



Holding Company for water & wastewater

giz Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH



Unconventional Water Resources in Egypt

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Head of technical support and planning sector
HCWW

Presentation Outline

- ✓ **Challenges Facing the Water Sector In Egypt.**
- ✓ **General Information About HCWW**
- ✓ **Water Production from different water sources in Egypt**
- ✓ **Uncoventional Water supply (related to drinking water|)**
- ✓ **Overview on water supply for Northern Coast**
- ✓ **Desalination projects planned till 2037 in Egypt**
- ✓ **Water desalination Roadmap**

Challenges facing Water & Sanitation sector

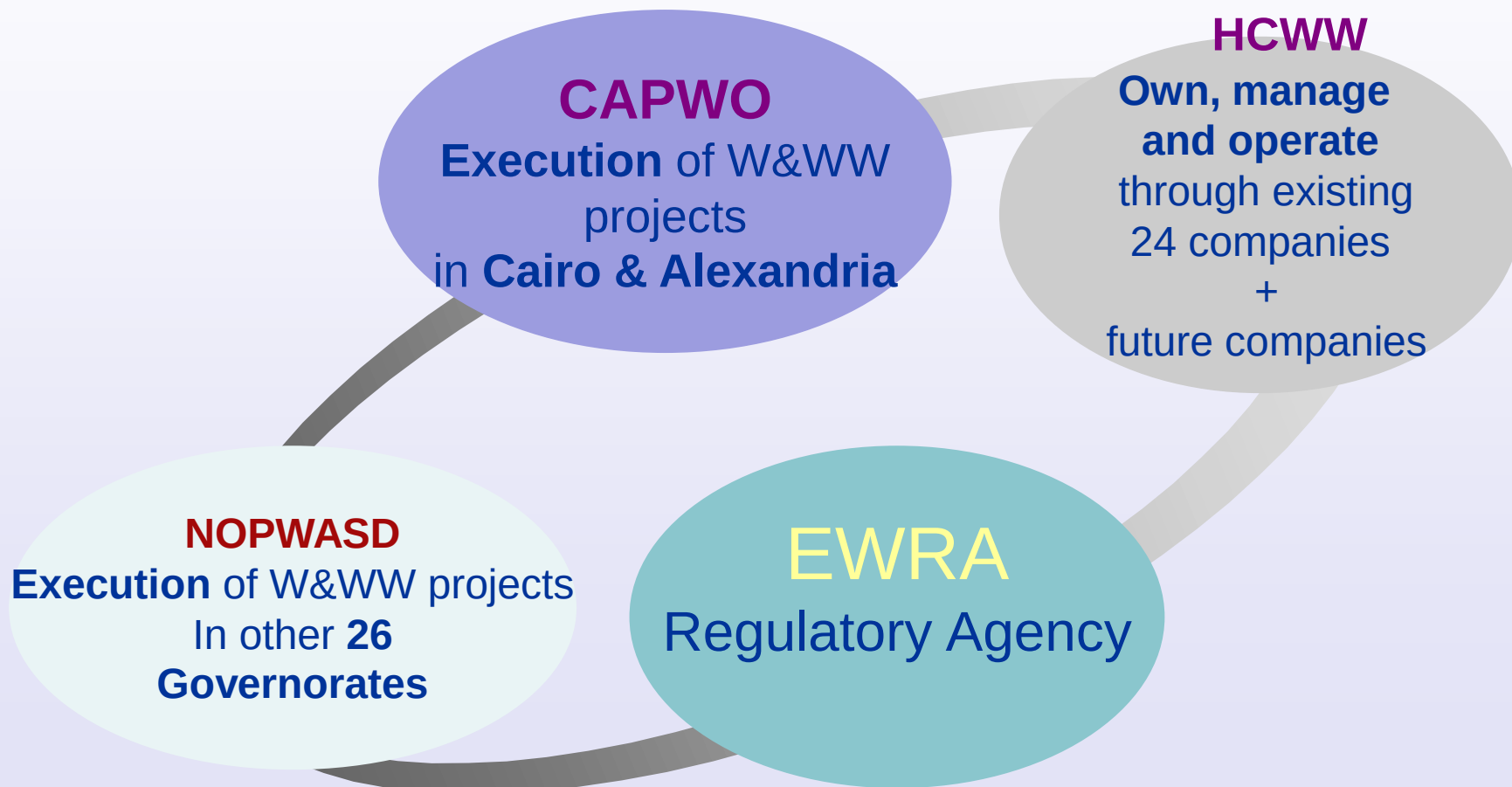
Financial & Institutional Problems

1. Low Tariff.
2. Lack of Public Awareness.
3. Lack of Coordination between different Authorities.

Technical Problems

- The Inefficient Water & Wastewater Networks.
- Small Capacities of the WWTP.
- Over Staffed Unskilled Labors.
- Lack of New Technologies.
- Inadequate Operation & Maintenance Plans.
- Lack of Master Plan in Governorates.
- Absence in Plans to Preserve Sector Investments.

Stakeholders



General Information About HCWW

Item	Existing situation
HCWW Service Scope	24 Governorates
No. of Affiliated Companies	24 companies
No. of connections	11 million
Served Population No.	83 Million Capita
No. of HCWW Employers	126000 Employees

General Information About HCWW

Item	Existing situation
Water Production	25 million m ³ /day
Treated Sewage	9.6 million m ³ /day
No. Of WTPs	200 WTP Above 17000m ³ /d, 801 WTP Under 17000, 1580 Artesian, 31 Desalination Plant
No. Of WWTPs	357 WWTPs
Total Length Of Water Networks	146000 Km
Total Length Of Waste Water Networks	39000 Km

Strategic Goals

Provide excellent service for customers

Safeguard and develop infrastructure

Upgrade company performance standards

Upgrade citizen awareness of water issues.

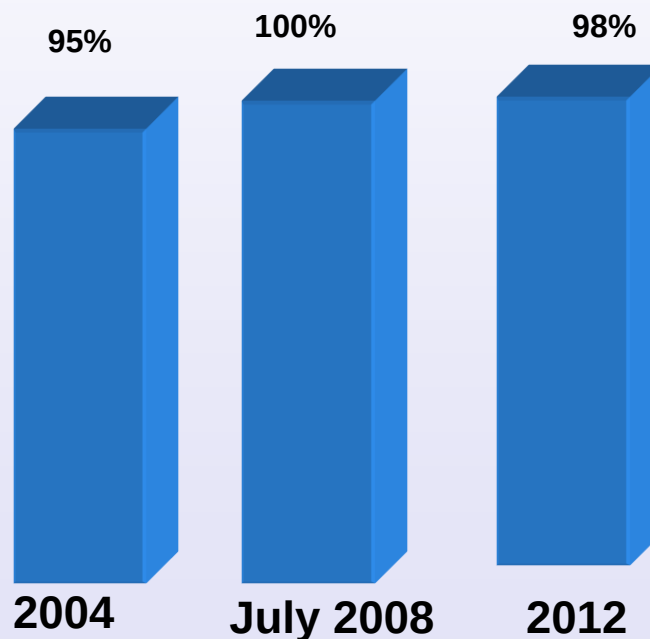
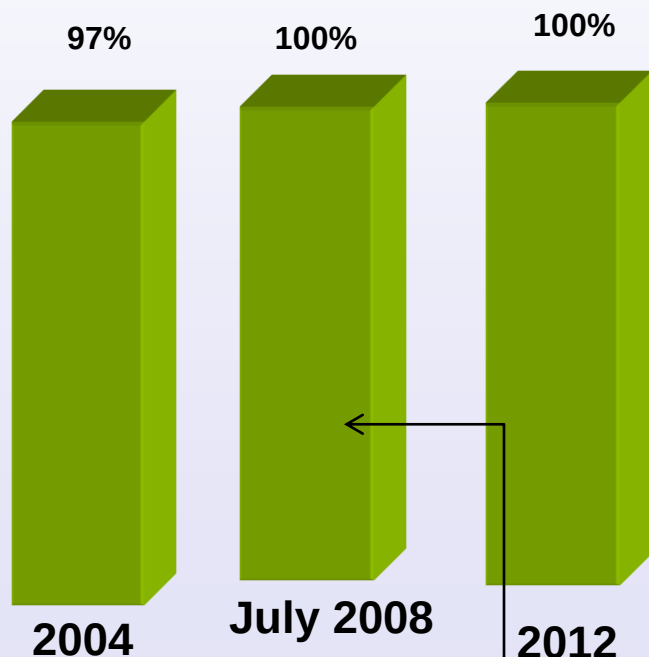
Develop leaders and staff

Achieve financial autonomy

Water Coverage Percentage All Over Egypt

Cities(217)

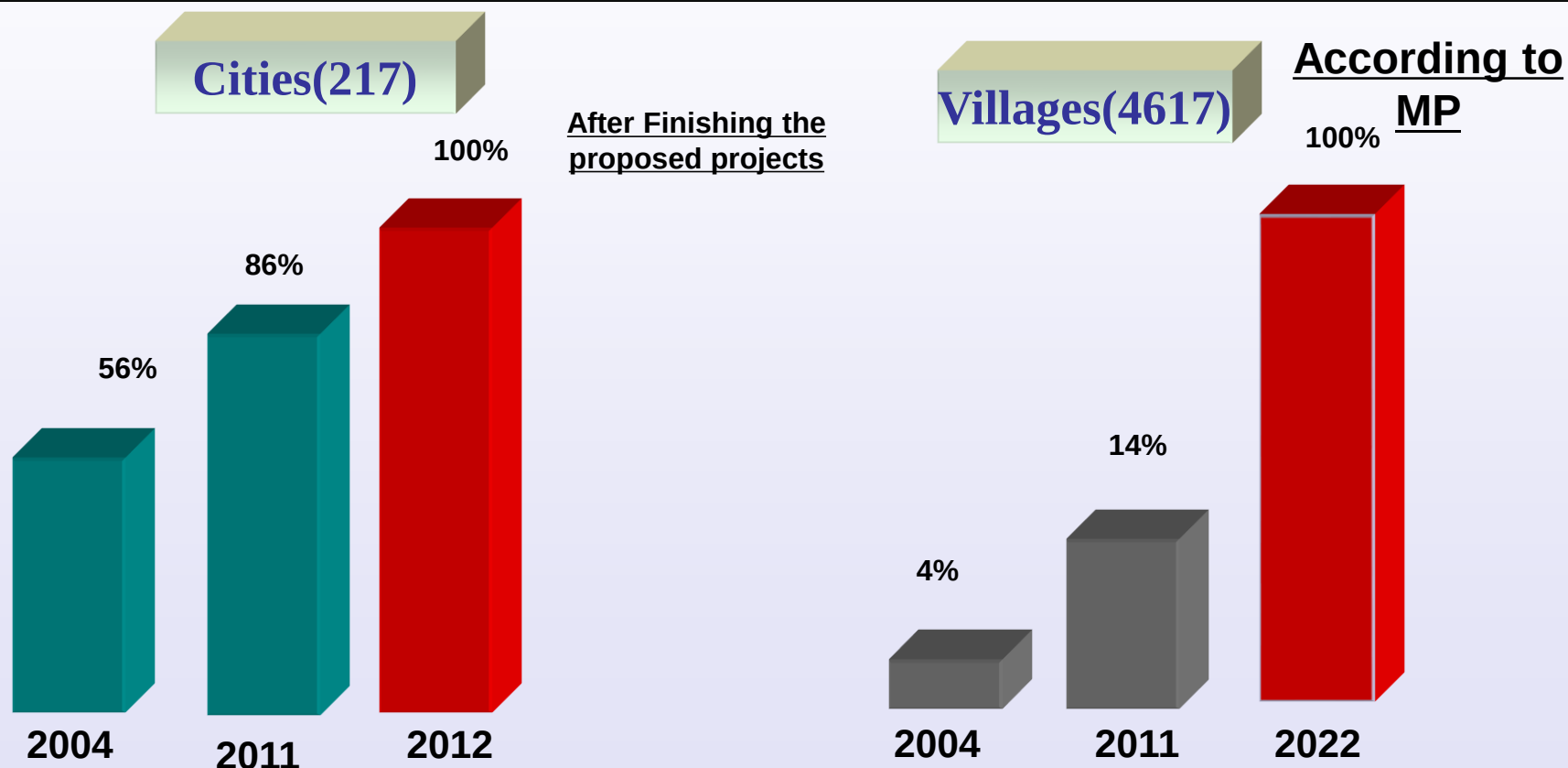
Villages(4617)



No. of served Pop.25 Million Capita

- 2 unserved Complexes
- 7.5 served complexes (shifts)
- 15.5 complexes need service improvement

Wastewater Coverage Percentage All Over Egypt



No. of Non-Served Cities = 47 Cities

Results of the Reform

1. Decentralization of the decision making
2. Setting Master plan to get a clear vision for future
3. Investment & rehabilitation plans
4. Improvements in O&M
5. National Wastewater Strategy
6. Utilizing un-conventional water resources
7. Improving the produced water quality
8. Building the capacity of the staff
9. Technical Secondary Schools for Water and Wastewater

Better Governance....!

