WHEN DESAL IN CALIFORNIA GETS THE GREEN LIGHT: A COMPARISON OF FOUR PROJECTS

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Recent record-setting droughts, climate change, and population growth have strengthened the urgency of a diversified water portfolio in California. While desalination has historically been a small contributor to California's water supply, drought conditions and water shortages have spurred cities to build desalination plants along the coast. Thus, desalination will likely play an increasing role in meeting growing water demand in the State, in conjunction with other sources including brackish desalination, recycled water, and stormwater. However, desalination remains economically and environmentally costly, particularly for low-income, minority communities. Thus, this paper seeks to understand the factors behind whether a desalination project is approved or denied, using four recent projects in California as case studies: Carlsbad (in operation since 2015), Huntington Beach (denied May 2022), Doheny (approved October 2022), and Marina (approved November 2022). Analyzing four factors—permitting process, environmental impact, cost on the local community, and dependence on desalination—these case studies highlight the importance of using desalination as a last resort option, mitigating a project's impacts on marine life and the environment, and involving the local community in the decision-making process. Part I provides an overview of desalination and its controversial nature, and briefly traces the role that drought has played in spurring desalination projects along the coast. Part II provides an overview of key federal and state laws that regulate desalination projects. Part IV analyzes the factors that affect whether a desalination project is approved in California, using four recent projects, described in Part III, as case studies. Part V outlines recommendations and best practices that California can adopt as the State continues to develop desalination projects. Part VI concludes.

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I.DESALINATION AND ITS ROLE IN AN INCREASINGLY WATER-STRESSED WORLD

Fresh water is a critical but scarce resource in many regions of the world. The oceans contain ninety-seven percent of water on Earth,[1] and less than one percent of Earth's water is fresh water available for human use.[2] In 2025, 1.8 billion people are expected to face absolute water scarcity, as defined by the Food and Agriculture Organization, with two-thirds of the global population anticipated to be dealing with water stress.[3] Moreover, global water use is projected to increase by twenty to fifty percent by 2050, increasing the risk of water insecurity during the next two decades.[4]

As a result, water-stressed regions have increasingly been turning to desalination as a solution.[5] Desalination is the process of removing salt from water to transform seawater or brackish water into fresh water for human use.[6] Since ancient times, fishermen have relied on desalination to collect fresh water at sea.[7] There are two primary methods of desalination. The older method is distillation,

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[1] HEATHER COOLEY ET AL., DESALINATION, WITH A GRAIN OF SALT: A CALIFORNIA PERSPECTIVE 9 (Pacific Inst., June 2006).

[2] Fresh water includes both groundwater and surface water. *How We Use Water*, EPA, https://www.epa.gov/watersense/how-we-use-water (last updated Sept. 12, 2024).

[3] *Investing in water resilience is crucial – it is also an untapped opportunity,* WORLD ECON. F. (Dec. 16, 2024), https://www.weforum.org/stories/2024/12/investing-in-water-resilience-untapped-opportunity; *As shortages mount, countries hunt for novel sources of water*, UN ENV'T PROGRAMME (Jan. 17, 2024), https://www.unep.org/news-and-stories/story/shortages-mount-countries-hunt-novel-sources-water.

[4] WATER INSECURITY THREATENING GLOBAL ECONOMIC GROWTH, POLITICAL STABILITY, GLOBAL TRENDS 1–2 (Apr. 2021).

[5] *See* Jim Robbins, *As Water Scarcity Increases, Desalination Plants Are on the Rise*, YALE ENV'T 360 (June 11, 2019), https://e360.yale.edu/features/as-water-scarcity-increases-desalination-plants-are-on-the-rise; Paddy Padmanathan, *How technology and entrepreneurship can quench our parched world*, WORLD ECON. F. (June 29, 2022), https://www.weforum.org/agenda/2022/06/technology-and-entrepreneurship-can-quench-our-parched-world.

[6] Michael Pappas, *Unnatural Resource Law: Situating Desalination in Coastal Resource and Water Law Doctrines*, 86 TUL. L. REV. 81, 85 (Nov. 2011).

[7] *Id.*

or thermal desalination; this involves heating up seawater, capturing the steam, and condensing it into water.[8] However, most existing and planned desalination plants use the modern method of reverse osmosis because it is more energy efficient.[9] In reverse osmosis, intake pumps withdraw seawater from the ocean, either via surface intakes (drawing directly from a water source) or subsurface intakes (drawing from pipes installed beneath the seafloor).[10] After removing organic matter, inorganic particulates, and other suspended solids, reverse osmosis then removes the salt and any remaining impurities by filtering the seawater through a membrane, which separates the larger salt molecules from the smaller water molecules.[11] The resulting desalinated water undergoes additional treatment before it is ready for human use.[12]

Today, over 300 million people in 170 countries get their water from over 20,000 desalination plants.[13] The United States has historically been less dependent on desalination than countries in the Middle East because it contains many freshwater lakes and rivers and much of the country receives rain, whereas countries in the Middle East that are more dependent on desalination tend to have drier climates and more expensive alternative sources of water.[14] Saudi Arabia, for example, with its scarcity of fresh water and relatively inexpensive energy costs, produces the most fresh water from desalination in the world (a fifth of the world's total),[15] which comprises seventy percent of its drinking water.[16] Israel has also become a global leader in desalination after facing water crises and chronic water shortages.[17] Israel, which is more than half desert,[18] depends on

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[8] *Desalination*, USGS (Sept. 11, 2019), https://www.usgs.gov/special-topics/water-science-school/science/desalination.

[9] FINAL STAFF REP. INCLUDING THE FINAL SUBSTITUTE ENVIRONMENTAL DOCUMENTATION ADOPTED MAY 6, 2015, STATE WATER RES. CONTROL BD., DIV. WATER QUALITY 17 (May 6, 2015) [hereinafter FINAL STAFF REP.]. California installed the first commercial desalination plant incorporating the technology in 1965. Babak Zolghadr-Asli et al., *A Closer Look at the History of the Desalination Industry: The Evolution of the Practice of Desalination Through the Course of Time*, 23 WATER SUPPLY 2517, 2519 (2023).

[10] FINAL STAFF REP., *supra* note 9, at 17, 50, 64.

[11] *Id.* at 17.

[12] *Id.* at 17.

[13] *Desalination Plant in Orange County Will Help Ensure Clean Drinking Water*, CALMATTERS (Oct. 16, 2020), https://calmatters.org/environment/water/2020/10/desalination-plant-in-orange-county-will-help-ensure-clean-drinking-water.

[14] Taylor Denson, *Desalination and California's Water Problem: The Viability of the Desalination Industry as Examined Through the Lens of California's New Desalination Rules and Development*, 28 GEO. ENVTL. L. REV. 713, 717 (2016).

[15] Robbins, *supra* note 5.

[16] Marc-Antoine Eyl Mazzega & Élise Cassignol, *The Geopolitics of Seawater Desalination*, IFRI (Sept. 27, 2022), https://www.ifri.org/en/publications/etudes-de-lifri/geopolitics-seawater-desalination.

[17] Robbins, *supra* note 5.

[18] Christopher Woody, *Israel's Revolutionary Water Management Methods Aren't Going to Be Enough to Solve California's Devastating Drought*, BUS. INSIDER (June 15, 2015),

desalination for eighty percent of its drinking water[19] because of its arid climate, rising temperatures, and large bodies of saltwater.[20] The United Arab Emirates gets forty-two percent of its drinking water from desalination. and Saudi Arabia gets seventy percent of its drinking water from desalination.[21] Additionally, many smaller communities rely on desalination to fulfill their water needs.[22] For example, the island of Curaçao, the first place to make a major commitment to desalination and open a production-scale desalination plant,[23] relies on desalination for 100% of its water.[24] Even in the United States, desalination plants exist in every state, with Florida, California, Texas, and Arizona having the greatest installed capacity.[25]

A. California's Drought Problem

California has experienced historic record-setting droughts, exacerbated by climate change.[26] The last twenty-five years has been the driest quarter-century in the American West in the past 1,200 years.[27] In January 2014, Governor Jerry Brown declared a State of Emergency as a result of severe drought conditions, which he lifted in April 2017.[28] The 2012-2016 drought set records as the hottest and most severe drought in the state's recorded history,[29] and the 2019-2022 period was the driest three-year period on record in California.[30] Summer 2021

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https://www.businessinsider.com/israel-style-methods-arent-going-to-solve-californias-devastating-drought-2015-6.

[19] Sharon Udasin, *Could Desalination Play a Role in the Future of the Colorado River?,* TRELLIS (Sept. 1, 2021), https://trellis.net/article/could-desalination-play-role-future-colorado-river/.

[20] Akiko Shimizu, *Desalination Provides Important Source of Scarce Drinking Water in Israel*, COLUM. CLIMATE SCHOOL SABIN CTR. FOR CLIMATE CHANGE LAW (July 28, 2014), https://blogs.law.columbia.edu/climatechange/2014/07/28/desalination-provides-important-source-of-scarce-drinking-water-in-israel.

[21] IFRI, *supra* note 16.

[22] COOLEY ET AL., *supra* note 1, at 20.

[23] COOLEY ET AL., *supra* note 1, at 11; Denson, *supra* note 14, at 716.

[24] Pappas, *supra* note 6, at 90.

[25] Pappas, *supra* note 6, at 91.

[26] Jeffrey Mount et al., *Droughts in California*, PUB. POL'Y INST. OF CAL. (Apr. 2021), https://www.ppic.org/publication/droughts-in-california.

[27] Ian James, *The American West's Last Quarter-Century Ranks as the Driest in 1,200 Years, Research Shows*, L.A. TIMES (July 30, 2024), https://www.latimes.com/environment/story/2024-07-30/megadrought-ucla-research.

[28] *2012-2016 California Drought: Historical Perspective*, USGS, https://ca.water.usgs.gov/california-drought/california-drought-comparisons.html (last visited Apr. 28, 2024).

[29] Mount et al., *supra* note 26; *Drought*, STATE OF CAL. OEHHA (July 1, 2024) https://oehha.ca.gov/climate-change/epic-2022/changes-climate/drought.

[30] Rachel Becker, *Four in a Row: California Drought Likely to Continue*, CALMATTERS (Sept. 28, 2022), https://calmatters.org/environment/2022/09/california-drought-likely-to-continue; Hayley Smith, *California Suffering Through Driest Three Years Ever Recorded, With No Relief in Sight,* L.A. TIMES (Oct. 3, 2022), https://www.latimes.com/california/story/2022-10-03/california-experiences-driest-three-years-ever-recorded.

was the State's warmest summer on record[31]—until summer 2024 surpassed that as the State's warmest summer on record.[32] At the same time that California's population is projected to increase slightly over the next couple of decades, from 39 million in July 2024 to nearly 41 million by 2040,[33] the State expects to lose as much as 10% of its existing water supplies by 2040 because of hotter and drier weather from climate change.[34] The Colorado River—which supplies over 15% of California's surface water supplies[35] and about a third of the water supply for Southern California cities and suburbs[36]—is likely to lose more than half of its flow by 2100.[37]

Given the need for a diversified water portfolio in California, the State has recognized the potential of desalination as a reliable local water supply option to help meet growing water needs.[38] The California Water Code declares that desalination is "consistent with both state water supply and efficiency policy goals."[39] AB 2717, passed in September 2002,[40] established the California Water Desalination Task Force to look into potential opportunities for desalination; the Task Force found that "economically and environmentally acceptable desalination should be considered as part of a balanced water portfolio to help meet California's existing and future water supply and environmental needs."[41] AB 314, passed in 2003, established that desalination projects "should be eligible for assistance and funding on an equal basis with projects for water supply

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[31] *Summer 2021 Neck and Neck With Dust Bowl Summer for Hottest on Record*, NOAA (Sept. 13, 2021), https://www.noaa.gov/news/summer-2021-neck-and-neck-with-dust-bowl-summer-for-hottest-on-record.

[32] *NOAA: Summer 2024 was California's Hottest on Record*, KCRA (Sept. 10, 2024), https://www.kcra.com/article/summer-2024-california-hottest-on-record/62144078; *U.S. sweltered through its 4th-hottest summer on* record, NOAA (Sept. 10, 2024), https://www.noaa.gov/news/us-sweltered-through-its-4th-hottest-summer-on-record.

[33] Hans Johnson, Marisol Cuellar Mejia & Eric McGhee, *California's Population*, PUB. POL'Y INST. OF CAL. (Jan. 2025), https://www.ppic.org/wp-content/uploads/JTF_PopulationJTF.pdf.

[34] CALIFORNIA WATER PLAN UPDATE 2023, DEP'T WATER RES. 4-3 (2023), https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/California-Water-Plan/Docs/Update2023/Final/California-Water-Plan-Update-2023.pdf [hereinafter 2023 WATER PLAN UPDATE].

[35] *The Colorado River Compact*, CAL. WATER IMPACT NETWORK, https://www.c-win.org/the-colorado-river-compact (last visited Apr. 28, 2024).

[36] *The Colorado River*, PPIC WATER POL'Y CTR. (Nov. 2018), https://www.ppic.org/wp-content/uploads/californias-water-the-colorado-river-november-2018.pdf.

[37] Grayson Zulauf, *Colorado River Deal Forever Changes the Price of Water in the West*, CALMATTERS (June 6, 2023), https://calmatters.org/commentary/2023/06/colorado-river-deal-west-water.

[38] *See*, *e.g.*, Rob Oglesby, *California Desalination Policy and Energy Impacts*, CAL. ENERGY COMM'N (Nov. 6, 2015), https://www.energy.gov/sites/default/files/2015/11/f27/Desalination%20Workshop%202015%20Oglesby.pdf.

[39] Cal. Water Code § 12947(a) (West 2011).

[40] Assemb. B. 2717, Ch. 957, 2001–2002 Leg. Reg. Sess. (Cal. 2002).

