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California's Renewable Energy Generation

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Pre-Solicitation Workshop on Implementation Strategies
for Production of Renewable Hydrogen in California

Art Rosenfeld Hearing Room, CEC

January 30, 2017

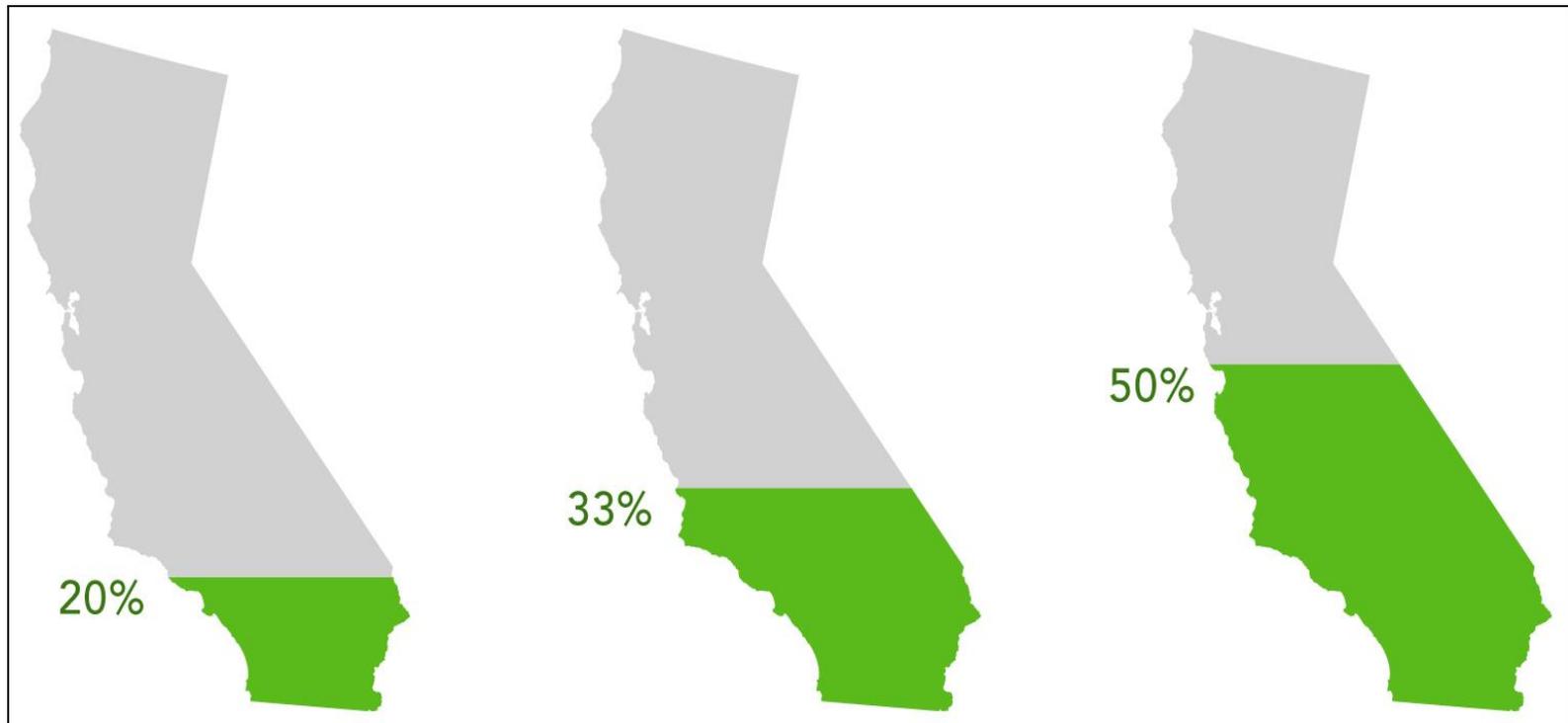


California's Renewable Targets

2013

2020

2030





What is a Renewable Resource?