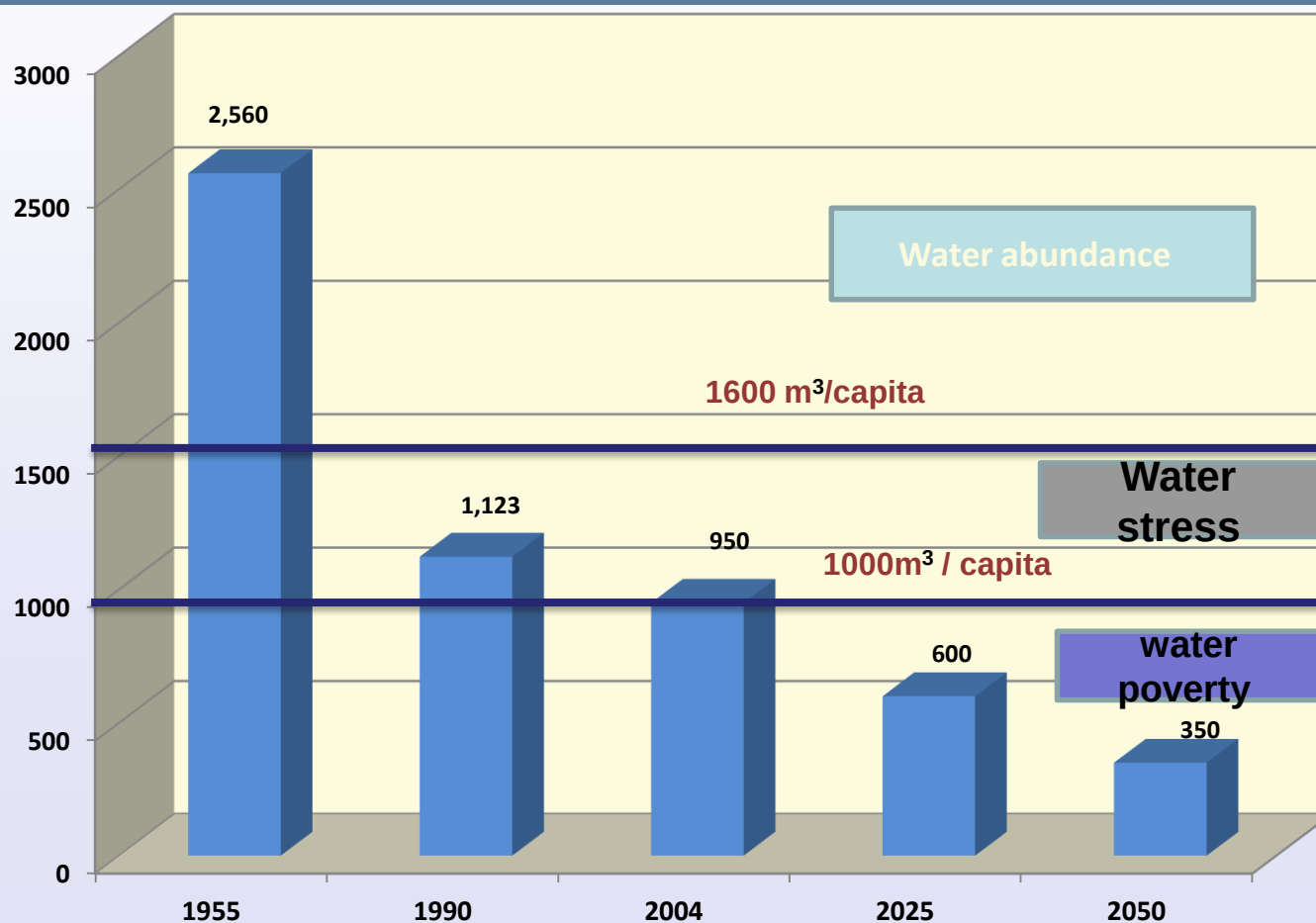
Challenges Facing the Water Sector

Challenges facing water resources development in Egypt:

- Rapid growth and unbalanced distribution of the population
- Rapid urbanization
- Water quality deterioration
- Government's policy to reclaim new land
- Unsustainable water use practices

These constraints developed a situation which places higher demand on water resources far exceeding the available supply and are imposing limits on the economic development of the country

The expected water share per Capita Till 2050 (in case of constant resources)



Amount of Water Produced By different sources in Egypt

River Nile

WTPs

**Total amount 18.15
million m³/day**

**82.1 % from total
amount**

Artesian Plants

**Total amount 3.791
million m³/day**

**17.14 % from
total amount**

Sea Water

Desalination

**Total amount 0.166
million m³/day**

**0.76 % from total
amount**

In order to face these challenges the following must be considered:

***Optimize* the use of unconventional sources of water:**

1. ***Desalination***
2. ***Wastewater Reuse***
3. **Rain harvesting**
4. **Ground water**



1-Water Reuse in Egypt

Existing Situation For Water Reuse In Egypt

Shortage In Water Demand

Water uses	Water requirements [billion m ³ /year]	
	1997	2017
Agriculture	58.65	67.5
Municipal use	4.75	6.7
Industry	7.5	18.7
Fishery	1.3	0.6
Navigation	0.2	0.2
Total	72.4	93.7

Water Reuse For Substituting Water Demand Shortage

- **Sewage Water.**
- **Agricultural drainage water.**
- **Industrial Wastewater.**

