

YOUR WATER PARTNERS

Innovations in Desalination



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IDE Technologies Ltd – Overview

Winner of 'Desalination Company of the Year' GWI Award

- ▶ Established - 1965
- ▶ Headquarters - Kadima, Israel
- ▶ Employees - 400⁽¹⁾
- ▶ Subsidiaries - China, India, USA, Europe
- ▶ Installed units - 400 in over 40 countries
- ▶ Ownership:



Significant Global Presence

Israel



Total Capacity:
1,207,000 m³/day

Spain



Total Capacity
78,000 m³/day

Cyprus



Total Capacity
125,000 m³/day

Italy



Total Capacity
27,000 m³/day

USA



Total Capacity
2,000 m³/day

China



Total Capacity
200,000 m³/day

Caribbean

Total Capacity
106,000 m³/day

India



Total Capacity
198,000 m³/day

Latin America

Total Capacity
36,000 m³/day

Australia



Total Capacity
140,000 m³/day

Central Asia

Total Capacity
19,000 m³/day

**Global Deployment.
4 Decades. 40 Countries.
400 Plants.**

Common Issues and Objections re Desalination

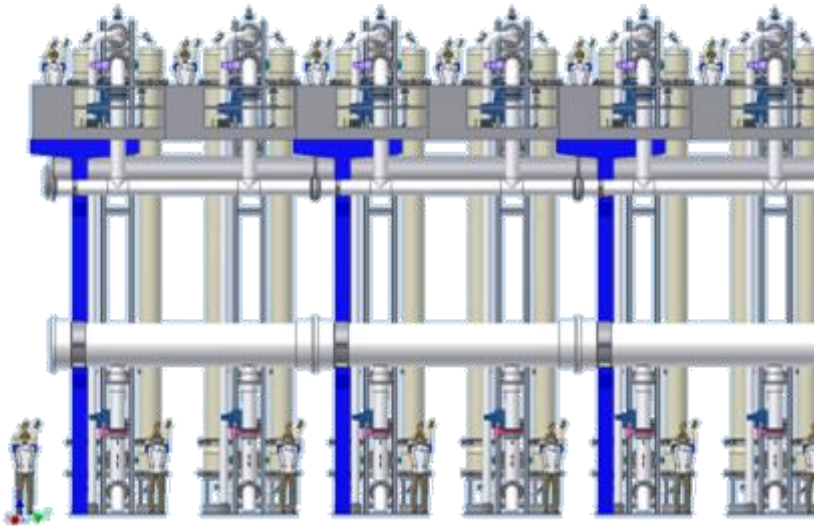
(what I hear in the market place)

- Footprint (takes up too much space)
- Energy Consumption (uses too much energy)
- Water Intake (where is the water coming from?)
- Brine Management (where does the waste stream go?)
- Time to Water (I need the water tomorrow!)
- Price of Water (its too expensive)
- Its Eventually Going to Rain... (so we will just wait)

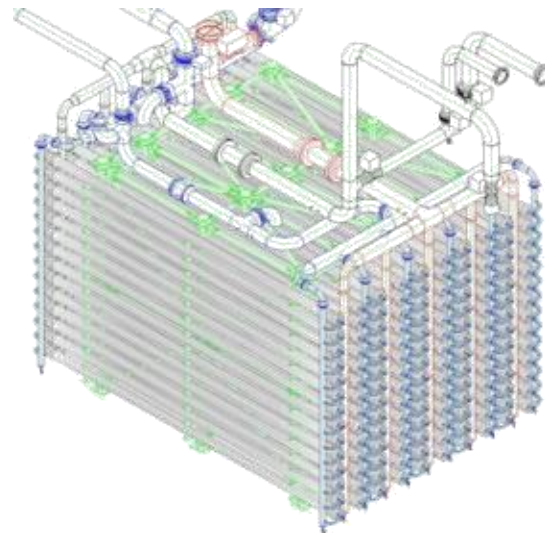
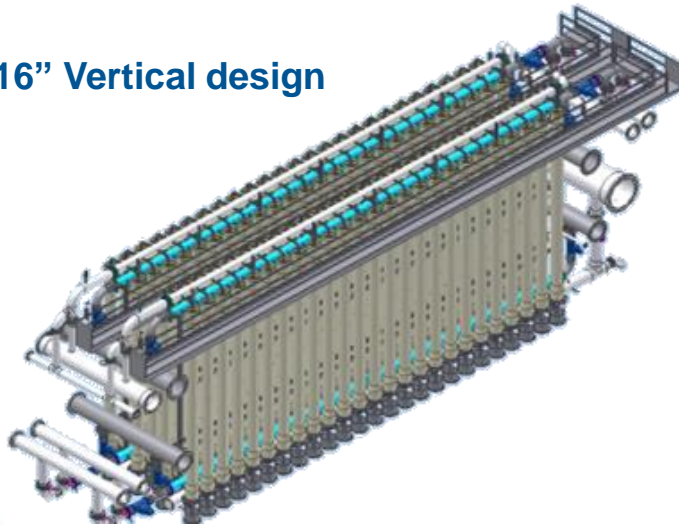
▶ All of these issues, have already been resolved! (some examples)

