Near Term Generation Update

March, 2023
February Recap

- OPPD is experiencing **historic load growth**, ~100 MW per year, up from a typical ~4 MW per year.
- **Power with Purpose assets** provide critical capacity and energy, support reliability and resiliency, and provide generation diversity that meets our demand to 2027.
- OPPD is **planning for generation resources** to serve our growing load beyond Power with Purpose for approximately 2027 to 2032.
- In addition to more energy supply resources, OPPD is constructing **transmission system expansion** and planning future transmission system projects to accommodate near- and long-term needs.
- Resource planning process is **guided by our mission** to provide affordable, reliable and environmentally sensitive energy services, our **strategic directives**, and our **legal and regulatory obligations**. Our energy services **power people, communities and the economy in Eastern Nebraska**.
- It is OPPD's **responsibility and obligation** to serve our customers and that is getting more and more difficult for a variety of reasons including local permitting, supply chain and federal policy related to generation interconnection.
Overview

• In 2022, thanks to stakeholder input, OPPD completed *Pathways to Decarbonization* to identify potential pathways to Net Zero by 2050.

• In the near term, OPPD is experiencing multiple factors, requiring a need to plan to grow accredited capacity beyond Power with Purpose. These include:
  • Continued rapid near-term load growth
  • More generation supply is required from an increasing Planning Reserve Margin (PRM)
  • Diminishing surplus of regional generation capacity
  • Significant extension of planning & execution time requiring more action, sooner

• OPPD and E3 are studying near-term resources needs, guided by OPPD’s mission and long-term goals and building on Pathway findings. Our guidepost are:
  • **Affordable**: Economic, least-cost optimization
  • **Reliable**: Maintain OPPD’s high historical levels of reliability
  • **Environmentally Sensitive**: 2050 Net Zero carbon target
# Informing our Direction

Customer, employee and public feedback through workshops, surveys, etc.

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>Power with Purpose (PwP)</td>
<td>OPPD launches plans to add solar power and national gas to meet load growth through 2026.</td>
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<tr>
<td></td>
<td><strong>2019-2021</strong> Pathways to Decarbonization</td>
<td>Study determines it is possible to reliably operate with a mix of renewable, storage, and low-carbon firm resources to achieve net-zero.</td>
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<tr>
<td>January 2022</td>
<td>Integrated Resource Plan</td>
<td>Regulatory plan finds that OPPD’s forecasted load is fully supported through 2026 with new solar and natural gas resources (PwP).</td>
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<td>June 2022</td>
<td>North Omaha Extension Extension</td>
<td>PwP delays require OPPD to temporarily extend the capability for coal operations at NOS.</td>
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<tr>
<td>2023</td>
<td>Near-term planning</td>
<td>As part of on-going planning, OPPD studies how to meet growing energy needs.</td>
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- OPPDCommunityConnect Decarbonization Pages
  - 10,500 visits
  - 80 comments & questions
- OPPD launches plans to add solar power and national gas to meet load growth through 2026.
- Study determines it is possible to reliably operate with a mix of renewable, storage, and low-carbon firm resources to achieve net-zero.
- Regulatory plan finds that OPPD’s forecasted load is fully supported through 2026 with new solar and natural gas resources (PwP).
OPPD is committed to engaging customers, the community and other stakeholders around key decisions and providing meaningful ways for them to participate and provide feedback.

- OPPD Community Connect
  - OPPD’s stakeholder engagement platform – follow along the journey
  - Project page dedicated to all projects, including Generation
  - Opportunity to ask questions, take surveys provide feedback

- Listening Sessions

- Master-class deep dive workshops

- 1:1 discussions
Pathways: Key Findings for Net Zero 2050

1. OPPD can achieve net zero while balancing **affordability** and **reliability**.

2. All scenarios **cease** coal generation and **reduce** use of fossil fuels.

3. Pathways require a **mix** of renewable energy, energy storage, and community-wide energy efficiency.

4. Firm (dispatchable) generation is needed to maintain **resource adequacy**.

5. Resources are **consistent** across a variety of pathways.

6. Achieving Absolute Zero is more **costly** and is dependent on future technology development.

7. Accelerating decarbonization reduces cumulative emissions at a relatively low incremental cost, but poses **implementation** and **integration** challenges.

8. The changing resource mix will pose new **resiliency challenges** that must be evaluated, understood, and mitigated.
Load Growth Acceleration

The State of Nebraska and local communities continue to invest in economic growth, and OPPD must be ready to enable that growth.

- State has dedicated $110M to site development in last two legislative sessions, up from $2M annually
- $430M+ is proposed this legislative session
- The greater Omaha area had 61 new projects last year, totaling $2.1 billion capital investment
- Nebraska Department of Economic Development has clear economic development goals:
  - Recruit high-wage, high-tech job creators
  - Encourage expansion of existing firms
  - Develop first-rate sites to attract projects
  - Promote startups and small business
Load Growth

• We know the growth over the next 10 years will be significant and demanding and of proportions never seen by OPPD before.
• Bringing on new generation is now taking 6- to 10- years, so OPPD must make challenging decisions now.

Factors driving **LOAD GROWTH**

- Electrification
- Biotech
- Manufacturing
- Data Centers (Fintech)
- Food Processing
- Agricultural Processing

Factors driving **LONGER LEAD TIMES**

- Regulated grid interconnection study backlogs
- Solar zoning & Federal regulatory challenges
- Supply and workforce challenges
- Building at multiple sites is a significant incremental challenge to execution teams
Extreme Recent Events - Winter Storms

- **Resource and operational challenges** can contribute to **stresses** of extreme events, such as winter storms Uri and Elliott.

