

Desalination

By

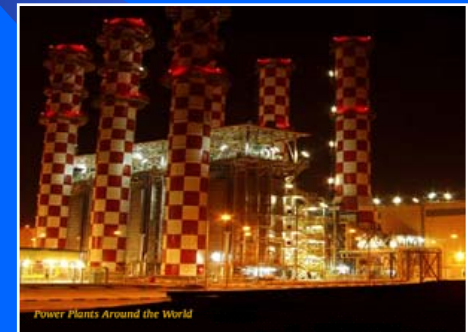
Dr. Eng. Ahmed Moustafa A. Moussa

Why Desalination Worldwide ?

- Increasing demand for fresh water
- 2.4 billion people (39% of world population) live in coastal areas.
- Currently, only 3% of global drinking water is supplied through desalinated water, concentrated in developed countries and in the Arab Gulf countries.



Jubail, Saudi Arabia



Al Hidd II, Bahrain



Al Taweelah, UAE



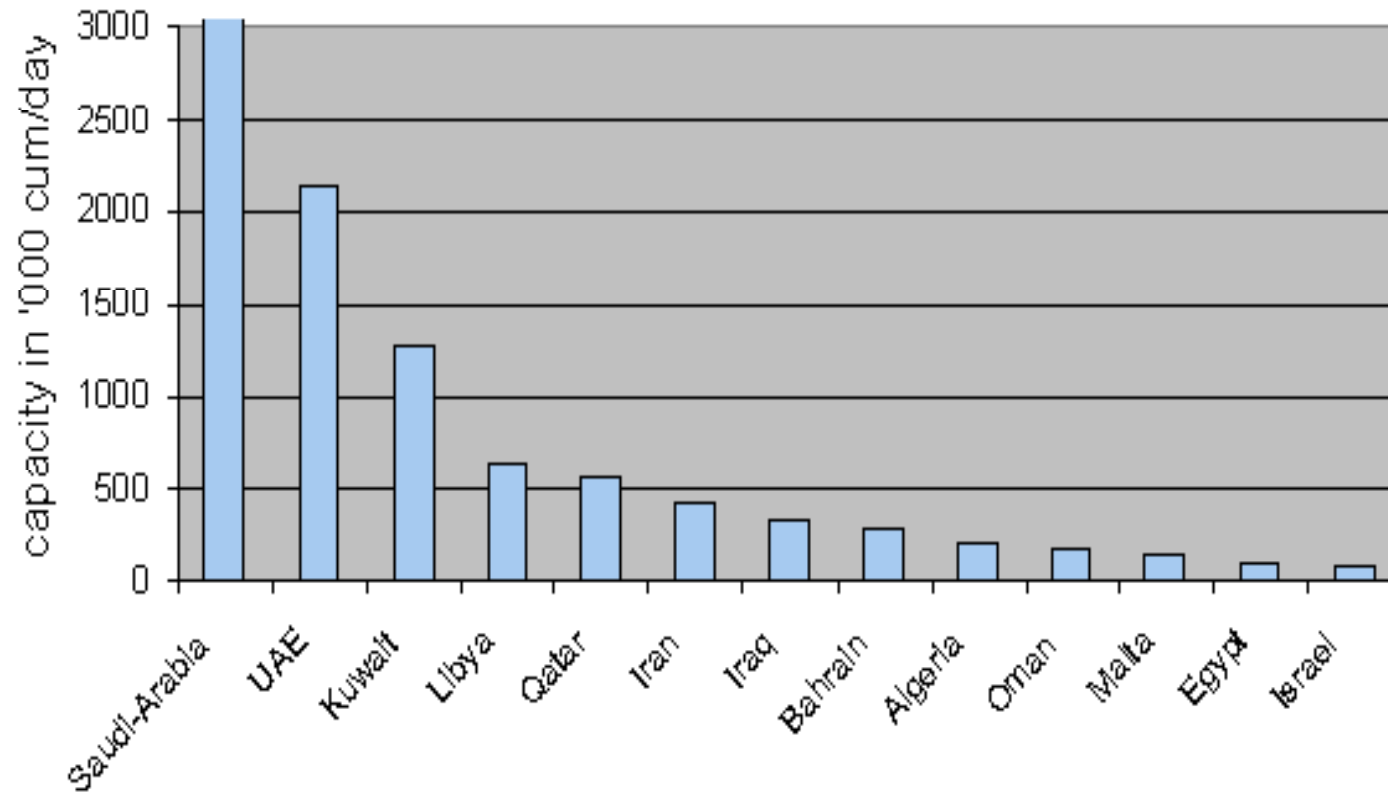
Ras Abu Fontas, Qatar

