



DATE: September 12, 2016

AGENDA ITEM # 6

TO: Environmental Commission

FROM: J. Logan, Staff Liaison

SUBJECT: Receive Silicon Valley Clean Energy Authority update and provide recommendations as needed

BACKGROUND

State and Local Mandates

State Assembly Bill 32, the Global Warming Solutions Act, was signed into law in 2006 and directed public agencies in California to support the state-wide target of reducing greenhouse gas (GHG) emissions to 1990 levels by 2020. In addition, California adopted ambitious energy and environmental policies to reduce state-wide greenhouse gas (GHG) emissions to 20% of 1990 levels by 2050 and, to provide 33% of electricity demands in 2020 from renewable resources utilizing clean energy technologies and environmental benefits.

To address the reduction of GHG emissions at the local level, the City Council adopted a Los Altos Climate Action Plan (CAP) on December 10, 2013. The CAP is a comprehensive strategy with goals and measurements to reduce GHG emissions within five focus areas: Transportation, Energy, Resource Conservation, Green Community and Municipal Operations. The CAP was adopted with a target of reducing the community's GHG emissions by at least 15% by 2020 and with an overarching plan for how the City can achieve up to a stretch-goal of 17% reduction in the GHG emissions by 2020.

Community Choice Energy

One method that has the potential to reduce the GHG emission associated with energy consumption is the establishment of Community Choice Energy (CCE), a system that allows cities, counties and Joint Power Authorities (JPA) to aggregate the purchasing power of an identified customer base within a defined area to secure alternative energy supply contracts with the goal of increasing the percentage of energy from renewable sources. The purchase of alternative energy supplies includes renewable sources such as hydroelectric, wind and geothermal as opposed to non-renewable fossil fuels such as coal, oil and natural gas. The consequences inherent in the use of fossil fuels to generate energy are particularly high carbon dioxide equivalents or GHG emissions which contribute to global warming. The ability to form CCEs has been adopted into law in California and a few other states.

In the 2005 Los Altos GHG Community Inventory baseline, residential and commercial electricity account for 18% of Los Altos community-wide GHG emissions. Reducing the GHG intensity of the electricity currently flowing through the PG&E grid by incorporating more energy from renewable sources is an effective way to directly reduce community GHG emissions. If by establishment of a CCE, Los Altos purchased electricity that was 25% cleaner than PG&E-provided grid electricity, the use of renewal-source energy could potentially reduce overall city emissions by up

to 4.5%. If 100% renewable/clean energy were purchased, Los Altos emissions could be reduced by up to 18% and could attain the 2020 stretch goal of 17% reduction in GHG. As such, implementing a CCE has the potential to rapidly reduce community GHGs more so than any other measure currently identified in the Climate Action Plan.

It is noted that the GHG reductions by 2020 are only the first step in the State's GHG reduction goals. The state is proposing additional targets for 2030 and 2050. The initiative of establishing community choices to purchase energy produced by renewal sources is quickly becoming a viable option to achieve GHG reductions. Currently operating Community Choice Energy Programs can demonstrate savings to residents on energy bills and the attainment of sufficient GHG reductions to propel communities to reach short and long-term state goals for clean energy.

In July 2013, the City of Los Altos Environmental Commission explored the concept of GHG reductions that could be achieved by Community Choice Energy and is continuing to hear presentations on the topic and take action for recommendations to Council.

Council Actions

City Council convened a study session on Community Choice Aggregation (Energy) on March 10, 2015. The full staff report and video of the Council CCE study session is posted on the City Website at http://los-altos.granicus.com/GeneratedAgendaViewer.php?view_id=4&clip_id=911

On April 3, 2015 the City of Sunnyvale sent invitations to Santa Clara County cities to participate in the South Bay Technical Feasibility Study currently composed of and partnered by the Cities of Sunnyvale, Mountain View, Cupertino and Unincorporated Santa Clara County. This partnership is investigating the feasibility of a Community Choice Energy program for the South Bay.

At its April 28, 2015 meeting, Council received a staff report proposing CCE Goals and an Approach Plan to formulate and recommend a CCE business model.

In accordance with direction given to the Environmental Commission by Council at the March 10, 2015 Study Session, the CCE Subcommittee convened meetings that were held throughout 2015 and part of 2016 to research and determine the feasibility of joining a CCE for the City of Los Altos.

A Regular meeting of the Environmental Commission was held on July 13, 2015 and was immediately followed by a Study Session on CCE. Melody Tovar, Regulatory Programs Divisions Manager, City of Sunnyvale Environmental Services Department delivered a presentation on the Silicon Valley CCE Partnership (SVCCEP).

On August 25, 2015 the Environmental Commission presented a CCE Interim Report to Council and included an update on the progress of the Silicon Valley CCE Partnership.

The Environmental Commission assisted with outreach efforts to promote the CCE Community meeting held at LAYC (Los Altos Youth Center) on January 13, 2016. The presentation provided information about SVCCEP's efforts to form a group of agencies under a Joint Powers Authority to establish a CCE Program within Santa Clara County.

Receive Silicon Valley Clean Energy Authority update and provide recommendations as needed

On January 26, 2016, the Environmental Commission presented its Final CCE Report to Council. Council expressed appreciation to the Commission and directed staff to move forward with the necessary steps for membership in Silicon Valley Clean Energy Authority (SVCEA) and the establishment of a CCA program for Los Altos at its February 9, 2016 meeting. At its February 9 and February 23, 2016 meetings, Council finalized the steps for membership in SVCEA and establishment of a CCA for the City. Mayor Bruins was appointed as the SVCEA regular member of the Board of Directors and Commissioner Don Bray as the alternate member.

DISCUSSION

SVCEA held its initial Board of Directors' meeting at the Santa Clara Board of Supervisors chambers on April 13, 2016. The agenda packet and video of the monthly proceedings are available at http://www.svcleanenergy.org/app_pages/view/297.

The Environmental Commission will review SVCEA monthly agendas, materials and meeting summary notes for purposes of discussion at its Environmental Commission meetings. The results of Commission discussions and recommendations will be provided to Director Bruins. This is in accordance with the Work Plan project to provide resources to Director Bruins on policy and programs guidance. In the event the subcommittee needs to convene for items pertaining to SVCEA, the meeting will be agendaized to the public and will comply with requirements of the Brown Act.

Commissioner Bray attended the August 27, 2016 SVCEA Board of Directors' Power Supply workshop and will provide his comments and briefing of the meeting to the Commission. The PowerPoint presentation used at the workshop is Attachment A.

Attachments:

- A. August 27, 2016, SVCEA Board of Directors Power Supply Workshop presentation
- B. September 14, 2016, SVCEA Board of Directors Meeting agenda and materials (*to be distributed at the September 12, 2016 Commission meeting*)

Receive Silicon Valley Clean Energy Authority update and provide recommendations as needed



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City of Cupertino

Rob Rennie, Vice Chair
Town of Los Gatos

Liz Gibbons
City of Campbell

Daniel Harney
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County of Santa Clara

Howard Miller
City of Saratoga

Jim Griffith
City of Sunnyvale

**Silicon Valley Clean Energy Authority
Board of Directors Meeting**

Saturday, August 27, 2016
9:00 a.m. – 4:30 p.m.

Sunnyvale Community Center | Recreation Center
Neighborhood Room
550 E Remington Drive
Sunnyvale, CA

AGENDA

Call to Order

Roll Call

Public Comment on Matters Not Listed on the Agenda

The public may provide comments on any item not on the Agenda. Speakers are limited to 3 minutes each.

Regular Calendar

1) SVCE Power Supply Workshop

The Board will recess for lunch at 12:00 p.m. for 45 minutes.

