

# STATE WATER PROJECT POWER PORTFOLIO MANAGEMENT IN AN EVOLVING POWER MARKET



June 19, 2019

# THE DEPARTMENT OF WATER RESOURCES AND THE STATE WATER PROJECT (SWP)



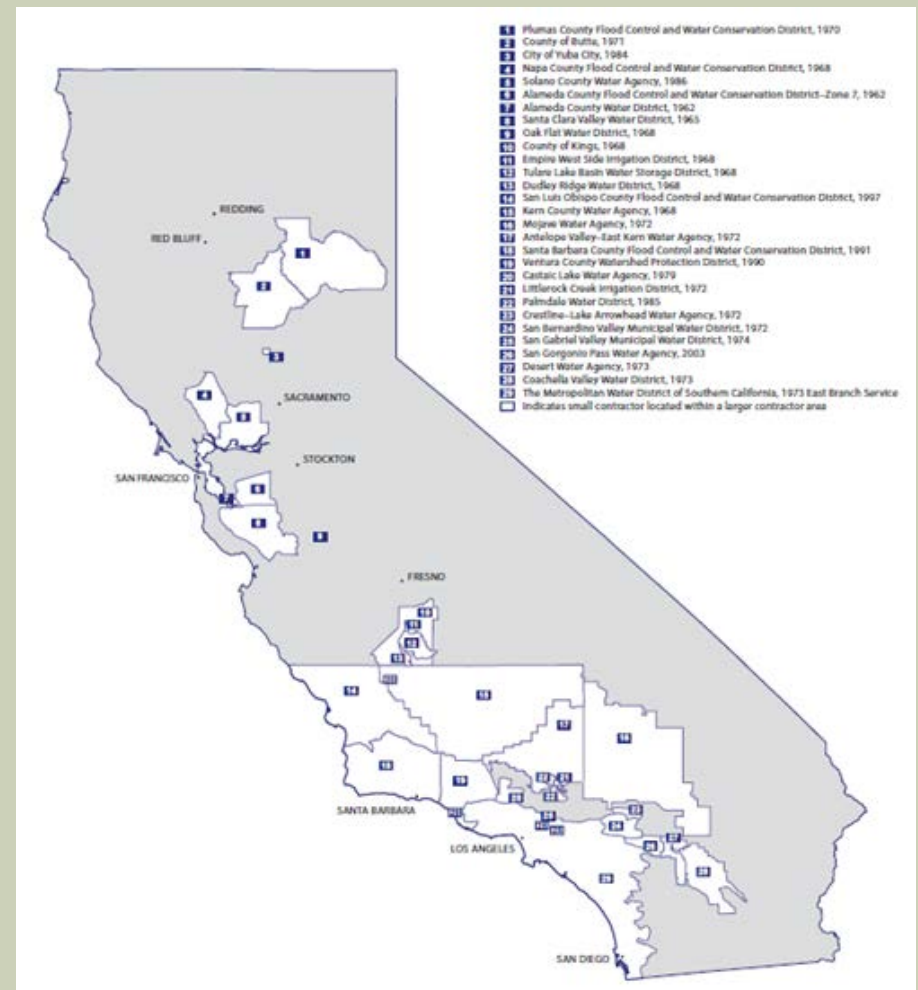
# STATE WATER PROJECT

- Largest state-built and operated water and power system in the U.S.
  - 32 Storage Facilities
  - 21 Pumping Plants
  - 4 Pumping-generating Plants
  - 8 Hydroelectric Generating Plants
  - 700 miles of Canals and Pipelines
- Multiple Purposes and Benefits:
  - Water Supply
  - Flood Control
  - Fish and Wildlife Mitigation and Enhancement
  - Delta Water Quality and Outflow
  - Power Generation
  - Recreation



# WHO RECEIVES WATER FROM THE SWP

- Serves 25 million Californians and over 750,000 acres of farmland
- Water provided to 29 State Water Contractors (SWC)
- SWC are the public agencies who signed long-term water supply contracts to receive water from the SWP

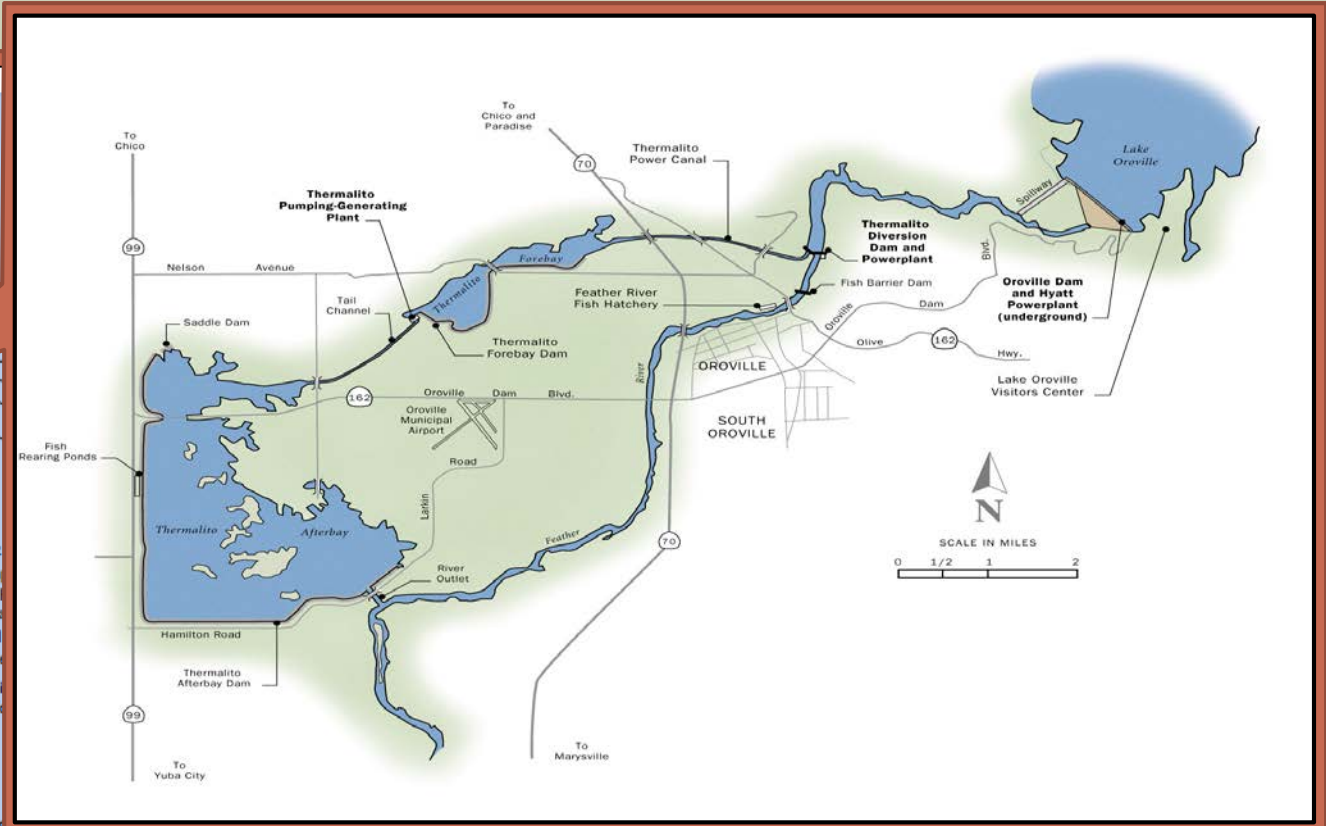
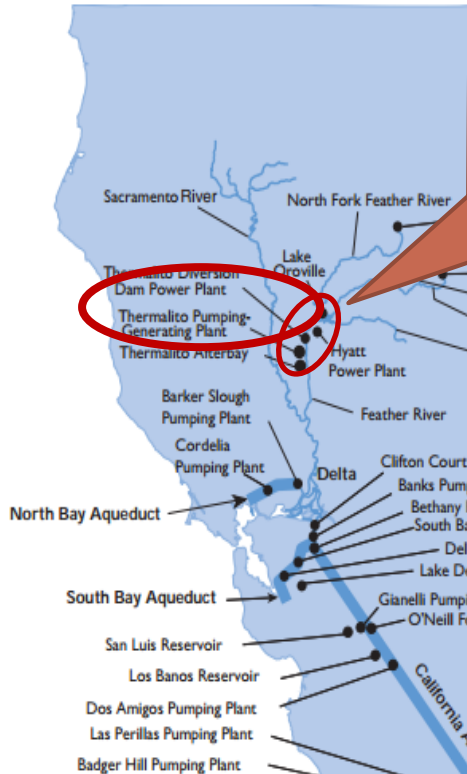


