
California's Renewables Portfolio Standard: Overview and Trends of the Growing Renewable Wholesale Market

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Presentation Outline

- Overview - CPUC and California Power Market
- RPS Program Basics
- RPS Program Status
- RPS Market Trends
- Lessons Learned



About the California Public Utilities Commission

- The CPUC regulates privately owned telecommunications, electric, natural gas, water, railroad, rail transit, and passenger transportation companies, in addition to authorizing video franchises.
- Five Governor-appointed Commissioners dedicated to the **CPUC mission**: ensure adequate service to the public at rates that are just and reasonable to utility customers and shareholders.



California's Electric Utility Service Areas

Multiple Utility Service Territories:

- 81% Investor Owned
 - regulated by CPUC
- 19% Municipal

2011 Peak Demand:

- **60,310 MW**

2011 Electricity Use:

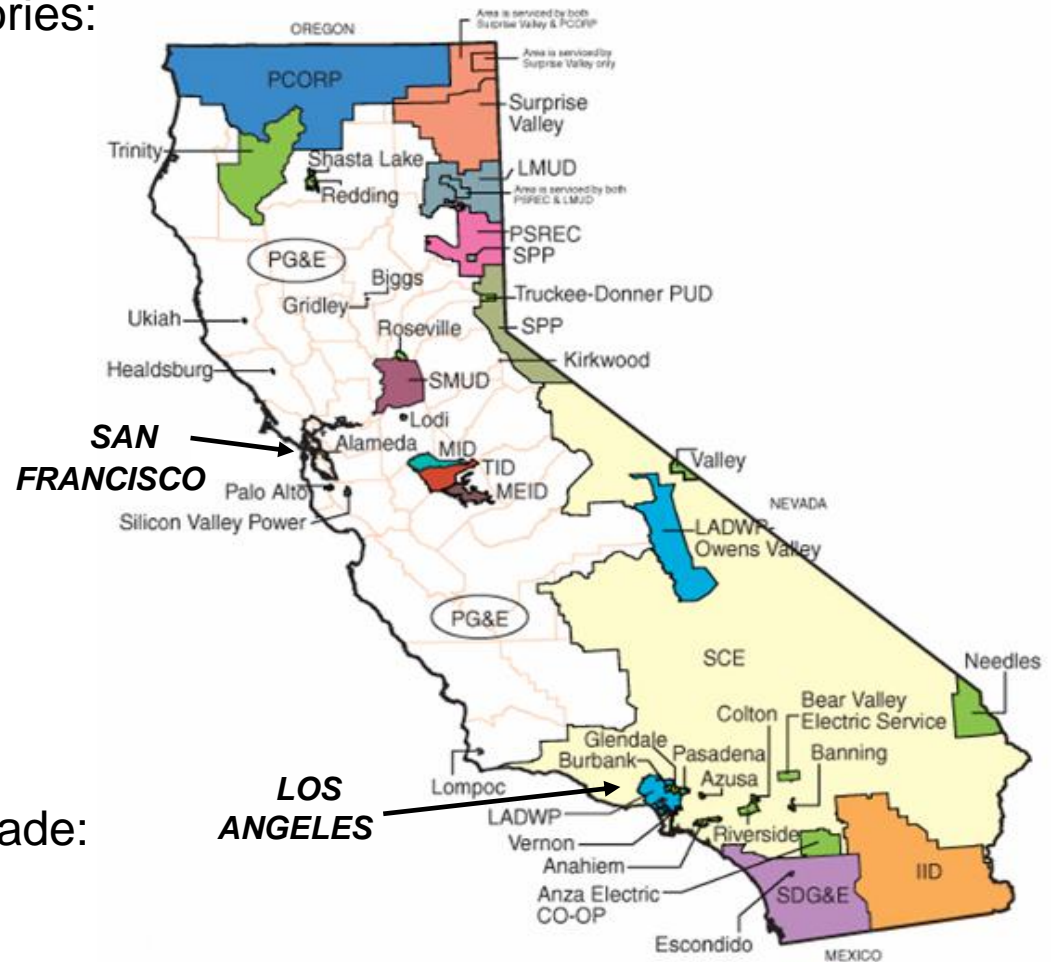
- **277,735 GWh**

Population:

- **36.6 million,**
- **0.55% per year growth**

Electricity growth for last decade:

