

Got Desal?

MSSC Annual Salinity Summit



Mark Lambert,

January, 2016



IDE Technologies | Your Water Partners

IDE Technologies



Delivering Excellence
Through Partnership
50
YEARS

**Industrial Water
Treatment**

**Seawater
Desalination**

Wastewater Reuse

A Full Range of Water Project Types

**EPC / EPS /
Turnkey**

Water Sales

**Operation &
Maintenance
Services**



Municipalities



Mines

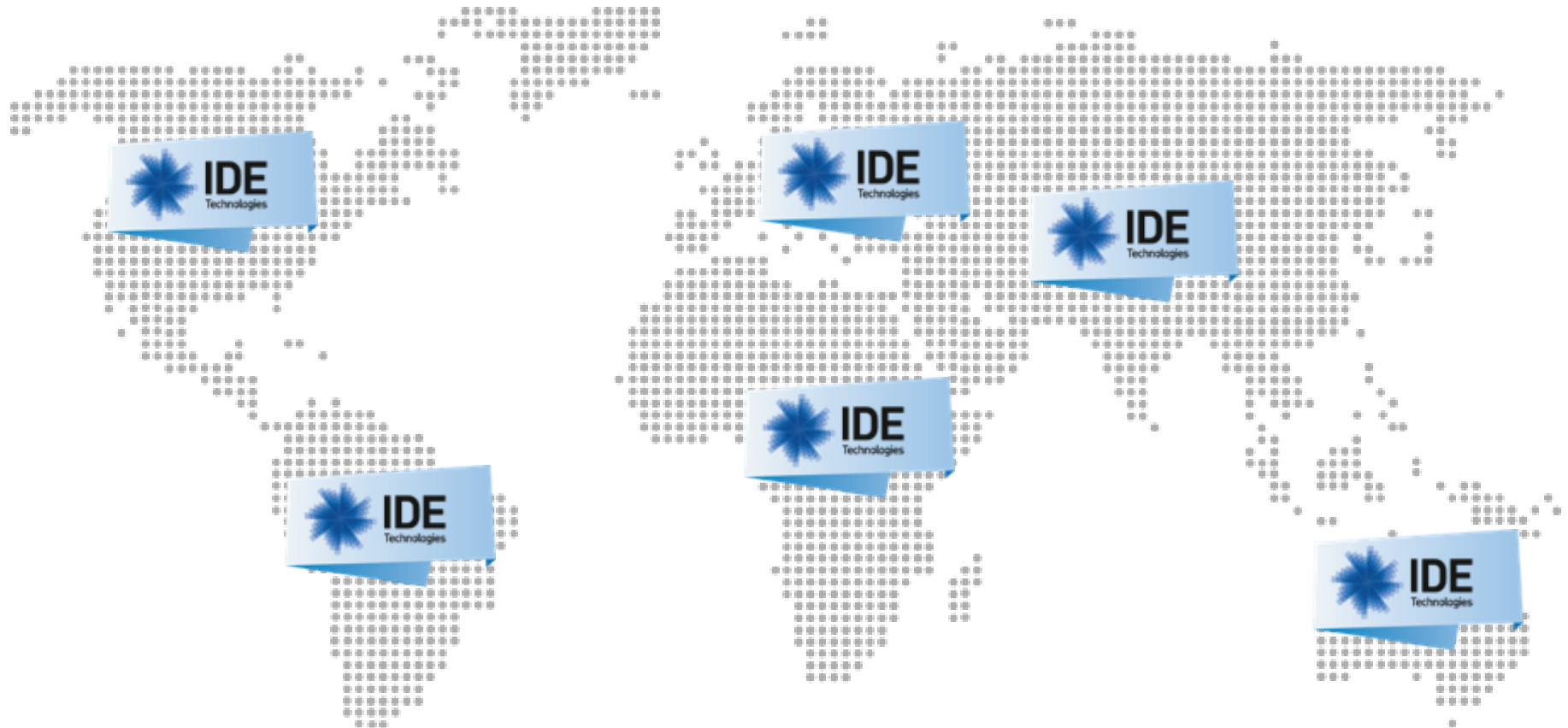


Energy



Oil & Gas

Successful Global Leadership



3M m³/day of high
quality water

IDE's Value Proposition

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
- Creative Financing

