The Future of California's Water-Energy-Climate Nexus

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Presentation Overview

1. Comprehensive assessment of the energy and GHG footprint related to water in California

2. Case studies highlighting risks and opportunities associated with water-related energy use and GHG emissions

3. Policy recommendations for reducing California's water-related energy and GHG footprint

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Methodology

1. Identify the energy intensities associated with each stage of the water management cycle,
2. Calculate the GHG intensity of each energy source related to water,
3. Develop scenarios of future water supplies and demands for the urban and agricultural sectors, and
4. Apply the energy and GHG intensities to historical water use and each scenario of future water use.

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Future Water Demand and Supply Scenarios

- Demand scenarios for 2020, 2025, 2030, 2035 by region
- Supply mix as given from water suppliers' plans and DWR, by region

Urban

- **Low:** Decreasing 2% per-cap demand per year
- **Mid:** 2015 per-cap demand
- **High**: Growing per-cap demand per water suppliers

Source: 2015 Urban Water Management Plans

* 90% of statewide population

Agricultural

- **Low**: High urban growth, greatest climate impact
- **Mid**: Mid urban growth
- **High**: Low urban growth, lowest climate impact

Source: 2018 CA Water Plan Update, DWR

* Central Valley Hydrologic Regions (80% of CA ag acreage)

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Urban Scenario Results

Estimated Urban Water-Related Energy and Greenhouse Gas (GHG) Impacts, 2015-2035

Change from 2015-2035	Declining Per-Capita Demand Scenario (Low-Case)	2015 Constant Per-Capita Demand Scenario (Mid-Case)	Water Supplier Projections Scenario (High-Case)
Urban Water Demand	-17%	+24%	+44%
Water-Related Electricity Use	-19%	+21%	+40%
Water-Related Natural Gas Use	-16%	+25%	+45%
GHG Emissions From Urban Water-Related Energy Use	-41%	-12%	+2%

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Agricultural Scenario Results

Estimated Central Valley Agricultural Water-Related Energy and Greenhouse Gas (GHG) Impacts, 2015-2035

Change from 2015-2035	Low Ag Water Use Scenario	Mid Ag Water Use Scenario	High Ag Water Use Scenario
Agricultural Water Supply Delivered	-3%	-2%	-5%
Water-Related Electricity Use	-5%	-4%	-6%
GHG Emissions From Agricultural Water-Related Energy Use	-62%	-62%	-62%

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Urban and Agricultural Case Studies

- **LADWP's shift to recycled and local sources**
  - Shifting from imported water from Northern CA and the Colorado River to local sources, especially stormwater and recycled water, saves energy.

- **Energy Recovery at EBMUD's Wastewater Treatment Plant**
  - Plant produces more energy than needed to run it, saving $2.5 million in energy costs and generating $750,000 in revenues by selling excess energy to the grid.

- **Sustainable Groundwater Management Act (SGMA) impacts on pumping energy**
  - Declining groundwater levels increase pumping energy use by 11% to 26%, depending on pump efficiency.

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Report Key Takeaways

- Urban water-related energy and GHGs are projected to increase under current or increased per-capita water use scenarios.

- Urban water-efficiency offers the greatest reductions in water-related energy use and GHG emissions. Replacing imported with local water sources can also reduce energy use and GHG emissions.

- Decarbonization coupled with greater electrification of end-uses (water heaters) can accelerate reductions in water-related GHG emissions.

- Agricultural water use is far greater than that of CA's urban sector, but urban water is 9x more energy-intensive and produces 9x more GHG emissions.

- Declining groundwater levels could increase agriculture's water related energy use.

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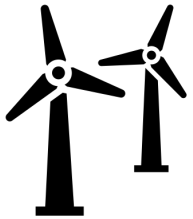
Policy Recommendations

Expand urban water conservation and efficiency efforts.



Accelerate water heater electrification.

Restore groundwater levels and expand more flexible, high-efficiency groundwater pumps.

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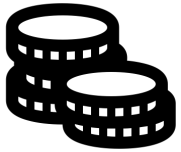
Policy Recommendations



Provide financial incentives and regulatory pathways for water suppliers to invest in less energy- and GHG-intensive water systems.