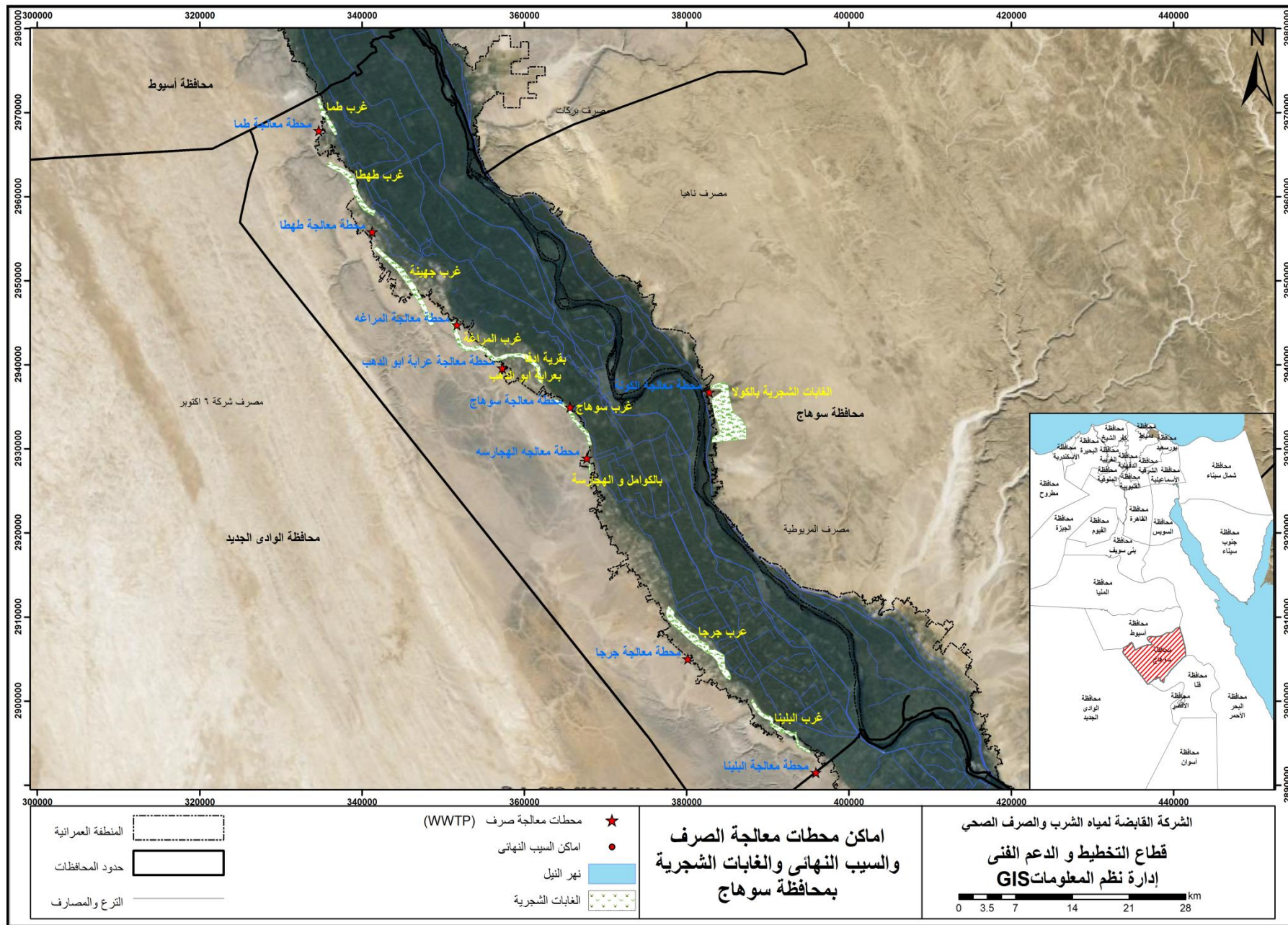
Egypt Water Requirements Egypt 2017

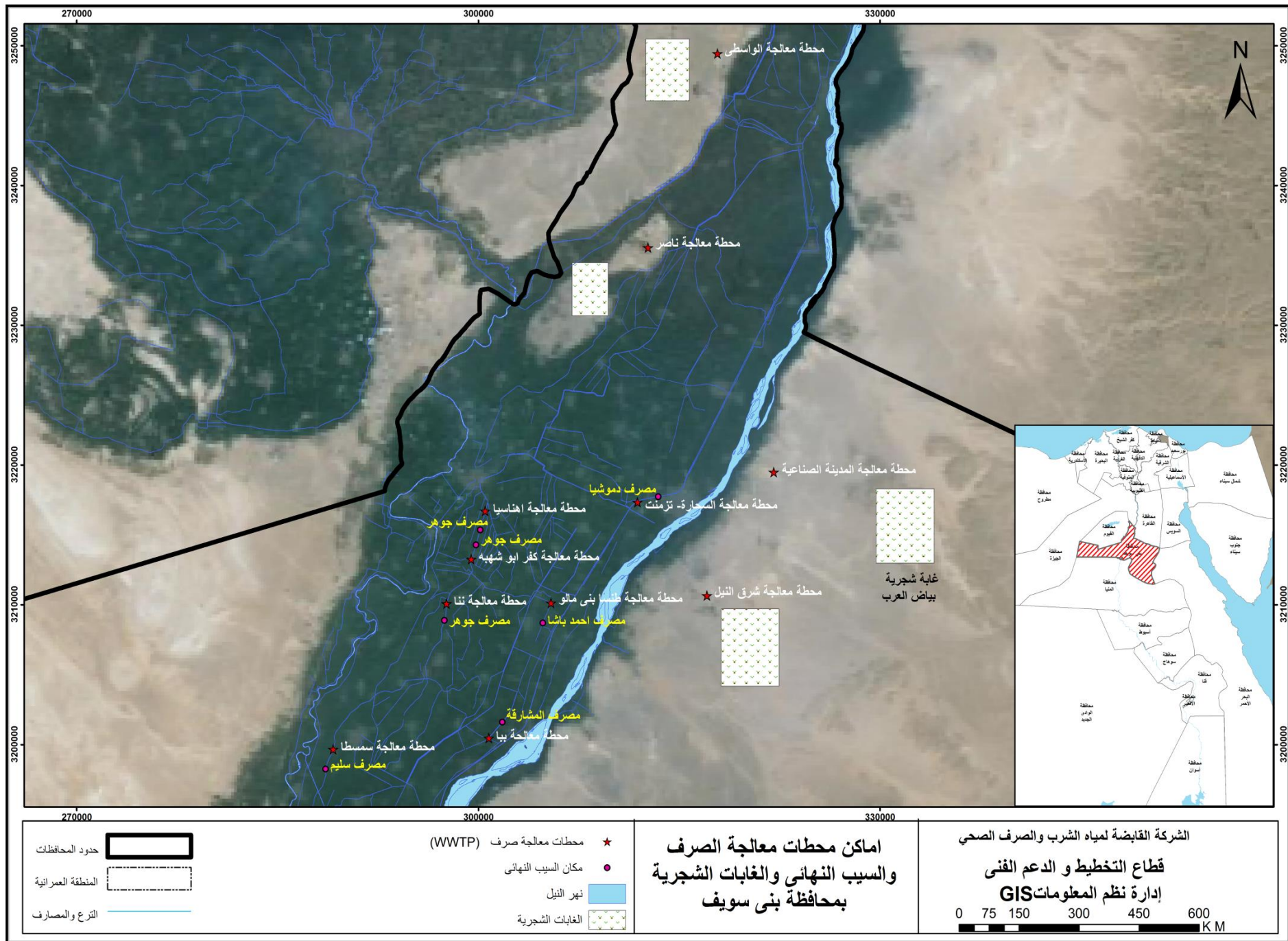
Ministry of Water Resources and Irrigation 2005, National Water Resources Plan for Egypt – 2017,

Water Reuse Roadmap

Contents

- Existing situation of the water reuse in Egypt.
- Water balance (Water Reuse For Substituting Water Demand Shortage)
- Laws & Legislations that regulates water reuse in Egypt
- Challenges that faces water reuse in Egypt
- Water reuse on the international level
- Future vision for water reuse in Egypt
- Recommendations



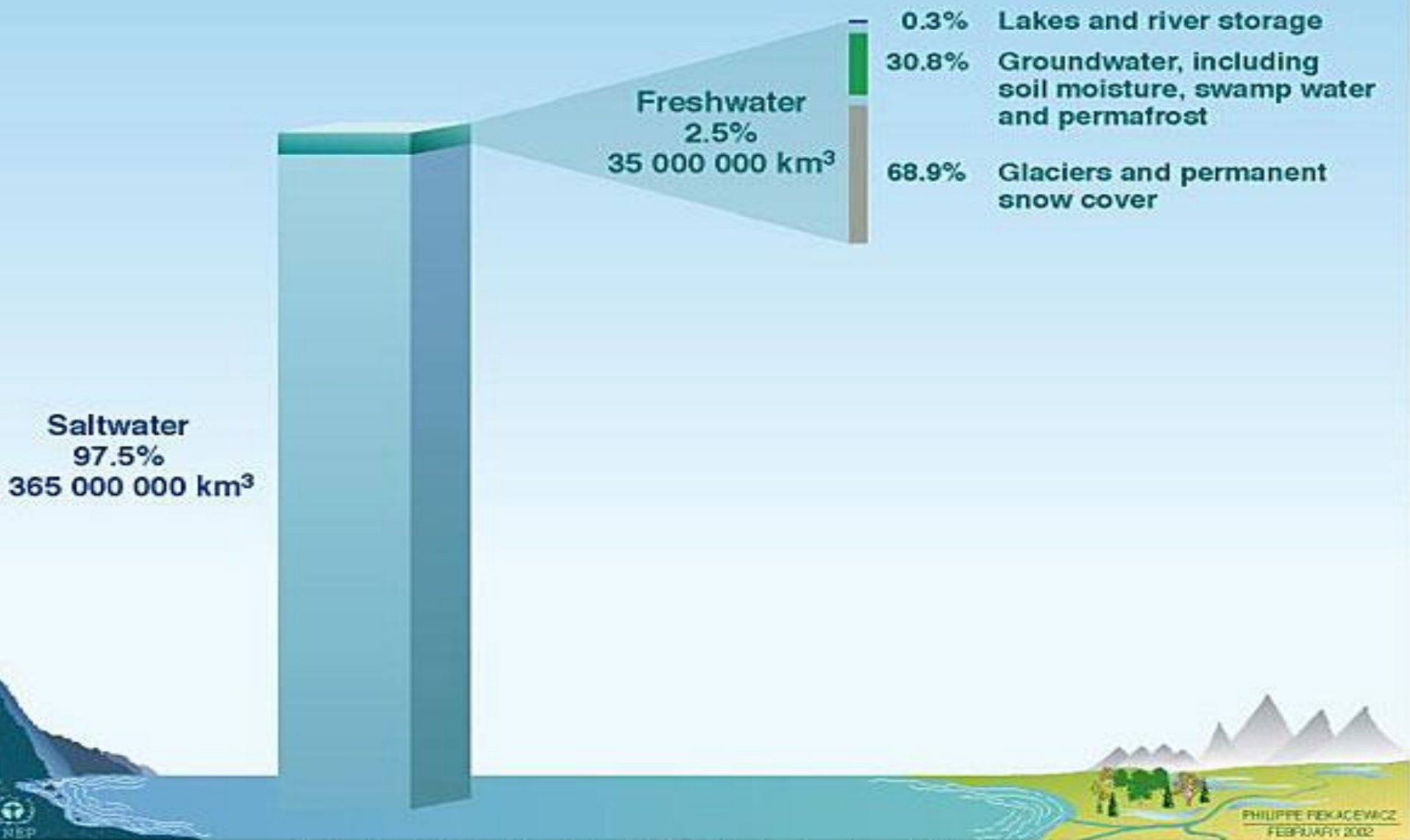


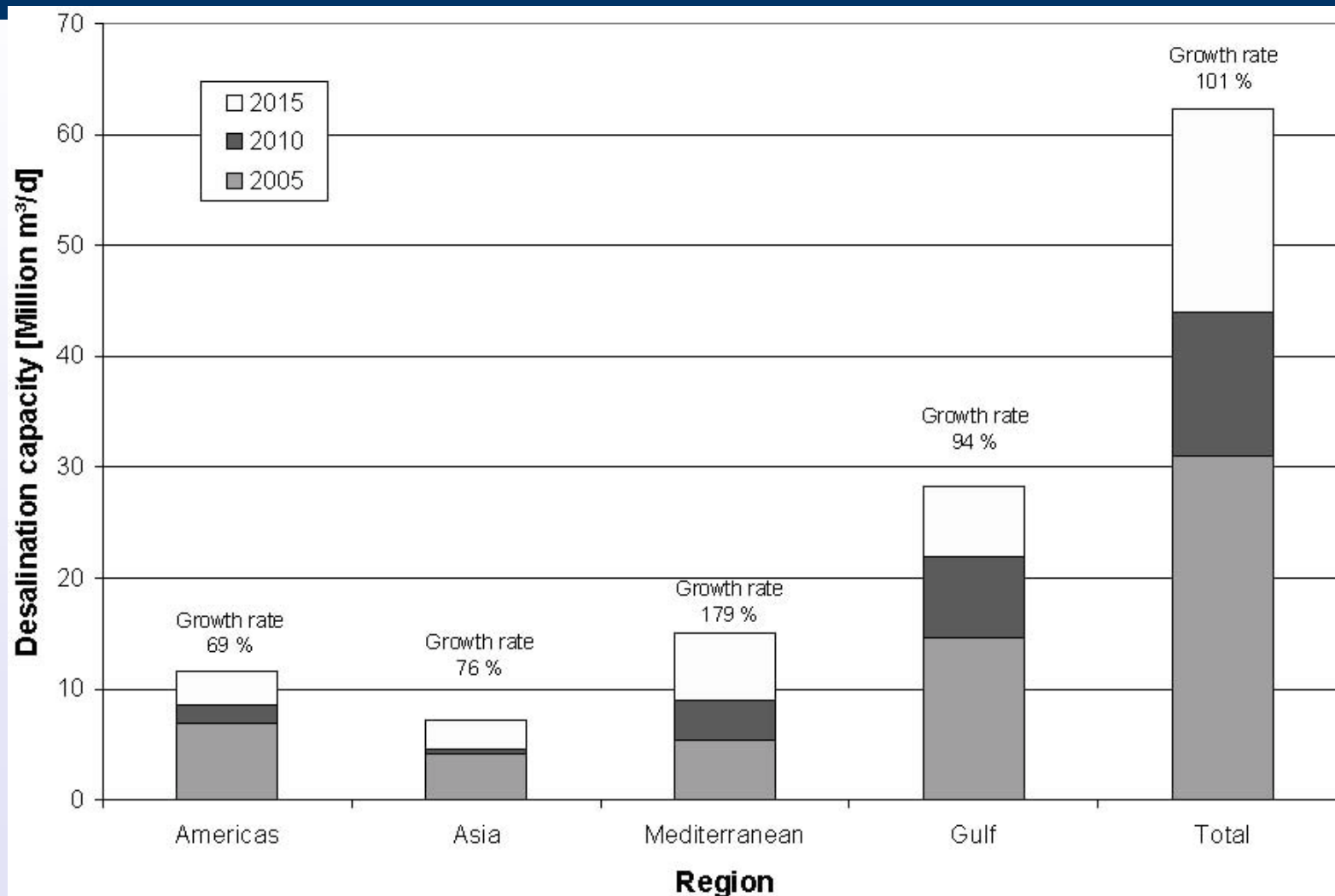


2-Desalination

A World of Salt

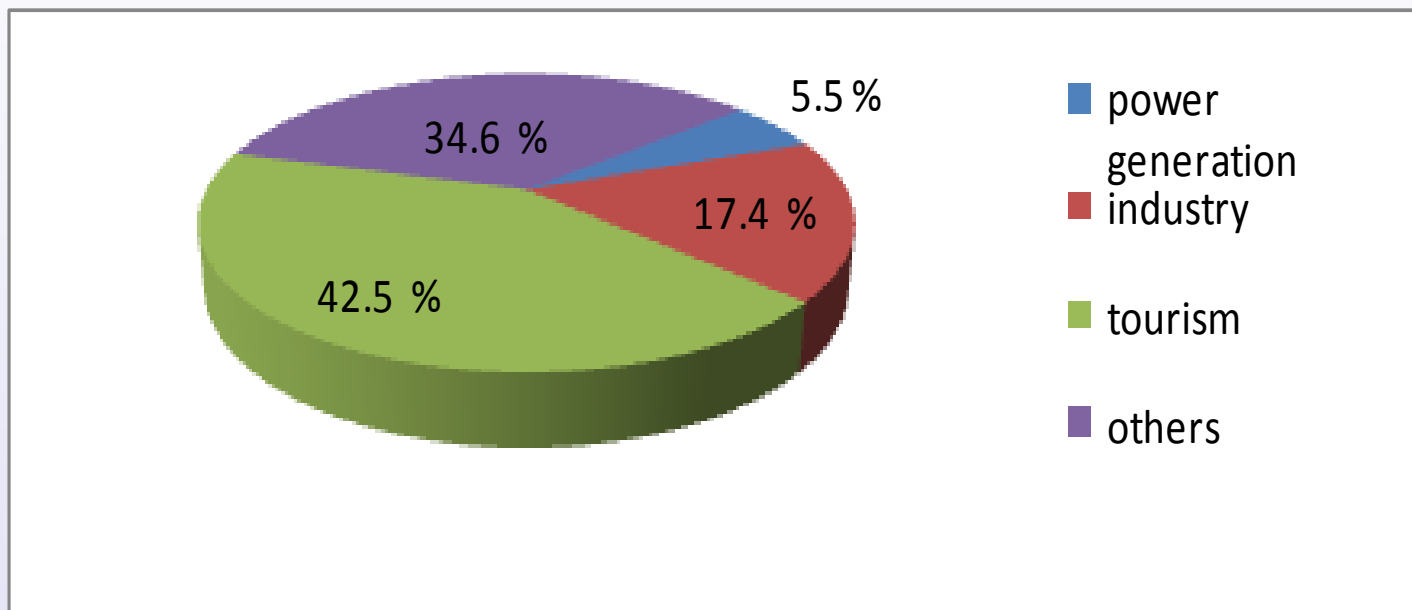
Total Global Saltwater and Freshwater Estimates





