



International
Desalination
Association



“Desalination: The Vision of Today and the Future”

Sustainability and Innovation in Desalination

Corrado Sommariva

Managing Director generation ILF Middle east

Sustainability and Innovation in Desalination

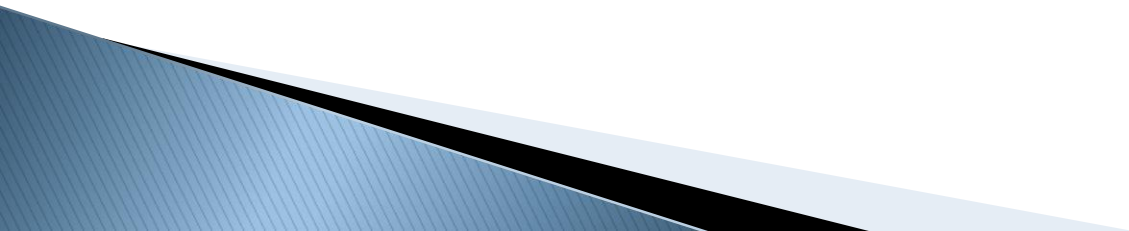
“Meeting the needs of the present without compromising the ability of the future generations to meet their own needs”
(Bruntland 1987)



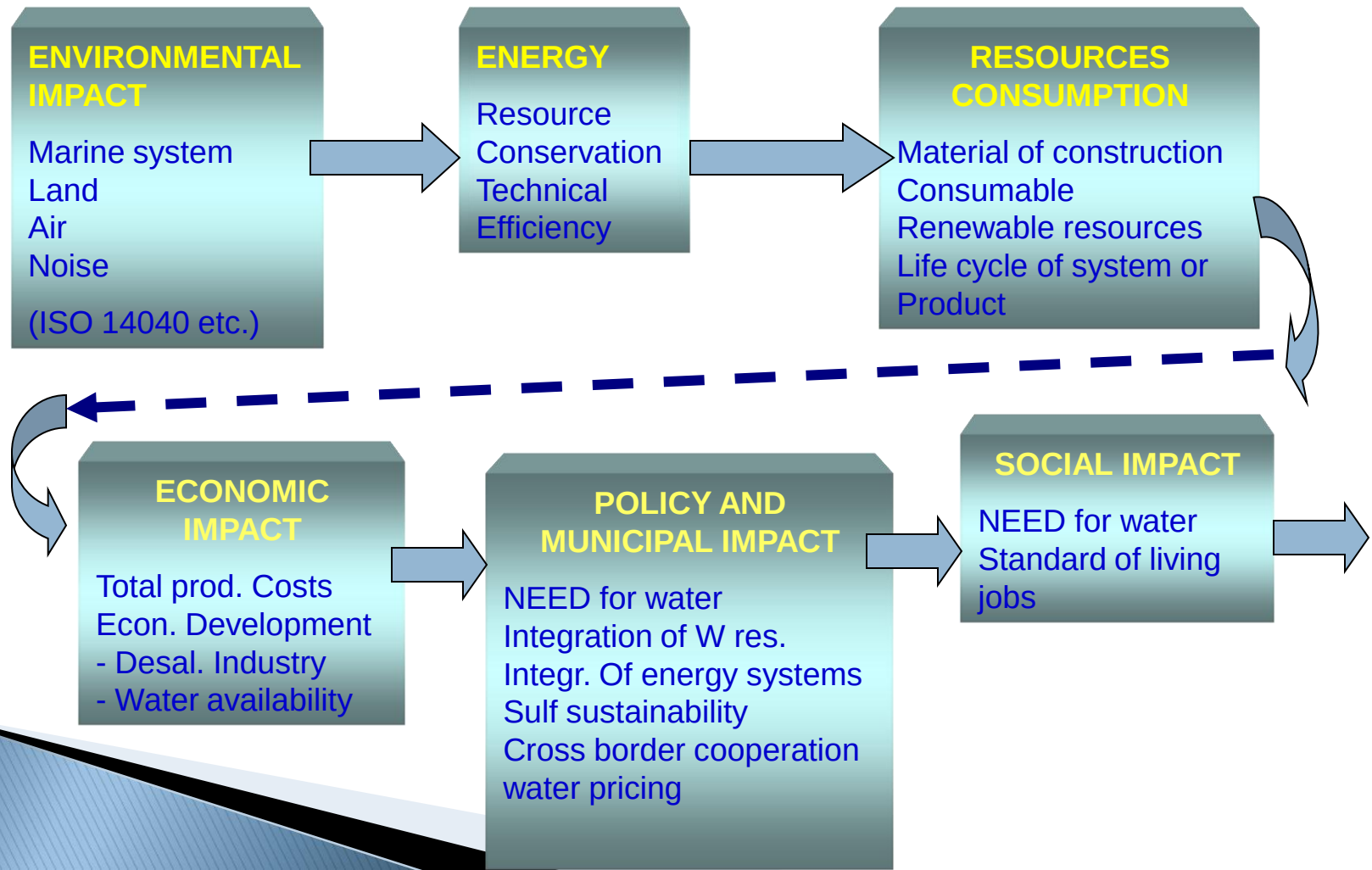
Sustainability and Innovation in Desalination

Viewed in terms of meeting current environmental regulations, desalination plants have a relatively low impact and....

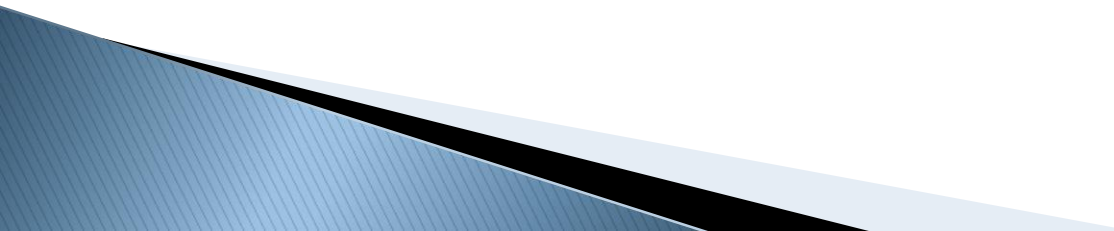
there are no significant problems in meeting regulations in particular for the seawater abstraction and brine discharge.