- **0.93% per year**



CA Power Market – Key Participants

- California Independent System Operator (CAISO)
 - Operates the transmission system by matching generation with load and maintains electric frequency of the grid.
 - Operates real-time, hour-ahead, and day-ahead power market
 - Ensures non-discriminatory access to the grid for wholesale buyers and sellers of electricity
- Investor-owned utilities (IOUs)
 - Responsible for providing reliable electrical service to retail customers
 - Owns transmission and distribution system
 - Responsible for long-term procurement on behalf of customers, including new infrastructure
- California Public Utilities Commission (CPUC)
 - Regulates IOU rates
 - Conducts portfolio resource planning and authorizes procurement
 - Develops and administers energy policy and programs
 - Oversees IOU procurement process



CA Regulatory Structure

	Jurisdiction	Regulatory Status
Generation – short/long-term procurement & cost recovery	Federal, except State governs purchase decisions	Partially deregulated (hybrid)
Transmission – planning, operation & interconnection	Federal, except in case of local public utilities	Regulated
Distribution – Planning, operation & interconnection	State	Regulated
Retail delivery	State	Partially deregulated



CA Generation Permitting

- Thermal generation ≥ 50 MW - permitted by California Energy Commission (CEC)
- Thermal generation < 50 MW – permitted by local counties
- Non-thermal generation – permitted by local counties
- Generation sited on federal land – permitted by federal agency

Challenge: approximately 50 counties in California and there are no standardized guidelines for county permitting, which increases the time and cost of renewable development



RPS Program Basics



SEGS, Solar Thermal Plant, Mojave Desert



Renewables Portfolio Standard (RPS): Background and Goals

A market-based program that requires all retail sellers of electricity to procure increasing amounts of renewable energy through 2020

- The RPS program was established in statute in 2002; 20% by 2010, current law sets a 33% by 2020 target
- RPS program is responsible for the majority of utility-scale renewable procurement in California
- RPS-obligated entities include: IOUs, Energy Remarketers, Community Choice Aggregators (CPUC regulates) and Public Utilities (with CEC oversight)
- RPS compliance is measured in terms of renewable energy credits (RECs) procured, **not signed contracts**



What is the RPS Compliance Metric?

Retail Sellers procure renewable energy credits (RECs) which are created with each MWh of renewable energy

$$\text{RPS \%} = \frac{\text{Renewable Energy Procurement (MWh)}}{\text{Retail Sales (MWh)}}$$



Agency Roles

RPS program is jointly administered by CPUC and CEC

- The CPUC is responsible for:
 - Approving utility procurement plans
 - Approving/rejecting contracts executed to procure RPS-eligible electricity and RECs
 - Long-term resource planning for renewables
 - Determining RPS procurement / compliance targets
 - Determining RPS compliance and imposing penalties for non-compliance
- The CEC is responsible for:
 - Certifying renewable generating facilities as RPS-eligible
 - Verifying the RPS-eligibility of energy procured to meet RPS targets
 - Overseeing POU RPS programs



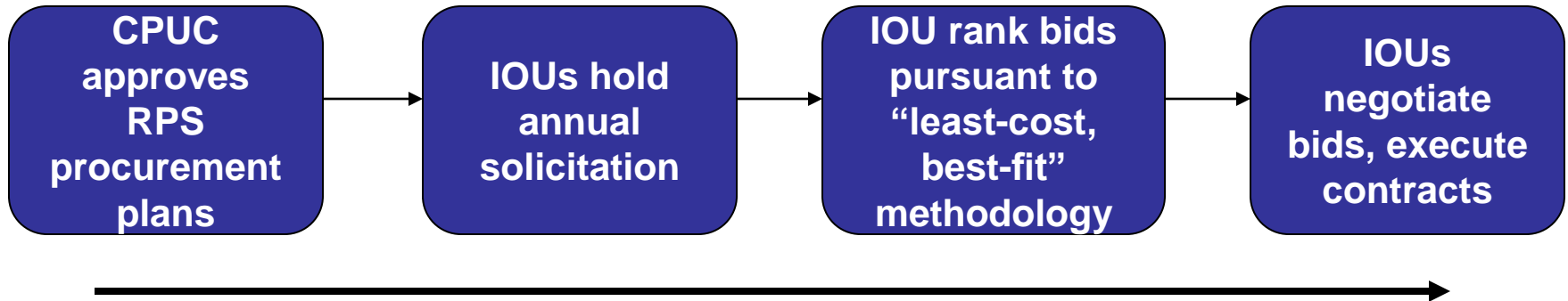
RPS-Eligible Technologies

The California Energy Commission (CEC) determines what resources count towards RPS

