Committee on Water
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Desalination as a Water Source
Water Supply Reliability for San Diego County

NARUC Summer Policy Summit
July 17, 2017

Bob Yamada
Director of Water Resources
San Diego County Water Authority
San Diego County Water Authority

Wholesale water agency created by State Legislature in 1944
- 24 member agencies
- 36–member board of directors
- Serves 3.3 million people and region’s $222 billion economy

Provides 80%–90% of water used in San Diego County
- Added desalinated seawater to local supply in late 2015
- Builds, owns, operates and maintains large-scale regional water infrastructure
Acre-Foot of Water (AF)

- 325,851 gallons (43,560 cubic feet)
- Enough to serve the annual needs of two single-family households of four people
San Diego Has Few Natural Water Assets

Very Little Groundwater

Very Little Rainfall

San Diego: 10”
At the End of a Very Long “Pipeline”
San Diego County’s Water Supply Sources

- 17% State Water Project
- 68% Colorado River
- 15% Local Supply

(2012–2016 average)
San Diego Civic Leaders
"Never Again!"
"No More Water Shortages!"

State Water Project cuts off water to farms; urban slash expected
L.A. Ready to Battle San Diego Over Water

Water: Authority to Vote Today on Mandatory Restrictions

Companies cringe at 50 percent cut in water
Firms offer conservation plans to mayor; some say cutbacks could cripple growth
Water Supply Reliability

- Employ resource strategies unique to local conditions
- No single resource strategy can manage all uncertainties

- Multi-faceted approach required
  - Diversification
  - Water use efficiency
  - New supplies
    - Recycled water
    - Desalination
  - Infrastructure improvements
  - Regional storage

- Close coordination with member agencies
Increasing San Diego County's Water Supply Reliability through Supply Diversification

**1991**
- 28 TAF (5%)
- **Total = 578 TAF**

**2016**
- 79 TAF (17%)
- **Total = 455 TAF**

**2020***
- 80 TAF (14%)
- 43 TAF (7%)
- 56 TAF (10%)
- **Total = 588 TAF**

**2035***
- 80 TAF (12%)
- 57 TAF (8%)
- 72 TAF (10%)
- 36 TAF (5%)
- **Total = 694 TAF**

**Region under State Mandated Water Use Restrictions**

*Includes verifiable and additional planned local supply projects from 2015 UWMP (TAF=Thousand Acre-Feet)*
• Based on SANDAG Forecast
  o Series 13 projections
  o Includes 2010 Census results

• Additional 700,000 people from 2015 to 2040

• Population totals roughly 3.8 million by 2040

• \( \frac{2}{3} \) growth from in-region births over deaths
San Diego Region has seen 40% Reduction in GPCD Since 1990
Total Water Demands Within Water Authority Service Area

Historic Demand → Projected Demand

726 TAF
533 TAF
719 TAF

Includes Long-Term Water Use Efficiency

TAF = Thousand Acre-Feet
San Diego County 2015 Water Use by Sector

- Residential: 65%
- Commercial & Industrial: 14%
- Agriculture: 9%
- Public & Other: 12%

San Diego County Water Authority
Historic Investments in Infrastructure

- **San Vicente Dam Raise & Related Projects**: $816 million
- **Twin Oaks Valley Water Treatment Plant**: $179 million
- **Pipeline Relining**: $493 million
- **Carlsbad Seawater Desalination Projects**: $1 billion
- **Lake Hodges Projects**: $208 million
- **Olivenhain Dam & Reservoir**: $198 million
- **All-American & Coachella Canal Lining Projects**: $447 million ($190 million from Water Authority)

[Pump House Detail]
Next Increment of Supply - Potable Reuse Sampling of Proposed Projects

<table>
<thead>
<tr>
<th>Member Agency</th>
<th>2035 Estimated Yield (AF/YR)</th>
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<tbody>
<tr>
<td>City of San Diego</td>
<td>93,000</td>
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<tr>
<td>Padre Dam MWD</td>
<td>11,500</td>
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<tr>
<td>City of Oceanside</td>
<td>3,000</td>
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<tr>
<td>Santa Fe Irrigation District</td>
<td>1,000</td>
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*Padre Dam MWD’s Advanced Water Purification Facility Demonstration Project*

*City of San Diego’s Pure Water Facility Demonstration Project*
Why Ocean Desalination?