Indicator aspects within the various sustainability criteria

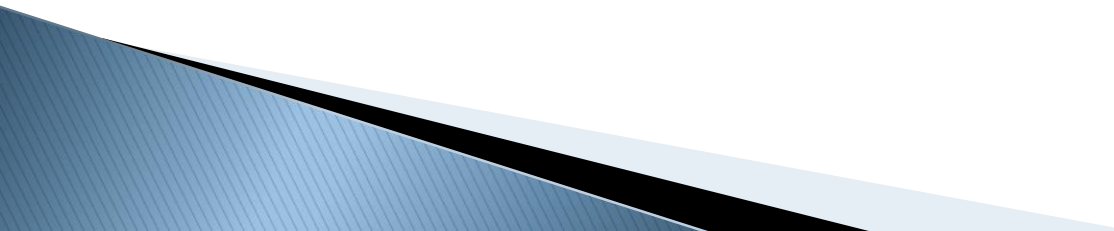


Indicator aspects within the various industry sustainability criteria

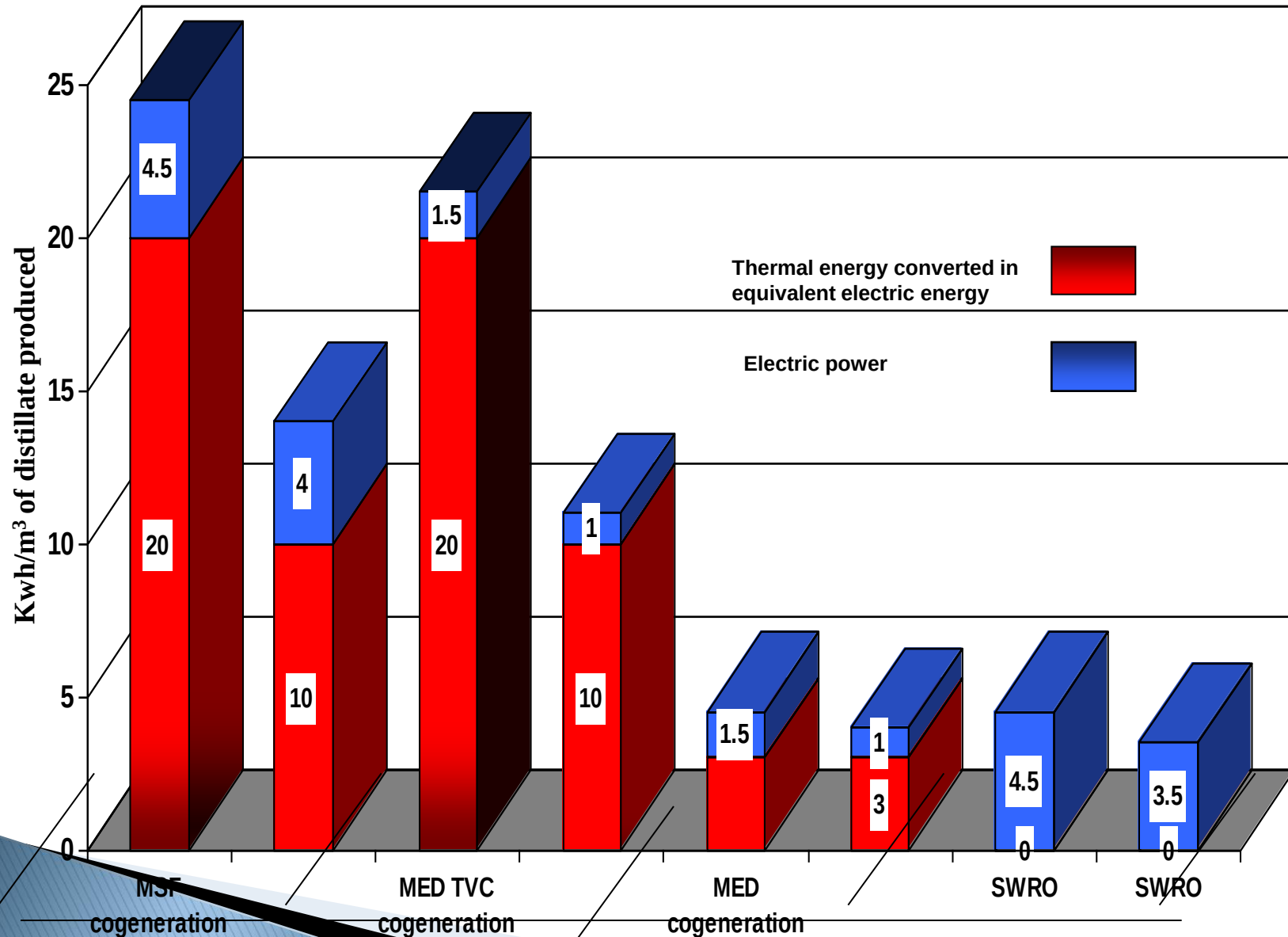
- ▶ Energy and carbon footprint
 - ▶ Seawater discharge
- 

Energy and carbon footprint

Huge difference in power requirements
between different desalination
technologies

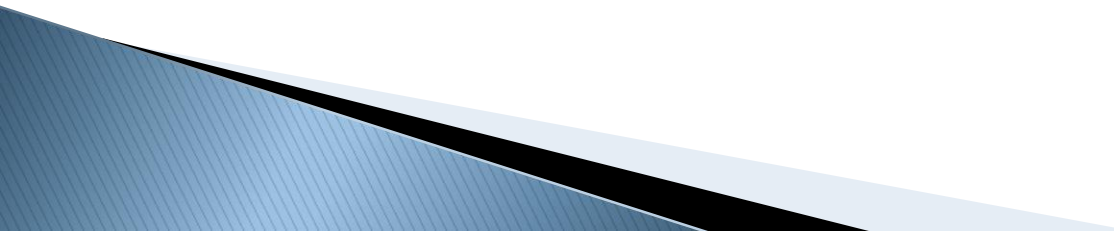


Sustainability and Innovation in Desalination: energy and carbon footprint

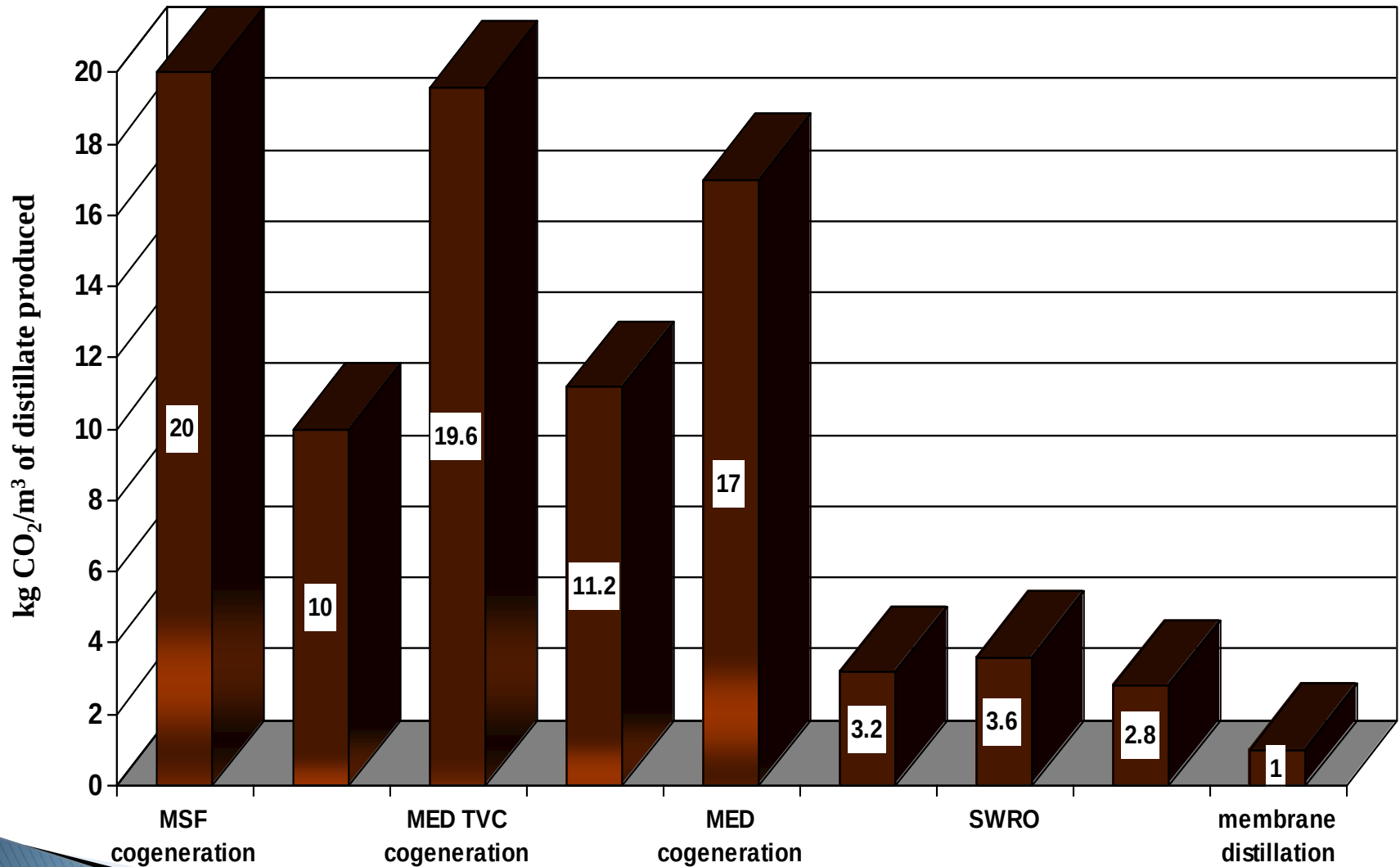


In parts of the world that are heavily reliant on coal the grid emission factor is somewhere near.

