

**INTERNATIONAL
CONFERENCE ON
DESALINATION AND
SUSTAINABILITY**

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الجمعية المغربية للأغشية و تحلية المياه



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Desalination in the Middle East: Overviews and Future Trends

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MOR12-019



From sustaining life to sustaining future

Clearly desalination is a critical component of sustaining life and economy in the Gulf region: some countries in the Gulf rely on desalination to produce 90% or more of their drinking water, and the overall capacity installed in this region amounts to about 40% of the world's desalinated water capacity





A gradual but constant change in perspective and environmental understanding



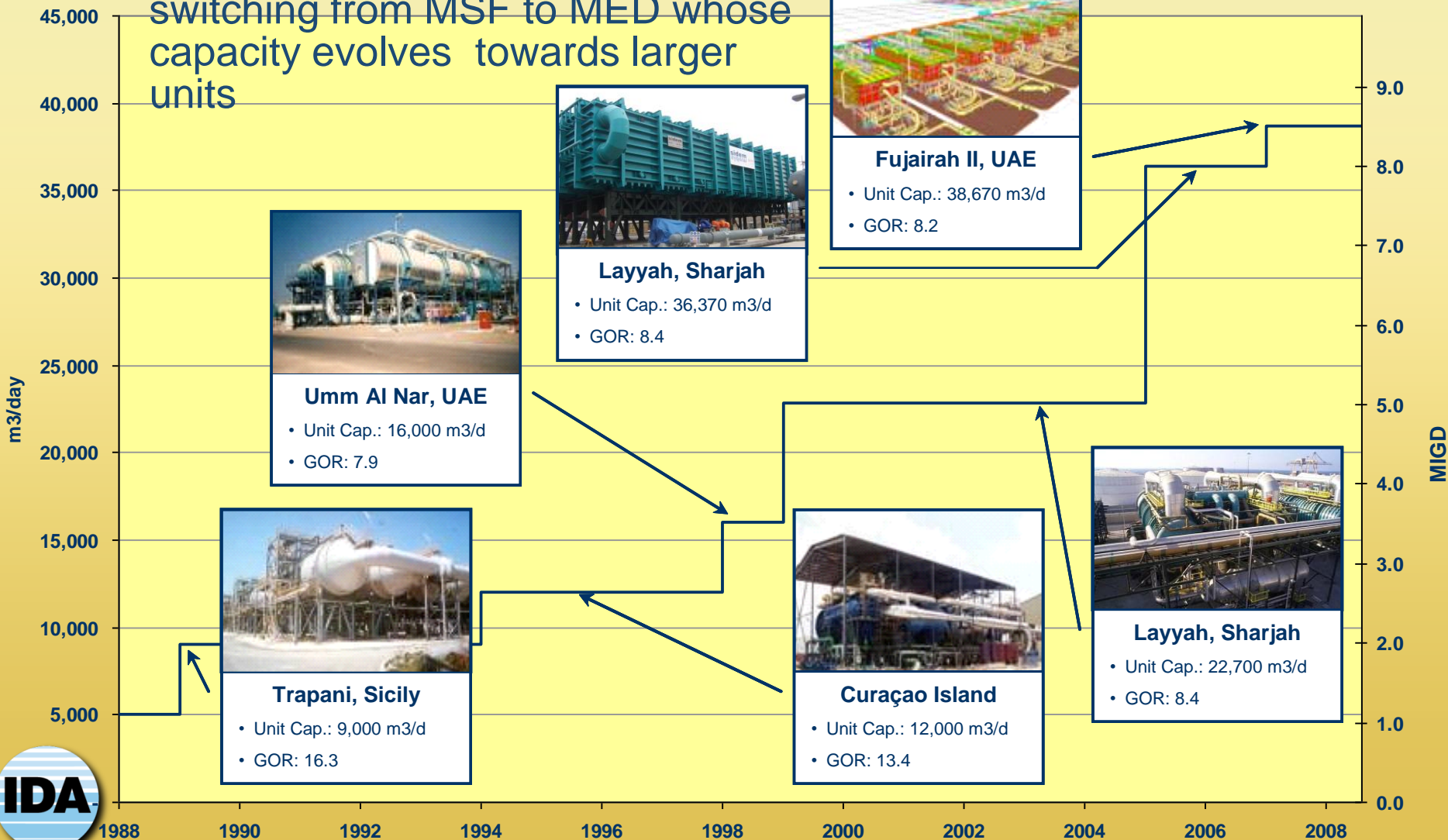
Is driving the technology towards more efficient and environmentally friendly options and towards energy optimization



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Thermal technology gradually switching from MSF to MED whose capacity evolves towards larger units



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Evolution of the performance ratio

- ▶ Contract Award: April 06
- ▶ End User: Electricity and Water Authority
- ▶ Owner: Hidd Power Company
- ▶ 10 units x 6 MIGD
- ▶ 7 effects
- ▶ GOR: 9.03

