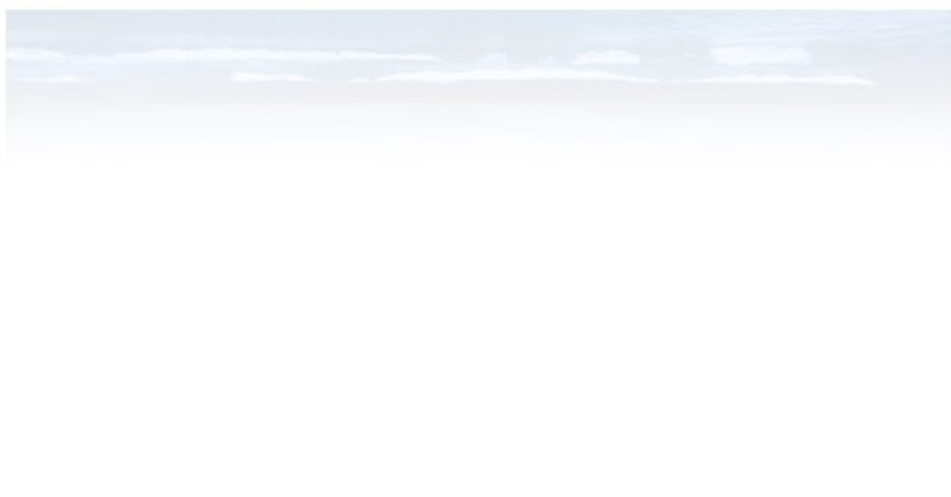


Workshop on Water Optimization in Thermal Power Plants

India Habitat Centre, Lodhi Road, New Delhi

Corporate



Winner of 'Desalination Company of the Year 2011' GWI Award

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



(1) Including subsidiaries

Another Milestone

IDE's Carlsbad desalination project now going for the double



The **Carlsbad Desalination deal** is now going for the double. Having just won Project Finance magazine's North American Water Deal of the Year, we hope, with your help, it will also win the equivalent Global Water Award for 2013.

The project took a decade of preparation and tremendous tenacity by all participants, proving that large-scale desalination projects in the US can be financed. The innovative structure of the deal allows savings of an estimated \$200 million and will serve as a blueprint for future large-scale desalination projects in the US.

Cape Preston plant shortlisted for Industrial Water Project of the Year in the Global Water Awards 2013



The **Cape Preston Desalination Plant** is truly groundbreaking.

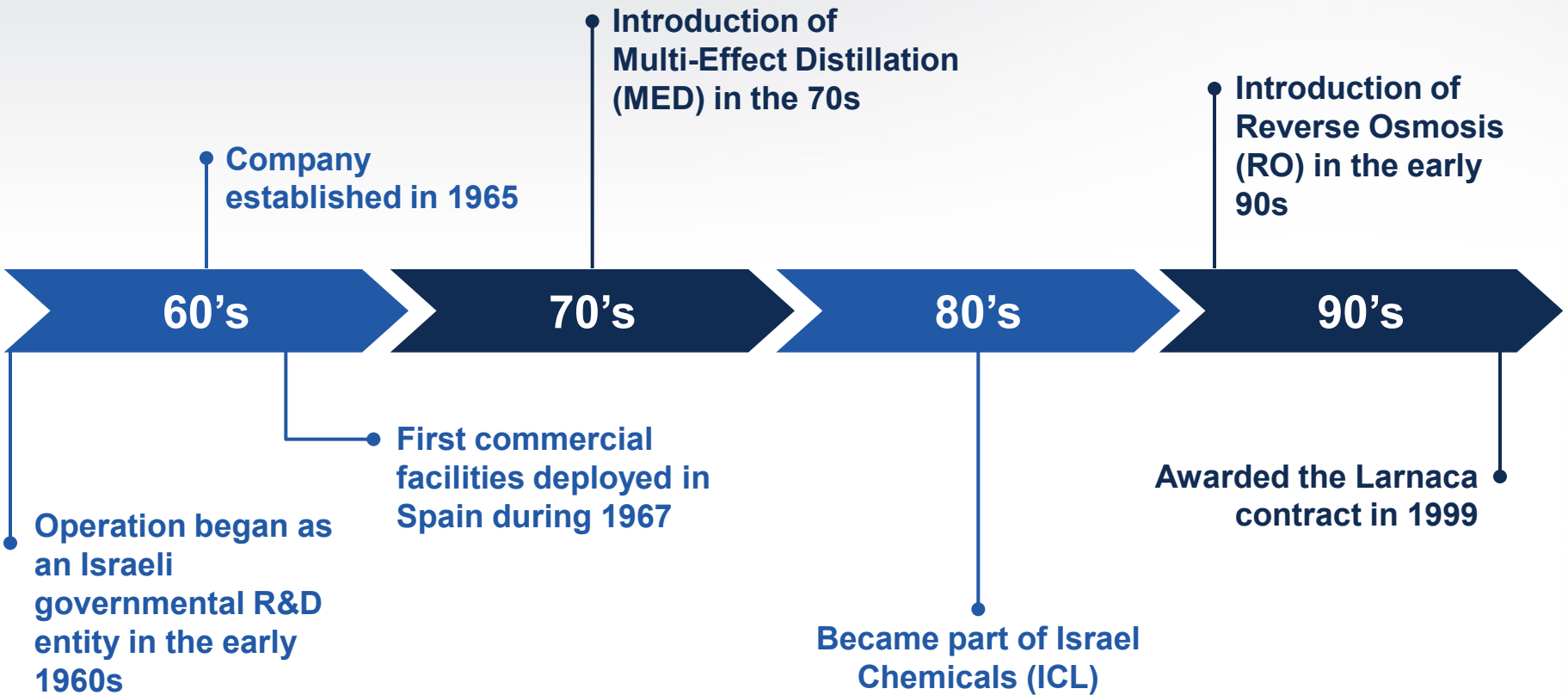
This is the first time a pre-engineered modular plant has been built on this scale and represents a revolution in the desalination plant supply chain.

Solutions & Technologies:

- Desalination
- Industrial Water Treatment
- Snowmaking & Refrigeration



Corporate History



Corporate History



Desalination: Solutions & Technologies

- Thermal Desalination
- Reverse Osmosis Desalination
- Water Sales

Tianjin, 200,000 m³/day
China's largest MED desalination facility



Hadera, Israel 127M m³/year
The largest operating SWRO facility worldwide



Desalination Solutions – Large Scale Projects

EPC Global Market Leader

- **Reduced Costs:**
 - Unparalleled optimization of Capex vs. Opex expenses
- **Expertise:**
 - Successful implementation of world's largest, most complex mega-size thermal & SWRO facilities
 - Successful global BOT projects
- **Proven Track Record**
 - 400 Plants. 40 Countries. 4 Decades

Reliance, India 160,000 m³/day
MED desalination facility



Ashkelon, Israel 118M m³/year
Second largest operating desalination
facility worldwide

Unique Value: MED, MVC - Thermal Desalination

Largest MED & MVC Facilities

- **Technology**
Proprietary Multi-Effect Distillation (MED) & Mechanical Vapor Compression (MVC) technologies
- **Energy**
Lowest MED & MVC desalination plant energy consumption
- **Cost**
Optimized competitive cost performance
- **Plant Size**
Largest MED sites & MVC units worldwide⁽¹⁾

(1) In accessible markets



Unique Value: SWRO – Membrane Desalination

Largest Operating SWRO Facilities Worldwide

■ Technology

- Intellectual Property (IP)
- Innovation
- Industry First
- Setting global standards & trends