# SWP PUMPING AND GENERATING

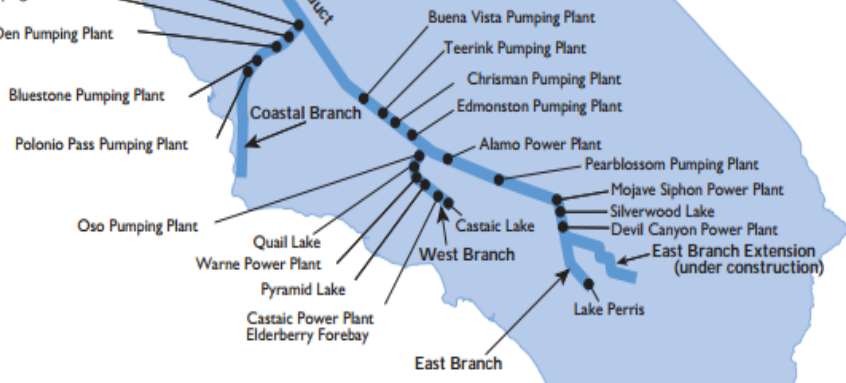
## State Water Project Facilities

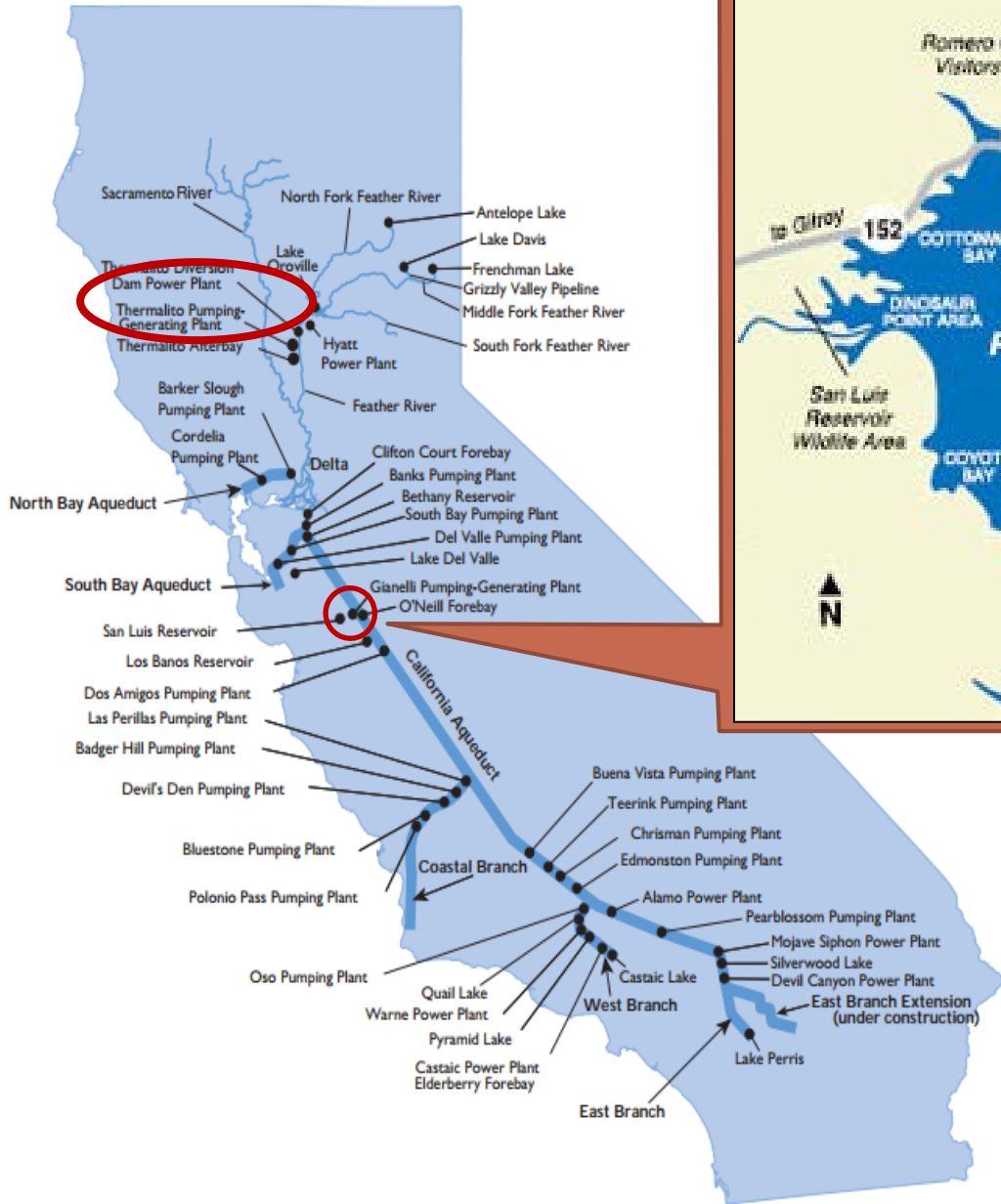
- 1 Hyatt PGP
- 2 Thermalito
- 3 Diversion Dam P
- 4 Thermalito PGP
- 5 Barker Slough PP
- 6 Cordelia PP
- 7 Banks PP
- 8 South Bay PP
- 9 Del Valle PP
- 10 Gianelli PGP
- 11 Dos Amigos PP
- 12 Las Penillas PP
- 13 Badger Hill PP
- 14 Devil's Den PP
- 15 Bluestone PP
- 16 Polonio Pass PP
- 17 Buena Vista PP
- 18 Teerink PP
- 19 Chrisman PP
- 20 Edmonston PP
- 21 Alamo P
- 22 Oso PP
- 23 Warme P
- 24 Castaic PGP
- 25 Pearblossom PP
- 26 Mojave Siphon P
- 27 Devil Canyon P
- 28 Greenspot PS
- 29 Citrus PS
- 30 Crafton Hills PS
- 31 Cherry Valley PS