AL-HIDD IWPP – KINGDOM OF
BAHRAIN





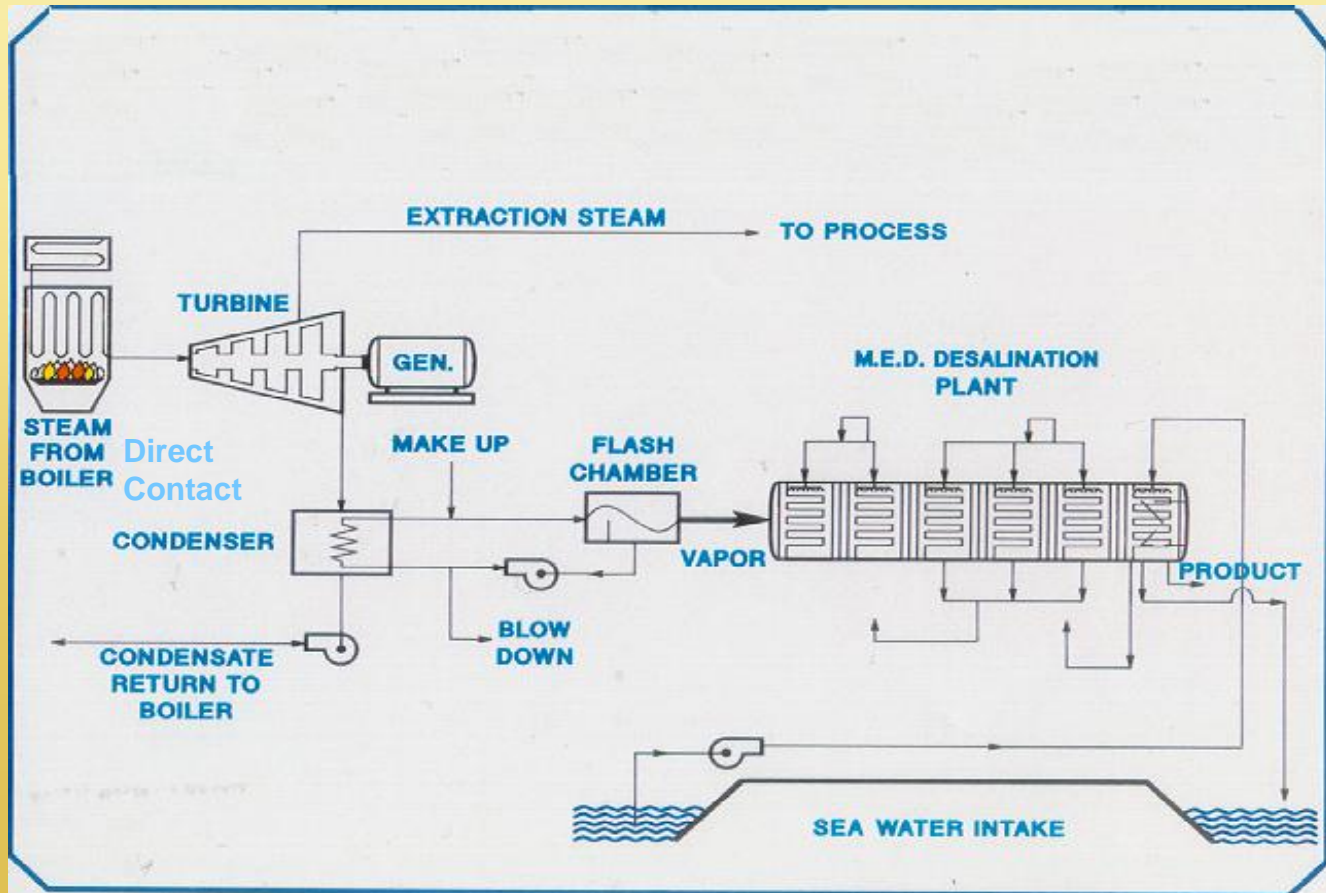
Evolution of the performance ratio



**Ras Laffan C IWPP - Qatar MED-TVC - 10 units of 6.3 MIGD
(63 million gallons daily production) GOR 11.12**

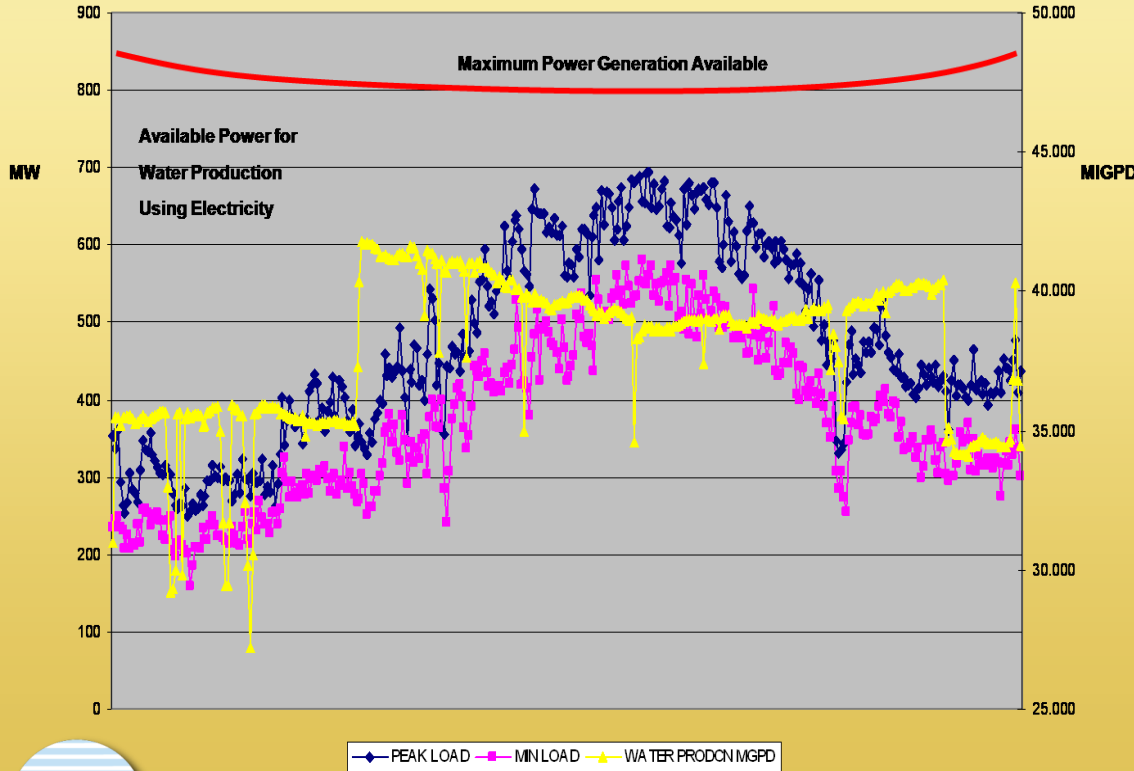


Direct Contact Condenser with Hot Water from Condenser