Interdisciplinary Panel: Impacts and Solutions Associated with Widespread ZNE Buildings on the Grid

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Panel Statement

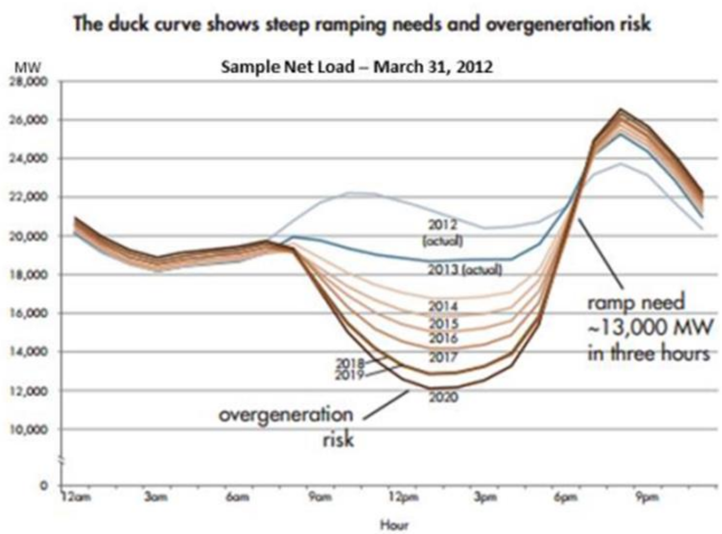
With widespread adoption of renewables (solar, wind) at the residential, commercial, and grid scale, the load profile of electricity is changing rapidly. Associated with this change are challenges and opportunities.

Questions/ Topics of Discussion

- Is the arrival and impact of the duck curve imminent or exaggerated? At the system level? At the local substation level? Are there particular months when the issue of over generation by PV is exacerbated? By when do you think this widescale, microgrid/solar adoption will reach a critical mass?
- How will electricity pricing be affected?
- How will customers deal with changing electric prices (both buying or selling)?
- Time dependent valuation – codes and standards- with solar and wind coming on board (both local and grid), how do you see TDV codes and standards changing?
- Grid-level energy storage- Please comment on current and future plans
- Internet of Things- Smart Building/Network of Buildings- Are there ways to implement dynamic demand-response to meet peak needs?
- Residential/commercial energy storage
  - Comments on the Solar City's "grid of the future"; Tesla's Powerwall
  - Could electric cars be used as electric storage?
  - Is there a role for thermal energy storage?
- Do you envision a scenario wherein a network of homes with electrical energy storage could become self sufficient (day and night)? What do you see as the role of utilities in a scenario where ZNE buildings produce and store their own electrical energy?
- Are there grid reliability issues with widespread ZNE buildings? Or would the grid be more robust as a result of these smaller (residential/commercial) building "power plants"?

Backup slide

Predicted duck curve in March



(from the California Independent System Operator)

Table 2: California Natural Gas-Fired Power Plants Summary Statistics for 2011

	Capacity (MW)	Share of Capacity	GWh	Share of GWh	Capacity Factor	Heat Rate (Btu/KWh)[1]
Total Gas	45,850	100.0%	95,775	100.0%	23.8%	7,855
Combined Cycle Plants [2]	17,163	37.4%	55,368	57.8%	36.8%	7,303
Aging Plants [3]	15,964	34.2%	5,679	5.9%	4.1%	11,989
Peaker Plants [4]	5,801	12.7%	1,654	1.7%	3.3%	10,705
Cogeneration [5]	6,070	13.2%	31,537	32.9%	59.3%	N/A
Other [6]	1,121	2.4%	1,538	1.6%	15.7%	9,378

2011 CEC report- 69 peaker plants in CA; up from 34 in 2001- peaker plants are very inefficient compared to baseload plants

Opportunities on generation side:

- increase efficiency of peakers
- Incorporate thermal storage at production level