[41] *Desalination: Hearing on A.B. 2595 (Hall) Before the Assem. Comm. of Nat. Res.*, 2011—2012 Leg. Reg. Sess. 5 (Cal. 2012).

reliability and efficiency."[42] Governor Brown's 2015 Executive Order B-29-15 directed state agencies to accelerate the use of cutting-edge technologies, including "renewable energy-powered desalination."[43] Under California's Water Supply Strategy, released in August 2022, the State plans to increase desalination production by 28,000 acre-feet per year by 2030 and 84,000 acre-feet per year by 2040.[44]

B. History of Desalination Projects in California

While desalination has traditionally been a small contributor to California's water supply[45] because of its high costs, drought conditions and water shortages have driven cities to build desalination projects along the coast. The State's first seawater desalination facility began operating on Catalina Island in 1992[46] and can produce 200,000 gallons of water per day.[47] Because of extreme drought, Catalina imposed water rationing from August 2014 until April 2017, during which time it had to reduce its water usage by 25 or 50 percent, depending on reservoir capacity.[48] As a result, the city of Avalon (located on Catalina Island), Los Angeles County, and Southern California Edison ("SCE") partnered to build a second desalination unit in order to avoid additional water rationing.[49] The new unit, which began operating in 2016[50] and cost $3 million,[51] connects to SCE's original plant and can produce an additional 150,000 gallons of water a day (168 acre-feet/year).[52]

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[42] Assemb. B. 314, 2003–2004 Leg. Reg. Sess. (Cal. 2003).

[43] Cal. Exec. Order No. B-29-15 (Apr. 1, 2015), https://www.waterboards.ca.gov/waterrights/water_issues/programs/drought/docs/040115_executive_order.pdf.

[44] CALIFORNIA'S WATER SUPPLY STRATEGY, CAL. NATURAL RES. AGENCY 3 (Aug. 2022) [hereinafter 2022 WATER SUPPLY STRATEGY].

[45] COOLEY ET AL., *supra* note 1, at 25.

[46] Brian Leventhal, *Celebrating 30 Years of Quenching Catalina's Thirst*, EDISON INT'L (May 17, 2022), https://energized.edison.com/stories/celebrating-30-years-of-quenching-catalinas-thirst.

[47] *SCE, Avalon Partner to Buy Additional Desalination Unit for Catalina Island to Potentially Delay or Avoid 50 Percent Water Rationing*, EDISON INT'L (July 15, 2015), https://newsroom.edison.com/releases/sce-avalon-partner-to-buy-additional-desalination-unit-for-catalina-island-to-potentially-delay-or-avoid-50-percent-water-rationing [hereinafter *SCE, Avalon Partner to Buy Additional Desalination Unit*].

[48] *Water Conservation*, AVALON CALIFORNIA, https://www.cityofavalon.com/271/Water-Conservation (last visited Apr. 28, 2024).

[49] *Catalina Island Aims to Avoid More Water Rationing With New Desalination Plant*, LAIST (Dec. 1, 2015), https://laist.com/news/kpcc-archive/catalina-island-hopes-to-avoid-more-water-rationin.

[50] Leventhal, *supra* note 46.

[51] Lauren Bartlett, *New Desalination Plant Comes to Catalina Island*, EDISON INT'L (Nov. 23, 2015), https://energized.edison.com/stories/new-desalination-plant-comes-to-catalina-island.

[52] *SCE, Avalon Partner to Buy Additional Desalination Unit*, *supra* note 47.

The Sand City Coastal Desalination Plant in Monterey County was the first full-scale seawater desalination facility in California.[53] Sand City decided to build a desalination plant with California American Water (Cal-Am), the region's public water utility,[54] because it had limited water resources, and regional efforts to address the issue had been unsuccessful for over twenty years due to financial and political challenges.[55] The $5.2 million project began operating in spring 2010 and can produce 268,000 gallons/day (300 acre-feet/year).[56]

Following this project milestone, new desalination projects began to arise with increasing frequency to address water shortages and the need for alternative water sources. The City of Santa Barbara voted to reactivate a desalination plant that had been dormant for over two decades. The plant had initially been built in response to an extended drought between 1987 and 1992. The City was already particularly vulnerable to water shortages because it relied on rainfall and local groundwater to meet its water needs and was not connected to the State Water Project,[57] a large water supply and distribution network across the state that provides water to over 25 million California residents and 750,000 acres of irrigated farmland.[58] Faced with growing pressure, the city approved an emergency desalination plant and piped connection to the State Water Project.[59] Santa Barbara spent $34 million to build the Charles E. Meyer desalination plant, which was completed in March 1992. Shortly after completion, however, the drought ended, and the plant was placed in active standby mode because the cost to produce the water was too high to justify its use following the drought.[60] When the drought returned in July 2015, the City Council voted unanimously to reactivate the plant, even though the desalinated water was projected to cost about a third more than the alternative of imported water; the estimated cost of opening the plant was $40 million, in addition to $5.2 million per year to keep it running.[61]

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[53] Larry Greenemeier, *Coastal California City Turns to California to Quench Its Thirst*, SCIENTIFIC AMERICAN (Apr. 7, 2010), https://www.scientificamerican.com/article/california-desalination-reverse-osmosis.

[54] *Id.*

[55] *Sand City Desalination*, MONTEREY PENINSULA WATER MGMT. DIST., https://www.mpwmd.net/water-supply/sand-city-desalination (last visited Apr. 28, 2024).

[56] Greenemeier, *supra* note 53; *Sand City Coastal Desalination Facility (CA),* Water Collaborative Delivery Ass'n, https://watercollaborativedelivery.org/project/sand-city-coastal-desalination-facility-ca (last visited on Mat 13, 2025); Peter Lobner, *Status of Desalination Plants in California*, THE LYNCEAN GROUP OF SAN DIEGO (Oct. 29, 2023), https://lynceans.org/all-posts/status-of-desalination-plants-in-california-2.

[57] Peter H. Gleick et al., *With a Grain of Salt: An Update on Seawater Desalination*, *in* THE WORLD'S WATER 2006-2007: THE BIENNIAL REPORT ON FRESHWATER RESOURCES 51, 63 (2006).

[58] *California's State Water Project*, COACHELLA VALLEY WATER DIST., https://www.cvwd.org/170/Californias-State-Water-Project (last visited Apr. 28, 2024).

[59] Gleick et al., *supra* note 57, at 63.

[60] Gleick et al., *supra* note 57, at 64.

[61] Amanda Covarrubias, *Santa Barbara Working to Reactivate Mothballed Desalination Plant*, L.A. TIMES, (Mar. 3, 2015), https://www.latimes.com/local/california/la-me-santa-barbara-desal-20150303-story.html.

In fact, the capital costs to reactivate the facility were $72 million.[62] The plant began operating in May 2017 and produces three million gallons of drinking water per day, equivalent to about 30% of the city's demand.[63]

The 1987–1992 drought also influenced the development of the Claude "Bud" Lewis Carlsbad Desalination Plant, the largest seawater desalination facility in the United States ("Carlsbad project").[64] The San Diego County Water Authority had an interest in building a San Diego-based desalination plant as early as the 1987–1992 drought, when the Metropolitan Water District of Southern California cut San Diego's water supply by 31% in 1991.[65] San Diego has a particular need for alternative water sources because San Diego County historically has imported up to 90% of its water from the Colorado River and Northern California.[66] The region receives half of its water from the Colorado River, which is vulnerable as a result of reduced snowfall in the Rocky Mountains and climate change.[67] In addition, San Diego receives just twelve inches of rain per year and has no groundwater.[68] These conditions made San Diego a prime location for a large desalination project that would help provide a reliable local water supply not dependent on local rainfall, snowpack, or outside suppliers.[69] The project, which began commercial operation in December 2015, cost almost $1 billion and produces fifty million gallons of fresh water each day, enough to serve an estimated 400,000 people in San Diego County, or nearly 10% of the region's demand.[70]

Drought and water shortages have continued to spur proposals for other desalination projects throughout the state. A plan to build a desalination plant in Huntington Beach ("Huntington Beach project"), while ultimately rejected in 2022, was proposed to strengthen local water supplies and serve as an alternative water source to imported water from the Sacramento-San Joaquin River Delta and

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[62] *Carlsbad Desalination Plant*, CAL. WATER BDS., https://www.waterboards.ca.gov/sandiego/water_issues/programs/regulatory/carlsbad_desalination.html (last updated Mar. 14, 2025).

[63] *Desalination*, CITY OF SANTA BARBARA, https://santabarbaraca.gov/government/departments/public-works/water-resources/water-system/water-sources/desalination (last visited Apr. 28, 2024).

[64] CAL. WATER BDS., *supra* note 62.

[65] Yossi Pinhas, *How the Carlsbad Water Desalination Plant Became a Game Changer for Desalination in The US*, IDE TECHS. (Jan. 28, 2024), https://ide-tech.com/en/blog/how-the-carlsbad-water-desalination-plant-became-a-game-changer-for-desalination-in-the-us.

[66] *Frequently Asked Questions*, CARLSBAD DESAL, https://www.carlsbaddesal.com/faqs.html (last visited Apr. 28, 2024) [hereinafter *Carlsbad Desal FAQs*].

[67] Robbins, *supra* note 5.

[68] *Id.*

[69] *Carlsbad Desal FAQs*, *supra* note 66.

[70] *Desalination*, WATER EDUC. FOUND., https://www.watereducation.org/aquapedia/desalination (last visited Apr. 28, 2024); *Carlsbad Desal FAQs*, *supra* note 66; https://www.sdcwa.org/carlsbad-desalination-plant-celebrates-100-billion-gallons-served

the Colorado River, whose water levels have been reduced from severe drought.[71] The project would have had a capacity of fifty million gallons a day, enough to supply nearly 460,000 people in Orange County.[72] In October 2022, California approved a $140 million ocean desalination plant in Dana Point ("Doheny project"),[73] expected to be in operation by 2029.[74] The Doheny project would provide water for communities in Orange County that otherwise rely almost entirely on water imported from Northern California and the Colorado River, helping to reduce communities' reliance on imported water and vulnerability to drought.[75] And in November 2022, the California Coastal Commission ("Coastal Commission") approved a permit for a $330 million seawater desalination plant in the city of Marina ("Marina project"[76] that is expected to begin operation in 2027.[77] As with prior desalination projects, drought and water shortages prompted the development and approval of this project.[78] The Monterey Peninsula, which includes Marina, does not receive imported water and relies on over-pumped groundwater, the overtaxed Carmel River, and treated wastewater.[79] The state imposed water rationing on the Peninsula in the mid-1970s as a result of drought[80]

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[71] Ian James, *California Coastal Commission Rejects Plan for Poseidon Desalination Plant*, LOS ANGELES TIMES (May 12, 2022), https://www.latimes.com/environment/story/2022-05-12/poseidon-desalination-project.

[72] Rachel Becker, *A Salty Dispute: California Coastal Commission Unanimously Rejects Desalination Plant,* CALMATTERS (May 12, 2022), https://calmatters.org/environment/2022/05/california-desalination-plant-coastal-commission.

[73] Rachel Becker, *A Pivot on Desalination Plants: California Approves Project in Orange County*, CALMATTERS (Oct. 13, 2022), https://calmatters.org/environment/2022/10/desalination-plants-california.

[74] *Doheny Ocean Desalination,* SOUTH COAST WATER. DIST. https://www.scwd.org/about/district_projects/doheny_ocean_desalination_project/index.php (last visited May 7, 2025); *South Coast Water District Receives Unanimous Approval for Coastal Development Permit to proceed with the Doheny Ocean Desalination Project*, SOUTH COAST WATER. DIST. (Oct. 13, 2022), https://cms9files.revize.com/scoastwaterdist/DODP%20Receives%20Unanimous%20Approval%20from%20Coastal%20Commission.pdf [hereinafter *South Coast Water District Receives Unanimous Approval for Doheny Project*].

[75] Becker, *supra* note 73; *Doheny Ocean Desalination Project*, SOUTH COAST WATER DIST., https://www.scwd.org/about/district_projects/doheny_ocean_desalination_project/index.php (last visited Apr. 28, 2024).

[76] Rachel Becker, *Another California Desalination Plant Approved – The Most Contentious One Yet*, CALMATTERS (Nov. 17, 2022), https://calmatters.org/environment/2022/11/desalination-plant-monterey-california.

[77] *California Coastal Commission Approves Desalination Slant Well Permit*, AM. WATER (Nov. 18, 2022), https://www.amwater.com/press-room/press-releases/california/california-coastal-commission-approves-desalination-slant-well-permit2.

[78] *Fact Sheet*, MONTEREY PENINSULA WATER SUPPLY PROJECT, https://www.watersupplyproject.org/fact-sheet (last visited Apr. 9, 2025).

[79] Becker, *supra* note 76.

[80] David Schmalz, *Nearly 30 Years After Cal Am Was Ordered to Cut Back on its Pumping of the Carmel River, Solutions Brought by Public Agencies Might Finally End the Peninsula's Water Poverty*, MONTEREY CNTY. NOW (Dec. 7, 2023),

and mandated in December 2021 that Cal-Am reduce the amount of water it takes from the Carmel River by more than 50% of its prior allotment.[81] Further, California has barred parts of the peninsula from adding new water connections for over a decade.[82] Thus, the Monterey Peninsula needed to find an alternative source of water to avoid severe rationing.[83] The Commission staff report initially recommended in 2020 that the Commission reject the proposed Marina project.[84] However, after California faced its driest three-year stretch on record with a fourth drought year on the horizon,[85] the Coastal Commission approved the project with added conditions.[86]

In April 2023, the California Department of Water Resources ("DWR") awarded $5 million in desalination grants to three projects in Mendocino, Fresno, and Los Angeles counties.[87] One of the projects is the City of Fort Bragg Design Pilot Project in Mendocino County, which is piloting the State's first wave-powered seawater desalination plant.[88] The Mendocino Coast has faced particular challenges during the recent three-year drought because it depends on shallow groundwater wells that have begun to run dry. As a result, many communities along the coast sought to purchase water from Fort Bragg, which was already struggling to meet the needs of its own residents.[89]

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https://www.montereycountyweekly.com/news/cover/nearly-30-years-after-cal-am-was-ordered-to-cut-back-on-its-pumping-of/article_0bb58d1a-9481-11ee-b107-b7dac072a694.html.

[81] Christopher Neely, *After 26 Years, The Hammer is Finally Coming Down on The Peninsula's Water Use. Will We Have Enough to Avoid Water Rationing?*, MONTEREY CNTY. NOW (Oct. 8, 2021), https://www.montereycountynow.com/news/cover/after-26-years-the-hammer-is-finally-coming-down-on-the-peninsula-s-water-use/article_4aff11d6-26d2-11ec-8269-3bdbbb7c09c6.html.

[82] Becker, *supra* note 76.

[83] *See*, *e.g.*, Neely, *supra* note 81.