- During these extreme events **margin for disturbances is low** with typically all available resources in service and resource diversity remains critically important.

- Winter storm Uri was more impactful to OPPD requiring load shedding throughout SPP, and Elliott required load shedding in the Southeast U.S.

Winter Storm Elliott – Dec. 23, 2022
Recent Events – Temperature & Demand

- Peak loads continue to increase during both summer and winter
- SPP all-time peaks:
  - Winter peak: Dec. 22, 2022 (47,157 MW)
  - Summer peak: July 5, 2022 (51,090 MW)
- OPPD all-time peaks:
  - Winter peak: Dec. 22, 2022 (2,091 MW)
  - Summer peak: Aug. 2, 2022 (2,545 MW)

### OPPD SUMMER PEAK
- **Aug. 2, 2022**
- High: 101°F
- Low: 77°F
- Average: 89°F
- 2,545 MWs

### OPPD WINTER PEAK
- **Dec. 22, 2022**
- High: -2°F
- Low: -14°F
- Average: -8°F
- Wind Chill: -40°F
- 2,091 MWs

### Winter Storm Elliott
- **Feb. 14, 2021**
- High: -2°F
- Low: -10°F
- Average: -5°F
- Wind Chill: -32°F
- 1,824 MWs

### Previous Peaks
- **July 29, 2021**
- High: 96°F
- Low: 79°F
- Average: 88°F
- 2,509 MWs

### Peak Load (MW) vs. Year

- **Peak Load Actual**
- **Peak Load Forecast**
Accredited Capacity

- While both summer and winter peak loads are increasing, OPPD’s winter peak has increased in higher proportional magnitude than the summer peak in recent years.

- OPPD must have sufficient accredited capacity to serve its seasonal peak load plus SPP’s Planning Reserve Margin for regional reliability. Without sufficient resources, OPPD won’t be able to meet our regulatory requirements.

- Extreme weather highlights that regional margin requirements have been lagging as regions undergo load growth and a changing resource mix.
  - Far reaching affects of winter storms Uri and Elliott are examples
  - System challenges during these events have placed significant attention on winter PRM requirements

- Increases have occurred for SPP’s summer margin requirements and are very likely to continue for both winter and summer to strengthen reliability. Even without load growth, this will require more resources.

- More strict regulatory requirements and enforcement are expected, especially for winter periods.
SPP Accreditation Policy

• Seasonal accreditation values are dependent on the specific resource type and accreditation methodology.
• While thermal resources maintain high accreditation in both summer and winter, wind and solar vary and are based on the Effective Load Carrying Capability (ELCC)
• Demand Response accreditation is currently being revised by SPP’s Supply Adequacy Working Group

**Resource Accreditation % of Nameplate Capacity**

<table>
<thead>
<tr>
<th>Program</th>
<th>Summer</th>
<th>Winter</th>
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<tbody>
<tr>
<td>Thermal Generation</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td>Energy Storage</td>
<td>88%</td>
<td>85%</td>
</tr>
<tr>
<td>Solar</td>
<td>75%</td>
<td></td>
</tr>
<tr>
<td>Wind</td>
<td>0%</td>
<td>27%</td>
</tr>
<tr>
<td>Demand Response</td>
<td>14%</td>
<td></td>
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**Resource Accreditation**

<table>
<thead>
<tr>
<th>Type</th>
<th>Performance-Based Accreditation (PBA)</th>
<th>Effective Load Carrying Capability (ELCC)</th>
<th>Net Peak Load Reducers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal Generation</td>
<td>Wind, solar, and energy storage</td>
<td>Captures performance over a wide range of historical weather conditions</td>
<td>Based on the individual utility’s ability to reduce load. Reduces the amount of reserve resources required</td>
</tr>
<tr>
<td>Based on historical unit reliability</td>
<td></td>
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<tr>
<td>SPP considering more stringent firm fuel requirements for winter accreditation.</td>
<td>Values are not constant and reduce with increasing resource saturations</td>
<td>SPP is expected to change to ELCC-like approach, which would significantly reduce accreditation of these resources</td>
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Example - Renewable Output vs. System Load

- Renewable resources have varying power output dependent on the time of day and season of year. The below graphics illustratively show average renewable production during peak summer and winter periods as well as the range of output during these times.

- While both wind and solar do provide system benefits, their reliability contribution is quantified through SPP’s Effective Load Carrying Capability (ELCC) studies, which account for variability and periods of low production.

**Summer Season Performance**

- Solar output is generally good during summer peak days.
- Wind produces at lower levels during summer peaks.

**Winter Season Performance**

- Solar has low output during winter peak periods.
- Wind has higher output, but has high variability.
- The system must be designed for periods when both wind and solar are producing at low levels.
Likely Next Steps & Outcomes

• Continue the ongoing conversation on load growth in the community.

• Generation resource recommendations are expected to be a combination of renewables and continued expansion of dispatchable natural gas.

• Supporting infrastructure for those resources is expected to be required.

• These solutions are consistent with our 2050 goals.

• More detailed information in April and the coming months.
Education Going Forward

OPPD continues to educate broader audience about our generation journey with focus on new transmission and generation to ensure understanding of situation / recommended solutions.

Use OPPD’s broad communication channels to build understanding about load growth, as well as trust in our near- and long-term generation strategies as they evolve and continue. Examples:

- OPPDtheWire content
- Social media
- News releases
- Outlets bill insert newsletter
- OPPDCommunityConnect.com
- Community events, i.e. Earth Day
- Community relationships
- Customer conversations