



Hybrid Seawater Desalination in the Middle East

Fujairah 2 Power and Water
Plant

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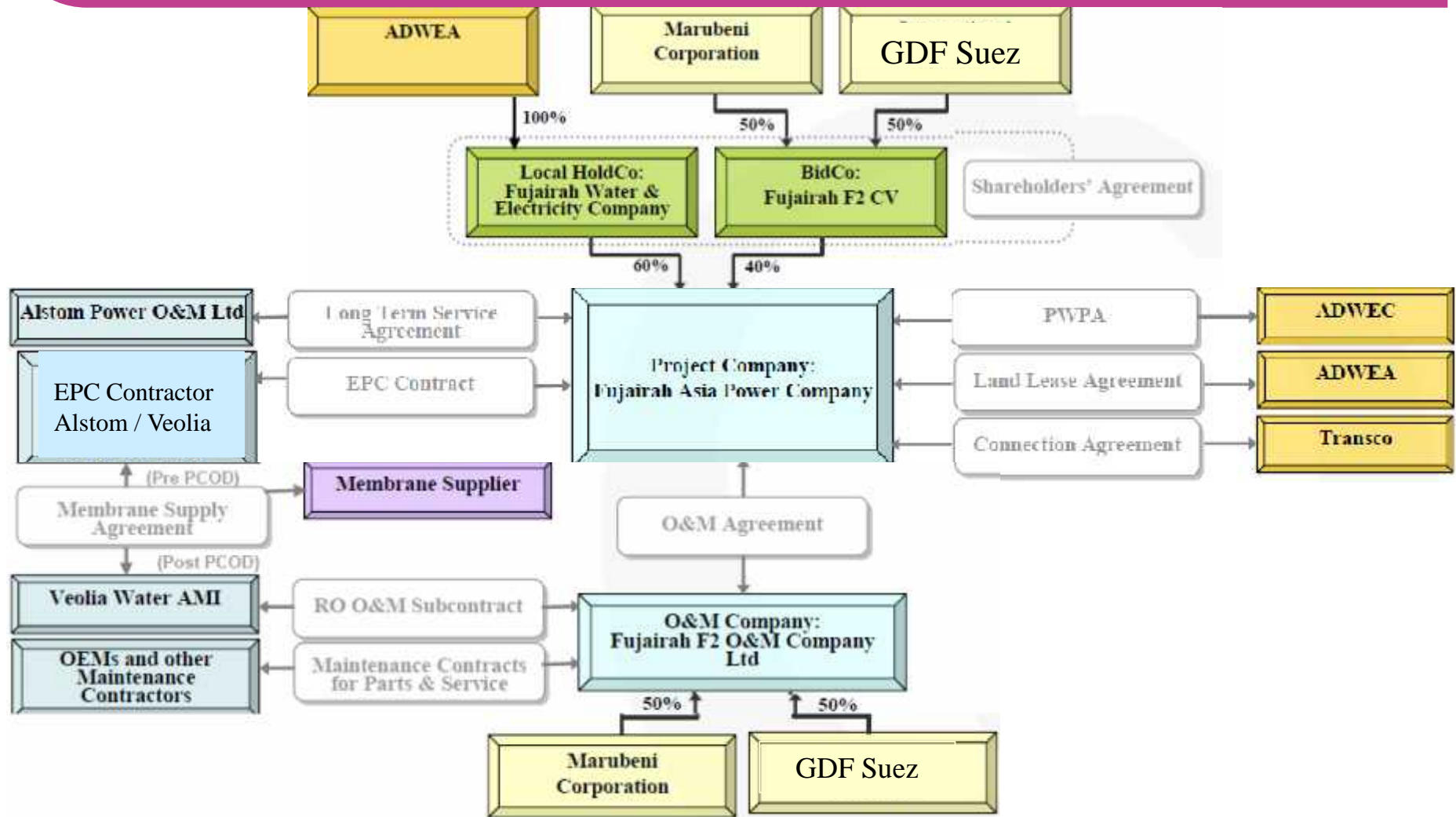