▶ **Sustainable Solutions**

- Reduced energy consumption
- Renewable energy
- Low chemical footprint

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



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

Leadership in Seawater Desalination



Sorek, Israel

The largest SWRO plant worldwide: 624,000 m³/day – BOT



Tianjin, China

The largest desalination plant in China: 200,000 m³/day – EPC



Reliance, India

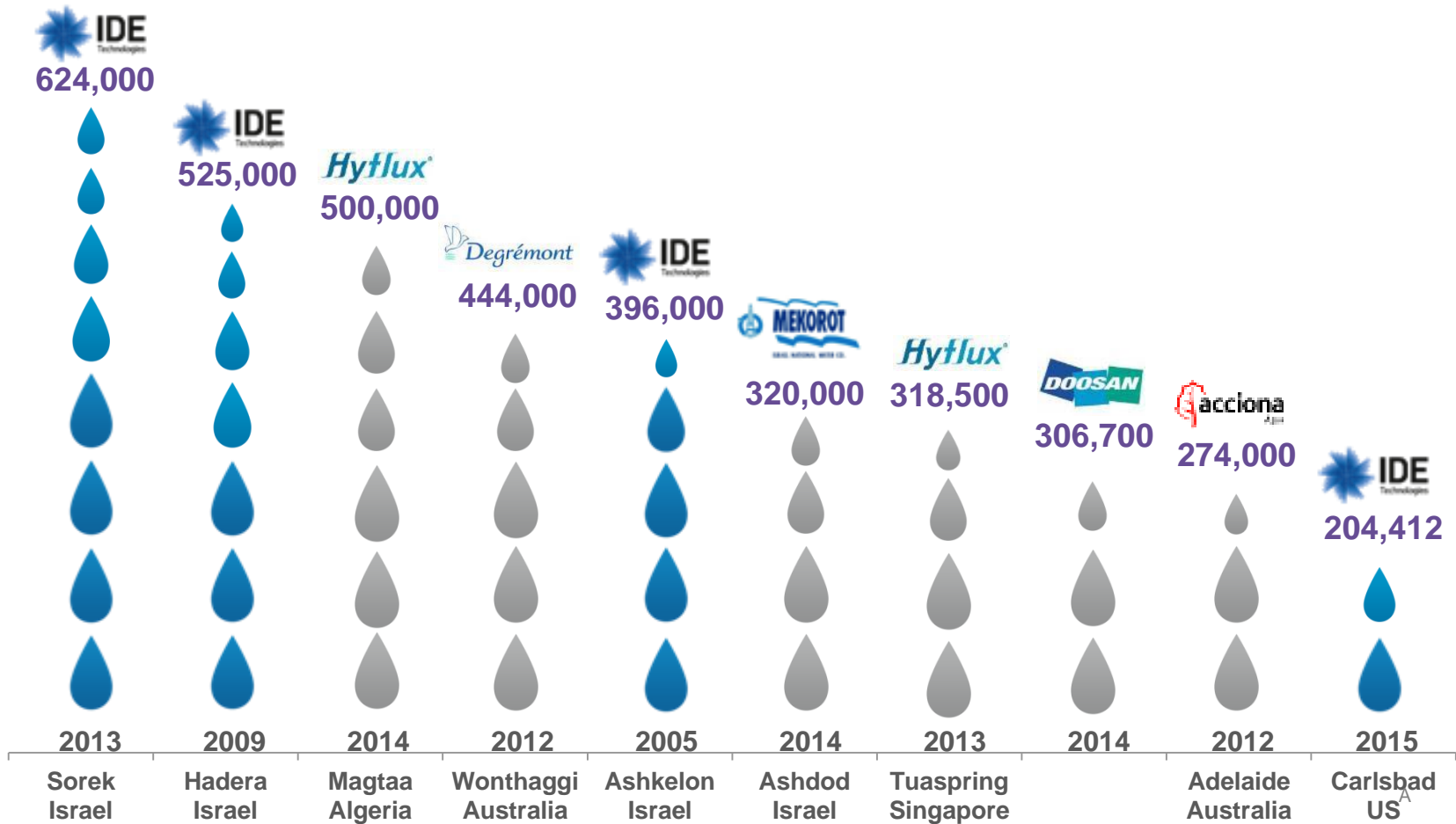
The largest desalination plants in India: 400,000 m³/day – EPC



Carlsbad, USA

The largest desalination plant in the western hemisphere:
204,000 m³/day – EPS + O&M (In commissioning)

