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# Value of Solar as an Input into Electricity Pricing

## Panel – Dealing with the duck: How utilities are using pricing to address projected solar impacts

Presented by: Josh Schellenberg, Principal Consultant

2015 National Town Meeting on Demand Response and Smart Grid

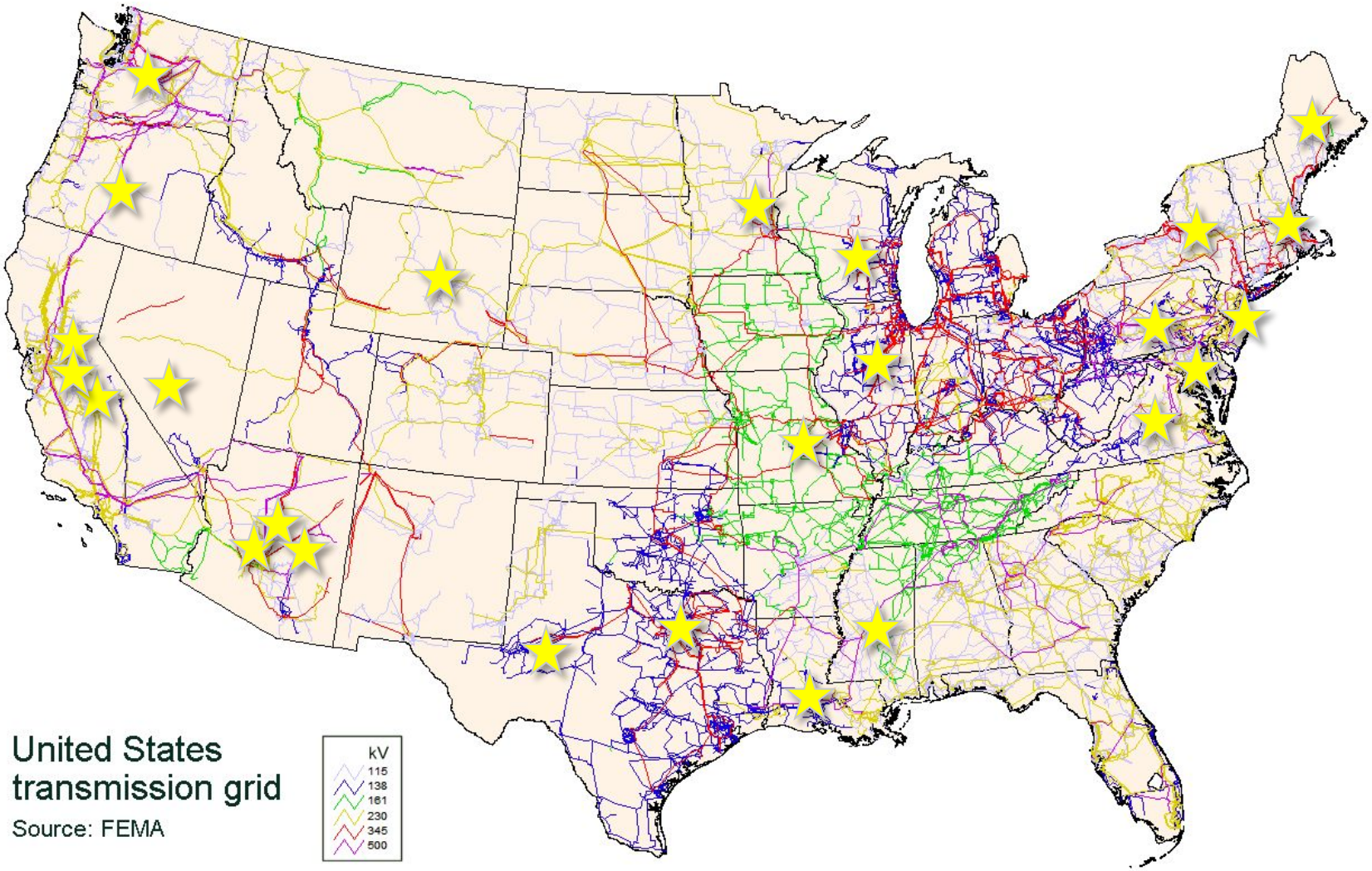
Washington DC

May 28, 2015

# ADS Pricing Working Group Meet-up

- This panel was organized by the ADS Pricing Working Group
- If you are interested in joining the group, please meet us for lunch (11:45 AM to 12:45 PM) at a reserved table in the Atrium to discuss upcoming activities for the Working Group
- ADS Pricing Working Group Mission
  - Identify and document innovative pricing options and strategies
  - Be a clearing house for objective, empirical evidence on pricing
  - Identify policy issues and barriers that impact time-varying pricing and provide objective input concerning how they might be addressed
  - Educate regulators and other policymakers