at 85°C to provide steam to MED and return colder 67.5°C to condense steam offer great potential to MED to be extremely competitive for from the energy view point (≤ 2 kwh/m³)





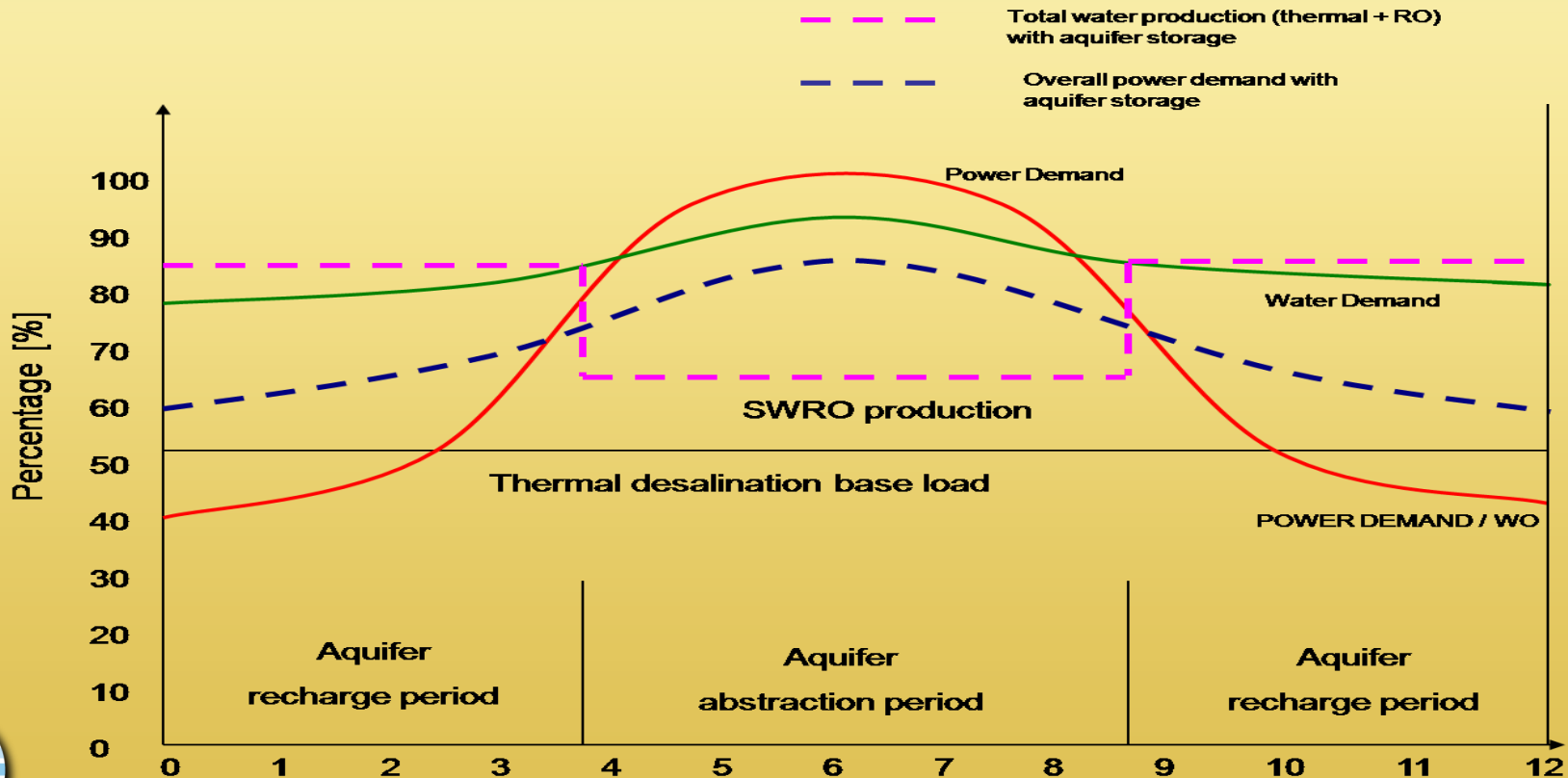
Great unbalance between water and power demand is one of the major reasons for inefficiency