# Lake Oroville



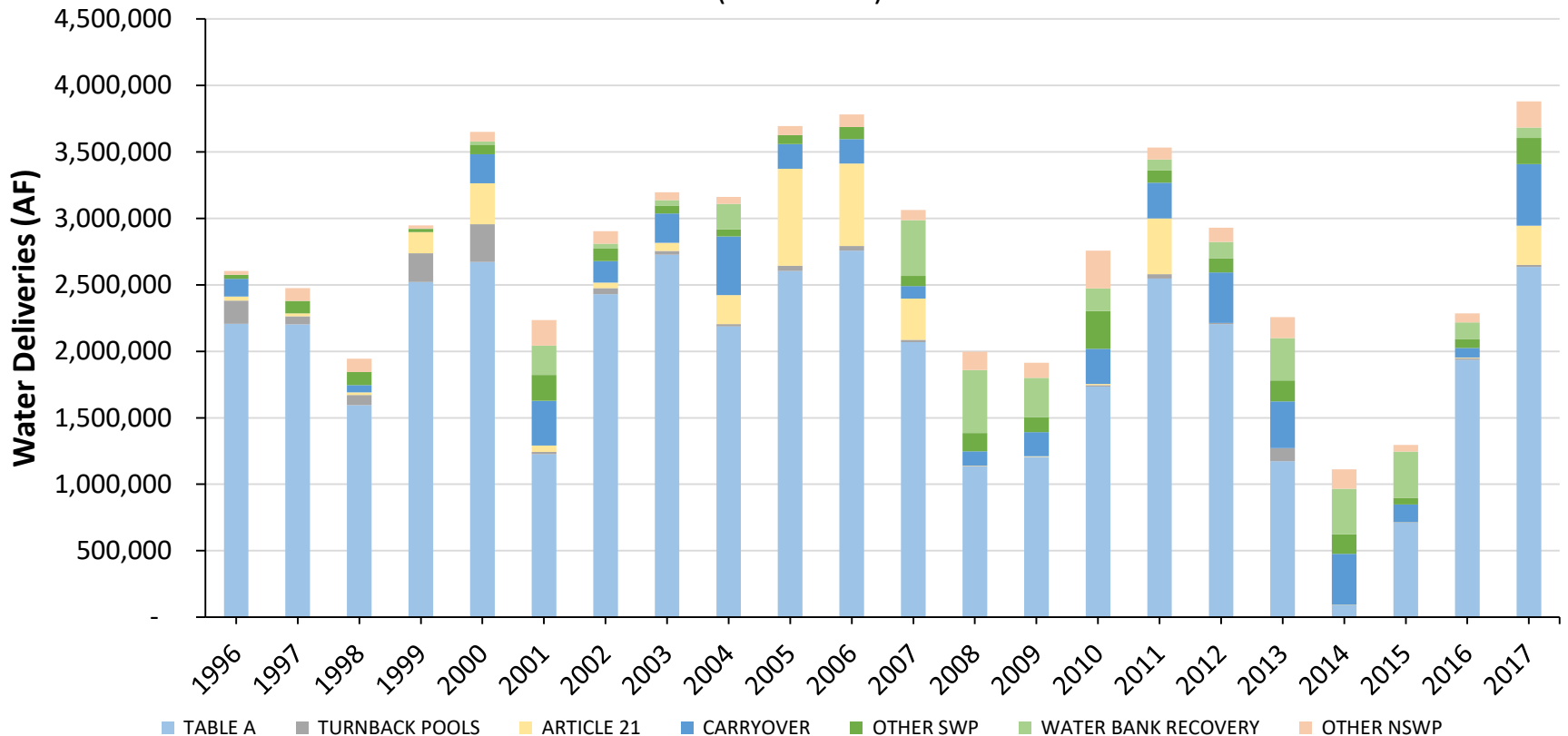


# San Luis Reservoir

# SWP POWER PORTFOLIO MANAGEMENT

## (SWC DEMAND PROFILE)

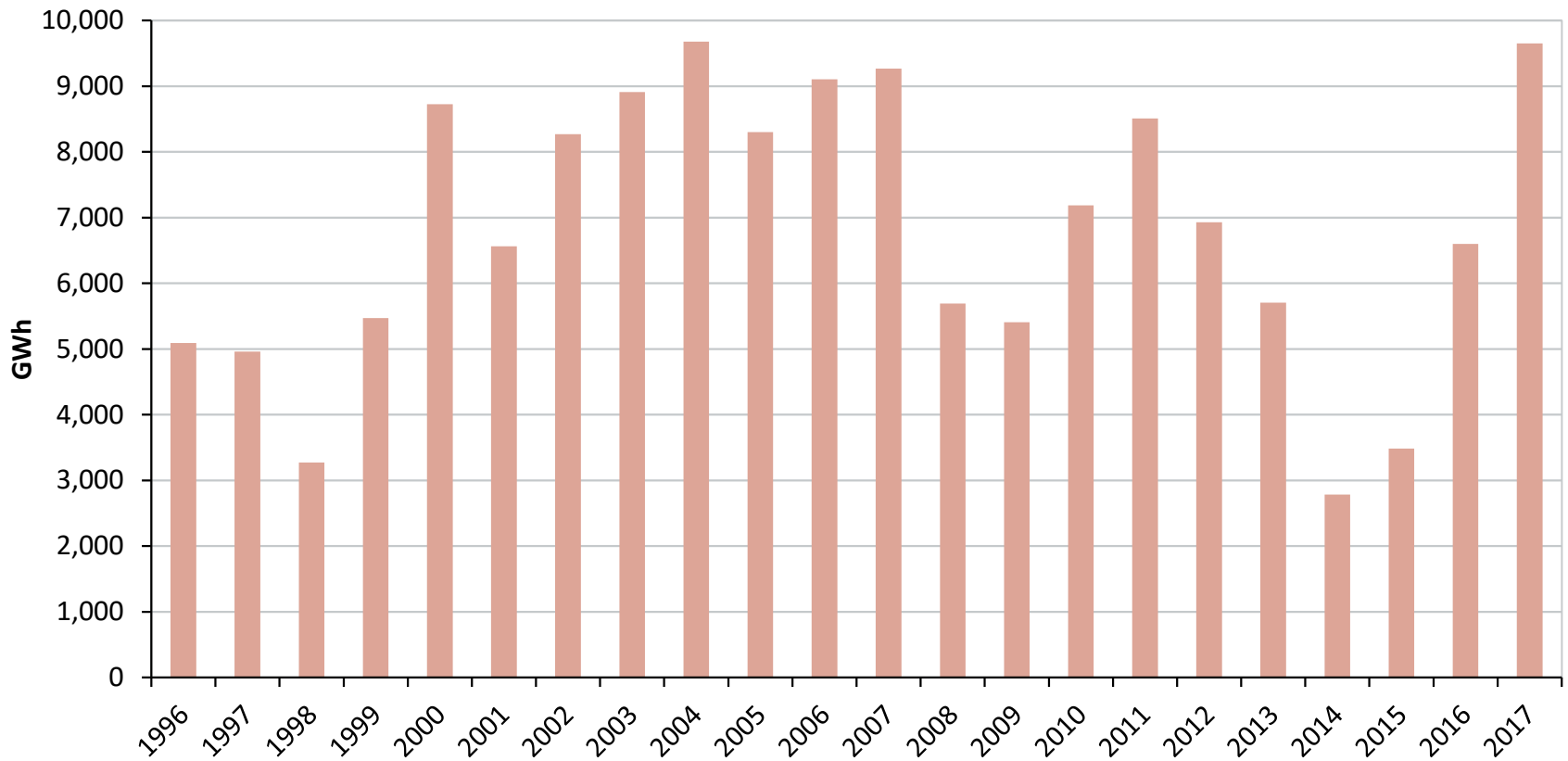
SWP Historical Water Deliveries  
(1996-2017)





