Desalination as Part of a "Balanced Water Portfolio"

Cal Desal 2017

Mark Lambert | Feb 2017
The Protagonist and The Antagonist: The Water Story

- The Protagonist *pursues* the Story Goal and *considers* the value of doing so.
- The Antagonist *prevents* the Story Goal and forces others to *reconsider* what it is they are doing.

- The Story Goal: A Balanced Water Portfolio.
“If we could produce fresh water from salt water at a low cost, that would indeed be a great service to humanity, and would dwarf any other scientific accomplishment”

President John F. Kennedy, 1962
Today’s Agenda

California’s Water Situation

A Balanced Water Portfolio

Desalination Success Stories

How Do WE Move Forward?
5 Things the State of California wants You to Know:

- Water is the Essence of Life for California.
- California’s Complex Water System is in Crisis.
- A Diverse Portfolio Approach is Required.
- Solutions Require Integration, Alignment, and Investment.
- We All Have a Role to Play in Securing Our Future.

Source: State Water Plan 2018 update
Diverse Landscape of Water Rich and Water Poor Regions

“water, water everywhere and nary a drop to drink”
California Drought Monitor: focused on surface water sources & snowpack

Drought conditions as of August 2015

- Abnormally Dry
- Moderate Drought
- Severe Drought
- Extreme Drought
- Exceptional Drought

As of January 2017.

US Drought Monitor
Groundwater Health: many basins remain critically poor: dept. of water resources

21 critically overdrafted basins and sub basins are in GSP status

Impacts which can include: seawater intrusion, land subsidence, groundwater depletion, and chronic lowering of groundwater levels
The California Facts:

Due to severe drought conditions:
- Governor Brown declared a state of emergency in California in January 2014. More than 71 percent of the state was experiencing an extreme drought by August 2015.
- More than 400,000 acres of farmland in the Central Valley, Central Coast, and Southern California were left fallow in 2015.
- State mandated an overall 25 percent reduction in water use, compared to 2013, to be achieved by March 2016.

But, Southern California Remains in Drought
- Rainfall totals are only average or slightly above average.

SWP uses 2% of ALL electricity generated in CA (5 billion watts/yr.)
- That’s an average of: 2300 kwh/acre-ft. (based on 2.2 million acre-ft.)
  (http://www.nrdc.org/water/conservation/edrain/edrain.pdf)

50% of population (20 million) lives South of Wilshire Blvd:
- Let’s focus here!

The vast majority of LA County’s 9.8 million people live below Wilshire Blvd. Orange County has an additional 3 million, San Bernardino has 2 million, Riverside has 2.2 million, San Diego County has 3.1 million, Imperial County has 174,000. Add them up and you get just over 20 million.)
What If:

- Southern California had an uninterruptable, sustainable and expandable supply of water to meet the needs of industry, agriculture and municipal users regardless of rainfall levels?
- Managers of existing water resources could know that their current demand levels are not subject to supply interruption and that if they need to expand, additional water supplies can be brought on line in a timely fashion?
- Local and regional elected officials and economic developers could assure new “industrial” prospects that if they locate in this region they will have water?
A Balanced Water Portfolio: A Goal for Southern California?

- Less Reliance on Imported Water, More Reliance of Local Supply

Balanced Water Portfolio

- Local Surface Water, 30%
- Local Ground Water, 15%
- Recycled Water (purple pipe), 20%
- Direct Potable Reuse, 10%
- Sea Water Desalination, 15%
- Imported Water, 10%
Sources of San Diego County’s Water Supply
(2010-2014 five-year average)

19% State Water Project
(MWD supplies)

64% Colorado River
(Long-term Transfers and MWD supplies)

17% Local Supplies
Why Desalination should be Part of California’s Water Supply

- Southern California requires an uninterruptable supply of water for economic sustainability
- Water Reuse is an essential element but has limitations
- SW and BW Desalination offers an uninterruptable, sustainable, and expandable water supply for industry and municipal customers.
- The technologies, practices, and policies needed to realize this outcome are proven
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

SWP and MWD

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

(source: http://www.nrdc.org/water/conservation/edrain/edrain.pdf)
Proposed or Planned Seawater Desalination Plants in CA

17 proposed plants along the CA coast (= 500 MGD capacity)
IDE – Your Water Partners

Success Stories
The Israel Story: Water Independence

- In 2008, Israel teetered on the edge of catastrophe. A decade-long drought had scorched the Fertile Crescent, and Israel’s largest source of freshwater, the Sea of Galilee, had dropped to within inches of the “black line” at which irreversible salt infiltration would flood the lake and ruin it forever. Water restrictions were imposed, and many farmers.

