

Community Scale Renewable Energy

Josh Moenning, *Mayor of Norfolk*

Lance Hedquist, *South Sioux City*

Courtney Kennedy, *Omaha Public Power District*

Phil Burke, *Polk County Rural Public Power District*

Moderator: David Rich, *Nebraska Public Power District*



12TH ANNUAL
Nebraska
Wind & Solar
CONFERENCE & EXHIBITION

A large field of solar panels under a blue sky with white clouds. The panels are arranged in a grid pattern, extending towards the horizon. The sky is a vibrant blue with scattered white clouds. The text is overlaid on the upper portion of the image.

Community Solar and Renewable Energy Generation As Economic Growth Catalyst

Norfolk Community Solar/Battery Project

City of Norfolk and NPPD team up for solar project

Initiative tied to battery energy storage system is touted as being the first of its kind in Nebraska

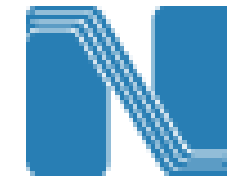


"Approval was given Monday at the Norfolk City Council meeting regarding the state's largest community solar project with NPPD. The project will be tied to a battery energy storage system (BESS) demonstration project expected to be in operation by mid-2020."

Omaha World-Herald *April 18, 2019*

REAL. FAIR. ACCURATE.

"NPPD, Norfolk Partner on Battery Storage System"



Nebraska Public Power District
Always there when you need us

"If selected to receive funds, the demonstration project would be tied to a proposed community solar facility to be built in Norfolk and would be similar to the facility already operating in Kearney."

"The unit would store approximately the amount of electricity that a small home would use over the course of two months."

"A key problem with electric generation is the U.S. electric grid has virtually no storage capacity, so grid operators can't stockpile a surplus of clean energy and deliver it when the wind isn't blowing, or the sun isn't shining," he added. "Battery storage could be a step forward in this area." Electric energy produced today is generated and delivered at the time it is consumed on a real-time basis."

Norfolk Solar Project

- **NPPD SunWise Community Solar Project, Same Model as Kearney and Scottsbluff Projects**
- **RFPs in November, Developer Selected in April**
- **8.5 MW Project, Largest in State**
- **Sited on City-Owned Property – 70 plus Acres of Wellfields on W Hwy 275**
- **Tie-in With 1.5 MW Battery Project, NE Environmental Trust Grant Award**
- **Finalizing Contract Negotiations**
- **Project Planned to be Completed and in Operation by End of 2020**

Why Renewables, Why Now?

Affordability

- Cost of Solar Energy has Decreased 86% since 2009
- Cost of Wind Energy had Decreased 69% since 2009
- Norfolk Project could help lower participants' energy bills

Abundance of Resource

- 13th in Solar Energy Potential
- 3rd in Wind Energy Potential

Strengthens/Diversifies Local Economy

- New jobs
- New farm income
- New tax revenues

Economic Recruitment Potential

- Facebook Data Center Example



For First Time, Renewables Surpass Coal in U.S. Power Mix

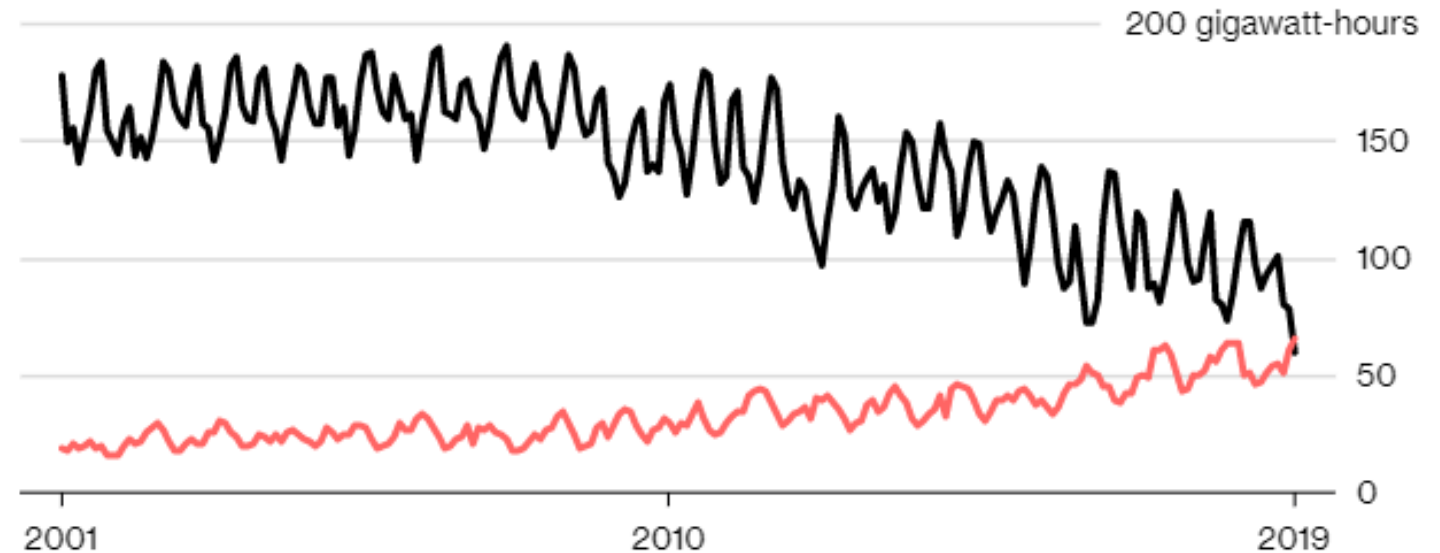
"For the clearest sign yet that renewable energy has gone mainstream, consider this: Clean-energy resources supplied more of America's electricity than coal for the first time ever in April."