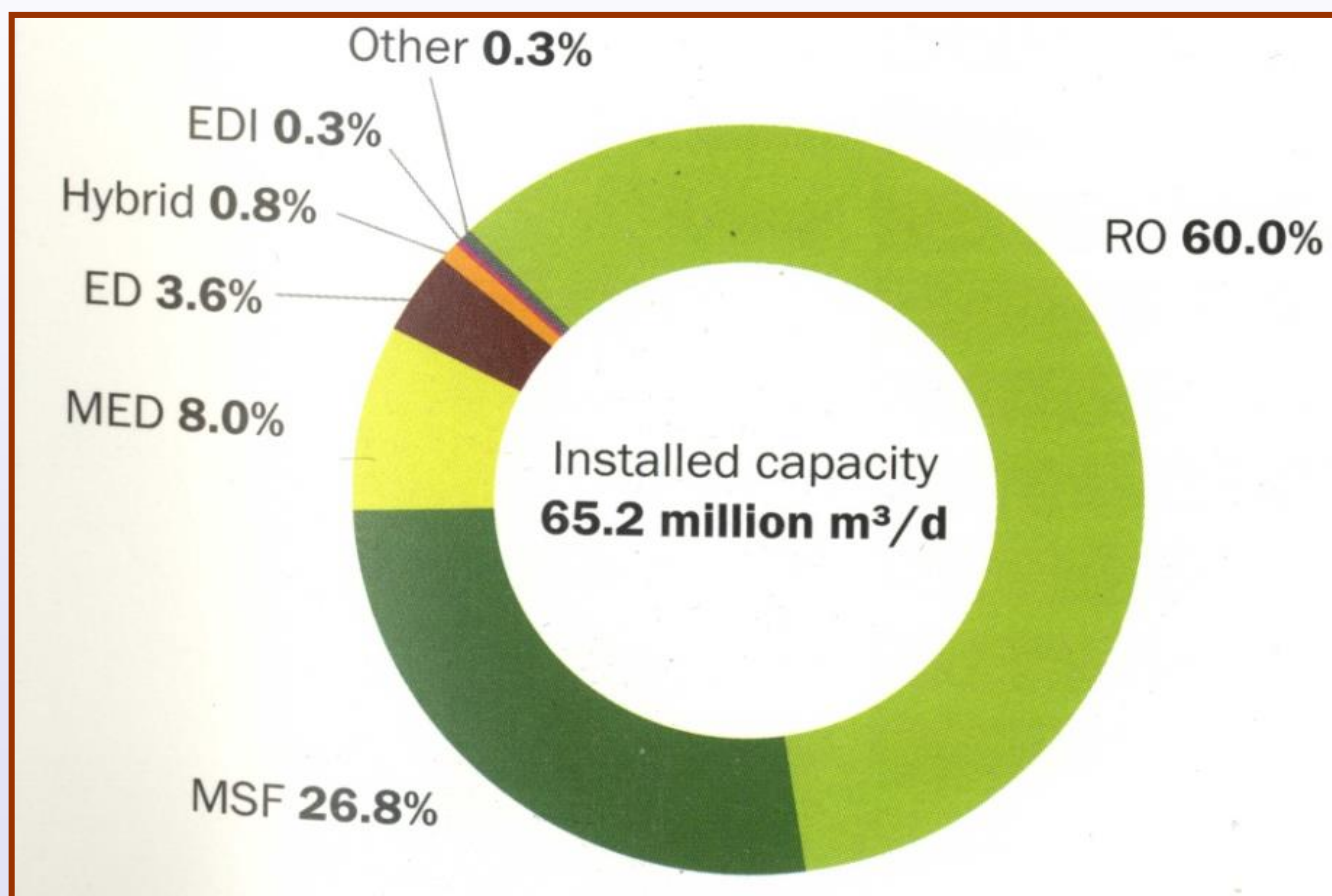
Expected growth of desalination capacities around the world

Desalination in Egypt

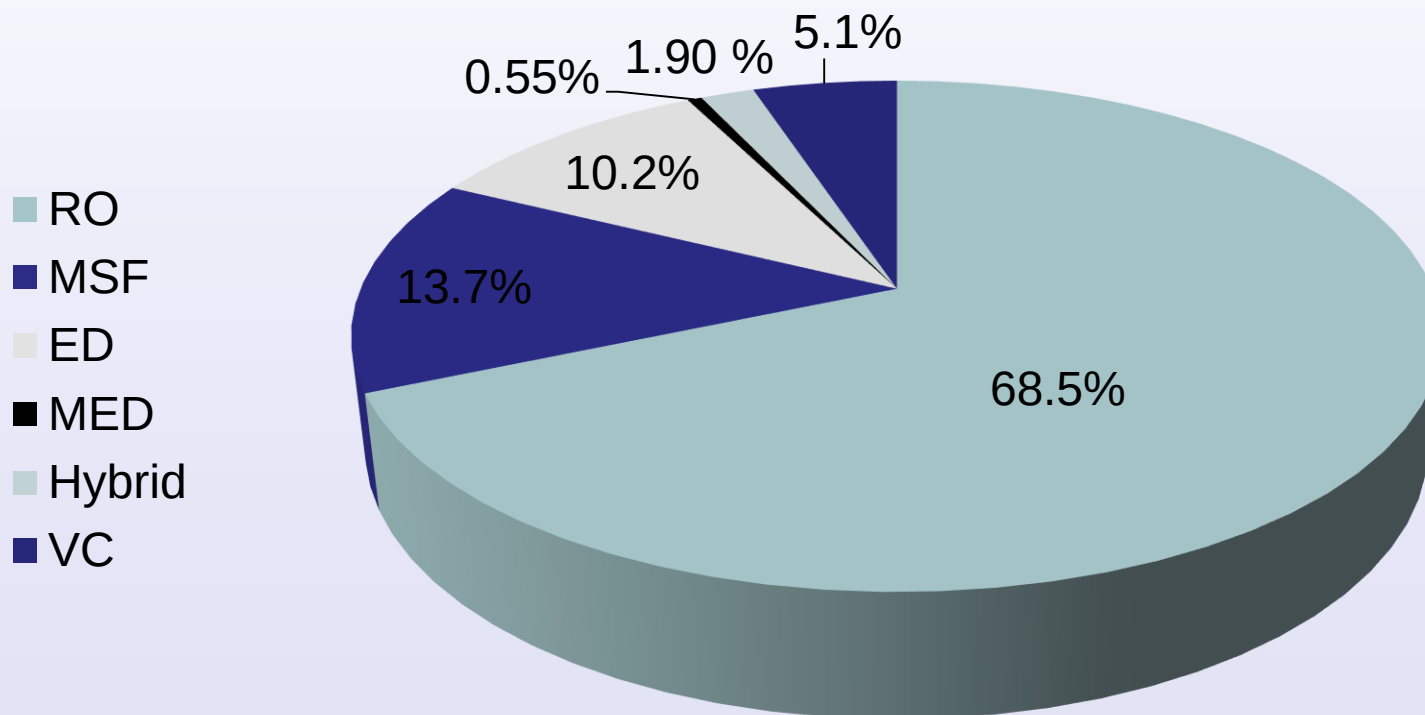


Most of desalinated water produced nowadays is used in tourism sector while industry and electricity generation uses 20 % of the total produced capacity.

Desalination technologies share across the world



Distribution of total capacity of desalination plants according to technologies in Egypt







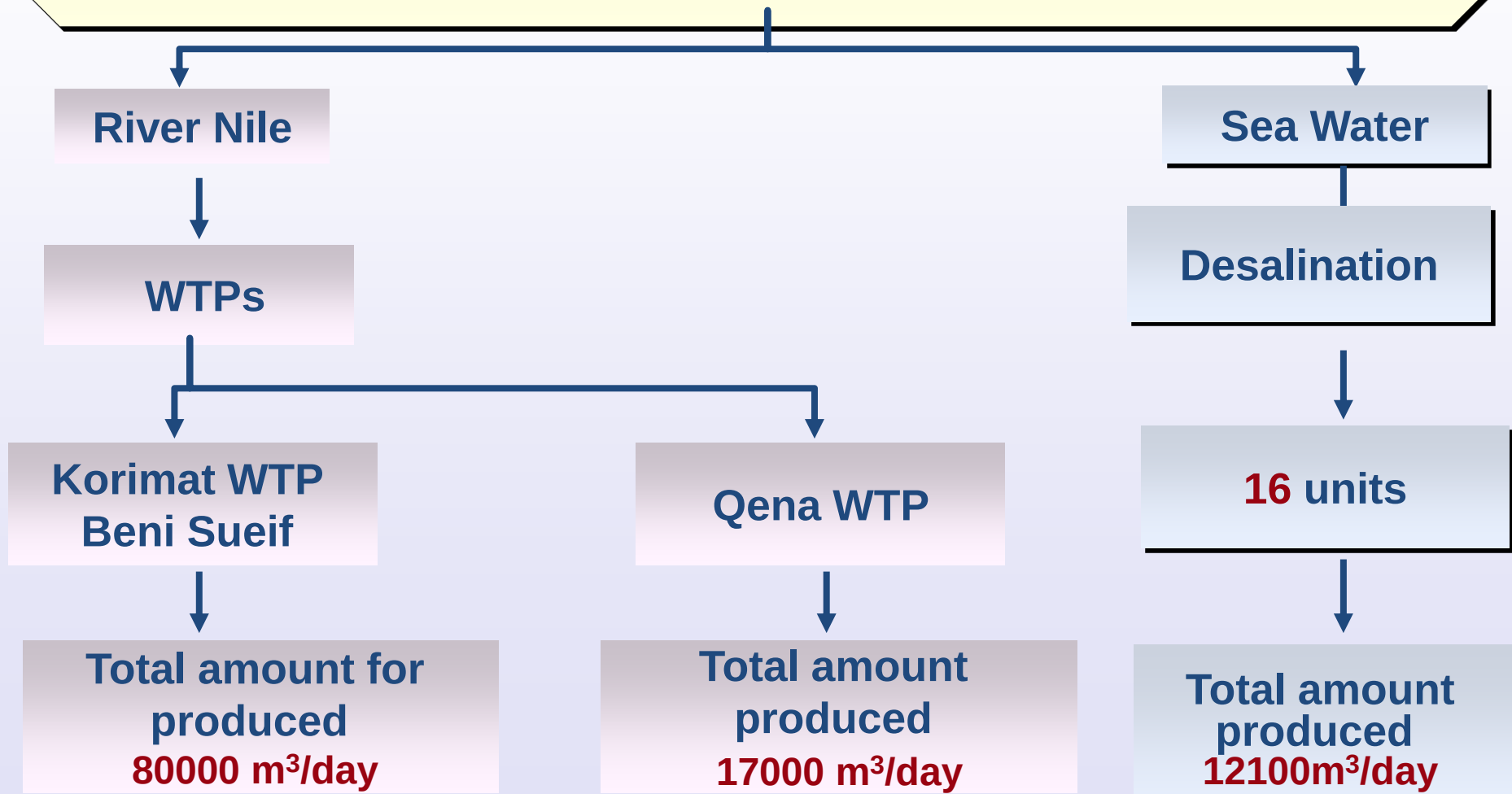
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**Water supply in Red sea Governorate,
(existing plants, planned projects).**

