Clean Power and Electrification Pathway – Southern California Water Dialogue

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About Southern California Edison

**Who We Serve**
We delivered more than 87 billion kWh of electricity in 2015 and powered a total of
- 15 million people
- 180 incorporated cities
- 15 counties
- 50,000 square miles of service area
- 5,000 large businesses
- 280,000 small businesses

**How We Do It**
To deliver power safely, reliably and affordably, we monitor and maintain a vast electricity system:
- 12,782 miles of transmission lines
- 90,401 miles of distribution lines
- 1,433,336 electric poles
- 720,800 distribution transformers
- 2,959 substation transformers

Source: https://www.sce.com/wps/portal/home/about-us/who-we-are
California Climate Policies – Timeline

**2006-2010**
- CPUC authorizes Smart Meter investments by IOUs (2006)
- SB 107 (2006) – accelerates 20% IOU renewable target to 2010

**2016-2017**
- SB 32 (2016) – 40% GHG reduction from 1990 levels by 2030
- AB 2868 (2016) – added 500 MW storage investment
- CARB Updated Scoping Plan under SB32 (2017)

**2000-2005**
- SB 1078 (2002) – 20% renewables target for IOUs by 2017
- Executive Order S-03-05 (2005) – 80% GHG reduction policy target by 2050

**2011-2015**
- SB X1-2 (2011) – increases renewables targets to 33% by 2020 for all electric utilities
- CPUC authorizes 1,325 MW of storage investments by IOUs (2013)
- CPUC authorizes IOUs to own transportation electrification (TE) infrastructure (2014)

Source: Edison Insights Series: California’s Climate Policies and Transportation Electrification, April 12, 2017
California Climate Policies – Future Timeline

2018
- IOU Transportation Electrification proposals
- CARB Updated Scoping Plan
- Integrated Resource Plan
- 1.5 million electric vehicles
- Energy storage policy mandate

2020
- Reduce GHG emissions to 1990 levels
- 33% of electricity sales from renewables
- Once through cooling retires significant conventional generation
- New residential construction with zero net energy
- Reduce GHG emissions to 40% below 1990 levels
- 50% of electricity sales from renewables
- 4.2 million electric vehicles CPUC target
- Post 2020 cap-and-trade program

2025
- New commercial construction zero net energy
- Frame state energy efficiency savings

2030
- Target reduction of GHG emissions to 80% below 1990 levels

Achieving California’s expansive energy and environmental policy goals will require taking foundational steps to evolve the electric grid and further develop new technologies

Source: Edison Insights Series: California’s Climate Policies and Transportation Electrification, April 12, 2017
Emissions contributors

- The largest contributor is **transportation**, followed by the electric sector.

  Industrial, and commercial and residential sectors trail not too far behind.

- The most **practical and economical** way to create real change is for sectors to **work together** to find an affordable alternative to fossil fuels.
SCE’s integrated solution

Clean the power grid. And electrify.
Solution Part 1: Clean the power grid

By 2030, create an electric generation mix powered by at least 80% carbon-free resources.

- More solar, wind, hydropower and other zero-emission sources, along with battery storage.
- Currently at about 40%.
Solution Part 2: Electrify vehicles

By 2030, electrify 25% of cars and trucks – about 7 million in total.

Transportation accounts for 39% of emissions today.

Use zero-emission electric generation to power zero-emission vehicles.
Solution Part 3: Electrify buildings

- By 2030, electrify **one-third** of space and water heating in buildings.

- Buildings use **fossil fuels** for space & water heating, and they **don’t need to**.

- Now powered by clean, **affordable** electricity.
SCE’s Clean Power and Electrification is an alternate path to achieve California’s 2030 GHG reduction goals

SCE embarked in an economy-wide analysis of GHG reduction measures and paths aimed at generating an informed view on the optimum approach for meeting the state’s 2030 GHG reduction goals

- As a first step SCE developed an economy-wide view of the expected abatement from existing and expected policies along with the forecasted economic adoption of low carbon technologies and fuels.

- With this reference “economic” scenario, a gap of 48 millions of metric tons (MMT) CO2e remains to the 2030 emissions target.

- Analysis of the measures and paths with a framework of cost, feasibility to meet the 2050 goals resulted in the Clean Power and Electrification scenario as the measure set that represented the preferred end state.

- This future state requires further and faster de-carbonization of the electric sector, pushing to 70% renewables along with aggressive electrification of transportation (7M electric vehicles (EV) on the road) and buildings (~5.3M heat pumps in homes and up to 30% electrification of commercial space and water heating end uses).

- Increased transportation and building electrification only partially offsets future load losses from assumed Energy Efficiency (EE) and distributed solar photovoltaic (DGPV).
How RPS Requirements Are Changing TOU Periods
– “The Duck Curve”

By 2020, when 33% of CA's electricity is mandated to come from renewable resources, the net load 1/ curve is expected to look like a duck

The 33% RPS requirement is making mid-day energy less expensive through greater supply. Load net of wind and solar drops during the day and peaks in the late afternoon/early evening.

The California ISO (CAISO) has identified this over-supply condition to occur primarily in the Spring and on weekends.

SB350’s 2/ 50% RPS requirement will exacerbate this impact and emphasizes the urgency of this work.

California’s Investor Owned Utilities (IOU) are re-assessing their current TOU periods to determine the potential need to shift Time-of-Use (TOU) periods for all customer classes to later in the day.

Source: Net load curves for March 31, from 2012 to 2020, based on analysis by CAISO.

1/ Net Load as defined by the CAISO: The difference between forecasted load and forecasted electricity production from variable generation resources, wind and solar.
2/ SB350 (2015) increased CA’s commitment to clean power, including solar.
Future wholesale market electricity prices may offer opportunities for load management and opportunistic electricity use.
Preferred Resources Pilot (PRP)

**PRP Goal:** Validate the untested CAISO and CEC assumptions in the ability of a portfolio of DERs to deliver energy when, where, and for as long as needed.

**2018 PRP Milestone 1:**
- Demonstrate the ability to **acquire** and **deploy** a mix of preferred resources to offset demand expected in 2022 in the PRP region.
- **Measure** the deployed PRP resources performance capabilities for offsetting incremental load on six peak days in the PRP region and determining their capability to serve the load above a baseline value set by the 7th day peak level.

<table>
<thead>
<tr>
<th>Work Stream</th>
<th>Status</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition</td>
<td>✓</td>
<td>273 MW of DERs acquired.</td>
</tr>
<tr>
<td>Deployment</td>
<td>⇧</td>
<td>66 MW of the 273 MW deployed.</td>
</tr>
<tr>
<td>Operations</td>
<td>○</td>
<td>PRP resource testing will take place after sufficient resources are deployed currently forecasted for October 2018.</td>
</tr>
<tr>
<td>Measurement</td>
<td>⇧</td>
<td>Measurement data will be provided by the contracted resources providers once DERs are deployed.</td>
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</tbody>
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**Forecasted Deployment**

**2018 Planned Focus**
- Continue advocating for approval of PRP RFO 2 contracted DERs (105 MW).
- Support the deployment of an additional 42 MW of contracted DERs by 10/1/2018.
- Measure DERs contributions toward 2018 PRP Region peak and publish findings in 2018 PRP Milestone report.
Questions???

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