<http://www.energy.ca.gov/portfolio/>

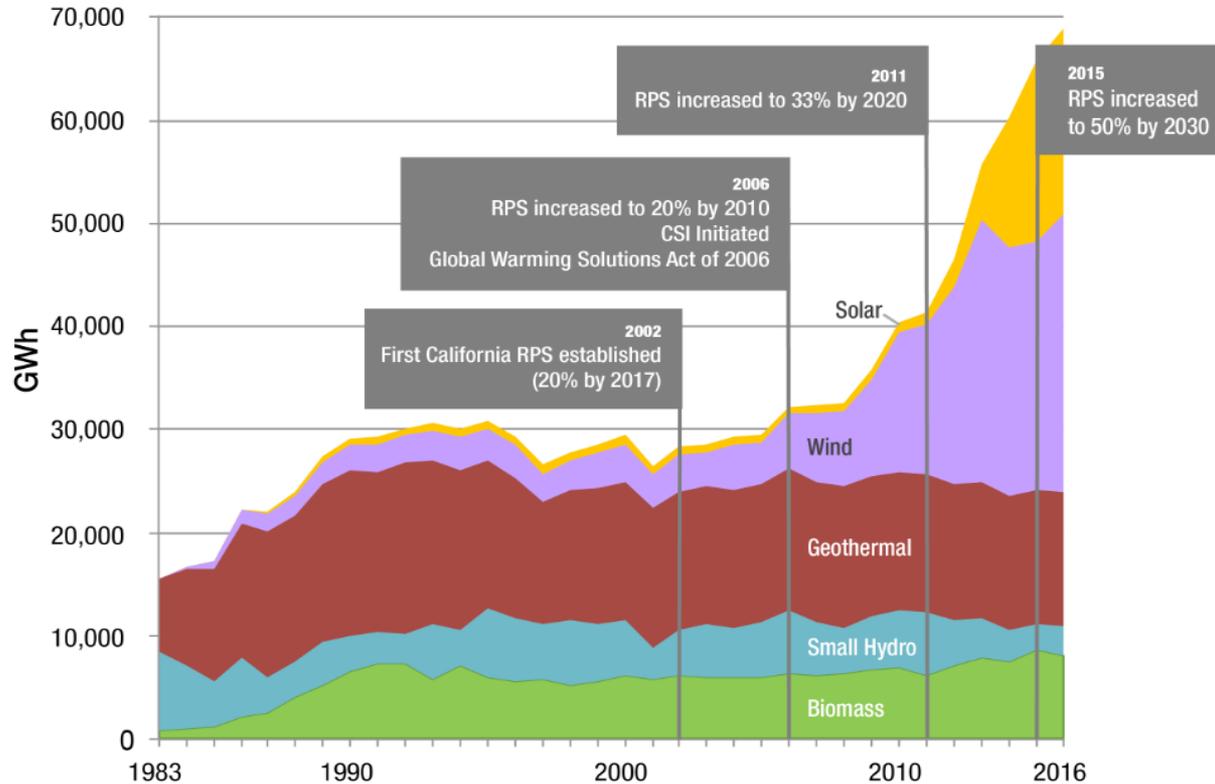
- Eligible renewable resources:
 - Biomass (solid, liquid, gas)
 - Geothermal
 - Small hydroelectric (<30 MW)
 - Solar (thermal or photovoltaic)
 - Wind
 - Fuel cells using renewable fuels
 - Ocean wave, ocean thermal, or tidal current
- For purposes of the Renewables Portfolio Standard (RPS) program, must meet requirements of the RPS Eligibility Guidebook₃