Context

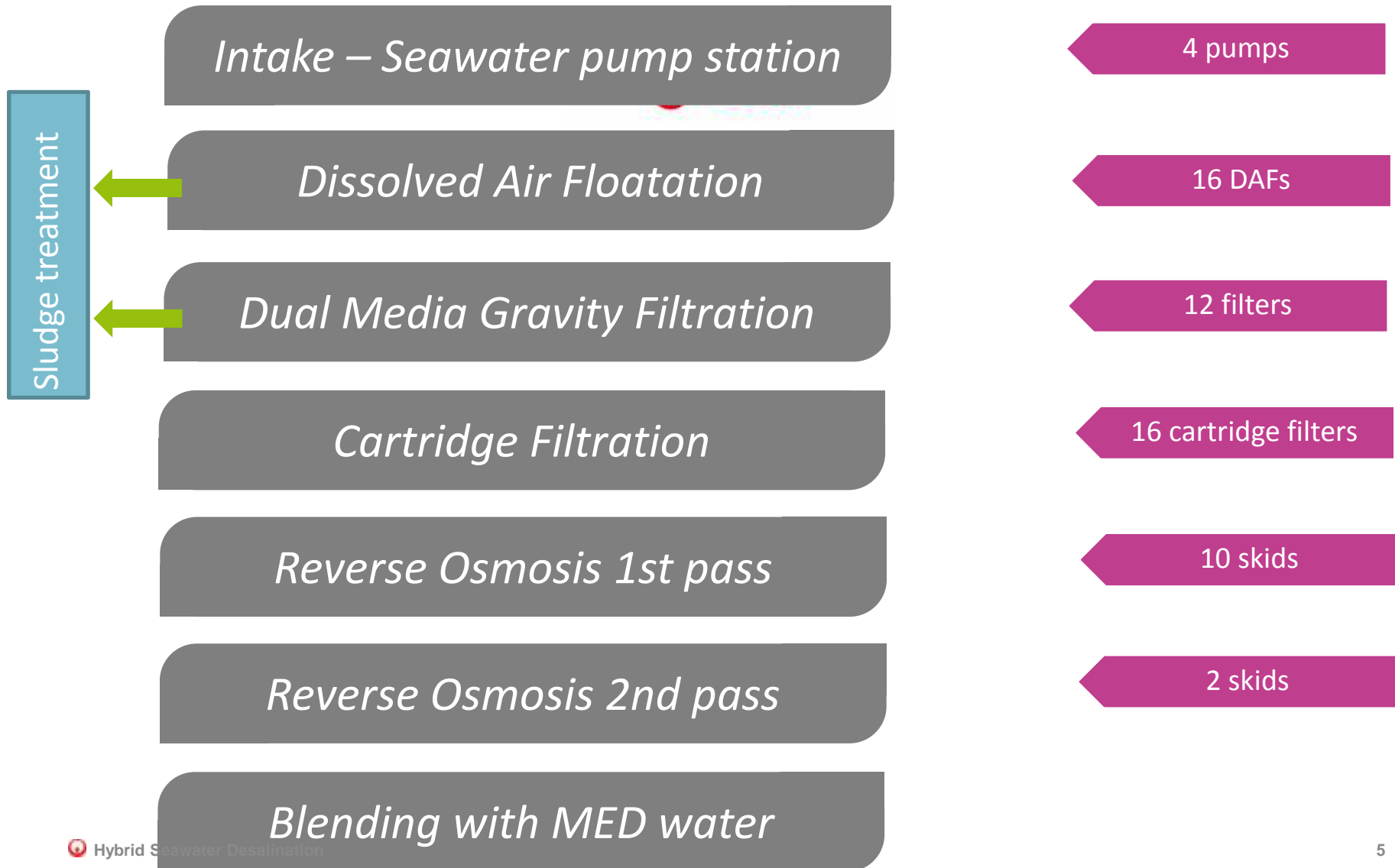
The largest hybrid desalination Plant in the world total capacity 591,000 m³/d
Hybrid desalination system – MED plus RO – the answer to variations in Energy demand with relatively constant water demand.
Allows reduced energy demand in the RO while meeting overall water quality specification.