Amount of Water Produced By different sources in Red Sea Governorate

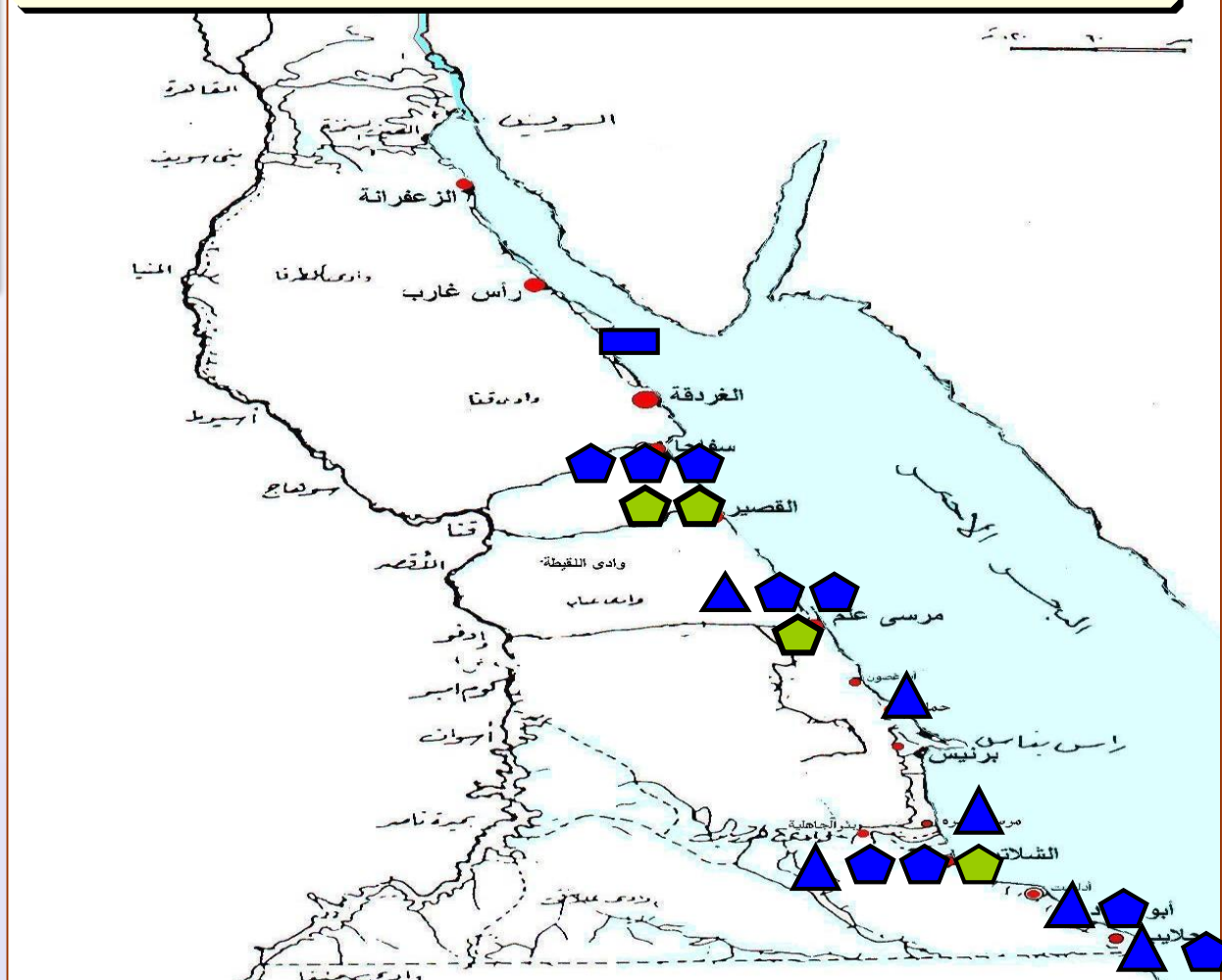


-  Desalination unit 100m³/d
-  Desalination unit 500m³/d
-  Desalination unit 4000m³/d
-  Desalination unit under construction

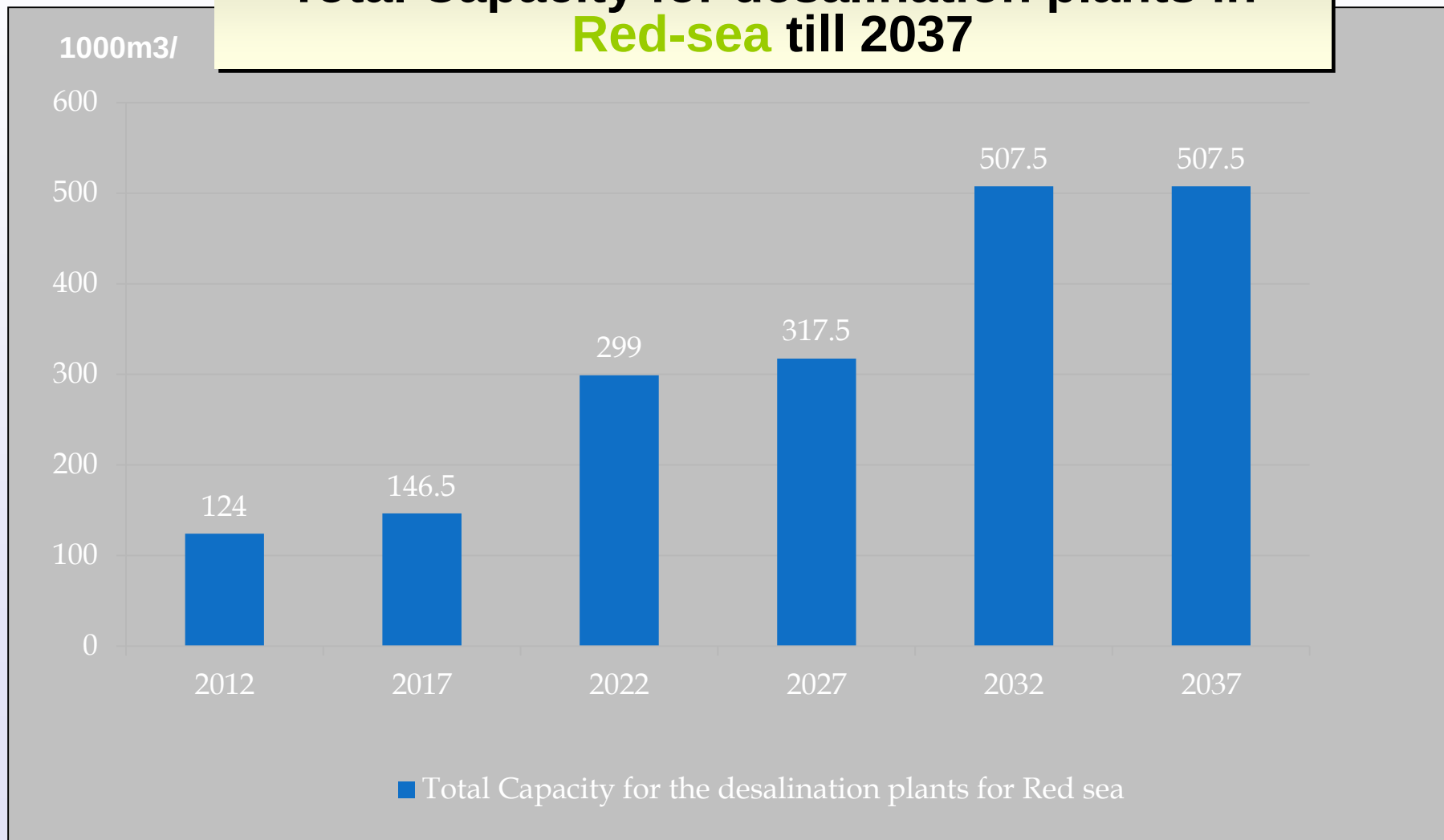
8 Desalination plants

**Total amount
produced
12100m³/day**

Existing Desalination Plants in Red sea Governorate



Total Capacity for desalination plants in Red-sea till 2037



Existing Desalination Plants in Red sea Governorate



Qusair desalination plant (4500 m³/day)

Existing Desalination Plants in Red sea Governorate



Qusair desalination plant (3000 m³/day)



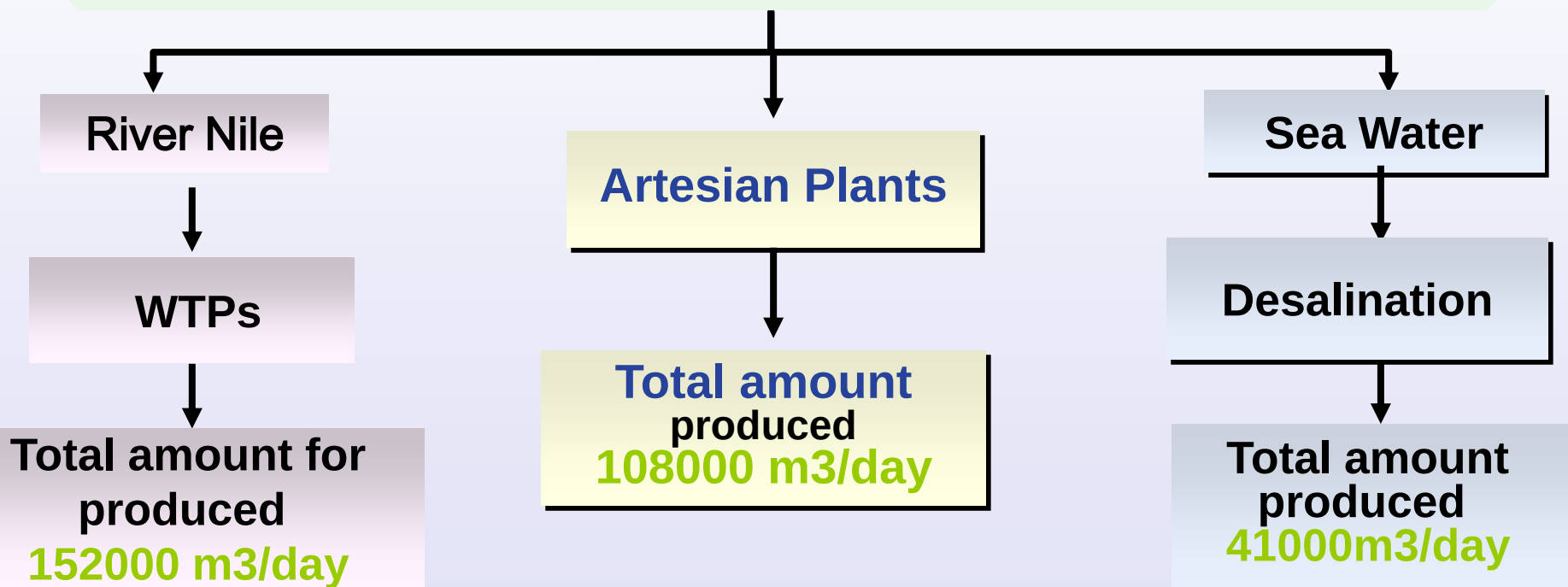
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**Water supply in North and South Sinai
(existing plants, planned projects).**