[84] STAFF REPORT: DE NOVO APPEAL AND CONSOLIDATED COASTAL DEVELOPMENT PERMIT 11 (CAL. COASTAL COMM'N 2020), available at https://documents.coastal.ca.gov/reports/2020/9/Th3a&4a/Th3a&4a%20Staff%20Report.pdf.

[85] Becker, *supra* note 76.

[86] *Id.*

[87] *California Invests in Desalination Projects to Expand Water Supplies*, GOVERNOR GAVIN NEWSOM, https://www.gov.ca.gov/2023/04/19/california-invests-in-desalination-projects-to-expand-water-supplies (last visited Apr. 9, 2025). (In November 2014, California voters passed Proposition 1, part of which provided $725 million for grants and loans for water recycling and advanced treatment, including desalination projects. The California Department of Resources ("DWR") Water Desalination Grant Program subsequently allocated $100 million to desalination.) *Water Desalination Grant Program*, CAL. DEP'T WATER RES., https://water.ca.gov/Work-With-Us/Grants-And-Loans/Desalination-Grant-Program (last visited Apr. 9, 2025); *see also* Cal. Water Code §§ 79765–79768.

[88] Sophie Lincoln, *California's First Wave-Powered Desalination Plant Underway in Fort Bragg*, KRCR (Oct. 23, 2023), https://krcrtv.com/north-coast-news/eureka-local-news/californias-first-wave-powered-desalination-plant-underway-in-fort-bragg; *see also* Becki Robins, *Can We Desalinate Water Without All the Mess?*, HAKAI MAGAZINE (July 5, 2023), https://hakaimagazine.com/news/can-we-desalinate-water-without-all-the-mess (for further information on the Fort Bragg pilot project).

[89] Mary Callahan, *Ocean Water To Fresh: First-Of-Its-Kind Wave-Powered Pilot Project in Fort Bragg Set to Test*, PRESS DEMOCRAT (May 3, 2023),

According to the California State Water Resources Control Board ("WRCB"),[90] as of December 2023, there are twelve seawater desalination facilities throughout California, eight of which are active.[91] However, not all are operating at full capacity—only four are utility-scale and in regular operation: the Claude "Bud" Lewis Carlsbad Desalination Plant (San Diego county), Charles E. Meyer Desalination Plant (Santa Barbara county), Santa Catalina Island Desalination Plant (Santa Catalina Island), and Sand City Coastal Desalination Plant (Monterey county).[92]

C. The Controversy over Desalination

Despite the potential opportunities of desalination, desalination remains controversial because of a host of financial and environmental challenges. The controversy over various desalination projects highlights the tradeoffs that cities face in balancing the need for alternative sources of water with the economic and environmental consequences that the project can have on local communities.

From a financial perspective, desalinated water, particularly seawater, has a higher cost than water produced from other sources; the average price per acre-foot for water produced by seawater desalination is several times higher than water from other sources,[93] and seawater desalination is the most expensive source of potable water for users.[94] While the cost of seawater desalination has decreased over the past two decades, it is still considerably more costly compared to alternatives including brackish desalination, wastewater recycling, and stormwater capture.[95] If more affordable alternatives can meet the needs of local

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https://www.pressdemocrat.com/article/news/ocean-water-to-fresh-first-of-its-kind-wave-powered-pilot-project-in-fort.

[90] *About The Water Board*, STATE WATER RES. CONTROL BD., https://www.waterboards.ca.gov/about_us (last visited May 7, 2025). (The WRCB, along with the nine Regional Water Quality Control Boards ("Regional Water Boards"), is responsible for protecting water quality and allocating surface water rights in the state under the federal Clean Water Act ("CWA") and the state Porter-Cologne Water Quality Control Act ("Porter-Cologne Act")).

[91] *Ocean Plan Requirements for Seawater Desalination Facilities*, STATE WATER RES. CONTROL BD., https://www.waterboards.ca.gov/water_issues/programs/ocean/desalination/#existing-facilities (last updated Nov. 4, 2024).

[92] Jeremy Miller, *In California's Monterey Bay Area, a Proposed Desalination Plant Divides Wealthy Communities and Poorer Ones*, SIERRA (June 13, 2023), https://www.sierraclub.org/sierra/california-s-monterey-bay-area-proposed-desalination-plant-divides-wealthy-communities-and; SAFE DRINKING WATER PLAN FOR CALIFORNIA, STATE WATER RES. CONTROL BD. 43 (Sept. 2021), available at https://www.waterboards.ca.gov/drinking_water/safedrinkingwaterplan/docs/ExecSumPlan_Report.pdf.

[93] Denson, *supra* note 14, at 723.

[94] Caroline M. Reinhart, *In Times of Scarcity, California's Best New Source of Water?* REUSE., & THE WEST (Feb. 8, 2023), https://andthewest.stanford.edu/2023/in-times-of-scarcity-californias-best-new-source-of-water-reuse.

[95] *Id.*; Denson, *supra* note 14, at 723, 729.

communities, desalination may not be worth the additional cost for many communities.

Desalination also presents several environmental challenges. First, a coastal desalination plant's intake systems can harm marine life.[96] Desalination typically involves pumping water from the ocean into the plant for treatment;[97] thus, intakes can directly harm aquatic organisms by impingement or entrainment.[98] The flow of water drawn into the facility can trap (or "impinge") fish, birds, invertebrates, and other larger marine organisms against the intake screens, killing them in the process.[99] This process can also suck in ("entrain") smaller organisms including algae, plankton, and fish through the screens and kill them through exposure to high pressures, temperatures, and salinities.[100] While subsurface intakes minimize the intake of marine life and can reduce the problems of impingement and entrainment, they are not always feasible and may decrease seawater intake capacity.[101]

The salty waste byproduct from the desalination process further harms marine life. It takes two gallons of seawater to make one gallon of fresh water, and the resulting brine is typically discharged into the ocean.[102] The brine can be up to twice the salinity of seawater[103] and contain high concentrations of potentially toxic chemicals and metals such as chlorine, copper, and iron.[104] Concentrated brine can also lower oxygen levels in the seawater surrounding the desalination plant, harming marine life.[105]

Additionally, desalination requires large amounts of energy—mostly generated by fossil fuels[106]—to separate salts from water and pump water into and out of the plant.[107] For example, the estimated energy intensity of desalinated water in San Diego County is 4,100–5,100 kWh/acre-foot, considerably greater than the energy intensity of imported water (2,000–3,300 kWh/acre-foot), recycled potable water (600–2,000 kWh/acre-foot), and surface water (500–1,000 kWh/acre-foot) or groundwater (400–1,200 kWh/acre-foot).[108] The Carlsbad plant uses 246,156 megawatt hours of electricity per year, equivalent to the usage of roughly 23,000

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[96] Robbins, *supra* note 5.

[97] *See*, *e.g.*, *id.*

[98] FINAL STAFF REP., *supra* note 9, at 17–18.

[99] Matthew C. Lewis, *Thirsty for Change: Desalination as a Practical and Environmentally Friendly Answer to California's Growing Water Shortage*, 44 U.S.F. L. REV. 933, 937 (2010).

[100] *Id.*; FINAL STAFF REP., *supra* note 9, at 17–18.

[101] Pappas, *supra* note 6, at 88.

[102] Robbins, *supra* note 5.

[103] FINAL STAFF REP., *supra* note 9, at 17–18.

[104] Pappas, *supra* note 6, at 88.

[105] Robbins, *supra* note 5.

[106] Reinhart, *supra* note 94.

[107] Lewis, *supra* note 99, at 938.

[108] *San Diego's Water Sources: Assessing the Options*, EQUINOX CENTER 4 (July 2010), https://energycenter.org/sites/default/files/San_Diego_Water_Sources_Assessing_the_Options_July_2010_FBI.pdf.

homes.[109] However, desalination plants have become more energy-efficient over the past few decades as technology has improved.[110] In California, the amount of energy required for desalination has decreased from 36 MWh/acre-foot of desalinated water produced in 1980 to 4-5 MWh/acre-foot in 2013.[111] Looking ahead, continuing technological improvements can potentially continue to increase energy efficiency and reduce the energy usage of desalination plants.[112]

Despite these challenges, California's urgent drought problem and need for reliable water supply sources mean that desalination is likely here to stay as part of the future of California's water supply,[113] and regulations play a crucial role in shaping whether and how desalination plants are built. To that end, the following section discusses relevant federal and state laws that affect desalination proposals in California.

II. LAWS THAT APPLY TO DESALINATION PLANTS

Desalination plant developers must comply with federal and state environmental laws. The following section provides an overview of key federal and California laws that regulate desalination plant operations and their impacts.

A. Federal Law

The Clean Water Act governs both open seawater withdrawals for industrial processes such as power plants and discharge of pollutants into waters of the United States.[114] While the Clean Water Act does not explicitly govern desalination, it would indirectly apply to desalination facilities co-located with power plants that collect source water through the power plant's cooling water intake.[115] Clean Water Act section 316(b) regulates open seawater intakes for industrial uses, including power plants, that withdraw water to cool the facility;[116]

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[109] Robbins, *supra* note 5.

[110] *Energy-Efficient Desalination: What If Oceans Could Become an Inexhaustible Source of Fresh Water?*, VEOLIA (June 30, 2023), https://www.veolia.com/en/our-media/newsroom/news/energy-efficient-desalination-oceans-water-freshwater (since the 1980s, the energy required to desalinate seawater has declined by around 80%); *see also* Hannah Ritchie, *How Much Energy Does Desalination Use? Is It "Absurdly Cheap"?*, SUSTAINABILITY BY NUMBERS (Sept. 18, 2024), https://www.sustainabilitybynumbers.com/p/how-much-energy-does-desalinisation (stating that reverse osmosis technologies have become much more energy-efficient over the last few decades: in the 1970s, it would take around 20 kWh to desalinate one cubic meter of water; today that figure is around 2.5-3.5 kWh).

[111] Oglesby, *supra* note 38, at 17.

[112] Lewis, *supra* note 99, at 939.

[113] *See* Oglesby, *supra* note 38, at 4.

[114] *See*, *e.g.*, *Clean Water Act (CWA) and Federal Facilities*, EPA, https://www.epa.gov/enforcement/clean-water-act-cwa-and-federal-facilities# (last updated Sept. 24, 2024).

[115] Angela Haren Kelley, *A Call for Consistency: Open Seawater Intakes, Desalination, and The California Water Code*, 4 GOLDEN GATE U. ENV'T. L.J. 277, 287–88 (2011).

[116] *Id.*

it also provides that Environmental Protection Agency ("EPA") standards "shall require that the location, design, construction, and capacity of cooling water intake structures reflect the best technology available for minimizing adverse environmental impact."[117] While the EPA has not promulgated regulations that specifically address desalination facilities,[118] the EPA regulates cooling water intake structures and discharges of brine or other wastewater from desalination facilities into the ocean through the National Pollutant Discharge Elimination System ("NPDES") permit process, which regulates point sources that discharge pollutants.[119] The EPA delegated implementation of the federal NPDES program to California, where Regional Water Quality Control Boards issue NPDES permits for power plants and desalination facilities.[120] The permits contain requirements for both intakes from and discharges to surface water, and typically include conditions on how to dispose of brine into the ocean.[121]

If a desalination project has the potential to impact protected species, it would also implicate the federal or state Endangered Species Act ("ESA").[122] For a proposed project supported by federal funds that a federal agency must approve, the ESA includes a "Jeopardy Clause" that requires developers to modify a project if it will jeopardize the existence of an endangered or threatened species, or alternatively apply for an exemption.[123] The ESA also prohibits the killing or "taking" of an endangered species.[124] However, it allows for several exceptions and is likely a hurdle that desalination projects can overcome.[125] For example, the approved Marina plant will be located by the Monterey Bay National Marine Sanctuary, which supports two dozen sensitive species, including threatened and endangered species such as the Western snowy plover.[126] In addition, if a project may affect species that are protected under California law but not the federal ESA,

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117 33 U.S.C. § 1326(b).

118 RICHARD MCLAUGHLIN, REGULATORY AND PERMITTING ISSUES RELATING TO DESALINATION SEAWATER INTAKES AND CONCENTRATE DISPOSAL IN COASTAL TEXAS (TASK 2.3) 6-7 (Sep. 22, 2014), available at https://www.harteresearch.org/sites/default/files/inline-images/McLaughlin-TM%202.3-Desal%20Legal%20Issues%20Project%20Final%20092214.pdf; ADAM PAN, SEAWATER DESALINATION AND THE CLEAN WATER ACT IN CALIFORNIA AND FLORIDA: BALANCING ENVIRONMENTAL PROTECTION WITH THE NEED FOR WATER 1 (Aug. 31, 2011), available at https://scholarspace.library.gwu.edu/downloads/0z708w48k?locale=en (on file with author).

119 *Id.* at 26-27; 40 C.F.R. Part 122.

120 Kelley, *supra* note 115, at 287.

121 Jessica Schroeder, *Maximizing the Benefit of Desalination in California*, 39-SPG ENVIRONS ENV'T. L. & POL'Y J. 141, 147,149–50 (2016).

122 J. Tom Boer & Kathryn Oehlschlager, *Regulating Seawater Desalination in California*, WATER REP. 20 (July 15, 2015), https://www.downeybrand.com/wp-content/uploads/2019/09/Regulating-Seawater-Desalination-in-CA_The-Water-Report_137.pdf.

123 16 U.S.C. § 1536(a)(2) (2006).

124 16 U.S.C. § 1538(a)(1)(B) (2006).

125 Lewis, *supra* note 99, at 950–52.

126 Becker, *supra* note 76.

consultation with the California Department of Fish and Wildlife will be required.[127]

Desalination plants must also follow fishery protection laws. The Fish and Wildlife Coordination Act authorizes the Secretary of Agriculture and Secretary of Commerce to coordinate with federal and state agencies to study the effect of polluting substances on wildlife.[128] Thus, a desalination project would need to take into account its impacts on nearby fisheries.[129]

B. California Law

The Porter-Cologne Water Quality Control Act ("Porter-Cologne Act"), enacted in 1969 and codified in the California Water Code, is the primary water quality law in California.[130] The Porter-Cologne Act addresses water quality control planning and waste discharge regulation.[131] Like the federal Clean Water Act, California Water Code section 13142.5(b) also regulates the intake of water used for industrial facilities: "For each new or expanded coastal powerplant or other industrial installation using seawater for cooling, heating, or industrial processing, the best available site, design, technology, and mitigation measures feasible shall be used to minimize the intake and mortality of all forms of marine life."[132] The Porter-Cologne Act provision is both narrower and broader than Clean Water Act section 316(b). Section 13142.5(b) addresses only new or expanded facilities,[133] whereas section 316(b) does not differentiate between new or existing intakes.[134] On the other hand, section 13142.5(b) explicitly includes the intake of water used for desalination and mandates the best site and design for the entire facility, not just the intake structure.[135] It also requires mitigation measures as a tool to minimize impacts to marine life resulting from industrial intakes.[136] Thus, the Porter-Cologne Act directly regulates desalination plants.