  - Transfer knowledge from those who have been in the industry for decades to those who will inform policy for decades to come

# Value of solar studies in these states have informed regulatory proceedings



# Value of solar studies and tariffs seek to understand the net value of distributed solar (usually on a per kWh basis)

| Category | Impact |
|---|---|
| **Energy** | Fuel / gen cost |
| | O&M costs (Fixed + variable) |
| | Fuel price hedge |
| | Market price response |
| **Capacity** | Generation capacity |
| | Ancillary services / costs |
| | T&D capacity |
| **Utility / cost to serve** | Lost revenue |
| | Administrative |
| | Interconnection |
| **Environmental** | Emissions (Carbon + Criteria pollutants) |
| | Water |
| **Social** | Resiliency |
| | Economic development |

# Typical value ranges of key components

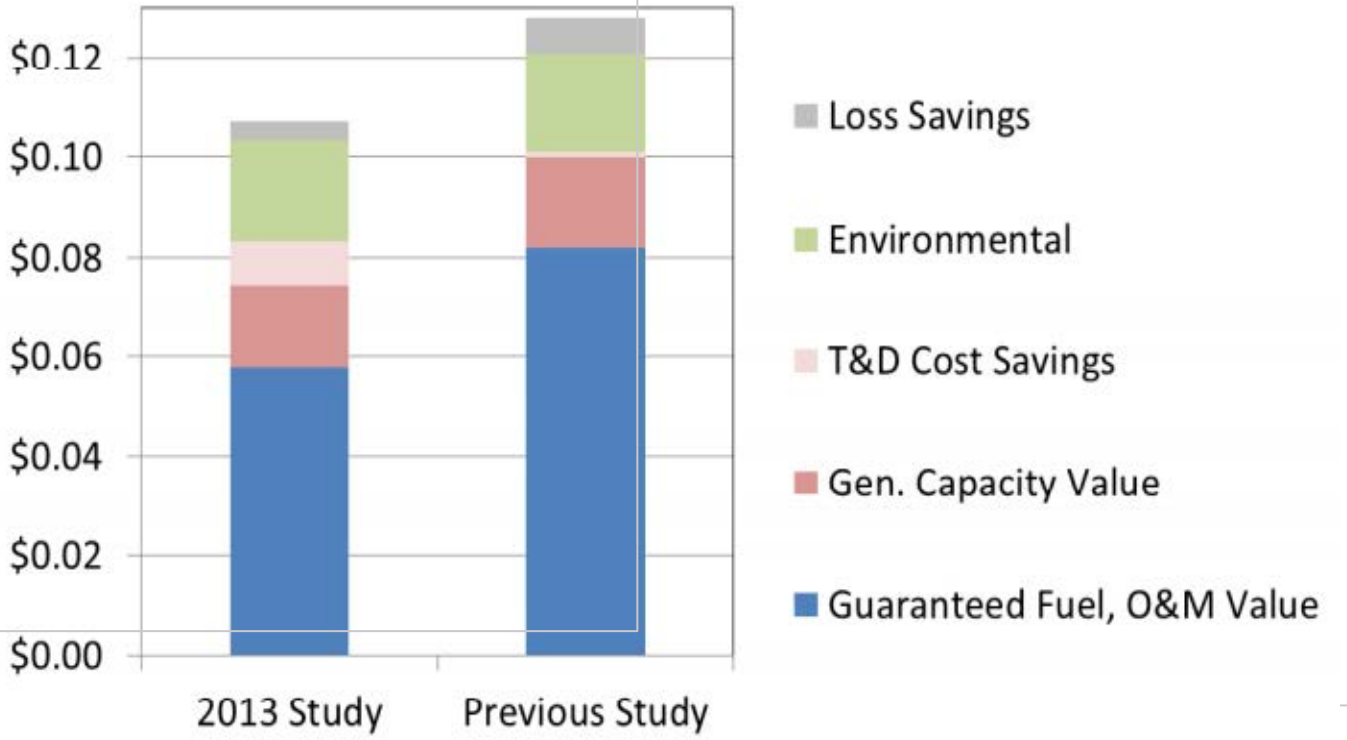
| Impact | Value range (per kWh) |
|---|---|
| **Avoided fuel / generation (including O&M)** | 4 to 7 cents |
| **Avoided generation capacity** | 1 to 2 cents |
| **Avoided T&D capacity** | 0 to 1.5 cents |
| **Environmental (carbon and other)** | 1.5 to 2.5 cents |

