

The California Water-Energy Overview

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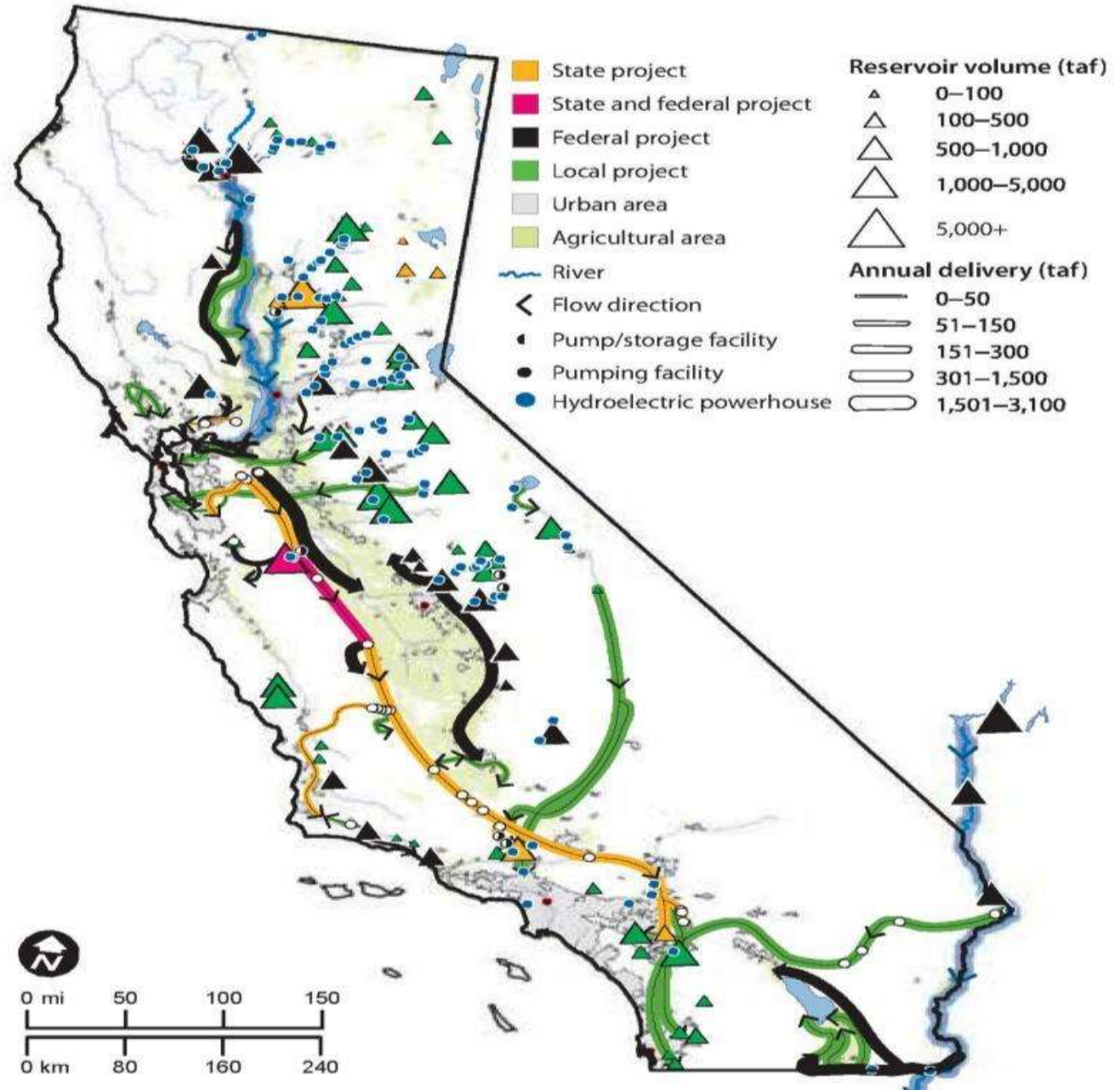
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Utility Energy Forum 2013



