Carlsbad Desalination Project
October 27, 2015
Agenda

I. Introduction

II. Market Demand - Seawater Desalination

III. Public Private Partnerships

IV. Case Study: Carlsbad
DEMAND FOR SEAWATER DESALINATION
Problem - Strained Water Supply

Stressed: Drought, Environmental Concerns, Federal Pumping Restrictions, Oversubscription

Conservation (Water Use Efficiency)

Source: Municipal Water District of Orange County, March 2012 and Poseidon Water
Desalination Offers a Reliable Solution

Poseidon’s Value Proposition

Why Desalination?

- San Diego County imports approximately 85% of its water supply
- Current water supply dependent upon rainfall and snowpack
- Desalination a reliable, drought-proof, clean and safe source of water
- Limited incremental land needs
- Competitive with other locally available water supply options
Desalination Energy Improvements

Scale Economies of Desalination Plants

Reduced Cost of SWRO
By the numbers: Desalination Energy Usage

- 24 kWh Central Air conditioning unit for an average day
- 13.2 kWh Used to drive an electric vehicle for one day
- 12.5 kWh Hot Water for an average household per day
- 7.8 kWh desalinated water supply for an average household
Desalination – a duck’s best friend?

Source: CalISO
Public Private Partnerships – what are they?

Typical Risk Allocation

- Permitting
- Closing
- Construction
- Technology
- Plant Performance
- Regulation
- Electricity Consumption

PUBLIC UTILITY

- Market Demand
- Electricity Rates
- Interest Rate
- Change in Regulation

Water Purchase Agreement
### Typical Terms of a Water Purchase Agreement

<table>
<thead>
<tr>
<th>Term</th>
<th>30 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantity</td>
<td>Sized to meet Buyer’s demand and guaranteed with “take-or-pay” agreement</td>
</tr>
<tr>
<td>Quality</td>
<td>Will meet Buyer’s requirements</td>
</tr>
<tr>
<td>Delivery Point</td>
<td>Delivered to the Buyer at a point set by mutual agreement</td>
</tr>
<tr>
<td>Delivery Schedule</td>
<td>The agreement will have guaranteed milestones for water delivery</td>
</tr>
<tr>
<td>Price</td>
<td>Project-specific, but typical agreement to include:</td>
</tr>
</tbody>
</table>

1. **Capital Charge**
2. **Fixed and Variable Operating Charge**
3. **Fixed and Variable Electricity Charge**

- Water Price dependent on plant location, size of the facility, delivery points, additional water distribution infrastructure required and energy and labor prices among other factors
- Any subsidy, grant or other will typically be to the benefit of the Buyer

| Reliability | Poseidon will guarantee the facility’s reliability to a mutually agreed basis |
Cross Section of Water Price

Fixed & Variable Electricity Charge is Driven by:
- Power Consumption
- Cost of Power
- Terms of Poseidon’s O&M Agreement with Contractor

*The Electricity Charge will vary with electricity prices*

Fixed & Variable Operating Charge is Driven by:
- Terms of Poseidon’s O&M Agreement with Contractor
- Other operating expenses

Operating Charge is indexed to CPI

Capital Charge is Driven by:
- Poseidon’s Capital Budget
- Bond Issuance
- Equity Return/Developer Fee
- Development period costs

*Capital Charge is fixed at a pre-established escalation rate*
CASE STUDY – CARLSBAD DESALINATION PROJECT
Carlsbad Desalination Project
Carlsbad Desalination Project

Mouth of Lagoon

Outfall

Intake

Mouth of Lagoon
Carlsbad Water Flow Diagram

PACIFIC (33.5 ppt)

Power Plant

Intake Pumps

Desalination Plant

High-quality Product Water to Local and Regional Water Supply Systems 50 MGD (.2 ppt)

200 MGD (33.5 ppt)

304 MGD (33.5 ppt)

OCEAN (33.5 ppt)

Power Plant Discharge Pond

254 MGD (40 ppt)

Concentrate Discharge 54 MGD (65 ppt)

Seawater Intake

Agua Hedionda Lagoon (33.5 ppt)

Existing Storage Tanks

KEY:
MGD=million gallons per day
ppt=parts per thousand
Plant Construction
Pipeline Construction: 100% Complete
Plant Construction: 98% Complete
Carlsbad Desalination Plant
Project Overview