Concerns Regarding Footprint:

Innovation Example: vertical vs. horizontal (16" Vertical Membranes, Sorek)



16" Vertical design



Standard 8" Horizontal design

Benefits- Vertical RO -16 Inch

Significant Reduction of total “Foot Print”

	Horizontal	Vertical
Membrane Size	8 "	16"
Number of Membrane per PV	8	8
Number of PVs per Train	140	50
Number of Trains	16	16
Number of PVs	2240	800
Number of PVs, equiv 8 "	2240	3200
Total RO Area, m²	1750	1900
Specific Area per PV	0.78	0.59
Total Foot Print Saving	32%	





Putting Desalination Energy Consumption in Perspective

Kenmore 19 cu. ft.
Bottom-Freezer
Refrigerator - White



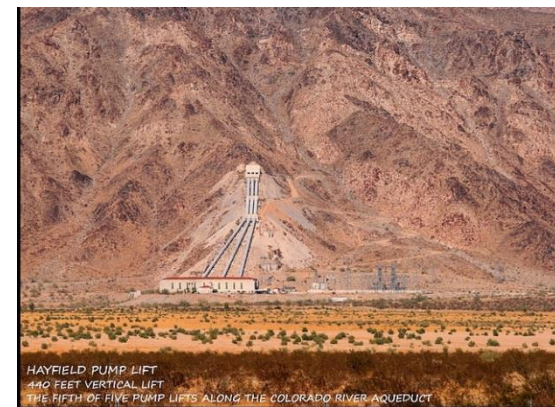
Kilowatt Hrs. per Year:
~448

SWRO Desalination
Plant



Kilowatt Hrs. per Year:
~483/pp

Imported Water in
CA: SWP and MWD



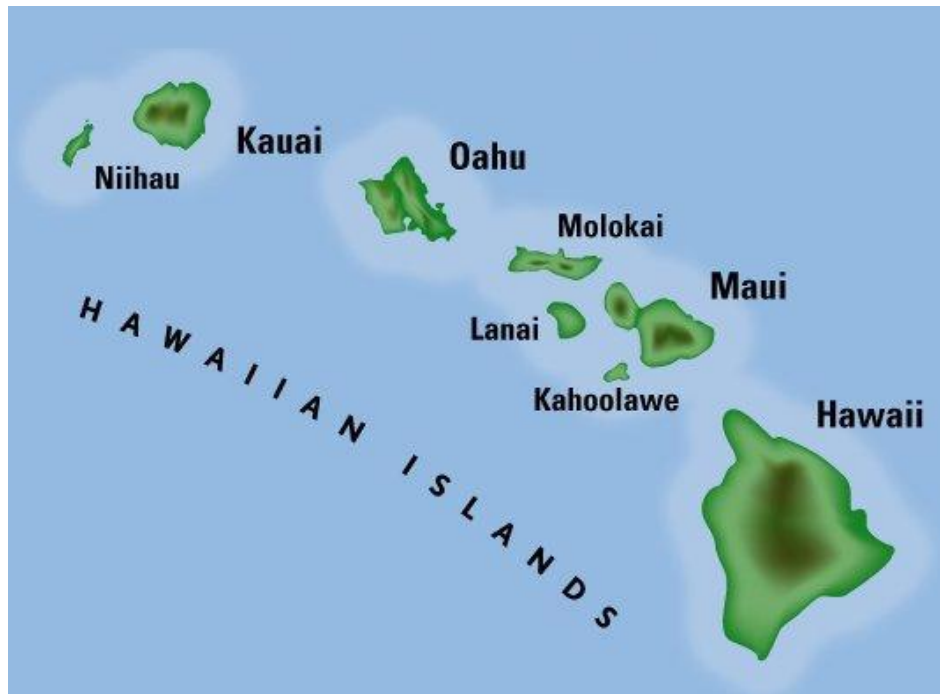
Kilowatt Hrs. per Year:
~SWP – 336/pp
~MWD – 224/pp

