

Informational

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**No Board  
Decision  
Requested**

# Board Presentation – Renewable Growth in the US

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# Renewable Growth

- Renewable prices continues to decline and installed capacities continue to grow
- Presentation outlines:
  - Renewable capacity additions
  - Pricing trends
  - An overview of the Xcel Energy RFP response
  - Lazard's Levelized Cost of Energy Analysis
  - Renewables and storage pricing information

# Wind and Solar Expansion

## New Generation In-Service (New Build and Expansion)

| Primary Fuel Type | December 2017 |                         | January – December 2017 Cumulative |                         | January – December 2016 Cumulative |                         |
|-------------------|---------------|-------------------------|------------------------------------|-------------------------|------------------------------------|-------------------------|
|                   | No. of Units  | Installed Capacity (MW) | No. of Units                       | Installed Capacity (MW) | No. of Units                       | Installed Capacity (MW) |
| Coal              | 0             | 0                       | 0                                  | 0                       | 3                                  | 45                      |
| Natural Gas       | 6             | 842                     | 79                                 | 11,980                  | 125                                | 9,283                   |
| Nuclear           | 0             | 0                       | 1                                  | 102                     | 3                                  | 1,290                   |
| Oil               | 0             | 0                       | 10                                 | 40                      | 22                                 | 67                      |
| Water             | 0             | 0                       | 11                                 | 214                     | 37                                 | 449                     |
| Wind              | 8             | 913                     | 69                                 | 6,881                   | 93                                 | 8,045                   |
| Biomass           | 0             | 0                       | 26                                 | 268                     | 57                                 | 110                     |
| Geothermal Steam  | 1             | 37                      | 2                                  | 55                      | 0                                  | 0                       |
| Solar             | 42            | 798                     | 503                                | 4,853                   | 612                                | 9,282                   |
| Waste Heat        | 0             | 0                       | 1                                  | 220                     | 2                                  | 23                      |
| Other *           | 2             | 0                       | 23                                 | 1                       | 27                                 | 22                      |
| <b>Total</b>      | <b>59</b>     | <b>2,590</b>            | <b>725</b>                         | <b>24,614</b>           | <b>981</b>                         | <b>28,616</b>           |

Sources: Data derived from Velocity Suite, ABB Inc. and The C Three Group LLC. The data may be subject to update.

# Renewable Energy Growth

- The renewable energy industry is experiencing a high level of policy uncertainty
- Renewable energy is well-entrenched and growing
- Wind and solar markets are finally reaching scale and scope
- Near term, pace of growth may moderate as markets mature
- US policy uncertainty may cause additional challenges along the way
- Longer term, powerful enablers for growth
  - customer demand across multiple business segments
  - declining prices
  - decarbonization
  - drive to boost resiliency