- Power Plant – 2000 MW Combined Cycle Power Plant
 - *5 Gas Turbines plus 3 Steam Turbines*
- MED Plant
 - *12 - 10 MGD MED-TVC units to produce 120 MGD (455,000 m³/d)*
- RO Plant
 - *10 - 1st Pass RO*
 - *2 – 2nd Pass RO*
 - *Total capacity 36 MGD (136,000 m³/d)*
- EPC Contract – Alstom / Veolia Consortium (2172 M\$)
 - *Alstom :1366 M\$*
 - *Veolia : 806 M\$*

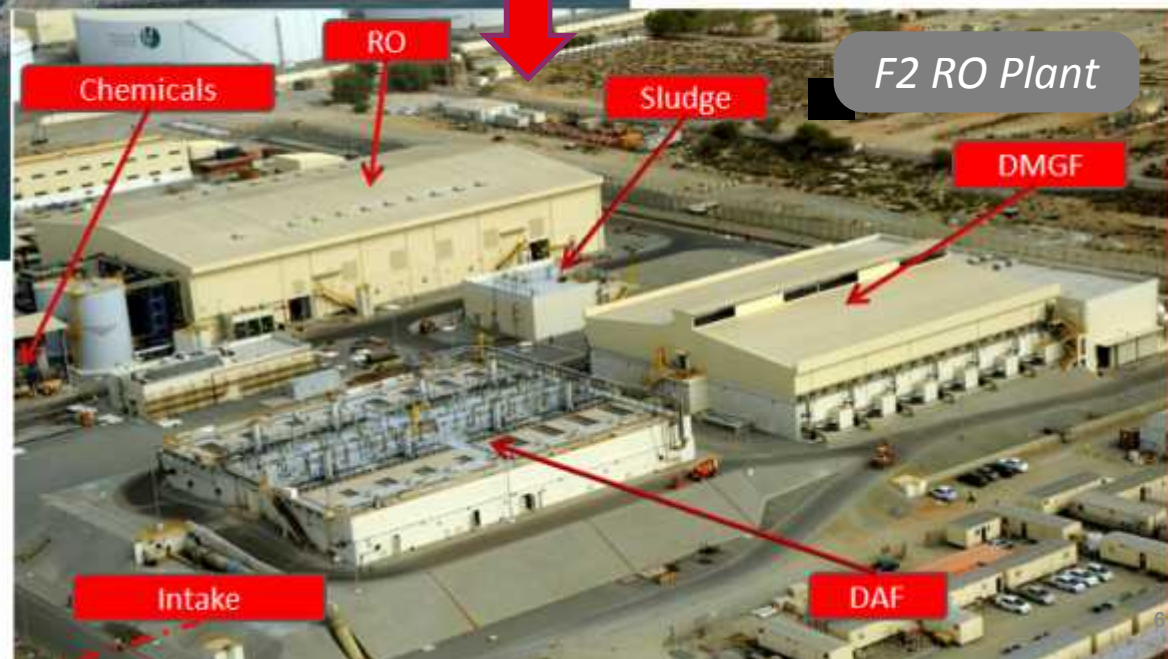
Contract Structure Overview



Plant Process Line



Plant Overview



- 5 Gas turbines : 2000 MW
- 12 MED : 120 MGD (454,000 m³/d)
- RO : 36 MGD (136,500 m³/d), operated by Veolia

Key Figures - Desalination System

◦ Key Dates

- *Notice to proceed* : 12/18/2007
- *Taking Over Group 1* : 03/31/2010 (33% MED + 100% Post Treatment)
- *Taking Over Group 2* : 05/31/2010 (33% MED + 100% RO)
- *Taking Over group 3* : 07/31/2010 (33% MED)
- *24 Month Defect liability period*

◦ Production Capacity - 591,000 m³/d (156 MGD)

- *MED* : 120 MGD (455,000 m³/d) : Recovery ~30%
- *RO* : 36 MGD (136,000 m³/d) : Recovery ~40%