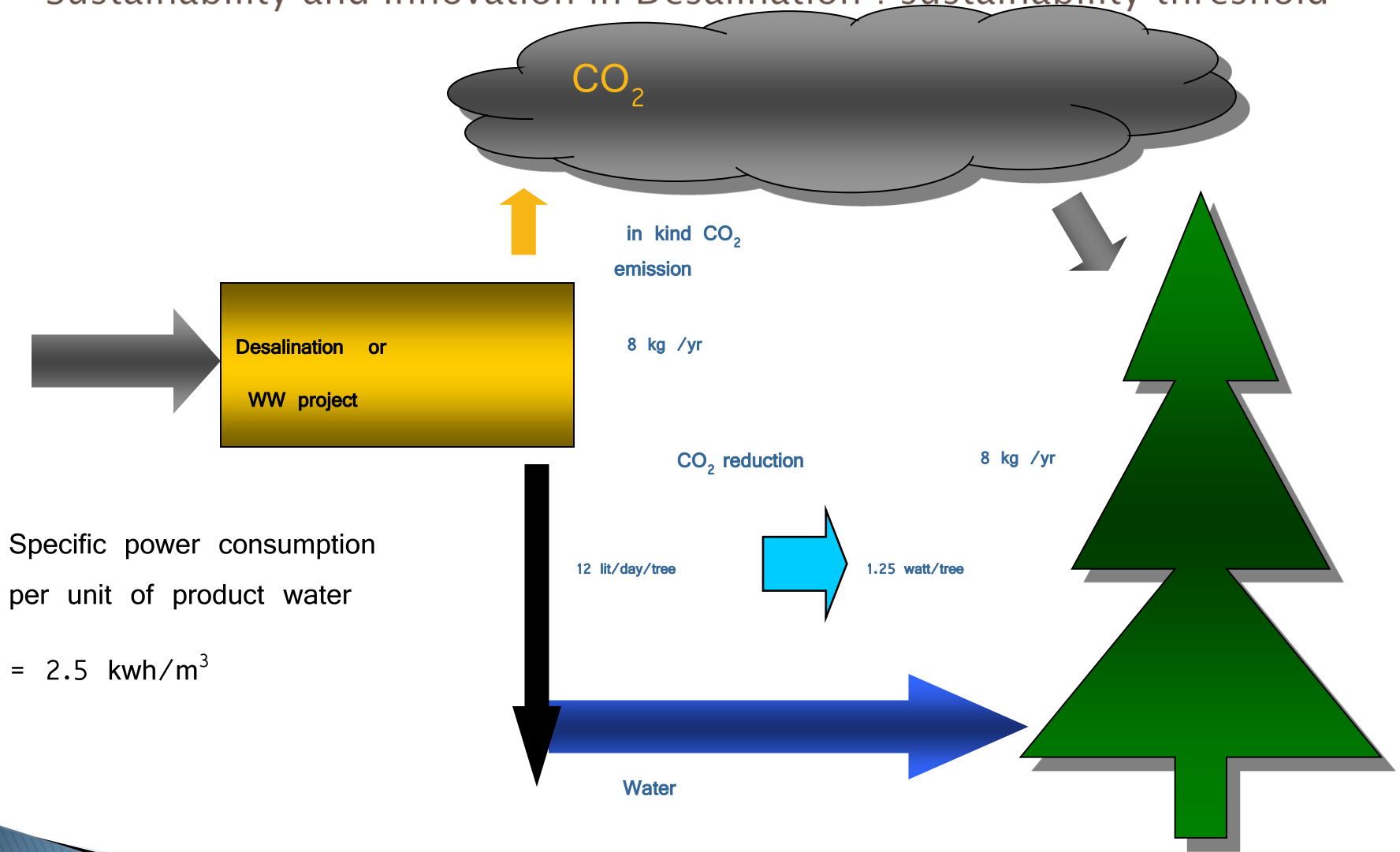
0.8 TCO₂/MWH.



