Overview of Ocean Desalination in California

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Water Resources vs. Population Distribution

Average Annual Precipitation (Inches), California
Period: 1961-1990

Source: U.S. Census Bureau
Census 2000 Summary File 1
population by census tract.

Oregon Climate Service, 1995
Figure 2.6
California has an elaborate network of conveyance and storage infrastructure, controlled by different agencies.
Regional Water Supply Portfolios in California

Note: Regional water portfolios provide information about annual Water Supply and Water Use balances for California’s 10 hydrologic regions. The regional water balances depicted at the right of each bar show conditions for water year 2010. Update 2013 presents regional and statewide water balances for years 2001 through 2010. Water balances can be used to compare how water supplies and uses can vary between wet, average, and dry hydrologic conditions throughout the regions and how each region’s water balance can vary from year to year. For more information, see Volume 2, Regional Reports.

Source: California Water Plan update 2013
California water Supply and Use Portfolio

Source: California Water Plan update 2013
Why it has not been widely adopted?
Coastal Desalination Facilitates in California

Existing ocean desalination plants: 11
Active plants: 5
(mostly industrial)

Proposed plants: 11 in California and two in Mexico

Source: State Water Resources Control Board
Cost and Financing Challenges

• Expensive and highly dependent to the cost of energy and financing: $1800-$3000 /AF

• Demand Risk: while it is believed to be drought proof and independent from weather. e.g. Santa Barbara
Cost of Water Supply Alternatives

Source: Heal the Ocean, 2015
Energy Requirements and GHG Emissions

Source: Heal the Ocean, 2015
Marin Impacts

• Intake and brine management challenges
  ➢ Local
  ➢ Data
  ➢ Ongoing pre and post monitoring
  ➢ Scientifically sounds research
Closing Thoughts

• Ocean desalination could be a good addition to some of the regional water supply portfolios in California.

• High cost and environmental impacts are two of the main challenges related to this technological solution.

• There are very limited data and scientific knowledge available related to the marine impacts of ocean desalination.
Table 10-4 Summary of California Desalting, 2006

<table>
<thead>
<tr>
<th>Feedwater Source</th>
<th>In Operation</th>
<th>In Design and Construction</th>
<th>Planned</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO. OF PLANTS</td>
<td>ANNUAL CAPACITY</td>
<td>NO. OF PLANTS</td>
</tr>
<tr>
<td>Groundwater</td>
<td>14</td>
<td>46,200</td>
<td>5</td>
</tr>
<tr>
<td>Seawater</td>
<td>4</td>
<td>1,150</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
<td>47,350</td>
<td>6</td>
</tr>
<tr>
<td>Cumulative</td>
<td></td>
<td>47,350</td>
<td>24</td>
</tr>
</tbody>
</table>

Notes:
Capacity in acre-feet per year.

Data courtesy of California Department of Water Resources Exhibit-H1, California Perspective on Desalination Meeting, Jeanine Jones, May 24, 2006.

http://www.waterplan.water.ca.gov/docs/cwpu2013/Final/Vol3_Ch10_Desalination.pdf
# Existing Ocean Desalination Plants in California

<table>
<thead>
<tr>
<th>Station ID</th>
<th>Operator/ Location</th>
<th>Production Capacity (MGD)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Monterey Bay Aquarium</td>
<td>0.04</td>
<td>Active</td>
</tr>
<tr>
<td>2</td>
<td>Marina Coast Water District</td>
<td>0.3</td>
<td>Temporarily idle</td>
</tr>
<tr>
<td>3</td>
<td>Duke Energy, Moss Landing</td>
<td>0.5</td>
<td>Active</td>
</tr>
<tr>
<td>4</td>
<td>Sand City</td>
<td>0.3</td>
<td>Active</td>
</tr>
<tr>
<td>5</td>
<td>City of Morro Bay</td>
<td>0.6</td>
<td>Intermittent use</td>
</tr>
<tr>
<td>6</td>
<td>Duke Energy</td>
<td>0.4</td>
<td>Not known</td>
</tr>
<tr>
<td>7</td>
<td>Pacific Gas &amp; Electric (PG&amp;E)</td>
<td>0.6</td>
<td>Not known</td>
</tr>
<tr>
<td>8</td>
<td>Chevron USA</td>
<td>0.4</td>
<td>Active</td>
</tr>
<tr>
<td>9</td>
<td>City of Santa Barbara</td>
<td>2.8-8.9</td>
<td>Temporarily idle</td>
</tr>
<tr>
<td>10</td>
<td>U.S. Navy</td>
<td>0.02</td>
<td>Not known</td>
</tr>
<tr>
<td>11</td>
<td>Southern California Edison (SCE)</td>
<td>0.12</td>
<td>Inactive</td>
</tr>
</tbody>
</table>

Source: State Water Resources Control Board