Bloomberg, June 25, 2019

U.S. Renewables Eclipse Coal

Solar, wind, hydroelectric plants surpassed American coal in April

Coal Renewables



Source: Energy Information Administration

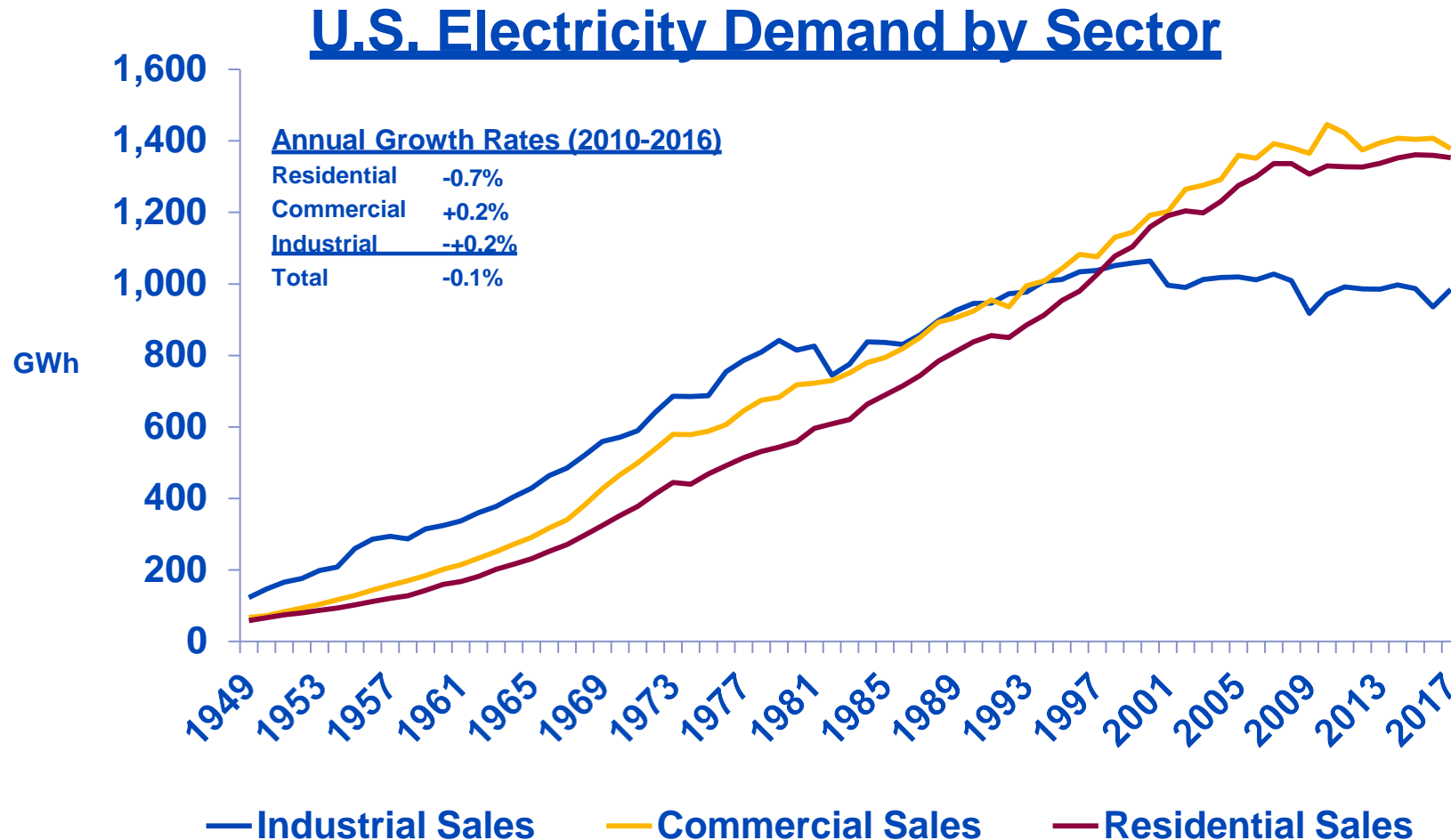
Here Comes the Sun (and Wind): Renewables Have Their Market Moment



"According to U.S. government data, utility-scale solar electricity now costs \$36 to \$44 per megawatt-hour of electricity, and onshore wind power costs as little as \$29, undercutting the \$36 average of running existing coal plants and far beating the \$60 to \$143 per megawatt-hour cost of building and running new coal plants."

Wall Street Journal, June 9, 2019

Following the industrial sector's lead, residential and commercial grid-served demand growth for electricity has stalled since 2009

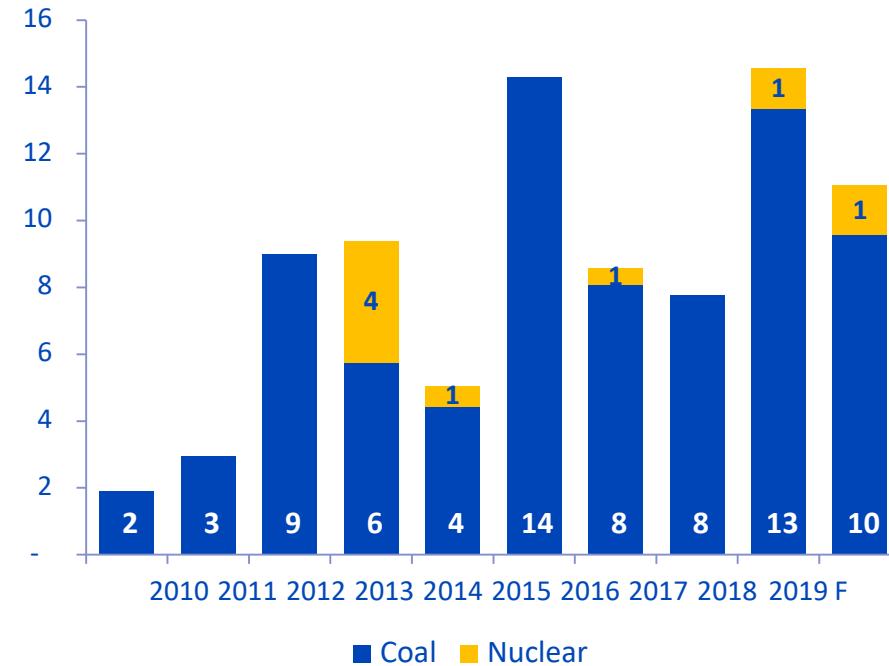


1) Source: U.S. Energy Information Agency

Despite headlines, administration policies have not yet meaningfully changed the competitive landscape for coal and nuclear generation