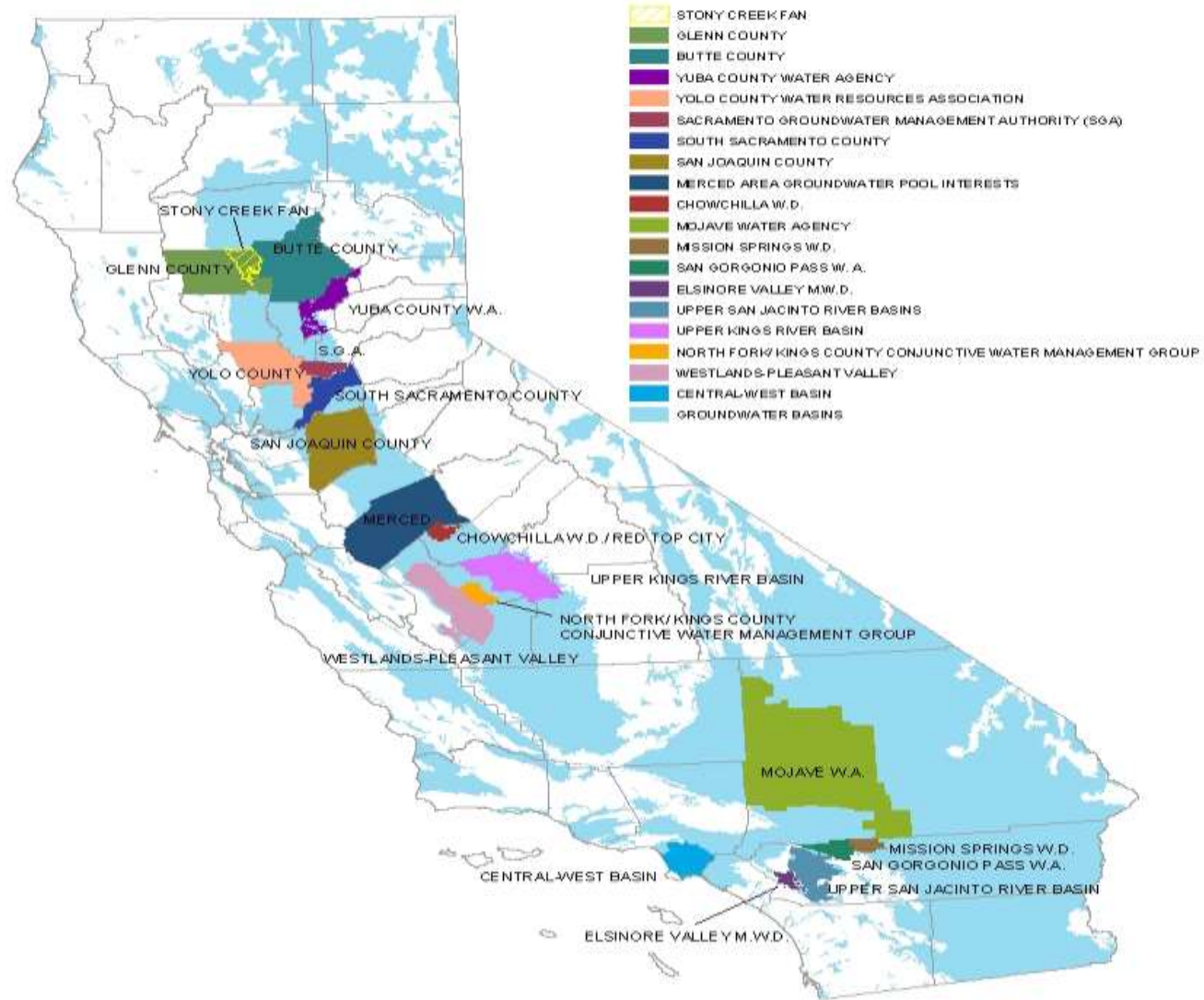
California Hydrologic Characteristics

- 75% of rainfall occurs north of Sacramento
- 80% of use of water occurs south of Sacramento
- Mediterranean climate: 80% of the precipitation occurs from November to March.
- Majority of water use is in summer



