

Seawater Desalination in California

KEY DESALINATION FACTS

Technologies

- Reverse Osmosis.

Pressure is applied to the intake water, forcing the water molecules through a semipermeable membrane. The salt molecules do not pass through the membrane, and the water that passes through becomes potable product water.

- Distillation.

The intake water is heated to produce steam. The steam is then condensed to produce product water with low salt concentration.

Ranges in Plant Capacity (Other than offshore oil and gas platforms)

- 20 - 112,000 AF/yr.[1]

Costs

- Most seawater desalination plants in California would produce water in the range of \$1,000 to \$2,200 per acre-foot (1992 cost basis).

Energy Use

- 2,500 to 29,500 kilowatt hours per acre-foot (kWh/AF).

Recovery (Percent of product water per unit input flow.)

- For every 100 gallons of seawater input, 15 to 50 gallons of fresh water would be produced (a "recovery" of 15 to 50%). The remainder is waste brine solution containing dissolved solids.

Water Quality

- 1.0 to 500 ppm tds.[2]

Feedwater Source

- Desalination plants can use either a pipeline into the ocean or wells on the beach or seafloor for intake of seawater.

Plant Size

- Area:

Varies according to plant design. Proposed or existing desalination plants in California range from 80 square feet for a 16 AF/yr plant to 7.5 acres for a 5,000 AF/yr plant. [3]

- Height:

15 to 20 feet for typical reverse osmosis equipment. 30 to 45 feet for typical distillation equipment.

Potential Coastal Zone Impacts

- Air quality
- Commercial and recreational fishing
- Construction impacts on land and marine species and habitats
- Energy use
- Growth-inducing effects
- Marine resources impacts from feedwater intake and ocean discharge
- Navigation
- Noise
- Potential hazardous releases from accidents
- Public access
- Recreation
- Visual quality
- Water quality
- Water quantity (e.g., effects of drawdown or saltwater intrusion of groundwater wells)
- Cumulative impacts

Saudi Arabia Desal Plant PICTURE (missing)

ENDNOTES

1. One acre-foot (AF) equals approximately 326,000 gallons; this is equivalent to the amount of water that two to three households would consume in one year. Units of capacity are acre-feet per year (AF/yr), gallons per day (gpd) or million gallons per day (MGD). In most cases, conversions can not be made directly from gpd or MGD to AF/yr since most plants will not operate every day of the year.
2. The California secondary drinking water standard for maximum total dissolved solids (tds) concentration is 500 milligrams per liter (mg/L), which is equivalent to 500 parts per million (ppm). In contrast, the tds concentration in "typical seawater" is 34,420 mg/L (Source: CH2M Hill, "Preliminary Feasibility Study Report of Seawater Desalination Options for Goleta Water District," September 1989.)
3. For example, the City of Santa Barbara's plant is designed to accommodate a capacity of up to 10,000 AF/yr on 2.1 acres of land, including both the main pump station and the chemical treatment area.