Sustainability and Innovation in Desalination energy and carbon footprint

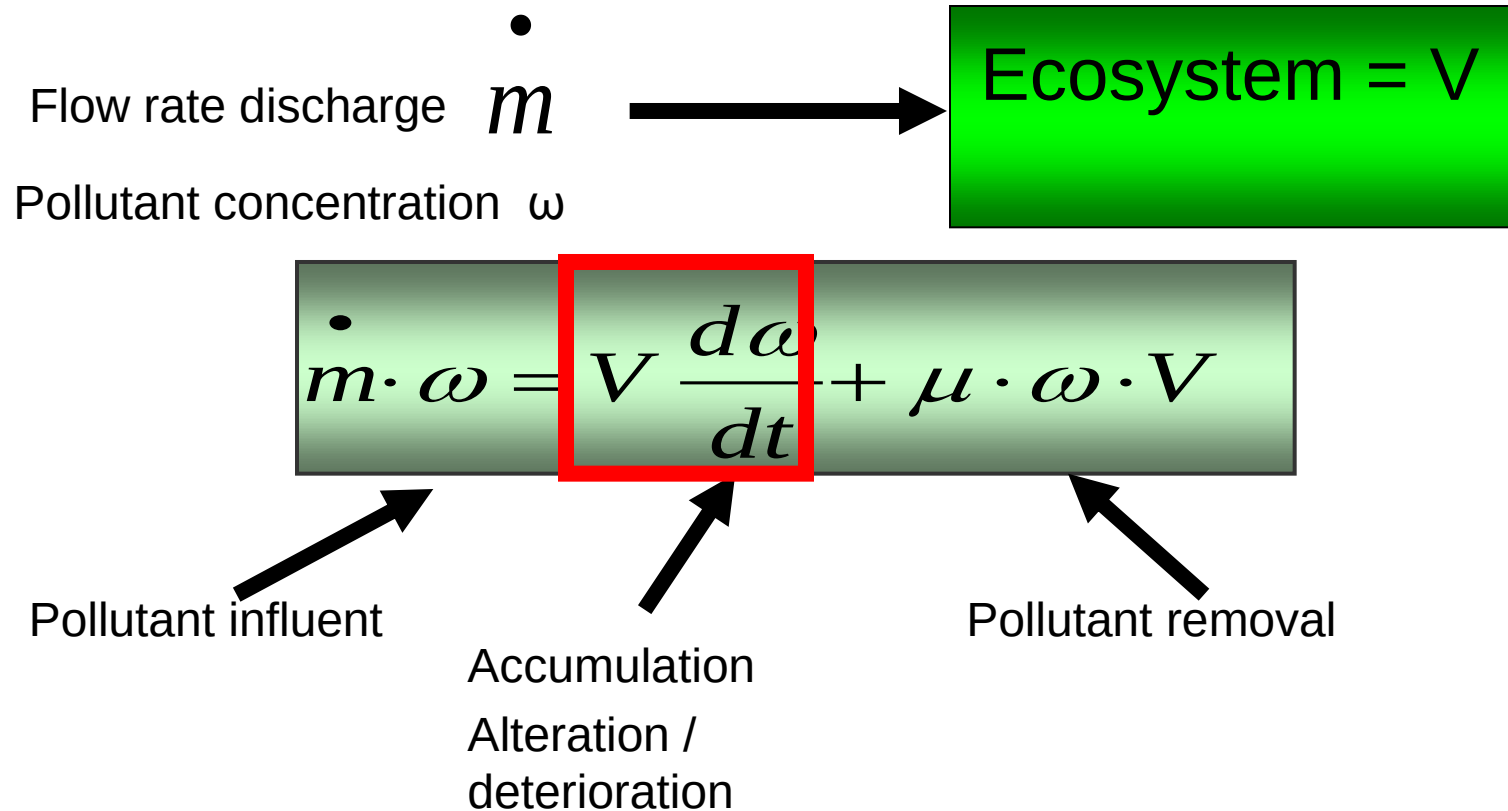


Sustainability and Innovation in Desalination : sustainability threshold



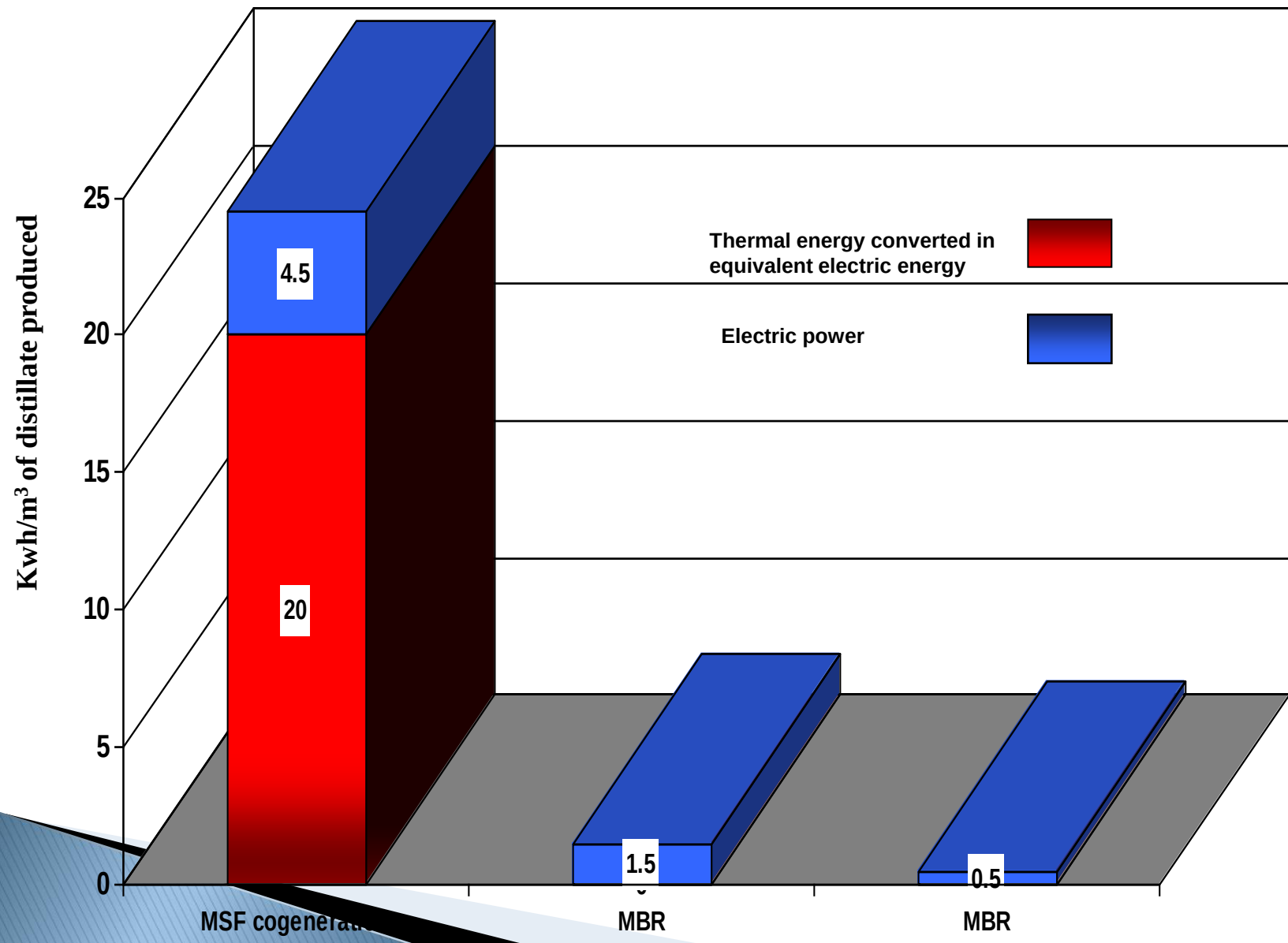
Sustainability and Innovation in Desalination

- ▶ How efficiency and sustainability are interrelated ?