Amount of Water Produced By different sources in Sinai (North & South)



بحر الابيض المتوسط

North Sinai

الشيخ زويد العريش

El -Arish

Rafah

sheikh
zewayed

محطة تحلية مياه أبو عجيلة

محافظة شمال سيناء

القسيمة

محطة تحلية مياه الحصنة

الحصنة

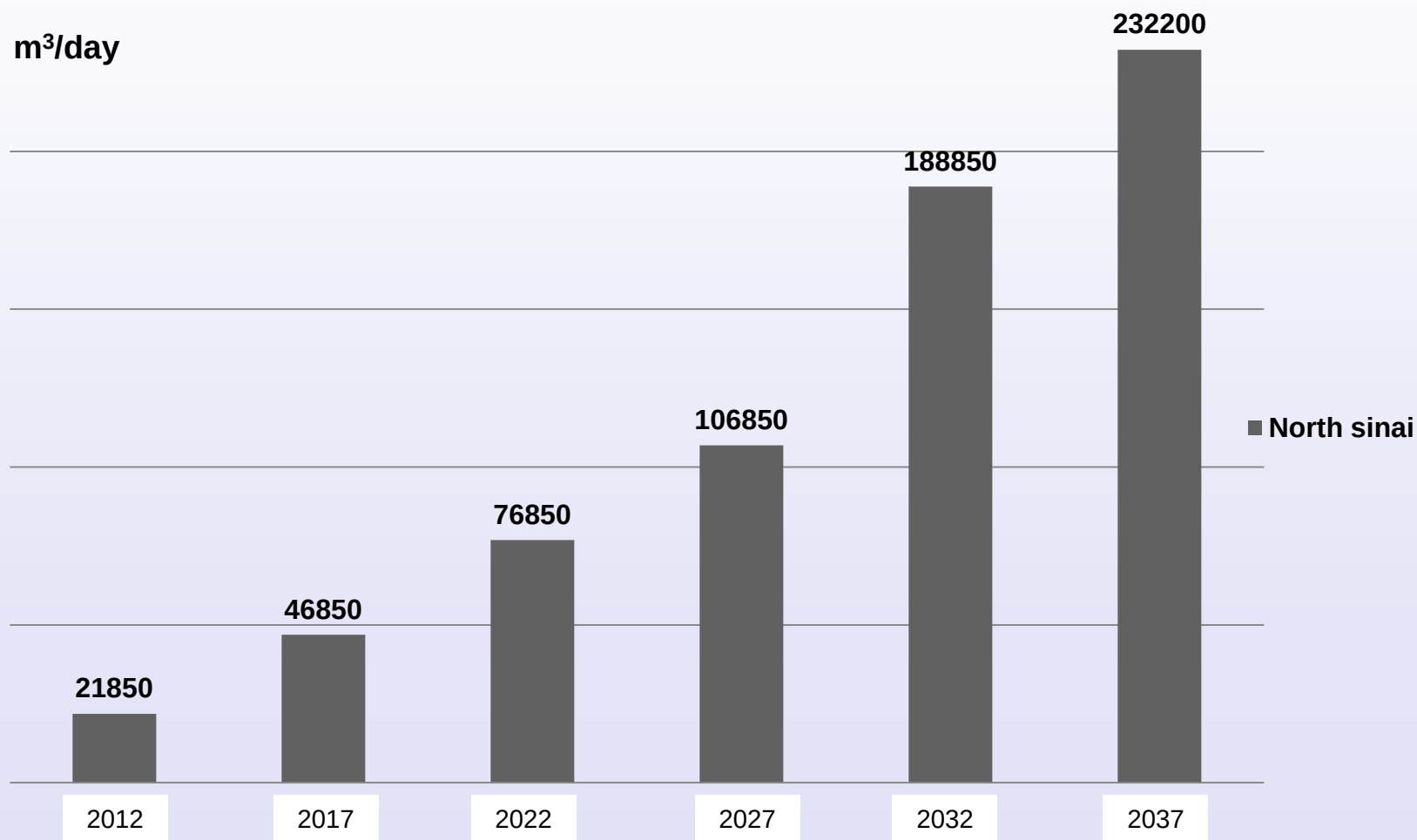
محطة تحلية العطار

محطة تحلية نخل

محطة تحلية الشمد

Total Capacity for desalination plants in North-Sinai till 2037

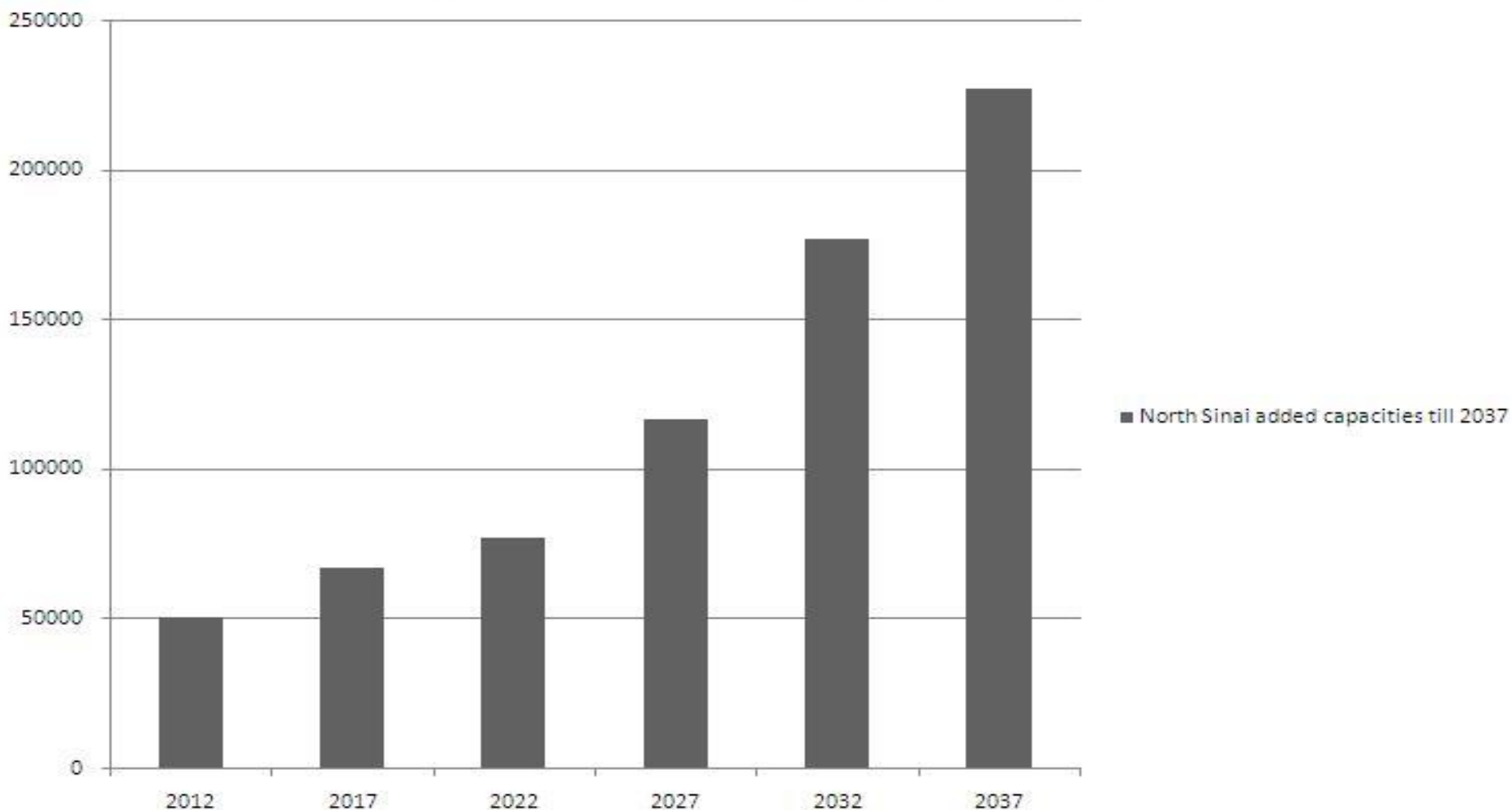
North sinai



South Sinai



Total Capacity for desalination plants in **South-Sinai** till 2037



Existing Desalination Plants in **Sinai Peninsula**



Nuweiba Desalination plant (10000 m³/day)

Existing Desalination Plants in Sinai Peninsula



Sharm el shiek Desalination plant (10000 m³/day)



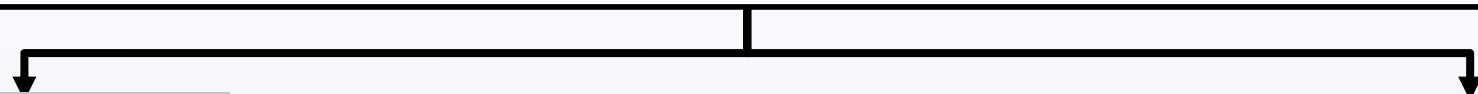
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**Water supply in Matrooh Governorate (existing plants,
planned projects).**

Amount of Water Produced By different sources in Matrooh Governorate



River Nile

Sea Water

WTPs

Desalination

Alamin south
WTP

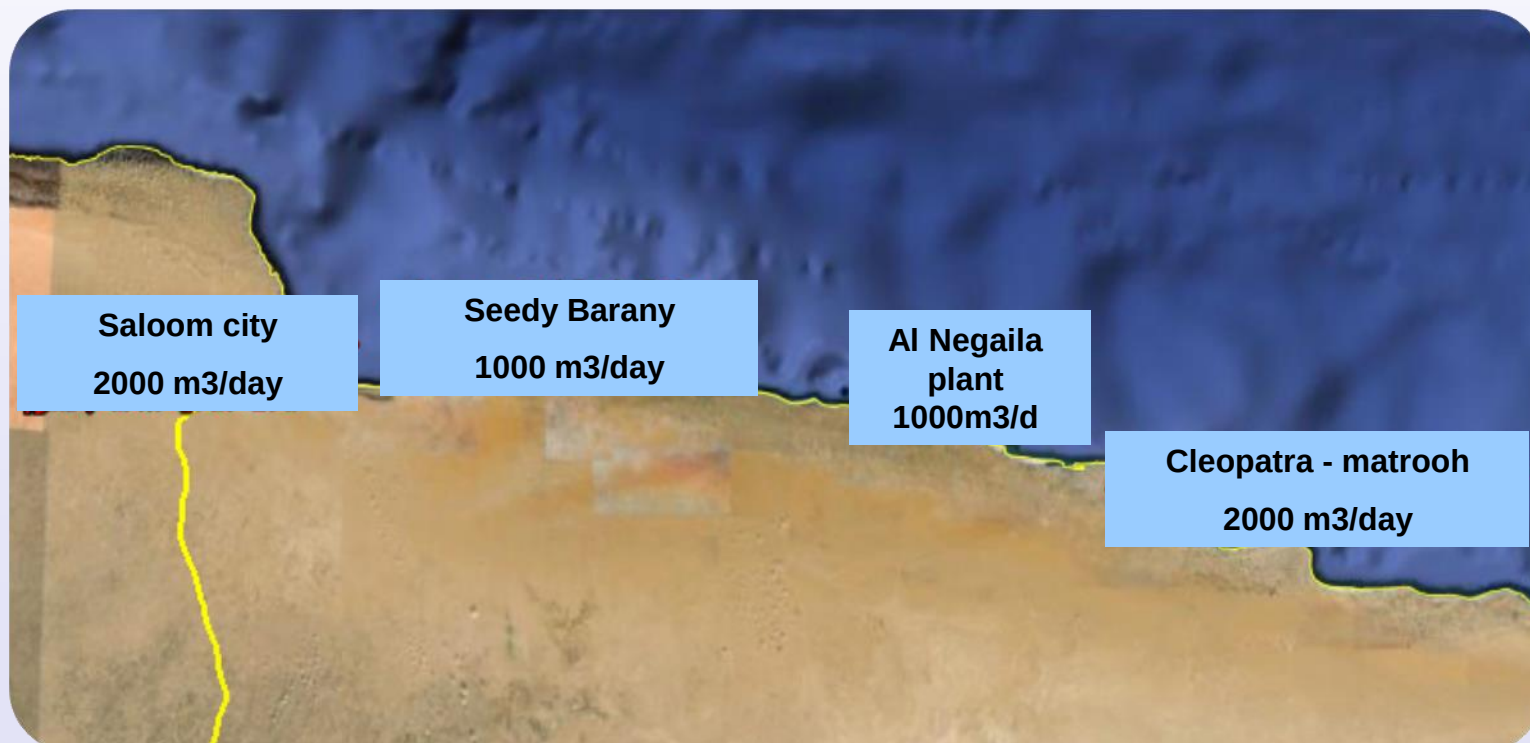
Bourg Al-Arab
booster, Alex.