Board Member Announcements

Adjourn

svcleanenergy.org

505 W Olive Avenue
Suite 130
Sunnyvale, CA, 94086



ELECTRICITY MARKET OVERVIEW

Silicon Valley Clean Energy Authority, Board Workshop

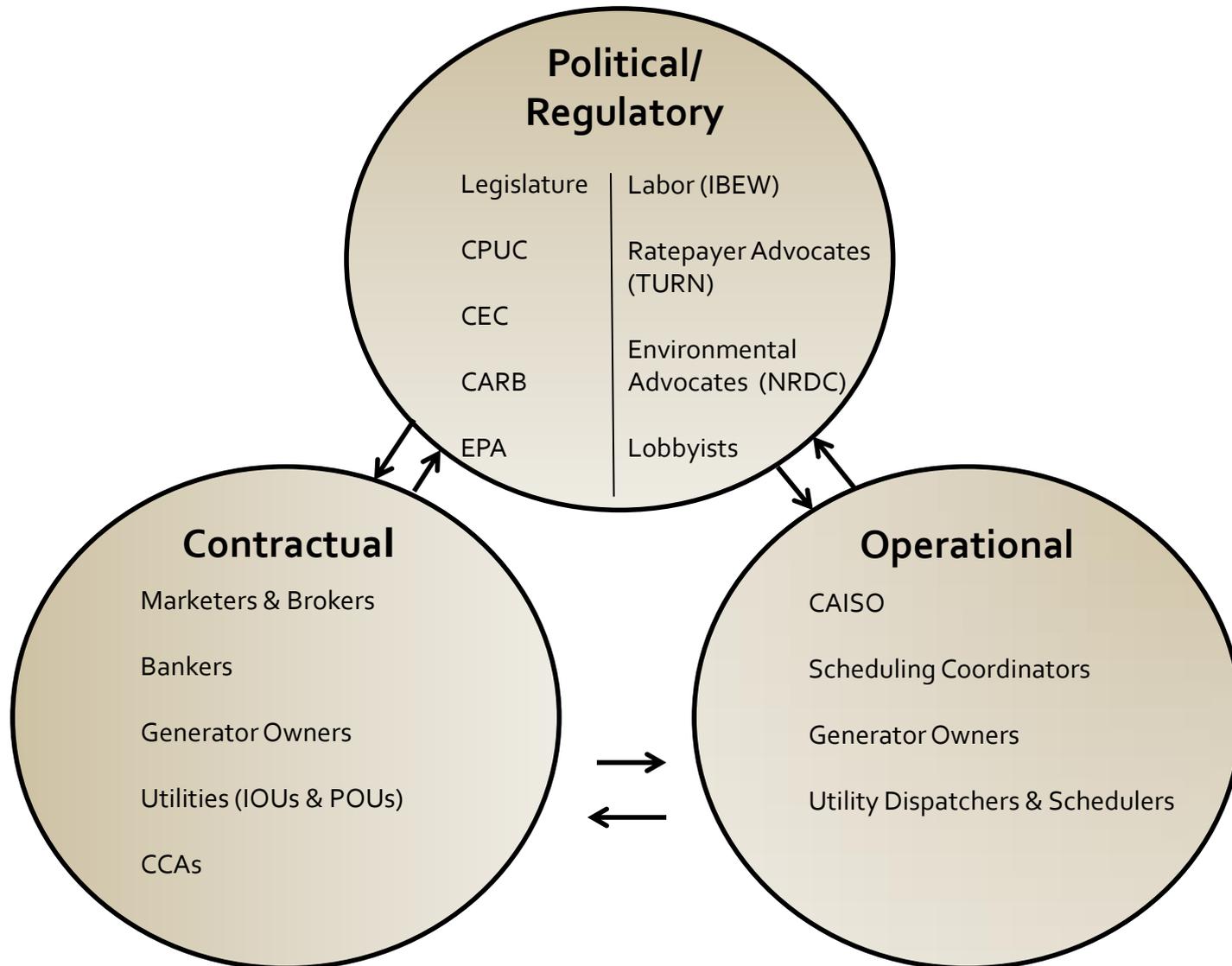
August 27, 2016



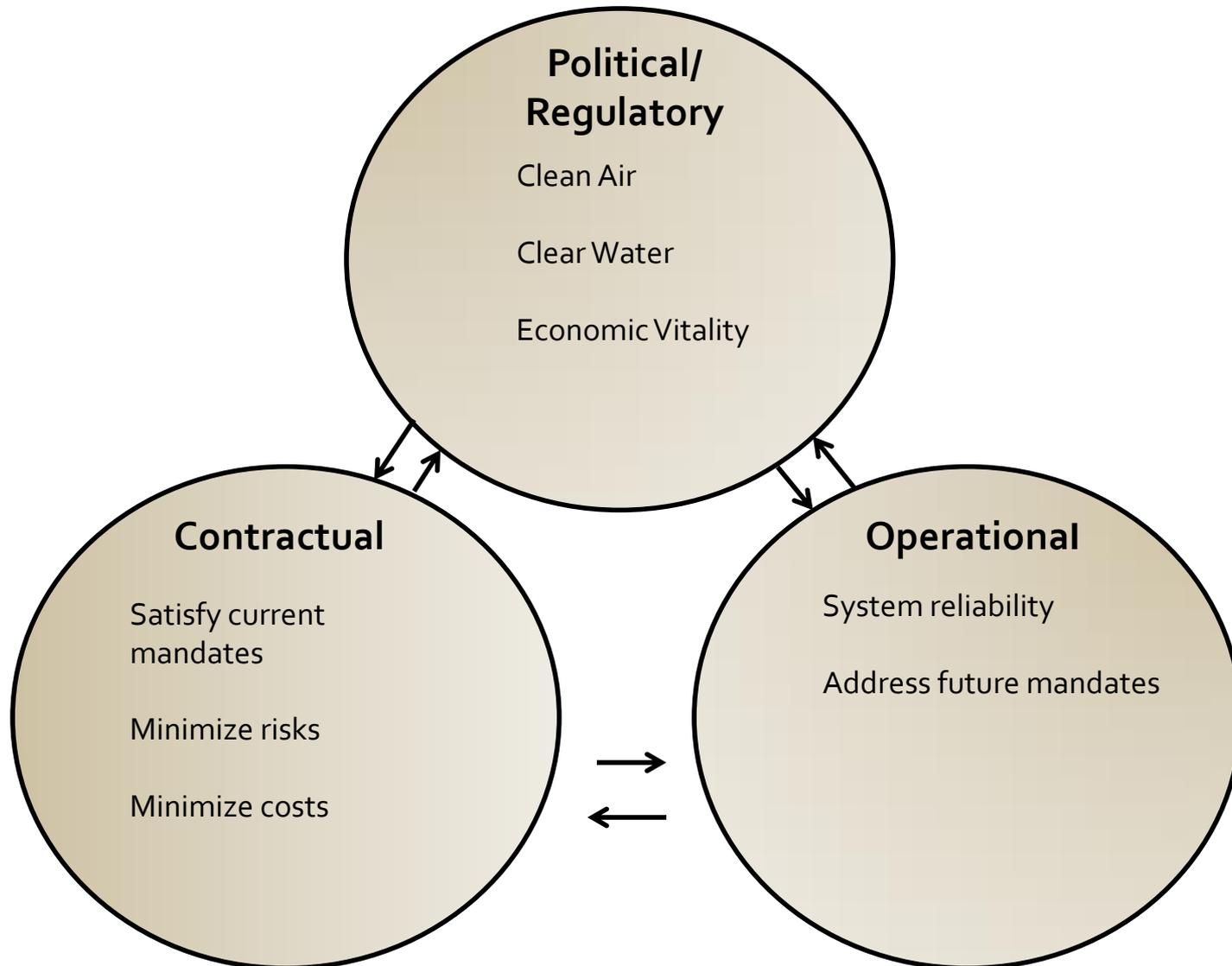
Workshop Overview – Key Topics

- Introduction: The World of Electricity – Participants, Ends and Means
- How The Grid Works: Overview
- Who's In Charge: Generation, HV Transmission and Distribution
- Generation Power Content: State and Local
- Independent System Operator (ISO): Functions and Oversight
- Energy Procurement: Products and Processes
- Clean Energy: Available Technologies and Key Considerations
- What Comes Next?