(source:
<http://www.nrdc.org/water/conservation/e-drain/edrain.pdf>)

Concerns Regarding Energy Consumption

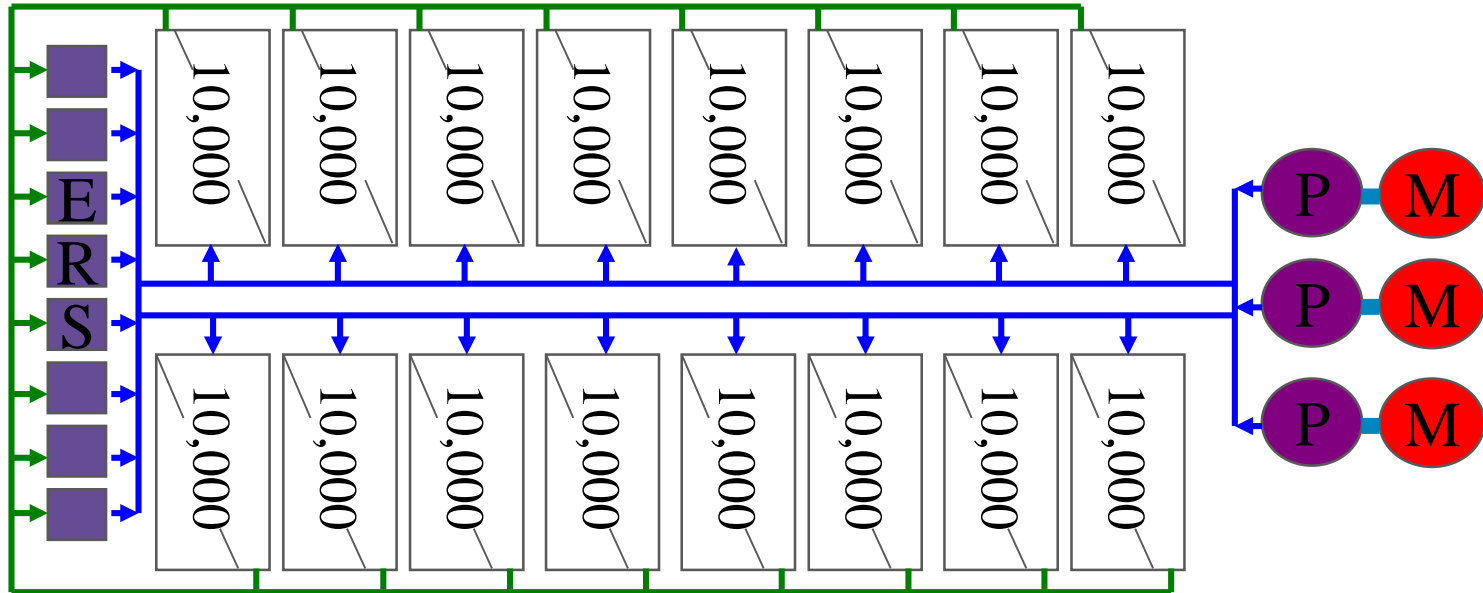
Lanai Example

- ▶ Global model of environmental sustainability
- ▶ 100% wind and solar operated in association with a micro-grid
- ▶ Pumped hydro as a mechanism for energy storage



Concerns Regarding Energy Consumption

IDE's Pressure Center Concept Minimizes Number of Pumps and Maximizes Motor Efficiency (RO trains operate with 95% energy recovery)



*Each RO bank no longer required its own pump and ERS.
Invented and Implemented in Ashkelon, Hadera, Sorek and Carlsbad*

Concerns Regarding Intake

▶ Sorek, Israel (150 MGD)