Despite all thermal desalination plant are installed as cogeneration the winter summer unbalance of water and power demand generate tremendous inefficiencies



New energy optimization concepts introduced include the grid peak stabilization which use SWRO as a buffer for aquifer storage





Emphasis of water security



Red tide is the result of an influx of a type of algae bloom that turns the water to reddish color.

The red tide problem has been growing over the past few years in the Gulf region, adversely impacting the important sea water desalination plants by clogging up dual media filters.

Affecting the availability of the project



Emphasis of water security

FEWA

During 2010 FEWA has issued three tenders:

- Installation of 2 DAF systems, one to serve the 31,822 m³/d SWRO Plant and the second for the 45,630 m³/d SWRO Plant located in Al Zawrah (UAE). Contract awarded to VW&T.

-- 45,460 m³/d (10 MIGD) SWRO located in Al Zawrah (UAE): DAF + UF + SWRO. Contract awarded to Cadagua SA

- 68,190 m³/d (15 MIGD) SWRO located in Ghalilah (UAE): DAF + UF + SWRO. Contract awarded to Aquatech

ADWEA

During 2011 ADWEA and SembCorp have issued a tender calling for a 30 MIGD SWRO Project at Fujairah 1: DAF + DMF + SWRO.

The DAF will be designed to serve the new 30 MIGD SWRO Plant plus the existing 37.5 SWRO Plant.



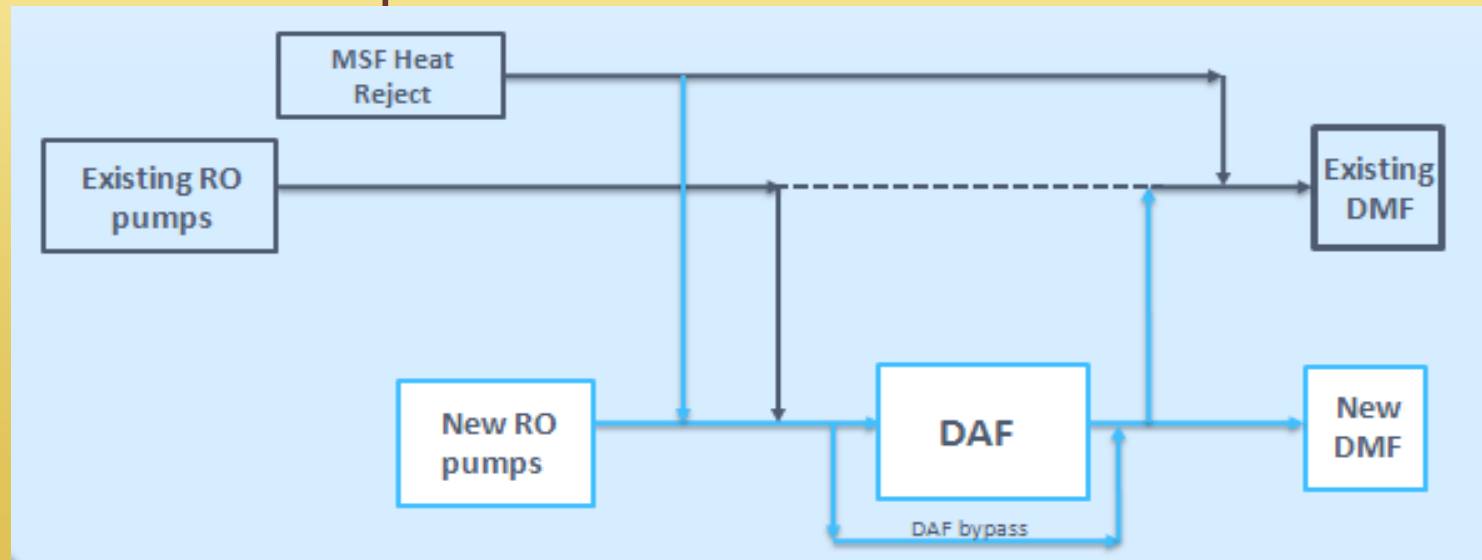
Fujairah 1 SWRO Expansion project : Combining Security of operation and supply with energy efficiency and operational cost optimization





Combining Security of operation and supply with energy efficiency

One of the most innovative aspects of this project is the recovery of the seawater discharge from the MSF for blending with fresh seawater from the SW intake and its use as feed for both plants integrating fully the streams from the thermal and SWRO plant.