Expand water data reporting and energy usage tracking.

Formalize coordination between water and energy regulatory agencies and utilities.

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QUESTIONS & ANSWERS

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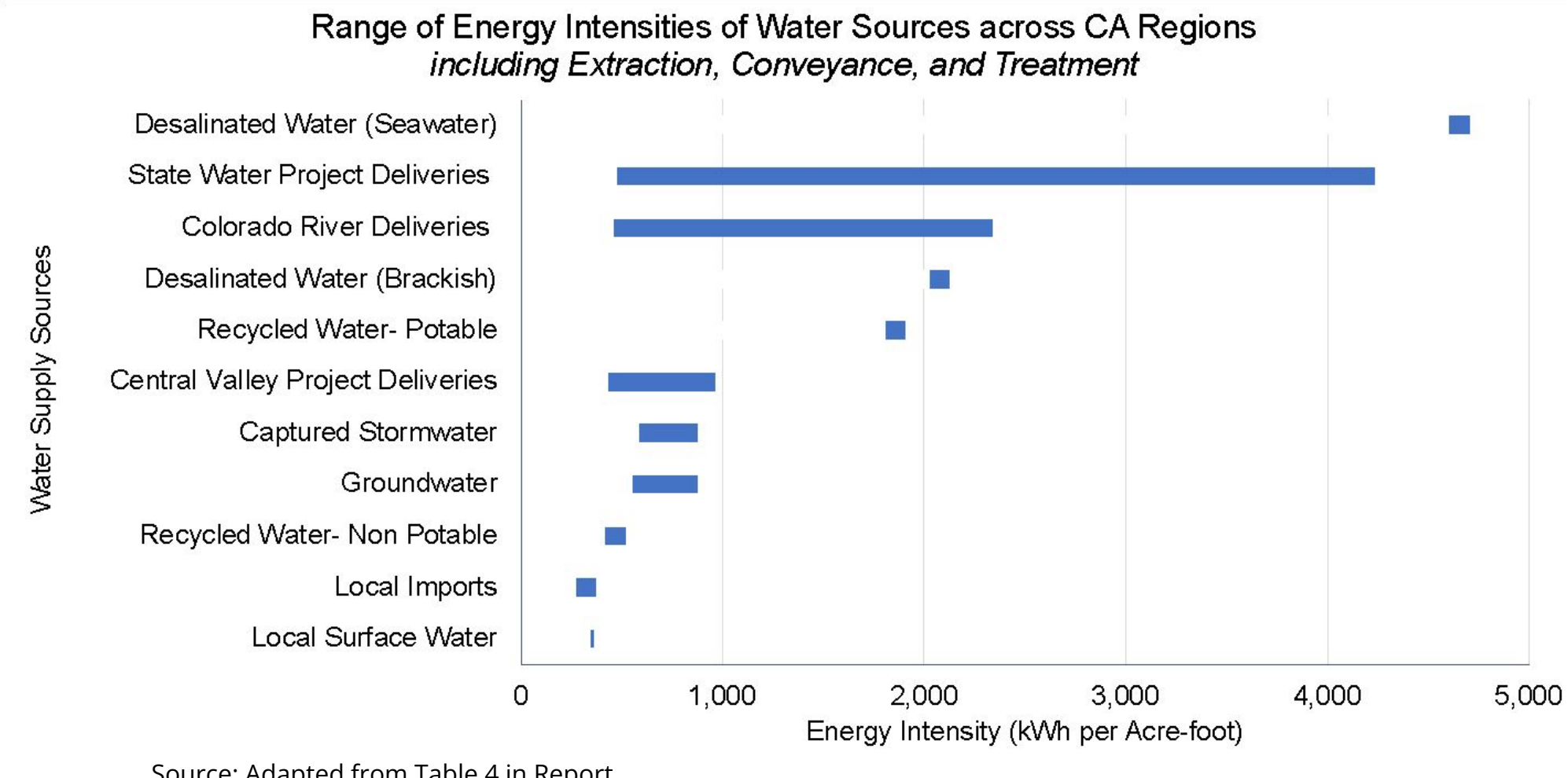
Energy Intensity of CA Water Supply



Source: Adapted from Table 4 in Report

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