■ Energy

World leader in lowest desalination plant energy consumption

■ Cost

Continuously setting price benchmarks

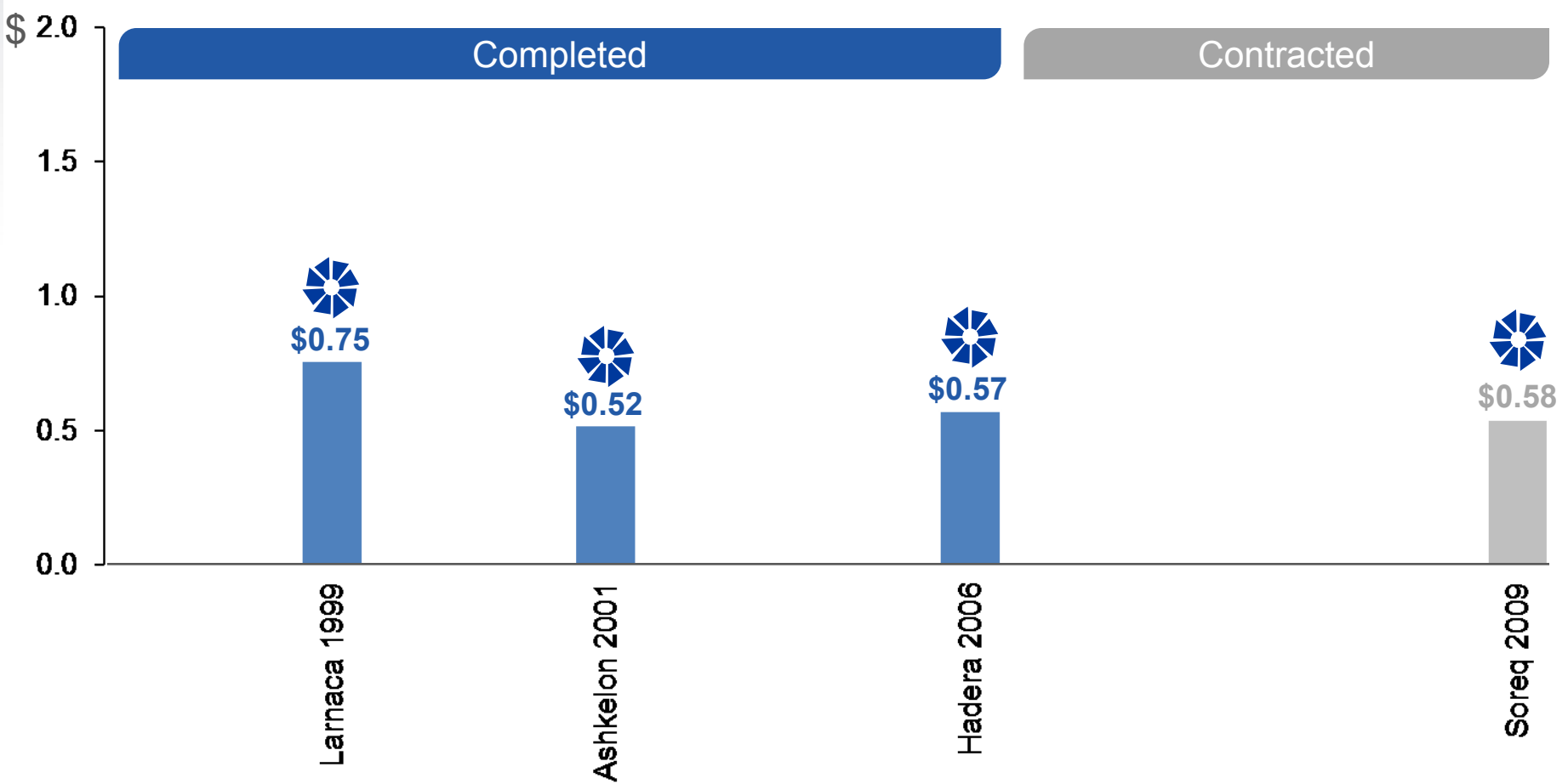
■ Track Record

World's largest, most complex SWRO projects



Setting the Industry Price Benchmark

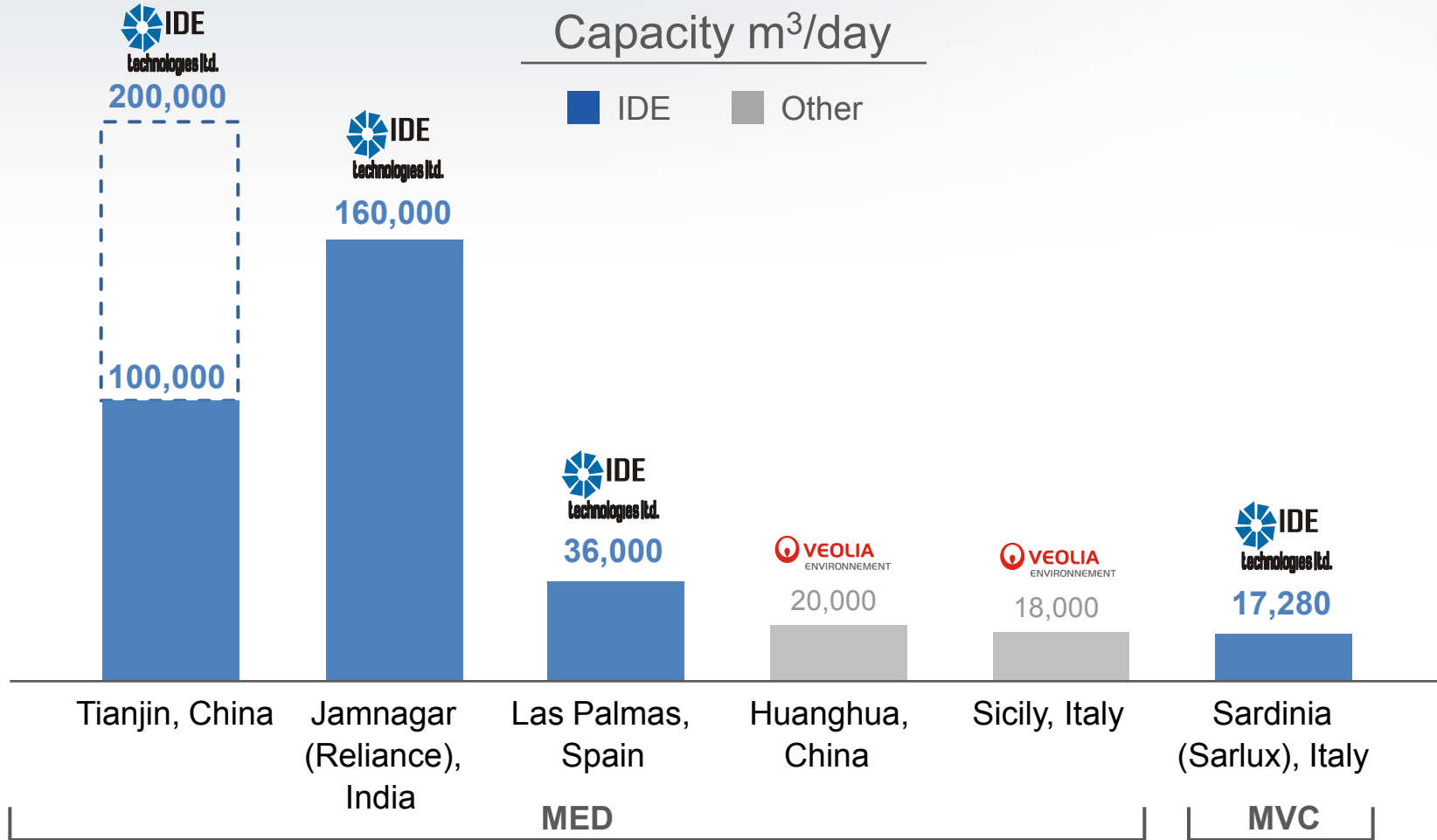
Global Key Projects Water Prices



Source: Global Water Intelligence (2010), Company Information

Proven Leadership in Large Scale Projects¹

MED/MVC



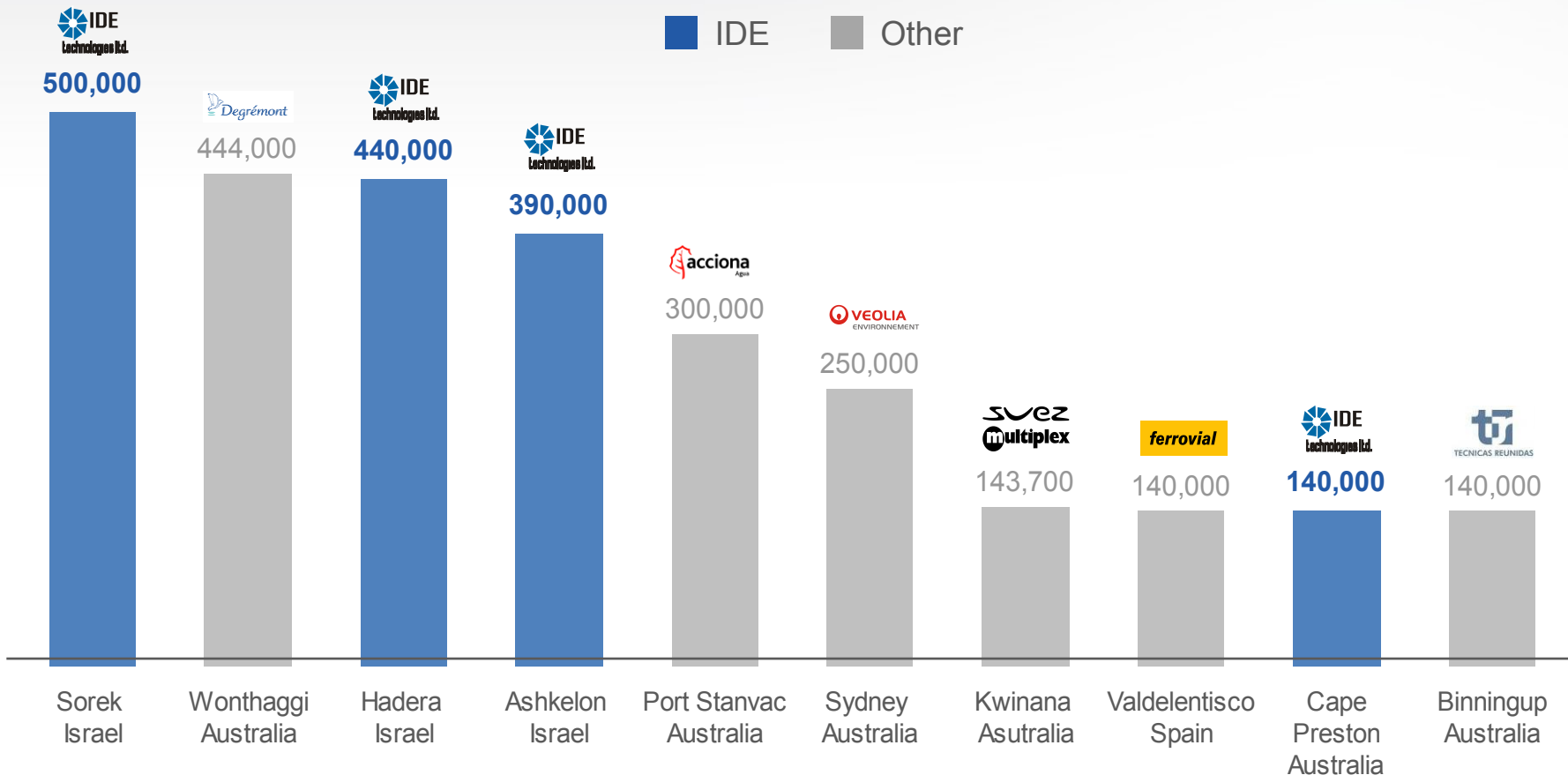
Source: Global Water Intelligence (2010), Company Information

