

# Moving to Zero Carbon

**JON HAWKINS – ASSOCIATE DIRECTOR, INNOVATION AND COMMUNICATION**



Talk to us.



---

## DISCLOSURE REGARDING FORWARD LOOKING STATEMENTS

---

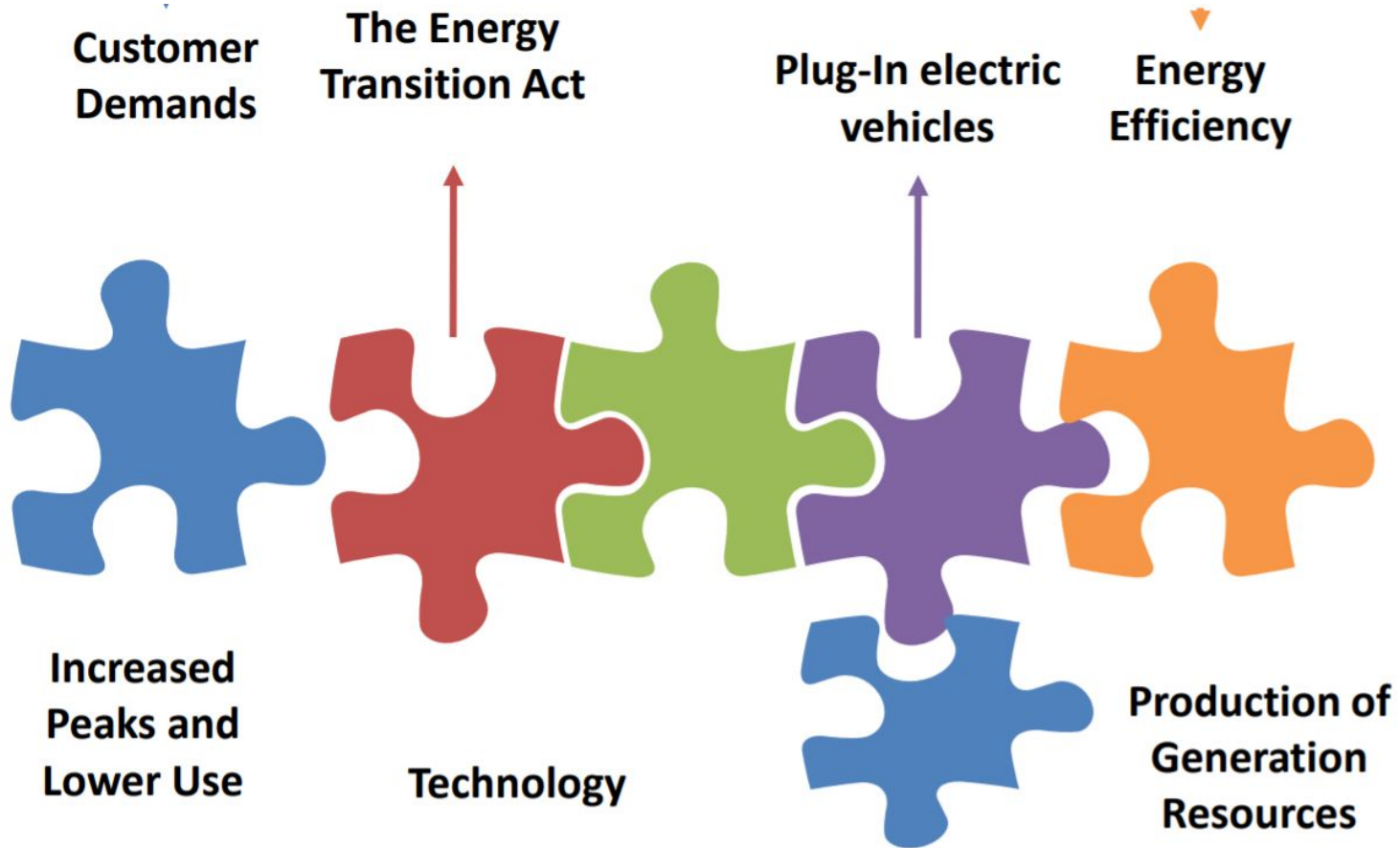
The information provided in this presentation contains scenario planning assumptions to assist in the Integrated Resource Plan public process and should not be considered statements of the company's actual plans. Any assumptions and projections contained in the presentation are subject to a variety of risks, uncertainties and other factors, most of which are beyond the company's control, and many of which could have a significant impact on the company's ultimate conclusions and plans. For further discussion of these and other important factors, please refer to reports filed with the Securities and Exchange Commission. The reports are available online at [www.pnmresources.com](http://www.pnmresources.com).

The information in this presentation is based on the best available information at the time of preparation. The company undertakes no obligation to update any forward-looking statement or statements to reflect events or circumstances that occur after the date on which such statement is made or to reflect the occurrence of unanticipated events, except to the extent the events or circumstances constitute material changes in the Integrated Resource Plan that are required to be reported to the New Mexico Public Regulation Commission (NMPRC) pursuant to Rule 17.7.4 New Mexico Administrative Code (NMAC).

