Testimony of Heather Cooley before the Assembly Select Committee on Coastal Protection "Seawater Desalination Impacts"

September 24, 2014

Good morning Chair Stone and members of the Assembly Select Committee on Coastal Protection. Thank you for having this hearing today and for inviting me to offer testimony. My name is Heather Cooley, and I am Director of the Water Program at the Pacific Institute. The Pacific Institute is a nonprofit research institute based in Oakland, California and has been working on seawater desalination for nearly a decade.

In an earlier panel, I discussed seawater intakes and opportunities to reduce the impacts associated with those intakes. My remarks for this panel will touch on the broader policy issues.

Current and Proposed Seawater Desalination Facilities

There are currently only a handful of seawater desalination plants in operation along the California coast. The majority of these are small facilities built for industrial purposes. However, two small facilities with a combined capacity of 0.4 million gallons per day (MGD) provide water for municipal purposes – including in Santa Catalina and Sand City.

Interest in developing seawater desalination in California remains high. A large facility is under construction in Carlsbad and is expected to be completed in late 2015. Additionally, there are 15 seawater desalination plants proposed for development along the California coast. Two additional plants that would provide water to southern California residents are also under consideration in Baja Mexico. The total combined capacity of the proposed plants ranges from 325 to 500 MGD. If all of these plants were built and fully utilized, seawater desalination would provide enough water to meet about 5% of the state's urban water demand.

Water Supply Diversity and Reliability

California's coastal communities are considering seawater desalination for a variety reasons. Desalination proponents argue that one of the most important benefits of desalination is the supply reliability provided by diversifying sources, especially in arid and semi-arid climate where weather variability is high. The production of desalination is largely independent of weather, and instead depends on ensuring the continued operation of the desalination infrastructure. There is also a value to new supply under local control and to increased diversity of supply as a way to increase resilience to natural disasters or other threats to water systems.

Key Outstanding Issues

The Pacific Institute has been working on seawater desalination for over a decade. In 2011, we launched a new research initiative on seawater desalination. As part of that effort, we conducted interviews with stakeholders to identify some of the key outstanding issues for seawater desalination projects in California. Through these interviews, we identified three key issues: (1) cost and financing, (2) energy and greenhouse gas emissions, and (3) marine impacts.

The earlier panels focused on the marine impacts, so I will limit my discussion to issues and concerns about the energy requirements and cost of seawater desalination in California.

Energy Use

Seawater desalination is an energy intensive process. Energy requirements for seawater desalination average about 5,000 kWh per acre-foot of water produced. By comparison, local sources of groundwater and surface water require up to 1,000 kWh per acre-foot; wastewater reuse, depending on treatment levels, may require from 500 – 1,500 kWh per acre-foot; and energy requirements for importing water through the State Water Project to Southern California range from 2,700 – 4,700 kWh per acre-foot.

Energy is the largest single variable cost for a desalination plant, varying from one-third to more than one-half the cost of produced water. Because of its high energy use, desalination creates or increases the water supplier's exposure to short- and long-term energy price variability. In California, and in other regions dependent on hydropower, electricity prices tend to rise during a drought, when runoff, and thus power production, is constrained and electricity demands are high. Additionally, electricity prices in California are projected to rise by 1.9% - 6.3% per year over the next 20-30 years to maintain and replace aging transmission and distribution infrastructure, install advanced metering infrastructure, comply with once-through cooling regulations, meet new demand growth, and increase renewable energy production.[1] While rising electricity prices will affect the price of all water sources, they will have a greater impact on those that are the most energy intensive, like desalination.

The high energy requirements of seawater desalination also raise concerns about greenhouse gas emissions. In 2006, California lawmakers passed the *Global Warming Solutions Act*, or Assembly Bill 32, which requires the state to reduce greenhouse gas emissions to 1990 levels by 2020. Thus, the state has committed itself to a program of steadily reducing its greenhouse gas emissions in both the short- and long-term, which includes cutting current emissions and preventing future emissions associated with growth. Desalination – through increased energy

[1] Cook, J. 2013. The Future of Electricity Prices in California: Understanding Market Drivers and Forecasting Prices to 2040. Energy Efficiency Center. University of California, Davis.

use – can cause an increase in greenhouse gas emissions, further contributing to the root cause of climate change and running counter to the state's greenhouse gas reduction goals.

Cost and Financing

Economics – including both the cost of the water produced and the complex financial arrangements needed to develop a project – are key factors that will determine the ultimate success and extent of desalination in California. Our analysis finds that the cost to produce water from a desalination plant is highly variable. Recent estimates for plants proposed in California range from $1,900 to more than $3,000 per acre-foot. While the cost of seawater desalination has declined considerably over the past 20 years, desalination costs remain high and there are unlikely to be any major cost breakthroughs in the near- to mid-term. Indeed, desalination costs may increase in response to rising energy prices.

The introduction of a new source of water increases the amount of wastewater that must be collected, treated, and disposed. Some communities may have adequate wastewater treatment capacity and the additional costs would simply be the variable O&M costs associated with that treatment. In other communities, however, wastewater treatment capacity may need to be expanded, which represents an additional, and in some cases significant, capital cost to the community. While these costs would apply to all of the water supply projects under consideration to meet demand, these costs would not be incurred if water demand was met through water conservation and efficiency improvements.

Risks Associated with Seawater Desalination Projects

There are several risks associated with seawater desalination projects that can affect the cost of the project, ability to attract financing, and overall viability of the project. Many of these risks are not unique to seawater desalination projects – rather they apply broadly to all major infrastructure projects. These include risks associated with permitting, construction, operations, and changes in law.

But as recent experience in the United States and Australia has shown, desalination projects entail risks specific to large water-supply projects, including demand risk. Demand risk is the risk that water demand will be insufficient to justify continued operation of the desalination plant due to the availability of less expensive water supply and demand management alternatives. In Australia, for example, four of the six desalination plants that have been developed since 2006 are being placed in stand-by mode. Likewise, the Tampa Bay Desalination Plant is operated considerably below full capacity because demand is lower than expected and less expensive water-supply options are available. Demand risk raises serious concerns about the size and timing of desalination projects, e.g., how big and when desalination plants should be built.

Conclusions

Seawater desalination is currently a small component of California's water supply portfolio. There is considerable interest in developing desalination in some coastal communities in an effort to improve water supply diversity and reliability. The key issues are its relatively high cost, energy intensity (and associated GHG emissions), and impacts on the marine environment – all of which must be balanced against the availability of other water supply and efficiency options. The failure to take the availability and cost of alternatives into account leads to demand risk and has been associated with reduced production and even closure of projects in the United States (e.g., Santa Barbara, California and Tampa Bay, Florida) and in Australia.

Thank you for the opportunity to speak before you today, and I am happy to answer any questions.