# Renewable pricing has decreased over time

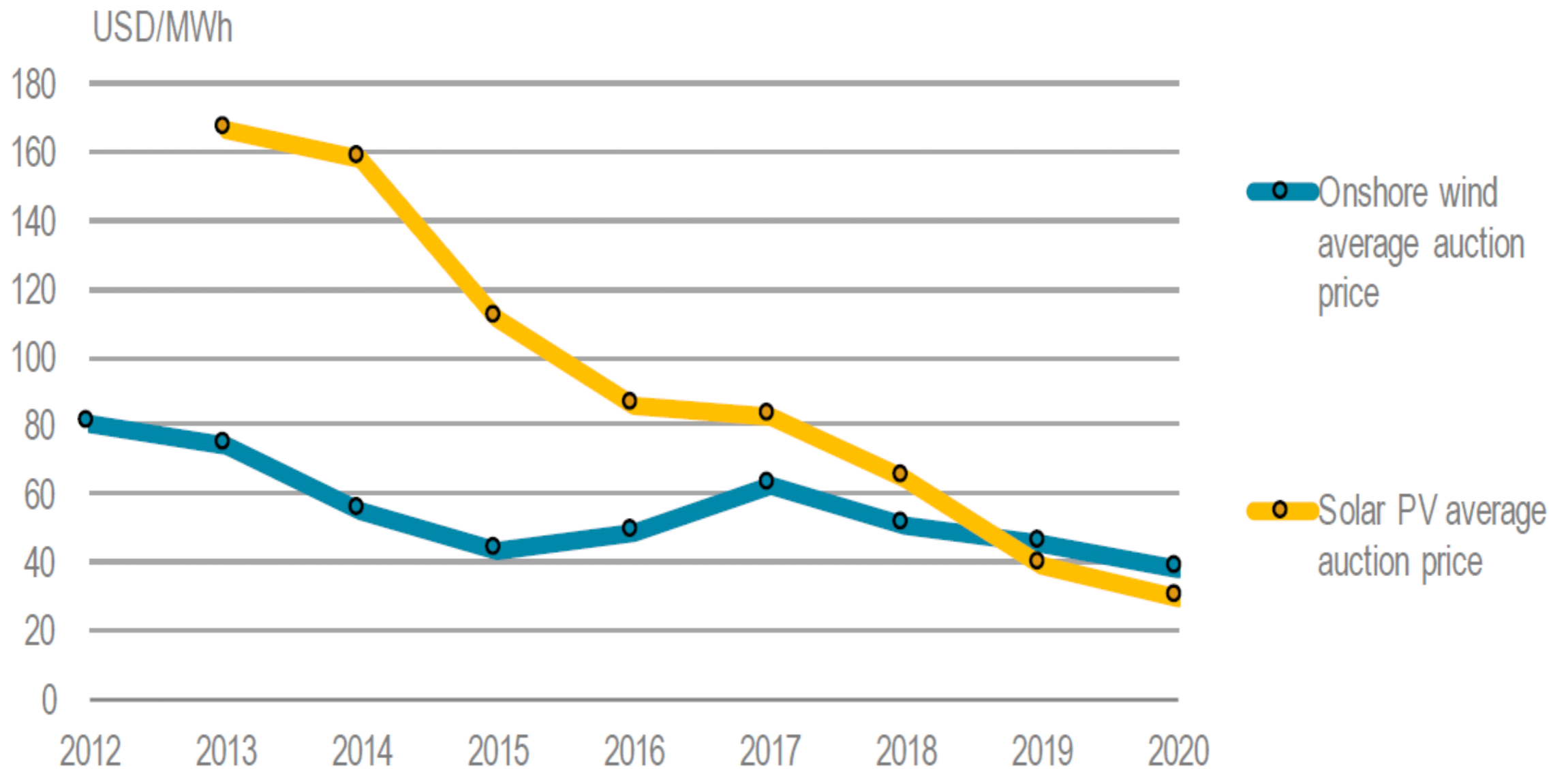
- Reductions in total installed costs are driving the fall in the levelized cost of electricity (LCOE) for solar and wind power technologies
- Main drivers
  - Technology improvements
  - Federal incentives
  - Competitive procurement
  - Large base of experienced active project developers

# Renewable pricing has decreased over time

- The installed costs of utility-scale solar PV projects fell by 68% between 2010 and 2017, with the LCOE for the technology falling 73% over that period.
- Installed costs for newly commissioned onshore wind projects fell by 20%, with a 22% reduction in LCOE.
- Over the period 2017-2022 global average generation costs are estimated to further decline by a quarter for utility-scale solar PV; by almost 15% for onshore wind