# SWP POWER PORTFOLIO MANAGEMENT

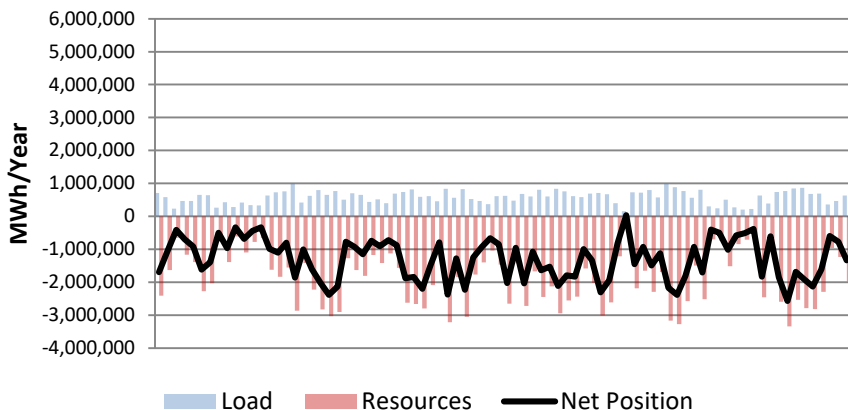
## (SWC DEMAND PROFILE)



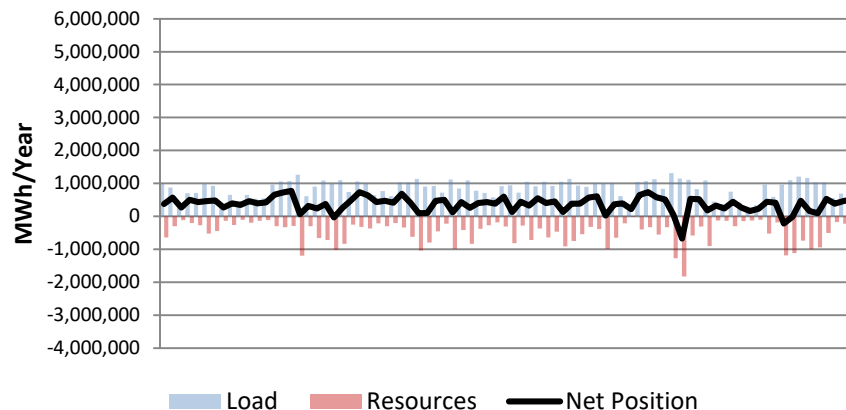
# SWP POWER PORTFOLIO MANAGEMENT

## (SWP OPERATIONS PER REGION)

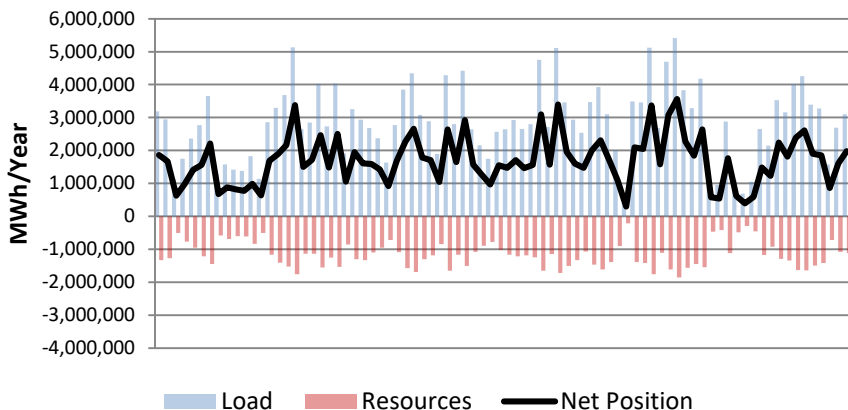
### NP-15 On-Peak



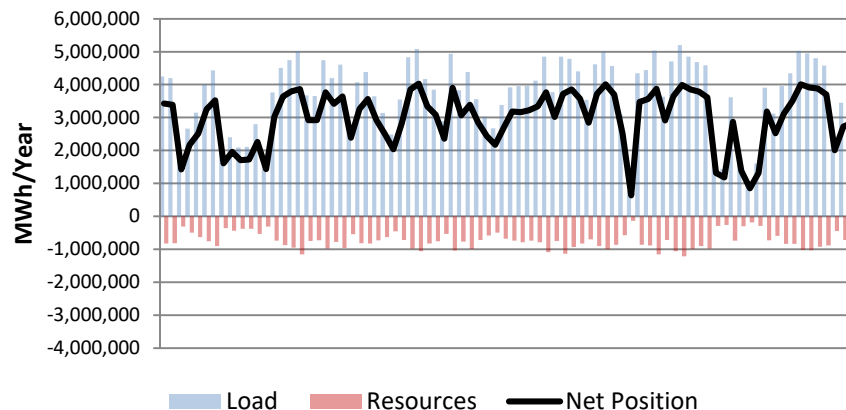
### NP-15 Off-Peak



### SP-15 On-Peak



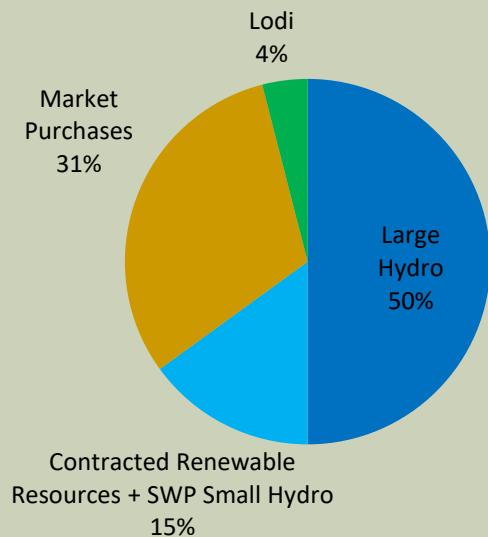
### SP-15 Off-Peak



# SWP POWER PORTFOLIO MANAGEMENT

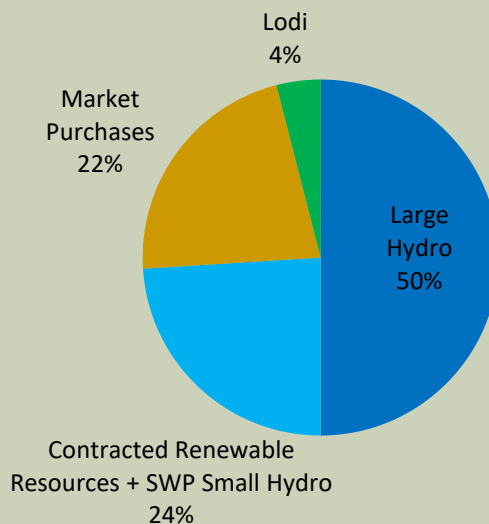
## (CURRENT AND FUTURE RESOURCE MIX)

