The Future of California's Buildings

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December 8, 2016
IFMA
In 2015 Gov. Brown announced new energy goals for 2030

- 50% increase in energy savings in existing buildings
- 50% increase in Renewable Portfolio Standard (RPS)
- 50% decrease in petroleum use
- ZNE for newly constructed nonresidential building by 2030 – get there in few code cycles (2013, 2016, 2019, 2022, 2025, 2028, 2031)
The California Energy Commission (CEC) defines ZNE as:

A **Zero-Net-Energy** Code Building is one where the net amount of energy produced by on-site renewable energy resources is equal to the value of the energy consumed annually by the building, at the level of a single “project” seeking development entitlements and building code permits, measured using the CEC’s Time Dependent Valuation (TDV) metric. A zero-net energy code building meets an energy use intensity (EUI) value designated in the Building Energy Efficiency Standards (BEES) by building type and climate zone that reflect best practices for highly efficient buildings.
2016 Standards Nonresidential Highlights

- Prescriptive insulation requirements have become more stringent for metal and wood-framed walls in certain climate zones.

- Occupant Sensing Control types shall be programmed to turn OFF all or part of the lighting no longer than 20 minutes (was 30 minutes) after the space is vacated.

- Acceptance testing required for controls requirements.

- New requirements for elevators that ensure the lights and fans do not stay on while the cab is empty.

- Directly conditioned space with operable roof or wall openings (typically fenestration) to have interlock controls that disable or reset temperature setpoint on thermostat if openings are open for more than 5 minutes.
Time Dependent Valuation (TDV)

- Value of gas and electricity changes depending on the season and the time of day
- Total of 144 hourly data sets (16 climate zones x 3 fuel types x 3 building types)
  - residential 30 year
  - nonresidential 15 year
  - nonresidential 30 year (high-rise)
- TDV consists of large data sets that convert electricity, gas or propane to TDV energy.
- Favors measures that save energy during high demand periods
## Components of TDV Value

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td>Estimate of hourly wholesale value of energy measured at the point of wholesale energy transaction</td>
</tr>
<tr>
<td>Losses</td>
<td>Losses between the appliance location and the point of wholesale energy transaction</td>
</tr>
<tr>
<td>Ancillary Services (A/S)</td>
<td>The costs of providing system operations and reserves for electricity grid reliability</td>
</tr>
<tr>
<td>System Capacity</td>
<td>The costs of building new generation capacity to meet system peak loads</td>
</tr>
<tr>
<td>Transmission &amp; Distribution (T&amp;D) Capacity</td>
<td>The costs of expanding transmission and distribution capacity to meet peak loads</td>
</tr>
<tr>
<td>Emissions</td>
<td>The costs of SOx, NOx, PM10, and CO2 associated with electricity production</td>
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</tbody>
</table>
Typical Daily Net Load Shapes for California

Winter: lighting, appliances, heating

Summer: air conditioning

Daily Peak Demand

Summer

Winter
The Future - 2019 Standards and ZNE

- Additional tradeoffs between solar reflectance (SR) and thermal emittance (TE) values for extreme climate zones (CZ), such as CZ15 (i.e. Palm Springs)

- Evaluate options for buildings that are not able to reach ZNE (i.e. energy intensive data centers or hospitals)

- Harmonize renewables, such as PV, with Grid – addressing potential for smart inverters and batteries

- More flexibility to adjust generation dispatch and loads can be a cost effective solution

- Community Solar - A building owner might also buy a share in an of-site community solar farm.
Smart Inverters

• A smart inverter must be adaptive and able to send and receive messages quickly, as well as share granular data with the owner, utility and other stakeholders.

• Allow technicians to diagnose O&M issues — including predicting possible inverter or module problems — and remotely upgrade certain parameters in moments.
California Laws to Promote Energy Storage

1. **AB 2868** requires the CPUC to direct the state’s 23 IOUs to speed up deployment of distributed energy storage by filing applications for new programs and investments of up to 500MW.

2. **AB 33** directs the CPUC and California Energy Commission to evaluate and analyze the potential for all types of long-duration bulk energy storage, such as pumped hydro, to help integrate renewable generation into the electric grid.

3. **AB 1637** provides an additional $249m in funding for the Self Generation Incentive Program.

4. **AB 2861** authorizes the CPUC to create an objective, expedited dispute-resolution process for distributed, behind-the-meter energy resources attempting to establish an interconnection to an IOU’s electricity distribution network.
AB 802 – mandates the establishment of a new statewide building energy use benchmarking and public disclosure program.

Benchmarking Provisions:
• Commercial buildings larger than 50,000 s.f. will be required to report submeter data in April of 2018!
• Sep. 1, 2019 the energy utility index (EUIs) will be publicly disclosed!
Energy Rebates

• Retrofit Program
  $0.24/kWh & $1.00/therm saved
  – AHU scheduling, night purge, supply air temperature reset, chilled/hot water pumping, etc.

• SDG&E Comprehensive Bonus: 20% bonus for participating in at least 3 Incentive categories
Other Incentives for Energy Efficiency

• Demand Response Program: Eligible customers can receive up to $300 per kilowatt (kW) of verified, dispatchable, fully automated on-peak load reduction.

• Savings By Design:
  – Up to $150,000 in building owner incentives
  – 10% and/or 20% bonus incentive opportunities in addition to the building owner incentive
  – Design assistance services and resources matched to the project needs

• Additional 10% rebate for Commissioning!

• Energy efficiency tax deduction
Thank you!

For questions please contact:

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