In 2012, the WRCB adopted the Water Quality Control Plan for the Ocean Waters of California ("Ocean Plan"), which establishes water quality objectives

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[127] J. Tom Boer & Kathryn Oehlschlager, *Regulating Seawater Desalination in California*, WATER REP. 20 (July 15, 2015), https://www.downeybrand.com/wp-content/uploads/2019/09/Regulating-Seawater-Desalination-in-CA_The-Water-Report_137.pdf.

[128] Karen M. O'Neill Ocasio, *Feeling Salty? Regulating Desalination Plants in the United States and Spain*, 48 CORNELL INT'L L.J. 451, 462–63 (2015).

[129] *Id.* at 463.

[130] STAFF REPORT, STATE WETLAND DEFINITION AND PROCEDURES FOR DISCHARGES OF DREDGED OR FILL MATERIAL TO WATERS OF THE STATE, STATE WATER RES. CONTROL BD. 21 (Mar. 2019) https://www.waterboards.ca.gov/board_info/agendas/2019/apr/040219_10_staff_rpt_clean_032219version.pdf; Cal. Water Code §§ 13000–14076 (West 2011).

[131] STATE WATER RES. CONTROL BD., *supra* note 130, at 21.

[132] Cal. Water Code § 13142.5(b) (Westlaw 2011).

[133] Cal. Water Code § 13142.5(b) (Westlaw 2011); s*ee also* Kelley, *supra* note 115, at 291.

[134] 33 U.S.C. § 1326(b); s*ee also* Kelley, *supra* note 115, at 290–91.

[135] Cal. Water Code § 13142.5(b) (Westlaw 2011); s*ee also* Kelley, *supra* note 115, at 291.

[136] Cal. Water Code § 13142.5(b) (Westlaw 2011); *see also* Kelley, *supra* note 115, at 291.

for the State's ocean waters and provides the basis for regulation of wastes discharged into coastal waters.[137] In May 2015, the WRCB amended the Ocean Plan ("Ocean Plan Amendment") to specifically address new desalination facilities, creating a legal framework for the expansion of seawater desalination in the State.[138] The Ocean Plan Amendment made California the first State to adopt regulations and guidelines for permitting, building, and operating seawater desalination plants.[139] Effective April 7, 2016, it also increased requirements for intake and brine disposal and included mitigation measures to ensure that the siting, planning, construction, and operation of seawater desalination facilities minimize intake and mortality of marine life.[140] For example, the Ocean Plan Amendment requires subsurface intakes, recommends commingling brine with wastewater, restricts the salinity of the brine discharge, requires facilities to implement a monitoring and reporting plan, and requires facilities to assess the mortality to marine life resulting from construction and operation of the facility.[141]

While federal Clean Water Act section 316(b) requires the EPA to issue regulations on open seawater intake structures in order to minimize adverse impacts on marine life and the environment,[142] California has gone further in banning these intake structures in power plants. In October 2010, California passed the Once-Through Cooling Policy,[143] becoming the first state to ban once-through cooling ("OTC") systems, a controversial process in which power plants withdraw billions of gallons of seawater from the open ocean per day to cool their equipment and the steam for generating electricity.[144] The cooling process kills

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[137] *See generally* WATER QUALITY CONTROL PLAN – OCEAN WATERS OF CALIFORNIA, STATE WATER RES. CONTROL BD. (2012), available at https://www.waterboards.ca.gov/water_issues/programs/ocean/docs/cop2012.pdf.

[138] AMENDMENT TO THE STATEWIDE WATER QUALITY CONTROL PLAN FOR THE OCEAN WATERS OF CALIFORNIA ADDRESSING DESALINATION FACILITY INTAKES, BRINE DISCHARGES, AND TO INCORPORATE OTHER NONSUBSTANTIVE CHANGES, STATE WATER RES. CONTROL BD. (May 6, 2015) [hereinafter Ocean Plan Amendment], available at https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2015/rs2015_0033_desalamd.pdf; *see Proposed Desalination Amendment: Creating a Consistent Permitting Process*, STATE WATER RES. CONTROL BD., https://www.waterboards.ca.gov/publications_forms/publications/factsheets/docs/desal_fs.pdf (last visited Apr. 9, 2025) ("Fact Sheet" published in April 2015, describing the Ocean Plan Amendment).

[139] Sharon Bernstein, *California Approves First Statewide Seawater Desalination Rules*, REUTERS (May 6, 2015), https://www.reuters.com/article/idUSKBN0NR21I.

[140] *Ocean Plan Requirements for Seawater Desalination Facilities*, *supra* note 91.

[141] Ocean Plan Amendment, *supra* note 141, at 32, 35, 46.

[142] *Cooling Water Intakes*, EPA, https://www.epa.gov/cooling-water-intakes (last updated Mar. 19, 2025).

[143] *Cooling Water Intake Structures Once-Through Cooling Water Policy – Official Policy Documentation*, STATE WATER RES. CONTROL BD., https://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/policy.html (last updated Jan. 2, 2024). (The WRCB has amended the policy several times to revise compliance schedules for power plants, with the last amendment becoming effective as of December 5, 2023.); *Id.*

[144] Amy Standen, *Calif. Power Plant Regs Changed to Save Marine Life*, NPR (May 5, 2010), https://www.npr.org/templates/story/story.php?storyId=126522956.

billions of aquatic organisms each year by drawing them into the cooling system (entrainment) or onto the intake screen (impingement).[145] OTC is a simple and older technology; many power plants using OTC systems were built before 1980, when the marine impacts of this technology were not well understood or regulated.[146] California's OTC Policy requires nineteen coastal power plants, which in combination withdraw almost sixteen billion gallons of water each day, to cease using seawater for cooling or use the best technology available to protect aquatic life from OTC impacts by 2030 or earlier.[147] While the California regulations currently do not explicitly prevent seawater desalination plants co-located with power plants from using the power plant's seawater intake or discharge structures,[148] the OTC Policy could result in power plants reducing water flow significantly or ceasing operation entirely, which would impact co-located desalination plants.[149] Thus, the OTC Policy's intent to protect marine organisms is broadly applicable to desalination plants.[150]

Finally, desalination projects require state and local land-use approvals from one or multiple governing bodies. Seawater desalination plants require a coastal development permit from the Coastal Commission, which must approve the intake structure, treatment facilities, and transmission pipelines.[151] The Coastal Commission's primary concerns with desalination plants include the danger to marine life and the risk of inducing new developments too quickly.[152] Additionally, projects on public trust lands including tidal and submerged lands

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[145] Standen, *supra* note 144; COMPARISON OF ALTERNATE COOLING TECHNOLOGIES FOR CALIFORNIA POWER PLANTS, CAL. ENERGY COMM'N 6-9, available at https://www3.epa.gov/region1/npdes/merrimackstation/pdfs/ar/AR-1167.pdf.

[146] COOLEY ET AL., *supra* note 1, at 74–75.

[147] *Total Phase Out of Once-Through Cooling Power Plants by 2029*, CAL. ENERGY COMM'N (Aug. 15, 2018), https://calenergycommission.blogspot.com/2018/08/the-end-is-near-for-aging-power-plants.html?view=flipcard. (The Policy requires power plants to either cease operation, reduce intake flow and velocity by using closed-cycle cooling systems, the best technology available (BTA) (Track 1), or reduce marine life mortality to a comparable level as Track 1 using operational controls such as viable speed pumps or structural controls such as screens (Track 2)); WATER QUALITY CONTROL POLICY ON THE USE OF COASTAL AND ESTUARINE WATERS FOR POWER PLANT COOLING, STATE WATER RES. CONTROL BD. 1 (Oct. 19, 2021) available at https://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/docs/otc_policy_2021/otc_policy.pdf; WATER QUALITY CONTROL POLICY ON THE USE OF COASTAL AND ESTUARINE WATERS FOR POWER PLANT COOLING (ONCE-THROUGH COOLING OR OTC POLICY), RES. NO. 2010-0020, STATE WATER RES. CONTROL BD. (May 4, 2010), available at https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2010/rs2010_0020.pdf.

[148] *Once-Through Cooling*, BEACHAPEDIA, https://beachapedia.org/Once-through_Cooling (last updated June 24, 2016).

[149] *See generally* COOLEY ET AL., *supra* note 1, at 74–77 (describing co-located desalination models).

[150] MITIGATION AND FEES FOR THE INTAKE OF SEAWATER BY DESALINATION AND POWER PLANTS, STATE WATER RES. CONTROL BD. 1, available at https://www.waterboards.ca.gov/water_issues/programs/ocean/desalination/docs/erp_rp021512.pdf.

[151] SAFE DRINKING WATER PLAN FOR CALIFORNIA, *supra* note 92, at 21.

[152] Lewis, *supra* note 99, at 942–43.

will require a lease from the California State Lands Commission ("State Lands Commission").[153] Such a project, or any other project that is conducted or approved by California public agencies, is subject to the California Environmental Quality Act ("CEQA"). CEQA requires public agencies to consider the environmental effects of a project before granting a permit; the agency must prepare an Environmental Impact Report ("EIR") for any project that "may have a significant effect on the environment,"[154] including desalination projects.[155] The EIR must address each significant impact and discuss ways to mitigate or avoid it.[156] If a permit issued after an EIR is challenged, courts tend to defer to the agency's discretion.[157] For example, in *North Coast Rivers Alliance v. Marin Municipal Water District Board of Directors*, the First District Court of Appeal upheld the Water District's EIR analysis of a desalination project in Marin County under CEQA, concluding that the EIR's detailed analysis need only be supported by substantial evidence.[158] In addition to state approvals, approval from one or more local agencies is required for a desalination project, including zoning variances.[159]

III. OVERVIEW OF CASE STUDIES: FOUR RECENT PROJECTS

Part IV analyzes the factors that affect whether a desalination project is approved in California, using four recent desalination projects as case studies: the Carlsbad project, Huntington Beach project, Doheny project, and Marina project. Thus, Part III first provides a brief overview of the four projects.

Carlsbad project (in operation). The Claude "Bud" Lewis Carlsbad Desalination Plant, the largest seawater desalination facility in the United States, began commercial operation in December 2015.[160] The project, operated by IDE Technologies,[161] cost almost $1 billion and produces fifty million gallons of fresh water each day, enough to serve an estimated 400,000 people in San Diego County, or approximately 10% of the region's demand.[162] The desalination

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153 Boer & Oehlschlager, *supra* note 122, at 20.

154 Cal. Pub. Res. Code §§ 21100(a), 21151(a) (Deering 2008).

155 *See* Lewis, *supra* note 99, at 944–46.

156 *See* Lewis, *supra* note 99, at 946.

157 *See* Lewis, *supra* note 99, at 947.

158 N. Coast Rivers All. v. Marin Mun. Water Dist. Bd. of Dirs., 216 Cal.App.4th 614, 656 (1st Dist. 2013).

159 Tom Boer & Kathryn Oehlschlager, *Regulating Seawater Desalination in California*, WATER REP. 20 (July 15, 2015), https://www.downeybrand.com/wp-content/uploads/2019/09/Regulating-Seawater-Desalination-in-CA_The-Water-Report_137.pdf.

160 *Carlsbad Desalination Plant*, *supra* note 64; *Frequently Asked Questions*, *supra* note 66.

161 *How We Do It*, CARLSBAD DESAL, https://www.carlsbaddesal.com/how-we-do-it.html (last visited Apr. 28, 2024).

162 *Desalination*, *supra* note 70; *Carlsbad Plant*, SAN DIEGO CNTY. WATER AUTH., https://www.sdcwa.org/your-water/local-water-%20supplies/seawater-desalination (last visited Apr. 10, 2025).

project resulted from a public-private partnership. In December 2012, the San Diego County Water Authority signed a water purchase agreement with Poseidon Water, the owner and developer of the plant.[163] The Water Authority agreed to purchase up to 56,000 acre-feet of desalinated water per year at a fixed rate for the next thirty years.[164] The plant uses subsurface slant intake wells on the shores of Agua Hedionda Lagoon and returns the remaining water to the ocean through the lagoon.[165] The plant was originally co-located with the Encina Power Station, allowing seawater from the power plant to be diverted to the desalination plant through an existing cooling water discharge system,[166] which eliminated any additional risks of impingement and entrapment[167] while diluting the brine before discharging it back into the ocean.[168] After the power plant's OTC system was phased out and the power plant decommissioned in December 2018,[169] the Carlsbad plant began operating new fish-friendly dilution pumps in 2020.[170] In September 2022, the Coastal Commission approved a permit allowing the plant to modify and upgrade its seawater intakes and discharge structures to better protect marine life.[171]

Huntington Beach project (denied). In May 2022, the Coastal Commission unanimously rejected a controversial plan to build a $1.4 billion desalination plant in Huntington Beach, after twenty years of debate and environmental planning.[172] The Commission cited the high cost of desalinated water, lack of local demand, risks to marine life, and possibility of flooding from rising sea levels as reasons for the denial.[173] The project would have had a capacity of fifty million gallons of water per day, enough to supply nearly 460,000 people in Orange County.[174] The proposed plant would use an adjacent power plant's

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163 *Carlsbad Plant*, *supra* note 162; Pinhas, *supra* note 65.

164 *How We Do It*, *supra* note 161.

165 *Carlsbad Plant*, *supra* note 162; Gunnar Herber, *Which Desalination Plant Has the Lowest Environmental Impact?*, MEDIUM (Feb. 1, 2024), https://medium.com/@desalter/which-desalination-plant-has-the-lowest-environmental-impact-32f6bc32156b.

166 *Intake and Outfall Modifications*, CARLSBAD DESAL, https://www.carlsbaddesal.com/intake-and-outfall.html (last visited May 7, 2025).

167 ENVIRONMENTAL IMPACT REPORT, CARLSBAD DESAL 4.3-35 (Dec. 2005), available at https://www.carlsbaddesal.com/files/uploads/1/0/0/4/100463770/eir_4_3.pdf.

168 *Carlsbad Plant*, *supra* note 162.

169 *Intake and Outfall Modifications*, *supra* note 166.