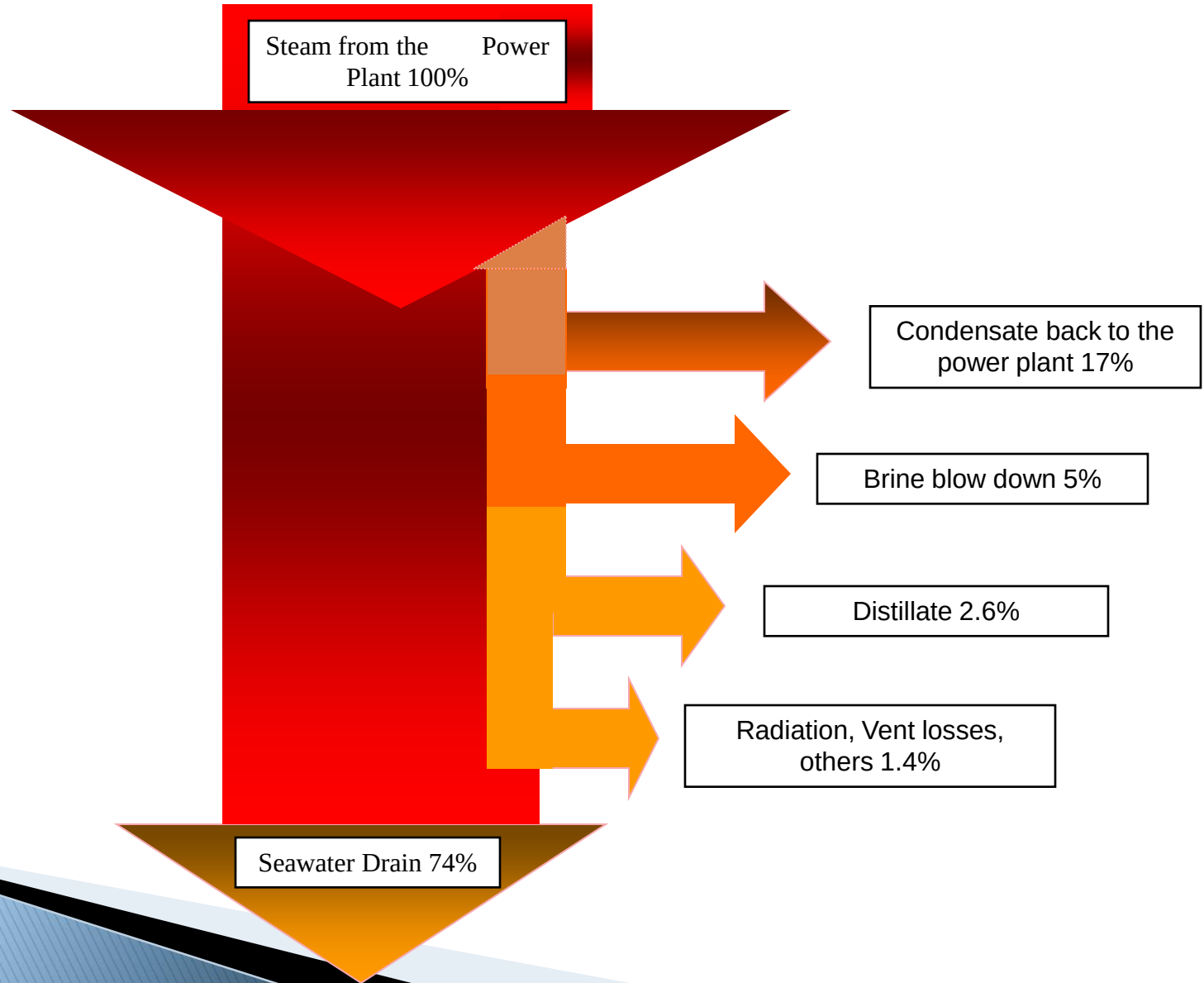


- ▶ Studies have been carried out showing that potable water with TDS lower than 500 mg/l could be obtained with less than 2.5 kwh/m³
- ▶ Minimum bottom threshold for power requirements for SWRO is 1.2–1.5 kwh/m³

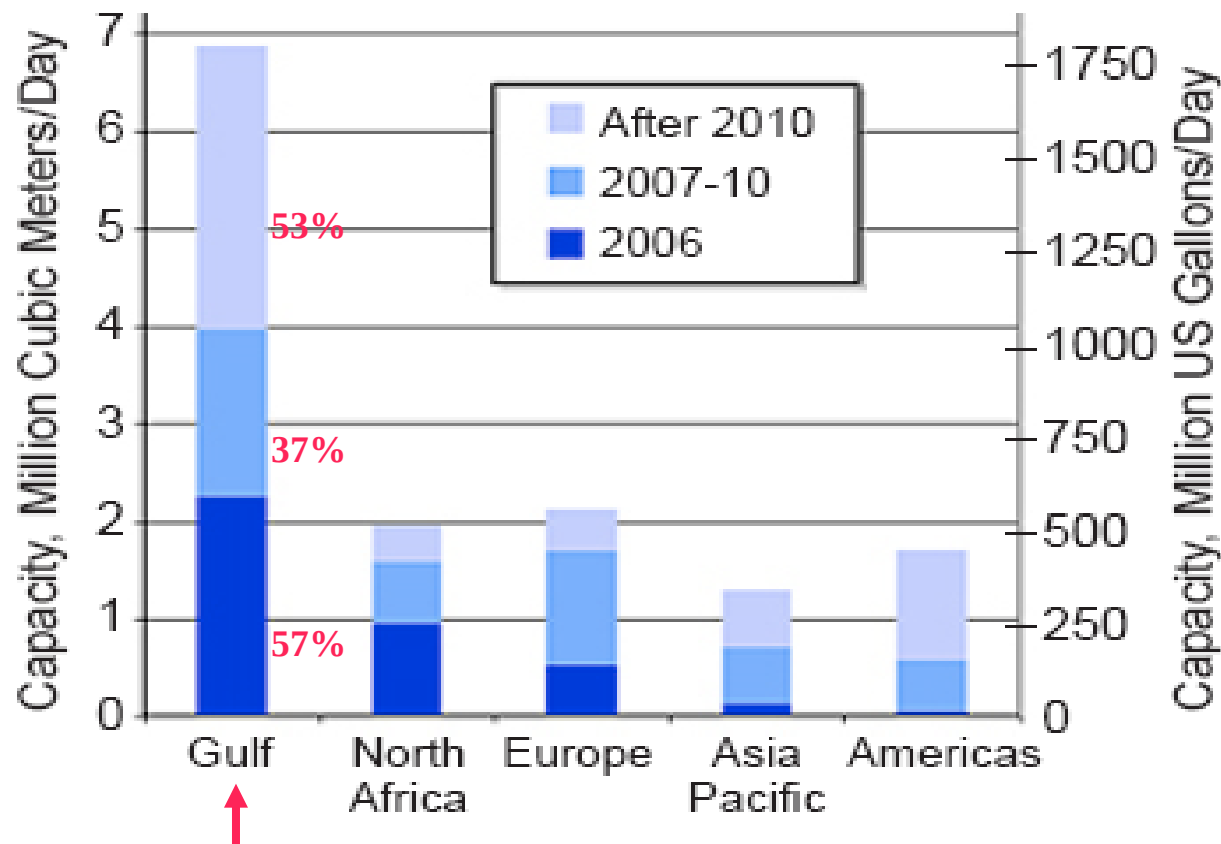
Sustainability and Innovation in Desalination: energy and carbon footprint