Baseload Generation - Headlines vs. Reality

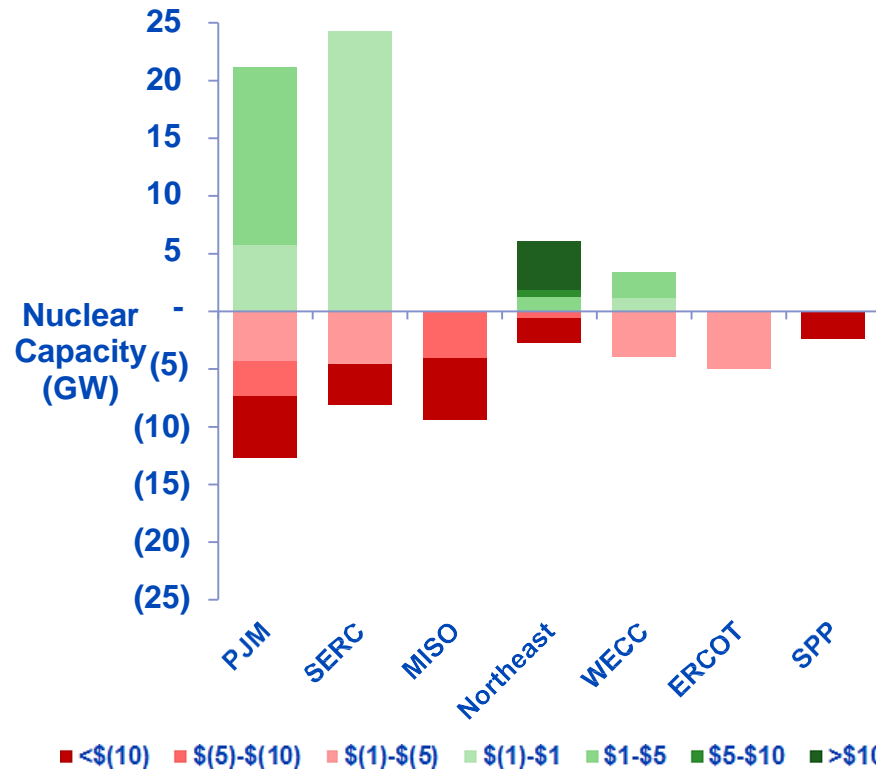
Coal and Nuclear Retirements (GW)



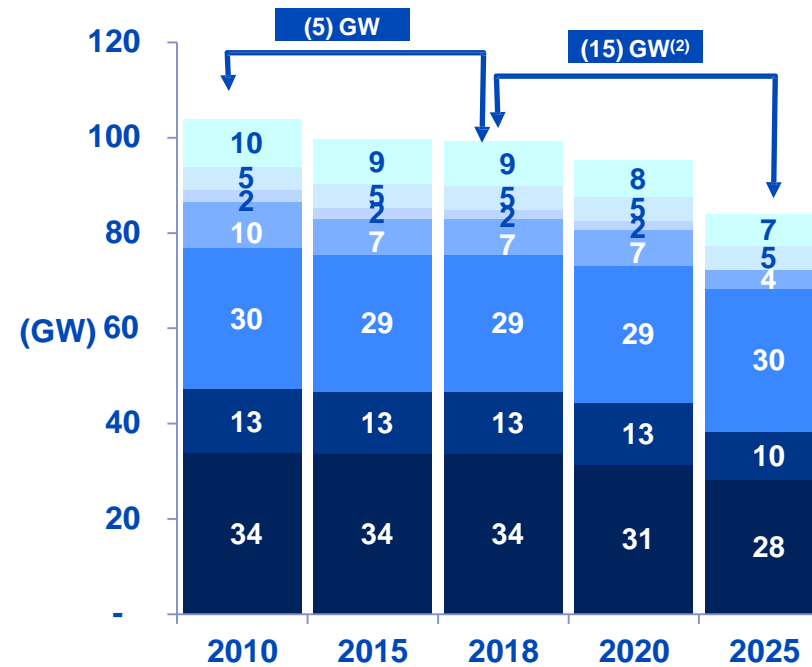
2018 was a record year for both physical and announced coal and nuclear retirements

45% of the U.S. nuclear fleet is out-of-the-money today

Nuclear Plant Profitability⁽¹⁾



Nuclear Capacity Evolution⁽²⁾

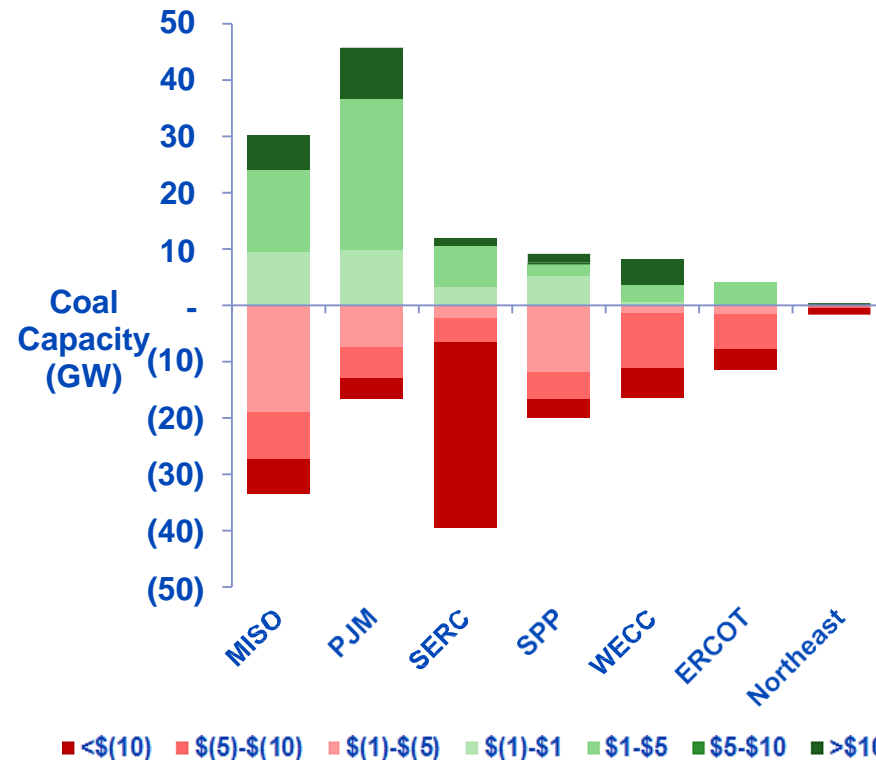


A further 14 GW of nuclear is likely to retire in the 2026 to 2030 period as operating licenses and state subsidies expire