170 *Carlsbad Desalination Plant Upgrades to Protect Marine Life*, SAN DIEGO CNTY. WATER AUTH. (Dec. 15, 2022), https://www.sdcwa.org/carlsbad-desalination-plant-upgrades-to-protect-marine-life; *New Fish-Friendly Seawater Intake Pumps at Carlsbad Desalination Plant*, WATER NEWS NETWORK (July 22, 2020), https://www.waternewsnetwork.com/new-fish-friendly-seawater-intake-pumps-at-carlsbad-desalination-plant.

171 Phil Diehl, *Modified seawater intakes approved for Carlsbad desalination plant*, THE SAN DIEGO UNION-TRIBUNE (Sept. 9, 2022), https://www.sandiegouniontribune.com/communities/north-county/carlsbad/story/2022-09-09/desalination-plant-approved-for-new-seawater-intakes.

172 Becker, *supra* note 71.

173 *Id.*

174 *Id.*

cooling water intake pipe to draw in seawater and discharge the resulting brine through the power plant's outfall pipe.[175] However, the power plant may cease operation in the next few years[176] because of the aforementioned OTC Policy which ordered coastal plants to phase out their OTC systems and cease using seawater for cooling.[177] The project would have also used open water intakes, which can be particularly harmful to marine life.[178] The Santa Ana Regional Board terminated the water quality permit for the project in September 2022, and the State Lands Commission canceled the lease of state lands in December 2022.[179]

Doheny project (under construction). In October 2022, the state approved the Doheny project, a $140 million ocean desalination plant in Dana Point.[180] The project, built by South Coast Water District, is expected to be in operation by 2029 and produce five million gallons of water per day, helping to serve approximately 35,000 residents in South Orange County, particularly in Dana Point, South Laguna Beach, and parts of San Clemente and San Juan Capistrano.[181] The Doheny project would be the first ocean desalination facility to use the Ocean Plan Amendment's preferred subsurface intake and blended brine discharge.[182] The subsurface intake (slant) wells will be fully buried beneath the seafloor, and the resulting brine will be co-mingled with treated wastewater from a nearby treatment plant and discharged into the ocean.[183] The facility will be located near regional water transmission lines, on property that the South Coast Water District already owns, and it will use existing infrastructure to distribute the water to utility customers in South Orange County.[184]

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[175] STAFF REPORT: REGULAR CALENDAR, CALIFORNIA COASTAL COMMISSION 1-2 (Jan. 6, 2022), available at https://documents.coastal.ca.gov/reports/2022/5/Th9a10a/Th9a10a-5-2022-staffreport.pdf.

[176] The plant had been slated to cease operation in 2020. *See* Bettina Boxall, *Poseidon's Huntington Beach desalination plant still in choppy waters*, L.A. TIMES (Aug. 6, 2020), https://www.latimes.com/environment/story/2020-08-06/poseidons-huntington-beach-desalination-plant-still-in-choppy-waters (discussing the "AES Huntington Beach Generating Station, which will soon cease operation"). However, as of August 2023, the plant will be kept in reserve until at least 2026 to maintain grid reliability and prevent blackouts. Rachel Becker, *Southern California's natural gas plants to stay open through 2026*, CALMATTERS (Aug. 15, 2023), https://calmatters.org/environment/2023/08/southern-california-natural-gas-plants-remain-open.

[177] *See* discussion, *supra* Part II.B.

[178] STAFF REPORT: REGULAR CALENDAR, *supra* note 175, at 30.

[179] *Timeline for the Brookfield-Poseidon Huntington Beach Desalination Plant*, CAL. DESAL FACTS, https://www.californiadesalfacts.org/timeline-for-the-brookfield-poseidon (last visited Apr. 28, 2024).

[180] Becker, *supra* note 73.

[181] *Id.*; *South Coast Water District Receives Unanimous Approval for Doheny Project*, *supra* note 74; https://www.scwd.org/about/district_projects/doheny_ocean_desalination_project/index.php.

[182] *Doheny Ocean Desalination Project*, *supra* note 75.

[183] *Id.*

[184] *South Coast Water District Receives Unanimous Approval for Doheny Project*, *supra* note 74.

Marina project (approved). In November 2022, the Coastal Commission approved a permit for a $330 million seawater desalination plant in the city of Marina, conditioned on additional requirements, after thirteen hours of debate at a Salinas public hearing with hundreds of people present.[185] The plant, expected to be in operation by 2027, will produce about 4.8 million gallons of water per day.[186] The Marina plant will use slant wells stretching at least 1,000 feet seaward and subsurface intake pipes to draw seawater into the plant from beneath the ocean floor.[187] The leftover brine would be co-mingled with the wastewater from an adjacent treatment plant and discharged about two miles offshore in the National Marine Sanctuary.[188] In addition, the plant will be powered with 100% renewable power to achieve net-zero greenhouse gas emissions.[189]

IV. FACTORS AFFECTING APPROVAL OF DESALINATION PROJECTS

This Part analyzes the factors that affect whether a desalination project is approved in California, using the four recent projects described in Part III as case studies.

A. Permitting Process

A long and complex permitting process has been common for desalination projects in California. Projects are approved on a case-by-case basis, and multiple state agencies need to approve a project before construction can begin.[190] Because these projects tend to be contentious, they also often face litigation, which can further delay construction of the project.

The Carlsbad project took more than fifteen years from proposal to operation.[191] The developer, Poseidon Resources, first proposed the Carlsbad project in 1998.[192] The permitting process took over six years because the plant was required to obtain land use and environmental permits from numerous authorities, including the City of Carlsbad, Regional Board, Coastal Commission, and State Lands Commission.[193] The plant also had to overcome numerous legal

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185 Becker, *supra* note 76.

186 *California Coastal Commission Approves Desalination Slant Well Permit*, *supra* note 77.

187 *Id.*; Becker, *supra* note 76.

188 Becker, *supra* note 76.

189 *Fact Sheet*, *supra* note 78.

190 *See*, *e.g.*, Ocasio, *supra* note 128, at 470–71 (describing the various approvals and permits required before the Carlsbad project was able to proceed with construction).

191 Denson, *supra* note 14, at 726.

192 Ocasio, *supra* note 128, at 470–71.

193 Denson, *supra* note 14, at 726.

challenges from community and nonprofit groups,[194] which in combination filed fourteen lawsuits challenging these permits between 2006 and 2009, delaying construction until December 2012.[195] In those lawsuits, courts typically deferred to the agency that permitted the plant. For instance, in *San Diego Coastkeeper v. California State Lands Commission*, the nonprofit San Diego Coastkeeper appealed the trial court's denial of its petition alleging that CEQA required the State Lands Commission to prepare a supplemental EIR for the proposed desalination project because the final EIR did not sufficiently analyze the project's impacts on marine life if the co-located power plant were discontinued.[196] The Commission found that a supplemental EIR was not permitted under CEQA because the final EIR considered the project's marine life impact as a stand-alone facility,[197] and the appellate court gave deference to the Commission's decision, holding that its conclusion was supported by substantial evidence.[198] Moreover, in *Surfrider Foundation v. California Regional Water Quality Control Board*, the nonprofit Surfrider Foundation appealed the trial court's denial of its petition alleging that the Regional Board, in issuing an NPDES permit for the project, failed to comply with the Porter-Cologne Act requirement that the project implement the best feasible site, design, technology, and mitigation measures to minimize impacts on marine life.[199] Again, the court gave deference to the Regional Board's finding that the proposal did adequately minimize the mortality of marine life, holding that substantial evidence supports the trial court's factual determinations.[200]

Similarly, the approval process for the Huntington Beach project was drawn out over twenty years before the Coastal Commission ultimately denied a permit for the project.[201] The developer Poseidon Water initially proposed the project in 1998.[202] The City of Huntington Beach prepared and certified a final EIR in 2005 and a subsequent EIR in 2010, and the State Lands Commission certified a supplemental EIR in 2017.[203] However, in May 2022, the Coastal Commission unanimously denied the permit.[204] The Commission vote came almost ten hours after the contentious hearing began; over 200 people commented on the project,

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194 *Id.* at 726–27.

195 Ocasio, *supra* note 128, at 472.

196 San Diego Coastkeeper v. Cal. State Lands Comm'n, No. D056421, 2010 Cal. App. WL 5058429, at 1 (1st Dist. Dec. 10, 2010).

197 *Id.*

198 *Id.*

199 Surfrider Found. v. Cal. Regional Water Quality Control Bd., 211 Cal.App.4th 557, 576 (2012).

200 *Id.* at 571.

201 Becker, *supra* note 72.

202 STAFF REPORT: REGULAR CALENDAR, *supra* note 175, at 2.

203 *Id.* at 204.

204 Becker, *supra* note 71.

and public comments lasted about six hours.[205] According to a Coastal Commission deputy director, the project proposal failed to develop several key details about the project, which made the project difficult to review.[206] For example, details about the ultimate buyer and cost of the water remained unclear.[207] The Coastal Commission staff report, which recommended that the Commission deny the project,[208] further raised concerns over protection of marine life and wetlands, as well as the potential effects on environmental justice communities.[209] The failure of the project illustrates the importance of having a thorough proposal that adequately addresses environmental and local community concerns.

The Doheny project, proposed by the South Coast Water District, underwent more than eighteen years of research, due diligence, outreach, and development before the Coastal Commission unanimously approved the project in October 2022.[210] While the hearing was less contentious than the Huntington Beach hearing, the plant still faced substantial opposition during an hour of public comment,[211] which indicates that even projects that are ultimately approved face substantial pushback. The State Lands Commission unanimously approved the project in December 2022, fulfilling the last of the three primary permits required for the project.[212] Additional approvals were granted by the National Marine Fisheries Service in April 2022, the U.S. Fish and Wildlife Service in February 2023, and the U.S. Army Corps of Engineers in February 2024.[213] The plant is scheduled to begin operating in 2029.[214]

The Marina project is facing a similarly long permit process. The project was first proposed in April 2012.[215] On August 13, 2018, the California Public Utilities Commission ("CPUC") unanimously approved the project.[216] In November 2022, the Coastal Commission approved the project in an 8-to-2 vote, after thirteen hours of debate at a Salinas public hearing where hundreds of people were

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[205] Becker, *supra* note 71.

[206] Becker, *supra* note 71.

[207] Becker, *supra* note 72.

[208] *See generally* STAFF REPORT: REGULAR CALENDAR, *supra* note 175.

[209] *Id.* at 2, 8-9; Becker, *supra* note 72.

[210] *South Coast Water District Receives Unanimous Approval for Doheny Project*, *supra* note 74.

[211] Becker, *supra* note 72.

[212] *Doheny Ocean Desalination Project*, *supra* note 75.

[213] *Id.*

[214] *Id.*

[215] David Schmalz, *The CPUC Approves Cal Am's Desal Project. Here's What it Means, and What's Next*, MONTEREY CNTY. NOW (Sept. 14, 2018), https://www.montereycountyweekly.com/blogs/news_blog/the-cpuc-approves-cal-am-s-desal-project-here-s/article_eacd948a-b7bd-11e8-8b89-0b973d4bbc5f.html.

[216] Sara Rubin & David Schmalz, *Public Utilities Commission Judges Give Cal Am Their Blessing for Proposed Desal Plant*, MONTEREY CNTY. NOW (Aug. 14, 2018), https://www.montereycountyweekly.com/blogs/news_blog/public-utilities-commission-judges-give-cal-am-their-blessing-for/article_58af554e-9ff2-11e8-a778-5f2b7ea1c7c2.html.

present.[217] However, the Coastal Commission heavily conditioned its approval with a list of conditions aimed at limiting the harm to the surrounding environment, groundwater supplies, and local communities.[218] In addition, Cal-Am, owner and operator of the plant, must obtain federal, state, and local permits and resolve potential litigation before construction of the plant can begin.[219] For example, Cal-Am is required to obtain permits from the City of Marina. If the city denies a permit, giving rise to litigation over the permit, the Coastal Commission retains the ability to withdraw their approval of the project. The Marina project has already survived a few litigation challenges.[220] Assuming Cal-Am meets the Coastal Commission's list of conditions, obtains the necessary approvals, and prevails in litigation, the company plans to operate the plant in 2027,[221] twenty-five years after it was first proposed.

B. Environmental Impact

A project's impacts on marine life and the environment and proposed measures to mitigate those harms play an important role in that project's approval. For example, the Coastal Commission rejected the proposed Huntington Beach project because of obsolete protocols, inadequate risk mitigation strategies, and violations of the California Coastal Act.[222] Further, the Coastal Commission staff report recommending that the Coastal Commission deny the project raised environmental concerns over coastal hazards and protection of marine life and wetlands.[223] The proposed plant would have been co-located with a power plant[224]

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[217] Becker, *supra* note 76.

[218] *Id.*

[219] *Id.*

[220] For example, in *Marina Coast Water District v. County of Monterey*, the Sixth District Court of Appeal held that the County was not required to prepare a supplemental or subsequent EIR under CEQA, holding that the environmental review process was adequate. 96 Cal.App.5th 46, 66 (2023). And in 2018, the Supreme Court of California declined to hear the City of Marina and Marina Coast Water District's challenge of the CPUC's approval; Asaf Shalev, *Supreme Court Won't Consider Marina's Challenge to Cal Am Desalination Plant*, MONTEREY CNTY. NOW (Sept. 3, 2019), https://www.montereycountyweekly.com/blogs/news_blog/supreme-court-wont-consider-marinas-challenge-to-cal-am-desalination-plant/article_8d3a55dc-ceb0-11e9-b8ae-bb5306a67b69.html (The City of Marina is expected to oppose the Marina project because of the city's concerns that the project will jeopardize the city's water supply, burdening residents who will not receive any of the water and destroy coastal habitat and marine life); *See*, *e.g.*, *Frequently Asked Questions: Cal Am Water's Monterey Peninsula Water Supply Project*, CITY OF MARINA, https://www.cityofmarina.org/DocumentCenter/View/11657/Marina_FAQ_final (last visited Apr. 10, 2025) (where the City of Marina expresses its various hesitations in building the Marina project).

[221] *California Coastal Commission Approves Desalination Slant Well Permit*, *supra* note 77.

[222] Sharon Udasin, *Dried Up: In California, desalination offers only partial solution to growing drought*, THE HILL (Dec. 5, 2022), https://thehill.com/policy/equilibrium-sustainability/3756406-dried-up-in-california-desalination-offers-only-partial-solution-to-growing-drought; https://documents.coastal.ca.gov/reports/2022/5/Th9a10a/Th9a10a-5-2022-staffreport.pdf.

