

Informational

**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
Total	59	2,590	725	24,614	981	28,616

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

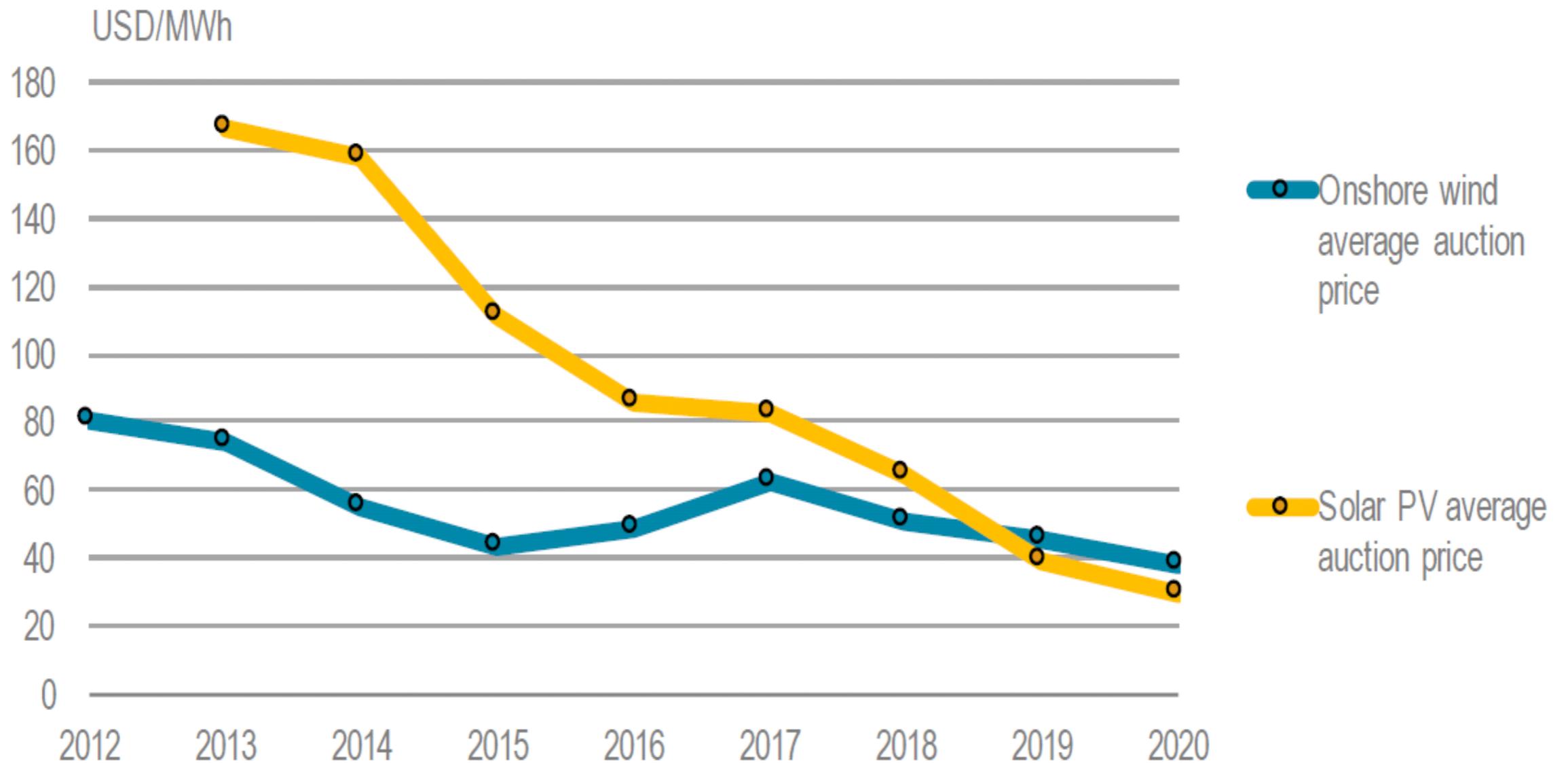
- Reductions in total installed costs are driving the fall in the levelized cost of electricity (LCOE) for solar and wind power technologies
- Main drivers
 - Technology improvements
 - Federal incentives
 - Competitive procurement
 - Large base of experienced active project developers