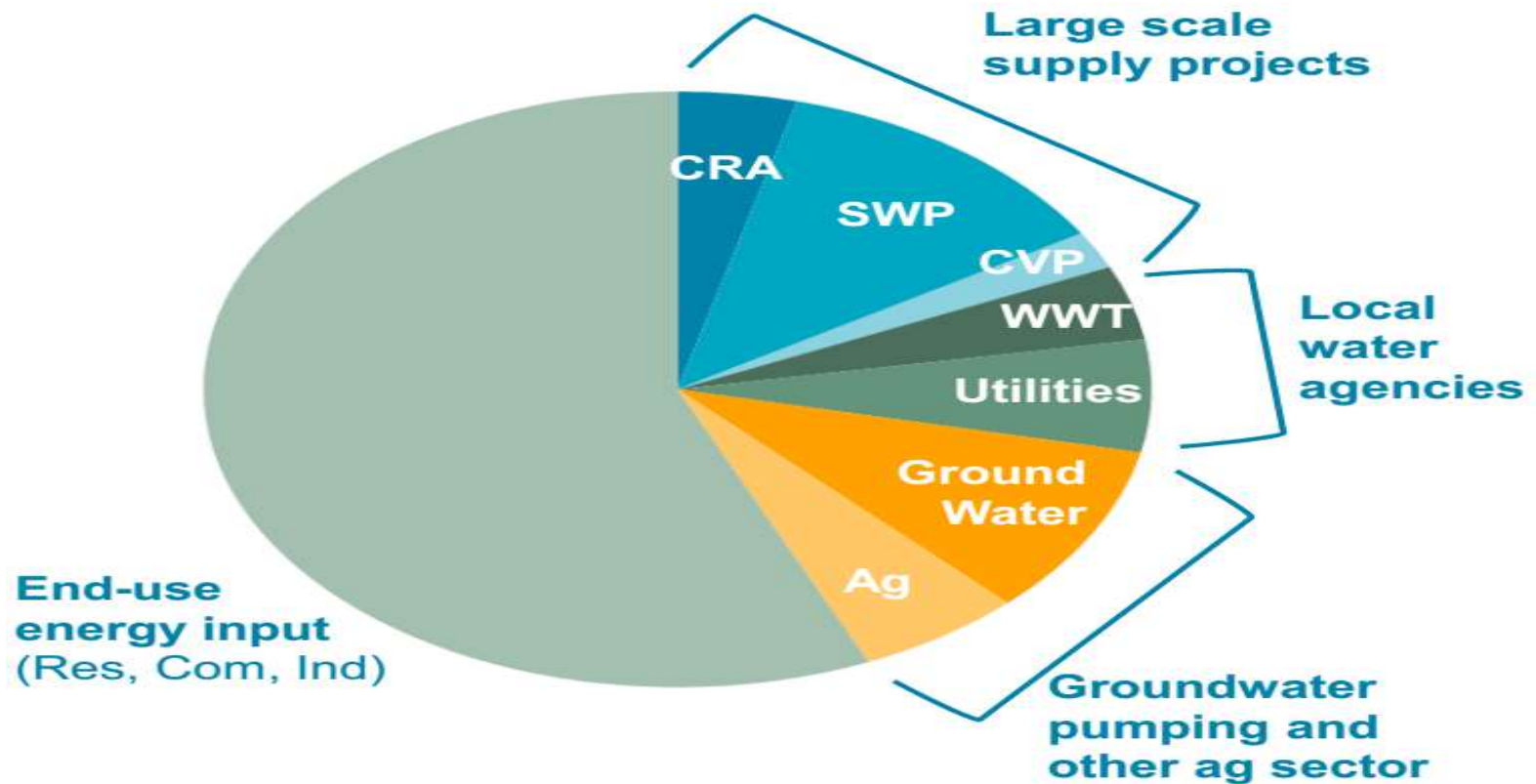
Department of Water Resources Conjunctive Water Management Branch MOU Partners