# Value of solar tariffs pay producers based on estimated net value, but currently exist only in MN and TX

## Texas

- Available at Austin Energy (municipal utility) instead of NEM for end-use customers
- Attempted at CPS (San Antonio muni) but met with resistance and withdrawn

**2014 Austin Energy VOS estimates**



# Value of solar tariffs pay producers based on estimated net value, but currently exist only in MN and TX (cont'd)

## Minnesota

- Available in Minnesota as an optional alternative to NEM (to end-use customers) or avoided cost payments to qualifying facilities.
- Established following state legislation requiring a VOST. Methodology developed via transparent workshops with utilities and the solar community. Not yet implemented.

**2014 MN VOS estimates (example)**

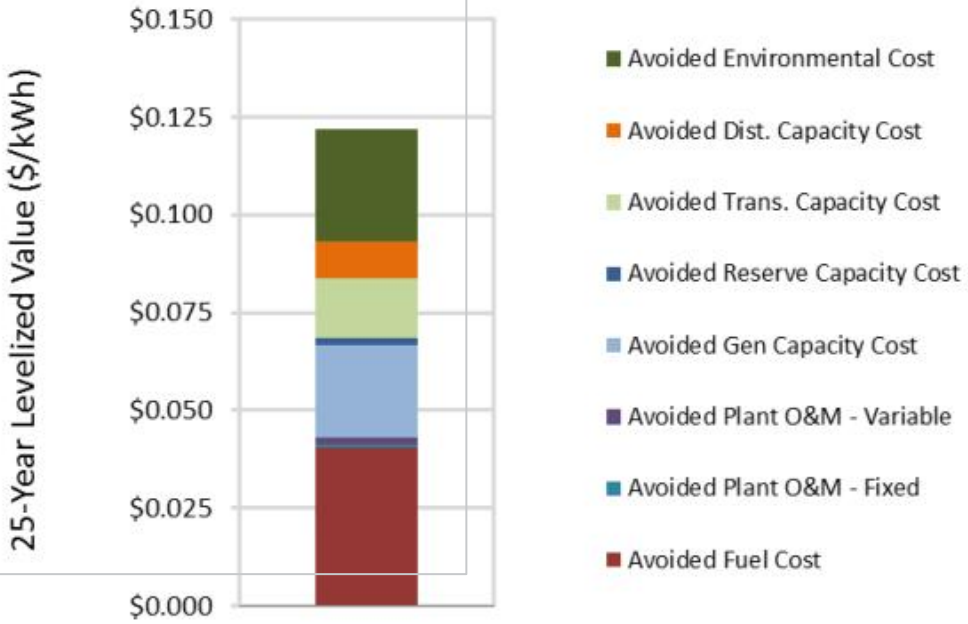



Figure 2. Preliminary Xcel Energy Value of Solar, Minnesota. Source: MN PUC Briefing Papers, July 25, 2014.