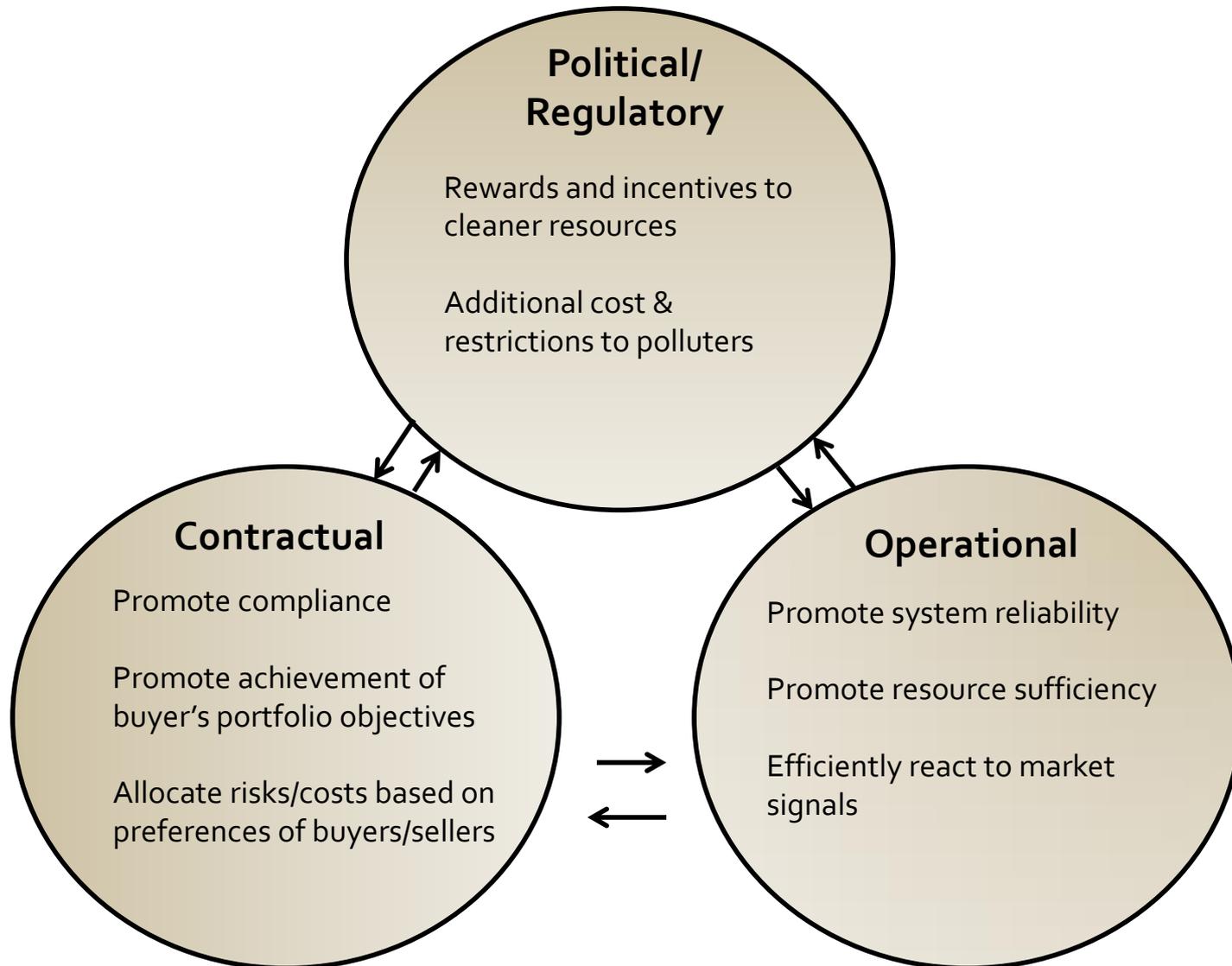
The World Of Electricity: Key Functions



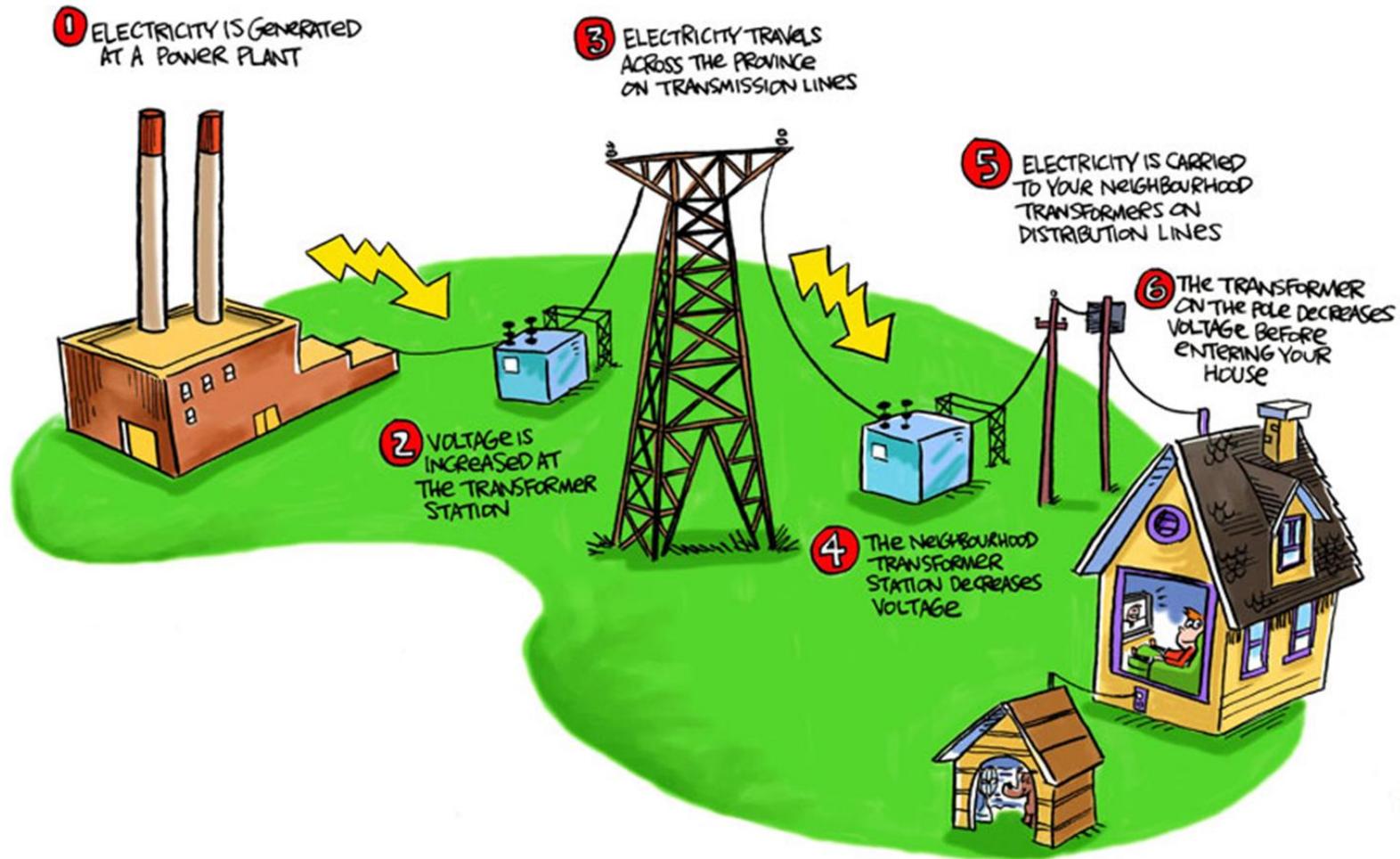
The World Of Electricity: Goals



The World Of Electricity

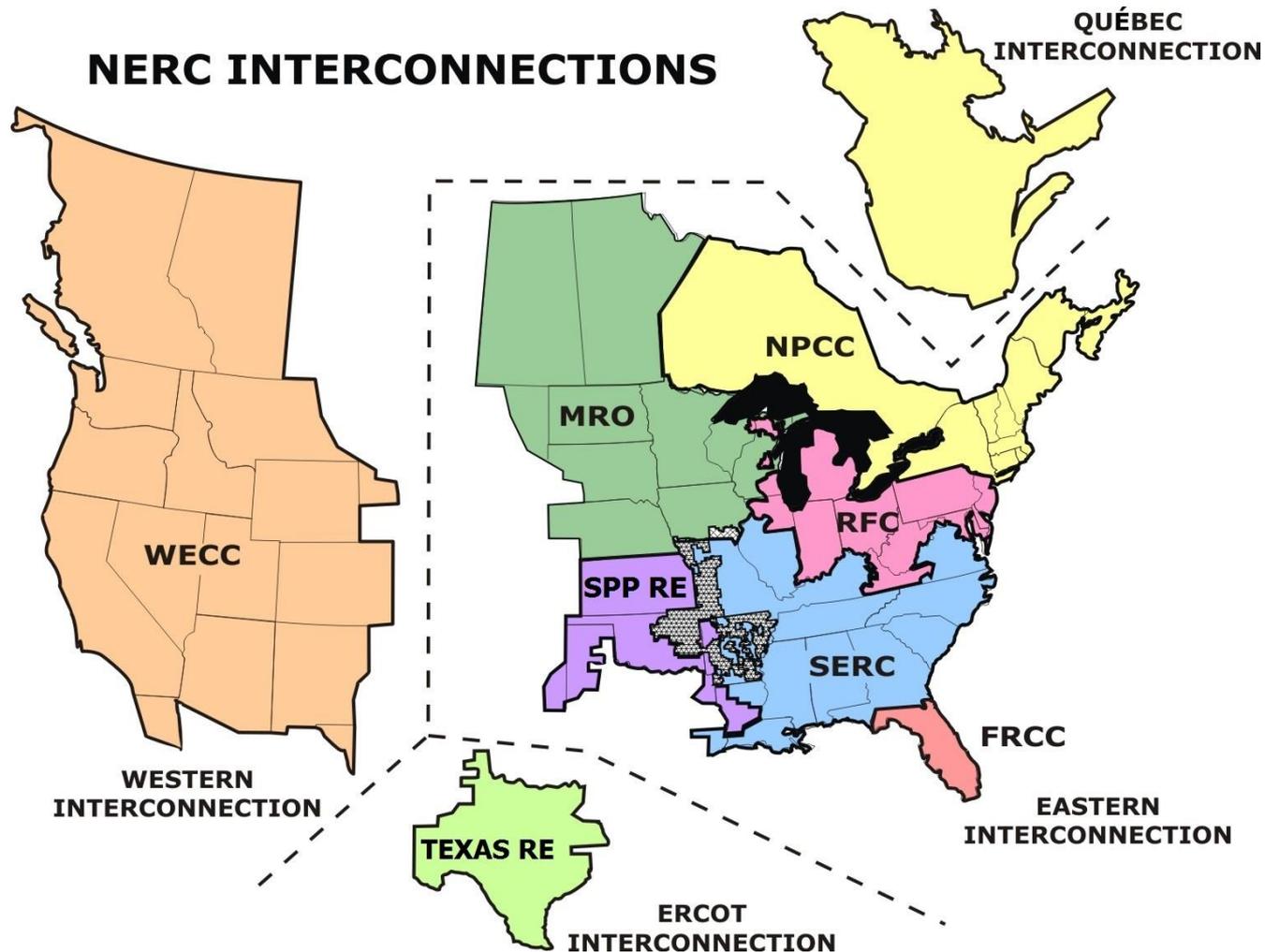


How "The Grid" Works: Utility Infrastructure



How “The Grid” Works: National Oversight

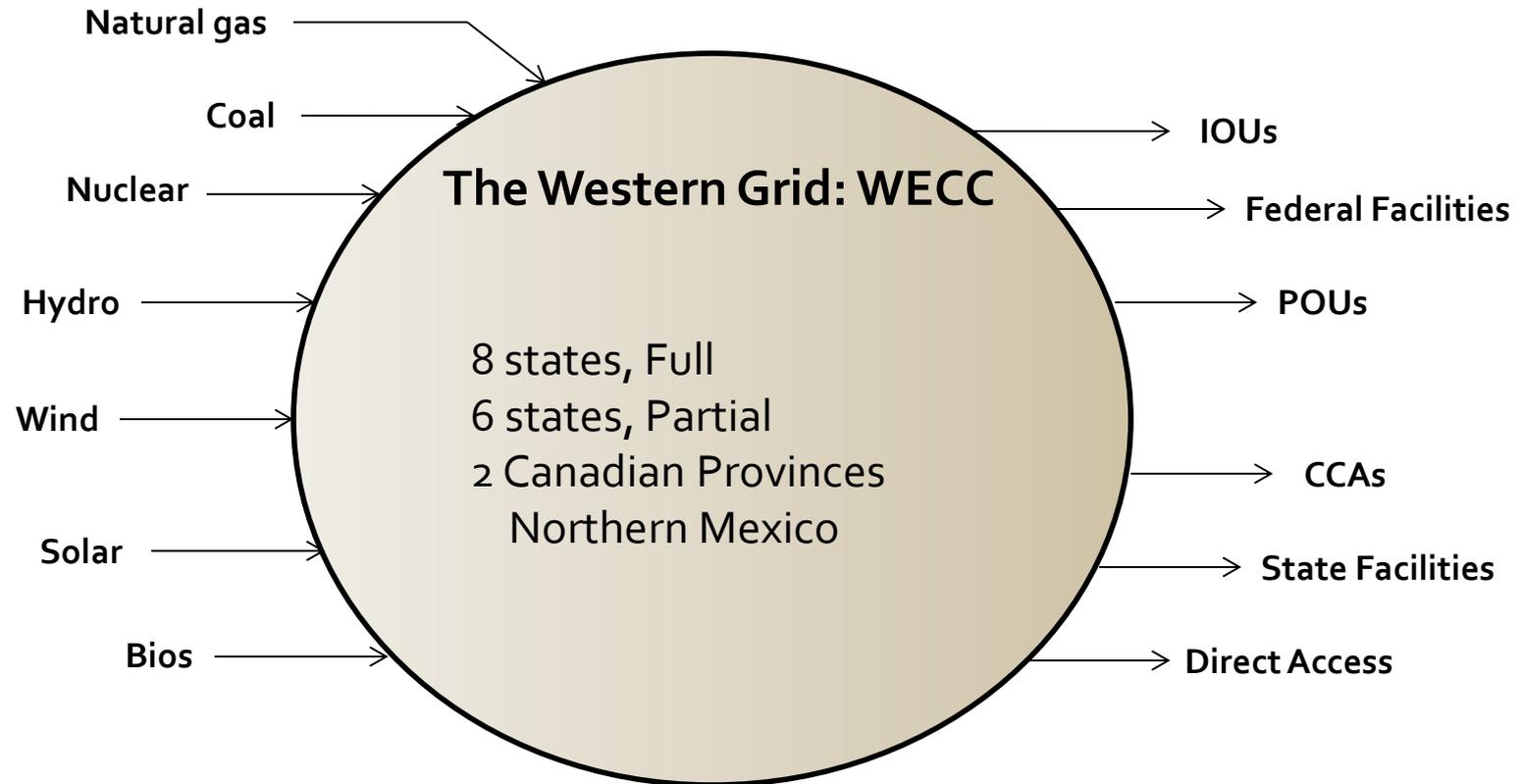
NERC = North American Electric Reliability Corporation



How “The Grid” Works: Sources & Sinks

Sources = Generation/Supply

Sinks = Electric Loads/Energy Users



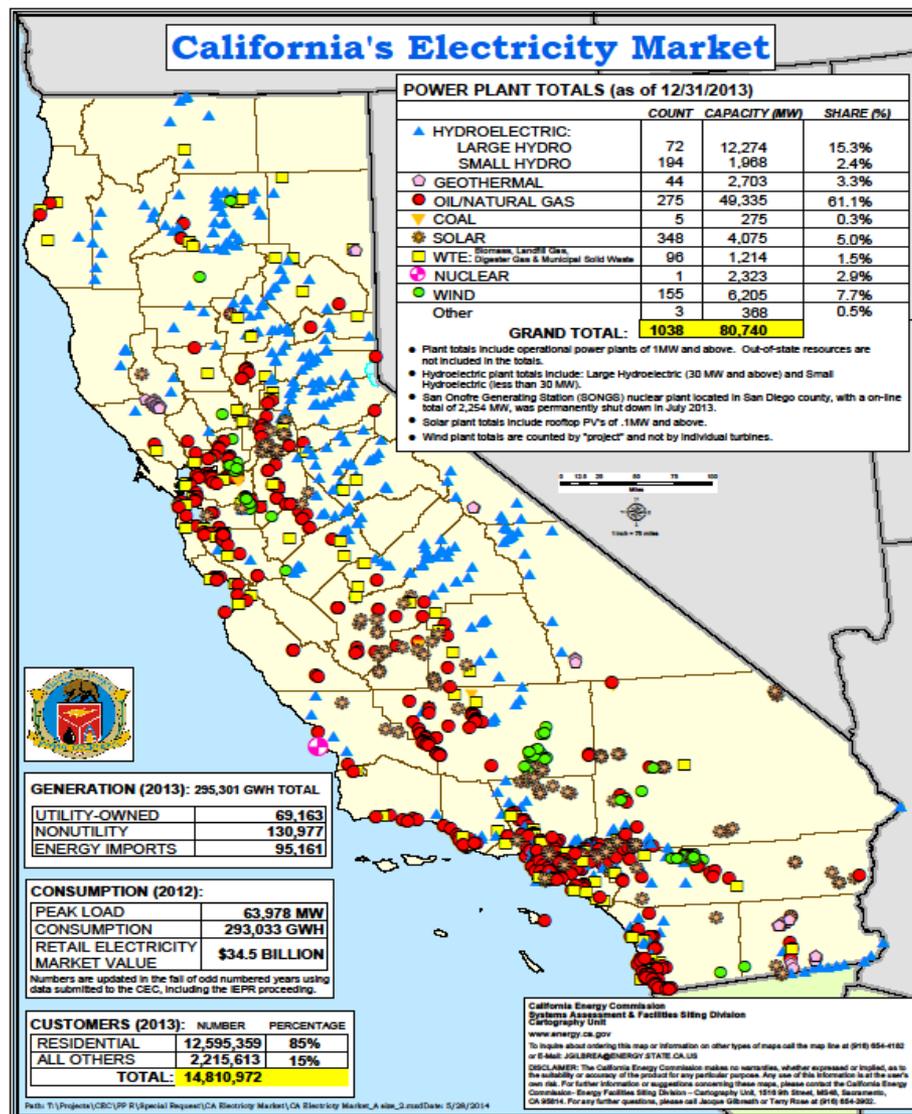
Who Manages the Grid?