Project Summary

- **Project Capacity**: 54 MGD
- **Water Purchase Agreement**: 30-year take-if-delivered contract for water, minimum purchase of 48,000 AF, option up to 56,000 AF with San Diego County Water Authority
- **Poseidon to Construct**:
  - 54 MGD desalination plant located on the site of the Encina Power Station
  - 10 mile 54-inch diameter conveyance pipeline to connect to existing aqueduct pipeline
- **Water Authority to Construct**:
  - Relining of 5.5 mile reach of aqueduct pipeline
  - Water Treatment Plant improvements to accommodate desalinated water flows

Key Responsibilities

**Poseidon**:
- Permit, Design and Build the Desalination Plant
- Permit, Design and Build the Product Water Pipeline
- Own, Operate and Maintain the Desalination Plant
- Supply Product Water

**San Diego County Water Authority**:
- “Take or Pay” for Product Water (minimum commitment of 48,000 AF/Yr)
- Timely construction of water treatment plant improvements and pipeline rehabilitation
- Receive Product Water
- Own, operate and maintain the Product Water Pipeline, the water treatment plant improvements and pipeline

![Overhead Rendering](image1)

![Site Aerial](image2)
Carlsbad Desalination Plant
Success Deploying PPP Approach

Carlsbad Desalination was developed through a public private partnership between the San Diego County Water Authority and Poseidon Water

Third Party Equity

San Diego County Water Authority

Project Management

Water Purchase Agreement

Energy Provider

Sempra Energy utility

EPC Agreement

Engineering, Procurement and Construction

Private Activity Bonds

O&M Service Agreement

O&M Provider

IDE Technologies Ltd.
Carlsbad Project Impact

• Carlsbad Desalination Project will provide locally controlled, drought proof water supply for 7% of San Diego County’s water supply

• Carbon Neutral GHG Emissions

• Construction impact of $350 million to local economy and an estimated 2,500 jobs in desalination, engineering, construction and other services industries

• The project will have 36 full-time employees, support 500 direct, indirect and induced jobs, and contribute $50 million in estimated annual spending to the county's economy
Questions?

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Carlsbad Desalination Plant
Financial Overview

Key Financial Metrics:

- **Project Capacity**: 54 MGD
- **Total Capital**: $922m
  - **Debt**: $755m
  - **Equity**: $167m

Financing Overview:

- **Project Equity**: 18%
- **Debt**:
  - 82% funded through split tranche bonds issuance via the California Pollution Control Financing Authority (CPCFA)
  - Plant Bonds issued as Tax-Exempt Private Activity Bonds with Poseidon as the sponsor
  - Subject to Alternative Minimum Tax (AMT)
  - Pipeline Bonds issued as Tax-Exempt Governmental Purpose Bonds with the Water Authority as the sponsor
  - Not subject to the AMT, but issued with a 5 year early call option
  - Water Authority exempt from repayment obligations if Poseidon does not perform
- **33 year financing**
- **Interest Rates**:
  - Plant Bonds: 4.8%
  - Pipeline Bonds: 4.4%
  - Bonds obtained two investment grade ratings
    - Moody’s Baa3, Fitch BBB-

1. Based on equity funding date, not closing date.
Any chlorine remaining in the filter can damage the RO membranes. To protect the RO system, filter effluent will be de-chlorinated using sodium bisulfate prior to treatment.

Desalinated water requires chemical conditioning prior to delivery to increase hardness and reduce corrosion potential. Chlorine is also added to meet the California Department of Public Health quality standards for potable water disinfection and to control biological growth in the transmission pipeline.

The product water pump station pressurizes the water for delivery to SDCWA.

The finished water (product water) is held in a 3.4 MG storage tank prior to delivery to SDCWA.

The RO treatment system will separate the pretreated and conditioned intake seawater in two streams: desalinated water, and concentrated seawater.
Seawater Desalination Process

Stages of the desalination process

- **Seawater Supply**
- **Pre-treatment System**
- **Reverse Osmosis Process**
- **Post-treatment**
- **Concentrated seawater disposal**
- **Freshwater Storage**

**Diagram Components**
- Membrane sandwiches
- Porous layer
- Semi-permeable membrane
- Product tube
- Fibreglass membrane element
- Mesh spacer

**Flow**
- Salt water enters the system and undergoes pre-treatment.
- It then passes through the reverse osmosis process, producing freshwater.
- Freshwater is stored in the freshwater storage tank.
- Concentrated seawater is treated and disposed of.