- Approval of SB100 puts California on the path to 100% zero-emission electricity by 2045



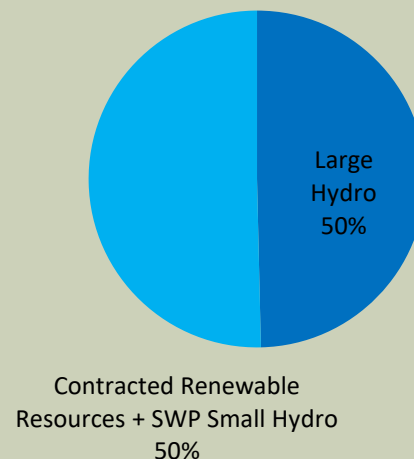
**2020**

65% emissions free resources



**2030**

75% emissions free resources

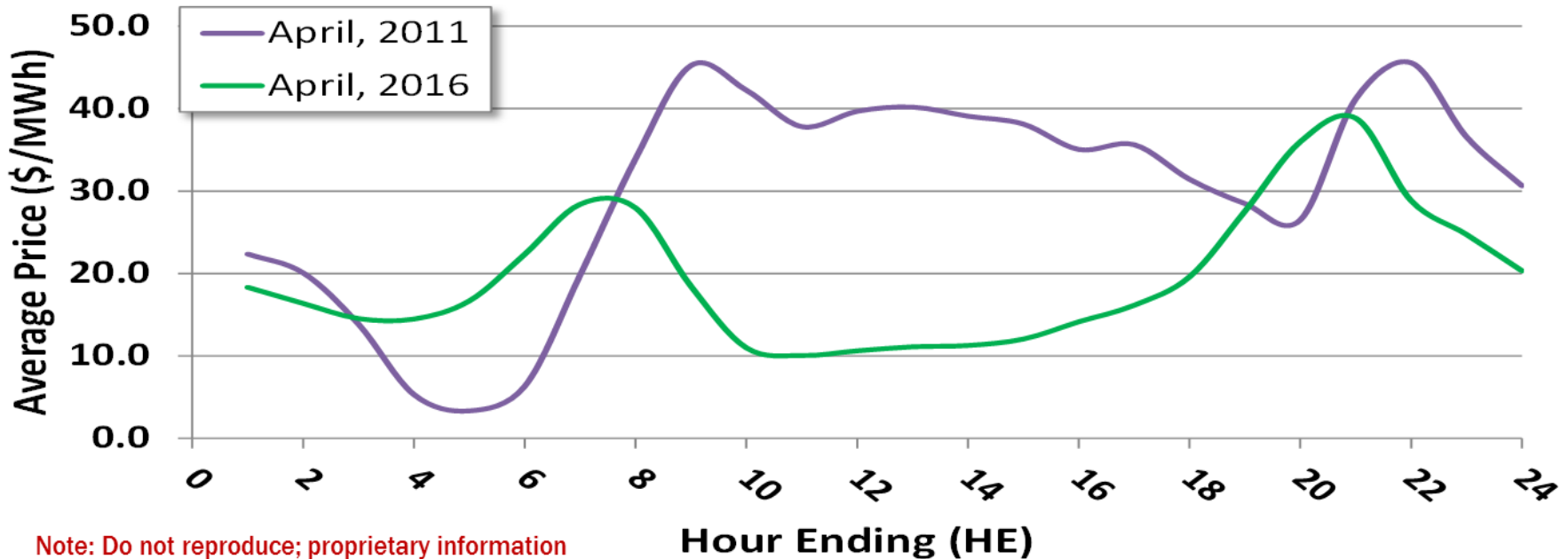


**2045**

100% emissions free resources

# EVOLVING ENERGY PRICES (ANNUAL)

**Average Hourly Energy Price for April**  
*CAISO SP-15 Region*



## 2011

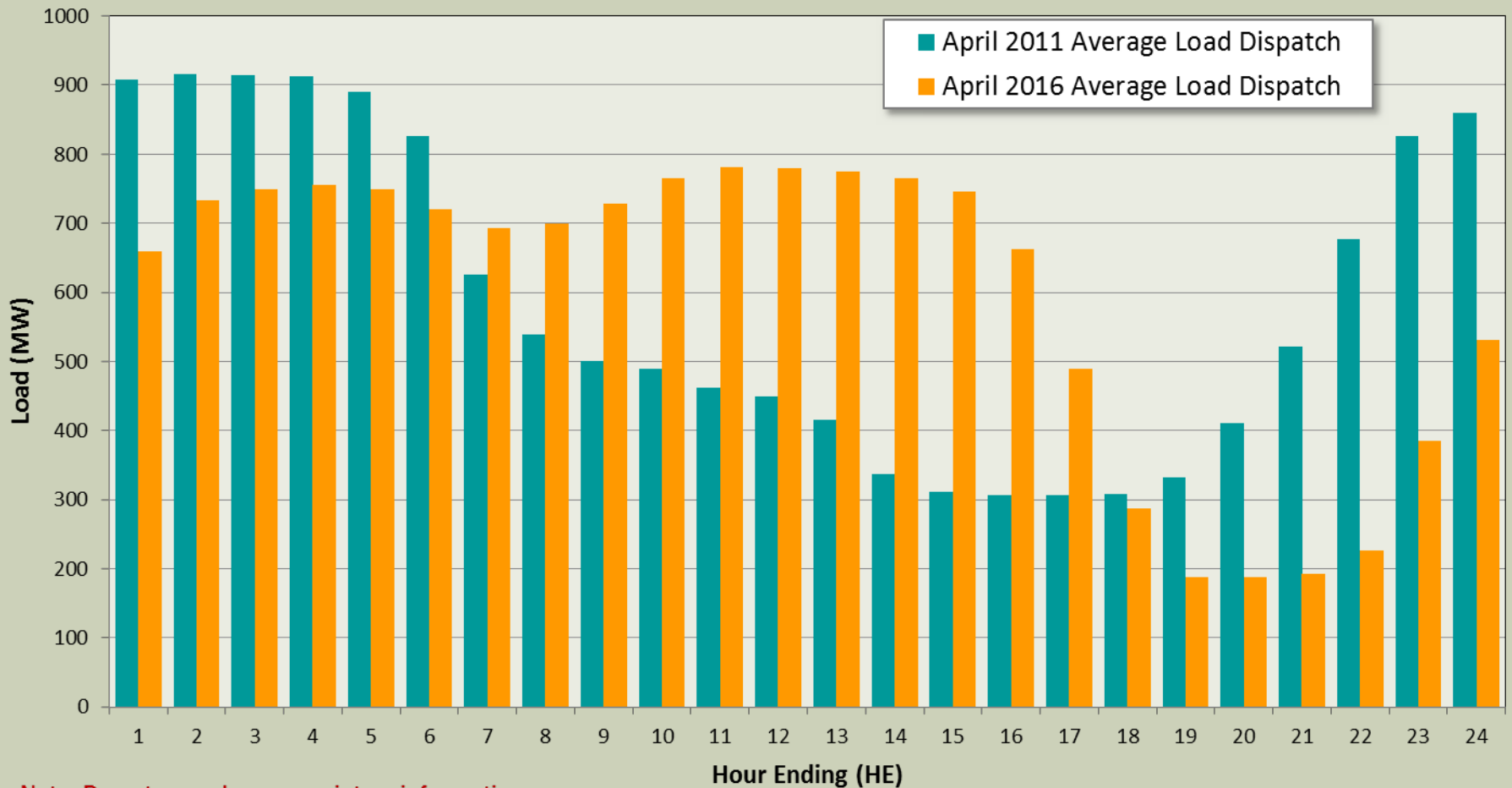
- Costly solar hours
- Reduction in solar hours prices greatly effects dispatch