Desalination in the Arab Region

About two-thirds of the world's total desalination capacity is installed in the GCC Countries (about 3.2 billion m³/yr):

- Saudi Arabia alone accounts for 25-30 % of the world's capacity
- all GCC Countries supply the bulk of municipal and industrial water from desalination
- Reliance on desalination is expected to increase as the population grows

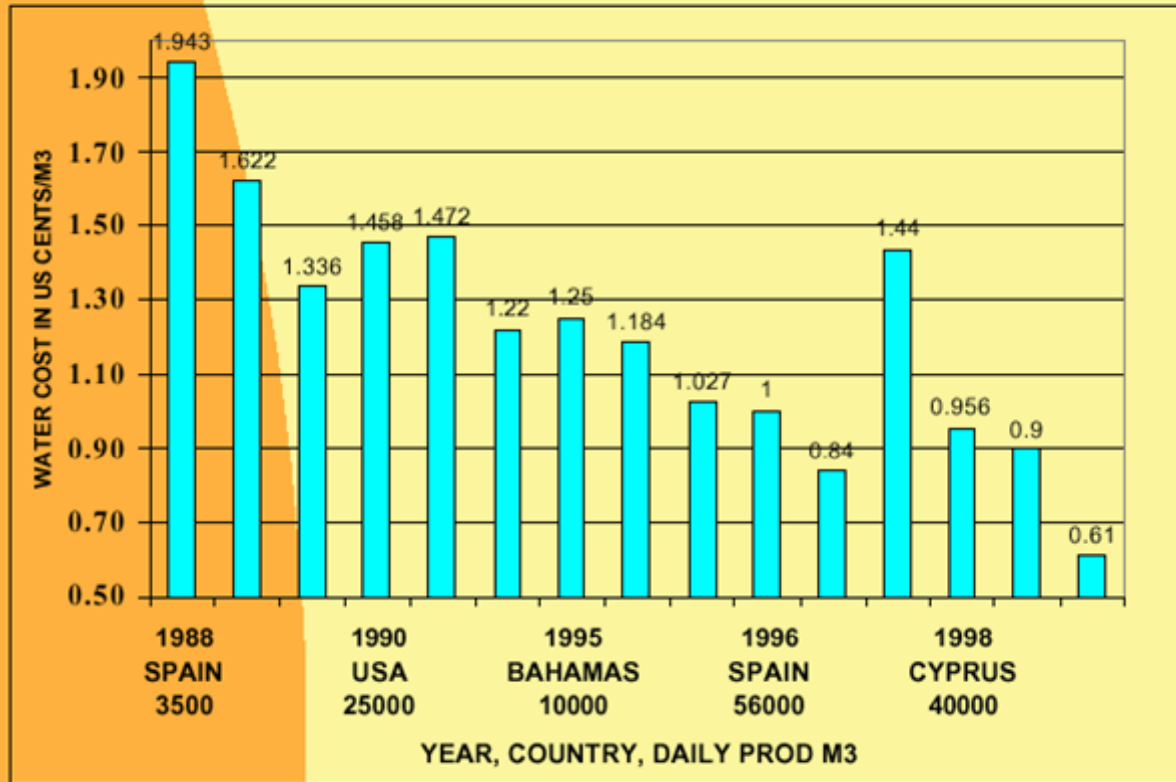
Desalination in the Middle East and North Africa including brackish water desalination