Leadership in Large Scale SWRO Projects



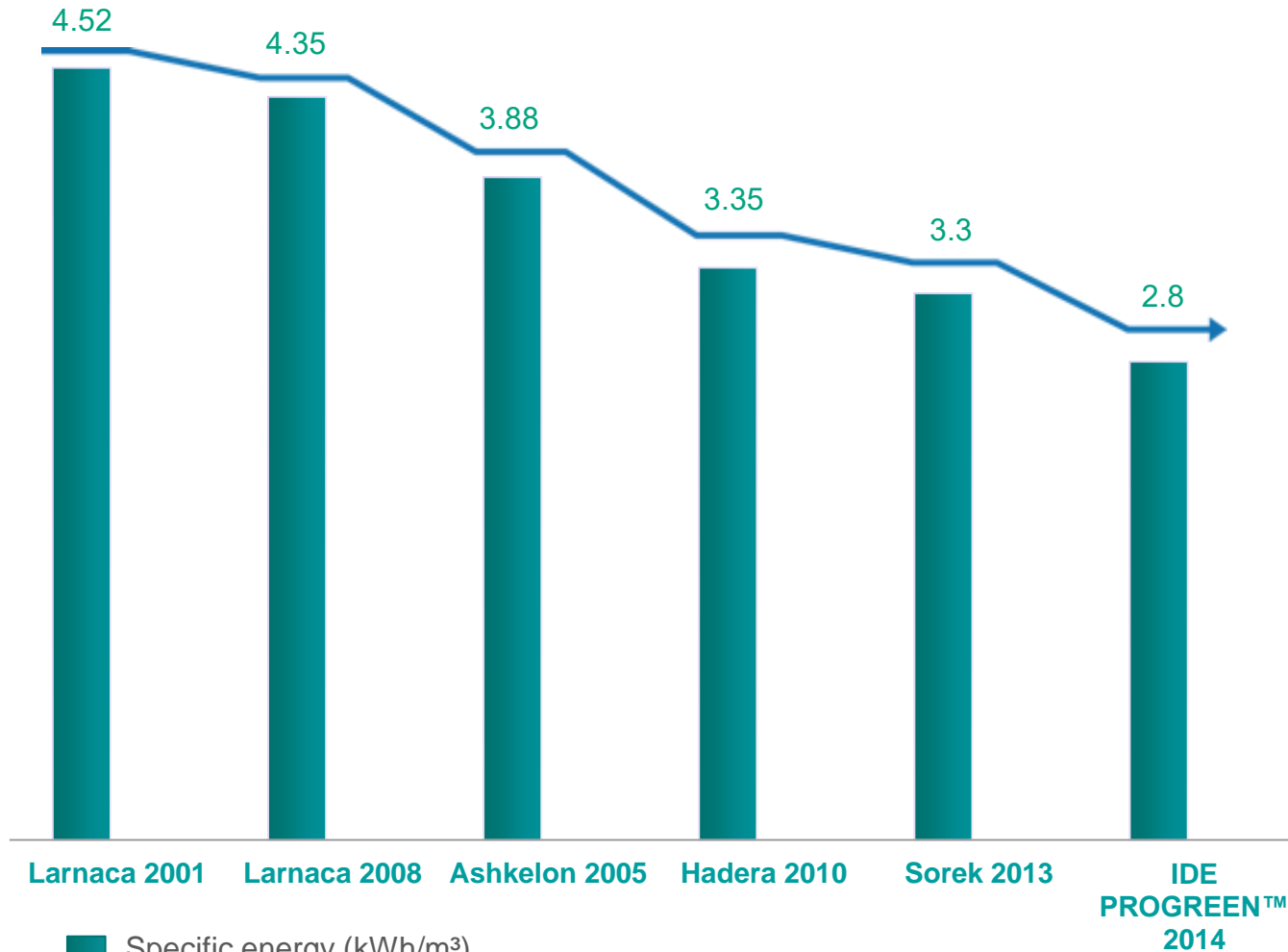
Capacity (m³/day)

Source: Global Water Intelligence (2014), company information

*In accessible markets

Leadership in Energy Consumption

Total Specific Energy Consumed per m³ of Product Water



■ Specific energy (kWh/m³)

Culture of Continual Innovation

Proven innovations:

- Pressure Center Design
 - Boron Removal System
 - Chemical-Free Desalination
 - Direct Osmosis Cleaning (DOC)
 - 16” Membranes in a Vertical Array
-
- Increased efficiency and reliability
 - Reduced CAPEX and OPEX costs
 - Minimize environmental impact