## 2016

- Cheap solar hours
- Reduction in solar hours prices has little effect on dispatch

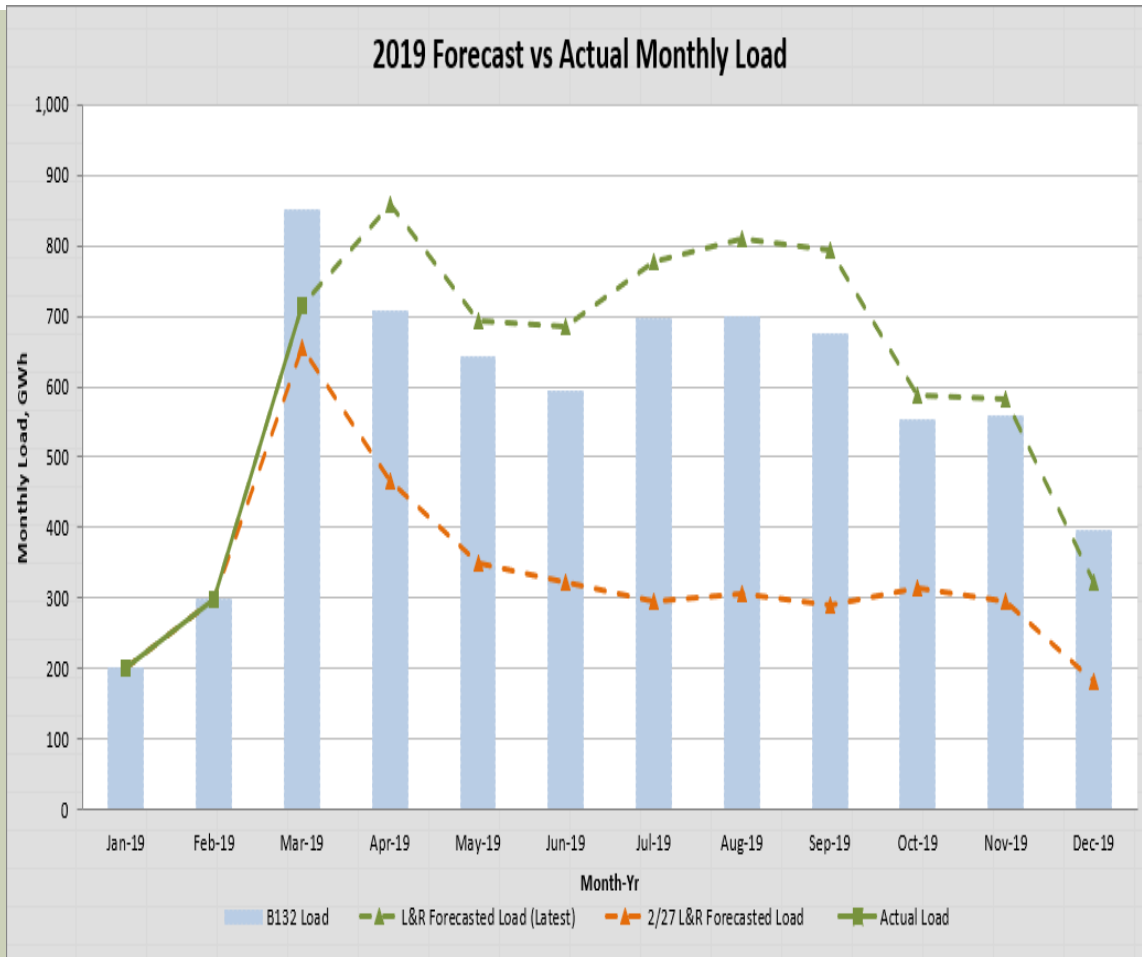
# SWP LOAD SHIFTING TO SOLAR HOURS (ANNUAL)

## Edmonston and Valley String Actual Load Dispatch



Note: Do not reproduce; proprietary information

# 2019 FORECAST VS ACTUAL LOAD



## B132-19 Load Forecast:

- 60% allocation (2.47 MAF) of water supply

## 2019 Updated Load Forecast (as of April 18, 2019), 90% exceedance:

- 70% allocation of Table A SWP delivery
- Delivery consists of updated demands, loss estimates, and conveyance limitations
- Pumping Load ~ 7,324 GWh (yearly total), and 6,108 GWh for April through December 2019.

# DWR CLIMATE ACTION PLAN

- **Phase 1 – Greenhouse Gas Emissions Reduction Plan (May 2012)**
  - Lays out GHG emissions reduction goals and strategies for the near-term (present to 2020) and long-term (2050, updated to 2045)
- **Phase 2 – Climate Change Analysis Guidance (September 2018)**
  - Develops a guidance to incorporate climate change impacts into DWR's project and program planning activities
- **Phase 3 – Climate Change Vulnerability Assessment (February 2019)**
  - Describes, evaluates, and quantifies the vulnerabilities of DWR's assets and operation to potential climate change impacts.
- **Emission reduction goals with SB 100:**
  - 2020 – 50% below 1990 level
  - 2030 – 60% below 1990 level
  - 2045 – Zero Emission

# DWR EMISSION SOURCES

- Pumping Load
- Natural Gas Power Plant
- Construction and Repair
- SF6
- Emergency Generators
- Stationary Equipment
- Mobile Equipment
- Electricity for Facilities
- Natural Gas (Retail Use)
- Propane
- Compressed Natural Gas
- Gasoline
- Diesel
- Acetylene
- Fire Extinguishers
- Refrigerants