- Biodiesel
- Biomass
- Conduit hydroelectric
- Digester gas
- Fuel cells using renewable fuels
- Geothermal
- Wind
- Landfill gas
- Municipal solid waste
- Ocean wave, ocean thermal, tidal current
- Photovoltaic
- Small hydroelectric (30 MW or less)
- Solar thermal electric
- Hydroelectric (incremental generation from efficiency improvements)



RPS RFO Procurement Process



- Independent evaluator oversees solicitation, bid evaluation, and negotiations
- Utilities can also sign bilateral contracts



Once the IOU executes the contract, must submit to the CPUC for approval

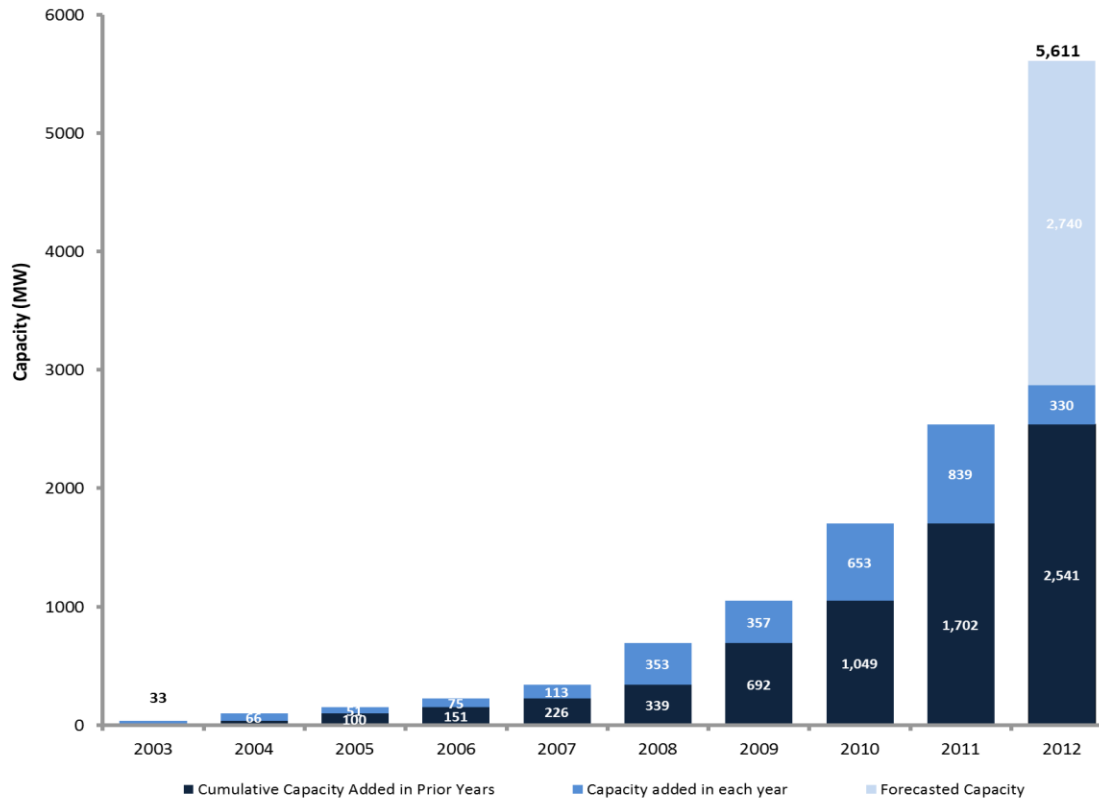


Current Status of RPS Program



Status of RPS Program

Installed Capacity Since Beginning of RPS Program



Source: California Public Utilities Commission, 2nd Quarter 2012

Grid Capacity Additions Since 2003*

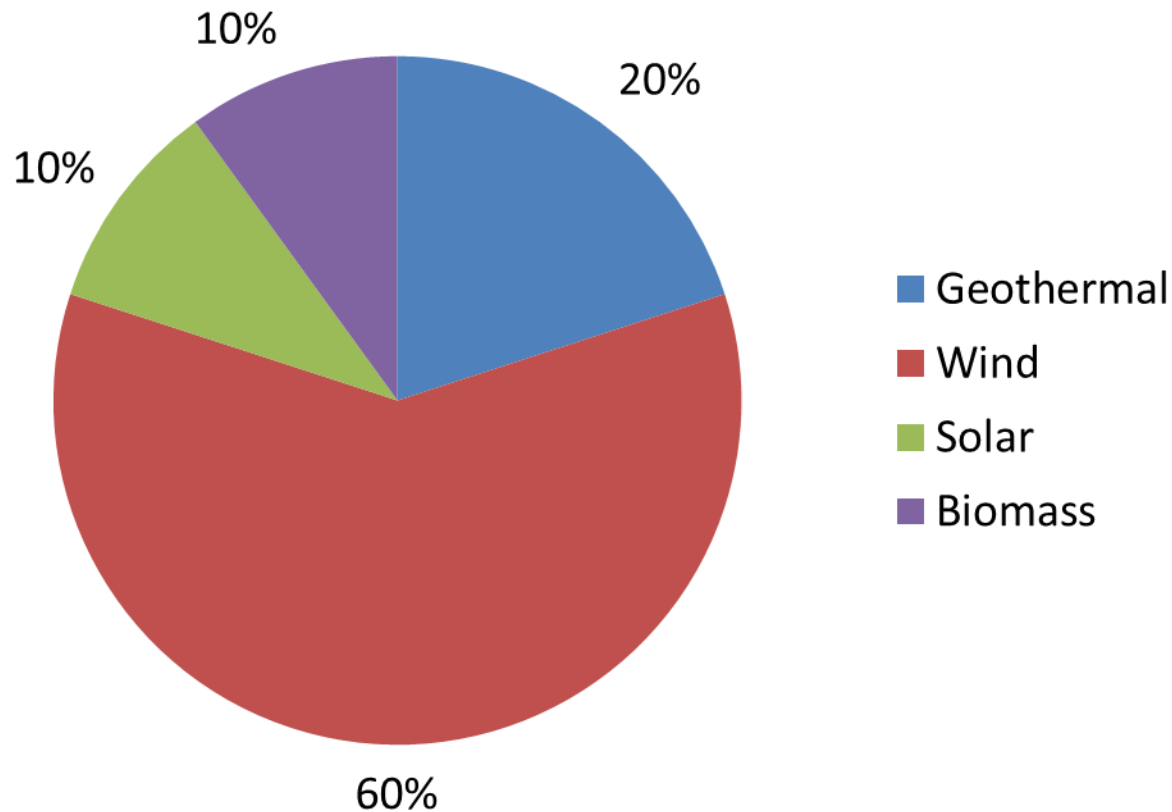
Renewables	5.6 GW
<u>Total Capacity Additions</u>	<u>8.0 GW</u>
Renewables %	70%