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Carlsbad Desalination Plant



Carlsbad, California, USA

An award-winning, milestone plant for the desalination industry

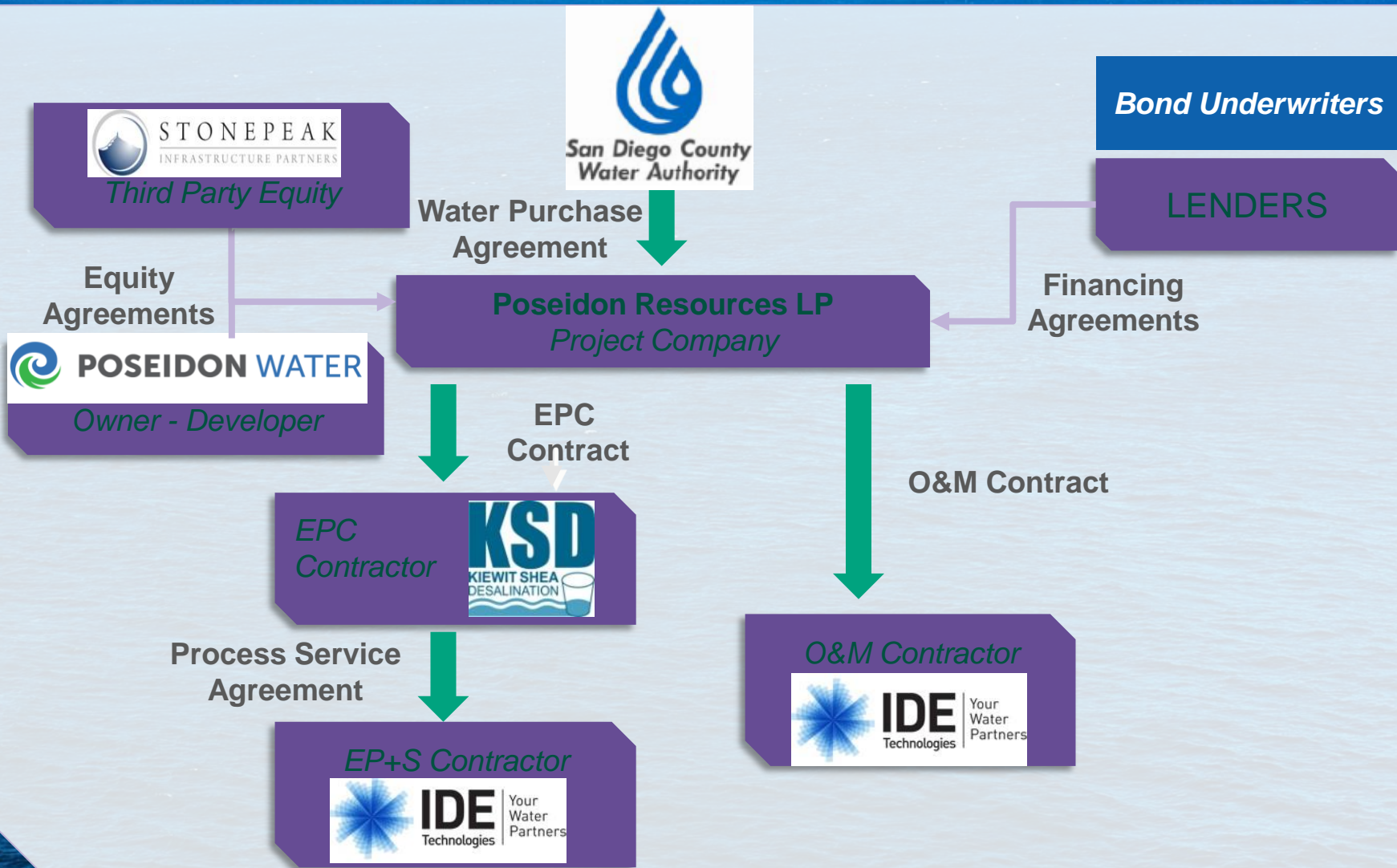


Overview

- **Capacity:** 54 MGD (60670 AFY)
- **Technology:** SWRO
- **Project Type:** EPS and O&M – 30 years
- **Footprint:** 6 acres (24,000 m²)
- **Off-Taker:** San Diego County Water Authority (SDCWA)
- **Commission Date:** December, 2015
- **Conventional project delivery**



Shareholders and Contractual Structure



Project Milestones

May 2012:
Financial close
(execution of
the Financial
Agreements)