# DWR EMISSION REDUCTION MEASURES

- Coal Plant Retirement
- Large Hydro Contract
- Renewable Energy Contracts:
  - Solar
  - Small Hydro
  - Geothermal (contract expired)
  - Biogas (contract expired)
- Generator/Turbine Efficiency Projects
- Retail Green Energy Program Participation
- Renewable Diesel Purchases
- Solar, Lighting, and HVAC Upgrades at DWR Facilities
- SF6 Inventory Reduction

# DWR ANNUAL EMISSION REPORTING

- California Air Resources Board
  - Mandatory reporting
- The Climate Registry (TCR)
  - Voluntary reporting
  - Emission reports are public
  - Reporting deadlines
    - Reporting - April 1
    - Verification - December 15
  - DWR's participation
    - Member since TCR's inception
    - Completed reporting and verification since 2007

# DWR CLIMATE AWARDS

- **Climate Leadership Awards**

- 2015 - Excellence in Greenhouse Gas Management / Goal Setting Certificate
- 2016 - Organizational Leadership Award
- 2018 - Excellence in Greenhouse Gas Management / Goal Achievement Award

- **The Climate Registry**

- Annual Climate Registered Recognition since 2007
- Water-Energy Nexus (WEN) Registry Founder

# DWR'S PARTICIPATION IN WEN

## **Annual Emissions and Water Delivery Reports to TCR**

- WEN Registry reporting will follow the same deadlines

## **DWR's Participation**

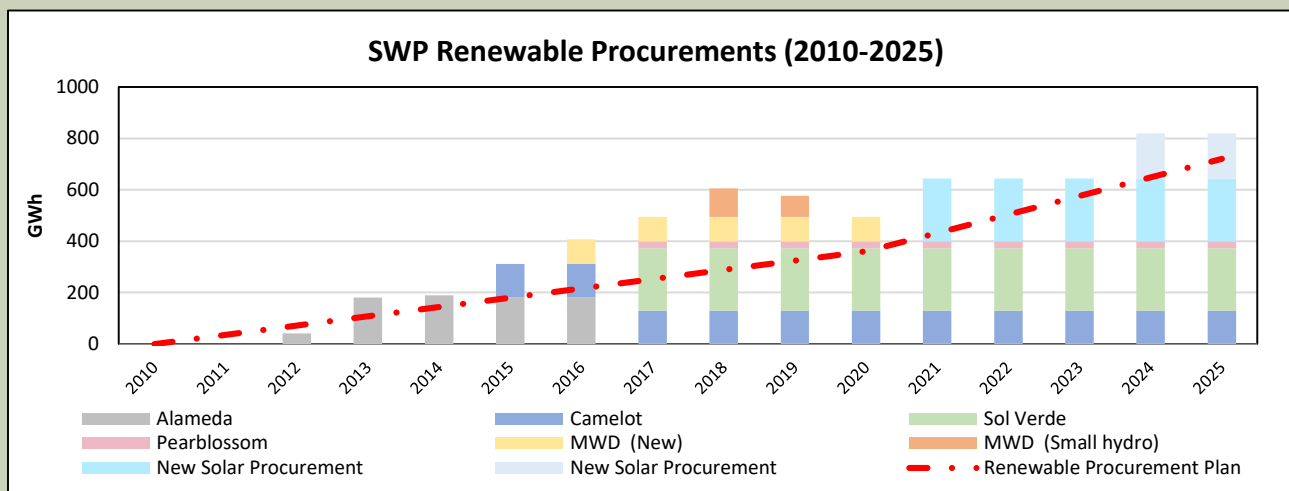
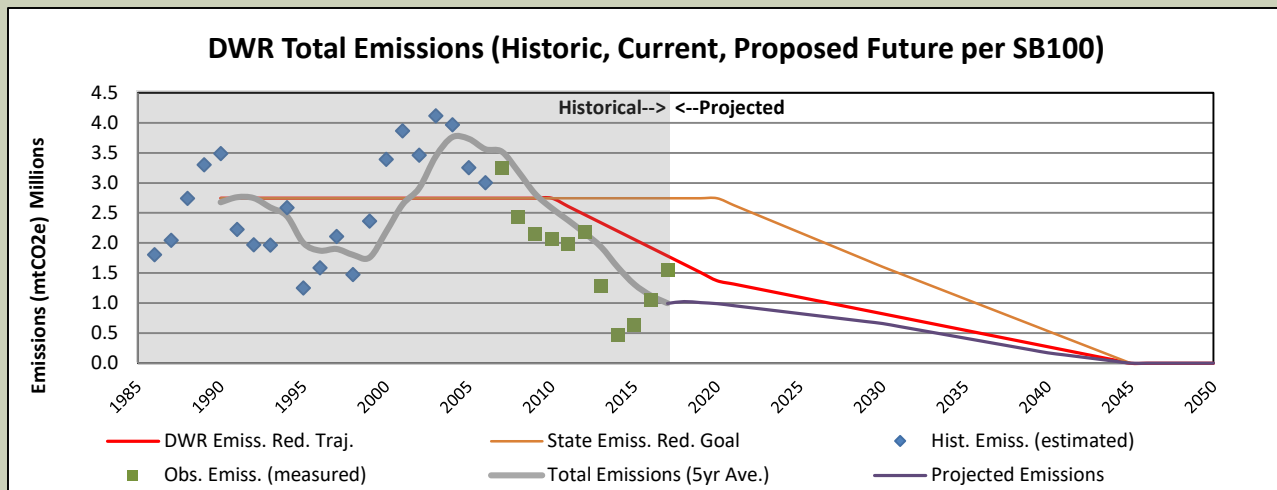
- 2017 – Development of Water-Energy GHG metrics
- 2018-19 – WEN Working Group and Advisory Committee workshops
- May 13, 2019 – WEN Registry Launch
- May 22, 2019 – CDWR signed WEN Registry Participation Agreement
- June 5, 2019 – Welcome & Orientation from TCR

## **Future Plans**

- Report and verify 2018 intensity metrics (Tons of CO<sub>2</sub>e / AF) to the WEN Registry
- DWR emission intensities available for water agencies to use for their upstream GHG emission for the water delivered by SWP