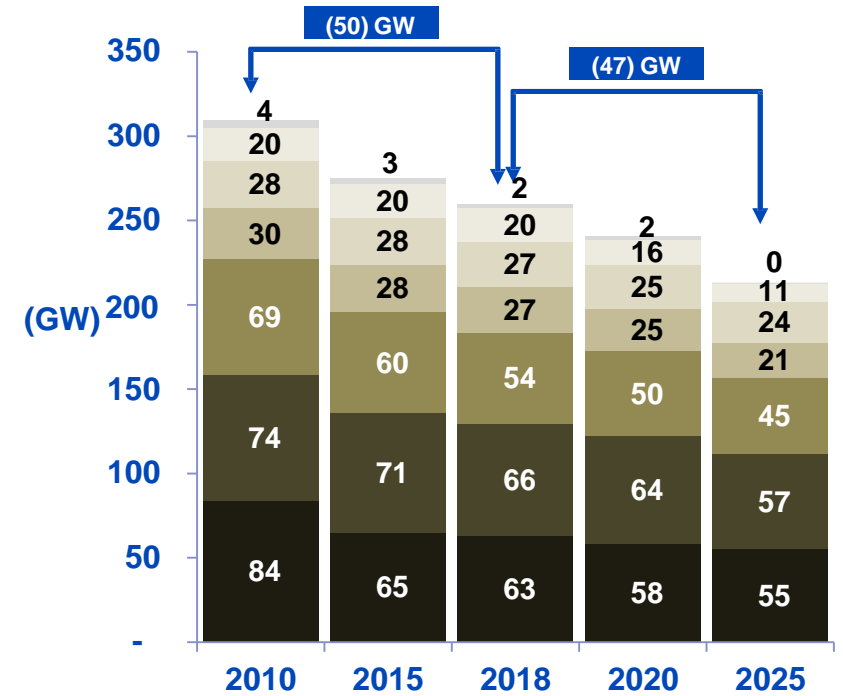
1) Profitability reflects annual estimated revenues less go-forward costs in 2020
 2) Includes addition of "under construction" Vogtle units (2.2 GW) in 2021 and 2022

56% of the U.S. coal fleet is out-of-the-money today

Coal Plant Profitability⁽¹⁾



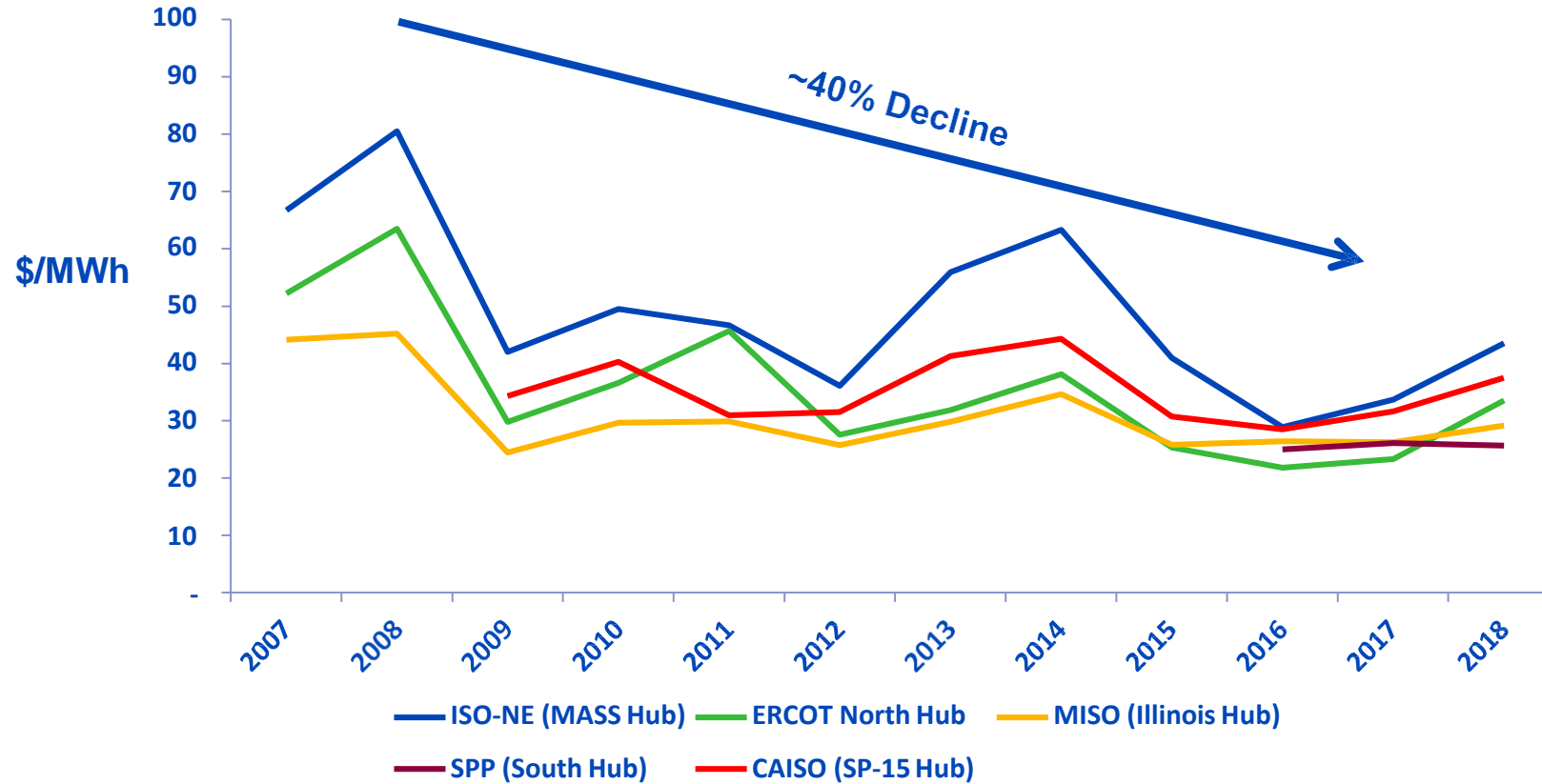
Coal Fleet Evolution



Coal retirements will be concentrated in PJM and MISO where 13 GW of retirements is projected in the 2018 to 2025 period