June 2015:
Start of Plant
Commissioning

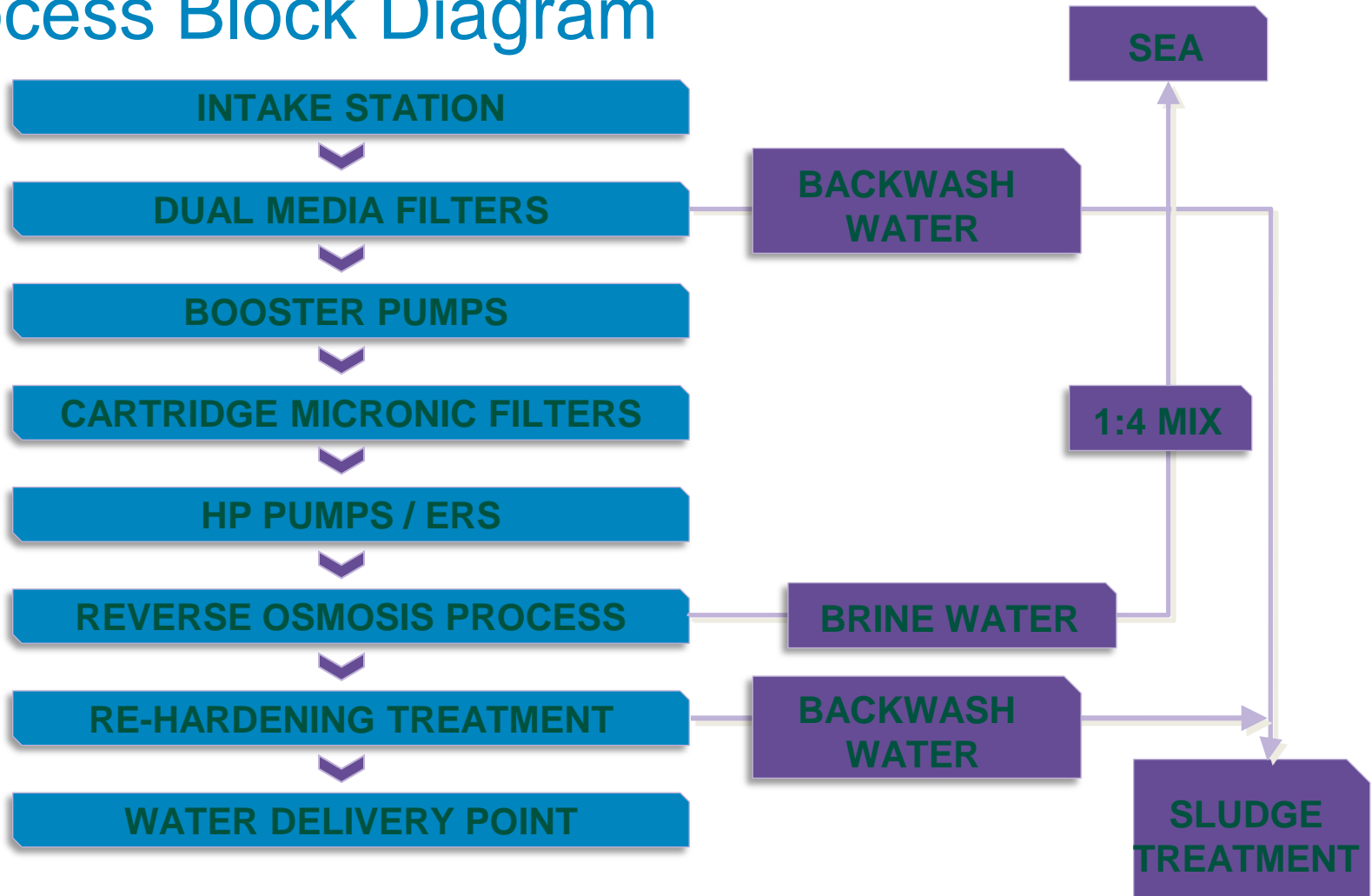
**December
2045:**
End of of
Agreement

**January
2003:**
BOT MOU for
54 MGD/year

**December
2012:**
Issuance of
the Notice to
Proceed

**December
2015:**
Completion
Date (54
MGD)

Process Block Diagram



Bid Water Price*: \$1,849 - \$2,064 per acre-foot
\$ 5.70-6.40/1000 gallons (\$1.50-1.67/m³)

Agua Hedionda Lagoon Aerial View



Plant Aerial View

- Intake
- Pretreatment
- Clear Well
- RO 1st Pass
- RO Cascade
- Post-treatment
- Product tank
- Chemical Area



Key Technical Parameters

- ▶ Recovery ratio ~52% - intake capacity 104 MGD
- ▶ Plant footprint - 6 acres
- ▶ 14,000 RO membranes → 6.2 million ft² of membrane area
- ▶ 4 high-pressure pumps 970-1060psi → 14.4 kWh per 1000 gallons
- ▶ 8 ERI trains – 168 PX300Q in total → 98% efficiency
- ▶ DAF-Lamella sludge treatment system → 20% dryness of sludge
- ▶ 2.5 million gallon product water tank → 8 – 420psi Product Pumps

Water Supply Benefits

- ▶ 56,000 acre-feet per year of new water
- ▶ Locally-controlled, drought-proof supply
- ▶ 8% of regional demand in 2016
- ▶ Key element of SDCWA water supply diversification strategy
- ▶ Reduces demand on sensitive water bodies

Economic Benefits

- › Private investment in regional infrastructure
- › supported 2,400 skilled jobs in construction period
- › Approx. \$560 million in local spending
- › Approx. \$5.3 million/year in incremental property and business tax revenues

Environmental Responsibility

MINIMIZED ENVIRONMENTAL IMPACT

- ▶ Minimized marine impacts by using Encina Power Station intake
- ▶ Minimized marine impacts by mixing of Brine 4:1 with seawater prior to ocean discharge
- ▶ Zero CO2 footprint, 66 acres of wetlands built in San-Diego Bay
- ▶ Reduced electrical and chemical consumption
- ▶ Dredging responsibility for the Agua Hedionda Lagoon
- ▶ Use of environmentally harmless chemicals and treatable cleaning solutions
- ▶ Treatment of media filters and limestone reactor backwashing