Existing
California
Conjunctive
Use Sites



California Electricity in Water

CA Statewide: Annual Electricity Demand Associated with Water Consumption¹



Total: ~54,000 GWh/yr

Water Agency Energy Overview

- Water agencies are single largest electricity end users in California
~3,400 MW maximum demand
 - Water agencies already curtail approximately 400-600 MW of summer on-peak demand daily, and have almost 500 MW in demand response programs
- Water agency solutions to California electricity problems
 - Additional peak demand curtailment - +250 MW from existing systems, +1,000 MW with more storage, +250 MW with TOU water meters/rates
 - Water agency generation
 - 500+ MW of standby generators available
 - Hydro - 1,631 MW existing, +255-500MW new small
 - Biogas - 38 MW, 36 MW new potential
 - Wind – 2.5MW, 50 MW new potential
 - Natural gas engines - existing ~100 MW, 200-400 MW additional potential
 - Solar - 100 MW, +400MW potential
- Water agencies potential for increased demand + ~3,575 MW (next 10 years)
 - Existing conjunctive use in drought/dry years ~350MW
 - Proposed conjunctive use development/drought ~ +1,350 MW
 - Desalinization ~250 MW salt water plus 250 MW desalting groundwater ~ +500 MW
 - Electrification of ag diesel pumps ~ +350 MW
 - Increased treatment requirements ~ +160 MW
 - Increased water marketing ~ +230 MW
 - Increased recycled water use ~ +685 MW



California Policies Impacting Electricity Prices

- Conversion to smart grid (new metering)
 - PG&E - \$1.7B, SCE - \$1.7B, SDG&E - \$0.6B
- Renewables
 - 33% by 2020
 - New transmission projects to access renewables
- Green House Gas emissions (1990 levels by 2020)
- Energy Efficiency (100% of economic potential by 2020)
- Demand Response (5% of peak load)
- Carbon Market implementation (Cap and Trade)
 - Over \$250K for 2013 (10%), \$1B by 2020.
- Once Through Cooling Closures
- Delta flow criteria
 - Changes in Hydroelectric generation