Combining Security of operation and supply with energy efficiency

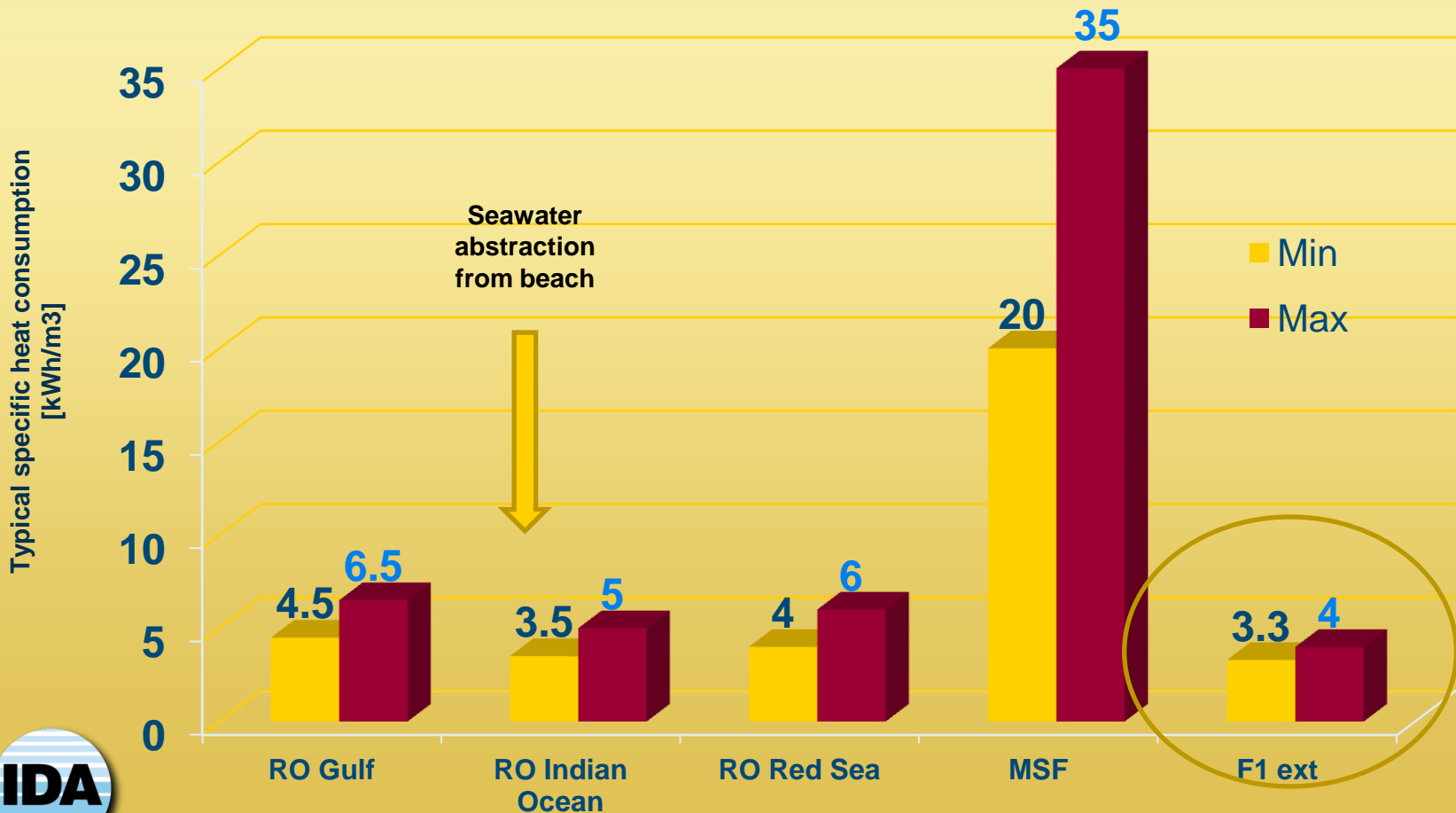
The optimization of the seawater feed to the RO plant has allowed to achieve a very competitive specific power consumption.

The specific power consumption offered were ranging between 3.3 to 4.0 kwh/m³.

This value included the electric utilities associated to the DAF (which has an inherent power consumption of 0.05 kwh/m³)



Combining Security of operation and supply with energy efficiency





Tariffs

Station	Tariff	Unit	Tariff	Unit	technology
Station P *	2.5	fiIs/IGD	1.50	US\$/m3	MSF
Ad Dur **	0.35	BD/m3	0.95	US\$/m3	SWRO
Fujeirah 2	3.72	USD/TIGD	0.81	US\$/m3	hybrid
Marafiq	3.723	USD/TIGD	0.81	US\$/m3	MED
Zour	3.62	SR/m3	0.99	US\$/m3	hybrid
Mostaganem			0.73	US\$/m3	SWRO
Cap Djinet			0.73	US\$/m3	SWRO
Magtaa			0.56	US\$/m3	SWRO
Tenés			0.59	US\$/m3	SWRO
Oued Sebt			0.68	US\$/m3	SWRO
El Tarf			0.89	US\$/m3	SWRO
Al Taweelah SWRO	12.8	DHs/TIG	0.76	US\$/m3	SWRO
Barka 1	na	na	1.28	US\$/m3	MSF
Barka 2				US\$/m3	SWRO
Sur			0.98	US\$/m3	SWRO
Shuweiat S2	18.8	AED/1000 IGD	1.12	US\$/m3	MSF
Askelon			0.57	US\$/m3	SWRO