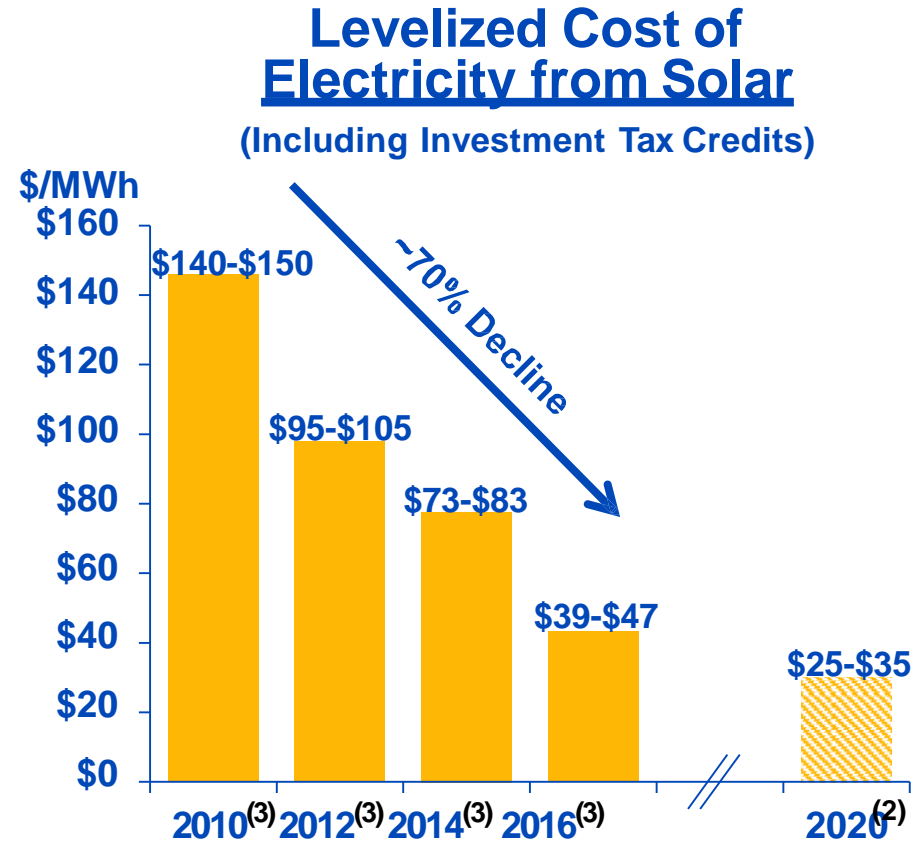
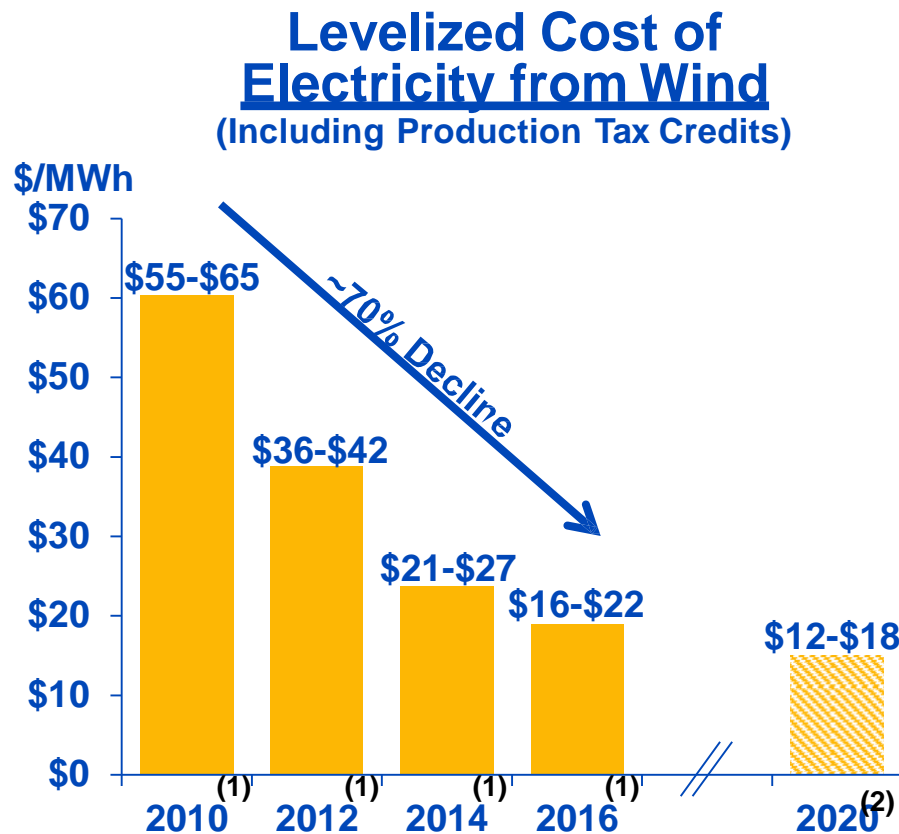
Low cost inputs combined with weak demand driving significant price declines across the country

Electricity Pricing Trends (7x24)



With continued technology improvements and cost declines, wind and solar are expected to be competitive into the next decade