Source: World Bank compilation, January 2000 (referring to various years)

*Desalination is most widespread in the Arab Gulf Countries
while the non-oil countries found large-scale seawater
desalination too far beyond their economic means*

**Desalination Cost Trend:
SEAWATER DESALINATION (REVERSE OSMOSIS) IN CENTS/M3 FROM BOOT
SCHEMES FROM INTERNATIONAL TENDERS YEARS 1988-1999**

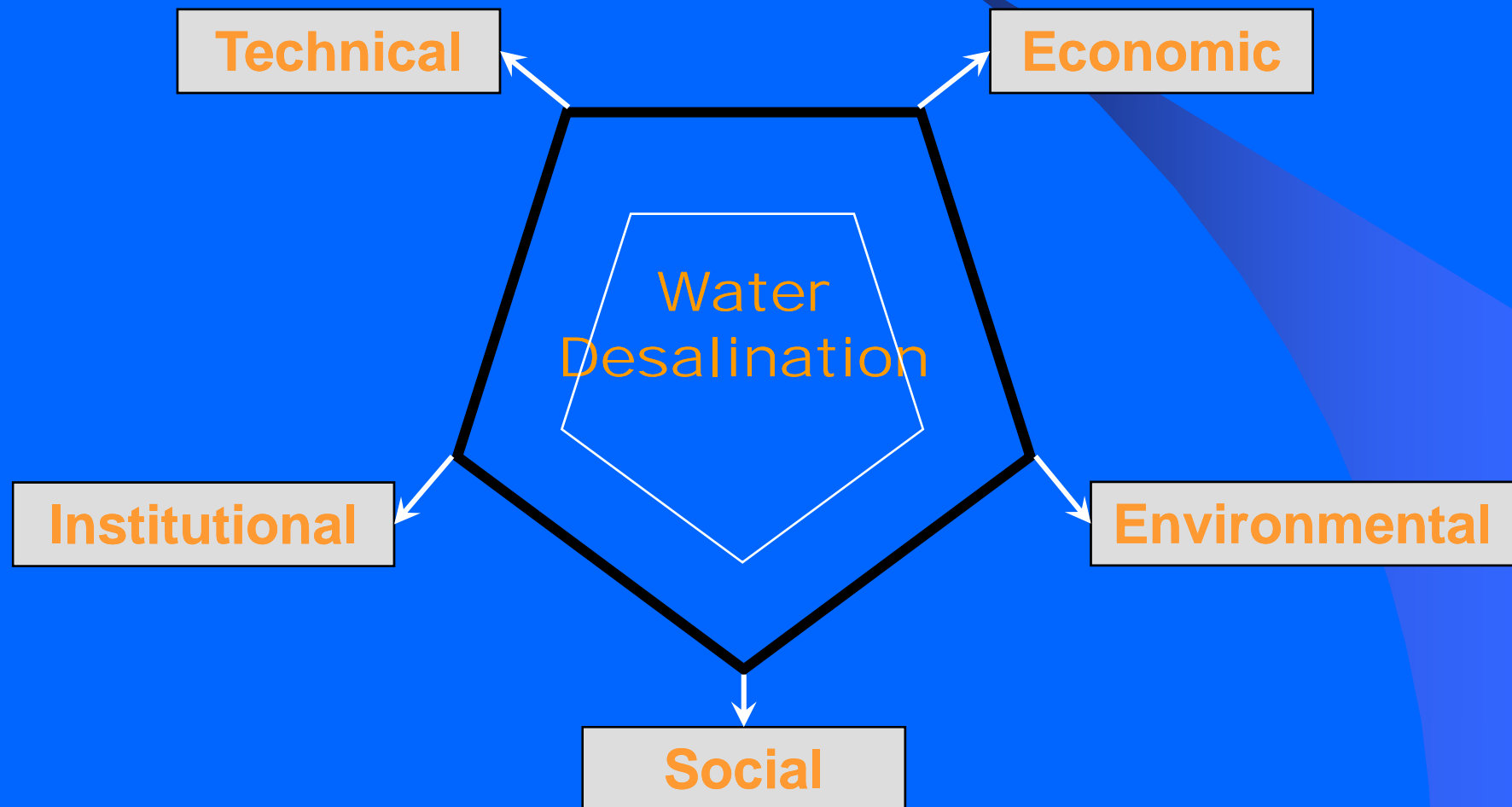


- Costs have now fallen to levels affordable by many communities.
- Costs will continue to fall but not as fast as previously

Priority Uses of Desalinated Waters