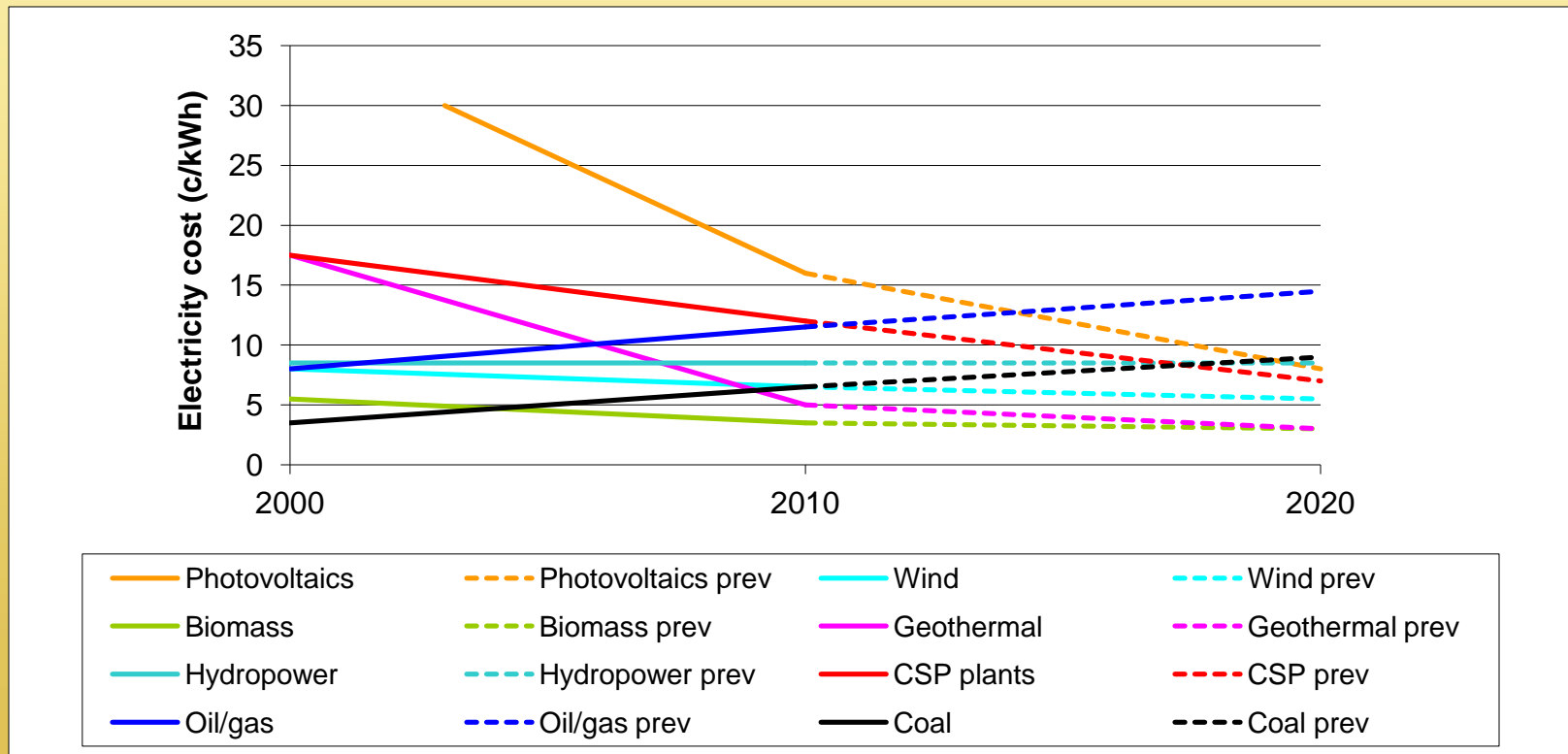
- Extremely attractive tariff in the range of 0.6 US\$/ m3 of product water
- Much lower than market bench mark for both the region and in general for the technology

Note: The cost of water does not include transmission and in some cases project returns and other additional costs