Wind and Solar Technology



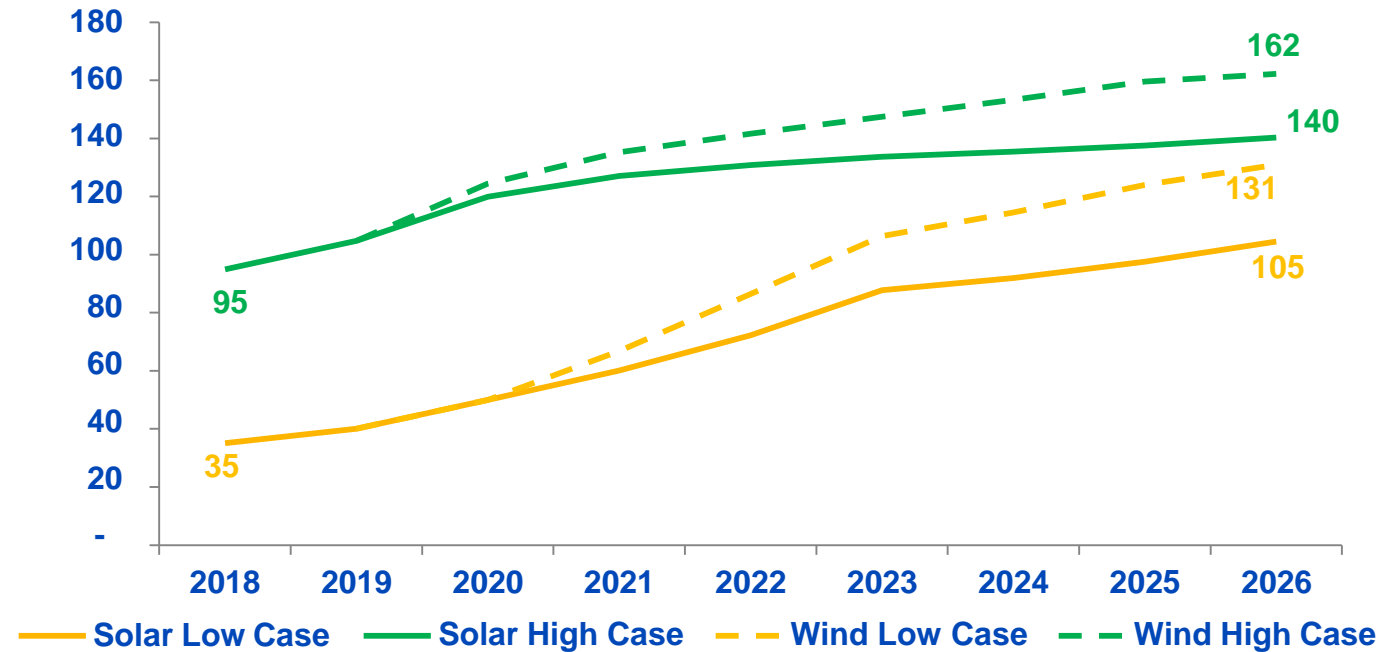
1) Source: U.S. Department of Energy, 2015 Wind Technologies Market Report – August 2016

2) Energy Resources' estimate

3) Source: IHS Markit; the use of this content was authorized in advance; any further use or redistribution of this content is strictly prohibited without written permission by IHS Markit; all rights reserved

Declining costs will drive an unprecedented wind and solar build through 2026

Renewable View



- Risks to Low Case :

- Interconnect backlogs
- Lack of cost declines

- High Case Requires:

- Unforeseen capital cost declines
- Increased RPS requirements
- Merchant solar appetite
- Offshore wind⁽¹⁾ in the northeast
- Baseload retirements