# Renewable pricing has decreased over time

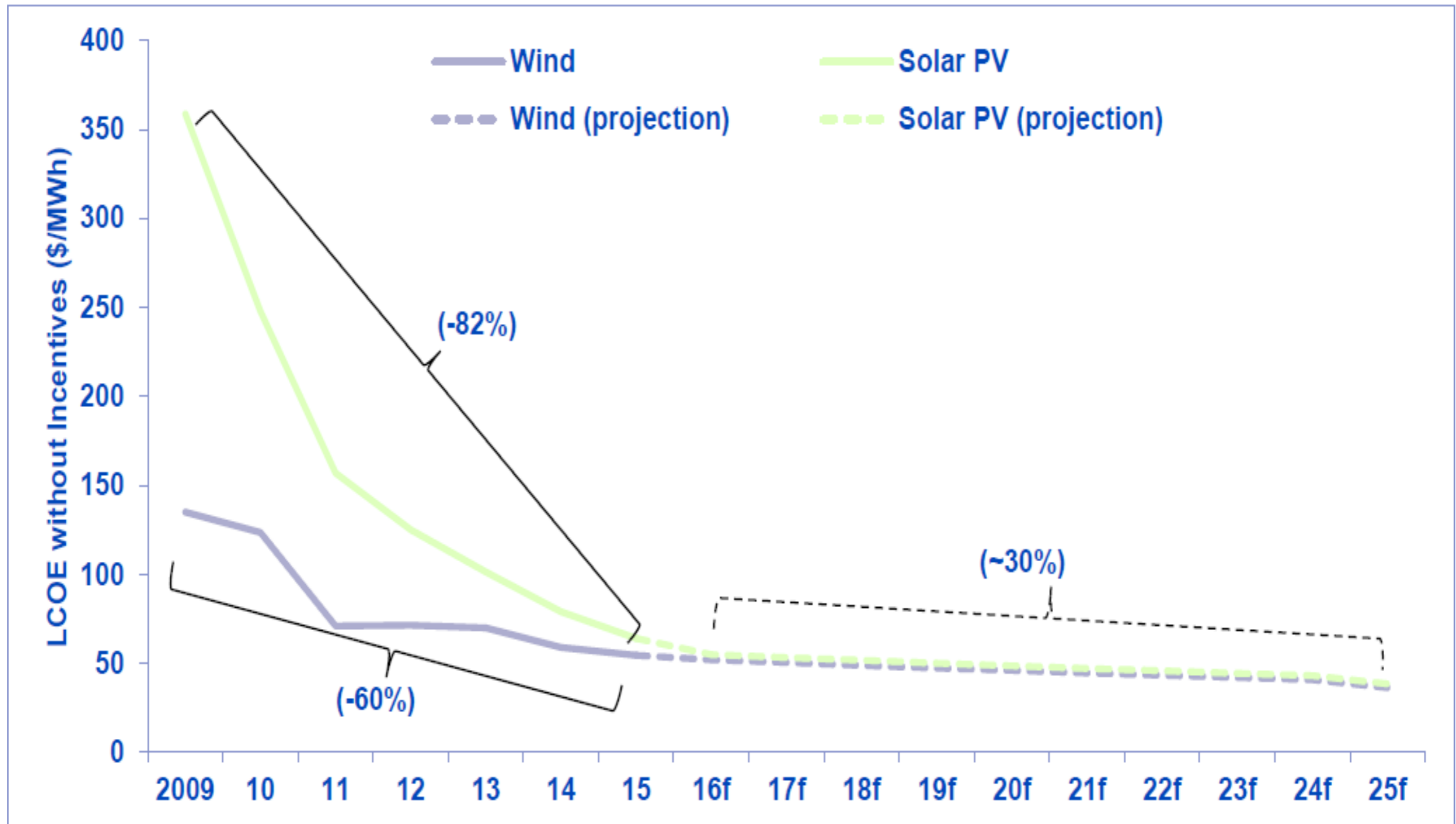
Announced wind and solar PV average auction prices by commissioning date



International Energy Agency, Renewables 2017 London –October 4, 2017

# Renewable pricing has decreased over time

Figure 4: Historical and Projected Cost Declines for Wind Power and Solar PV Technology<sup>3</sup>



NextEra ENERGY insight, December 8, 2016



## Xcel Energy - Colorado Solicitation

- Xcel (Public Service Colorado) issued its All-Source Solicitation on August 30, 2017; bids were received on November 28, 2017
- Received more than 400 individual proposals including what may be record-low prices for renewable energy paired with energy storage

*Currently evaluating bids from the RFP and anticipates filing its recommended portfolios in April; Colorado Public Utility Commission recommended portfolio is anticipated in the summer of 2018*

# Xcel Energy - Colorado Solicitation

- The median price bid for wind-plus-storage projects in Xcel's all-source solicitation was \$21/MWh, and the median bid for solar-plus storage was \$36/MWh.
- The financial advisory firm Lazard issues an analysis each year of the levelized cost of energy
  - The 2017 estimated LCOE is \$82/MWh for solar + storage
  - The median Xcel bid for solar + storage is less than half that

# Conclusion

- Renewable prices have dropped materially
  - Even with the wind down of subsidies, renewable energy prices are cost competitive and have put downward pressure on the market
- Other Examples
  - Lawrence Berkeley National Laboratory: Utility-scale photovoltaic power purchase agreements signed in 2016 averaged around \$35/MWh on a levelized basis, representing a roughly 75% drop from 2009 prices
  - Tucson Electric Power The project includes 100 MW of solar plus a 30 MW battery with four hours of discharge capacity. The 20 year PPA, \$45 including roughly \$15/MWh cost for the storage capability
  - Alberta: Total investment for three wind farms is projected at around \$1 billion. About 600 MW of renewable electricity will be added to the provincial grid at a price of \$37 per MWh
  - NV Energy Proposed entering into two 25-year, 25-MW PPAs with Techren Solar for a flat price of \$34.20/MWh

# QUESTIONS?



CHELAN COUNTY