(1) In accessible markets only

Proven Leadership in Large Scale Projects⁽¹⁾

SWRO

Capacity m³/day



Source: Global Water Intelligence (2010), Company Information


(1) In accessible markets only

Industrial Water Treatment & Recycling Solutions


- **Reliable. Sustainable. Economical.**
- **Proven Technology**
 - Thermal & Membrane based solutions
 - Successful operation for over 20 years e.g:
 - Tutuka, South Africa
 - Wintershall, Germany
- **Cost-Effective**
 - Unique horizontal modular design
 - Low field set up costs
- **Environmentally-Friendly**
 - Reduced energy consumption & footprint
 - Low chemicals consumption




Successful Global Leadership Over 4 Decades

Israel 


Total Capacity:
1,330,000 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


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

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

Blue Chip Customer Base

Desalination Solutions

Additional Solutions

Power Facilities

Refineries & Industries

Municipalities/ Governments

Industrial Evaporators

Refrigeration/Heating/Ice & Snow Machines

Top Customers

Top Customers

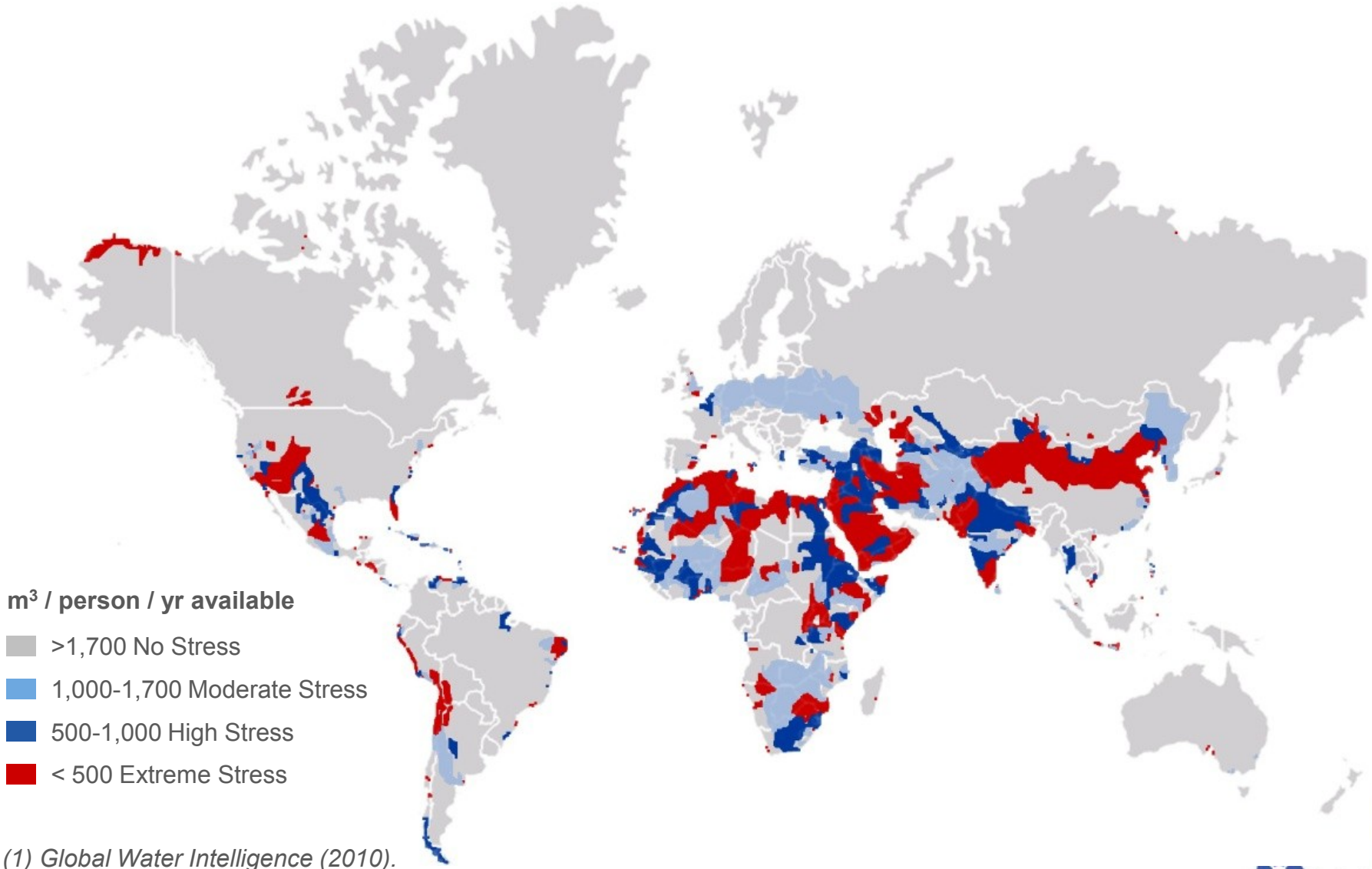
Top Customers

Top Customers

Top Customers

Company	Country	Company	Country	Company	Country	Company	Country	Company	Country
NPCIL	India	Reliance	India	WDD	Cyprus	Nestle	Thailand	Anglo Gold	South Africa
SDIC	China	HAR	Greece	WDA	Israel	Integral Technologies	Germany	Sanken	Japan
Endesa	Spain	PDVSA	Venezuela	Poseidon Resources	California, US			Lego	Denmark
CFE	Mexico	Hovensa	U.S.V.I	MoE Spain	Las Palmas, Spain			Alpine ski resorts	Switzerland
PPC	Greece	Ref. di Korsou	Antilles					Alpine ski resorts	Austria
Sarlux	Italy	Hess Oil	U.S.V.I						
Essar	India	Aruba Ref.	Aruba						
AES	Chile	Oil Refineries	Israel						
Enersur	Peru	Turkmenbashi Ref.	Turkmenistan						
Tacoa	Venezuela	Sino Iron	Australia						
Kazatomprom	Kazakhstan								

World Water Availability, 2025¹



(1) *Global Water Intelligence (2010).*

- **Technology**

Proprietary Multi-Effect Distillation (MED) & Mechanical Vapor Compression (MVC) technologies

- **Energy**

Lowest MED & MVC desalination plant energy consumption

- **Cost**

Optimized competitive cost performance

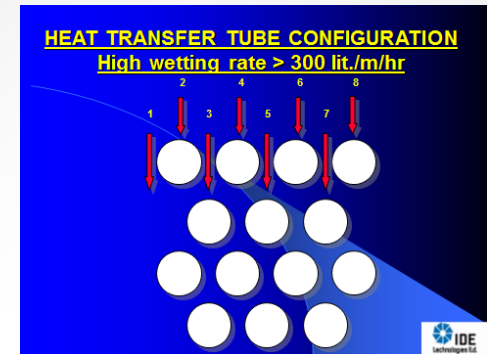
- **Plant Size**

Largest MED sites & MVC units worldwide

- **Efficiency**

The Low Temperature Multi Effect Distillation (LT-MED) is one of the most efficient thermal desalination processes in the world currently in use

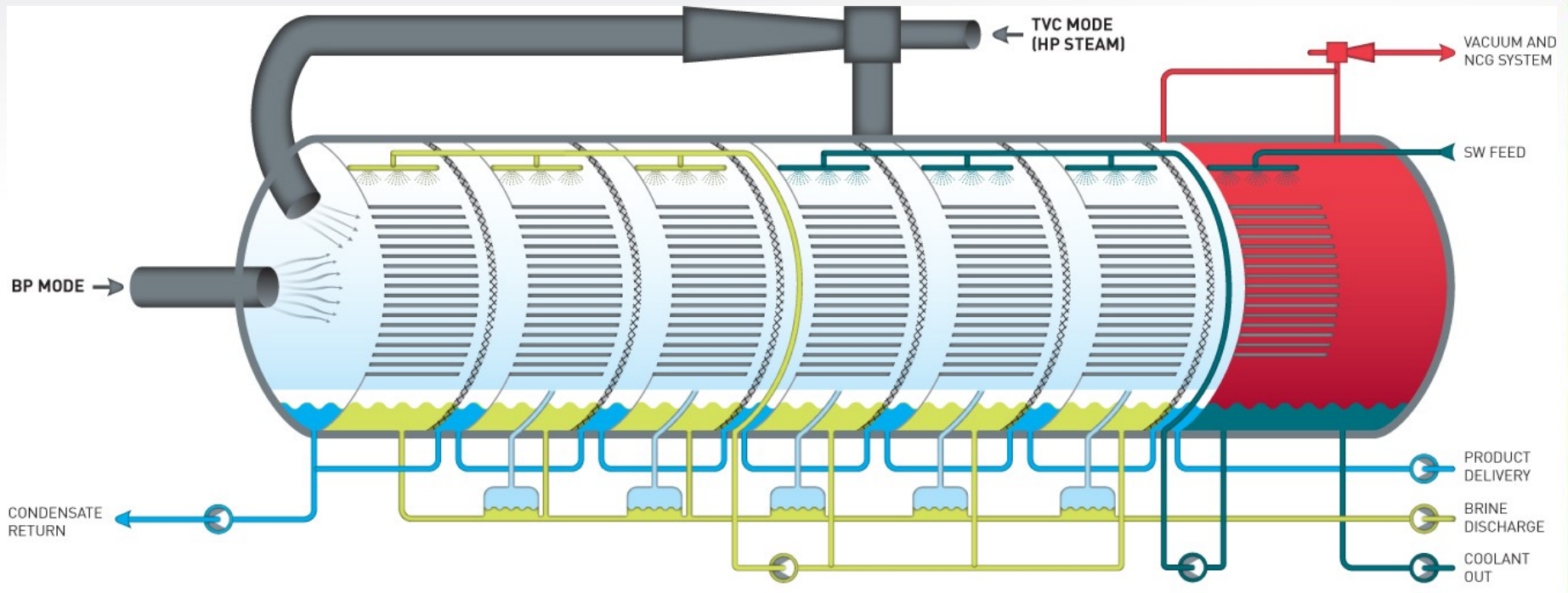
- The thermal desalination process requires the following:
 - Constant source of raw water
 - Constant source of energy
 - Evaporation - condensation in a vacuum environment