- Now Israel has more water than it needs. The turnaround started in 2007, when low-flow toilets and showerheads were installed nationwide and the national water authority built innovative water treatment systems that recapture 86 percent of the water that goes down the drain and use it for irrigation.

- But even with those measures, Israel still needed about 1.9 billion cubic meters of freshwater per year and was getting just 1.4 billion cubic meters from natural sources. That Sea of Galilee was draining like an unplugged tub and why the country was about to lose its farms.

- Enter desalination. The Ashkelon plant, in 2005, provided 127 million cubic meters of water. Hadera, in 2009, put out another 140 million cubic meters. And now Sorek, 150 million cubic meters. All told, desal plants can provide some 600 million cubic meters of water a year, and more are on the way.
Sea Water Desalination in Israel

- Severe Water Crisis throughout 1990’s
- By 2015 desalinated water supplies approximately 62.5%, of the domestic water
- By 2050 desalinated water to supply nearly 100%, of the domestic water

Hadera 120 MGD
Soreq 165 MGD
Palmachim 63 MGD
Ashdod (Planned) 72 MGD
Ashkelon 87 MGD
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Carlsbad Desalination Plant
Increasing San Diego County's Water Supply Reliability through Supply Diversification

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

**2016**
- 100 TAF (22%)
- 79 TAF (17%)
- 23 TAF (5%)
- Total = 455 TAF

*Region under State-Mandated Drought Restrictions*

**2020***
- 190 TAF (32%)
- 126 TAF (21%)
- 80 TAF (14%)
- 56 TAF (10%)
- 43 TAF (7%)
- Total = 588 TAF

**2035***
- 110 TAF (16%)
- 88 TAF (13%)
- 72 TAF (10%)
- 57 TAF (8%)
- 80 TAF (12%)
- 36 TAF (5%)
- Total = 694 TAF

*Includes verifiable and additional planned local supply projects from 2015 UWMP

(TAF = Thousand Acre-Feet)
Carlsbad, California, USA

An award-winning, milestone plant for the desalination industry

Overview

- **Capacity**: 54 MGD (204,412 m³/day)
- **Technology**: SWRO
- **Project Type**: EPS and O&M – 30 years
- **Footprint**: 6 acres (24,000 m²)
- **Off-Taker**: San Diego County Water Authority (SDCWA)
- **Operational Date**: December 2015
Agua Hedionda Lagoon Aerial View

- Mouth of Lagoon
- Outfall
- Intake
- Encina Power Station
RO Section (with local citizen) (my wife)
Regional Benefits

- 56,000 acre-feet per year of new water
- Locally-controlled, drought-proof supply
- 8-10% of regional demand
- Key to SDCWA water supply diversification strategy
- Boron reduction NOW for later recycle and reuse
  - Now that’s planning.
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Santa Barbara Desalination Project
Project Overview

- Retrofit of Existing Plant (1990’s vintage)
- Customer wanted a scalable facility = IDE’s Modular 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: December 2016
- Accelerated Project Delivery
  - Site preparation and module construction simultaneous
Santa Barbara: Under Construction (08-2016)
Santa Barbara: Under Commissioning (2-2017)
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Texas Situation: update
Texas Situation and Approach to Desalination

- Texas “Swings” in and out of Drought
  - 2010: reservoirs were same level as right now
  - 201: 252 of 254 counties were in drought and many on 90 day list

- 1000 people/day moving to Texas (not enough water to support)

- Economic Expansion along Gulf Coast at ALL time High
  - $1 trillion of new petrochemical growth planned or active
  - BUT, no secure, un-interruptible water supply

- State and Local Activities in Support of Desalination
  - Actionable Support at State Legislative Level
  - Governor and Key Legislators Proactive
  - Accelerated and Collaborative Permitting process by TCEQ
  - Industry Associations Collectively Reviewing draft WPA’s
  - Swift Fund Available to Support of Common Infrastructure
  - Desalination is Key Part of the Water Plan!
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What’s Needed to Move Forward?
Moving Forward:

- Recognition of the Problem and a Sense of Urgency
  - Drought remains the issue
  - Average rainfall does not solve the problem
- Leadership and Policy Advocacy
  - State and Local Level
  - Cal Desal Association
- Adoption of Regional Approach to Water Planning
  - e.g. San Diego; Santa Barbara
- Ample Capital is Available through PPP model
  - Trust Factor and Risk Mitigation
- Developer’s Working in Conjunction with Regional Stakeholders
- Proactive Communication Regarding Success Stories
  - Carlsbad
To Get Fish (my balanced portfolio)
Must
Manage
the
Antagonist
Thank you

Questions?