- New, local water supply
- Reduces need for imported water
- Drought-proof supply
- Recognized by the State as a drought-resilient supply
- Improved water quality
- While more expensive than existing imported supplies, cost on par with other new, local water supplies
- Enhances regional supply reliability and local control
- Strong public support
- Complements water recycling
Lewis Carlsbad Desalination Plant

- Owned and operated by Poseidon Water
- 30 year contract
- $1 billion investment
- 48,000-56,000 acre-feet/year of drought-proof supplies
- Largest, most advanced seawater desalination facility in North America
- On-line in December 2015
Lewis Carlsbad Desalination Plant – “How it Works”
Project Components

Pacific Ocean

Carlsbad

Desal WTP
Encina Power Station

New 54-inch steel pipe
10-miles

San Marcos

Pipeline 3
Pipeline 4

P3 relining
5-miles

TOVWTP Improvements

TOVWTP
Pipeline Interconnection

Pipeline 3 relining
5-miles
Reverse Osmosis System
Total Project Costs

Total Capital Cost

<table>
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<tr>
<th>Description</th>
<th>Cost</th>
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<tbody>
<tr>
<td>Total desalination plant</td>
<td>$537 million</td>
</tr>
<tr>
<td>Total conveyance pipeline</td>
<td>$159 million</td>
</tr>
<tr>
<td>Financing costs</td>
<td>$227 million</td>
</tr>
<tr>
<td>Water Authority improvements and oversight</td>
<td>$80 million</td>
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<tr>
<td>Total Capital Costs</td>
<td>$1.003 billion</td>
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2016/17 water purchase price* (includes pipeline)

*Current estimate based on highest electricity rate applicable

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<th>56,000 acre–feet per year</th>
<th>48,000 acre–feet per year</th>
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<tr>
<td>$2,125/AF</td>
<td>$2,368/AF</td>
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</table>
Landmark Water Purchase Agreement between the Water Authority and Poseidon

- Water Authority Board approved WPA on Nov 29, 2012
- Outlines commercial and financial terms for production and delivery of water from the Carlsbad Desalination Project

- Transfers risk to private developer
  - Permitting
  - Design liability
  - Cost overruns
  - Operations
  - Must meet water quality requirements
The Carlsbad Project: A Successful Public Private Partnership (P3)

- **Risk Transfer** to Poseidon/Contractor team
- **Price certainty** throughout Water Purchase Agreement term
- **Buy-out provisions** after 10 years of operation
- **Transfer to public ownership** at the end of the 30 year agreement
Project Financing Structure

- 82% funded through Bonds issued via the California Pollution Control Financing Authority
  - Plant Bonds issued as Tax-Exempt Private Activity Bonds with Poseidon as sponsor
  - Pipeline Bonds issued as Tax-Exempt Governmental Purpose Bonds with the Water Authority as sponsor
  - Bonds sold on December 24, 2012
  - Interest rate 4.78%

- 18% Cash Equity from Stonepeak Infrastructure
Project Delivery by P3

Pros:
- Risk transfer to the private sector
- Speed (design and construction can proceed concurrently)
- A commodity purchase with defined terms and conditions
- Performance guarantees
- Approval rights over acceptance/performance testing
- Debt is kept off the public agency balance sheet

Cons:
- Take or Pay contract
- Higher cost of capital
- Greater overall transactional complexity
- Limited public agency input regarding design, construction and operations
- Public agency does not have a direct relationship with contractors
Status of Plant Operations

- Began commercial operations on December 23, 2015
- Over 21 billion gallons of desalinated ocean water produced to date
- Permitting and procurement under way for planned intake and discharge modifications
A Balanced Approach is Required to Manage Supply Shortages

