Reduction.pdf](http://www.climatepolicyinitiative.org/wp-content/uploads/2011/12/Information-Tools-for-Energy-Demand-Reduction.pdf).

<sup>25</sup> The "rebound effect" is a situation where the introduction of a policy instrument to reduce consumption may occasionally result in a higher consumption. Consumers benefit from the reduced consumption of a product (and therefore from lower energy costs) and compensate this reduction by purchasing and/ or using additional products, leading to a stability or an increase in the overall consumption.

# 4

## Feedbacks

Your opinion is highly appreciated. By filling in the Feedback Form below, you will contribute to the improvement of the Handbook of Sustainable Building Policies. Personal data will only be used for statistical purposes.

Please fill in the form and send it to: [built.environment.unit@unep.org](mailto:built.environment.unit@unep.org)

Thank you in advance,

The authors

## FEEDBACK FORM

### 1. In what context did you use the Handbook?

- a. I used the Handbook in combination with the Quick Scan Tool.
- b. I used the Handbook as a reference manual.
- c. Other. Please specify \_\_\_\_\_

### 2. Did you use the Handbook to formulate a policy package?

- a. Yes. Please state:
  - o Policy making level (national or local): \_\_\_\_\_
  - o Location (city or country): \_\_\_\_\_
  - o Type of organisation (public or private) \_\_\_\_\_
  - o Name of the organisation (optional): \_\_\_\_\_
- b. No

### 3. Which of these sections did you read or use?

- a. Section 1: Introduction and Section 2: How to use the Handbook
- b. Section 3. Policy instruments. Please specify which chapters:
  - o \_\_\_\_\_
  - o \_\_\_\_\_
  - o \_\_\_\_\_
  - o \_\_\_\_\_
  - o More than 4 policy instruments

c. Section 4. Worksheet

**4. Did you find the information in the sections reviewed relevant to your local context?**

a. Yes

b. No. Please explain why / give examples:

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**5. Did you find the information in the Handbook clear?**

a. Yes.

b. No. Please specify which sections were unclear (please indicate the reasons, e.g. structure, language or other).

Section 1: Introduction, and section 2: How to use the Handbook \_\_\_\_\_

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Section 3. Policy instruments \_\_\_\_\_

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Section 4. Worksheet \_\_\_\_\_

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## **WORKSHEET: OUTLINE OF THE POLICY PACKAGE:**

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(Please write the name of the policy package, e.g. based on the name given during the completion of the Quick Scan Tool)

## 1 OVERVIEW OF THE POLICY PACKAGE

Please, make sure that you read the sections Introduction and How to use this Handbook before starting to fill in this worksheet.

Constituted by the following policy instruments:

Policy building block 1. \_\_\_\_\_

Policy building block 2. \_\_\_\_\_

Policy building block 3. \_\_\_\_\_

Policy building block 4. \_\_\_\_\_



	Energy efficiency	Renewable energy sources	Water demand	Construction materials	Air pollution	Social aspects
<b>Building block 1</b> _____ _____						
<b>Building block 2</b> _____ _____						
<b>Building block 3</b> _____ _____						
<b>Building block 4</b> _____ _____						



## 2 RELEVANCE

The relevance of the package is assessed in the following sections based on the aptitude of each policy building block to meet the context and the political priorities regarding: level of policy making, targets, barriers and goals. The users are invited to use a qualifier in the column at the right, which may be a plus or a minus or a numeric scale, depending on their needs, to facilitate further analysis.

### 2.1 Level of policy making

The following table serves to summarize at what level of policy making the introduction of the package is feasible.

Level of policy making	Building block 1:	Building block 2:	Building block 3:	Building block 4:	Relevance in the policy context
National level (country or independent regional unit within/ with jurisdiction over the country)					
Local level (city or lower level)					

## 2.2 Target areas

The following table serves to summarize the target areas that the package addresses. You may opt to assess all the areas presented or only those important in the policy context.

Technological areas	Building types according to use and ownership		Building block 1:	Building block 2:	Building block 3:	Building block 4:	Relevance in the policy context
			_____	_____	_____	_____	
<b>Buildings</b>	Existing buildings						
	New buildings						
	Public	Non-residential buildings					
		Residential buildings					
	Private	Non-residential buildings					
		Residential buildings					
<b>Building systems (lighting, air-conditioning, heating)</b>	Public	Non-residential buildings					
		Residential buildings					
	Private	Non-residential buildings					
		Residential buildings					
<b>Products (appliances and equipment )</b>	Public	Non-residential buildings					
		Residential buildings					
	Private	Non-residential buildings					
		Residential buildings					

## 2.3 Barriers

The following table serves to summarize the barriers that the policy package helps overcome. You may opt to name all those presented or only those that are important in the policy context.