* CAISO and CPUC



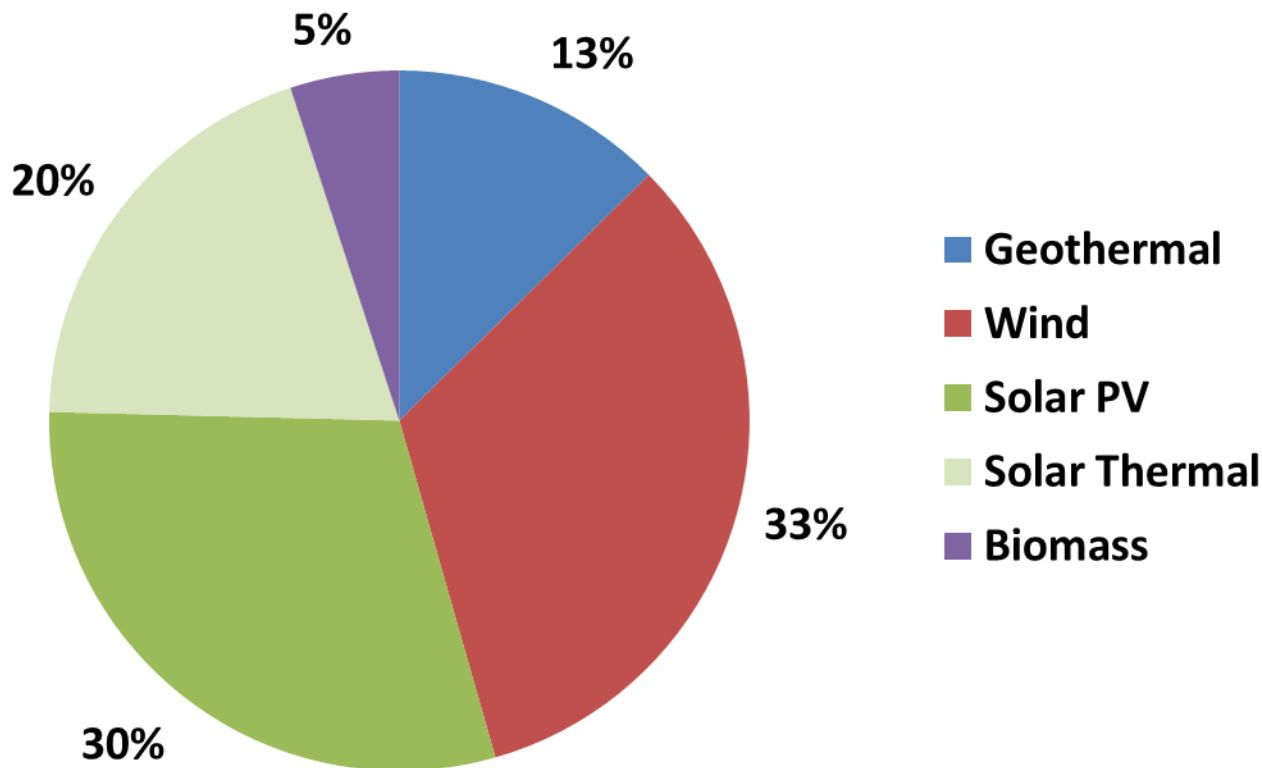
Status of RPS Program

2011 RPS Resource Mix - PG&E, SCE and SDG&E



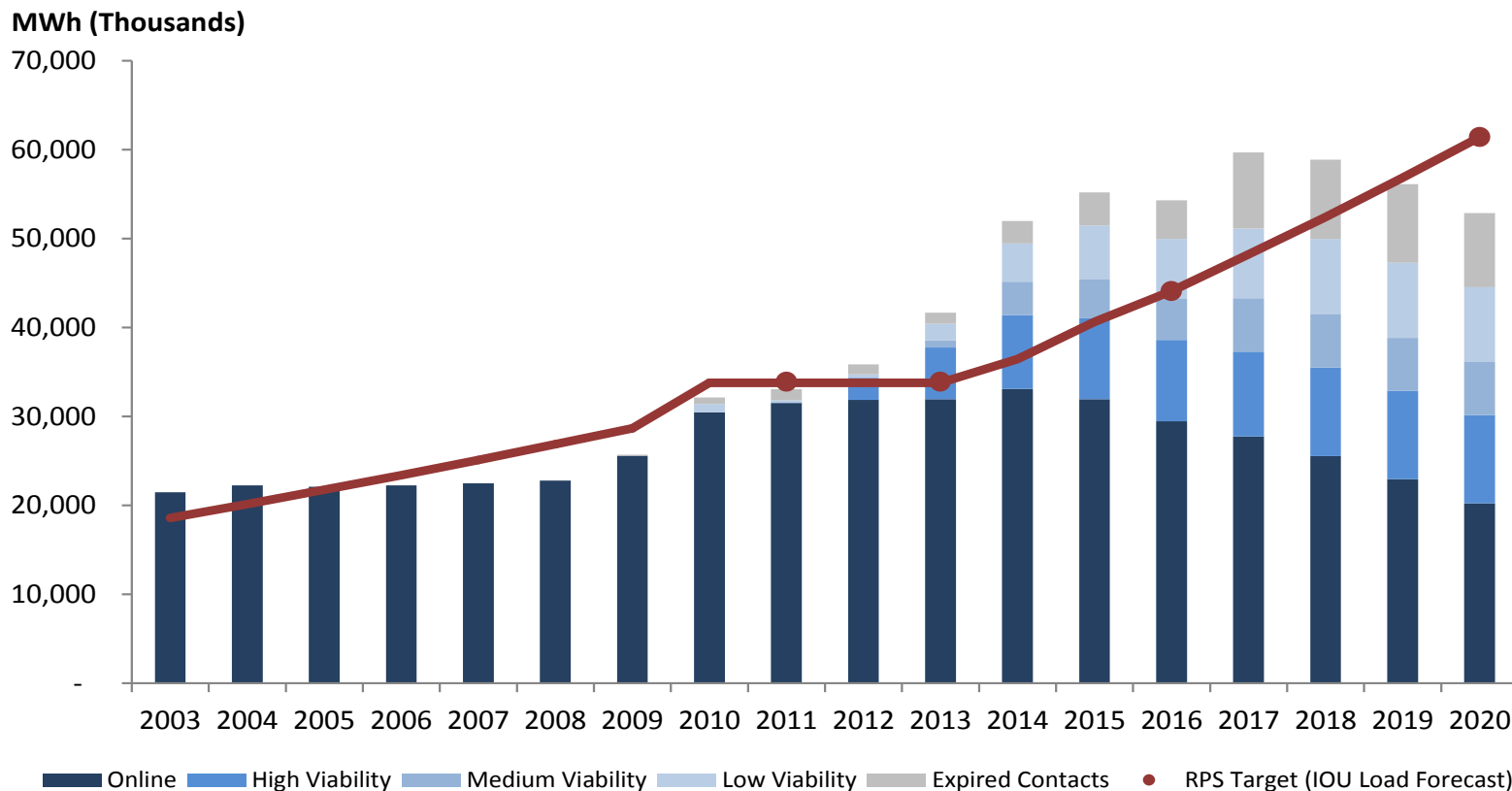
Status of RPS Program

2020 Projected RPS Resource Mix - PG&E, SCE and SDG&E



Status of RPS Program

Forecast Compliance Position



Source: California Public Utilities Commission, 3rd Quarter 2011