Renewable Energy Progress

http://www.energy.ca.gov/renewables/tracking_progress/

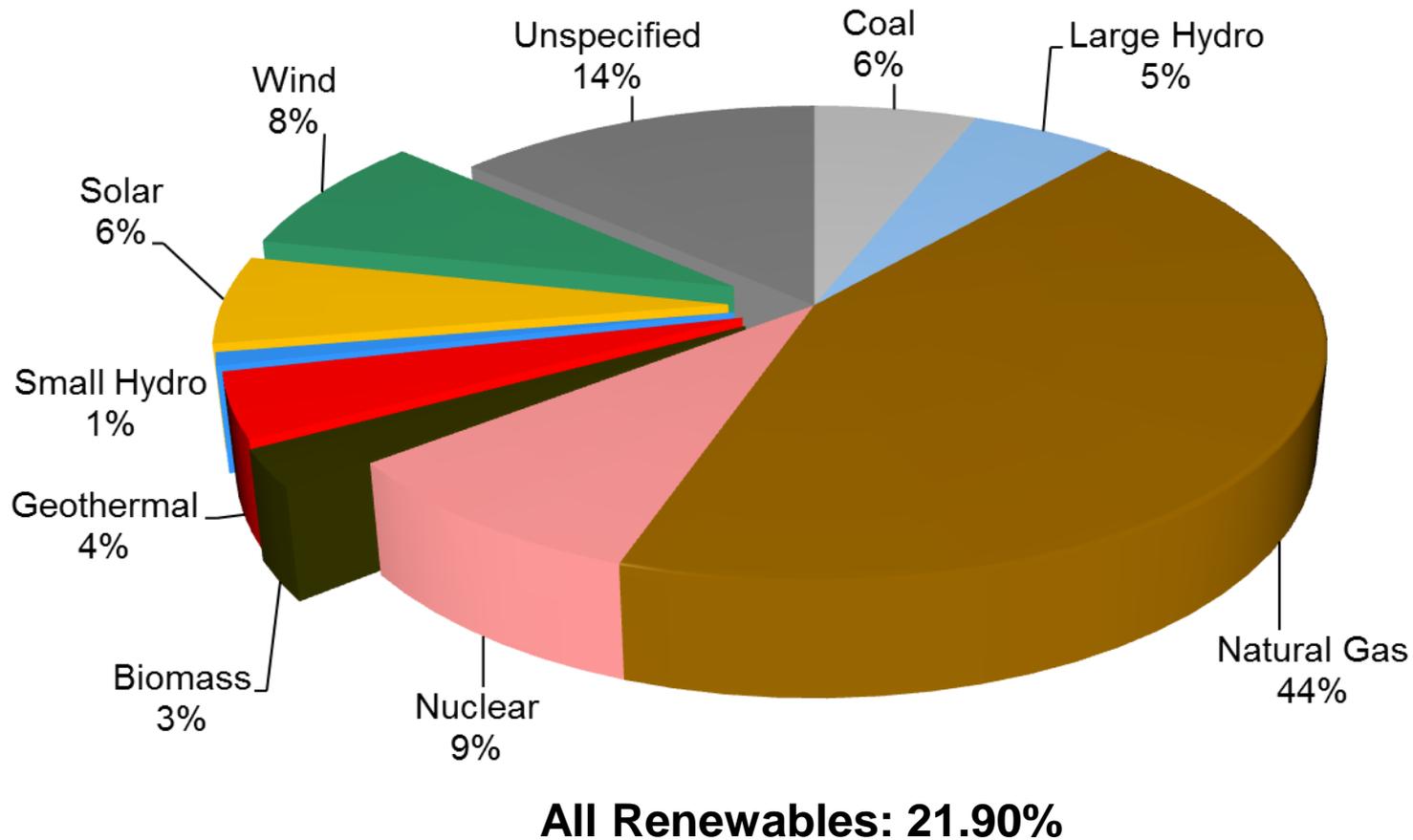
California Renewable Energy Generation by Resource Type



Note: Data for 2016 is based on estimates



California's 2015 Electricity Mix





Tracking Renewable Generation

<https://www.wecc.biz/WREGIS>

Western Renewable Energy Generation Information System (WREGIS)

- Regional tracking system began operation in 2007
- Creates Renewable Energy Certificates (RECs) with unique serial number for each MWh of renewable electricity, based on metered data
- Once RECs are claimed for RPS compliance or another program, they are “retired” and taken out of circulation
- Tracking system paid for by Energy Commission initially, but now is self-sustaining through user fees
- Over 750 companies and 4,000 generators currently registered in WREGIS.