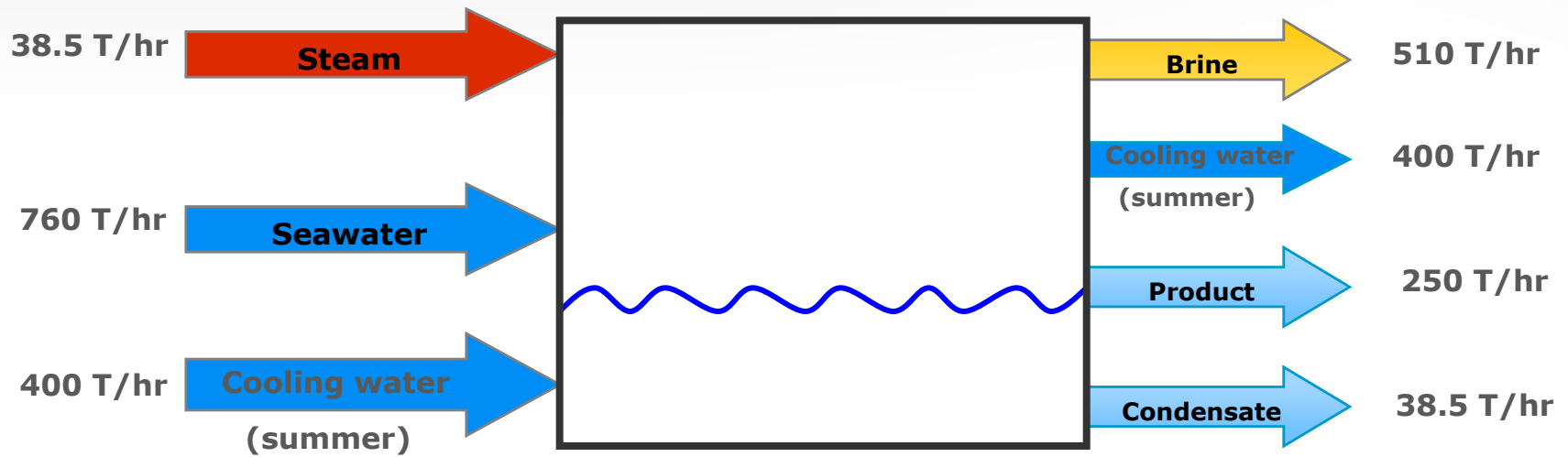
Technological Advantages:

- High thermal efficiency – low cost Materials of Construction (MOC)
- Large wetting areas - avoiding scaling & fouling
- Falling film wetting areas – reliable, non-clogging wetting operations
- Backpressure MED – enabling the use of waste heat as a driving force
- MED using flue gases from FGD or Diesel as a driving force (using a Flash Chamber)

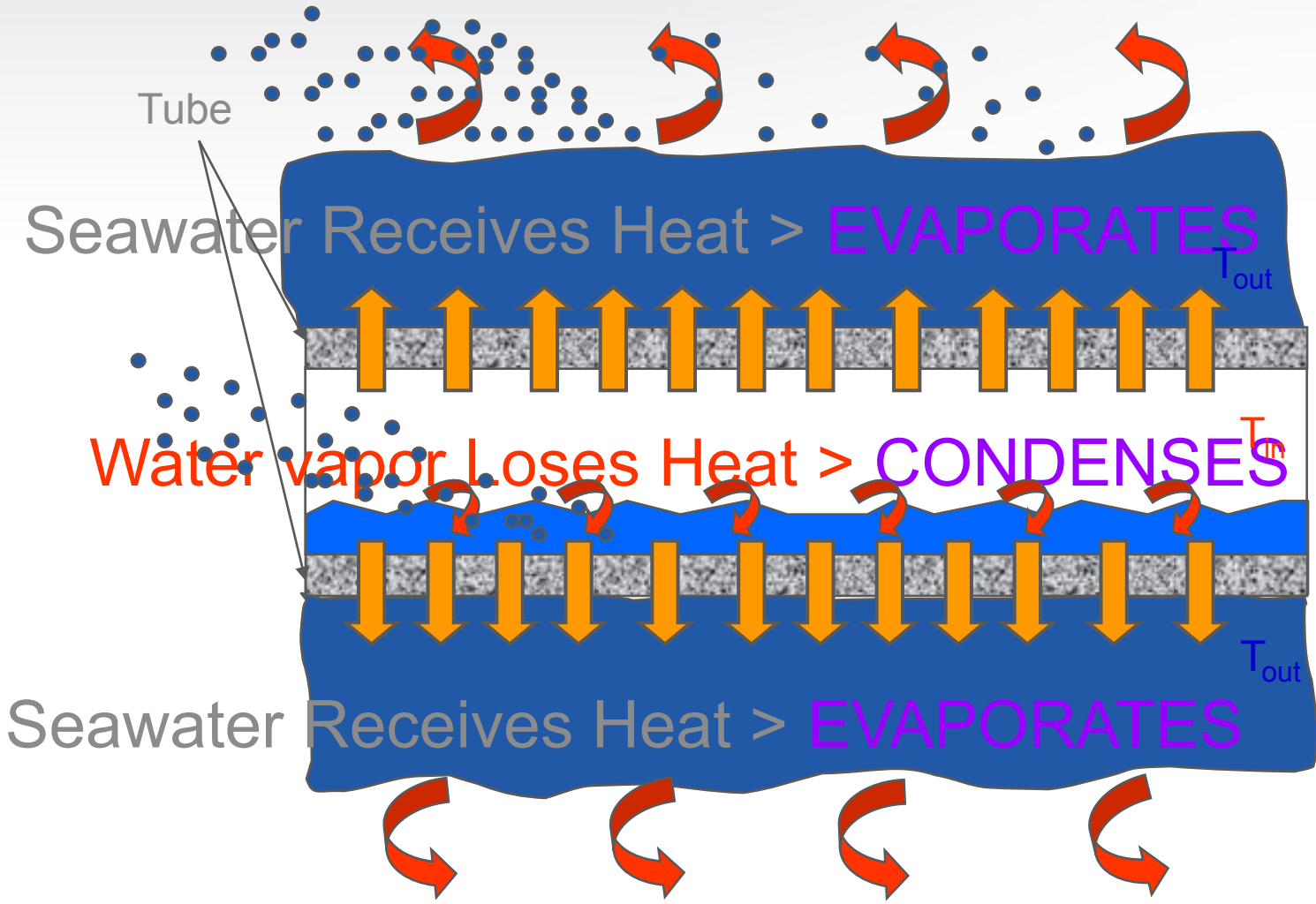
Multi Effect Distillation (MED)



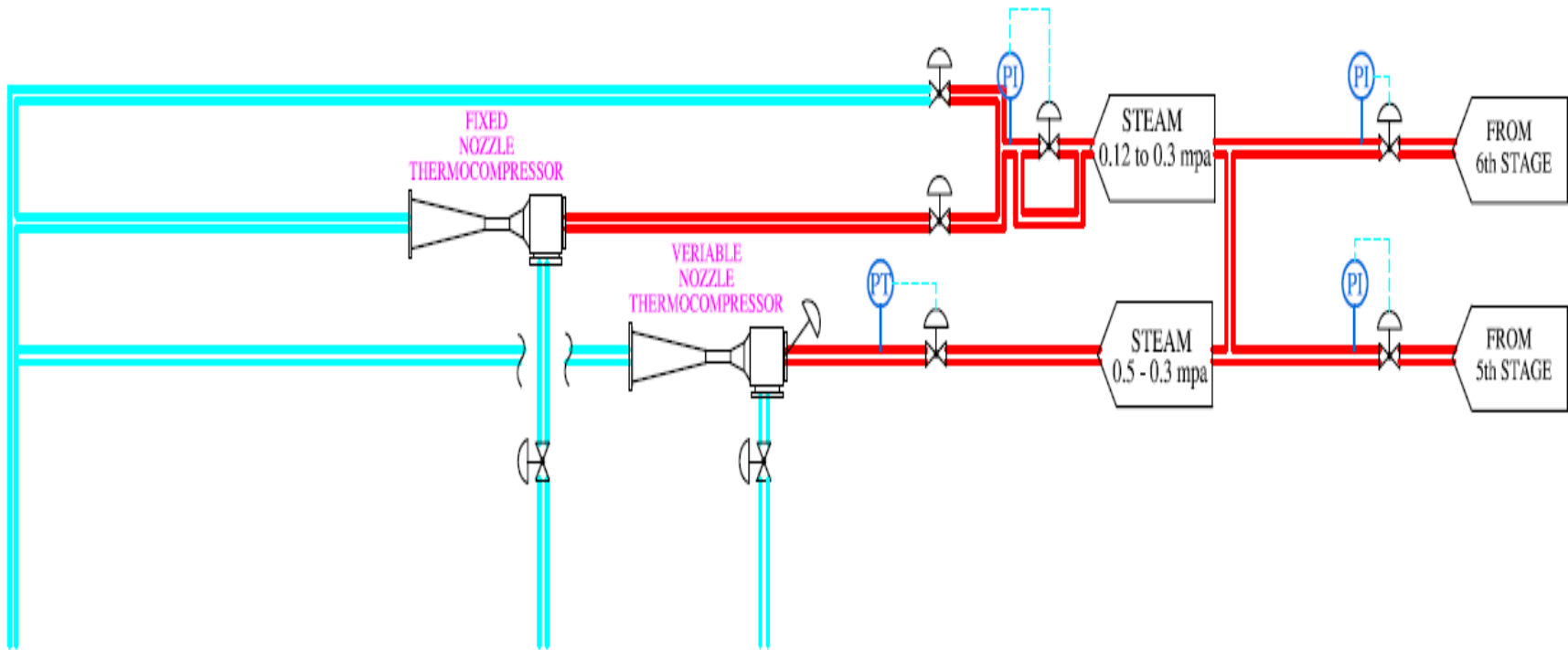
Typical MED 6000 Plant Design Mass Balance 6000 m³/day