The Renewable case

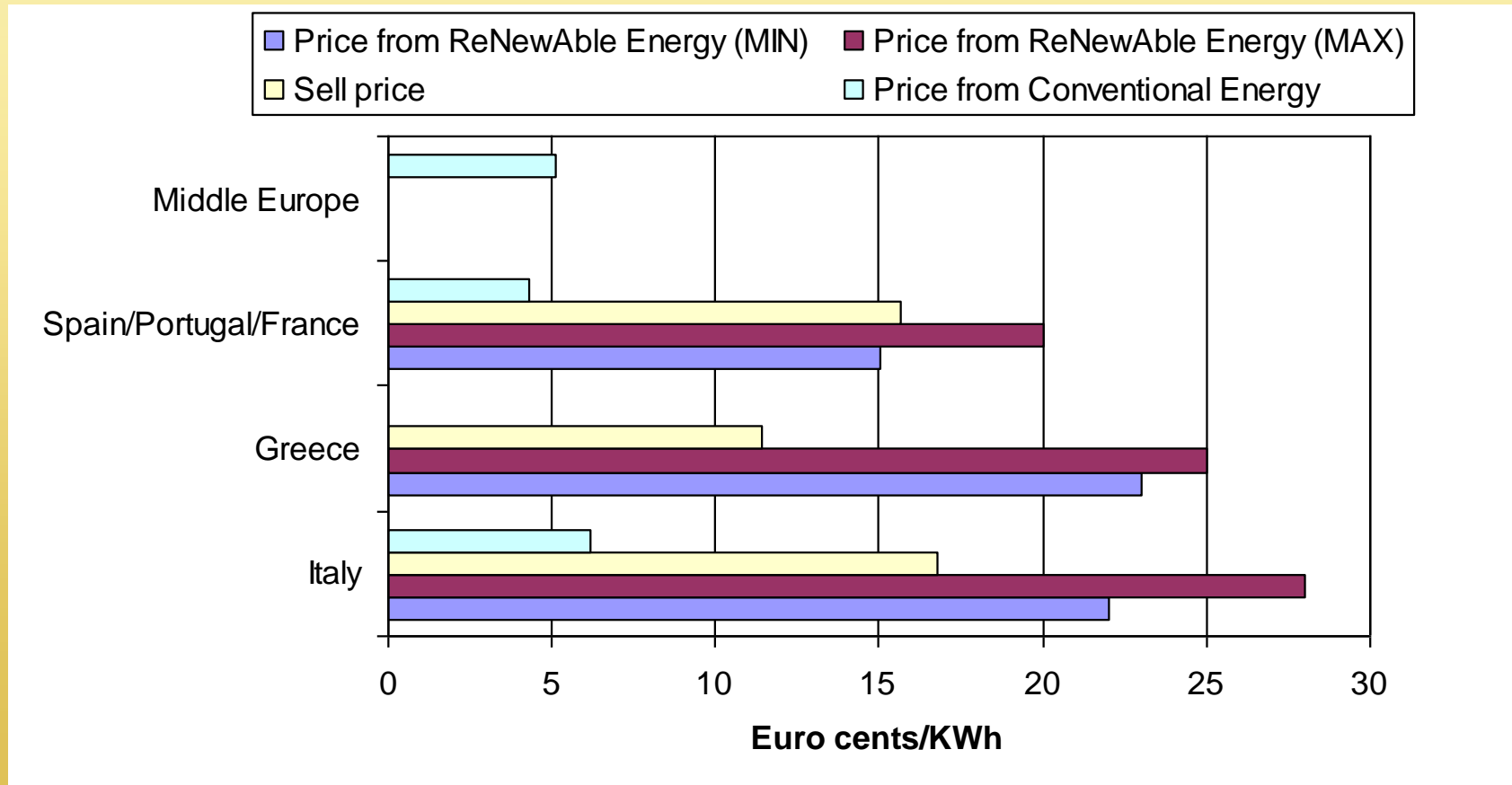
- In Europe renewable energy costs are now comparable and in some cases cheaper than fossil fuel costs





The Renewable case

- this result has been obtained by a continuous industry development supported also by short and long terms policies set up at governmental level





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Policies



1 – 2 March

The reduction of energy from renewable source was encouraged by the set up of policies that forecast for renewable energy

- Subsidies at construction stage
- Incentivized sale tariffs
- Guarantees of off tax from the government

These policies have incentivized the renewable power industry to both invest in R&D and allowed investors to find viable commercial solutions for the initial renewable power generation projects.





Can a similar approach to renewable power adopted for renewable water in the Middle East ?

There are several ideas and researches published the academic environment related to the development of renewable desalination but these do not appear to be any interest to the industry market.

In the Middle East renewable Power made its appearance after being developed and consolidated elsewhere and particularly in Europe.

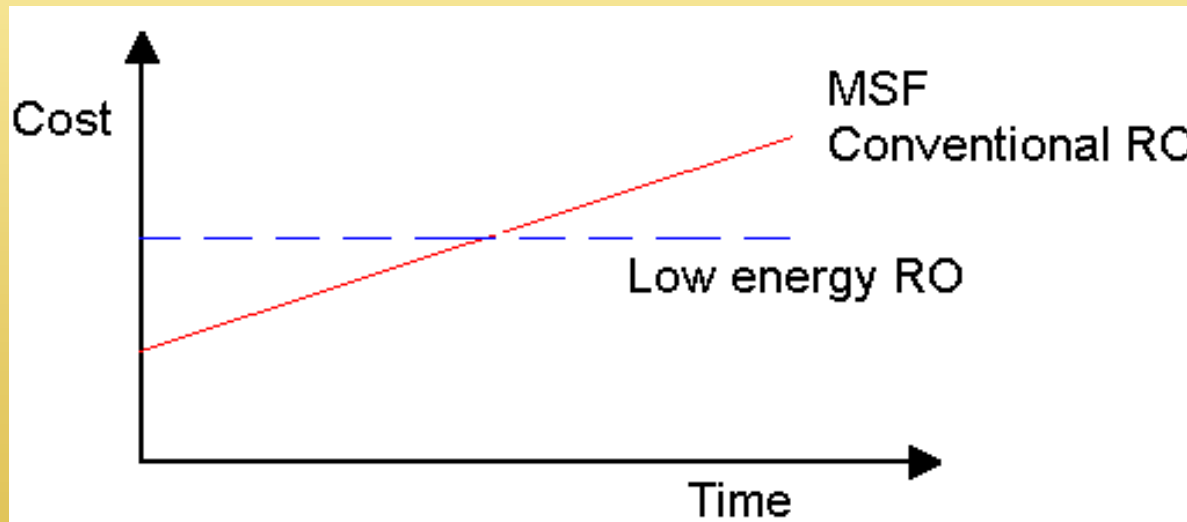
However he status of art of renewable desalination is no comparable to the status of renewable power and the installations are at Pilot plant level