South Sioux City Electric Load

- **45 Megawatts**
- **5 Megawatts Industrial Controlled**

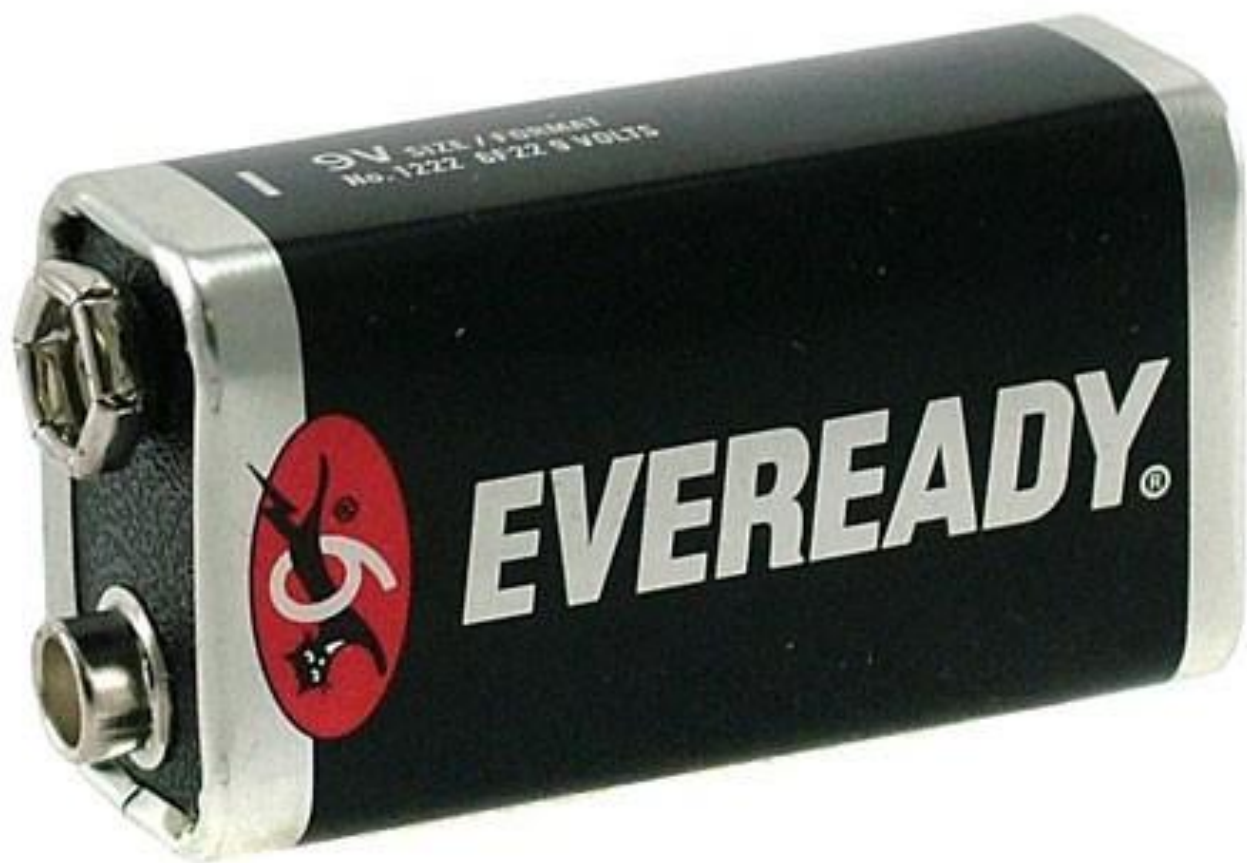
South Sioux City Battery Storage Costs

- **30% Federal Tax Credit**
- **\$600,000 Nebraska Environmental Trust**
- **Balance NextEra**



40 Megawatts Base Load

- **Battery Size 1.5 Megawatts**
- **1.5 Megawatts – One Hour**
- **.75 Megawatts – Two Hours**
- **>.50 Megawatts – Three Hours**



9V SIZE 1 500001
No. 1222 9VOLT



EVEREADY®

Savings are changing

Changes in Assumptions	Original Assumptions/Original Demand Costs	New Assumptions/New Demand Costs
Year 1 NCP Storage Savings Discount Factor	40%	36%
NCP Confidence Improvement	0.25%	0.27%
Year 1 CP Discount Factor	20%	18%
CP Confidence Level Improvement	0.25%	0.27%
NCP Charge Escalator	1.5%	1.75%
Storage Price	5.73/kW-Mo	\$5.58/kW-Mo
Total Savings (20 Years/Non-Discounted)	\$302,917	\$26,001



OPPD Community Solar

Courtney Kennedy – Manager, Alternative Energy Program

October 30, 2019

Why community solar?

- Interested customers
- Supports mission
- Provides an environmentally sensitive product

Renewables for 2018

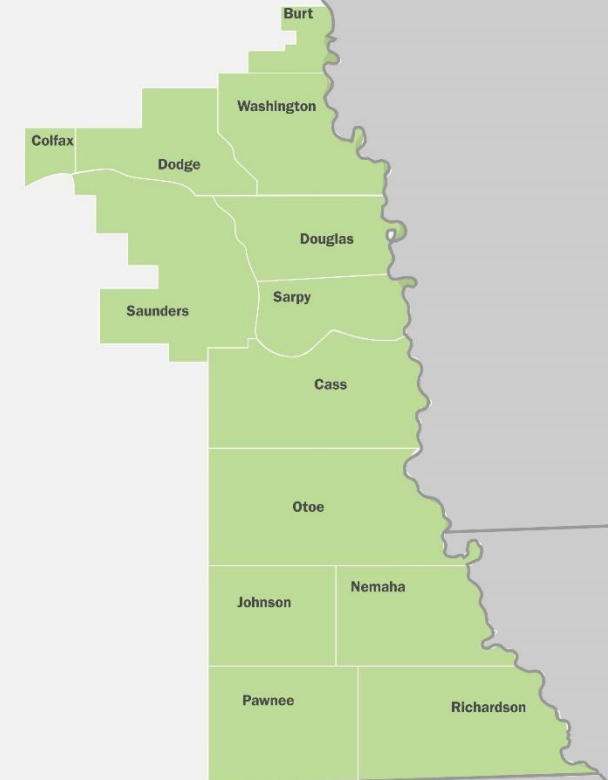
as a percentage of Retail Sales

Wind	28.1%
Hydro	3.5%
Landfill gas	0.4%
Total	31.9%



LEGEND:

● Service Area



What is community solar?

- Defined by customers
- Opt-in program
- Shared solar array within service territory
- Alternative to individual customer ownership



Key Milestones



Defined by OPPD Customers

- Engaged stakeholders
- Workshop findings:
 - **Simple and available to all** customers
 - Customer **demand is high**
 - Project **size is critical**
 - **Visibility** may be physical or virtual
 - **Affordability** and **educational value** is needed

Conduct Outreach

Develop Rate

Select Site

Issue RFP

Market Program

Construct Facility

Generate Solar Power!

Site selection & RFP process

- Sites identified:
 - Gretna
 - Bellevue
 - Fort Calhoun
- 100+ proposals



Conduct Outreach

Develop Rate

Select Site

Issue RFP

Market Program

Construct Facility

Generate Solar Power!

How does it work?

- Subscription-based product
- Purchase desired amount of solar shares
 - 1 share = 100 kWh per month
 - No quantity limit per household
- Market based rate rider
- Evaluated annually



Conduct Outreach

Develop Rate

Select Site

Issue RFP

Market Program

Construct Facility

Generate Solar Power!

What's the status today?

- 8,400 shares subscribed
- Sold out in 49 days
- All subscribed by residential customers
- 375+ customers waiting



Construction Update



Conduct Outreach

Develop Rate

Select Site

Issue RFP

Market Program

Construct Facility

Generate Solar Power!

Questions?



Prairie Wind

Polk County
Rural Public Power District

Phil Burke
CEO/General Manager



66%

PCRPPD should use a combination of renewable energy and traditional power sources

42%

Did not want to pay extra for renewable energy.