- Provides more resiliency in times of shortages
- Protects economy and quality of life in San Diego County
Thank You!
California’s Five-Year Drought (2012-2016)
Snow Water Content – Northern Sierra
Percent of Average as of April 1 (traditional peak)

Source: California Department of Water Resources
Lake Oroville (State Water Project)  
Final Year of Drought  
January 21, 2016 (Bidwell Canyon Marina)
Lake Oroville (State Water Project)
Beginning of Wet Year
January 21, 2017 (Bidwell Canyon Marina)
MONTEREY PENINSULA WATER SUPPLY PROJECT & HISTORICAL CONTEXT
AUGUST 1977
Severe drought
- Inflow was approximately 4% of the long-term average

SEPTEMBER 1992
Drought

JUNE 1995
SWRCB issues order 95-10

AUGUST 1997
Steelhead listed as “threatened”

OCTOBER 2009
Cease and Desist Order

DECEMBER 2010
CPUC approves Regional Desal project

APRIL 2012
MPWSP application filed with CPUC
Monterey Peninsula Water Supply Project (MPWSP)

DESALINATION

6,252 AF

3,500 AF

1,300 AF

GW

ASR

ground water replenishment

aquifer storage and recovery
WATER SOURCES
TODAY/TOMORROW

HISTORIC WATER SOURCES
- CARMEL RIVER 75%
- SEASIDE BASIN 25%

FUTURE WATER SOURCES
- DESALINATION 40%
- CARMEL RIVER 22%
- SEASIDE BASIN 5%
- PACIFIC GROVE 1%
- SAND CITY 2%
- ASR 8%
<table>
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<tr>
<th>Project Component</th>
<th>Cost (M) 9.6 MGD</th>
<th>Cost (M) 6.4 MGD</th>
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<tr>
<td>Desal Plant</td>
<td>$124</td>
<td>$115</td>
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<tr>
<td>Pipelines, Terminal Reservoir &amp; BPS</td>
<td>$128</td>
<td>$128</td>
</tr>
<tr>
<td>Intake Wells &amp; Return Systems</td>
<td>$86</td>
<td>$79</td>
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<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$338</strong></td>
<td><strong>$322</strong></td>
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SLANT WELL PROFILE
WATER PROJECT

KEY BENEFITS

- **RESTORES** CARMEL RIVER
- **REPLENISHES** SEASIDE BASIN
- **MINIMIZES** OCEAN LIFE IMPACT
- **SEEKS** GREEN ENERGY SOURCES

● SUBSURFACE INTAKES
● DIFFUSED OUTFALL
PUBLIC PARTICIPATION

- Governance
- Public investment – reduce cost
- Environmental – slant wells, diffused outfall
- Salinas Basin – aquifer modeling, Hydro Working Group
- Consensus 16-party settlement

- CALIFORNIA AMERICAN WATER
- CITIZENS FOR PUBLIC WATER
- CITY OF PACIFIC GROVE
- COALITION OF PENINSULA BUSINESSES
- COUNTY OF MONTEREY
- DIVISION OF RATEPAYERS ADVOCATES
- LANDWATCH MONTEREY COUNTY
- MONTEREY COUNTY FARM BUREAU
- MONTEREY COUNTY WATER RESOURCES AGENCY
- MONTEREY PENINSULA REGIONAL WATER AUTHORITY
- MONTEREY PENINSULA WATER MANAGEMENT DISTRICT
- MONTEREY REGIONAL WATER POLLUTION CONTROL AGENCY
- PLANNING AND CONSERVATION LEAGUE
- SALINAS VALLEY WATER COALITION
- SIERRA CLUB
- SURFRIDER FOUNDATION
QUESTIONS
On March 10, 2016, CPUC released EIR/EIS schedule changes which are reflected in this schedule. This schedule is based on our best estimate as of 7/5/2017.

Note: The schedule is based on the information and assumptions available at time of update and is accurate to +/- 6 months.
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