Sustainability and Innovation in Desalination : Thermal discharge

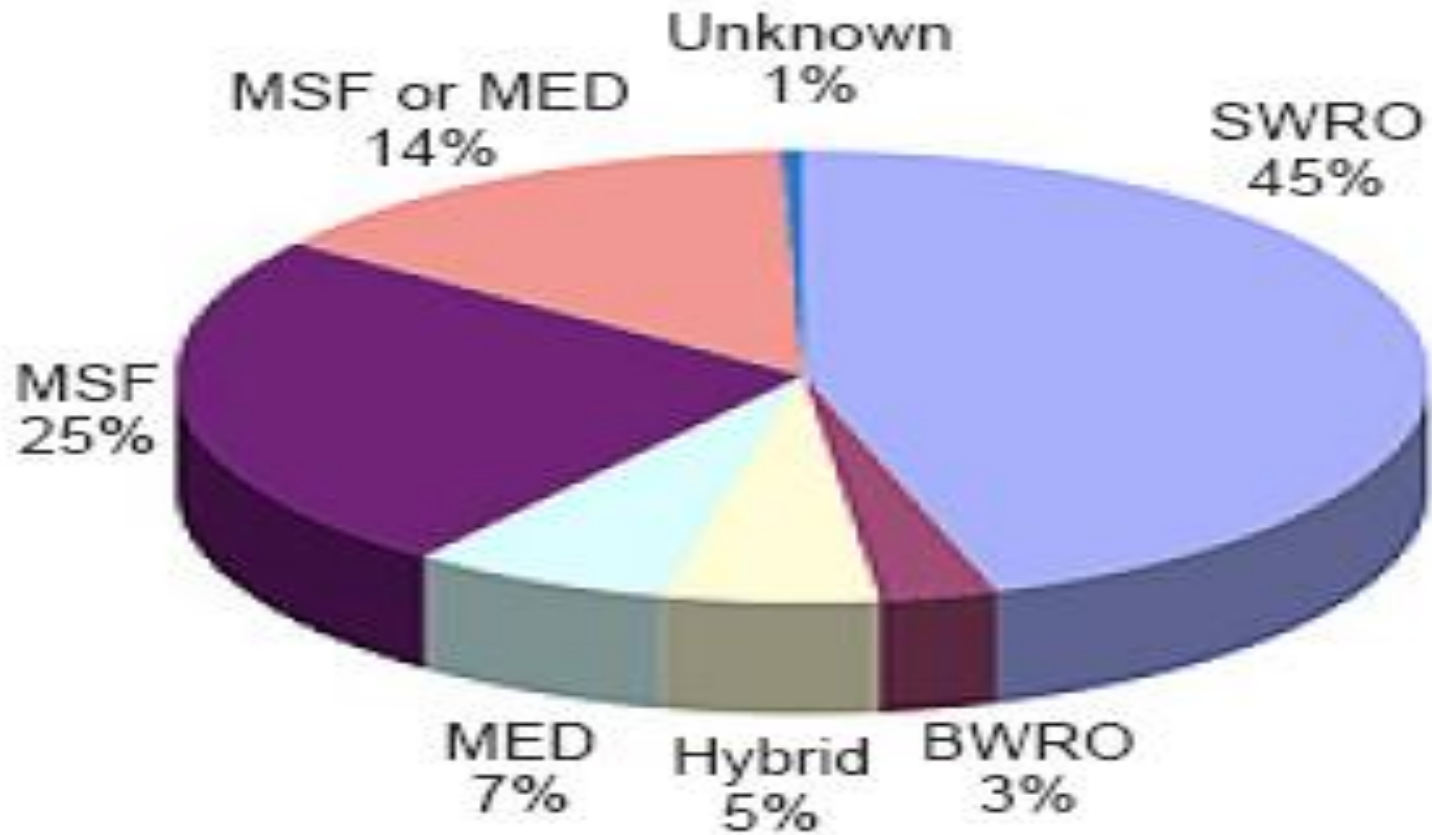


Forecast desalination capacity by region – future projects (2006–2010)*

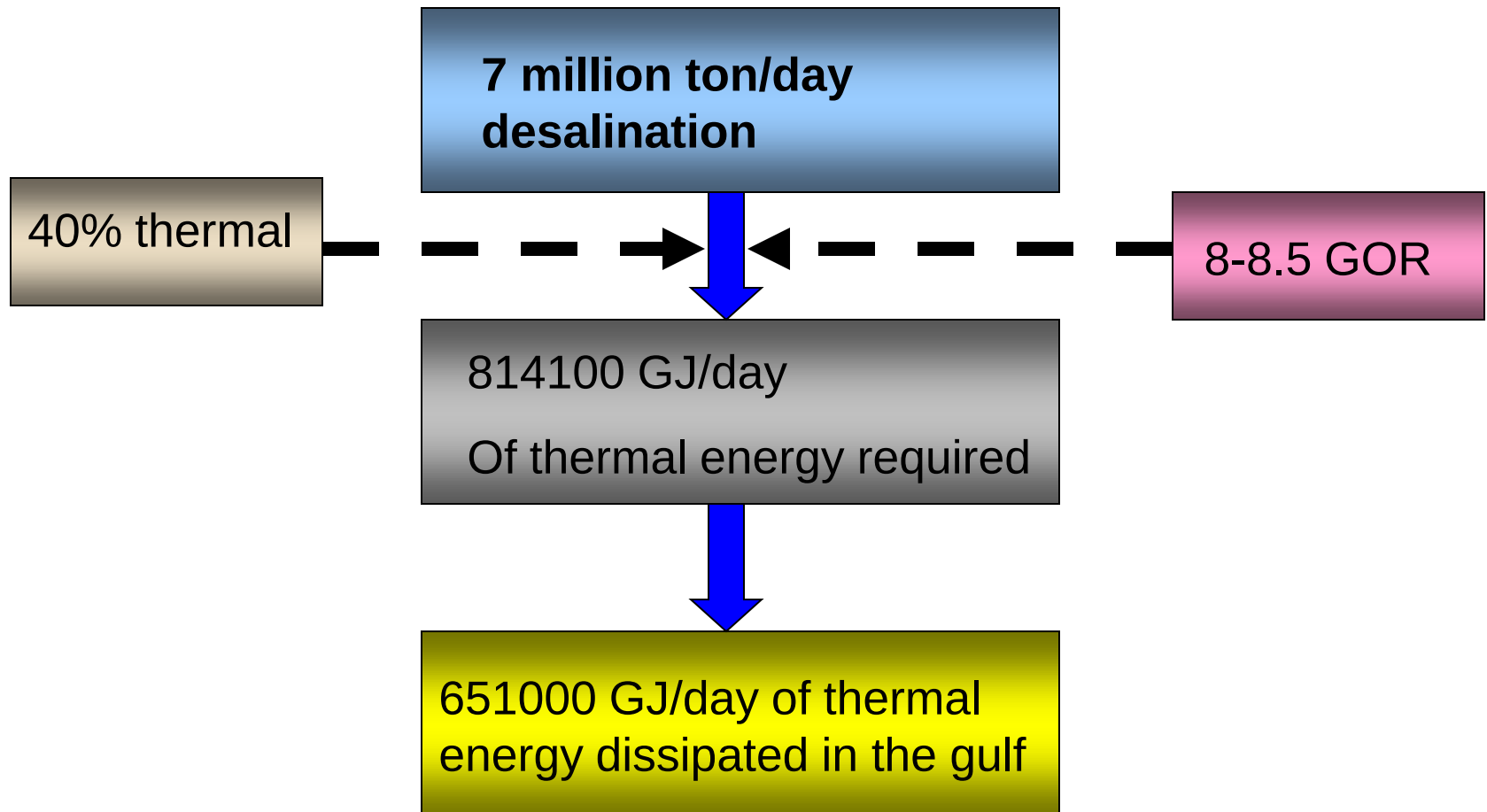


* Water Desalination Report

Forecast desalination capacity by region – future projects (2006–2010)*



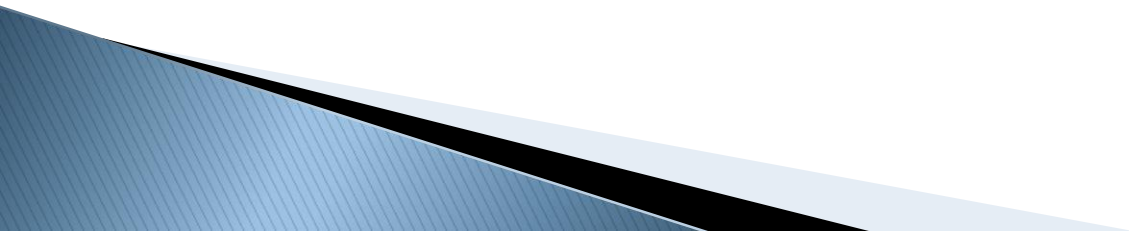
Sustainability and Innovation in Desalination : Thermal discharge