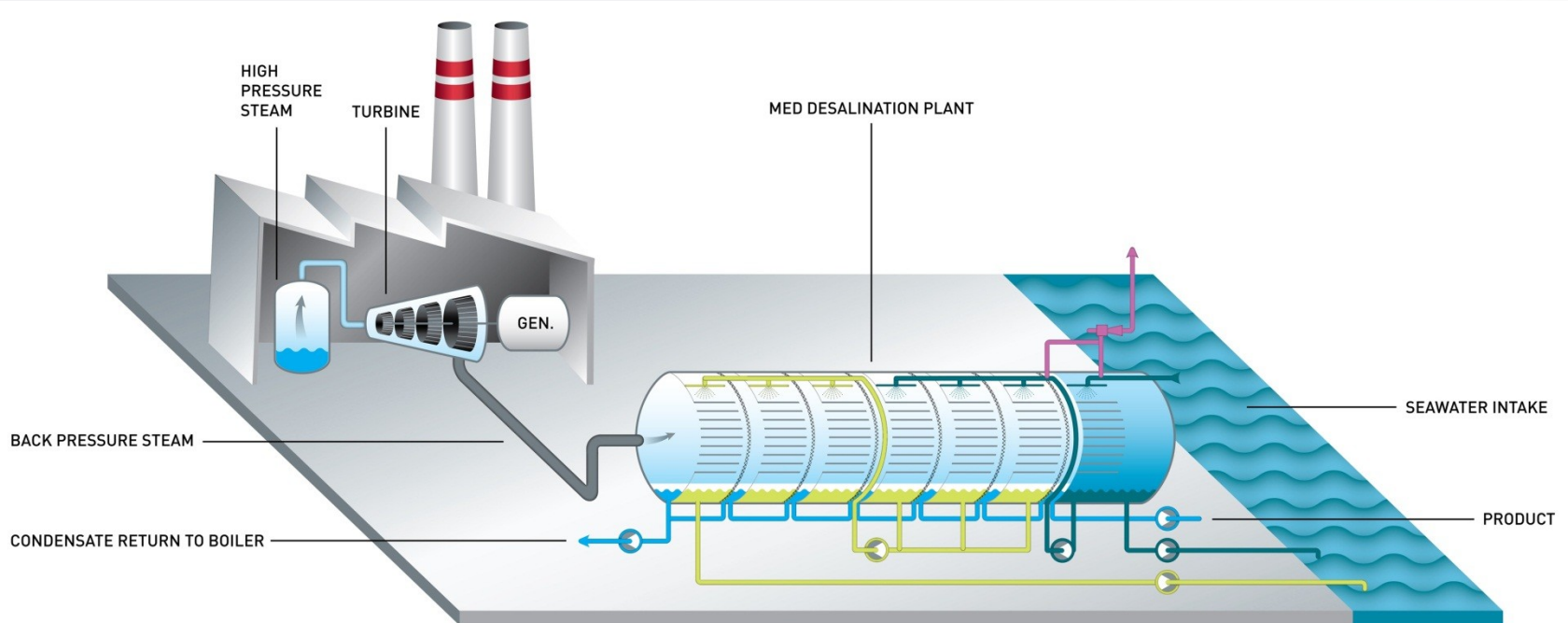
Condensation (inside) + Evaporation (outside)



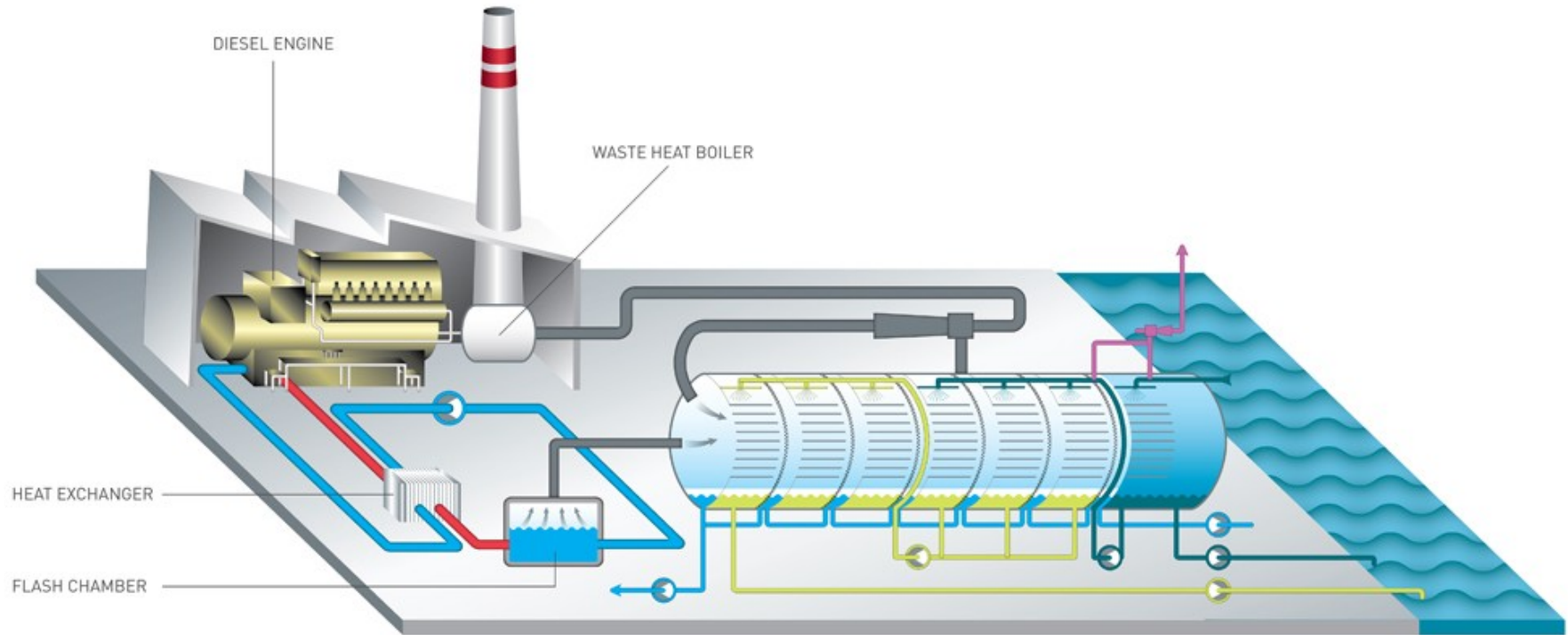
The MED can operate between 40%-110% capacity under variable steam pressures and temperatures



Back Pressure



MED Diesel



Reliance - India's Largest Desalination Plant

160,000 m³/day



Reliance Plant Benefits

- Technology
 - Continuous successful operation with high reliability > 95%
 - Low energy consumption
 - Low temperature process for high safety and low maintenance
- Robust customized design
 - Optimized for customer needs
 - Low O&M costs
- Easy operation
- Minimal pretreatment required

Additional IDE Thermal Solutions in APAC

- Tianjin, China
- Essar, India
- Parry, India
- Sanghi, India
- NPCIL/Kudankulam, India

SDIC Tianjin – China's Largest Desalination Plant

200,000 m³/day



Essar, Jamnagar, MED – 65,000 m³/day



E.I.D. Parry (Chennai) MED-1,560 (1994)



Sanghi Cement (Hyderabad) MED-5,500 (1996)



NPCIL (Nuclear Power Corps of India (Kudankulam))

4 x MVC - 2,560 (2006)



NPCIL, India 4 x MVC - 2,560 (2006)



Sorek Seawater Desalination Facility

One of the largest SWRO desalination plants worldwide

- **Capacity**

150 M m³/year, 624 MLD (max. 26,000 m³/hr): ~ 20% of the potable water consumption of Israel

- **Technology**

Reverse Osmosis (RO)

- **Project Type**

BOT (Build, Operate & Transfer) - 25 years

- **Location**

Sorek, Israel

- **To be Commissioned**

2013



Currently under construction - to be operational in August 2013

Hadera Seawater Desalination Facility

The largest SWRO operating desalination plant worldwide

- **Capacity**

127M m³/year

- **Technology**

Reverse Osmosis (RO)

- **Project Type**

BOT (Build-Operate-Transfer) - 25 years

- **Location**

Orot Rabin Power Station - Hadera, Israel

- **Commissioned**

2009



Ashkelon Seawater Desalination Facility

The second largest SWRO operating desalination plant worldwide

- **Capacity**

118M m³/year

- **Technology**

Reverse Osmosis (RO)

- **Project Type**

BOT (Build-Operate-Transfer) - 25 years

- **Location**

Ashkelon, Israel

- **Commissioned**

2005



Larnaca Seawater Desalination Facility

Among the largest SWRO desalination plant worldwide

- **Capacity**

21.5M m³/year (expansion)

- **Technology**

Reverse Osmosis (RO)

- **Project Type**

BOOT (Build-Operate-Own-Transfer),
10 year contract water sale

- **Location**

Larnaca, Cyprus

- **Commissioned**

2001/2008 (expansion)



Carlsbad Project - Seawater Desalination Facility

The largest desalination plant in the western hemisphere upon completion

- **Capacity**

54 MGD (204,412 m³/day)

- **Technology**

Reverse Osmosis (RO)

- **Project Type**

Engineering, Procurement and Support Services + Operation and Maintenance (O&M)

- **Location**

Carlsbad, California, US

- **To be Commissioned**

2016



Water Sale Concessions (BOT)

Larnaca, Cyprus



- 10 year concession, since 2001
- Operation began in 2001
- Capacity of 21.5M m³/year
- Expansion recently completed

Ashkelon, Israel



- 25 year concession, since 2002
- Operation began in 2005
- Capacity of 118M m³/year
- GWI Award – ‘Desalination Plant of the Year’ in 2006