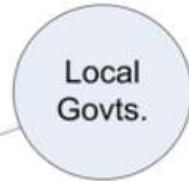


Organizations Coordinating on Electricity in California

Transmission rates



Smart grid, Transmission, Energy Efficiency, Demand Response, Renewables



Cap and Trade



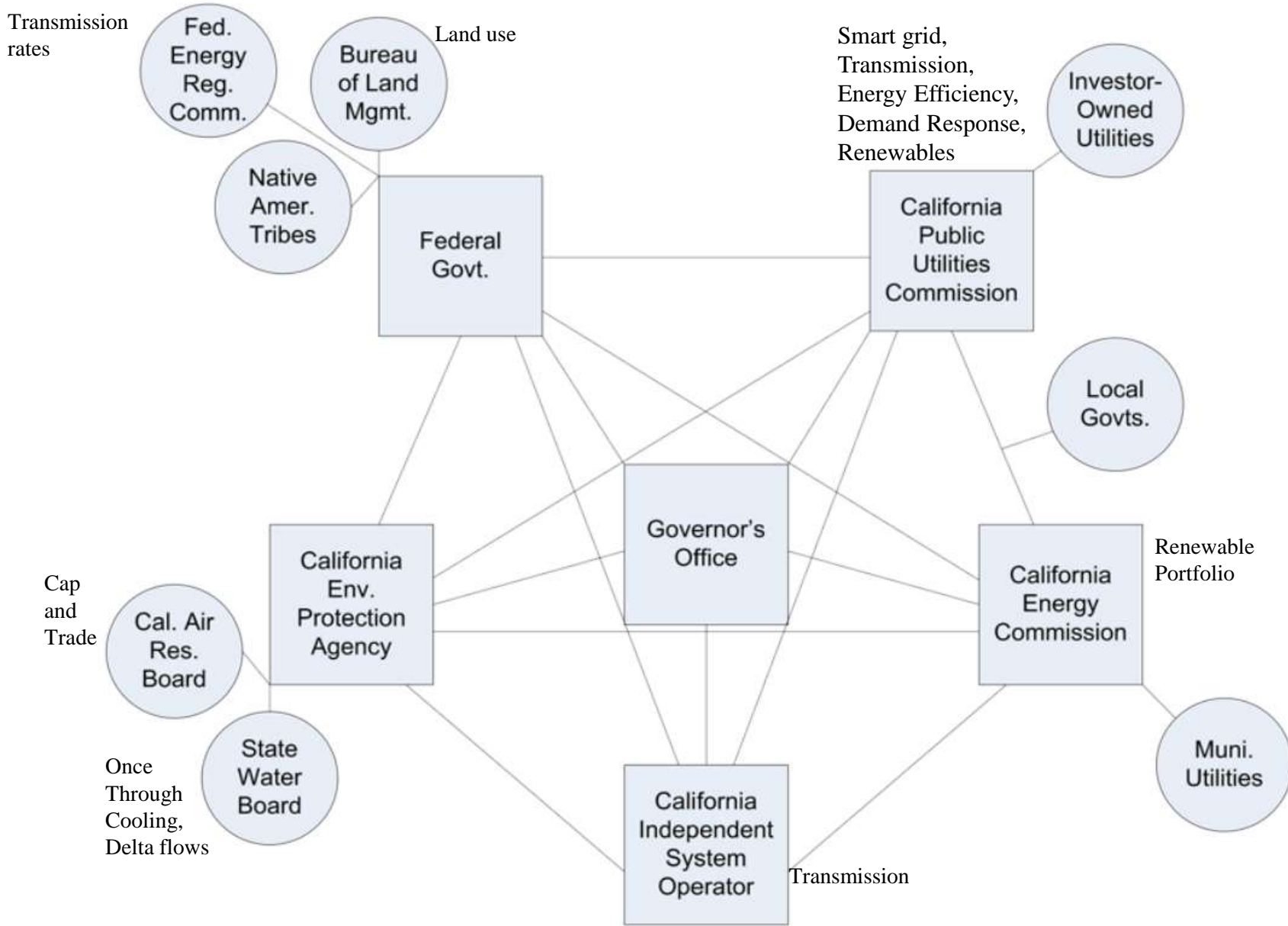
Renewable Portfolio



Once Through Cooling, Delta flows



Transmission



California Energy Policy Dates

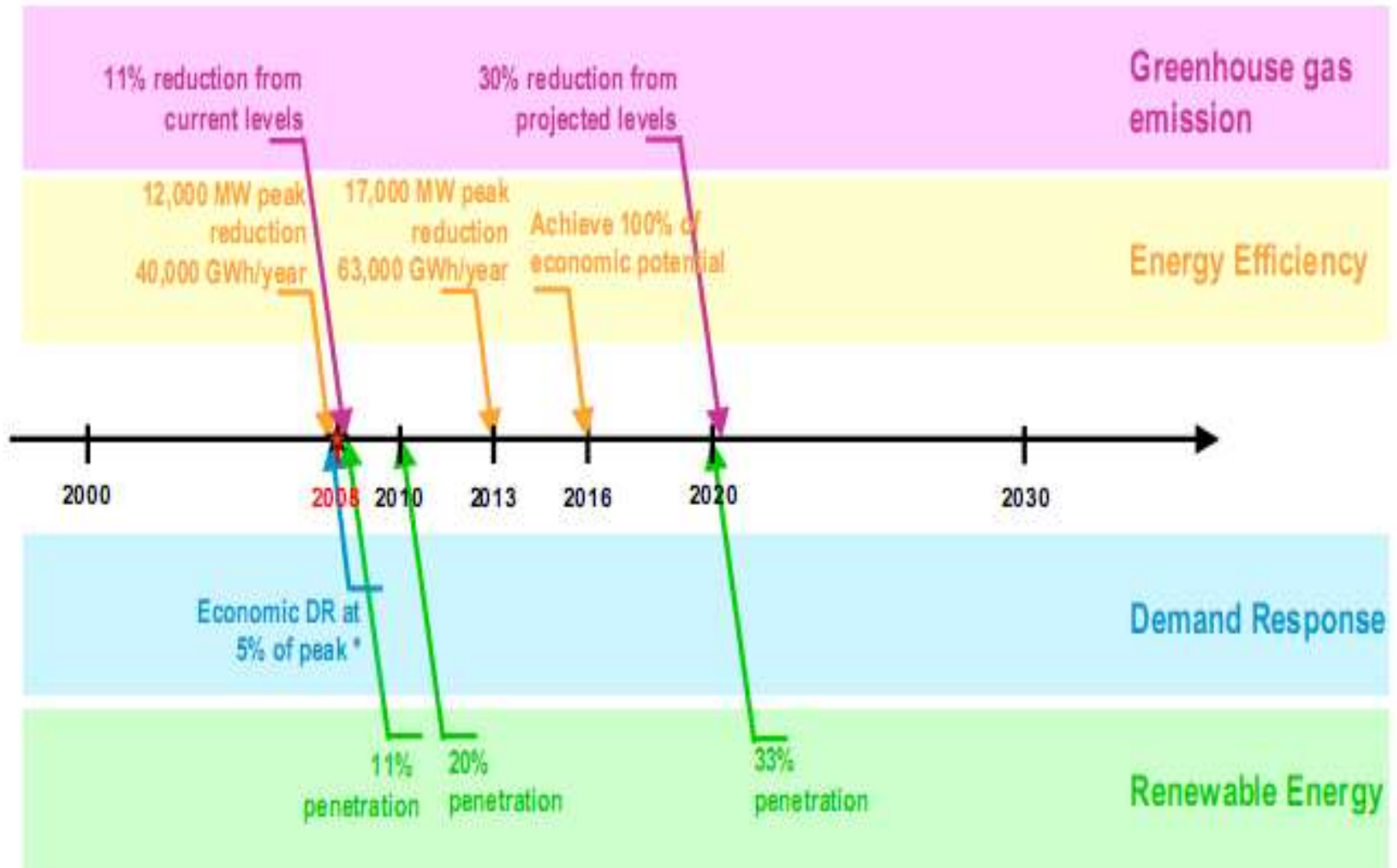
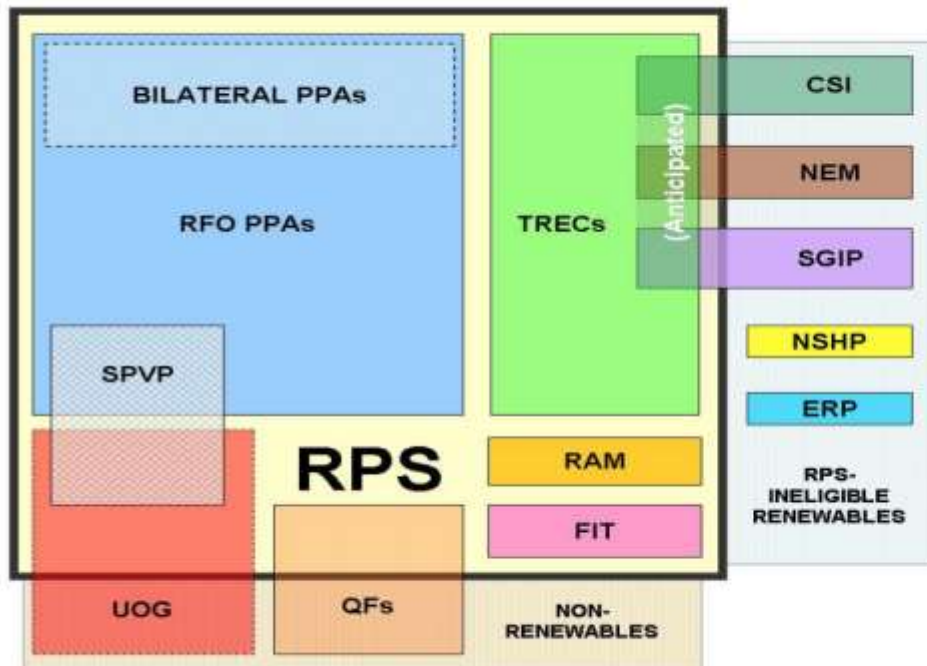