- Balancing Authorities are responsible for real-time balancing of supply (generating resources) and demand (load) to ensure grid reliability.
- Eight Balancing Authorities in California, with the largest being the California Independent System Operator (CAISO).
- CAISO imbalance market extends beyond CA – movement toward regionalization.



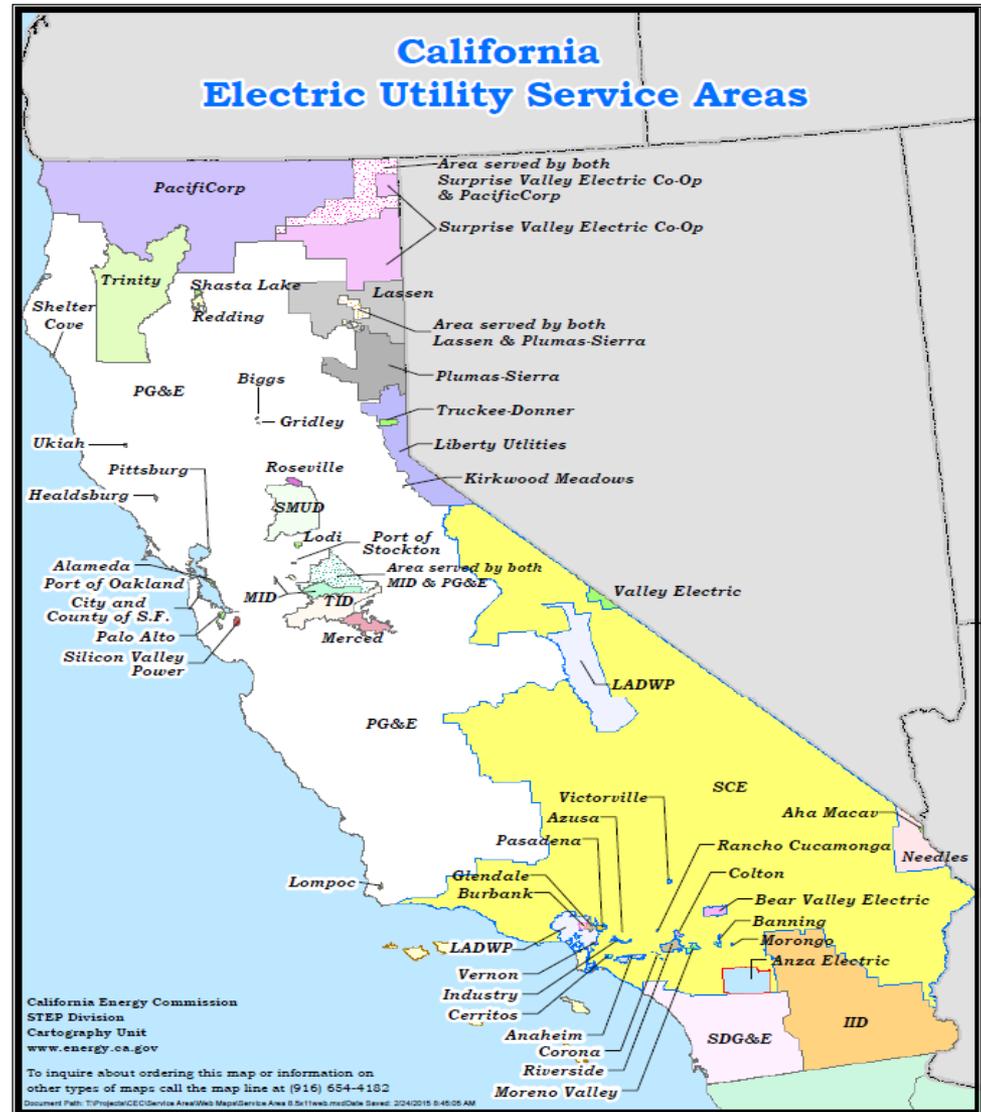
Who Generates Power?

- Over 1,000 electric generating units > 1 MW.
- Over 79,000 MW of generating capacity.
- ≈57% of capacity is natural gas.
- ≈66% of CA's energy is produced in-state.
- ≈ 12% is imported from NW.
- ≈ 21% is imported from SW.
- Approximately 24% of CA's generating capacity uses renewable fuel sources.
- 1,000 MW increase in solar PV capacity from 2014 to 2015.



Who Delivers Power?

- Distribution Utilities connect end-user to the transmission grid via distribution systems.
- 75% of electricity used in CA is delivered by investor owned utilities: PG&E, SCE and SDG&E.
- Public sector utilities deliver remaining 25%.



Power Content Accounting

- Once delivered to the grid, electrons are indistinguishable from one another.
- There is no way to physically track “green” vs. “brown” electrons.
- Accounting for electric power is “attribute based”.
- Power supply contracts specify ownership of product attributes (examples: electric energy volumes and RECs/emissions reductions).
- Owners of product attributes can make claims with regard to renewable energy content and environmental impacts.
- RECs, e-tags and contract documents are typically referenced to substantiate such claims.

California Power Content (2015)

“Contractual”

Fuel Type	California In-State Generation (GWh)	Percent of California In-State Generation	Northwest Imports (GWh)	Southwest Imports (GWh)	California Power Mix (GWh)	Percent California Power Mix
Coal	538	0.30%	0	16,903	17,735	6.00%
Large Hydro	11,569	5.90%	2,235	2,144	15,948	5.40%
Natural Gas	117,490	59.90%	49	12,211	129,750	44.00%
Nuclear	18,525	9.40%	0	8,726	27,251	9.20%
Oil	54	0.00%	0	0	54	0.00%
Other	14	0.00%	0	0	14	0.00%
Renewables	48,005	24.50%	12,321	4,455	64,781	21.90%
Biomass	6,362	3.20%	1,143	42	7,546	2.60%
Geothermal	11,994	6.10%	132	757	12,883	4.40%
Small Hydro	2,423	1.20%	191	2	2,616	0.90%
Solar	15,046	7.70%	0	2,583	17,629	6.00%
Wind	12,180	6.20%	10,855	1,072	24,107	8.20%
Unspecified Sources of Power	N/A	N/A	20,901	18,972	39,873	13.50%
Total	196,195	100.00%	35,800	63,410	295,405	100

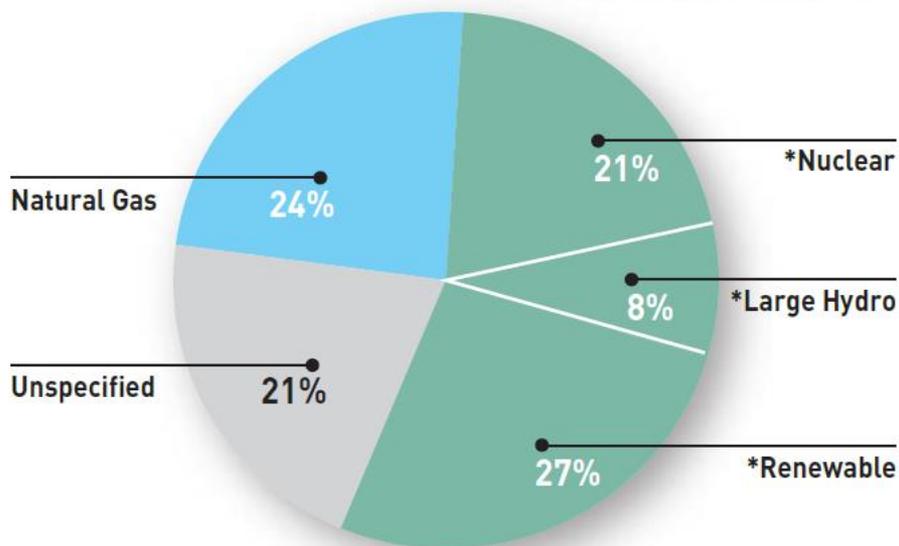
Source: California Energy Commission

PG&E Power Content – 2014

“Contractual”

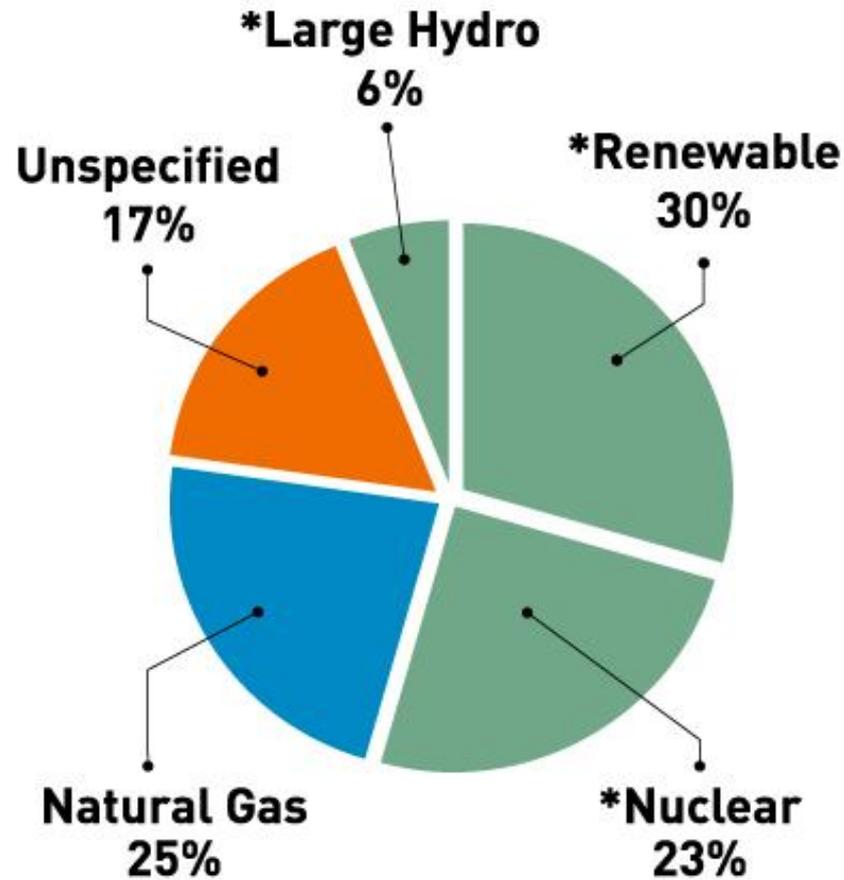
PG&E 2014 POWER MIX

*These resources are greenhouse gas-free and/or renewable



ENERGY RESOURCES	PG&E 2014 POWER MIX (Actual)	2014 CA POWER MIX* (For Comparison)
Eligible Renewable:	27%	20%
• Biomass and waste	5%	3%
• Geothermal	5%	4%
• Small hydroelectric	1%	1%
• Solar	9%	4%
• Wind	7%	8%
Coal	0%	6%
Large Hydroelectric¹	8%	6%
Natural Gas	24%	45%
Nuclear	21%	9%
Other	0%	0%
Unspecified**	21%	15%
TOTAL	100%	100%