Hadera, Israel



- 25 year concession, since 2006
- Operation began in 2009
- Capacity of 127M m³/year
- Euromoney Project Finance ‘Deal of the Year Award’ in 2007

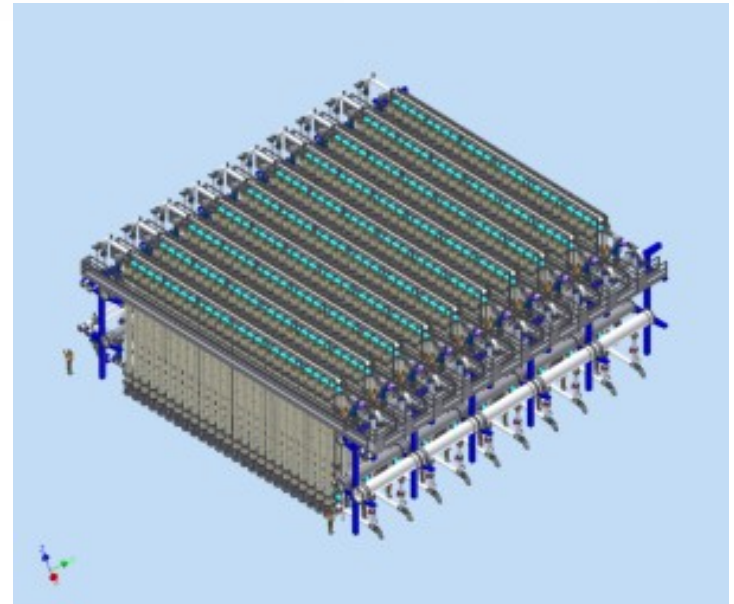
Sorek, Israel



- 25 year concession, from end of 2013
- Operation expected in 2013
- Capacity of 150M m³/year
- Expected to be the largest SWRO plant in the world upon completion

Main Plant Features

- Double Line Intake
- Three Pressure Center design concept (HP, RO, ERS) as implemented in Ashkelon and Hadera
- Large diameter (16") membrane elements in an innovative vertical arrangement of membrane PV
- Membrane based Boron removal system
- Self-Generating Energy Supply System



Pipe Jacking Intake and Outfall



Pipe Jacking

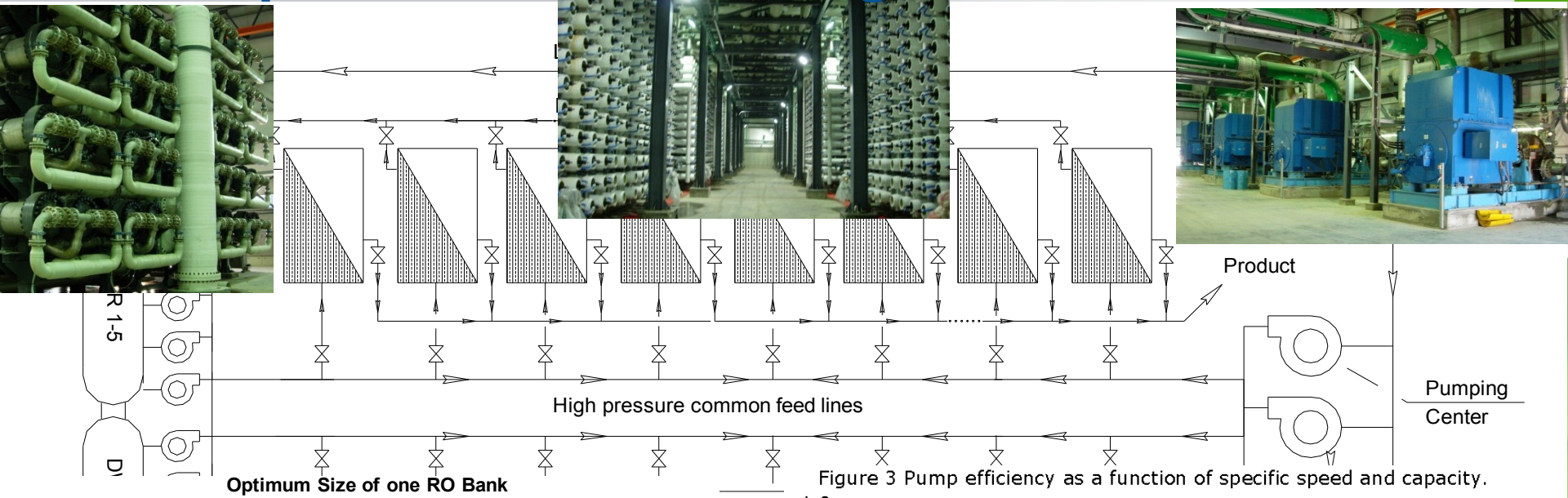
Pipe Jacking Shafts



Pipe Jacking Shafts

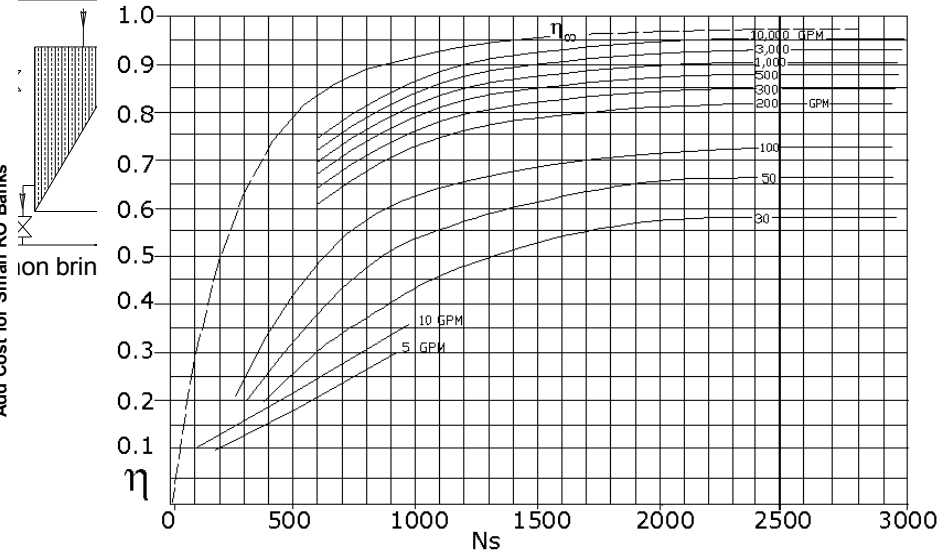
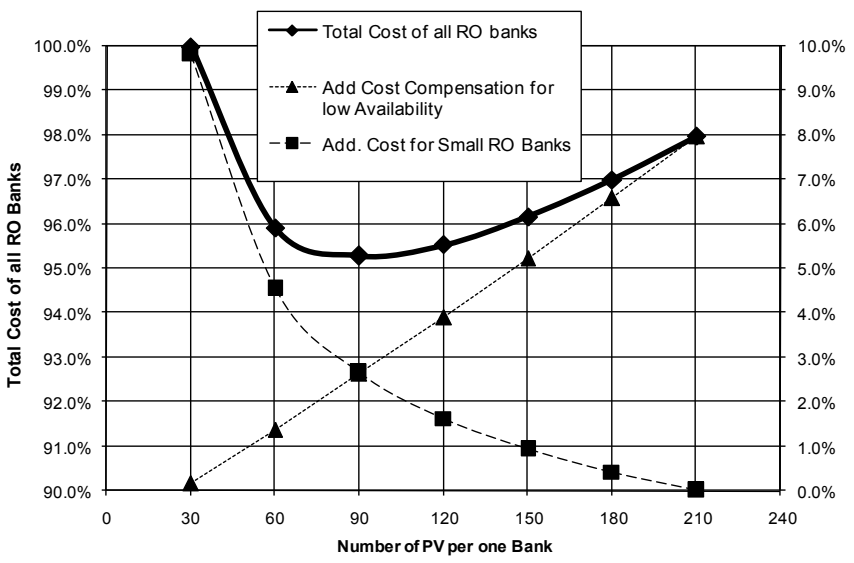