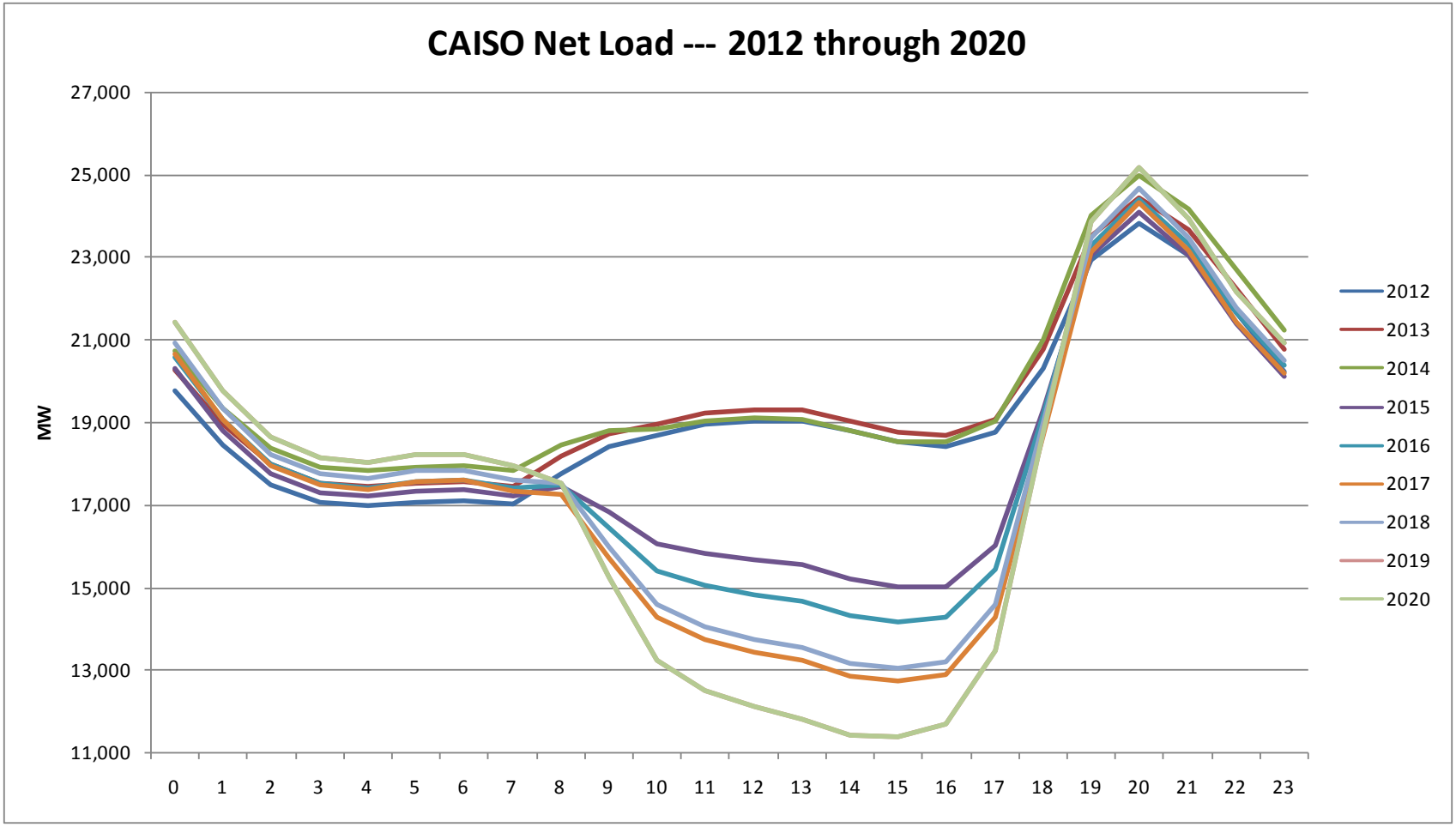
# Potential improvements in value of solar estimation methodology