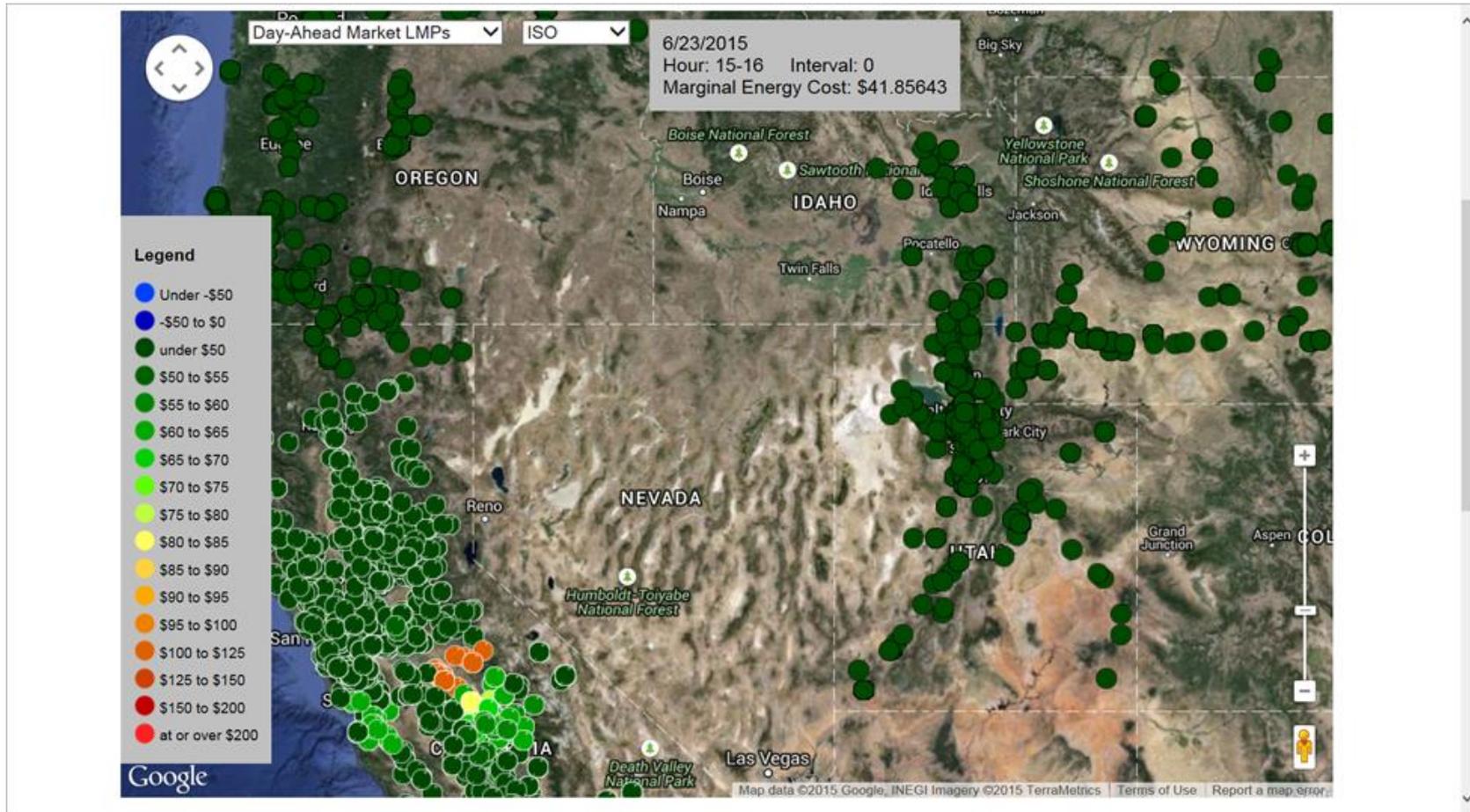
PG&E Power Content - 2015



Source: Pacific Gas & Electric Company

*Carbon-free resources; 58.2% total carbon-free (PG&E's 2015 PSDP annual report)

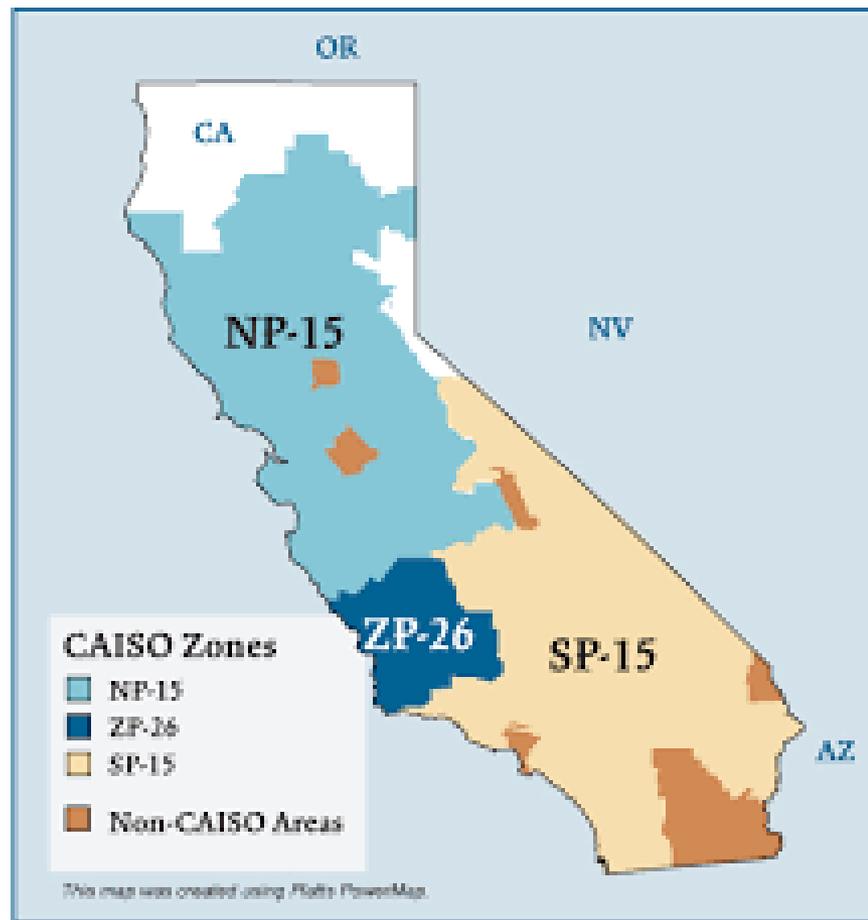
CAISO Electricity Market – Nodal Pricing



Source: California Independent System Operator

CAISO Trading Hubs

- Trading hubs: aggregated pricing nodes corresponding to CAISO transmission zones.
- NP-15 and SP-15 are actively traded delivery points in the wholesale power market.
- Trading hub vs. DLAP.



CAISO Centralized Energy Market

Load = 100 MW
P_Load = \$27.50



\$2,750



\$2,250

Gen1 = 75 MW
P_Gen1 = \$30



\$500



Gen2 = 25 MW
P_Gen2 = \$20

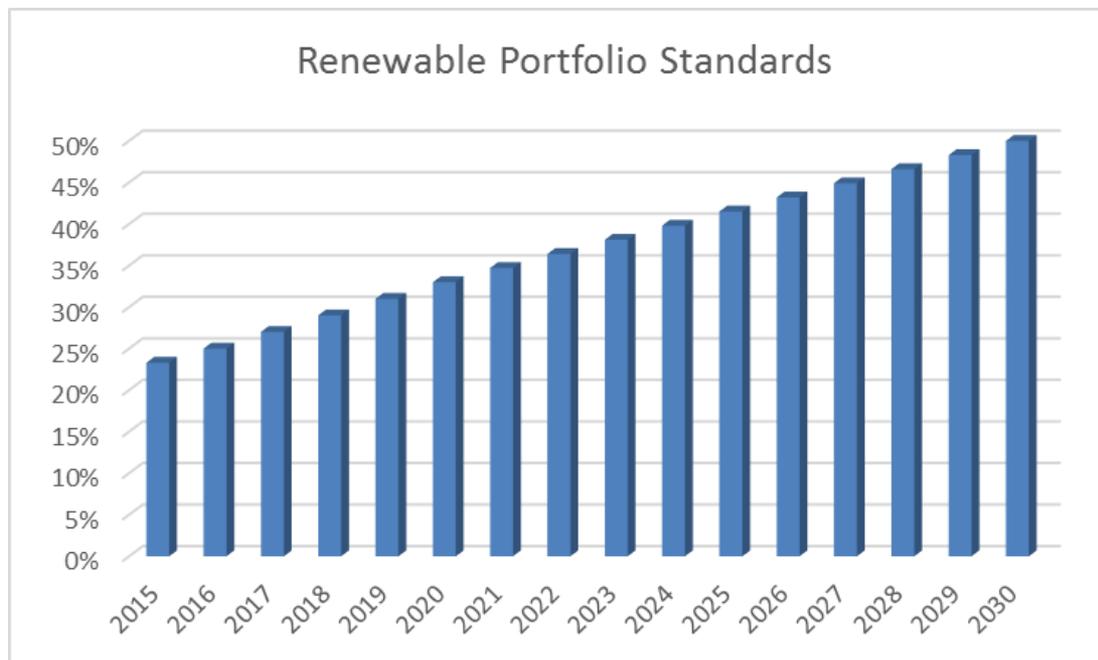
Energy Products & Services for CCAs

- **Electric Energy:** procured through term energy contracts (which mitigate price risk) or market purchases (which may reduce near-term costs but also expose CCAs to market volatility).
- **Renewable Energy:** procured to meet RPS mandates, support voluntary targets and supply specific retail product offerings.
- **Other Specified Energy Products:** GHG-free energy (typically hydro) and non-RPS-eligible renewable energy; generally procured to meet internally defined policy objectives.
- **Resource Adequacy Capacity:** procured to meet reserve capacity requirements.
- **Scheduling Coordinator Services (“SC” services):** SCs schedule forecasted hourly load, report usage, and settle transactions with the CAISO.
- **Contracting Options:** Variety of contracting options are available in regards to term (short-, mid-, long-), pricing structure (fixed or index+), and development status (new or existing).