Three pressure center design



Optimum Size of one RO Bank

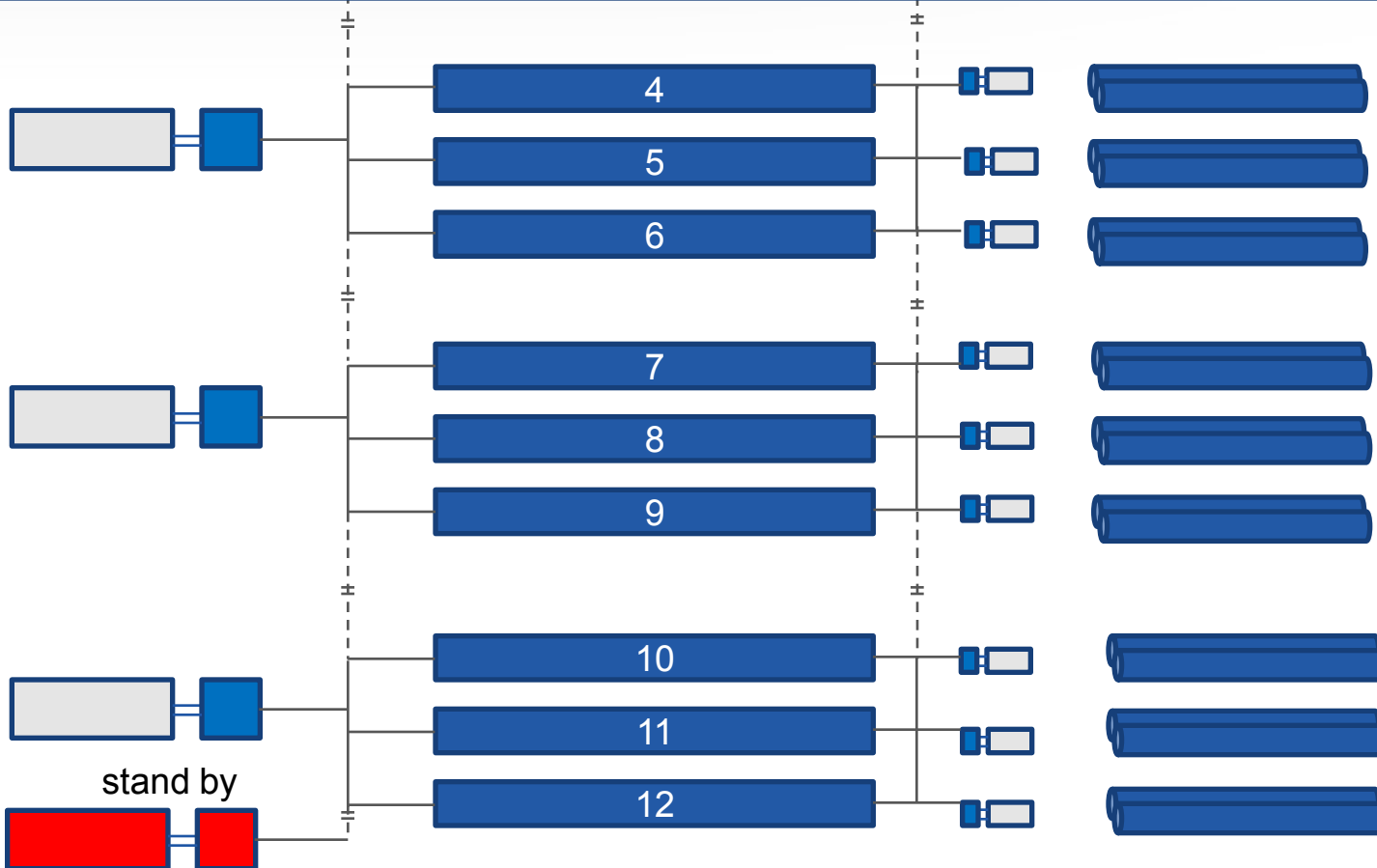
Figure 3 Pump efficiency as a function of specific speed and capacity.



High availability - pump maintenance do not affect actual production
 High flexibility - stop of RO train do not affect actual production

Mega Units Pressure Center Design

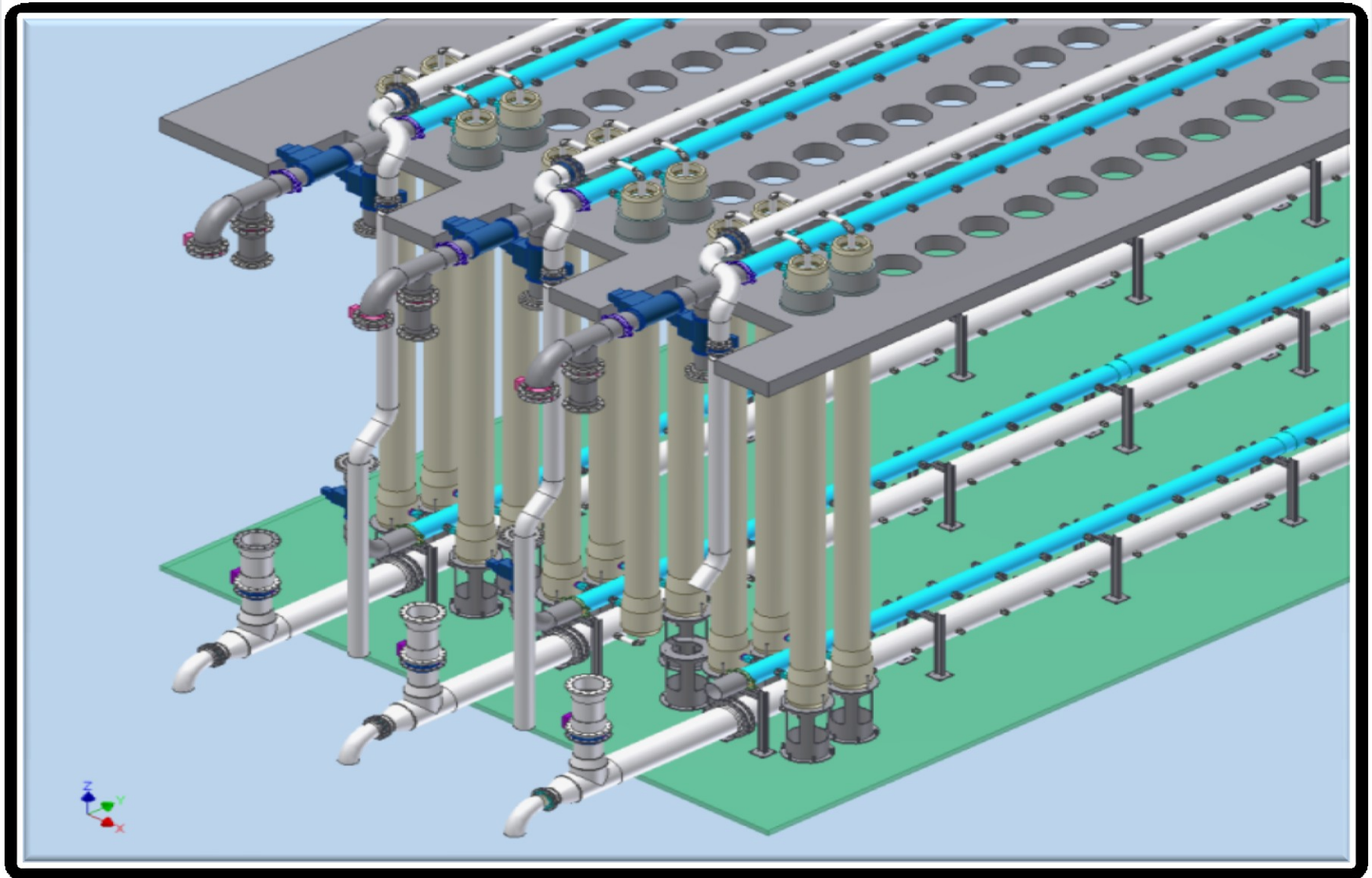
1 HP pump + 3 RO trains + ERD = 1 Unit



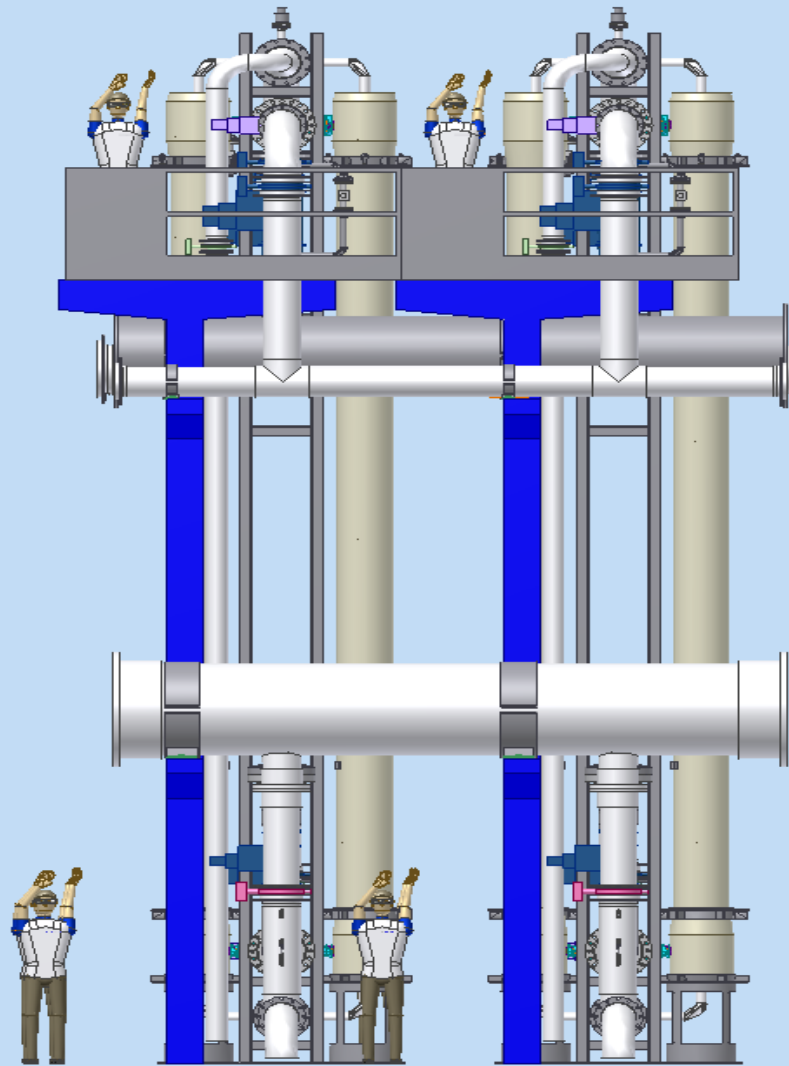
High Pressure Pumps-Ashkelon



Vertical Pressure Vessel Arrangement



16" vertical Membrane arrangement



16" Vertical Pressure Vessels



Sorek RO House



Ashkelon availability – September 2012

Daily volumes and production incidents

Water was produced according to the 2012 Production Plan latest approved by WDA on September 20th 2012.