Total amount
produced
5000 m³/day

Total amount produced
135000 m³/day- Under
construction second
phase **167000m³/day**

Total amount
produced
300000 m³/day

Existing Desalination plants in Matrooh Governorate



Desalination plants ongoing process

Ras elhkma

6000 m3/d

Minea hashesh

5000m3/d

Sede abd rahman

12000 m3/d

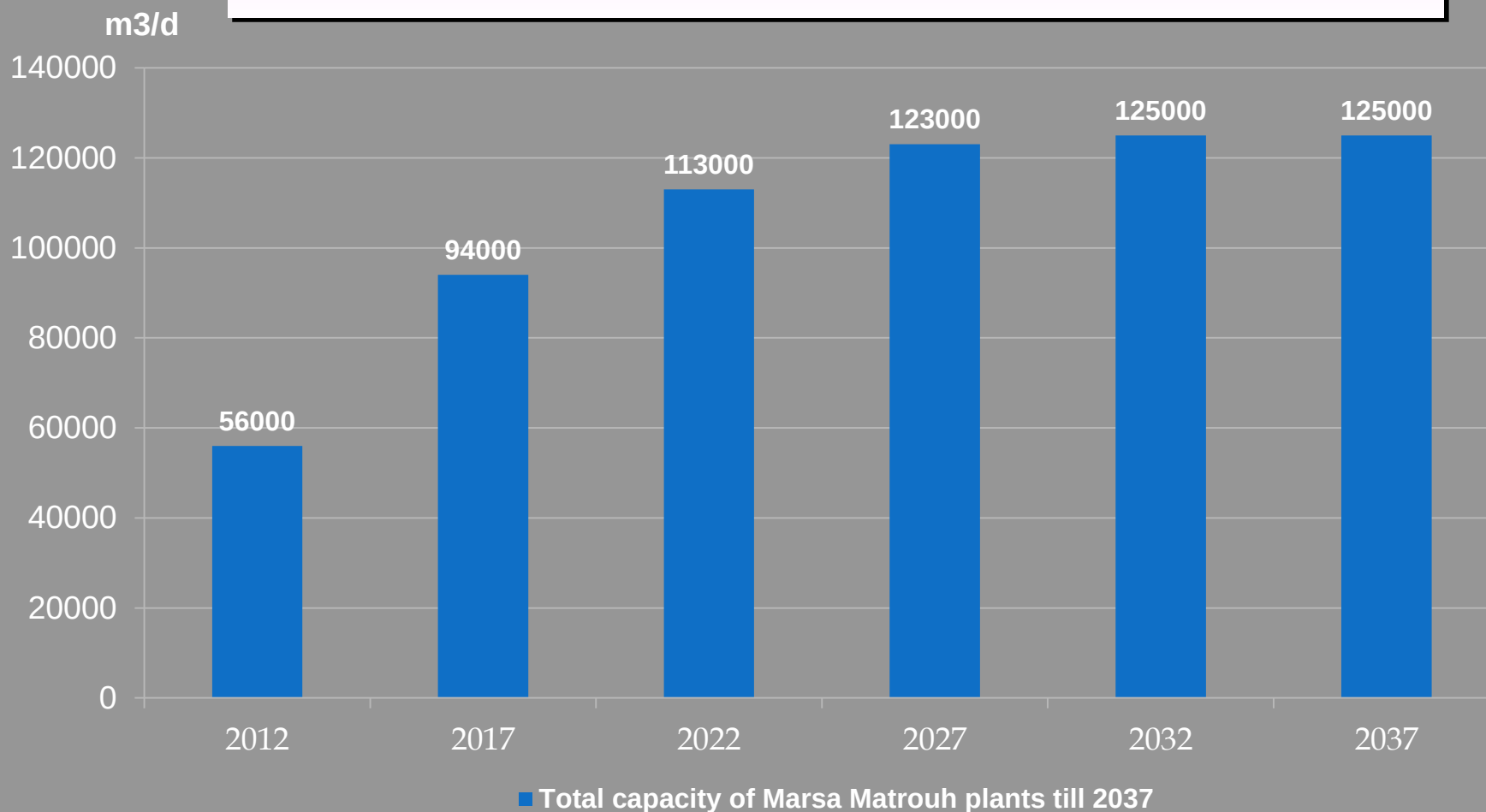
Remela 10000m3/d

**The first desalination plant,
solar-powered - under study**

**Des. plant at industrial area
50000m3/d**



Total capacity of Matrouh plants till 2037





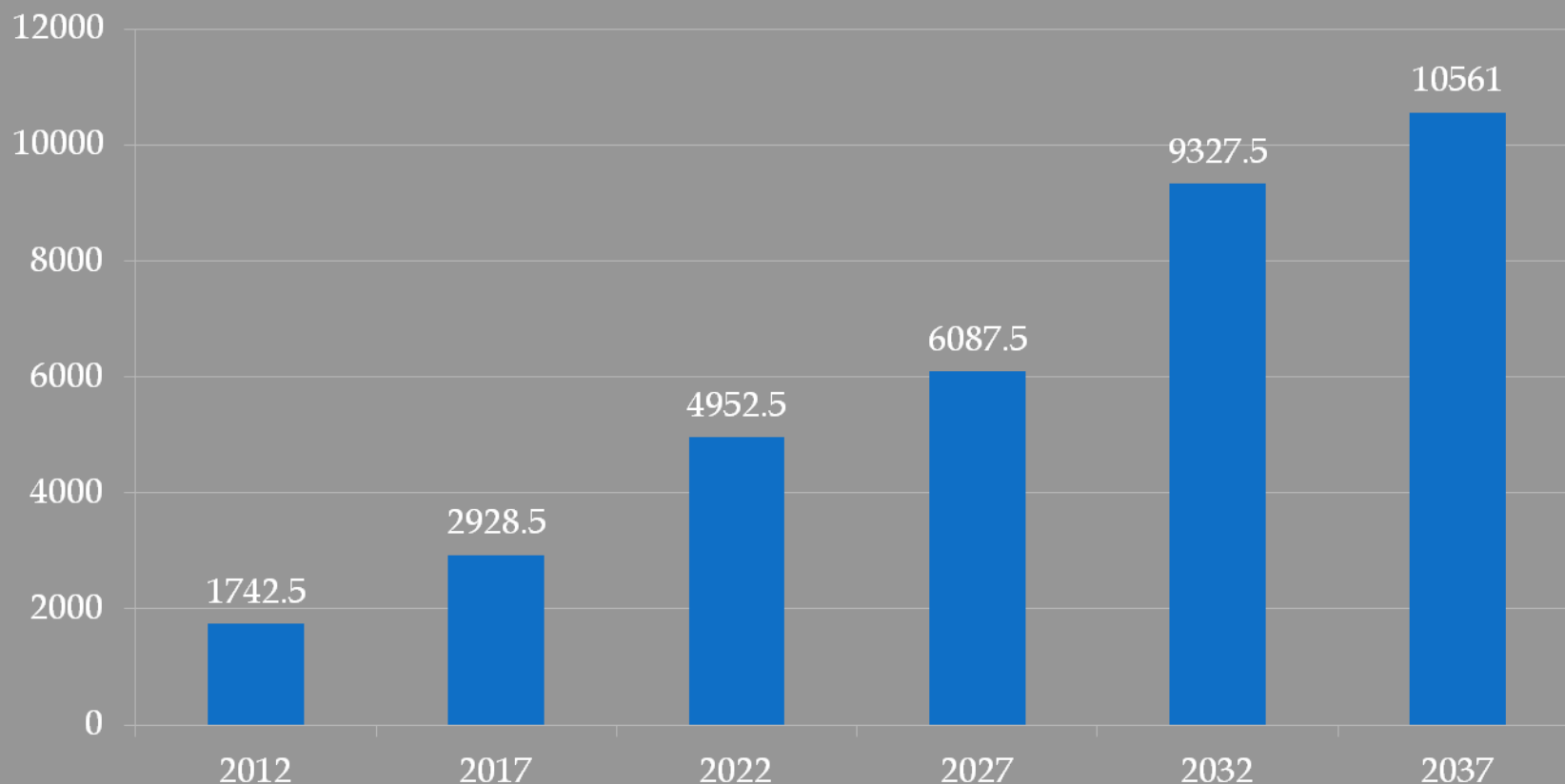
Planned desalination plants and investments in Egypt till 2037

Desalination Plants Capacity 2037



■ Total Capacity for the desalination plant for red sea, Sinai & marsa matrooh till 2037

Total Investments required desalination plants till 2037



■ Investments for desalination plants till 2037

Water Desalination Roadmap

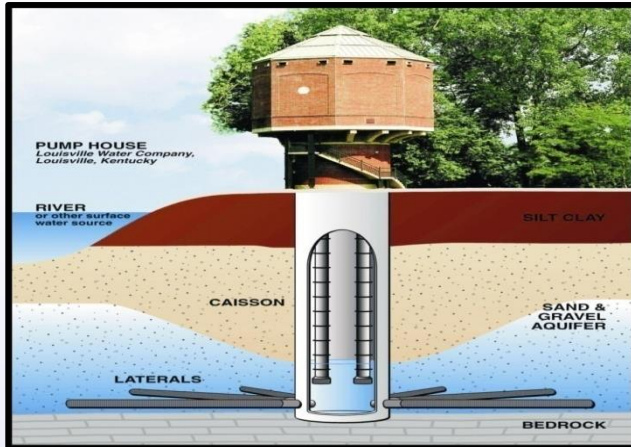
The Goals of water desalination Roadmap:

- Evaluation of the current situation of water desalination in Egypt .
- Identifying the of challenges facing Water Desalination.
- Suggestions of the areas of research and development that may lead to technological solutions to these challenges.
- Recommendations to spread utilizing the Desalination.
- It is a dynamic document that allows to accommodate the changes that result from the technological advances