[223] STAFF REPORT: REGULAR CALENDAR, *supra* note 175, at 4–8.

[224] *Id.* at 2.

that is scheduled to cease operation after 2026 due to the OTC Policy.[225] While Poseidon Water, the developer, negotiated a contingency plan should the power plant cease operation, the contingency did not address the lack of cooling water available for brine dilution.[226] The project would also have used open water intakes, which could kill millions of marine organisms drawn into and pumped out of the plant.[227] Moreover, an independent technical panel had declared that subsurface intakes, which are generally considered more protective of marine life, were technically or economically infeasible at this site.[228] Because the discharged brine would contain salinity levels about twice the level of seawater along with other harmful treatment chemicals,[229] the WRCB determined that the plant would need to install high-velocity diffusers to ensure that the discharge is adequately mixed with the seawater, which would also harm marine life.[230] In comparison to the Doheny project, the staff report found that the Huntington Beach project would produce 10 times as much drinking water as the Doheny project but cause more than 50 times the impact to marine life.[231] The Coastal Commission therefore concluded that the proposal lacked adequate mitigation measures to offset these harms to marine life and nearby wetlands and sensitive habitat,[232] and thus failed to provide an adequate plan to reduce the project's environmental impacts.[233]

In contrast to the Huntington Beach project, the smaller-scale Doheny project faced relatively little opposition because of its location and smaller environmental footprint.[234] The Doheny project will have a design that better addresses potential harm to marine life, including drawing in seawater from intake wells buried beneath the ocean floor and commingling the concentrated brine discharge with a nearby wastewater treatment plant.[235] The Marina project is designed similarly to the Doheny project and uses renewable energy to power the facility.[236] Nevertheless, concerns remain that the Marina plant could threaten groundwater

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[225] WATER QUALITY CONTROL POLICY ON THE USE OF COASTAL AND ESTUARINE WATERS FOR POWER PLANT COOLING, STATE WATER RES. CONTROL BD. (Aug. 15, 2023), available at https://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/docs/otc-policy-2023/otc-policy-2023.pdf.

[226] COOLEY ET AL., *supra* note 1, at 76.

[227] Becker, *supra* note 72.

[228] *Id.* at 3, 30, 100–01.

[229] *Id.* at 102.

[230] *Id.* at 5, 99.

[231] STAFF REPORT: REGULAR CALENDAR, *supra* note 175, at 108.

[232] *Id.* at 3, 7-10.

[233] *Id.* at 134; 171; *see also* Becker, *supra* note 72.

[234] *See*, *e.g.*, Udasin, *supra* note 222.

[235] Becker, *supra* note 72.

[236] Jennifer Yachnin, *California Greenlights 2nd Desalination Plant in a Month*, E&E NEWS (Nov. 18, 2022), https://www.eenews.net/articles/california-greenlights-2nd-desalination-plant-in-a-month.

supplies and endanger coastal dune and wetland habitat supporting two dozen sensitive species including the endangered western snowy plover.[237]

The Carlsbad project is the first desalination facility in California to comply with the Ocean Plan Amendment.[238] The plant uses advanced subsurface slant intake wells stretching 1,000 feet below the coastline to draw in seawater.[239] The city's EIR concluded that the desalination plant can operate without significant impacts to marine life.[240] Moreover, the Carlsbad plant continues to modify its operations to minimize its environmental impacts. The plant's intakes originally drew seawater from the power station's OTC system, but after the State phased out this system[241] and the power station shut down in December 2018, the plant began operating new fish-friendly dilution pumps in 2020.[242] In September 2022, the Coastal Commission approved a permit allowing the plant to modify and upgrade its seawater intakes and discharge structures in order to better protect marine life; these upgrades were completed in January 2025.[243] For example, new seawater intake screens would prevent any sea life larger than one millimeter from entering the plant.[244]Additionally, to mitigate the environmental impacts, the operator of the plant is restoring about 125 acres of wetlands in San Diego Bay.[245]

The Carlsbad plant also implemented a number of innovative mitigation measures, making it the most energy-efficient desalination plant in the nation.[246]

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[237] Becker, *supra* note 76; Miller, *supra* note 92.

[238] *New Seawater Intake Pumps Preserve Marine Environment, Enhance Climate-Resilient Water Supply*, CARLSBAD DESAL (July 23, 2020), https://www.carlsbaddesal.com/news/new-seawater-intake-pumps-preserve-marine-environment-enhance-climate-resilient-water-supply.

[239] Gunnar Herber, *Which Desalination Plant Has the Lowest Environmental Impact?*, MEDIUM (Feb. 1, 2024), https://medium.com/@desalter/which-desalination-plant-has-the-lowest-environmental-impact-32f6bc32156b.

[240] *Carlsbad Desal FAQs*, *supra* note 66; *see* ENVIRONMENTAL IMPACT REPORT, CARLSBAD DESAL, *supra* note 167, at 4.3-35, 4.3-36, 4.3-42.

[241] Bettina Boxall, *A $1-billion Desalination Plant Might Be Coming to Huntington Beach, But it Will Test California's Environmental Rules*, L.A. TIMES (Dec. 16, 2016), https://www.latimes.com/local/lanow/la-me-poseidon-desalination-20161005-snap-story.html; *see* discussion, *supra* Part II.B.

[242] *Carlsbad Desalination Plant Upgrades to Protect Marine Life*, *supra* note 170.

[243] Diehl, *supra* note 171; *Carlsbad Desalination Plant Upgrades to Protect Marine Life*, *supra* note 170; *Water Projects, Standalone Intake Modifications*, BUTIER, https://butier.com/project/standalone-intake-modifications (last visited May 13, 2025); *New Seawater Intake Pumps Preserve Marine Environment, Enhance Climate-Resilient Water Supply*, *supra* note 238.

[244] *New Seawater Intake Pumps Preserve Marine Environment, Enhance Climate-Resilient Water Supply*, *supra* note 238. *Carlsbad Desalination Plant Upgrades to Protect Marine Life*, *supra* note 170; *Water Projects, Standalone Intake Modifications*, BUTIER, https://butier.com/project/standalone-intake-modifications (last visited May 13, 2025).

[245] *Carlsbad Plant*, *supra* note 162.

[246] *Carlsbad Desalination Plant (USA)*, IDE TECHS., https://ide-tech.com/en/project/carlsbad-desalination-plant (last visited Apr. 28, 2024).

For example, the plant incorporates solar panels.[247] It also uses energy recovery devices that recycle pressure from the reverse osmosis process, capturing the energy created by the rejected stream of seawater and transferring it into incoming seawater.[248] According to the San Diego County Water Authority, these devices save about 146 million kWh of energy per year, reducing carbon emissions by 42,000 metric tons annually, and reduce the energy consumption of the overall reverse osmosis process by 46%.[249]

Desalination facilities continue to have concerning environmental impacts that need to be addressed.[250] However, advancing technological innovations could help current and future desalination plants minimize their impacts on marine life and coastal ecosystems.

C. Cost and Impacts on the Local Community

In California, the cost of desalination projects can be extremely high and the cost of desalinated water prohibitively expensive for low-income residents.[251] Despite this hurdle, cost has not prevented some desalination projects from succeeding. The Carlsbad project has entered operation, despite its relatively high costs. Water from the Carlsbad plant costs between $2,302 and $2,559 per acre-foot, according to the San Diego County Water Authority,[252] which is significantly more than the cost of water sourced and pumped from the Colorado River and Sacramento San Joaquin River Delta.[253] The Doheny project has also been approved despite the higher costs. As of September 2023, water from the Doheny project is expected to cost $2,058 per acre-foot the first year, and the water district expects average monthly bills to increase by $4.01 a month.[254] The water

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[247] *Water/Environment Best Project - Claude "Bud" Lewis Carlsbad Desalination Plant*, ENRWEST (Sept. 28, 2016), https://www.enr.com/articles/40369-waterenvironment-best-project—-claude-bud-lewis-carlsbad-desalination-plant.

[248] *Environmental*, CARLSBAD DESAL, https://www.carlsbaddesal.com/environmental.html (last visited Apr. 10, 2025); *see also Carlsbad Plant*, *supra* note 162.

[249] *Carlsbad Plant*, *supra* note 162; *see also Environmental*, *supra* note 248.

[250] *See* discussion, *supra* Part I.C.

[251] *See* discussion, *supra* Part I.B.

[252] *Desalination*, note 70.

[253] Robbins, *supra* note 5 (A 2019 analysis found that the Water Authority pays about $1,200 for an acre-foot of water sourced and pumped from the Colorado River and Sacramento San Joaquin River Delta. The same amount from the Carlsbad plant costs about $2,200); *see also* Emma Newburger, *Why desalination won't save states dependent on Colorado River water*, CNBC (Jan. 27, 2023), https://www.cnbc.com/2023/01/27/why-desalination-wont-save-states-dependent-on-colorado-river-water.html (discussing an analysis which estimates the cost of water from the Carlsbad plant to be $2,725 per acre-foot).

[254] Brooke Staggs, *As Cost for Doheny Desalination Project Grows, California Aims to Streamline More Projects*, ORANGE CNTY. REG. (Sept. 1, 2023), https://www.ocregister.com/2023/09/01/as-cost-for-doheny-desalination-plant-grows-california-aims-to-streamline-more-projects; *see also South Coast Water District Announces Financial Analysis Results for Doheny Ocean Desalination Project and Approves Release of Request for Qualifications*, DOHENY OCEAN DESALINATION PROJECT (June 27, 2023),

will cost about 20% more than imported water, which could increase monthly costs by about $2 to $7 per household, according to the Coastal Commission report.[255] Despite the projected increased costs, a $4 monthly bill increase is acceptable to most residents in exchange for a more reliable water supply, according to a water district customer survey.[256] In addition, water shortages are likely to drive up the cost of water from the Colorado River and State Water Project in the future, which could mitigate the increased cost of desalinated water.[257] In March 2022, as California entered a third year of drought, State officials announced that they were cutting State Water Project allocations to 5%.[258] Thus, despite the higher costs, emergency drought conditions may make these desalination projects a vital part of meeting water supply needs.

Despite substantial local opposition over environmental justice concerns, the Marina project was ultimately approved by the Coastal Commission in a divided 8-to-2 vote, conditioned on implementing mitigation measures.[259] The Marina project was highly controversial because of the burdens it would place on local communities. The City of Marina is a primarily low-income, blue-collar, and minority city of 22,500 residents.[260] Sixty-two percent of its residents are people of color, and the average annual income is $33,000, an average of $8,000 less than other residents across Monterey County.[261] Marina also has a long history of having a disproportionate share of industrial facilities.[262] Further, the City of Marina would receive no water from the plant.[263] Cal-Am, the nation's largest publicly traded water and wastewater company which owns the Marina project, serves customers in about 85% of the Monterey Peninsula but does not serve the residents of the City of Marina, which is instead served by the publicly owned Marina Coast Water District.[264] Instead, the water will go to other communities, including the generally whiter, wealthier neighborhoods of Carmel-by-the-Sea,

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https://cms9files.revize.com/scoastwaterdist/DODP%20Press%20Release_RFQ%20Release%20and%20Updated%20Costs_06.26.pdf (explaining that South Coast Water District's financial analysis predicted a $4.01 increase for the average monthly single-family residence as a result of the Doheny project).

255 Becker, *supra* note 72; STAFF REPORT: REGULAR CALENDAR 53 (CAL. COASTAL COMM'N 2022), available at https://documents.coastal.ca.gov/reports/2022/10/Th10a/Th10a-10-2022-report.pdf.

256 Staggs, *supra* note 254.

257 *Id.*

258 Hayley Smith, *California Slashes State Water Project Allocation as Year Begins With Record Dryness*, L.A. TIMES (Mar. 18, 2022), https://www.latimes.com/california/story/2022-03-18/california-cuts-state-water-project-allocation-to-5-percent.

259 Becker, *supra* note 76.

260 Becker, *supra* note 76; Miller, *supra* note 92.

261 Becker, *supra* note 76; Miller, *supra* note 92.

262 Yachnin, *supra* note 236.

263 Becker, *supra* note 77.

264 *Frequently Asked Questions: Cal Am Water's Monterey Peninsula Water Supply Project*, *supra* note 216.

Pacific Grove, and Pebble Beach.[265] Thus, rather than benefiting from the project, Marina residents would incur an added burden if the project harms their shoreline and contaminates or depletes local groundwater supplies that they rely on for drinking water. This would in turn raise water production or treatment costs for Marina Coast Water District or require the purchase of costly replacement water.[266]

Surrounding local communities in the Monterey Peninsula would also be adversely affected because Cal-Am would pass investment costs on to customers through rate increases.[267] The cost per gallon estimated for the Marina plant is poised to be among the highest proposed thus far.[268] Cal-Am estimates that customers could face bill hikes of $50 per month, about a 50% increase over the average residential bill,[269] though the final cost burden remains unclear.[270] This would be especially burdensome for low-income residents, including in the predominantly Latino, agricultural community of Castroville, despite receiving the water at a discount.[271]

In an attempt to mitigate these additional burdens, the Commissioners ordered Cal-Am to improve plans for assisting low-income ratepayers and cap rate increases for low-income customers to $10 per month.[272] The Coastal Commission also demanded further conditions, including guaranteed protection of low-income ratepayers, monitoring for potential groundwater damage, and extensive restoration of dune habitat.[273] Finally, the Coastal Commission ordered Cal-Am to provide the City of Marina with $3 million and a full-time employee for ten years to develop more public amenities for the community.[274] While many Marina residents still deemed these conditions insufficient in alleviating environmental justice burdens,[275] the Marina project was ultimately approved with these additional mitigation measures.

The Huntington Beach project, which was denied, faced local opposition related to the high economic cost and environmental justice concerns. If approved, the project would have cost up to $2,800 per acre-foot per water, in contrast to recycled wastewater and groundwater, which only costs about $1,200 per acre-

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265 Becker, *supra* note 77.

266 *Frequently Asked Questions: Cal Am Water's Monterey Peninsula Water Supply Project*, *supra* note 216.

267 *Id.*

268 Udasin, *supra* note 222.

269 Becker, *supra* note 76.

270 Rosanna Xia, *Monterey Bay desalination project is approved despite environmental injustice concerns*, L.A. TIMES (Nov. 18, 2022), https://www.latimes.com/environment/story/2022-11-18/desalination-project-wins-approval-despite-equity-concerns.