Day	Requested Quantity	Delivered Quantity (plant flow meters)	Delivered Quantity (Mekorot flow meters)	Delivered according WDA	% Delivered / Requested w/o rescheduled	% Daily Fixed Payment Base	Lacking Quantities (for LD) Base	% Daily Fixed Payment Phase A	Lacking Quantities Phase A (for LD)	% Daily Fixed Payment Phase B	Lacking Quantities Phase B (for LD)	comment
1	361,000	358,832	356,500	357,666	99.07%	100.00%	0	100.00%	0	100.00%	0	
2	355,000	357,168	355,400	356,284	100.37%	100.00%	0	100.00%	0	100.00%	0	
3	355,000	358,848	356,900	357,874	100.82%	100.00%	0	100.00%	0	100.00%	0	
4	285,001	304,760	303,100	303,930	106.88%	100.00%	0	100.00%	0	100.00%	0	S1
5	355,000	359,744	357,900	358,822	101.11%	100.00%	0	100.00%	0	100.00%	0	
6	355,000	360,224	358,000	359,112	101.19%	100.00%	0	100.00%	0	100.00%	0	
7	360,000	363,200	361,200	362,200	100.62%	100.00%	0	100.00%	0	100.00%	0	
8	354,000	363,856	361,800	362,828	102.52%	100.00%	0	100.00%	0	100.00%	0	
9	355,000	360,720	358,600	359,660	101.33%	100.00%	0	100.00%	0	100.00%	0	
10	280,000	292,968	291,300	292,134	104.41%	100.00%	0	100.00%	0	100.00%	0	U1
11	355,000	359,936	358,200	359,068	101.18%	100.00%	0	100.00%	0	100.00%	0	
12	355,000	360,960	358,700	359,830	101.38%	100.00%	0	100.00%	0	100.00%	0	
13	355,000	360,760	358,900	359,830	101.38%	100.00%	0	100.00%	0	100.00%	0	
14	354,000	362,608	360,600	361,604	102.17%	100.00%	0	100.00%	0	100.00%	0	
15	360,000	360,904	358,600	359,752	99.93%	100.00%	0	100.00%	0	100.00%	0	
16	355,000	357,728	355,900	356,814	100.52%	100.00%	0	100.00%	0	100.00%	0	
17	355,000	357,536	355,500	356,518	100.43%	100.00%	0	100.00%	0	100.00%	0	
18	355,000	361,112	359,100	360,106	101.46%	100.00%	0	100.00%	0	100.00%	0	
19	355,000	354,960	353,200	354,080	99.74%	100.00%	0	100.00%	0	100.00%	0	
20	355,000	357,232	355,000	356,116	100.32%	100.00%	0	100.00%	0	100.00%	0	
21	360,000	356,024	354,100	355,062	98.61%	100.00%	0	100.00%	0	100.00%	0	
22	354,000	358,088	356,100	357,094	100.88%	100.00%	0	100.00%	0	100.00%	0	
23	359,200	368,504	366,400	367,452	102.43%	100.00%	0	100.00%	0	100.00%	0	S2
24	345,000	350,040	348,100	349,070	101.20%	100.00%	0	100.00%	0	100.00%	0	
25	355,000	354,568	352,900	353,734	99.64%	100.00%	0	100.00%	0	100.00%	0	
26	355,000	355,856	353,800	354,828	99.95%	100.00%	0	100.00%	0	100.00%	0	
27	355,000	295,432	292,900	294,166	82.67%	97.05%	0	0.00%	17,000	0.00%	5,100	U2
28	360,000	354,088	352,100	353,094	98.06%	100.00%	0	100.00%	0	100.00%	0	
29	350,000	355,664	353,700	354,682	101.36%	100.00%	0	100.00%	0	100.00%	0	
30	345,000	355,224	353,400	354,312	102.79%	100.00%	0	100.00%	0	100.00%	0	
Total September	10,507,201	10,577,544	10,517,900	10,547,722	100.39%	99.90%	0	96.67%	17,000	96.67%	5,100	

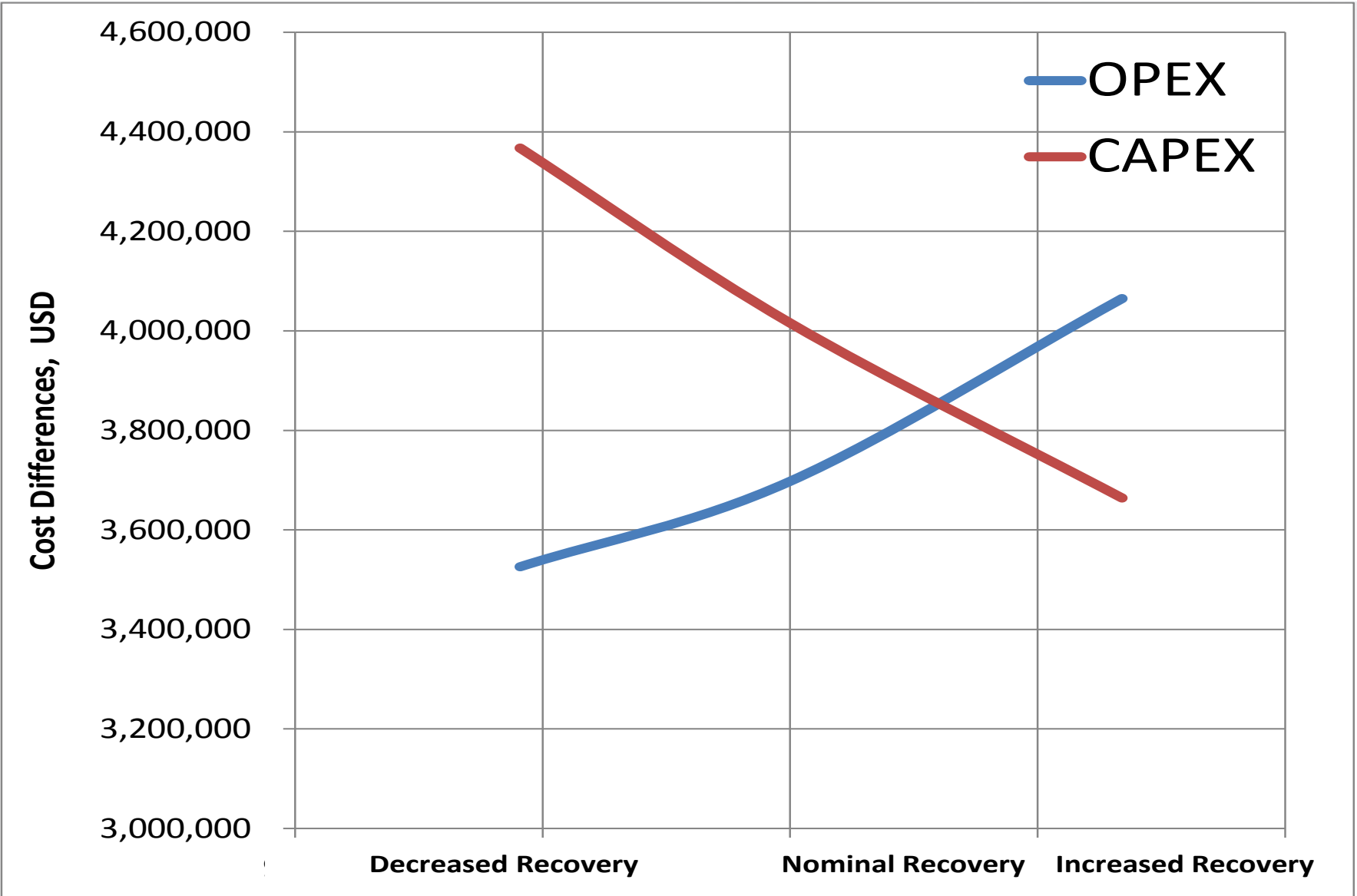
Yearly plant availability is about 96%

Hadera availability - – September 2012

1.1.1 Daily Volumes and Production Incidents				September 2012
Date	Production plan	Delivered Volume	Delivered - % of plan	Incidents
01/09/2012	472,800	474,624	100.4%	
02/09/2012	472,800	475,392	100.5%	
03/09/2012	335,000	339,648	101.4%	ביצוע פיג
04/09/2012	350,000	343,456	98.1%	ביצוע פיג
05/09/2012	350,000	357,632	102.2%	ביצוע פיג
06/09/2012	472,800	475,168	100.5%	
07/09/2012	472,800	476,128	100.7%	
08/09/2012	472,800	476,064	100.7%	
09/09/2012	447,600	461,952	103.2%	
10/09/2012	472,800	474,496	100.4%	
11/09/2012	472,800	475,520	100.6%	
12/09/2012	335,000	305,952	91.3%	תקלת תוכנה
13/09/2012	447,600	463,392	103.5%	
14/09/2012	472,800	476,672	100.8%	
15/09/2012	472,800	476,608	100.8%	
16/09/2012	472,800	475,520	100.6%	
17/09/2012	472,800	476,224	100.7%	
18/09/2012	472,800	476,736	100.8%	
19/09/2012	335,000	347,264	103.7%	
20/09/2012	472,800	475,584	100.6%	
21/09/2012	472,800	475,712	100.6%	
22/09/2012	472,800	476,864	100.9%	
23/09/2012	447,600	459,616	102.7%	
24/09/2012	447,600	439,360	98.2%	הפחתת ייצור לבקשת רשות המים
25/09/2012	472,800	439,776	93.0%	הפחתת ייצור לבקשת רשות המים
26/09/2012	472,800	439,040	92.9%	הפחתת ייצור לבקשת רשות המים
27/09/2012	472,800	438,624	92.8%	הפחתת ייצור לבקשת רשות המים
28/09/2012	472,800	439,840	93.0%	הפחתת ייצור לבקשת רשות המים
29/09/2012	472,800	436,736	92.4%	הפחתת ייצור לבקשת רשות המים
30/09/2012	472,800	439,680	93.0%	הפחתת ייצור לבקשת רשות המים
Monthly	13,424,200	13,289,280	99.0%	
Bimonthly	27,384,430	13,289,280	99.0%	

Yearly plant availability is about 96%

IDE's Design Philosophy: Optimization



Thank You

IDE India

Sanjeev Sharma, Head Of Marketing

M: 096506 88006

E-mail: sanjeevs@ideindia.com

www.ide-tech.com