Type of barrier	Barrier	Building block 1:	Building block 2:	Building block 3:	Building block 4:	Relevance
		_____	_____	_____	_____	
		_____	_____	_____	_____	
<b>Information barriers</b> <sup>1</sup>	Cultural and behavioural barriers <sup>2</sup>					
	Insufficient information or awareness among target actors <sup>3</sup>					
	High rates of illiteracy among consumers					
<b>Economic and market barriers</b>	Efficient/sustainable technologies unavailable					
	High initial costs of sustainable solutions					
	Fragmented market structure <sup>4</sup>					
	Limitations in the typical building design process <sup>5</sup>					
	Split incentives <sup>6</sup>					
	High transaction costs <sup>7</sup>					
<b>Regulatory capacity</b>	Inadequate implementation, e.g. due to limited institutional capacity, including corruption					
	Utility theft or non-payment					

- 1 Information about sustainable building solutions and their implementation is often unavailable, incomplete, difficult to obtain and/or unreliable.
- 2 Cultural and behavioural barriers include unsustainable everyday practices, tendency to ignore opportunities for energy conservation.
- 3 e.g. private individuals / households; commercial/business consumers; architects and engineers; building energy managers; construction companies; real estate developers; appliance producers; policy-makers; public administration employees.
- 4 The construction industry consists of a large number of entities, which are generally specialised small and medium-size companies. A construction project requires the involvement and agreement of numerous stakeholders with different perspectives.
- 5 The typical building design process is linear and sequential instead of being holistic and optimising the building as integrated systems.
- 6 Situation when actors responsible for investment decisions are different from those benefiting from the increased sustainability of the purchased solutions. It becomes a barrier when renting of buildings/dwellings is common.
- 7 Costs related to organizing and conducting business activities, including search, negotiation, and monitoring costs.

## 2.4 Policy goals

The following table serves to summarize the policy goals that the policy package helps achieve. You may opt to check and cross all those presented or only those that are important in the policy context.

Policy goal		Building block 1:	Building block 2:	Building block 3:	Building block 4:	Relevance
		_____	_____	_____	_____	
		_____	_____	_____	_____	
<b>Environment/ resources</b>	Increasing energy efficiency					
	Reducing water demand					
	Reducing waste-water generation					
	Reducing energy peak demand					
	Increasing access to high quality water in buildings					
	Decarbonising the energy supply, increasing the utilization of renewable energy sources					
	Increasing the sustainability of local resource use					
	Limiting land use in urban areas (including indirect land use)					
	Reducing air pollution					
	Supporting climate change adaptation					
<b>Social</b>	Reducing utility costs for the population					
	Supporting a specific target group	Public institutions				
		Small and medium enterprises				
		Low-income consumers				
Improving comfort, services and housing conditions						

## 4 Feedbacks

<b>Economic</b>	Creating/developing the local energy efficiency and renewable energy industry					
	Creating new employment opportunities					
	Supporting Research and Development (R&D) activities for technological innovation					
	Eliminating/tackling informal market					
	Facilitating the market introduction and proliferation of new or improved technologies with high initial cost, but with major benefits					
	Creating new business opportunities by market transformation					
	Increasing energy market transparency: enhancing knowledge and awareness of consumers					
<b>Political</b>	Favouring energy security					
	Making credible politics of sustainable development					
	Releasing budget from public bodies					
	Reducing corruption					

### 3 PRECONDITIONS AND RECOMMENDATIONS

This section allows users to assess whether the conditions are adequate for the implementation of these building blocks and otherwise, what mitigation measures, i.e. recommendations would need to be implemented. The following table serves to summarize the preconditions that should be in place, and in cases where they are not in place, whether a corrective measure is necessary, or whether it is preferable to reconsider the introduction of the package.

Building block 1:	Building block 2:	Building block 3:	Building block 4:
_____	_____	_____	_____
_____	_____	_____	_____
<b>Preconditions which are in place</b>			
<b>Preconditions which are NOT in place. A corrective measure (recommended) will be necessary</b>			
<b>Preconditions which are NOT in place. Reconsider the introduction of the package.</b>			

## 4 IMPLEMENTATION STEPS

This section begins with the different steps recommended for each policy building block. Subsequently, based on the sequence of introduction of the different building blocks in the package, users are invited to shuffle and merge the implementation steps to make a preliminary proposal of the necessary implementation steps of the package.

### 4.1 Adapted implementation steps for the each policy building block

The following table serves the purpose of gathering the implementation steps described in the Handbook for each policy instrument, after selecting and adapting them to the policy context by taking into consideration the notes taken in Section 3 (Preconditions and recommendations).