- ❑ **Desalinated Brackish Groundwater for:**
 - Municipal and industrial uses
- ❑ **Treated Polluted Agricultural Drainage Water for:**
 - Agricultural uses
- ❑ **Desalinated Seawater for:**
 - Municipal, mainly for tourism and recreation, and industrial uses

Interventions of Seawater and/or Brackish Groundwater Desalination



Staff Requirements

- Operational staff of about 60,000 persons across the MENA region in 2005
- Projected additional staff till 2010 is forecasted at 36,000 persons for all categories



Capacity and Technology Transfer

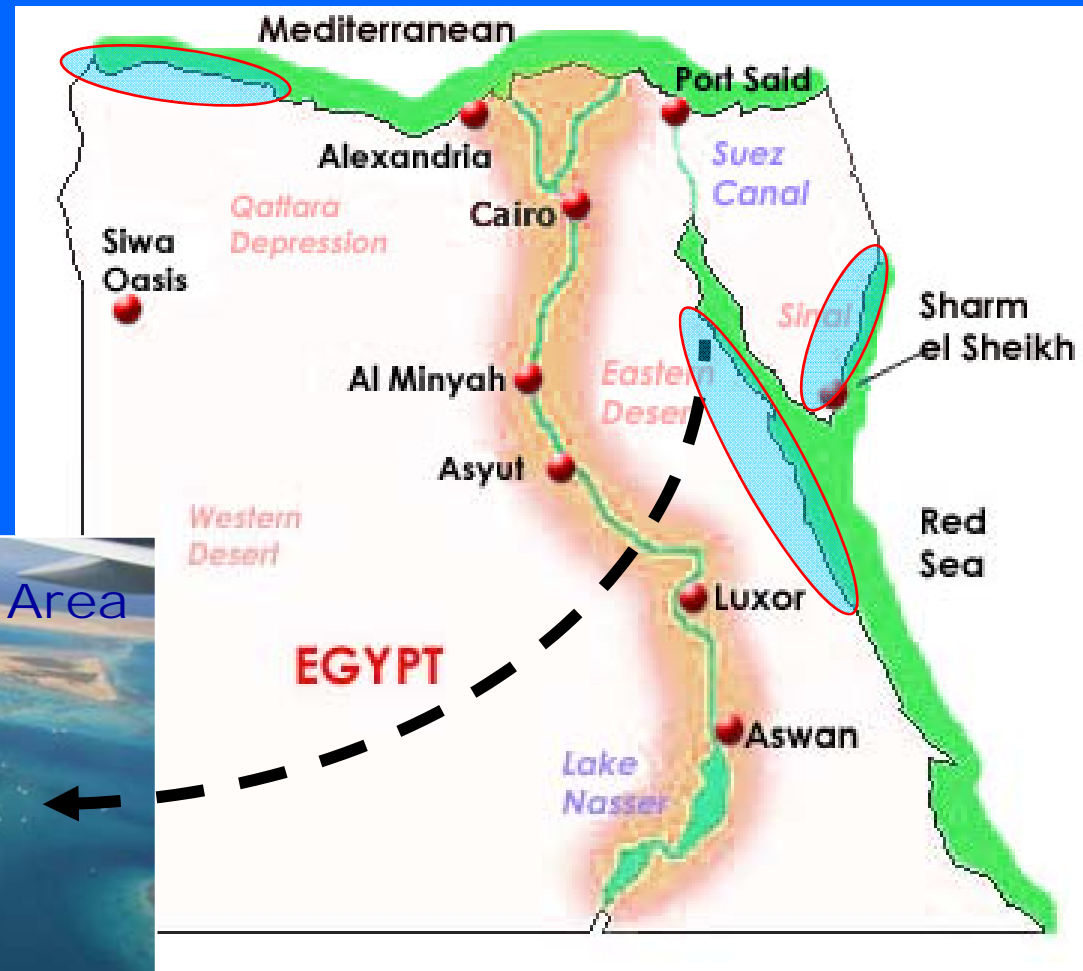
Requirements to 2010 in MENA Region :