271 Becker, *supra* note 76.

272 Becker, supra note 75.

273 Xia, *supra* note 270.

274 *Id.*

275 *Id.*

foot.[276] The project would thus have driven the average household water bill by $3-6 a month, or as much as 8.6%,[277] which would likely impact low-income ratepayers. The staff report recommending that the Coastal Commission deny the project raised concerns related to potential effects on environmental justice communities, despite being unable to fully assess those effects.[278] The proposed project location is in an area concentrated with industrial development, including a regional landfill, sewage plant, and sand mine,[279] as well as a history of contamination problems.[280] Thus, residents, a majority of whom are people of color, were concerned that adding more industrial development and construction could spread existing contamination.[281]

Despite the high costs, the cost of desalination has been decreasing because of technology advances. In the last three decades, the cost of desalination has dropped by more than half.[282] Combined with measures to mitigate the additional costs for low-income communities, the decreasing cost of desalinated water may ultimately help ease the financial burden on consumers, particularly for minority and disadvantaged communities.

D. Dependence on Desalination Compared to Alternatives

Dependence on desalination varies by region and municipality, making desalination a more attractive option in some cities than others. San Diego, where the Carlsbad project is located, is more dependent on outside water than most California cities,[283] receiving just twelve inches of rain per year and having no groundwater.[284] Thus, the region gets half of its water from the Colorado River, which is vulnerable as a result of reduced snowfall in the Rocky Mountains and climate change.[285] Moreover, the Carlsbad project is located south of the major Southern California fault lines, providing added water security in the event that an earthquake severs imported water supply lines.[286] These conditions make San Diego a prime location for a large desalination project like the Carlsbad project.

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[276] *Huntington Beach desalination project would be money down the drain*, CALMATTERS (May 6, 2022), https://calmatters.org/commentary/2022/05/huntington-beach-desalination-project-would-be-money-down-the-drain.

[277] Michael Hiltzik, *It's time to kill this useless and costly desalination project*, L.A. TIMES (May 2, 2022), https://www.latimes.com/business/story/2022-05-02/its-time-to-halt-poseidon-desalination-plant-huntington-beach.

[278] STAFF REPORT: REGULAR CALENDAR, *supra* note 175, at 8–9.

[279] Xia, *supra* note 270.

[280] STAFF REPORT: REGULAR CALENDAR, *supra* note 175, at 8.

[281] *Id.* at 8–9.

[282] Robbins, *supra* note 5.

[283] Denson, *supra* note 14, at 729.

[284] Robbins, *supra* note 5.

[285] *Id.*

[286] *Carlsbad Plant*, *supra* note 162.

The Doheny project would provide water for the South Orange County community that relies almost entirely on water imported from Northern California and the Colorado River; thus, the plant could help them reduce their reliance on imported water and vulnerability to drought.[287] Similarly, the Marina project's Monterey Peninsula does not receive imported water and relies on groundwater, the Carmel River, and treated wastewater.[288] Parts of the peninsula have been under a moratorium for new water connections for over a decade,[289] and in December 2021, the state mandated that Cal-Am cut the amount of water it takes from the Carmel River by more than 50% of its prior allotment.[290] Thus, the Monterey Peninsula needed an alternative source of water to avoid severe rationing,[291] and when California faced its driest three-year stretch on record with a fourth drought year on the horizon, the need for an alternative, reliable source like the Marina plant became more urgent.[292]

In contrast, Huntington Beach had a less urgent need for desalinated water, especially given that the relevant central and northern areas in Orange County have access to a large underground aquifer that provides about seventy-seven percent of the water used in the region.[293] Thus, the Coastal Commission found that rejecting the Huntington Beach project would not adversely affect the county's ability to meet local water demand and ultimately denied the project.[294]

V. RECOMMENDATIONS AND BEST PRACTICES

This Part suggests recommendations and best practices that California can adopt as the State continues to develop and implement desalination projects.

A. Diversify and Use Desalination as a Last Resort

Given the high economic and environmental costs of desalination, desalination should be a last resort option for communities where it is needed most.[295] California should first prioritize diversifying its public water supply and investing in alternative water sources including conservation, wastewater recycling, and

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287 Becker, *supra* note 73.

288 Becker, *supra* note 76.

289 *Id.*

290 Neely, *supra* note 81.

291 *See* Krista Almanzan, *Water Woes: Cal-Am Takes Portfolio Approach*, KAZU (Mar. 27, 2013), https://www.kazu.org/2013-03-27/water-woes-cal-am-takes-portfolio-approach.

292 Becker, *supra* note 76.

293 Chip Yost, *Developer wants to build a $1.4 billion seawater desalination plant in Huntington Beach*, KTLA (May 10, 2022), https://ktla.com/news/local-news/developer-wants-to-build-1-4-billion-seawater-desalination-plant-in-huntington-beach.

294 *See* STAFF REPORT: REGULAR CALENDAR, *supra* note 175, at 200–01.

295 *See* Peter Gleick, *National Geographic ScienceBlogs: The Future of Desalination in California Is Still in the Future: California, Israel, and Australia*, PACIFIC INST. (June 10, 2015), https://pacinst.org/national-geographic-scienceblog-the-future-of-desalination-in-california-is-still-in-the-future-california-israel-and-australia.

stormwater management, which are generally less costly and harmful to marine life and the environment than desalination.[296] In focusing on these alternatives, California can prioritize developing regulations that maximize its existing water supply options.[297]

Water conservation is the quickest, cheapest, and simplest solution to California's water problem.[298] California could look to Israel as an example. Israel faced a water crisis in 2008 when the Sea of Galilee, its primary source of water, dropped to dangerously low levels.[299] However, through innovations including a comprehensive water transportation network and drip irrigation, Israel has mostly overcome its water crisis, now producing 20% more water than it needs.[300] California could incentivize similar innovations that substantially reduce agricultural water use, which uses up 80% of the state's water supply,[301] as well as impose measures to reduce residential use. For example, during the late 1980s drought, Santa Barbara implemented new emergency measures including a ban on watering lawns and an increase in water rates.[302] As a result, water use fell by 40% in a year.[303] Today, the city continues to be a leader in water conservation in California, implementing rebate programs to encourage residents to convert from grass to drought-friendly plants, doing water checkups to help residents look for more ways to save water, and teaching about the drought in school.[304] A Pacific Institute study found that implementing efficiency measures such as fixing water leaks and replacing lawns with drought-friendly plants could reduce total urban use by 30-48%.[305] Los Angeles also implemented the city's first fines for flagrant wasting of water as well as water rationing measures.[306] While such measures may be unpopular, these success stories show that communities are capable of stepping up to the challenge when circumstances require it.

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296 *See* Schroeder, *supra* note 121, at 154.

297 *See* Schroeder, *supra* note 121, at 154–56.

298 S*ee* Reinhart, *supra* note 94.

299 Max Kaplan-Zantopp, *How Israel Used Innovation to Beat Its Water Crisis*, ISRAEL21C (Apr. 28, 2022), https://www.israel21c.org/how-israel-used-innovation-to-beat-its-water-crisis.

300 *Id.*

301 *See* Schroeder, *supra* note 121, at 158–63.

302 Lauren Sommer, *Icebergs and Green Paint: Lessons from California's Big Droughts*, KQED (Jan. 16, 2014), https://www.kqed.org/science/13105/icebergs-and-green-paint-lessons-from-californias-big-droughts; *Santa Barbara Leads California in Cutting Water Use*, NPR (May 5, 2015), https://www.npr.org/transcripts/404239904.

303 *Santa Barbara Leads California in Cutting Water Use*, *supra* note 302.

304 *Id.*

305 Ian James, *California Could Shrink Water Use in Cities by 30% Or More, Study Finds*, L.A. TIMES (Apr. 12, 2022), https://www.latimes.com/california/story/2022-04-12/california-could-shrink-water-use-in-cities-by-30-or-more.

306 Nona Yates, *The Water Picture: 1986-1993*, L.A. TIMES (Feb. 25, 1993), https://www.latimes.com/archives/la-xpm-1993-02-25-mn-776-story.html.

Reusing water is the next best option. Purifying reclaimed water produces a less salty and less harmful concentrate and is less costly than desalination.[307] Israel has become a global model for water scarcity, reusing almost 100% of its wastewater, the highest rate in the world.[308] Spain is second to Israel, recycling 17% of its wastewater.[309] California reuses 9% of its wastewater,[310] and the U.S. recycles just 1%.[311] A Pacific Institute study found that California currently recycles about 23% of its municipal wastewater and has the potential to more than triple the amount that is recycled and reused.[312] To reach this goal, government incentives could help spur an increase in the amount of wastewater that is recycled. Orange County Water District's recycling system is the world's largest water purification system and recycles all of its wastewater, creating enough drinking water to meet the needs of one million residents.[313] The District's success was largely the result of an effective public outreach and educational campaign, including facility tours, that garnered public support.[314] Los Angeles, which recently has been importing nearly 90% of its water from the Eastern Sierra, the Sacramento-San Joaquin River Delta, and the Colorado River, also has an ambitious plan to recycle 100% of its wastewater by 2035.[315] The Hyperion Water Reclamation Plant, the largest water treatment plant in Los Angeles and one of the largest in the nation, currently receives 81% of the City's total wastewater and recycles 27% of that amount.[316] The City plans to spend about $3 billion to increase Hyperion's recycling rate to 100%, which would result in recycled water

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307 Reinhart, *supra* note 94.

308 Jonah Mandel, *Israeli Desalination, Wastewater Treatment Becomes Global Model for Water Scarcity*, TIMES OF ISRAEL (Aug. 10, 2023), https://www.timesofisrael.com/israeli-desalination-wastewater-treatment-becomes-global-model-for-water-scarcity.

309 Isabel Kershner, *Aided by the Sea, Israel Overcomes an Old Foe: Drought*, N.Y. TIMES (May 29, 2015), https://www.nytimes.com/2015/05/30/world/middleeast/water-revolution-in-israel-overcomes-any-threat-of-drought.html.

310 James Conca, *California's Mega-Drought: Nuclear Power to the Rescue*, FORBES (June 9, 2015), https://www.forbes.com/sites/jamesconca/2015/06/09/californias-megadrought-nuclear-power-to-the-rescue/?sh=4ac41d6b41fb.

311 Kershner, *supra* note 309.

312 Conca, *supra* note 310.

313 *Orange County Completes World's Largest Wastewater Recycling and Purification System*, CAL. WATER BDS. (Apr. 14, 2023), https://www.waterboards.ca.gov/press_room/press_releases/2023/pr20230414-orange-county-replenishment.pdf; *see also New water you can count on,* ORANGE CNTY. WATER DIST, https://www.ocwd.com/gwrs (last visited Apr. 10, 2025).

314 *See* Reinhart, *supra* note 94.

315 Ian James, *Los Angeles Set to Build Facility to Transform Wastewater into Clean Drinking Water*, L.A. TIMES (Nov. 14, 2023), https://www.latimes.com/environment/story/2024-11-14/los-angeles-wastewater-recycling.

316 *LA to Recycle 100 Percent of Its Wastewater by 2035, Mayor Says*, CBS NEWS (Feb. 21, 2019), https://www.cbsnews.com/losangeles/news/la-goal-recycling-100-percent-wastewater-2035.

comprising 35% of the city's water supply, a considerable increase from the current 2%.[317]

Stormwater capture is another option and arguably a current missed opportunity in California. Almost 2.3 million acre-feet of precipitation from pavement, roofs, and other surfaces drains into the ocean every year; if it were captured and treated, it could supply more than a quarter of the State's urban water use, or almost seven million Southern California households each year.[318] Los Angeles County already collects about 200,000 acre-feet of runoff per year, enough to fill about 100,000 Olympic-sized swimming pools.[319] Investing in infrastructure to more efficiently capture the stormwater and greenspaces to better absorb it could significantly add to California's water supply.[320]

B. Streamline the Permitting Process & Implement Public-Private Partnerships

Given the complex web of federal and state requirements involving multiple agencies that desalination projects have to meet, in addition to litigation-related hurdles that projects have to overcome, it is no wonder that the California regulatory process has been referred to as "the 800-pound gorilla."[321] Streamlining the permitting process could facilitate the approval process while still ensuring a thorough environmental review. California's 2022 Water Supply Strategy and the 2023 California Water Plan Update suggest that to streamline the permitting process, state entities should develop criteria for siting desalination facilities along the coast, recommend new standards to facilitate approval of those facilities, and identify potential available mitigation sites.[322] Accordingly, the WRCB laid out a pathway to expedite the permitting process, including identifying site locations and technologies that have minimal environmental

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[317] *Id.*; *see also Pure Water Los Angeles*, L.A. SANITATION, https://sanitation.lacity.gov/san/faces/wcnav_externalId/s-lsh-wwd-cw-rw-h2035?_adf.ctrl-state=ewku1due4_11&_afrLoop=18951961511736533&_afrWindowMode=0&_afrWindowId=null#!%40%40%3F_afrWindowId%3Dnull%26_afrLoop%3D18951961511736533%26_afrWindowMode%3D0%26_adf.ctrl-state%3Dewku1due4_15 (last visited Apr. 10, 2025) (describing the program's objectives).

[318] Rachel Becker, *California's Urban Runoff Flows Down the Drain. Can the Drought-Plagued State Capture More of it?*, CALMATTERS (Feb. 29, 2024), https://calmatters.org/environment/water/2024/02/capturing-california-stormwater.

[319] *Id.*

[320] *Id.*

[321] Daniel Cochrane, *Government Is Giving Desalination A Salty Reception*, ALEC (July 6, 2016), https://alec.org/article/government-is-giving-desalination-a-salty-reception-why-every-state-should-care.

[322] 2022 WATER SUPPLY STRATEGY, *supra* note 44, at 5; 2023 WATER PLAN UPDATE, *supra* note 34, at 4-36.

impacts and planning for foreseeable coastal hazards such as sea level rise.[323] Because approval of a project is determined on a case-by-case basis, implementing a standardized process to the extent possible could make the approval process more predictable for project developers.