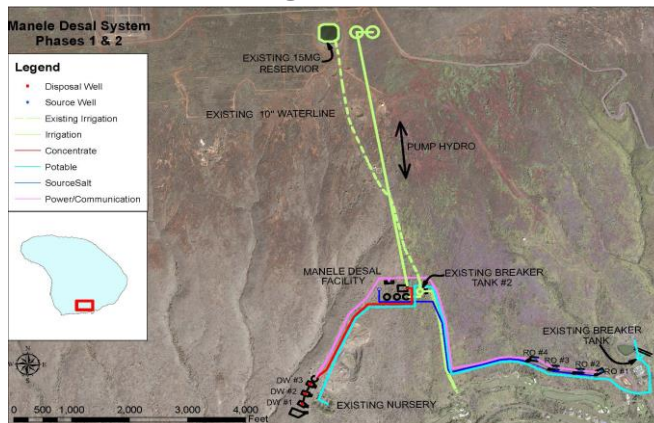
- 2.5 km of intake pipe using pipe jacking under nature reserve



Sorek SWRO Plant – Tel Aviv skyline on the horizon

▶ Lanai, Hawaii (10MGD)

- Saline groundwater well deployed 2 km away from beach



Desalination Innovation – Intake Design in Environmentally Sensitive Areas

- ▶ 2.5 km; D – 3.1m



Pipe Jacking

- ▶ Pipe segment



Intake Pipeline Suction Head + Air Bubbles for Jellyfish Rejection



Concerns Regarding Brine: Some Options

- ▶ Salt mining
 - Recapture valuable minerals
- ▶ Aquatic Farming
 - Brine shrimp to feed fish farm
 - Oyster farming
- ▶ Fracking and Completion Fluids
 - Avoids sourcing fresh water
- ▶ Brine Minimization Technologies
- ▶ Power Generation (osmotic power)
 - Forward Osmosis