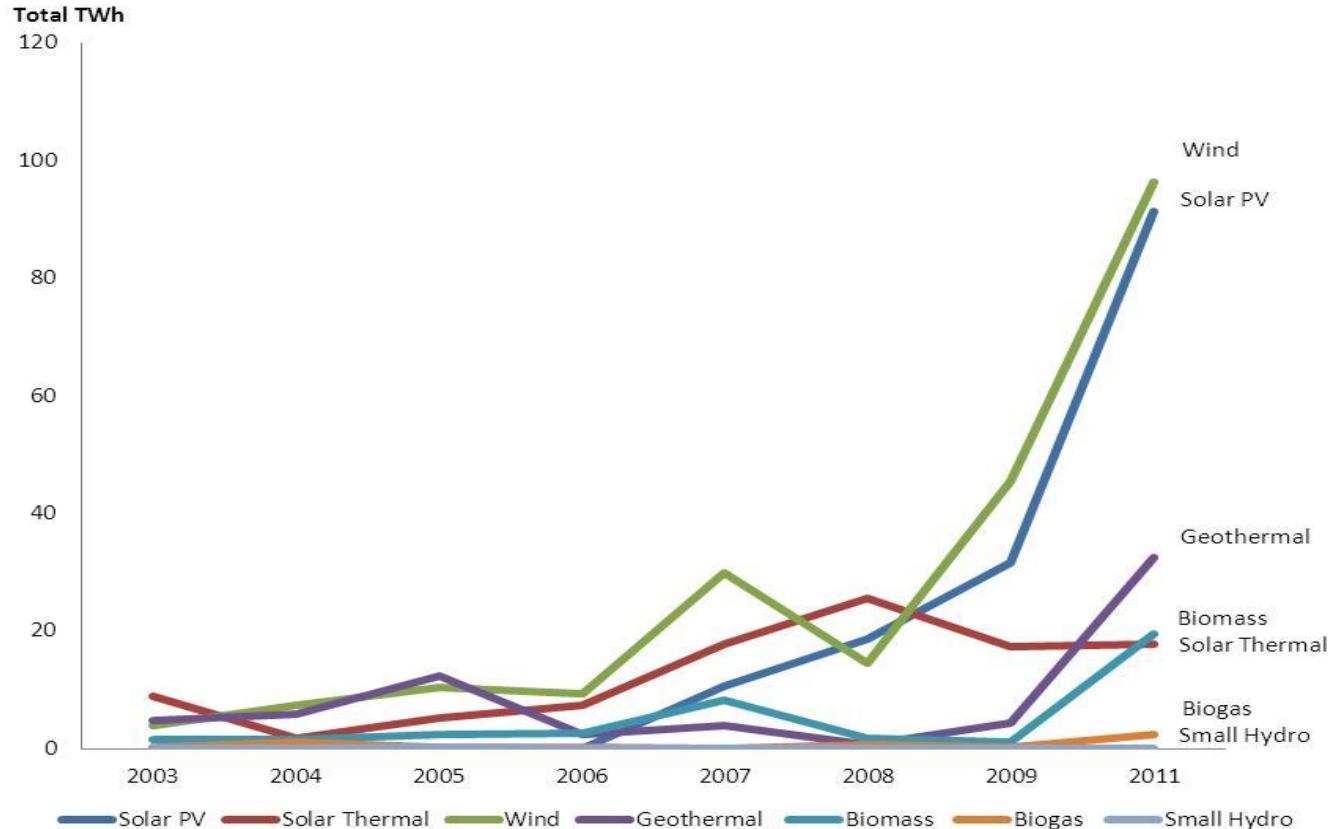


RPS Market Trends



RPS Market Trends

Annual Resource Contribution



Source: California Public Utilities Commission, 4th Quarter 2011



RPS Market is Rapidly Maturing

2011 RPS solicitation was very robust

- >3,000 pricing proposals (~1,000/IOU), up 250% from 2009
- ~500,000 GWh/yr bid, up more than 300% from 2009
- ~2% of all proposals were shortlisted (~14,000 GWh/yr)
- ~50% of shortlisted projects are solar PV; ~25% wind
- Average price for 1st quartile bids (~250 projects) was <\$100/MWh
- Overall bid prices were down ~30% from 2009
- Solar PV and wind projects offering very competitive bids