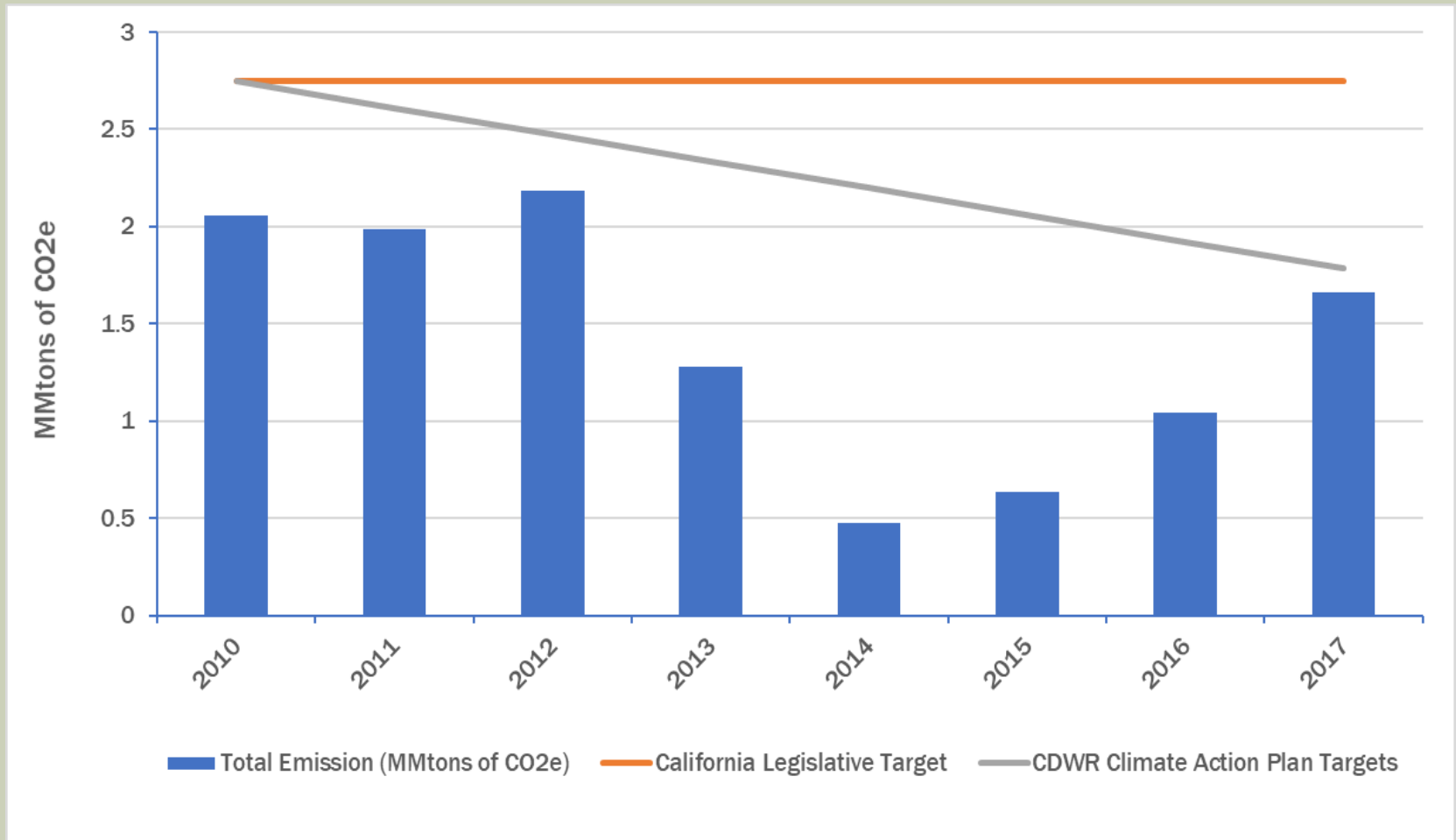
# SWP POWER PORTFOLIO MANAGEMENT

## (GHG REDUCTION AND RENEWABLES PROCUREMENT)

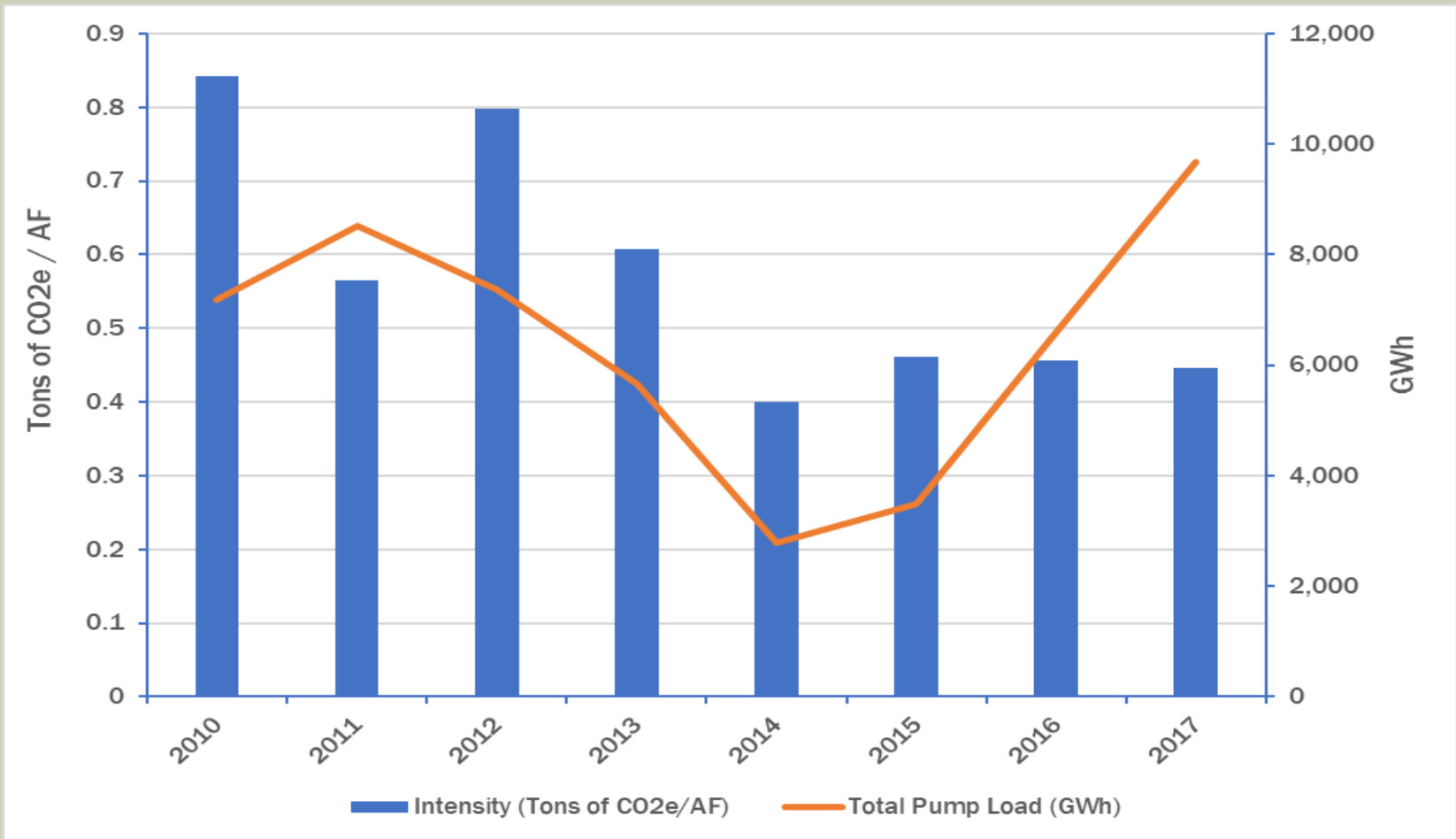




# DWR TARGET VS ACTUAL EMISSIONS



# DWR EMISSION INTENSITY VS PUMP LOAD (2010-2017)





**QUESTIONS?**

Thank You.