Acquisition of Electric Power

- Buyers and sellers can transact for future electricity deliveries through bilateral contracts.
- Forward contracts provide price certainty for duration of contract term, reducing exposure to CAISO price volatility.
- Contracts are also used to obtain certain attributes such as renewable energy certificates or carbon claims.
- Without owning product attributes, claims cannot be made with regard to renewable energy content or carbon intensity.
- Forward contracts often specify electricity delivery during defined time periods (i.e., peak, off-peak or around the clock) or based on generator availability, which may be intermittent.

Renewable Energy Procurement



- California's Renewables Portfolio Standard (RPS) specifies renewable energy procurement obligations through 2030 (SB 350, 50%).
- Load Serving Entities, including CCAs, must demonstrate that specified proportions of annual electricity sales were procured from qualifying renewable energy technologies.
- Compliance is demonstrated annually by ownership of renewable energy certificates or "RECs".

Renewable Energy Procurement (Cont'd)

- ALL renewable energy production is substantiated via REC ownership.
- In the western U.S., RECs are tracked through a centralized accounting system, known as WREGIS (Western Renewable Energy Generation Information System), to ensure that renewable energy purchases are not double counted.
- Compliance is measured over multi-year periods with interim progress reported and tracked annually.

Renewable Energy Procurement (Cont'd)

- Various contracting mechanisms/products are permissible under RPS rules, subject to specified minimums/maximums:
 - Bucket 1 – Located in-state or dynamically scheduled into CA (RECs delivered contemporaneously with electric energy)
 - Bucket 2 – Firmmed/shaped imports into CA (REC and energy quantities are balanced annually)
 - Bucket 3 – Unbundled RECs (RECs are sold separately from energy)
- Detailed compliance obligations for 2021-2030 are currently under development (SB 350).

Resource Adequacy Capacity

- LSEs must secure/procure capacity for projected monthly peak loads plus 15% reserve margin.
- Reserve capacity is also referred to as “Resource Adequacy” or “RA” – a separate product from energy.
- Procuring capacity reserves helps ensure that sufficient generation is available to maintain grid reliability.
- Additional requirements apply to RA procurement: geographic and operating flexibility specifications.
- RA capacity is transacted bilaterally (i.e., no organized market).

Specifying Source in Energy Contracts

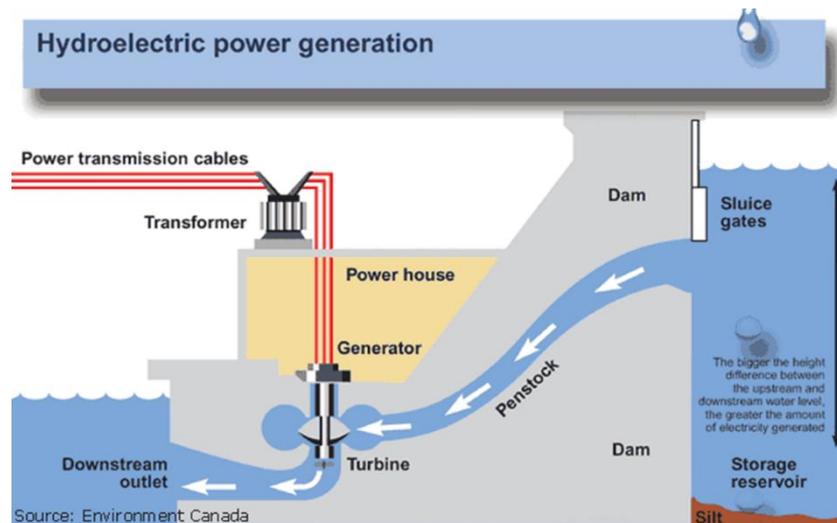
- Specified source purchases are reported on Power Content Label under appropriate fuel category:
 - Renewable energy purchases by generating technology/fuel source
 - Unit specific purchases by fuel source
- Purchases from CAISO market and contract purchases of system power are reported as “Unspecified”.
- Specified source contracts are typically sold at a premium (relative to unspecified) due to reduced supplier flexibility.
- Specified source contracts from out-of-state generators may require additional documentation (e-tags) to demonstrate CA delivery.

Greenhouse Gas Reporting

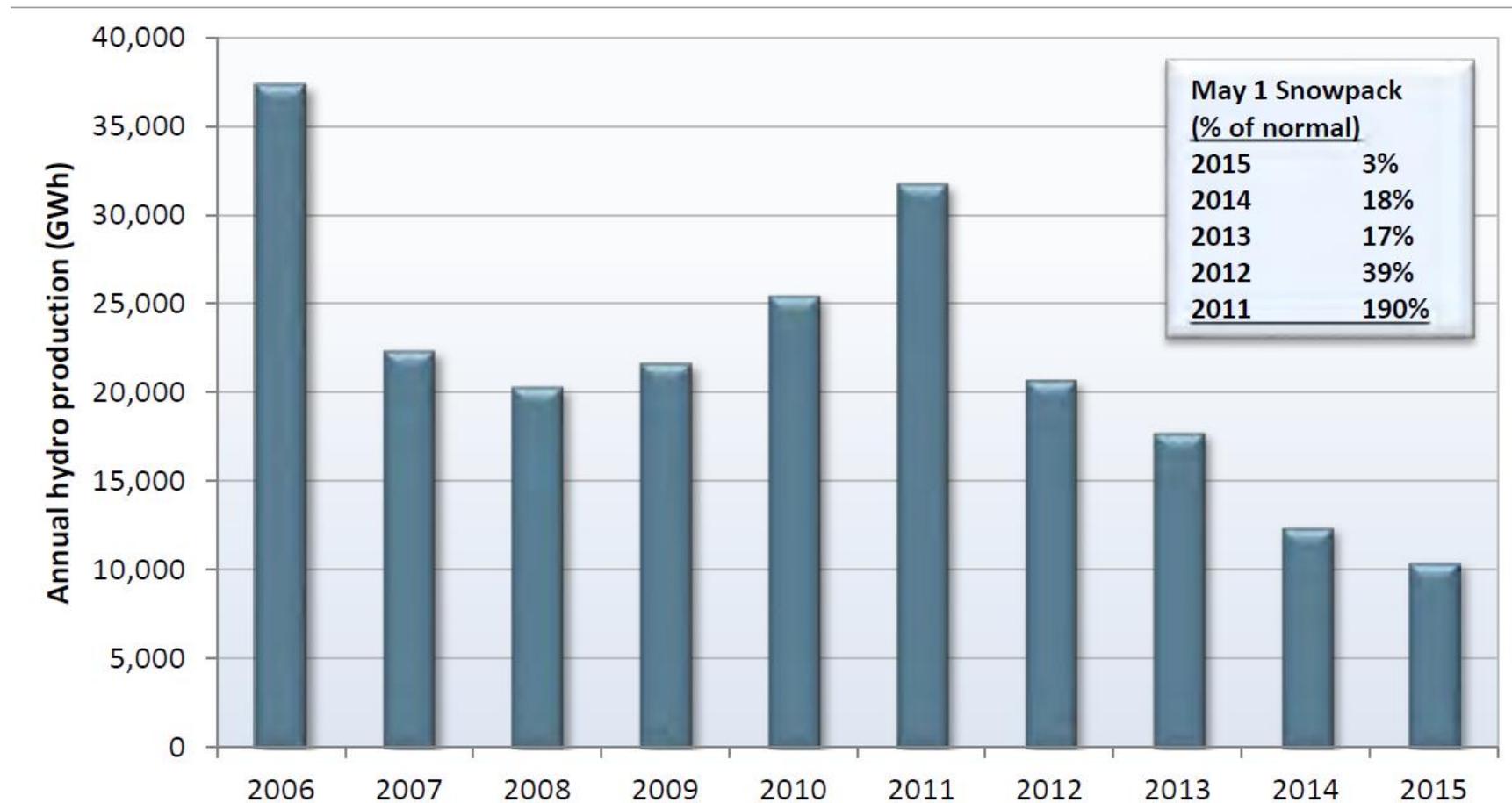
- Many load serving entities voluntarily report GHG portfolio emissions to their retail customers.
- Voluntary standards such as The Climate Registry's protocol are commonly used, but no single methodology is universally adopted or required.
- Renewable energy, hydro-electric energy and nuclear energy are generally considered carbon-free (or nearly carbon free).
- Unbundled RECs are commonly used to reduce reported portfolio GHG emissions, but some entities disregard unbundled RECs in GHG reporting.
- Potential legislative/regulatory changes may clarify treatment of unbundled RECs in GHG emissions reporting (AB 1110, Ting).

Sources of Power Generation – Hydro

- In California, dams smaller than 30 MW are considered RPS-eligible.
- Generators above 30 MW are considered “large hydro” (GHG-free).
- California’s drought has reduced hydropower production and increased natural gas generation:
 - During the first half of 2014 ~ 10% of California’s total electricity generation
 - Average 2004 – 2013 ~ 20%