Commissioning

- ▶ Mechanical completion: November 7th
- ▶ Acceptance Test: November 7th to December 12th, 2015
- ▶ Started producing water on December 14th, 2015
- ▶ 24 billion gallons of water produced thus far (as of January 27th)

Carlsbad Plant Dedication Event: Dec 14th, 2015



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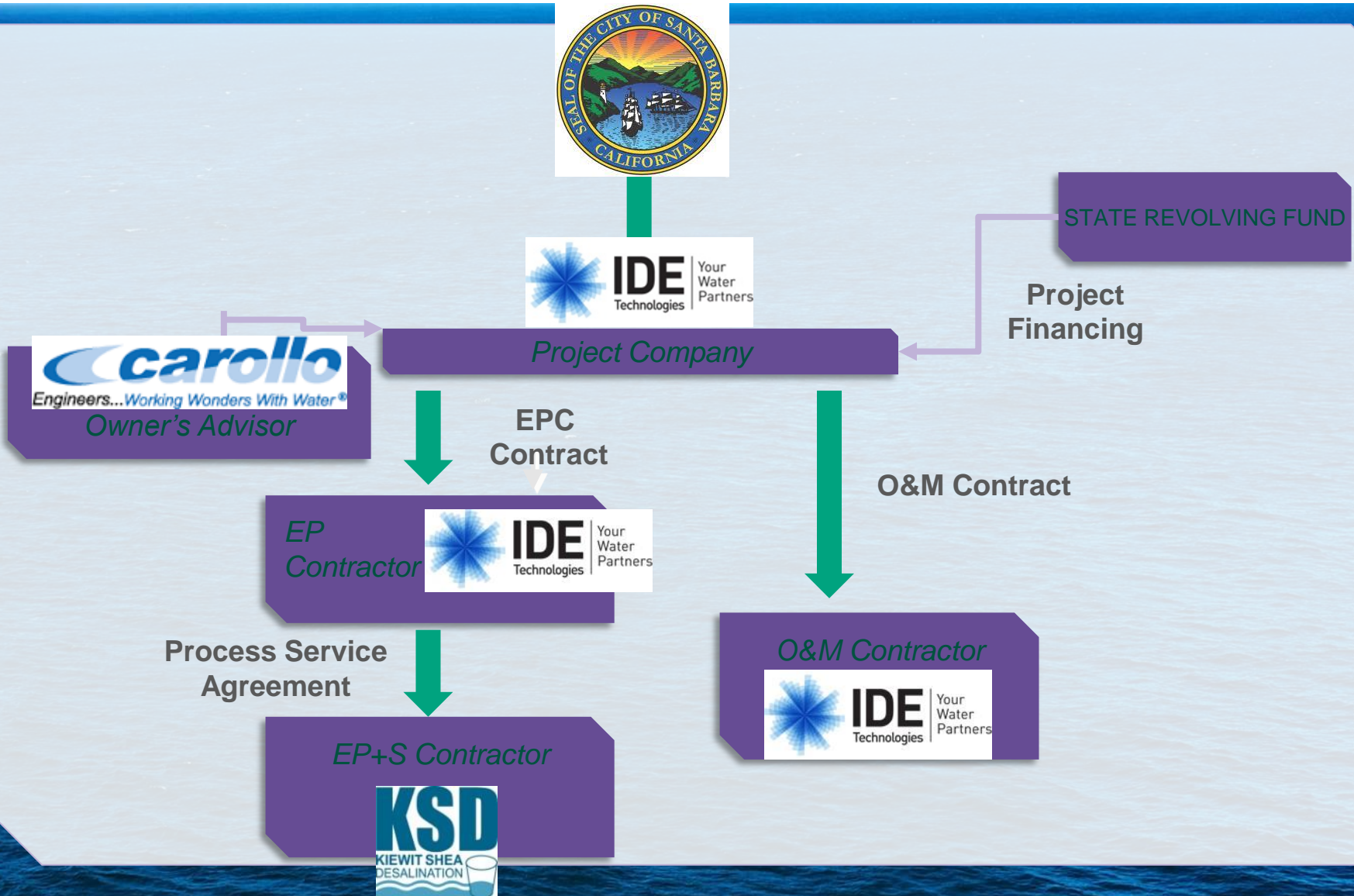
Santa Barbara Desalination Project



Project Overview

- Retrofit of Existing Plant (1990's vintage)
- Customer wanted a scalable facility = IDE's MPD concept
- Capacity: 2.8 MGD (3125 AFY)
 - Potential of expansion to 6.7 MGD (7500 AFY)
- Technology: SWRO
- Project Type: DBO (EPC and O&M – 5 years)
- Off-Taker: City of Santa Barbara
- Commission Date: November 2016
- Accelerated Project Delivery
 - Site preparation and module construction simultaneous