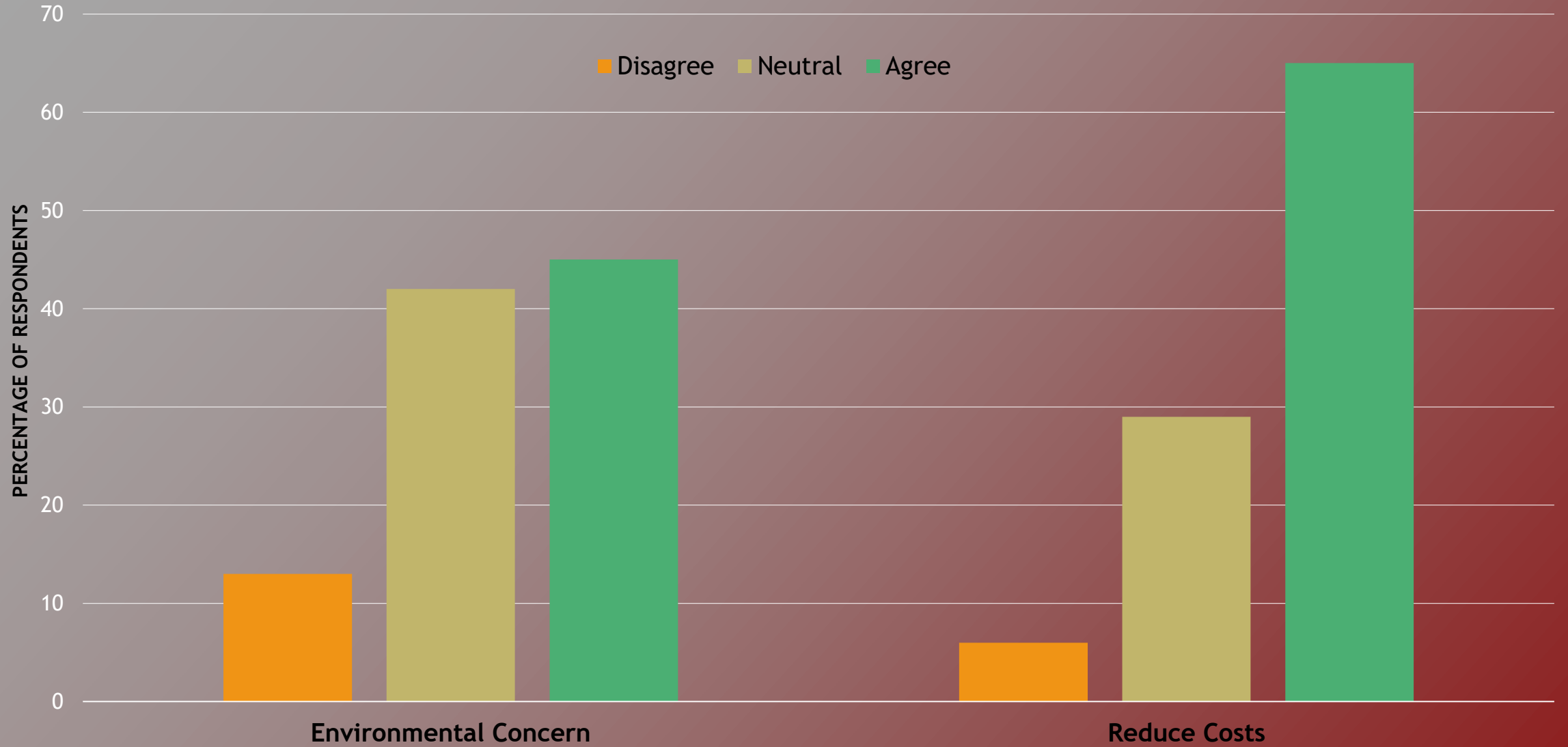
37%

Willing to pay extra for renewable energy.

Listening to our customers

2015 Customer Survey

Why should PCRPPD invest in renewables?



Customer Town Hall meeting



Board Direction
Customers must be in favor



Timeline video on
PCRPPD website
www.pcrppd.com

Project for the Customers

Documented Construction

PCRPPD Wind Turbine Name Campaign

FINALISTS

Wind-Dixie

81-92 Energy

Davis Creek Energy

Polk County Zephyr

\$25

**BILL CREDIT to
PCRPPD customer**

66 submissions

PRAIRIE WIND

Project for the Customers

Name-the-wind-turbine contest



**150 PCRPPD Customers
Attended Turbine
Open House Tour**

**Project for the Customers
Turbine tour at PCRPPD Customer Meeting**



POLK COUNTY
RURAL PUBLIC POWER DISTRICT

PRAIRIE WIND TURBINE PROJECT FACTS



Over \$1,000,000 put back into the local economy through landowner payments, construction, maintenance and property tax relief.

10,950
mwh
of energy
generated
annually

The Prairie Wind Turbine will pay **property taxes equivalent to 5 property owners.**

Consumes **NO** water during operation.



The project will power **over 900 homes per year.**



WIND TURBINE FACTS

- 1 Tower - 294'
- 2 Total system height - 499'
- 3 32 tons of Rebar
- 4 43 truckloads of concrete
- 5 Foundation - 58' wide
- 6 Tower Base - 14' diameter
- 7 10 Semi's to deliver turbine components
- 8 292 ladder rungs to the top

7,743
METRIC TONS
OF CO²
EMISSIONS
REDUCED
ANNUALLY

=

1,644

PASSENGER
VEHICLES

871,307

GALLONS
OF GAS
CONSUMED

9,113

ACRES OF
U.S. FORESTS

Project for the Customers
Inform, Educate, Communicate

100%



of the energy generated by this wind turbine is used locally. This is because the turbine is directly inter-connected to Polk County Rural Public Power District's electric system.

PCRPPD is responsibly using the natural resource of wind to supply their initial energy needs.



Supplying the remainder of their needs takes place through their current wholesale contract.

THIS ALLOWS POLK COUNTY TO ENJOY A FEW BENEFITS ALONG THE WAY:



FINANCIAL HEDGE

This arrangement allows PCRPPD the opportunity to **diversify their energy supply portfolio & hedge against uncertainties that exist in the energy industry.**



RATE CERTAINTY

Allows PCRPPD to secure **price certainty for 25 years** on a small **percentage of their total energy needs** with no upfront capital or long-term operational or maintenance risk.



ECONOMIC DEVELOPMENT

Allows PCRPPD to meet the demands of existing customers and **recruit new industry with sustainability initiatives.**



EDUCATION

Allows for **educational opportunities** with **local institutions.**

Project for the Customers
Inform, Educate, Communicate

QUESTIONS

Phil Burke

pburke@pcrppd.com



Polk County RPPD
Prairie Wind Turbine