FIGURE 1: RELATIONSHIP OF RENEWABLE ENERGY PROGRAMS¹⁸

Renewable Portfolio



- CSI = California Solar Initiative
- ERP = Emerging Renewables Program
- FIT = Feed-in Tariff
- NEM = Net Energy Metering
- NSHP = New Solar Homes Partnership
- PPA = Power Purchase Agreement
- QFs = Qualifying Facilities
- RAM = Renewables Auction Mechanism
- RFO = Request for Offers
- RPS = Renewable Portfolio Standard
- SGIP = Small Generator Incentive Program
- SPVP = Solar Photovoltaic Program

	PROGRAM	ESTIMATED AVERAGE ANNUAL COSTS
R P S	RPS Power Purchase Agreements (PPAs)	\$2.00 billion annually over 2003-2020
	Tradable Renewable Energy Credits (TREC's)	\$350 million annually over 2010-2013
	Qualifying Facilities (QFs) contracts	\$1.22 billion annually over 2003-2020 <i>[renewable only]</i>
	Utility-Owned Generation (UOG)	no major procurements to date outside of SPVP
	Solar Photovoltaic Program (SPVP)	\$503 million in UOG annually over 2010-2014, + PPAs
	Renewable Auction Mechanism (RAM)	PG&E expects \$124 million annually over 2014-2020
	Feed-in Tariffs (FIT)	PG&E expects \$37 million annually over 2015-2020
	Existing Renewable Facilities Program (ERFP)	\$25 million annually over 1998-2011 <i>[program ended]</i>
	California Solar Initiative (CSI)	\$237 million annually over 2007-2016
	Net Energy Metering (NEM)	cost estimates vary widely; ~\$100 million annually
	Self-Generation Incentive Program (SGIP)	\$81 million annually over 2001-2014
	New Solar Homes Partnership (NSHP)	\$40 million annually over 2007-2016 <i>[budgeted]</i>
	Emerging Renewables Program (ERP)	\$31 million annually over 1998-2011 <i>[program ended]</i>
Potential Total Annual Program Costs:		~ \$4.5 to \$5 billion