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

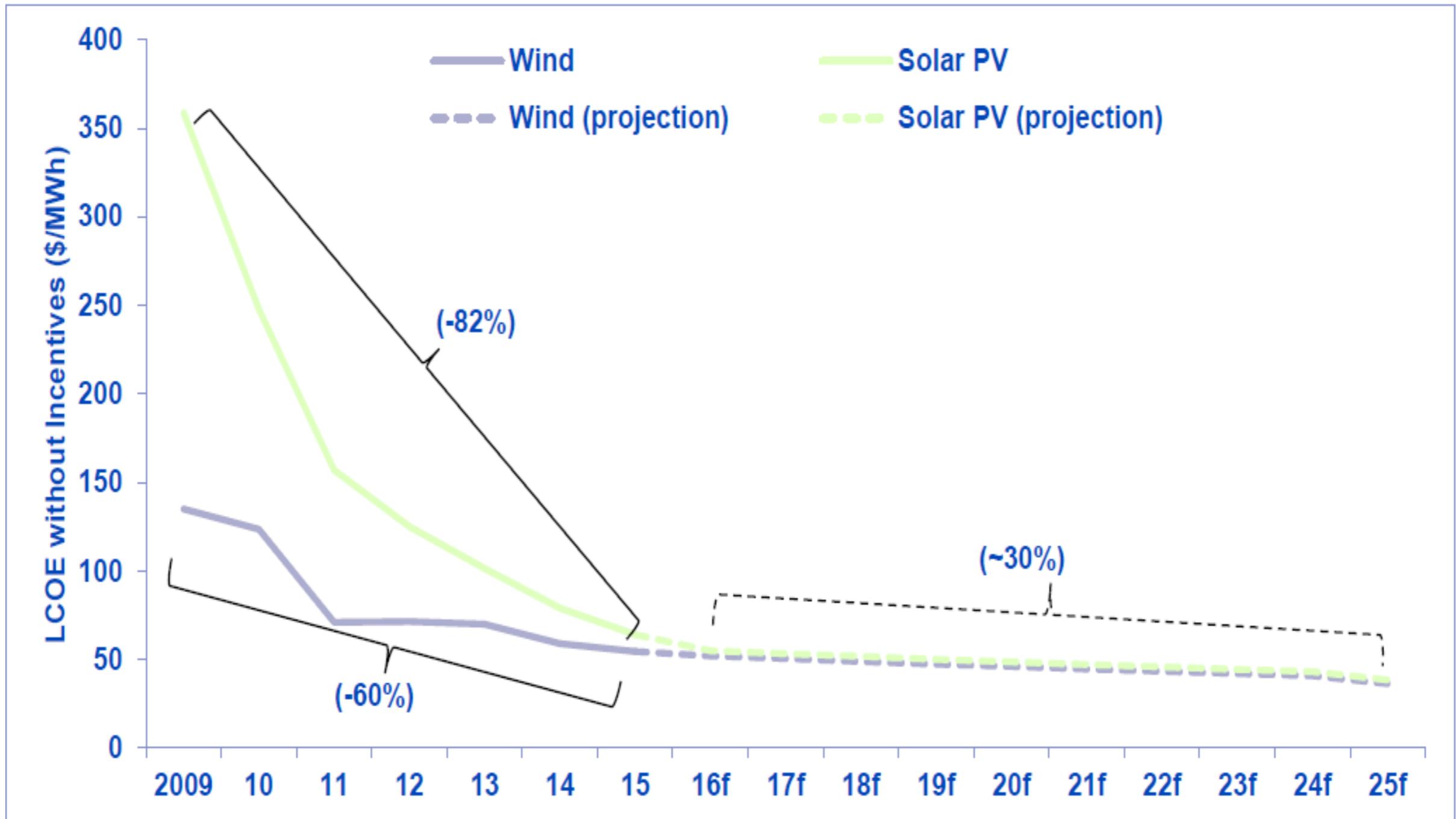
Announced wind and solar PV average auction prices by commissioning date



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 Technology³



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