Concerns Regarding Time to Water – Packaged Plant Modular Design



*Prefabricated RO Plant 140K m3/day
Cape-Preston, Australia*



*Manufacturing Shipyard,
China*



*Vessels were shipped from China to
India*



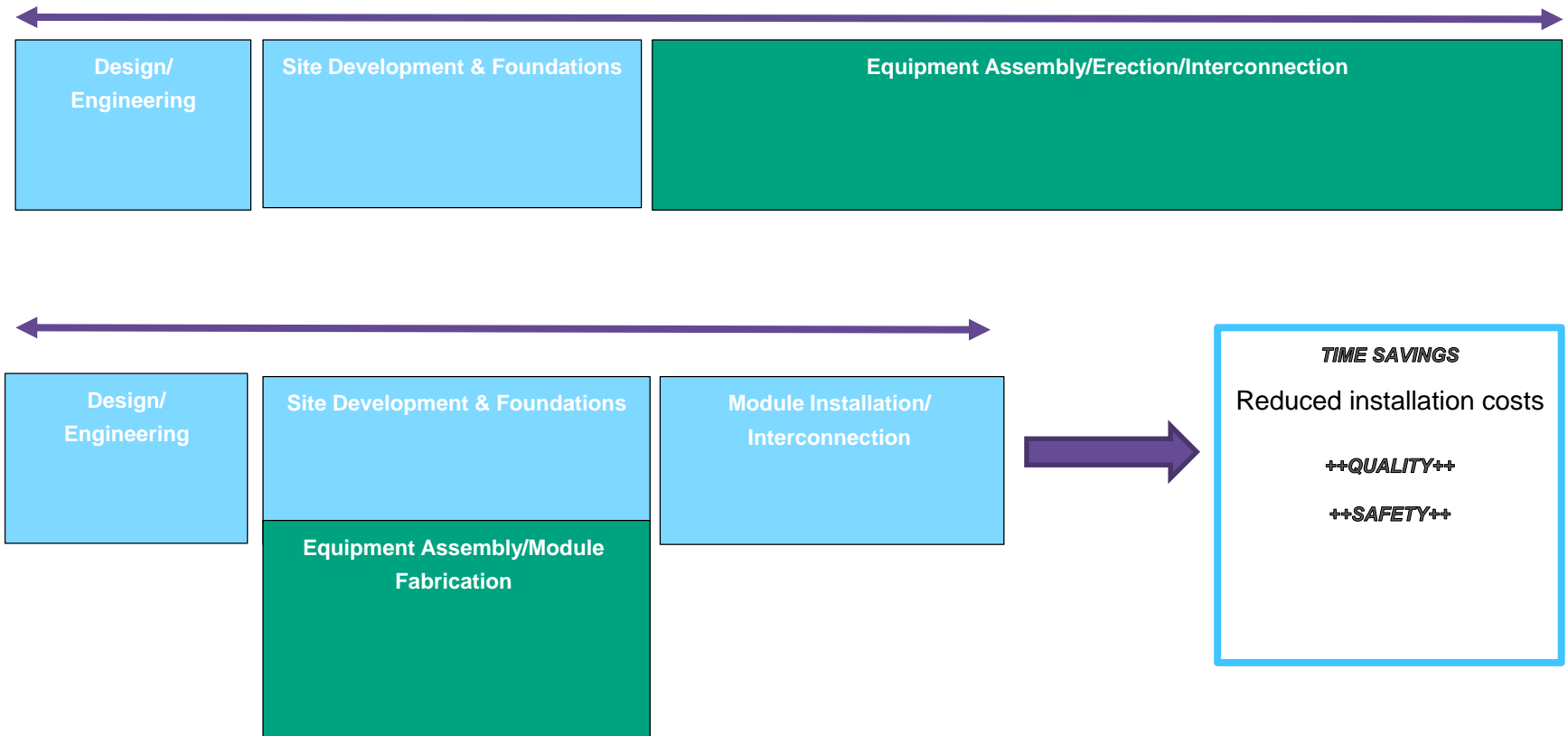
Skid/Containerized Plants



*MED Facility Erection,
Reliance, India*

Track Record – All Projects On Time and On Budget

Advantages of Modular Plant Design



Cape Preston – Modular delivery



SWRO Skid Delivered to Pre-fabrication Yard



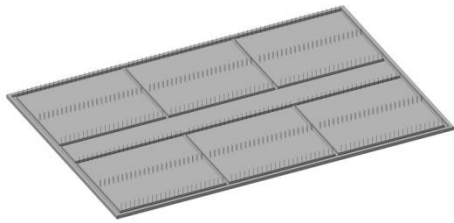
SWRO Skid Installed within Membrane Building Module and Pressure Vessels Installed



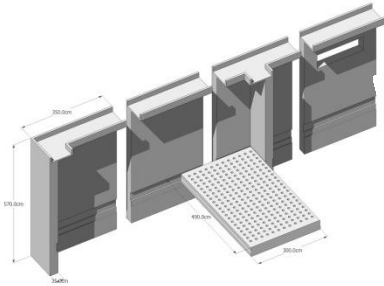
 Membrane Building Module – Ready for Transport