◦ Population served - 550,000

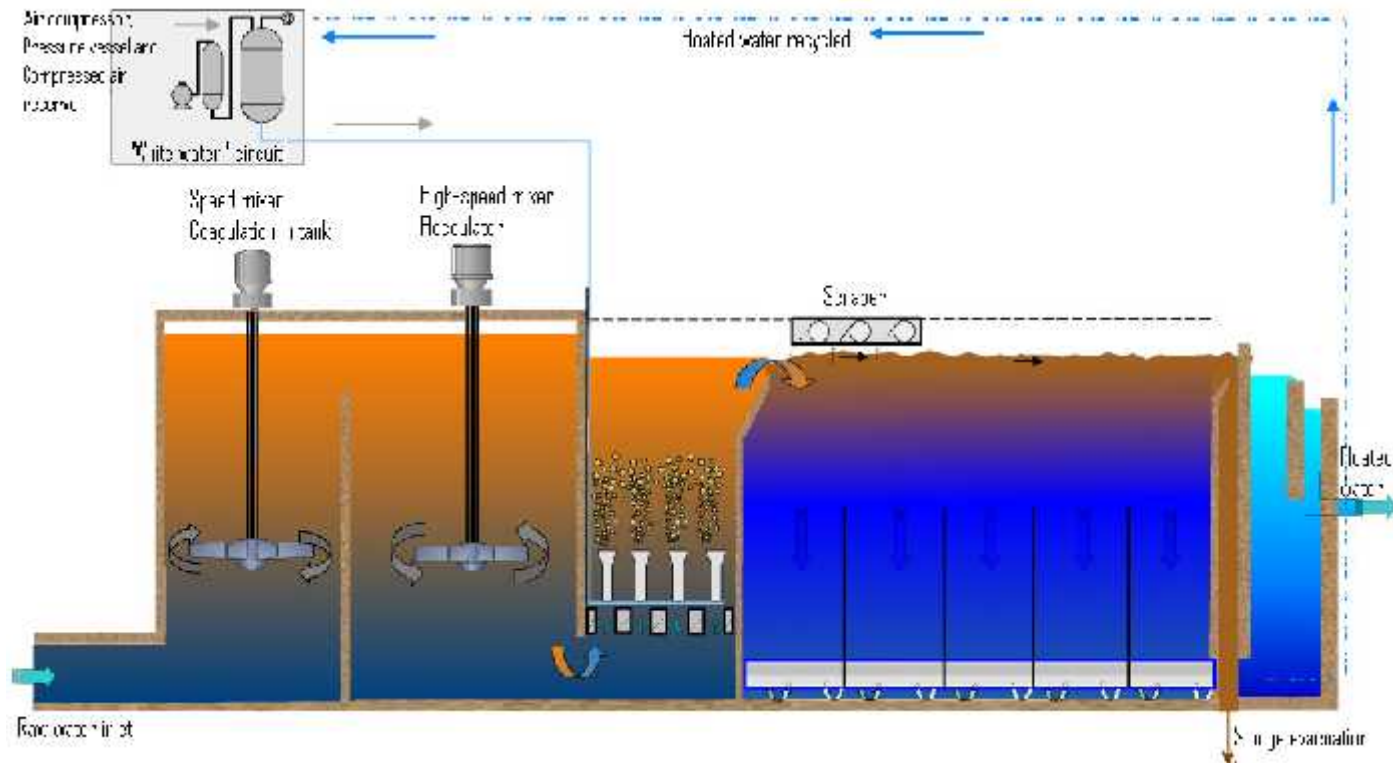
- *Intake Flow* : 321,000 m³/h (1,413.320 gpm) including cooling water
: Seawater Water TDS ~ 40,000 mg/l

◦ Energy (excluding intake)

- *MED* : Electricity 3 kWh/kgal (0.8 kWh/m³)
: Steam 160 T/h low pressure steam
- *RO* : Electricity 14 kWh/kgal (3.7 kWh/m³)
: Pelton Wheel energy recovery 87% efficiency

RO pretreatment sludge – 3,200 cu.ft /month (90 m³/month) 30% dry solids

SPIDFLOW® : Enhanced Dissolved Air Flotation



A process for the removal of Turbidity ,algae and oil from an aqueous suspension. **Successfully dealt with Red Tide algal event allowing continuous operation at full load when other regional plants were shutting down.**

Post Treatment

The product water from the SWRO and the product water from the MED units are blended together and treated by a single post treatment system to achieve the required low boron and final TDS.

The SWRO product

	Guarantee	Actual
TDS	<317 mg/l	200 – 300 mg/l
Boron	< 1.73 mg/l	< 1.0 mg/l
pH	6.5 to 7.5	6.5 to 7.3

Injection of On-site generated Carbon Dioxide.

Lime water injection to achieve positive Langelier Saturation Index

- *Lime water prepared by patented lime saturation process*

Final Product

TDS < 200 mg/l

Boron < 0.5 mg/l



Thank you