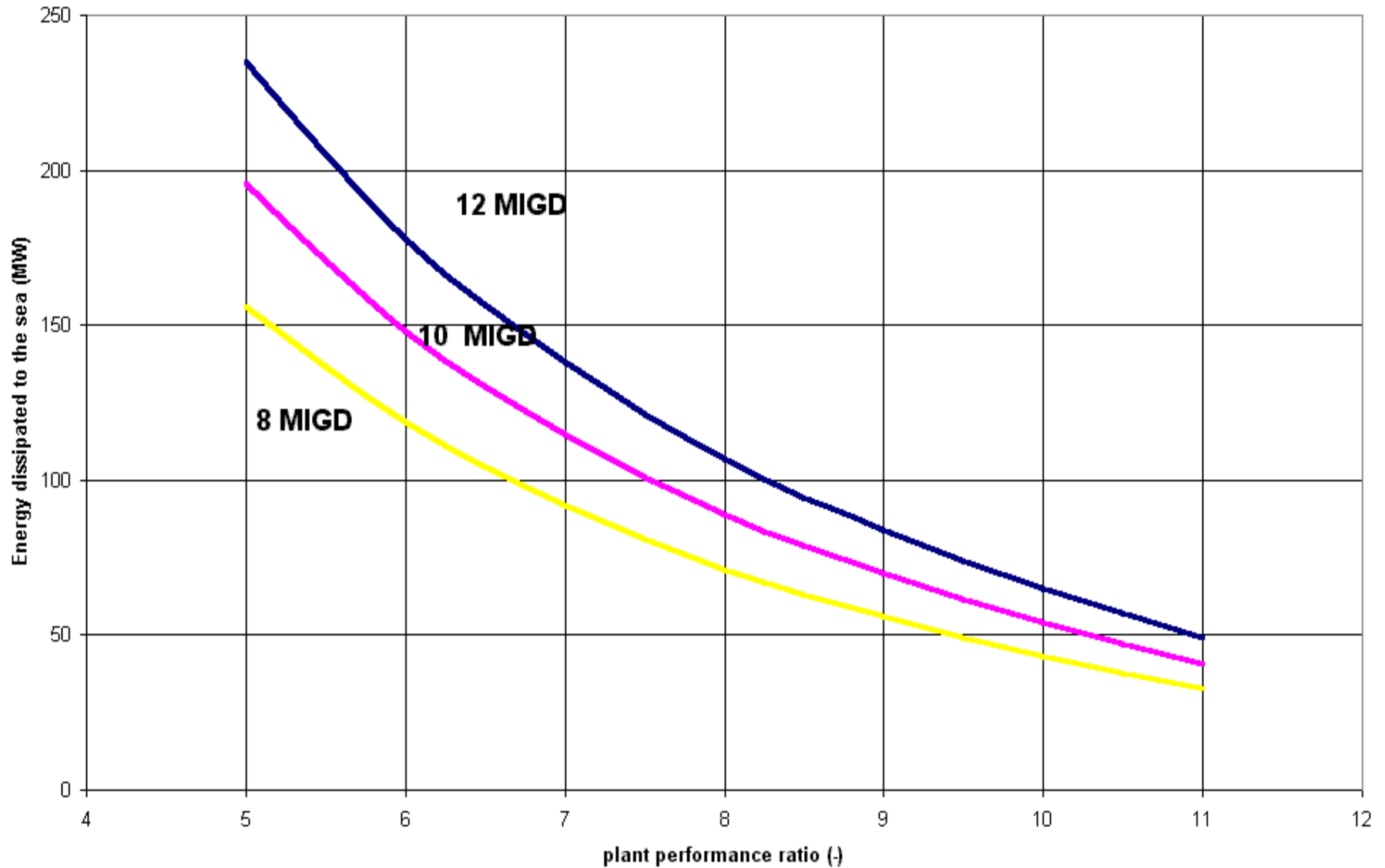
Is this really sustainable ?

What can be done in this respect ?

Optimise up-grade up-rate !!!!

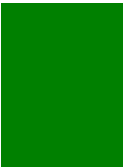


Sustainability and Innovation in Desalination : Thermal discharge





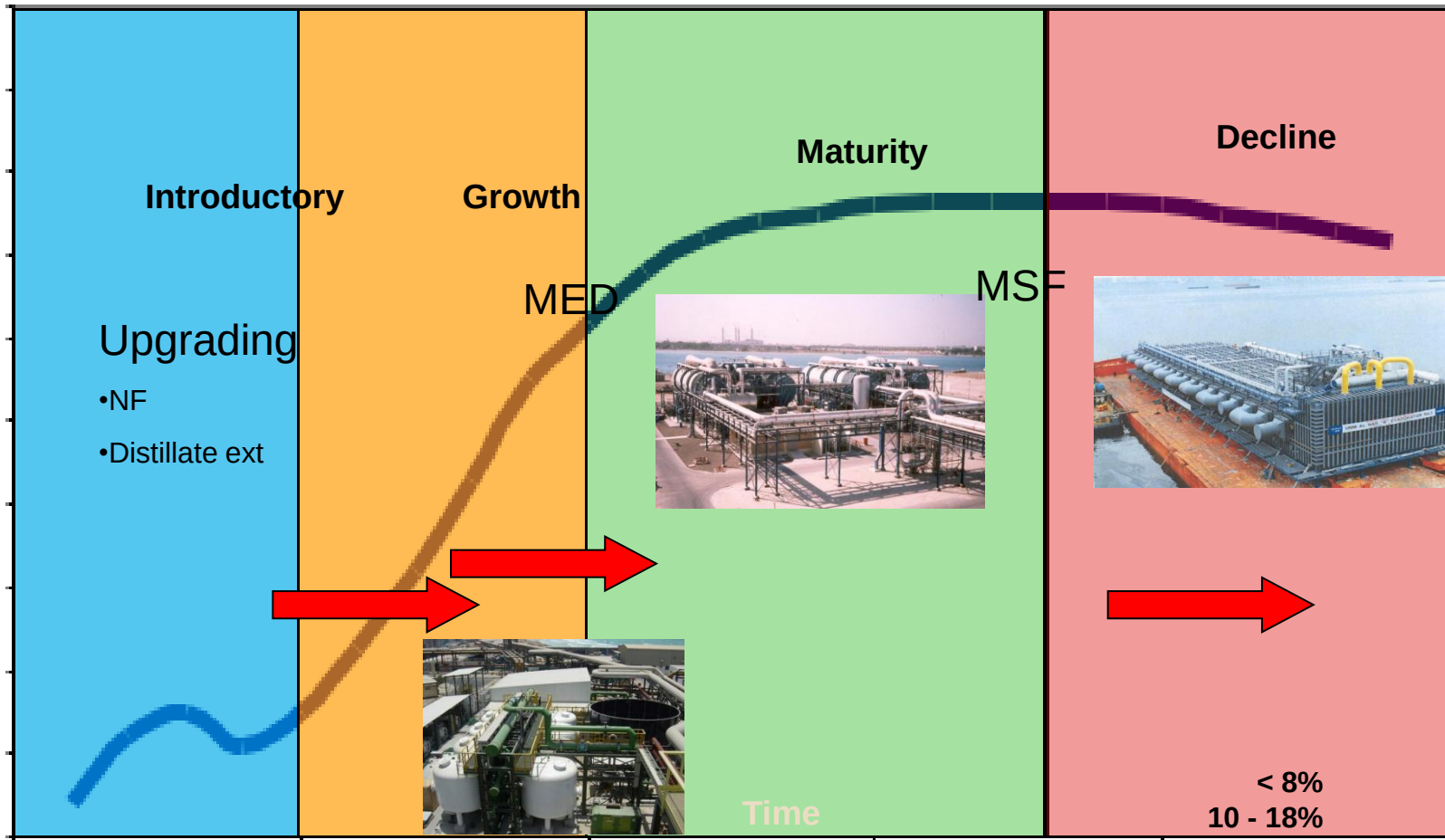
At a given discharge enthalpy and production plant efficiency sharply decrease the heat dissipated to the sea



At high efficiency the difference between the heat dissipation with increasing plant size decrease