Stakeholders and Contractual Structure



Project Milestones

August 2015:
Financial close
(execution of
the Financial
Agreements)

**September
2015:**
On Site

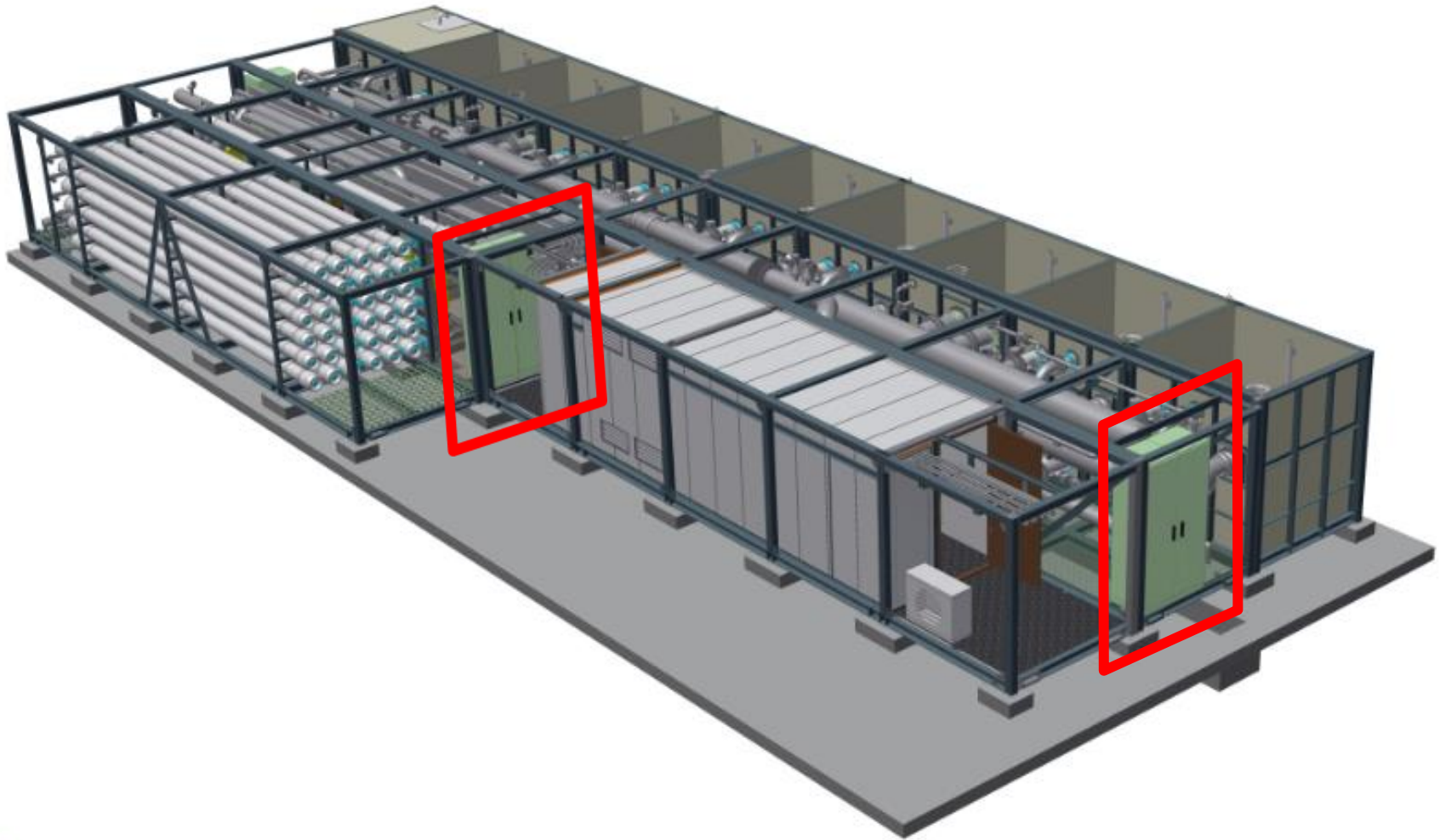
**December
2021:**
End of O&M
agreement

July 2015:
Contract
Signed

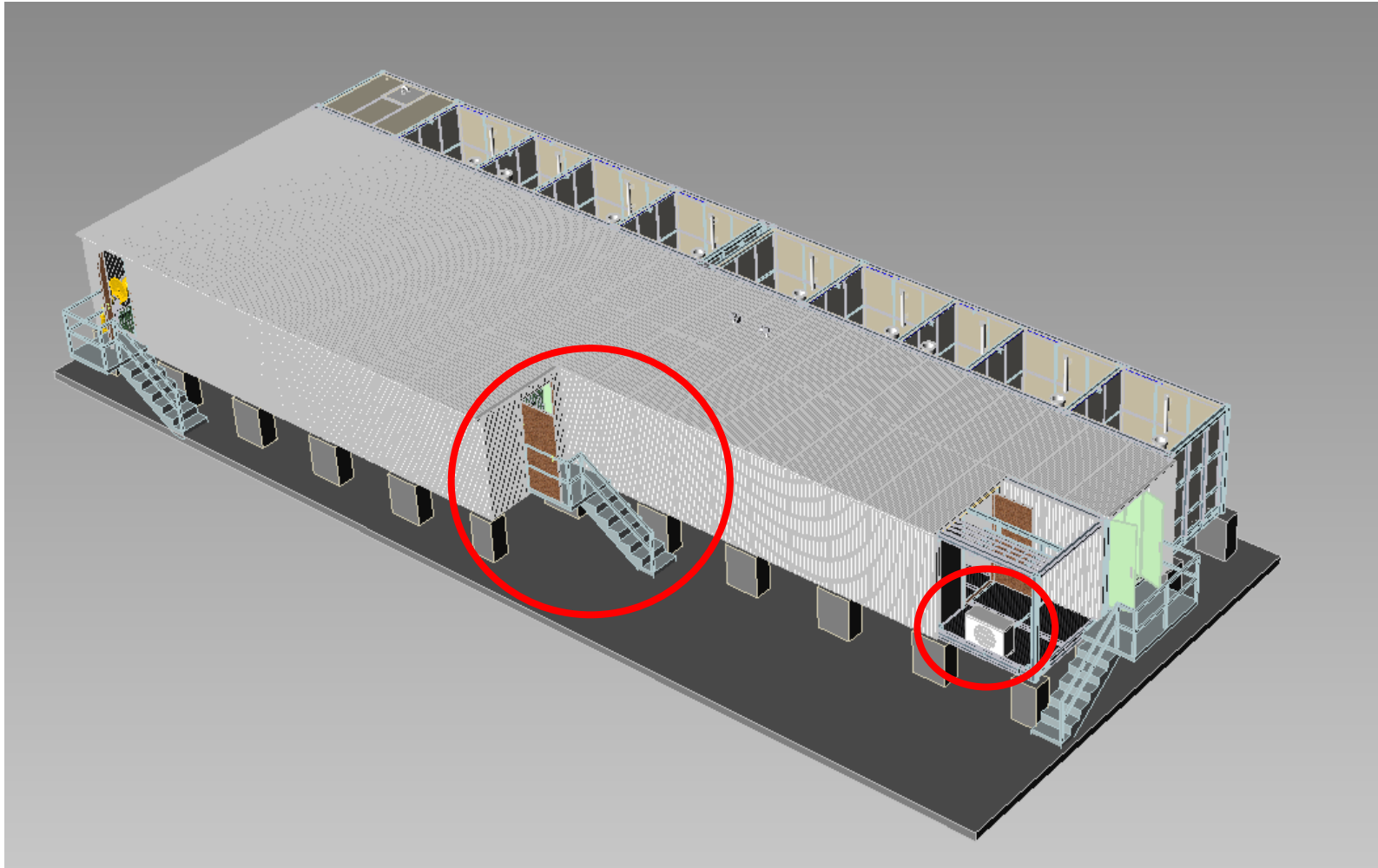
August 2015:
Issuance of
the Notice to
Proceed

**November
2016:**
Projected
Completion

SWRO 5,000 Module



Santa Barbara SWRO 5,000 Module



Santa Barbara Dec-08-2015



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Industrial Application Case Studies



IDE's Horizontal Evaporator: MED-50 MGD Capacity SDIC, Tianjin, China

POWER - CHINA'S LARGEST DESALINATION PLANT

- ❑ SDIC Electric Generation Plant: Tianjin, China
- ❑ No fresh water source available
- ❑ EPC project delivery
- ❑ In operation since 2010
- ❑ Powered by waste heat from SDIC
- ❑ 25% BFW, 75% sold to external industrial
- ❑ Brine recycled to produce table salt



8 X MED-25,000 m³/day

IDE's Horizontal Evaporator: MED-60 MGD Capacity Reliance - Gujarat , India

DOWN STREAM O&G - INDIA'S LARGEST DESALINATION PLANT

- ❑ Largest Refinery in the world
- ❑ Government terminated source of fresh water supply after 20 years.
- ❑ In operation since 1998
- ❑ Expandable source of water with 45 MGD SWRO currently under construction
- ❑ 20% to BFW; 80% to process/utility supply



4 X MED-50,000 m³/day(feed)
24,000 m³/day(distillate)

5 X MED-25,000 m³/day(feed)
12,000 m³/day(distillate)

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Got fish?