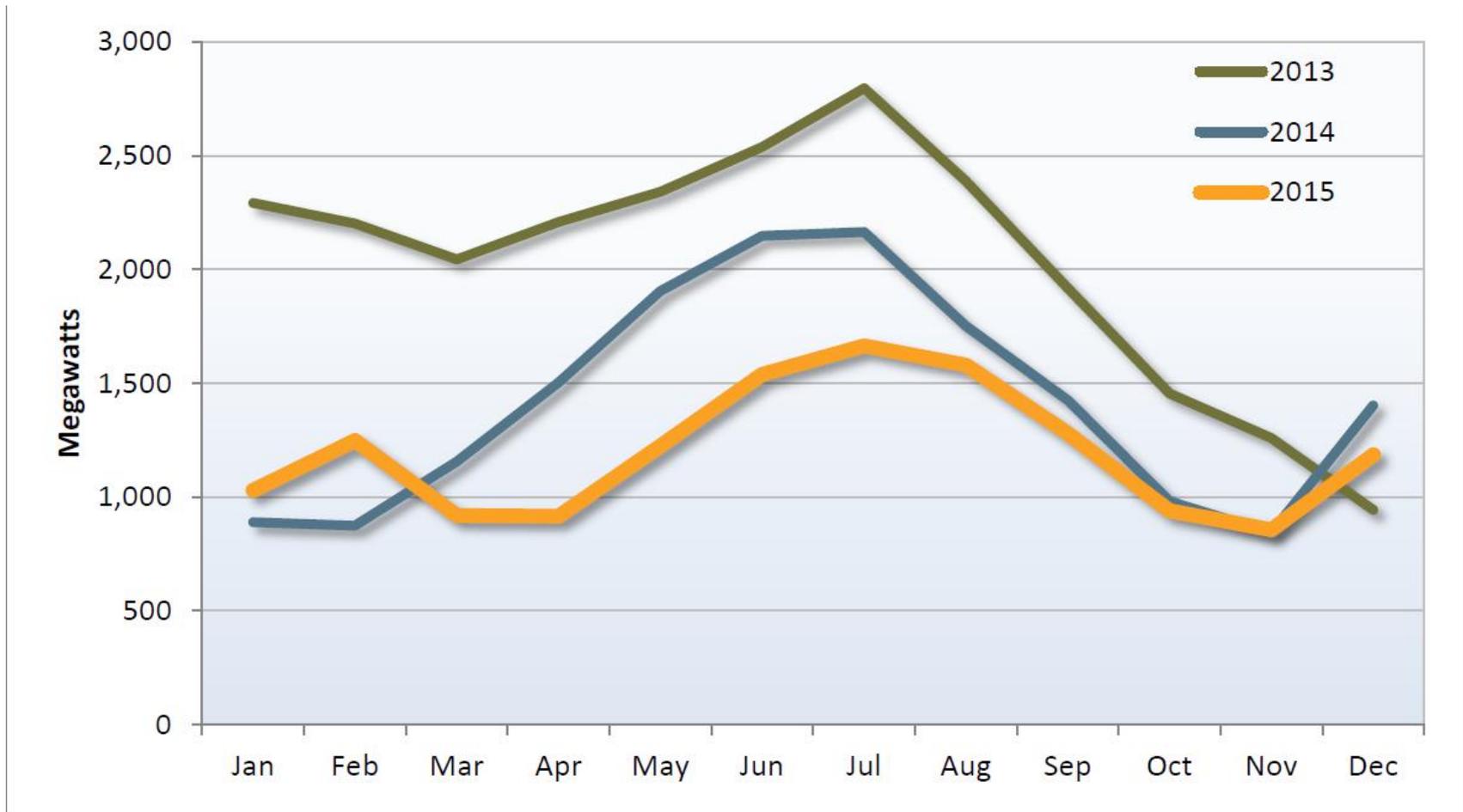


California Hydroelectric Production



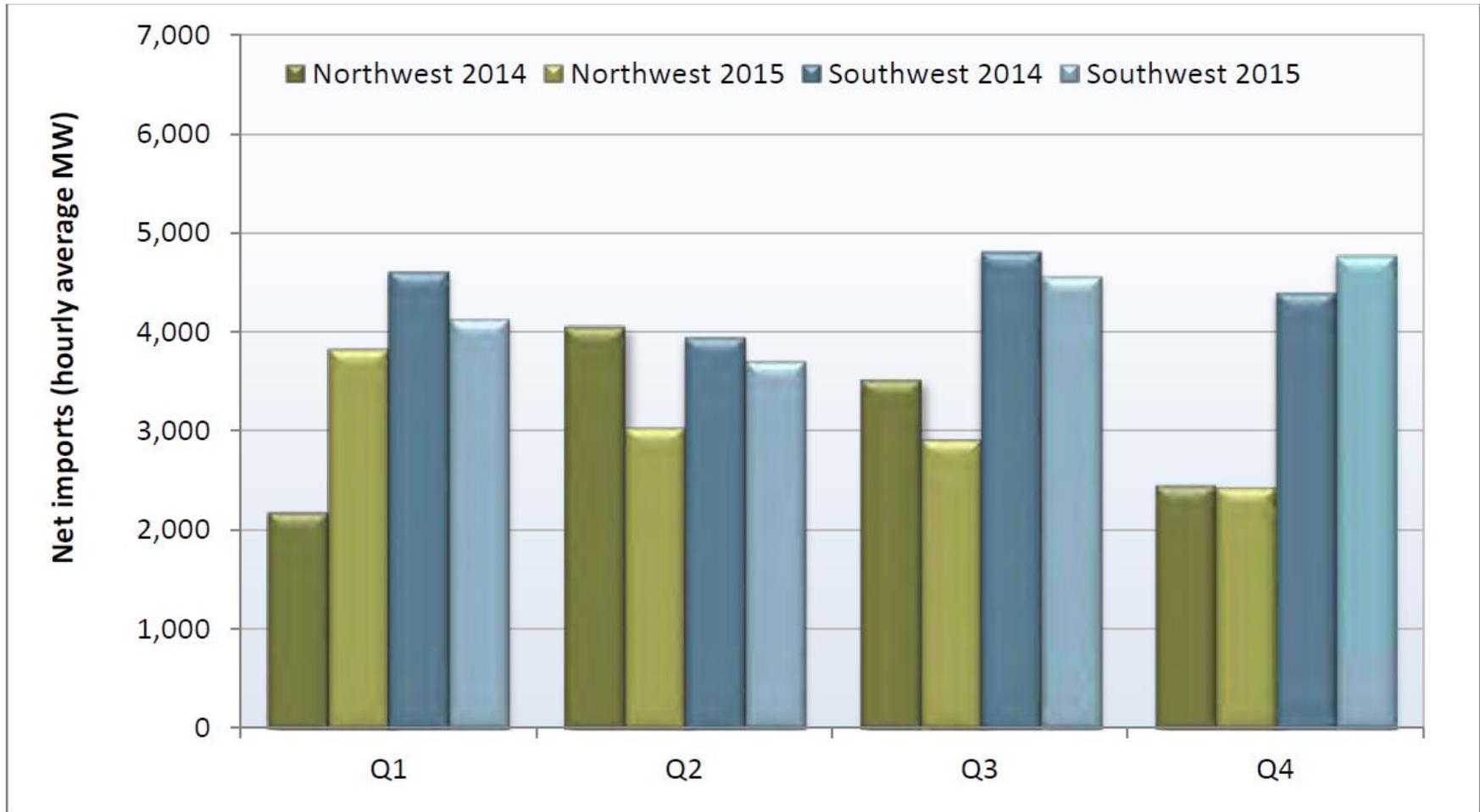
Source: California Independent System Operator

Seasonal Hydroelectric Production



Source: California Independent System Operator

California's Imported Electricity



Source: California Independent System Operator

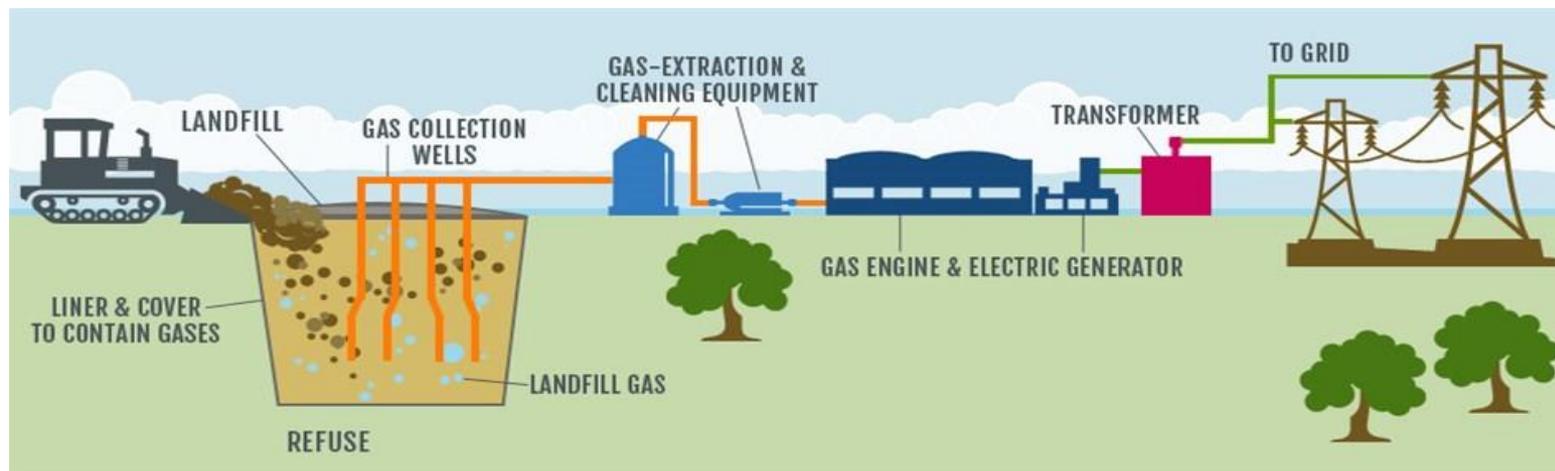
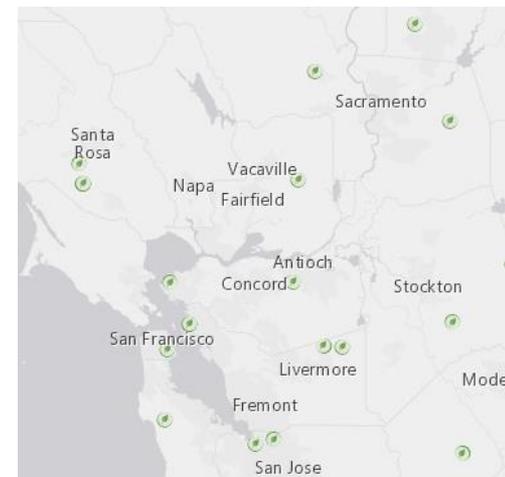
Sources of Power Generation – Wind

- One of the largest renewable resources.
- Relatively inexpensive – sometimes cheaper than gas.
- Power supply is intermittent.
- Aesthetic concerns – turbines on ridgelines.
- Avian fatalities – turbines responsible for 0.01% of human-caused bird fatalities.



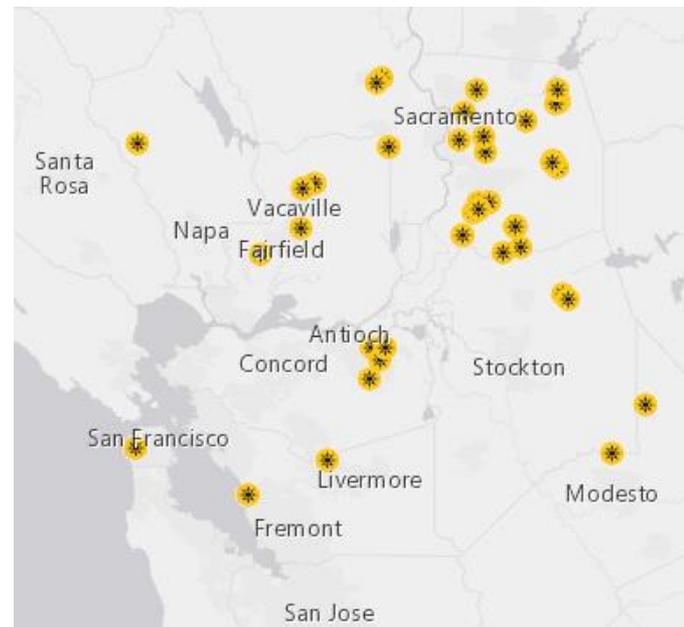
Sources of Power Generation – Biogas

- Produced through the anaerobic digestion of biodegradable materials such as manure, sewage, waste and plant material.
- Uses material that is already part of the carbon-cycle.
- Carbon-emitting, but an overall decrease in emissions through complete process.