Modular Plant Design

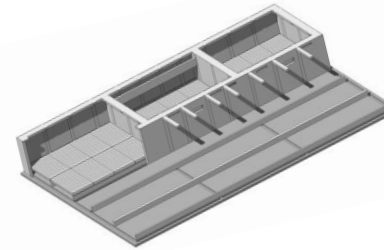
Pre-Treatment



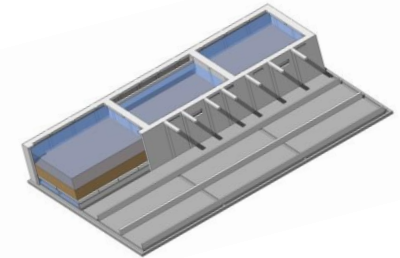
Foundation



Pre-Cast Panels

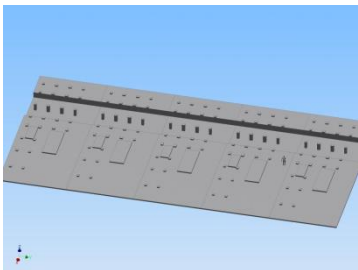


Panel and Underdrain
Erection

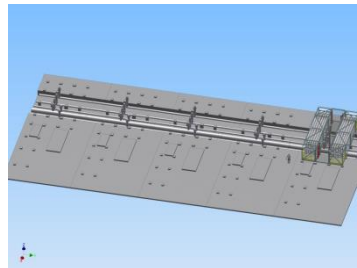


Media Installation

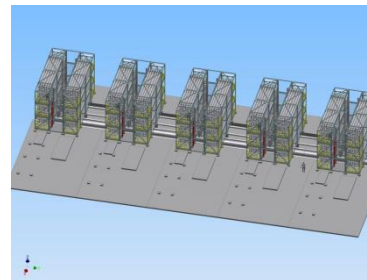
RO



Foundation



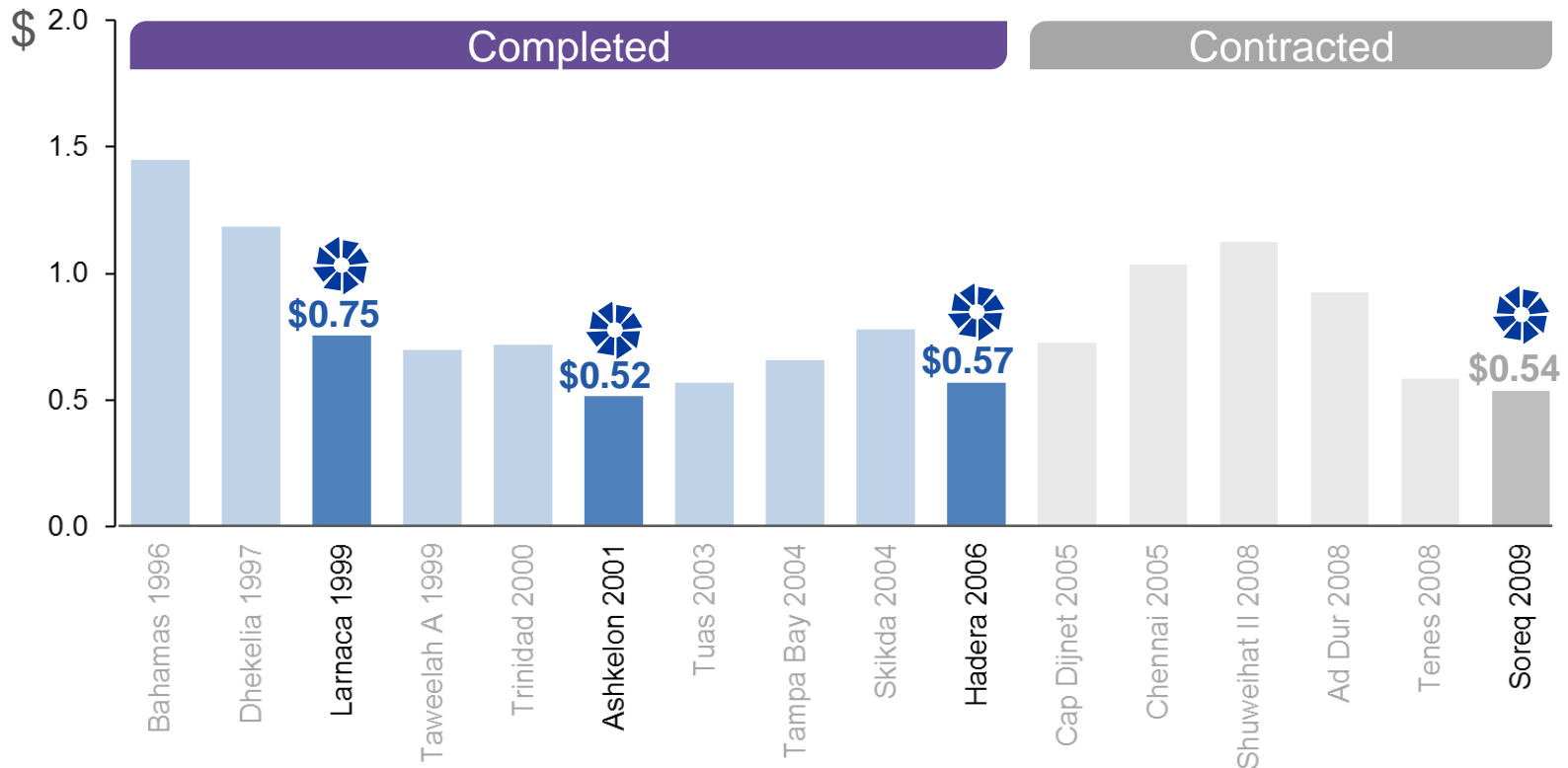
RO Skid Installation



Process Pumps and
Pre-Spooled Piping

Concerns Regarding Price of Water

- ▶ Blended pricing concept = lowest cost for water “security”
- ▶ Water Purchase Agreement shifts risk = lowest water price.
- ▶ When there is no water, how much would you pay for water?



It's Eventually Going to Rain

Really?



Thank you

Questions?