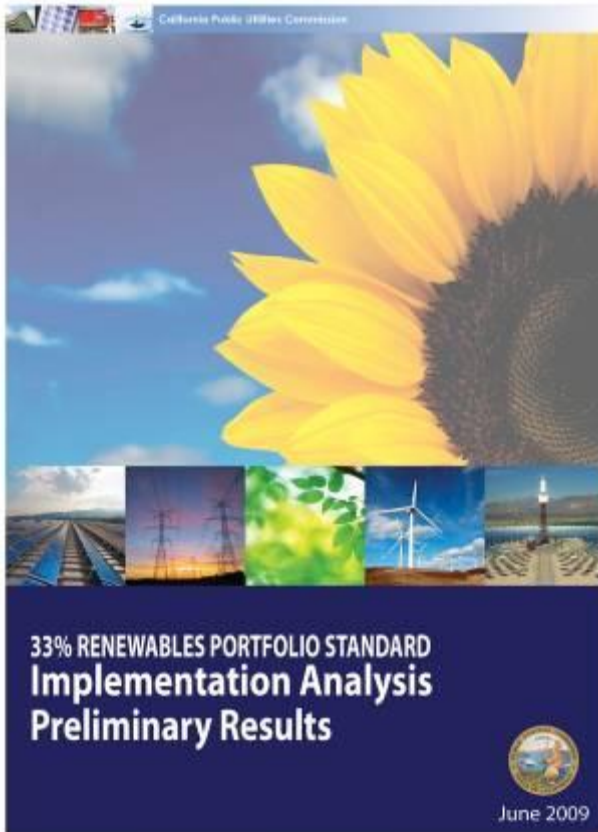


Major Trends and Implications

- # of highly viable projects has significantly increased reflecting a material increase in market maturity since 2009
- # of highly viable projects are chasing after decreasing RPS need are putting downward pressure on cost
- The current supply-demand imbalance is forcing market consolidation
- Low pricing for solar PV and wind may disadvantage other technologies and decrease technology diversity



Diversify RPS Procurement Strategy?



- In June 2009, CPUC staff issued an implementation assessment of the 33% by 2020 RPS goal
- Concluded that it will be challenging to permit and construct the generation and transmission needed to achieve 33% by 2020
- Noted that CA might need to diversify its current procurement strategy, which is largely dependent on large utility-scale projects