- Operational desalination capacity of 12 mcm per day at year 2000
- Growth of demand for water in MENA is 11% per year for all uses.
- Desalinated portion grows at the same rate, an additional 18 mcm per day by 2010.



Where Desalination in Egypt?

- Tourist Resorts
- Coastal Summer Resorts and Villages
- Petroleum Refining Complexes



Why Desalination in Egypt

- **Shortage of fresh water**
- **High cost of transporting water to remote communities**
- **Cost of conveyance system**
- **Capacity of irrigation canal system**

Cost of Desalination in Egypt For Water Supply

- Cost of desalination process 0.2 USD per m³
- Cost of transporting desalinated water 0.4 USD per m³
- Electricity needed 8 kwatt per m³

Cost Comparison of 1 m³ for Domestic Purposes
(Transport cost is not included)

Desalinated Water	Treated Nile Water	Treated Groundwater
1.20 L.E	0.60-0.80 L.E	1.00 L.E

Some Examples of Government Owned Desalination Plants

Location	Technology Used	Capacity (m ³ /day)	Salinity Level of Feed Water (ppm)	Salinity Level of Produced Water (ppm)	Energy Used (KW/M)	Total Cost (LE/M ³)
Taba	RO	600	48000	450	9.5	6.21
	V.C	2000	48000	30	9.0	6.64
Newaibaa	E.D	300	2400	500	4.3	2.78
	M.E.D	2000	45000 44000	50		
Sharm El-Sheikh	V.C	500	44000	30	9.0	4.75
	R.O	4000	44000	500	6.5	6.34
Dahab	R.O	500	44000	500	7.5	6.51

RO : Reverse Osmosis Desalination
 VC : Vapor Compressor Desalination
 MED : Multi Effect Desalination

Private Sector Share in Desalination in Sinai

Location	Owner	Technology Used	Capacity m3/day	Salinity Level of Feed Water (ppm)	Salinity Level of Produced Water (ppm)	Price (L.E)
Taba	El-Malah Company	R.O	4000	35000	400	7.5
Sharm El-Sheikh	Pyramiza Hotel	R.O	2000	44000	400	9.0
	Raja Hotel	R.O	2000	44000	400	8.0
	South Sinai company for water	R.O	7000	44000	400	11.0
	El-Montazah Hotel	R.O	2500	44000	400	
	Aqua Marina	R.O	2000	44000	400	
Dahab	Sheikh Zayed	R.O	2500	44000	400	

Issues for Consideration

- Prices and Cost Recovery
- Role in Dispute Resolutions
- Desalination for Agricultural
- Cost of Energy and Future prospective



Continued ... **Issues for Consideration**

- Does desalination offer a reliable and feasible source of potable water for poor communities?



- What is the role for desalination in achieving the MDGs?



UN Millennium Development Goals (MDG)

By the year 2015, all 191 United Nations Member States have pledged to meet these goals

Continued ... **Issues for Consideration**

The Sustainability Questions

- Capacity and Technology transfer
- Running Cost
- Environmental issues



The Strategic Research Unit