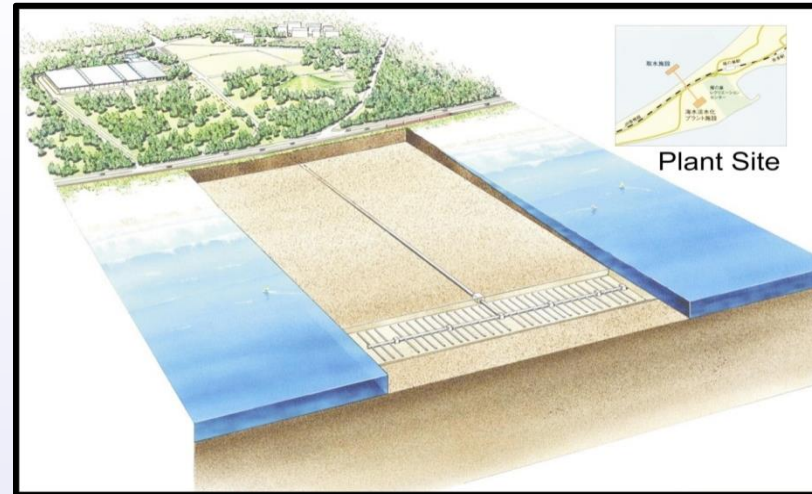
Water Desalination Roadmap

Contents

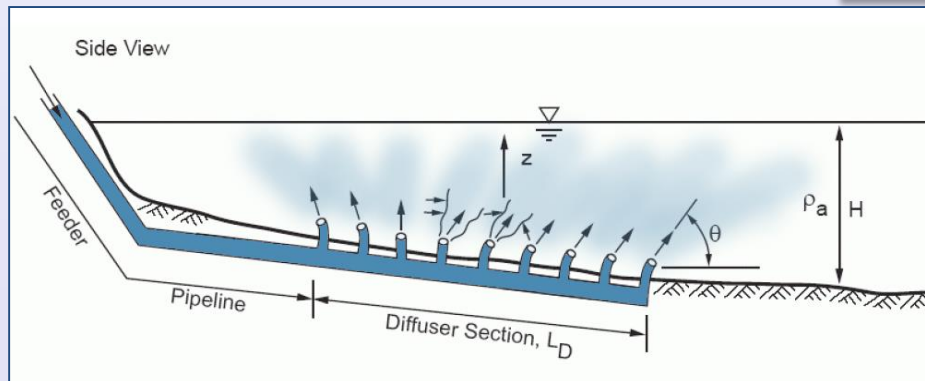
- Existing water resources situations.
- Water Desalination in Egypt
- Desalination technologies
- Intakes and outfalls
- Environmental effect of desalination plants (brine-chemicals-high pressure pumps)
- O&M cost and construction cost
- Renewable energies
- Identifications of possibly locally manufactured components.
- Recommendations



Radial shore intakes



Submerged intakes



Multi port diffuser

Capex and Opex for desalination plants (RO)

Capital cost	\$1200 per m3/day
Energy consumption	3.5 KWH / m3
Membranes	20 % per year
Chemicals	\$ 0.03 / m3
Maintenance	2% of the capital cost / year
Labour	\$ 0.03 / m3

Energy in desalination

Energy recovery devices used in our plants :-

-Turbo charger (5.6 Kwh/m³)

-Pelton Wheel (8.5 Kwh/m³)

-Pressure exchanger
(4 Kwh/m³)



Total area needed for desalination plants till 2037

1000 m²

■ Total area needed for desalination plants till 2037

1239

180

603

543

Red Sea

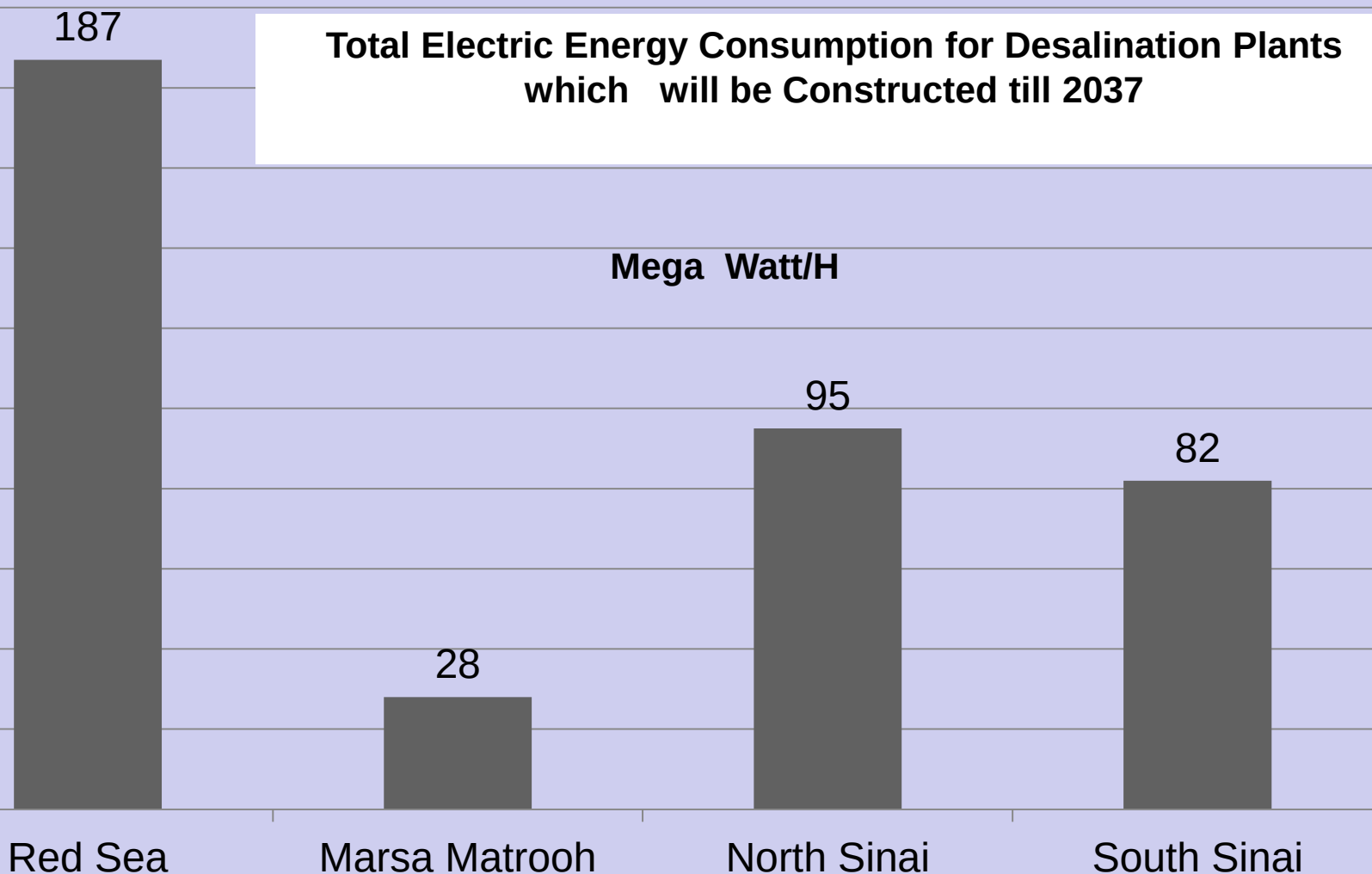
Marsa Matrooh

North Sinai

South Sinai

Total Electric Energy Consumption for Desalination Plants which will be Constructed till 2037

Mega Watt/H

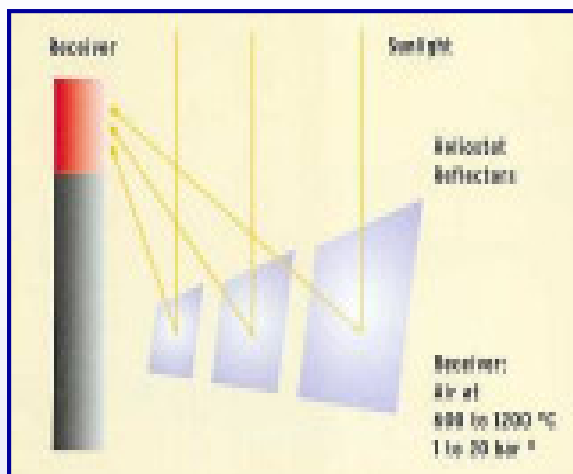


Using solar Energy in Desalination

Tower / Heliostats

Medium Air

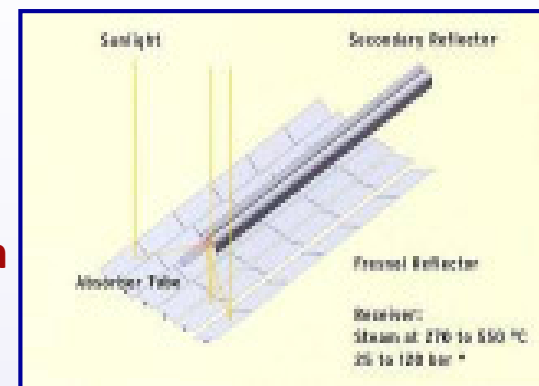
600-1200°C



Fresnel

Medium Steam

270-550°C



Parabol Troughs

Medium Oil/Steam

390-550°C



Paraboloid/Dish

small units < 50 kW remote

Helium/Hydrogen

Water Desalination Roadmap

Requirements for water desalination utilization:

- Institutional requirements (policies- strategies-**codes**)
- Technological requirements (researches –applications- industry- local manufacturing of the plants' components)
- Economical requirements
- Monitoring and risk assessment

Water Desalination Roadmap

The factors affecting water desalination development :-

Energy source:- kind of energy used in desalination can be thermal or electric , renewable or nonrenewable . Generally the energy source depends mainly on the used technology.

Raw water source: - raw water can be drawn from beach wells, open intake & deep wells.

Location of the plant.

Type of technology and its suitability to the Egyptian environment



Water Desalination Roadmap

Recommendations for desalination development

Legislative recommendations

- The establishment of a national entity for the desalination reporting to the Prime minister emerging from it specialized sub-committees
- Preparing a proposal of legislation to regulate the relationship between parties responsible for the construction and operation of the plants and those responsible for the coastal regions and shores of the nation.
- Regulate the role of the supervisory parties responsible for observation and following up the plants

Legislative recommendations

Activation of the laws that permit the involvement of the private sector (PPP) in producing desalinated water

Identifying the mechanisms to issue permissions for erecting desalination plants and identifying the parties concerning with the issuing

Forming legislations to estimate cost of production and operation and regulate the future rise in prices

Revising the environmental requirements for the desalination plants

Technical recommendations

- Update and revise the Master plan of the Ministry of Housing according to the variables, and industrial needs.
- Coordination to include the land area required for the erection of plants in the master plan of each governorate
- Coordination to set the demands of the electric power required to run desalination plants within master plan projects of the Ministry of Electricity
- The establishment of hybrid projects to generate electricity and desalinate water
(Zero-liquid discharge projects)

Technical recommendations

- The preparation of a code for the erection of desalination plants and a code for operation and maintenance of desalination plants .
- Develop a national program to increase the local product share in the components of the desalination plant .
- Develop a national program to prepare qualified staff in the field of desalination (labor - engineers - consultants) the program shall include :design, construction, operation and maintenance of desalination plants

Water Desalination Roadmap

Financing the desalination projects :-

To secure water sources for the long run , financing sources must be secured as well ... the following methods can be used :-

- **EPC contracts**
- **BOT, BOO or PPP**

So clear and proper contracting system must be established to handle and legalize this financing systems as well as encouraging such projects.



Water Desalination Roadmap

Prequalification :-

A call of tender was published by the holding company for water and waste water in which contractors shall be qualified technically to participate in the execution , operation and maintenance of the desalination plants by BOO and BOT systems and 36 company participated in that tender .

A white pyramid is shown floating in a body of blue water. The water is splashing around the base of the pyramid, creating a dynamic scene. The text 'Thank you' is written in a blue, serif font across the front face of the pyramid.

Thank you