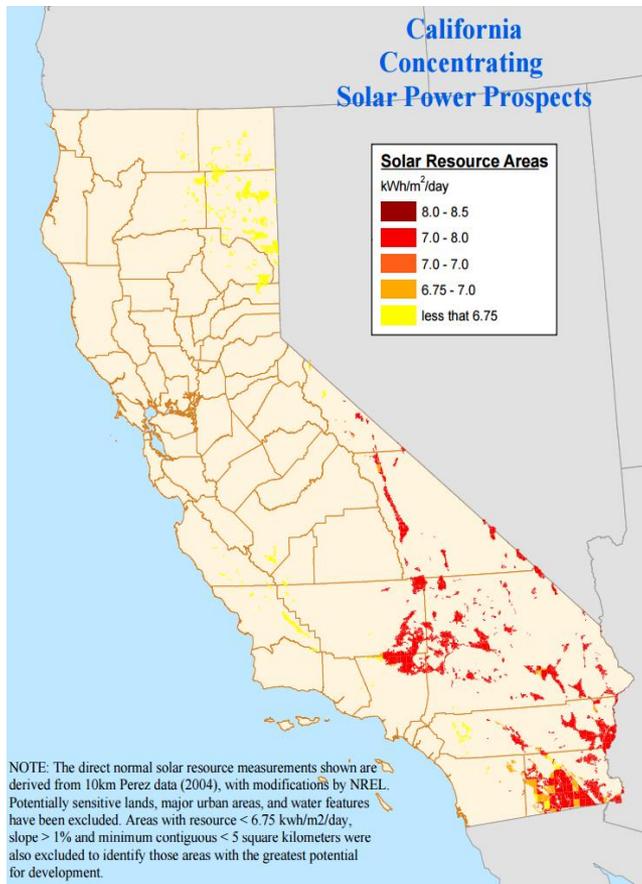
Cost of Renewables

- 1 REC = 1 MWh of generation from a renewable source
 - Roughly 51 million RECs retired per year 2011-2013
 - Over 71 million Calif. RPS-eligible RECs created in 2014
 - Price ranges from about \$1-\$50 per REC
- Price dependent on resource type, location, interconnection, vintage, and whether the RECs are purchased “bundled” with electricity



Where are Renewables Located?

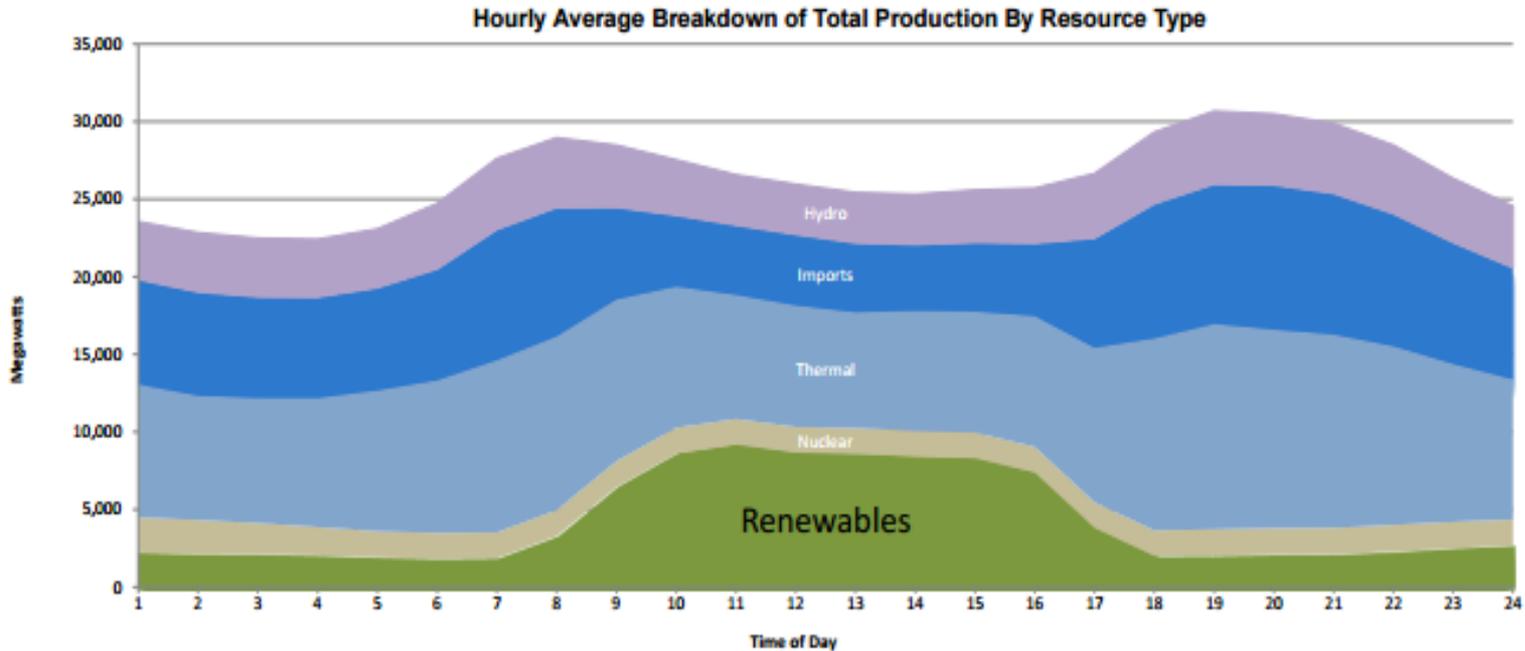
<http://www.energy.ca.gov/maps/>





Daily Renewables Summary

<http://content.caiso.com/green/renewrpt/DailyRenewablesWatch.pdf>



January 26, 2017



Potential Impacts of a 50% RPS

- Overgeneration
- Steep ramps in demand curve
- Increased renewable curtailment
- Increased cost
- Integration issues



Possible Ways to Mitigate Impact

- More regional approach
- Energy storage
- Demand/supply response
- Changes in rate structure



Thank you!

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