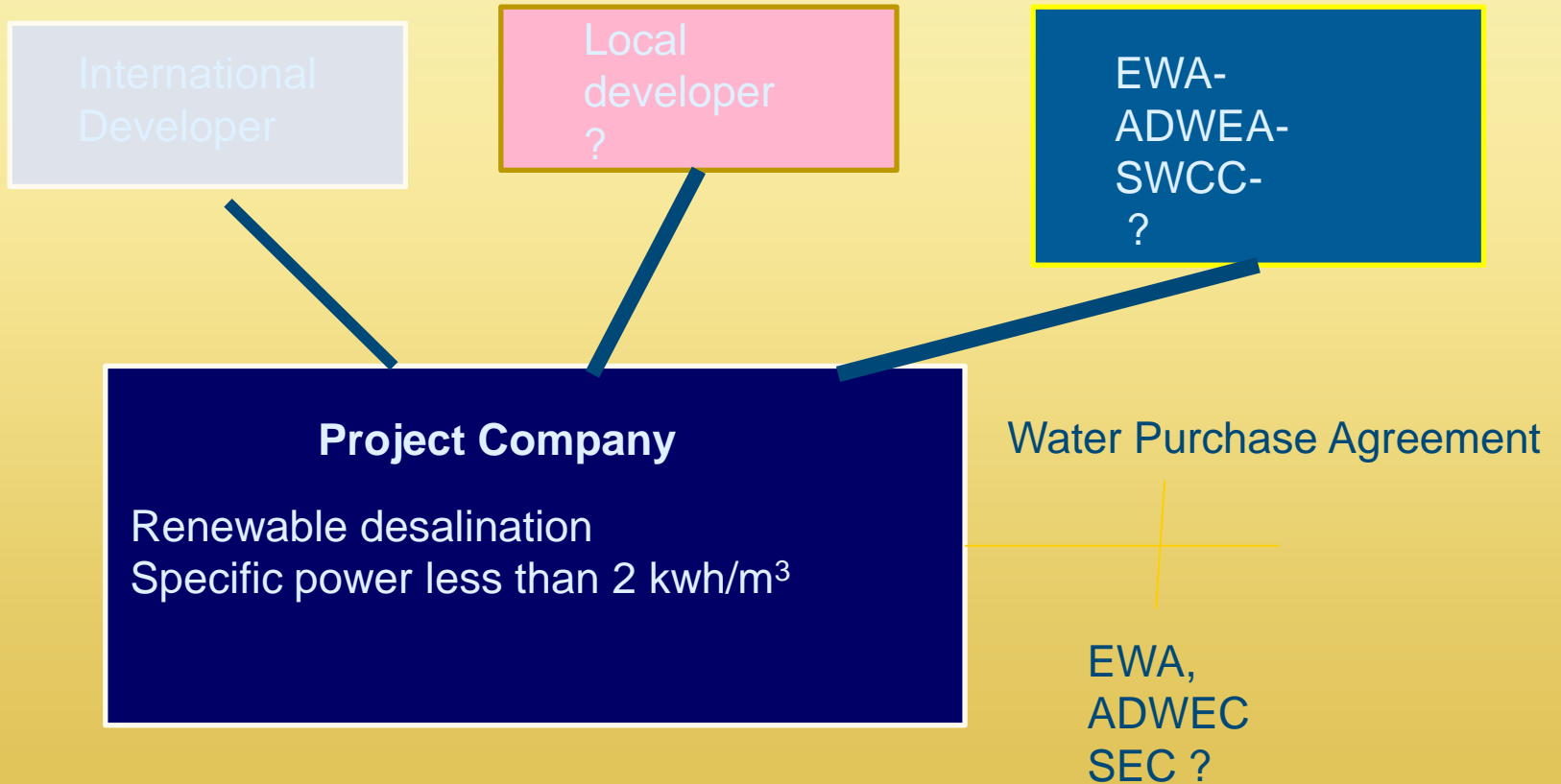
There is no incentive provided to encourage the development of renewable desalination technologies



	Aqaba , Red Sea, Jordan
Design capacity [l/day]	700 -900
Collector area [m ²]	72
Collector type	Standard flat plate
Capacity heat storage [m ³]	3
Number of MD modules	4
PV area [kWp]	1.44

- Nowadays the cost of the water from this system is higher than the water obtained by conventional system (RO MSF).
- However as for solar and wind in the next years we can aspect this to become break even in future.
- Abu Dhabi could set up an example in the world on how to promote renewable desalination.







THANKS