- Granularity of interval data analysis
  - With respect to ability of solar production to meet load, analyses using high level data may hide balancing issues that could occur at hourly or sub-hourly intervals
  - Affects value of avoided GT&D capacity and may introduce incremental reliability costs
- Geographic variation in value of solar
  - Magnitude of avoided GT&D capacity benefits may depend on area in which solar is installed
  - Some areas may have a load shape that matches closely with solar production, whereas others may not
  - Some areas may not have near-term, potentially high-cost capacity/load growth issues

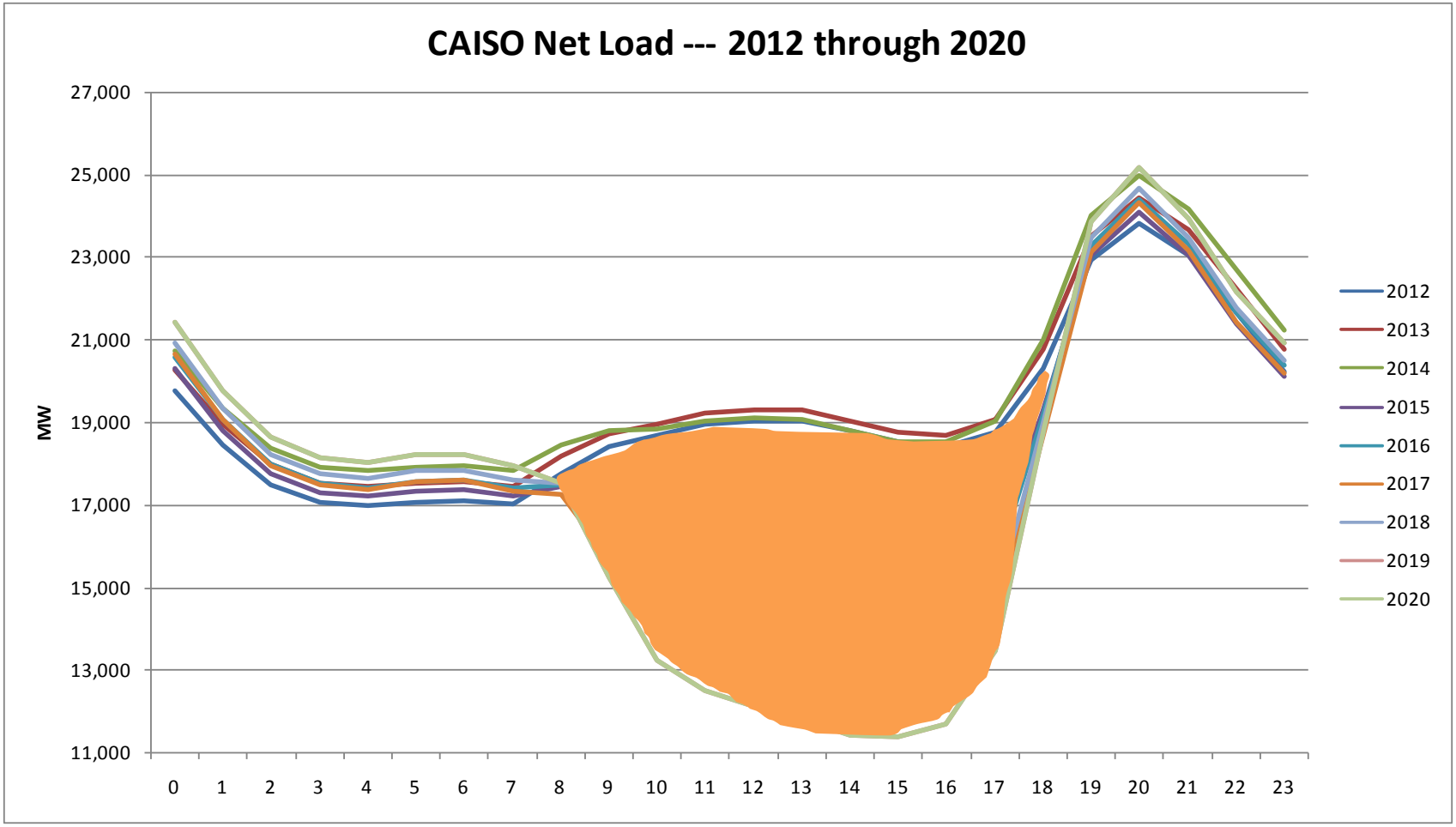
# Comparison of different solar pricing mechanisms