STEP	Building block 1: _____ _____	STEP	Building block 2: _____ _____	STEP	Building block 3: _____ _____	STEP	Building block 4: _____ _____
1.		1.		1.		1.	
2.		2.		2.		2.	
3.		3.		3.		3.	
4.		4.		4.		4.	
5.		5.		5.		5.	
6.		6.		6.		6.	
7.		7.		7.		7.	
8.		8.		8.		8.	
9.		9.		9.		9.	
10.		10.		10.		10.	
11.		11.		11.		11.	

#### 4.2 Implementation steps of the policy package (general)

Using section 5 (combination with other policy building blocks) of the relevant policy instrument chapters, it is possible to make a diagram describing the causal/temporal relations among the policy building blocks constituting the package. In addition, a brief justification can be added explaining the types of interactions between these instruments.

<b>PRECURSORY BUILDING BLOCKS</b>			
<b>CORE BUILDING BLOCKS</b>			
<b>SUBSEQUENT BUILDING BLOCKS</b>			

#### 4.3 Implementation steps of the policy package (detailed)

Based on the scheme generated in 4.2, list the implementation steps that should be followed for the introduction of the policy package, following the recommended order of implementation.

<b>STEP</b>	<b>Name of the step/ Short description</b>	<b>A step of the building block (-s)</b>	<b>Recommended period of implementation(month/year)</b>
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			



# About the UNEP Division of Technology, Industry and Economics

Set up in 1975, three years after UNEP was created, the Division of Technology, Industry and Economics (DTIE) provides solutions to policy-makers and helps change the business environment by offering platforms for dialogue and co-operation, innovative policy options, pilot projects and creative market mechanisms. The Division works to promote:

DTIE plays a leading role in three of the six UNEP strategic priorities: climate change, harmful substances and hazardous waste, resource efficiency.

DTIE is also actively contributing to the Green Economy Initiative launched by UNEP in 2008. This aims to shift national and world economies on to a new path, in which jobs and output growth are driven by increased investment in green sectors, and by a switch of consumers' preferences towards environmentally friendly goods and services.

Moreover, DTIE is responsible for fulfilling UNEP's mandate as an implementing agency for the Montreal Protocol Multilateral Fund and plays an executing role for a number of UNEP projects financed by the Global Environment Facility.

## **The Office of the Director, located in Paris, coordinates activities through:**

- > **The International Environmental Technology Centre** - IETC (Osaka), promotes the collection and dissemination of knowledge on Environmentally Sound Technologies with a focus on waste management. The broad objective is to enhance the understanding of converting waste into a resource and thus reduce impacts on human health and the environment (land, water and air).
- > **Sustainable Consumption and Production** (Paris), which promotes sustainable consumption and production patterns as a contribution to human development through global markets.
- > **Chemicals** (Geneva), which catalyses global actions to bring about the sound management of chemicals and the improvement of chemical safety worldwide.
- > **Energy** (Paris and Nairobi), which fosters energy and transport policies for sustainable development and encourages investment in renewable energy and energy efficiency.
- > **OzonAction** (Paris), which supports the phase-out of ozone depleting substances in developing countries and countries with economies in transition to ensure implementation of the Montreal Protocol.
- > **Economics and Trade** (Geneva), which helps countries to integrate environmental considerations into economic and trade policies, and works with the finance sector to incorporate sustainable development policies. This branch is also charged with producing green economy reports.

*DTIE works with many partners (other UN agencies and programmes, international organizations, governments, non-governmental organizations, business, industry, the media and the public) to raise awareness, improve the transfer of knowledge and information, foster technological cooperation and implement international conventions and agreements.*

For more information,  
see [www.unep.org/dtie](http://www.unep.org/dtie)

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***Buildings are at the centre of our economic and social lives, providing shelter, work places, and spaces for commerce and leisure. However, buildings also put a tremendous strain on our environment. It is estimated that globally, buildings are responsible for 40% of energy use, 30% of materials use, 20% of water use, and more than 30% of global greenhouse gas (GHG) emissions.***

***Experience has shown that designing appropriate policies for sustainable buildings can promote innovation, generate economic opportunities, reduce resource use, raise the overall standard of living, and improve human well-being, comfort and health.***

***This “Handbook of Sustainable Building Policies” provides significant support to improve buildings sustainability. It enables authorities at national and local levels to analyse existing policies affecting the building sector, and to identify packages of policy instruments for sustainable buildings, which can be adapted to fit local conditions.***

***Following the recommendations included in the Handbook, users can assess the relevance of different policy instruments to their local context and priorities, and prepare an implementation strategy. Users can also review interactions between instruments to ensure that the policy package will achieve its goals with a maximum impact to effectively improve the sustainability of buildings.***