Water

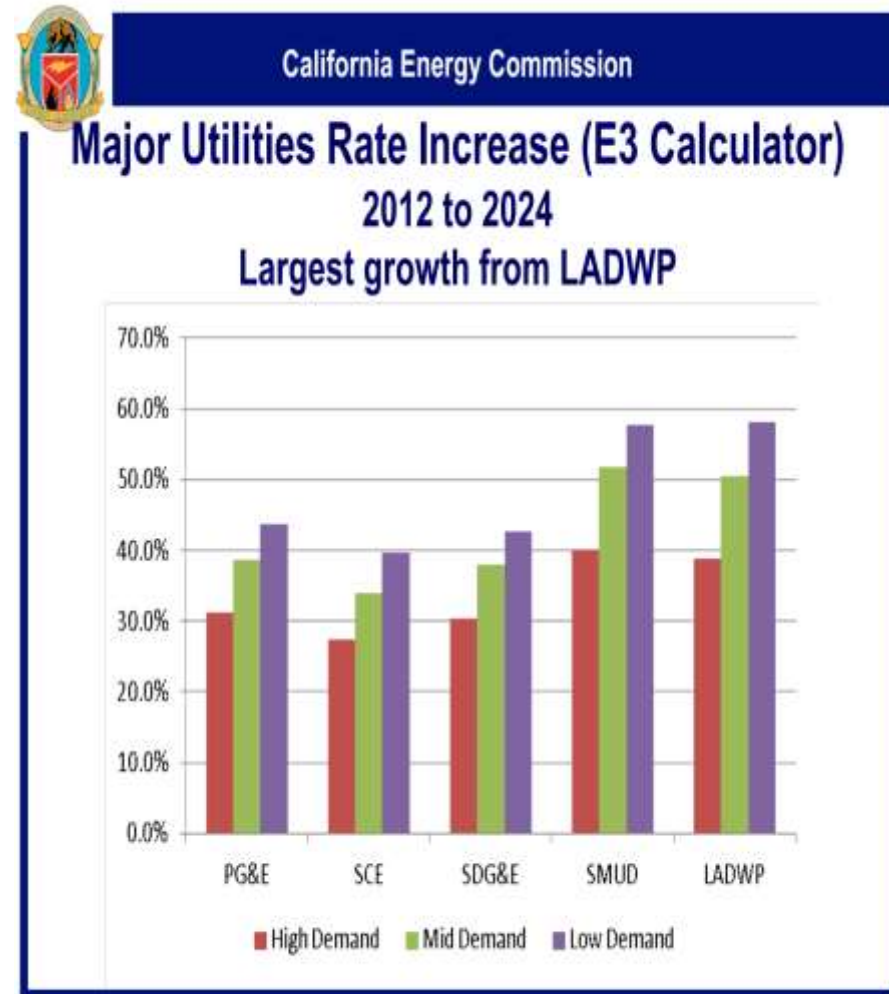


- **Once-Through Cooling**
 - The California State Water Resources Control Board's Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling, (March 2010) which stems from federal Clean Water Act regulations, requires that California power plant marine cooling intake structures change to closed-cycle wet cooling. OTC phase-out requirements range from 2010-2024, and the 19 affected plants in California represent about 30% of total in-state power generation installed capacity (21,000 MW). Cost is \$4-11 billion.
- **Delta Flows**
 - Changes in required Delta flows will have unknown impacts of state hydroelectric generation – critical for balancing vagaries in renewable generation output.
- **San Onofre Nuclear Generating Station (SONGS)**
 - Offline since January 2012. SCE has spent \$117 million in replacement power so far.

How Bad Will It Be?



- California Energy Commission forecast
 - 30-40% increase in 10 years
- California Public Utilities Commission
 - Long term procurement plan (2012) 23% increase in rates by 2020 (2.1%/year constant\$, about 4.5%/year increase in electricity rates)



Recommendations

- Prepare for uncertainty
 - When preparing for future,
 - evaluate scenarios
- Rate impacts (retail)
 - Infrastructure upgrades: 1-2.5% per year
 - Electricity costs: 1.5-2.0% per year
 - Climate change legislation 1-2.5% per year
- Electricity Retail Rate Escalations
 - 3%, 5%, and 7% per year scenarios.
- Take care of yourself
 - Energy efficiency
 - Demand response
 - Self generation

D R . H O U S E M.D.



Water Agency Opportunities

- Water Agencies are well positioned to participate in Energy Solutions
 - Water is Stored Energy
 - Almost all water agencies have stored water at elevation
 - Land
 - Lot of energy use and large energy bills
 - Accustomed to large capital investments
 - Diverse operations
 - Fresh water, wastewater, reclaimed water , storage
- Every Water Utility is Different
 - Different Opportunities, Different Constraints
- Energy Prices Are a Huge Concern
 - Up to 80% of operating budget can be energy costs.
- Many water agencies could become almost energy self sufficient – economics and policies stand in the way.



Eastern MWD's Energy Portfolio

- \$14 Million Energy Budget, 256 SCE Electrical Accounts, 46 So. Cal. Gas Accounts
- Biogas Fuel Cells (1,500 kw)
- Biogas Fueled Engines (1,465 hp)
- Natural Gas Microturbines (540 kw)
- Solar (500 kw)
- Natural Gas Engines (20,000 hp)
- And Demand Response - 12.2 MW's currently enrolled (33% of EMWD's Peak Demand)
 - Base Interruptible Program (BIP) - 6 MW's @ 3 accounts
 - Agricultural/Pumping Interruptible (AP-I) - 2.5 MW's @ 20 accounts
 - Aggregator (EnerNoc) - 3.7 MW's @ 16 accounts
 - Looking at an additional 1.6-3.5 MW of DR



Current Trends In the Water Industry

- Negative

- Dramatically increased energy use looming
- Utility interconnection requirements (small hydro) onerous

- Positive

- Encouraging new hydroelectric technologies

- In-conduit generators
- Open Channel Drop generators
- Retrofit of existing small hydro generators

- Rate options

- RES-BCT tariff option

- Allows government entities to install up to 5MW renewable generation at one location and get generation credit at up to 50 of their other accounts

- Increase use of natural gas engines for pumping



“The Most
Effective Water
Resource
Portfolios
Balance Supply
Reliability,
Water Quality
and Energy
Consumption”*

*ACWA President, MWD Vice
Chair and EMWD Vice-President
Randy Record, September 18, 2012