| Value of Solar Tariff | Net-energy Metering | Feed-in Tariffs |
|---|---|---|
| ▪ Can send the right price signals to customers<br>▪ May be generalized to all types of DERs, based on operating characteristics and locational value<br>▪ Can change over time, but separate from other ratemaking proceedings<br>▪ Drawback is that it requires sub-metering, which may raise issues if the value of solar tariff is less than the bundled retail rate | ▪ Does not require sub-metering of solar separately<br>▪ May not send the right price signal if the bundled retail rate is far above or below the value of solar<br>▪ May not be able to account for changes in operating characteristics and locational value over time, due to constraints around bundled retail rate design | ▪ Fixed return for investors over a long time horizon<br>▪ Tariff does not change over time as a result of changes in the value of solar<br>▪ Like value of solar tariffs, requires sub-metering |

# Question: How much would it cost to "fill in" the duck curve with Tesla Powerwalls?

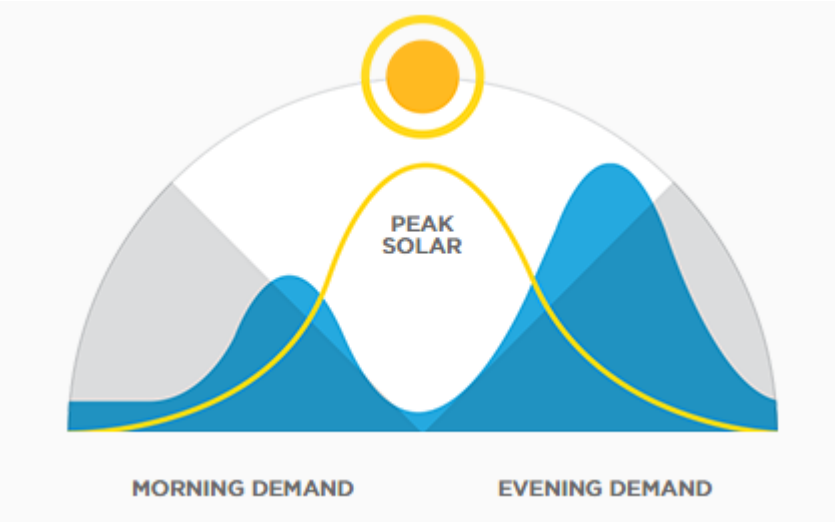


# How much would it cost to "fill in" the duck curve with Tesla Powerwalls? (cont'd)



# How much would it cost to “fill in” the duck curve with Tesla Powerwalls? (cont’d)

- ~$24 billion
  - Roughly 56,000,000 kWh reduction in midday net load from 2014 to 2020
  - 7 kWh Powerwall storage (for daily cycle applications) = 8 million Powerwalls required
  - $3,000 cost per battery






# Key takeaways

- Value of solar can be used to send the right price signals to customers and may be generalized to all types of distributed energy resources
  - Estimation method can be improved by incorporating more temporal and geographic granularity
- Value of solar tariffs serve as a middle ground between net-energy metering and feed-in tariffs
- Energy storage may not be the cost-effective, single solution for mitigating the impacts of high solar penetration, which increases the impetus for “getting the prices right” for solar

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For comments or questions, contact:

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