Link to report - <http://www.cpuc.ca.gov/33percent>

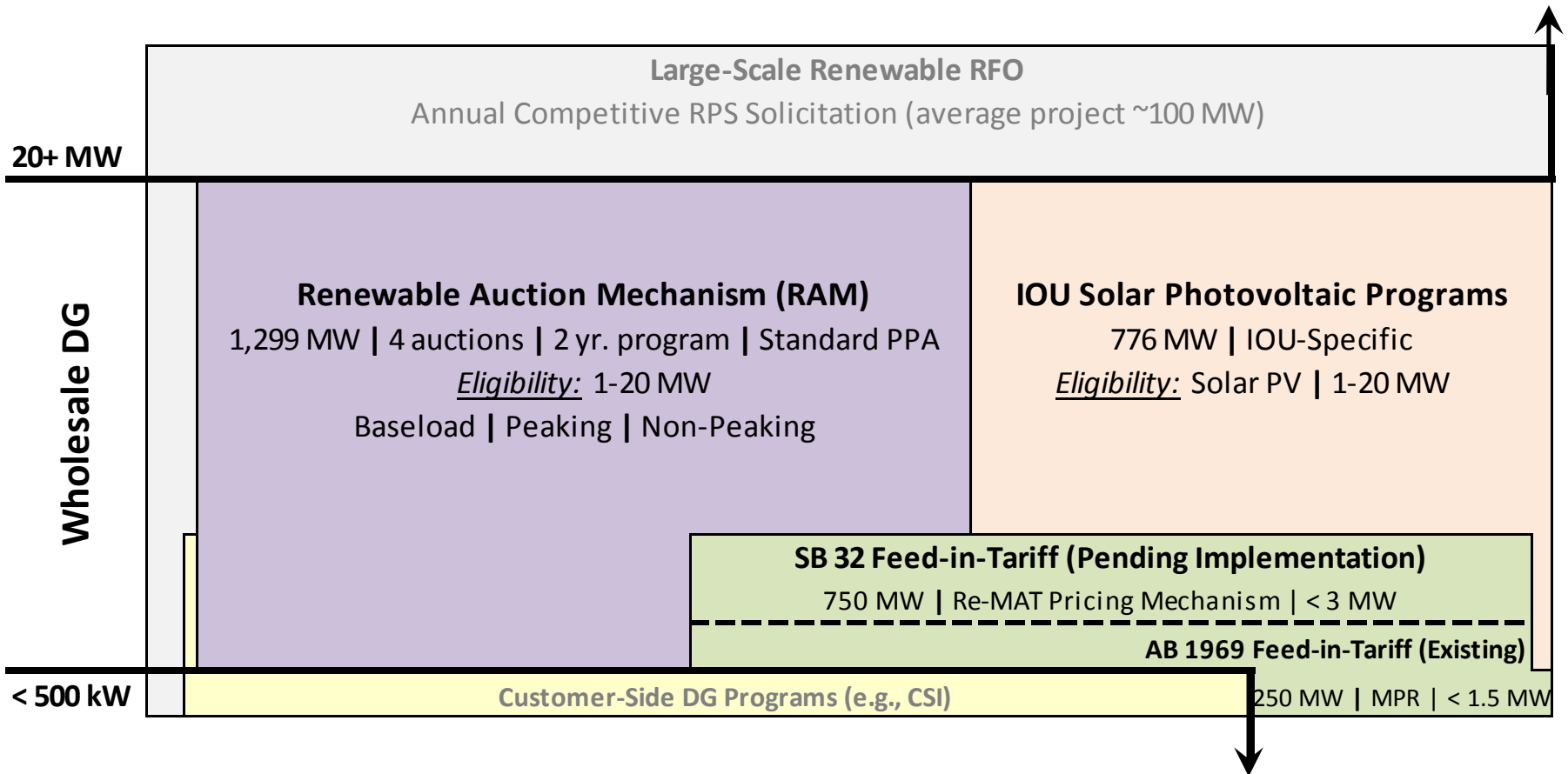


Why Pursue Wholesale DG Procurement?

- In between the Large-Scale RPS RFO program and the customer-side DG programs (e.g., California Solar Initiative) is the untapped wholesale distributed generation (WDG) market.
- Potential benefits of the WDG market segment include:
 - Quick project development timelines
 - Avoidance of new transmission
 - Declining technology prices (i.e., solar PV)
 - Insurance for riskier, large-scale renewable projects



Wholesale DG: Overview of Programs



Wholesale DG: Procurement Update

- **Renewable Auction Mechanism:** standard PPA, pay as bid
 - CPUC recently approved 13 contracts for 145 MW from 1st auction
 - Weighted average price of approved contracts: ~ \$90/MWh (post-TOD)
 - 83% of contracted MWs were for Solar PV projects
 - 2nd RAM Auction: closed May 31, 2012 (PPAs expected to be filed Oct. 2012)
- **Feed-in-Tariff:** standard PPA at a fixed price
 - 179 MW contracted (as of Jan. 2012) under existing AB 1969 FiT
 - CPUC adopted D.12-05-035 in May 2012 to adopt new pricing mechanism and program rules for SB 32 FiT
 - Creates the Renewable Market Adjusting Tariff (Re-MAT) – a market-based, volumetric price adjustment mechanism that operates independently for baseload, peaking, and non-peaking project types
 - SB 32 FiT Expected to become effective by early 2013
- **IOU Solar PV Programs:** standard PPA, pay as bid
 - SDG&E (74 MW) and SCE (225 MW) moved MWs from PV Program into RAM
 - More than 200 MWs currently under contract



Wholesale DG: What's Next?

- How much Wholesale DG should California procure?
 - Governor Brown's 12,000 MW DG goal
 - Using Wholesale DG...
 - To create jobs? To hedge against failure of large-scale renewable facilities?
- Policy challenge: ensuring sustainable Wholesale DG market
 - Interconnection: Current procedures designed to accommodate large-scale central generation – not large quantities of DG – resulting in long study delays.
 - Resource Planning: Required to ensure that cost-effective procurement pursued; that assets (e.g., transmission) aren't stranded; maintain system reliability
 - Cost-Benefit: Analysis required to better assess costs/benefits of variously sized DG projects – integration benefits? GHG benefits? Environmental benefits?
- **Solution**: Align procurement, resource planning, and interconnection!



More Information

CPUC RPS Website: www.cpuc.ca.gov/renewables

CPUC RPS RAM Website: www.cpuc.ca.gov/RAM

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