Sustainability and Innovation in Desalination : Thermal desalination

Thermal desalination evolution

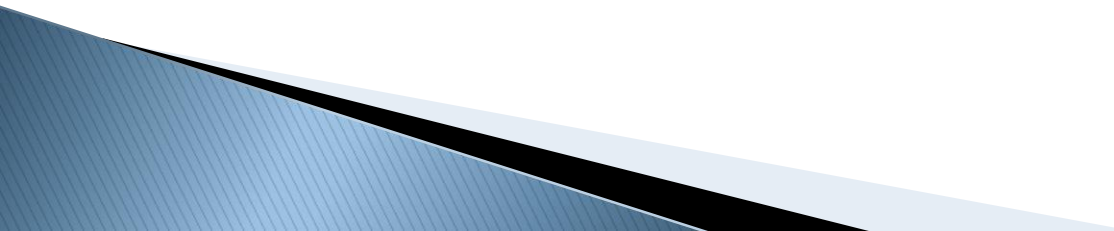


Cost of Sales: 20%
Margin: 35%+

12 - 20%
24 - 35%

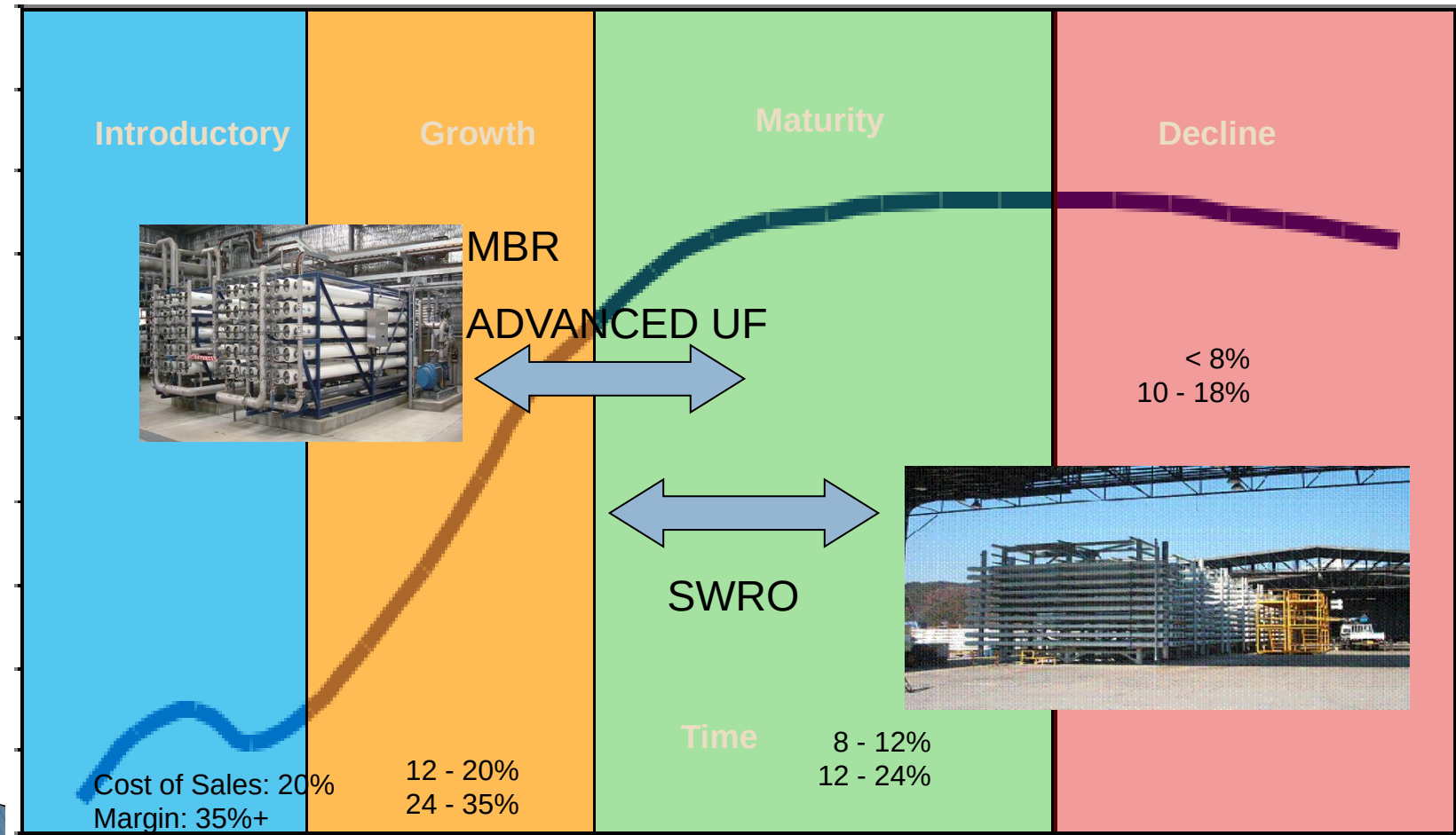
8 - 12%
12 - 24%

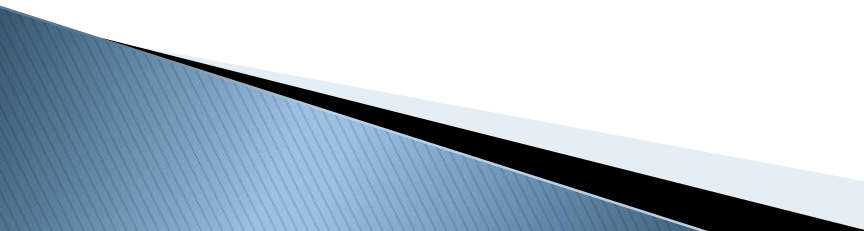
Sustainability and Innovation in Desalination : Thermal desalination

- ▶ Unit size increase : economy of scale
 - ▶ Material selection : Longer life of the assets
 - ▶ Reliability and availability factors
 - ▶ Thermodynamic design
 - ▶ MED desalination thermo-compressor design
 - ▶ MED-MSF extraction
 - ▶ Increased operating temperature
 - ▶ Matching
- 

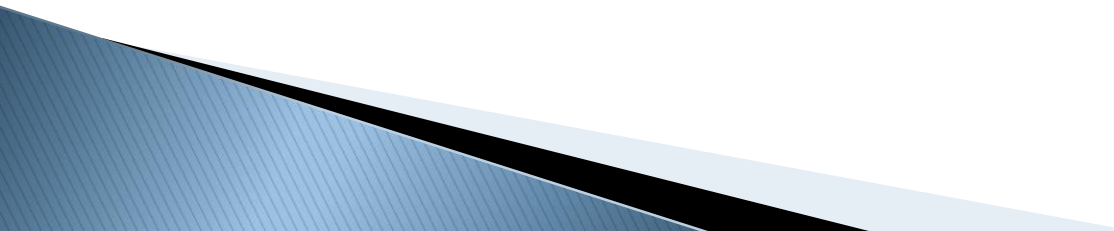
Sustainability and Innovation in Desalination : SWRO desalination

SWRO and advanced WWT evolution potential



- ▶ Energy recovery : lower energy input
 - ▶ Membrane development :
 - Large size membranes
 - Lower pressure membranes
 - Costing
 - ▶ Reliability and availability factors
 - ▶ Process configuration (pressure centre etc)
 - ▶ Ultra filtration
 - ▶ Matching
- 

Conclusions

- Energy footprint is one of major sustainability challenge for desalination technology
 - The future of water demands creative solutions. It requires effective innovations and integration of energy resources to generate power and to economically create and store desalinated water This is essential to a country's sustainable development and to the security of its communities.
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