The private and public sectors can also work together to lower costs and mitigate risk. For example, Israel has effectively adopted public-private partnerships in which private companies finance, construct, and operate the desalination plant, and the government purchases water from the plant at a predetermined, relatively low price.[324] Unlike California, Israel has a centralized regulatory system where three official bodies govern desalination plant construction and operation,[325] where all water sources, including water pumped from the sea, belong to the state,[326] and where every resident must pay the same price for water, no matter the real cost of delivering it.[327] While California relies on privatized markets[328] and cannot so easily centrally control water prices or communication between regulatory agencies,[329] California could continue to adopt a similar strategy of public-private partnerships, where the city buys the desalinated water for a competitive price. For example, the Carlsbad project came out of a public-private partnership in which the San Diego County Water Authority agreed to purchase water from Poseidon Water, a private developer, for thirty years.[330] This arrangement allows the private sector to assume various risks

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[323] Pam McFarland, *California Outlines Expedited Permitting for Seawater Desalination*, ENRWEST (July 18, 2023), https://www.enr.com/articles/56805-california-outlines-expedited-permitting-for-seawater-desalination.

[324] *Water Management in Israel*, FANACK WATER (June 5, 2023), https://water.fanack.com/israel/water-management-in-israel; *see, e.g.*, Kershner, *supra* note 309 (noting that Israel buys Sorek's desalinated water for a relatively cheap price); *see also* Melissa Lee, *Privatization of Water Desalination: The Need to Balance Governmental and Corporate Control in California*, 5 GLOB. BUS. L. REV. 1, 33 https://engagedscholarship.csuohio.edu/cgi/viewcontent.cgi?article=1052&context=gblr# (stating the role of public-private partnerships to help pay for the cost of construction and the continued use of desalination plants).

[325] Miriam Brusilovsky, *Desalination Can–And Does –Co-Exist in Harmony with the Environment*, IDE TECHS. (May 7, 2023), https://ide-tech.com/en/blog/desalination-can-and-does-co-exist-in-harmony-with-the-environment.

[326] *The Central Role of the Israel Water Authority*, MUN. WATER LEADER, https://municipalwaterleader.com/the-central-role-of-the-israel-water-authority (last visited Apr. 28, 2024).

[327] Udasin, *supra* note 222.

[328] *Id.*

[329] Christopher Woody, *Israel's Revolutionary Water Management Methods Aren't Going to Be Enough to Solve California's Devasting Drought*, BUS. INSIDER (June 15, 2015), https://www.businessinsider.com/israel-style-methods-arent-going-to-solve-californias-devastating-drought-2015-6.

[330] *How We Do It*, *supra* note 161.

associated with design, construction, and operation of the plant,[331] and provide the upfront capital investment needed to develop a major project.[332]

C. Minimize Environmental Impacts

In the future, all proposed desalination projects must ensure that they meet the standards set in the Ocean Plan Amendment, which includes using subsurface intakes and minimizing the harms of the brine byproduct.[333] The Doheny project, for example, will use slanted wells that draw water from beneath the seabed and treat the brine at a nearby wastewater treatment facility, in compliance with the Amendment.[334] Commingling the brine with wastewater would make the chemical composition and salinity of the water as close to the original source as possible, as the Sand City plant has done and the Marina project will do.[335] Desalinating sources that are less saline than seawater such as brackish water is also considerably less energy-intensive and costly than desalinating seawater (on average, between one-third to one-seventh the cost of desalinated water).[336] Proposing such mitigation measures will likely improve the chances of project approval.

Even though California's OTC Policy does not explicitly prohibit seawater desalination plants co-located with power plants from using the power plant's seawater intake or discharge structures,[337] the OTC Policy will likely affect co-located desalination plants if the adjacent power plant reduces its water flow significantly or ceases operation entirely as a result.[338] To that end, desalination plants that use a power plant's intake or discharge structures may need to look to modify or upgrade structures to remain in compliance with environmental standards. For example, the Carlsbad project, in response to the closure of an adjacent power plant, incorporated new fish-friendly dilution pumps in 2020,[339] and upgraded its seawater intakes and discharge structures, including new seawater intake screens that would prevent any sea life larger than one millimeter from entering the plant, in January 2025.[340]

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331 *Carlsbad Plant*, *supra* note 162.

332 *Carlsbad Desal FAQs*, *supra* note 66.

333 *See* Ocean Plan Amendment, *supra* note 141, at 32, 35–38.

334 *Doheny Ocean Desalination Project*, *supra* note 75.

335 *See* Becker, *supra* note 76 (Marina project plans to commingle brine with wastewater).

336 Miller, *supra* note 92.

337 *See* discussion, *supra* Part II.B.

338 *See* COOLEY ET AL., *supra* note 1, at 74–77.

339 *Carlsbad Desalination Plant Upgrades to Protect Marine Life*, *supra* note 170.

340 *Id.*; *Carlsbad Desalination Plant Upgrades to Protect Marine Life*, SAN DIEGO CNTY, AUTH., https://www.sdcwa.org/carlsbad-desalination-plant-upgrades-to-protect-marine-life (last visited on May 13, 2025); *Water Projects, Standalone Intake Modifications*, BUTIER, https://butier.com/project/standalone-intake-modifications (last visited May 13, 2025); *New Seawater Intake Pumps Preserve Marine Environment, Enhance Climate-Resilient Water Supply*, *supra* note 238.

Because desalination is an extremely energy-intensive process, implementing measures to reduce energy consumption or power desalination plants with renewable energy would minimize carbon emissions. For example, the Carlsbad project implemented a number of innovative measures making the project the most energy-efficient desalination plant in the nation, including energy recovery devices that reduce carbon emissions by 42,000 metric tons every year.[341] Additionally, co-locating a desalination plant with a nuclear power plant could be beneficial from both an energy and economic standpoint. The Diablo Canyon nuclear power plant near San Luis Obispo, the state's only nuclear facility,[342] is co-located with a seawater desalination facility that produces about 675,000 gallons of fresh water per day.[343] A recent MIT and Stanford feasibility study found that integrating the nuclear plant with a desalination plant brings significant economic advantages:[344] the report found that the cost of water produced at the plant would be up to 50% cheaper than water generated at the Carlsbad plant,[345] and that the cost of electricity would be 5.4 cents per kWh, a significant reduction from the price of power purchased from the electricity grid.[346]

The state can further encourage investment in technological innovations, including renewable energy development, that will continue to decrease the environmental footprint of desalination facilities. Several large-scale plants using wind and solar power are in operation in Australia and Morocco,[347] and others are currently in development. Saudi Arabia recently authorized a large solar project to power one of the largest desalination plants in the world, which is expected to eliminate the use of 410,000 barrels of crude oil and offset 115 megatonnes of carbon dioxide emissions each year.[348] On a smaller, decentralized scale, renewable energy-powered desalination plants have also seen signs of success.

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341 *Carlsbad Desalination Plant Upgrades to Protect Marine Life*, *supra* note 170; *Desalination Plant Cuts Energy Demand to Help Avoid Blackouts*, SAN DIEGO CNTY. WATER AUTH. (Sept. 4, 2022), https://www.sdcwa.org/carlsbad-desalination-plant-cuts-energy-demand-to-help-avoid-blackouts.

342 *California's Only Nuclear Plant Gets State Approval For 5-Year Extension*, REUTERS (Dec. 15, 2023), https://www.reuters.com/business/energy/californias-only-nuclear-plant-gets-state-approval-5-year-extension-2023-12-15.

343 Conca, *supra* note 310.

344 Andrew T. Bouma et al., *Water for a Warming Climate: A Feasibility Study of Repurposing Diablo Canyon Nuclear Power Plant for Desalination*, MIT CEEPR 1 (July 2021), https://ceepr.mit.edu/wp-content/uploads/2021/09/2021-012.pdf.

345 Catherine Clifford, *Why California Should Reconsider Shutting Down its Last Nuclear Plant, Scientists Say*, CNBC (Dec. 1, 2021), https://www.cnbc.com/2021/12/01/diablo-canyon-open-could-save-21-billion-mit-stanford-scientists.html.

346 Bouma et al., *supra* note 344, at 1.

347 Maryème Kettani & Philippe Bandelier, *Techno-Economic Assessment of Solar Energy Coupling with Large-Scale Desalination Plant: The Case of Morocco*, 494 DESALINATION 1-2 (June 2020).

348 *Saudi Arabia's SWCC Awards Alfanar Deal to Construct 110MW Solar Park For Desalination Plant*, UTILITIES MIDDLE EAST (Oct. 18, 2022), https://www.utilities-me.com/news/saudi-arabias-swcc-awards-alfanar-deal-to-construct-110mw-solar-park-for-desalination-plant.

The Marina project in California is powered with 100% renewable energy.[349] Portable desalination devices and devices that use shockwaves to remove salts from water are another recent development to effectively desalinate water. These devices require less energy than existing devices and can be powered by solar energy. They also cost less and can be deployed in remote areas or areas affected by natural disasters.[350] In April 2023, the state DWR awarded $5 million in desalination grants to three projects in Mendocino, Fresno, and Los Angeles counties.[351] The grants are enabling a water technology company, Oneka Technologies, to pilot the state's first wave-powered desalination plant consisting of floating raft-like units which will use carbon-free wave action to produce water without grid electricity[352] and can save both energy and cost.[353] Another water technology company, SeaWell, is testing floating buoys, powered by onshore renewable energy,[354] that would transfer only fresh water to shore, cutting in half the volume of seawater that an onshore plant would require to transfer to shore and reducing energy usage.[355] In sum, there are a variety of promising new technologies in development that may help address environmental concerns over desalination.

D. Prioritize Environmental Justice Communities

In 2012, California became the first state to enact legislation recognizing a human right to water.[356] The WRCB has emphasized that this right extends to all Californians, including underrepresented communities.[357]

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[349] *Fact Sheet*, *supra* note 78.

[350] Elissaveta M. Brandon, *This Portable Device Can Turn Saltwater into Drinking Water at the Touch of a Button*, FAST CO. (May 6, 2022), https://www.fastcompany.com/90749473/this-portable-device-can-turn-saltwater-into-drinking-water-at-the-touch-of-a-button; Meghan Brown, *Shockwave Desalination Removes Salts from Flowing Water*, ENGINEERING.COM (Nov. 12, 2015), https://www.engineering.com/story/shockwave-desalination-removes-salts-from-flowing-water.

[351] NEWSOM, *supra* note 87.

[352] Callahan, *supra* note 89.

[353] *See Desalination*, *in* POWERING THE BLUE ECONOMY: EXPLORING OPPORTUNITIES FOR MARINE RENEWABLE ENERGY IN MARITIME MARKETS 86, 86 (U.S. Dep't of Energy Apr. 2019), available at https://www.energy.gov/sites/default/files/2019/09/f66/73355-7.pdf.

[354] *See generally, A Sensible Approach to Fresh Water*, SEAWELL, https://www.seawellwater.com/theproduct.

[355] California Strategies, LLC, *Innovative SeaWell Desalination Buoys Proposed for Vandenberg Space Force Base*, SANTA BARBARA INDEP. (Sept. 14, 2022), https://www.independent.com/2022/09/14/innovative-seawell-desalination-buoys-proposed-for-vandenberg-space-force-base.

[356] *Human Right to Water Portal*, STATE WATER RES. CONTROL BD., https://www.waterboards.ca.gov/water_issues/programs/hr2w (last visited May 7, 2025) (stating that "Every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes"); *see also* Cal. Water Code § 106.3.

[357] *Environmental Justice, Racial Equity, and Tribal Affairs*, STATE WATER RES. CONTROL BD., https://www.waterboards.ca.gov/centralcoast/water_issues/programs/enviro_justice/enviro_justice.html (last updated Jan. 30, 2025).

Future planning of desalination projects should identify impacts to local environmental justice communities from the start of the permitting process. This approach includes siting projects through an open, transparent public process involving the local community and incorporating the use of environmental justice screening tools to identify communities of concern such as CalEnviroScreen,[358] which helps identify California communities disproportionately burdened by pollution.[359]

The controversy over the approval of the Marina project has made clear the importance of addressing environmental justice and affordability concerns.[360] The increase in cost estimated for the Marina project is poised to be among the highest proposed so far,[361] which can create hardship for low-income households that can barely afford basic water services. Because an increase in water bills disproportionately burdens low-income, minority communities, it is important to prioritize measures that can help alleviate these burdens. For example, the government or utility could set caps on cost increases or subsidize cost increases to help alleviate the financial burden. Implementing tiered rate structures in which customers would pay more for water used above a baseline threshold (enough to meet the needs of the average household) could also help maintain water costs for low-income households while incentivizing water conservation.[362]

Even though residents of Marina will not receive the desalinated water from the Marina project, they will nevertheless have to shoulder the inevitable environmental harms from the project sited in their community. To improve public support for a project, cities can prioritize measures ensuring that the local community benefits from the project. Alleviating environmental justice concerns will need to be more comprehensive than increasing funding or maintaining water bills. It would also include extensive monitoring for groundwater contamination, public education and transparency on the need for a given desalination project, wetlands and coastal restoration projects, and investments in parks and other recreational spaces that benefit all members of the public. Being intentional about using desalination projects to benefit the local community and including the community in the decision-making process can help garner local support for the project and ensure that residents' voices are heard.

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358 *CalEnviroScreen 4.0*, CAL. OEHHA, https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-40 (last visited May 7, 2025).

359 CALIFORNIA SEAWATER DESALINATION INTERAGENCY GROUP, SEAWATER DESALINATION SITING AND STREAMLINING REPORT TO EXPEDITE PERMITTING, STATE WATER RES. CONTROL BD. (Dec. 2023) 13 https://www.waterboards.ca.gov/water_issues/programs/ocean/desalination/docs/desal-siting-streamlining-report-dec2023.pdf.

360 *See* discussion, *supra* Parts I.B., Part IV.C.

361 Udasin, *supra* note 19.

362 *See* Schroeder, *supra* note 121, at 161–62.

VI. CONCLUSION

Desalination projects are approved on a case-by-case basis, pursuant to a range of factors. Cities where these factors are favorable towards desalination—where a project obtains the required permits and overcomes litigation challenges, where a project minimizes adverse impacts on marine life and the environment to the extent possible, where the local community is involved in the development process, and where the city has a vulnerable water supply and depends on desalination to meet growing water demand—are more likely to approve a desalination project than other cities.

As drought problems persist, exacerbated by climate change and growing water demand, and as desalinated water becomes more cost-effective and the technology more advanced, desalination will likely become more prevalent in California. Thus, a combination of technological, economic, and policy incentives along with public buy-in will help ensure that California approves and constructs desalination projects as needed to reliably supply water to communities and operates them in a way that will most effectively mitigate their impacts on the environment, on marine life, and on the local communities that the projects will most directly impact.