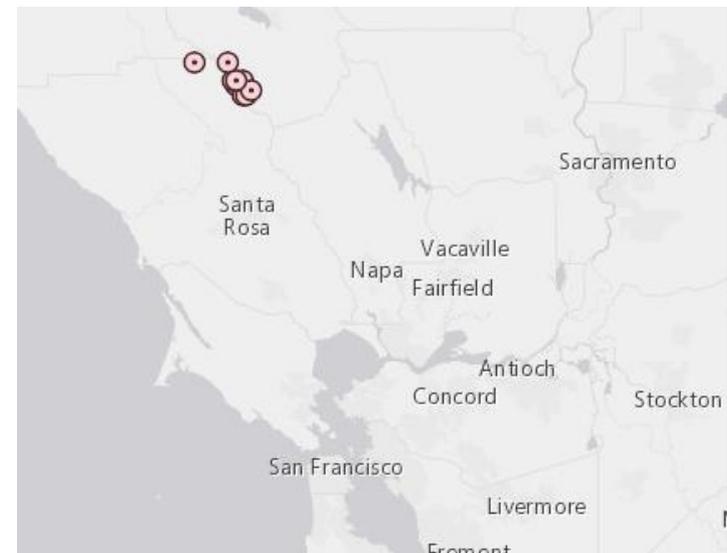
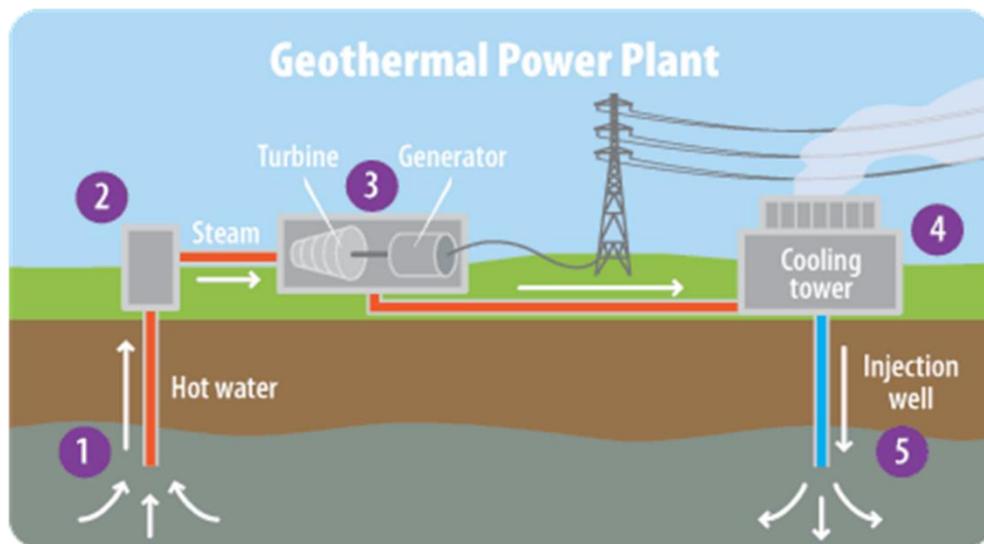
Sources of Power Generation – Solar

- A rapidly growing and “preferred” renewable resource.
- Different technologies available, though photovoltaic is dominant.
- Power supply is intermittent but near-term delivery profile is predictable.
- Potential for wildlife disturbance, agricultural land conversion.

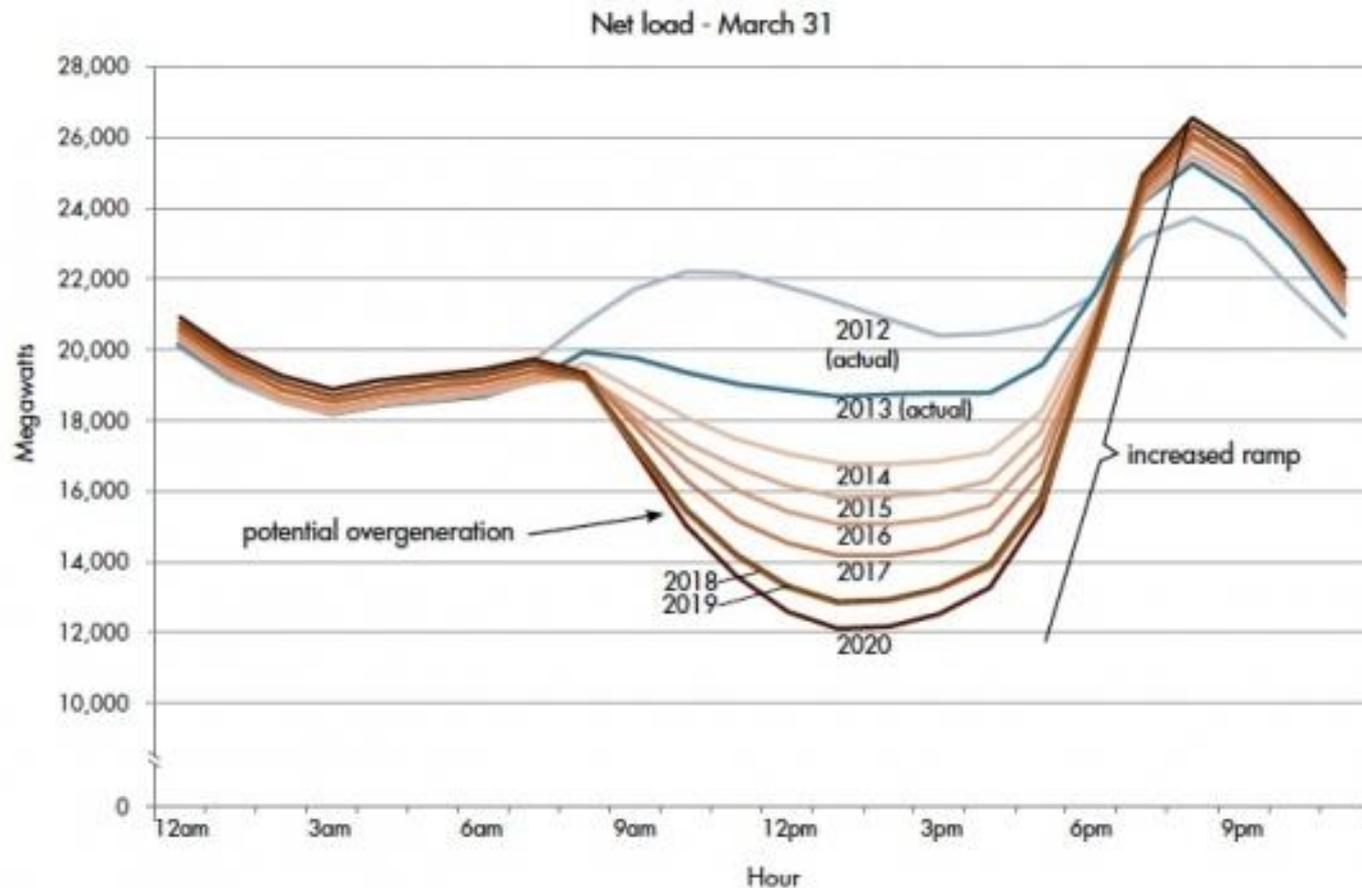


Sources of Power Generation – Geothermal

- Very low-carbon emitting generation process.
- Generates electricity using heat from the earth's core.
- Generating potential is regionally isolated.
- Requires large amounts of water.
- Large facilities create potential for wildlife disturbance.
- Causes minor (only) local earthquakes.



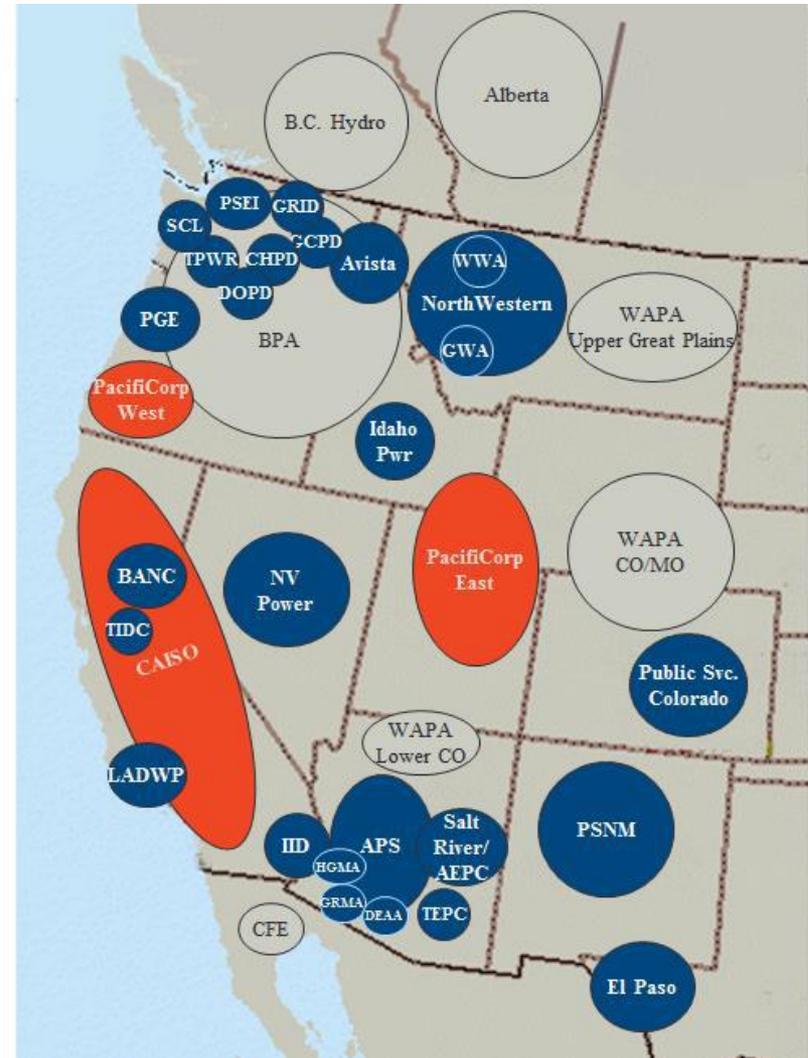
Evolving Grid Patterns



Source: California Independent System Operator

Regionalization

- SB 350: Transform CAISO into regional organization (if determined to be in CA's best interest)
- Recent studies indicate variety of benefits:
 - Reduced costs
 - Renewable integration
 - Reduced emissions



Source: CAISO/Brattle Group

California Regulatory Agencies – Electric

- California Public Utilities Commission (CPUC): Regulates the investor owned utilities (i.e., PG&E, SCE, and SDG&E), but also regulates capacity reserve and RPS compliance of CCA's.
- California Energy Commission (CEC): Primary energy policy and planning agency in California – areas of focus include long-term forecasting, planning for energy emergencies, generator permitting and certification as well as promoting energy efficiency and renewable technologies.
- California Air Resources Board (ARB): Objectives are to maintain healthy air quality and to promote approaches for compliance with air pollution rules and regulations.



California Air Resources Board

- CARB, through its Mandatory Reporting Requirement and cap and trade program, regulates sources of GHG emissions:
 - Electricity Generators within CA
 - Importers of electricity to CA
- Point source emitters (generators or importers) must obtain GHG allowances under the cap and trade program and report emissions to CARB.
- CARB does not regulate load serving entities, and retail portfolio emissions disclosure is outside of CARB's purview.
- Unbundled RECs cannot be used to offset a reporting entity's GHG emissions to CARB.

The Road Ahead

- **Regionalization**

Support renewable resources to all regions and service territories throughout the Western Interconnect

- **Local Renewables**

Use set aside funds to expand local renewable and energy storage facilities

- **Electrification and Fuel Switching**

Support actions that will shift demand from Fossil Fuels to renewable resources

- **Energy Efficiency**

Prepare to absorb funding and consolidate energy efficiency programs implementation