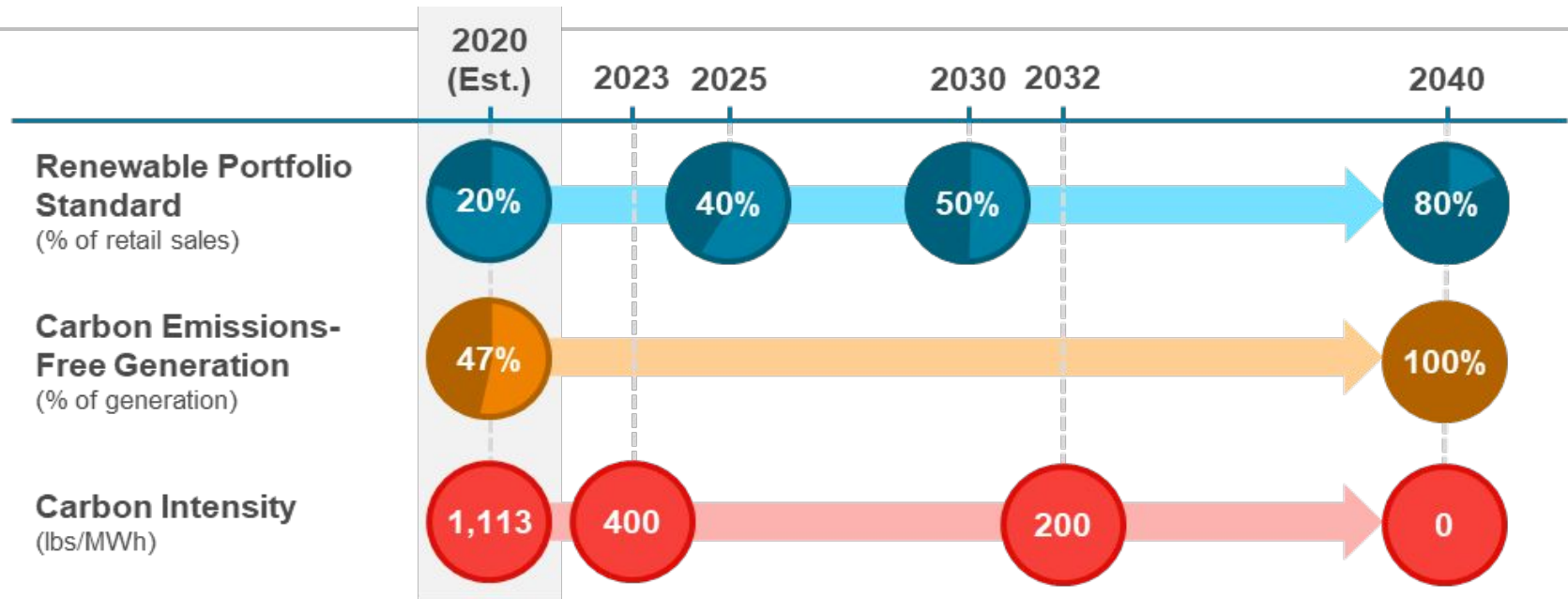
---

# MANY FACTORS INFLUENCE PROVIDING POWER 24/7/365

---



# REVIEW OF THE ETA REQUIREMENTS

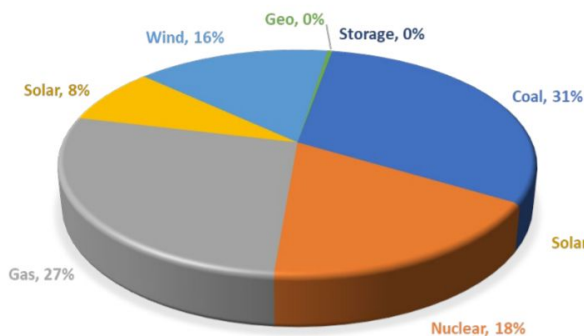


Metrics for 2020 estimated based on PNM's current portfolio

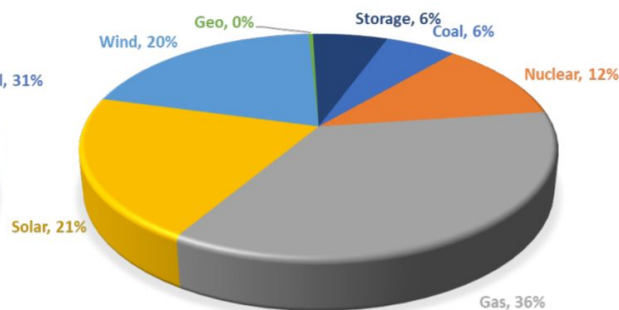
- Senate Bill 489, Energy Transition Act, passed on 3/12/2019
- Expands Renewable Portfolio Standards
- Creates Carbon Standards

# WHERE WERE WE IN 2019 AND WHERE WE WILL BE AFTER SAN JUAN CLOSURE?

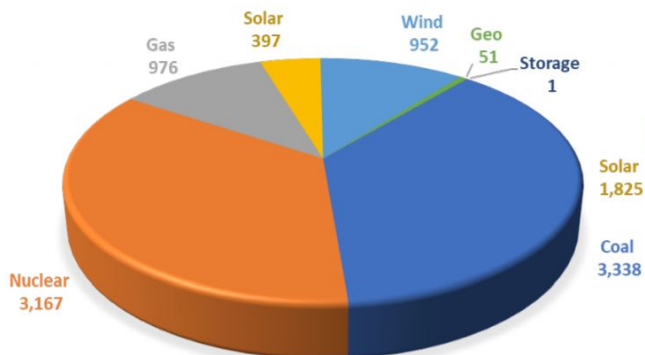
2019 PNM CAPACITY (MW)



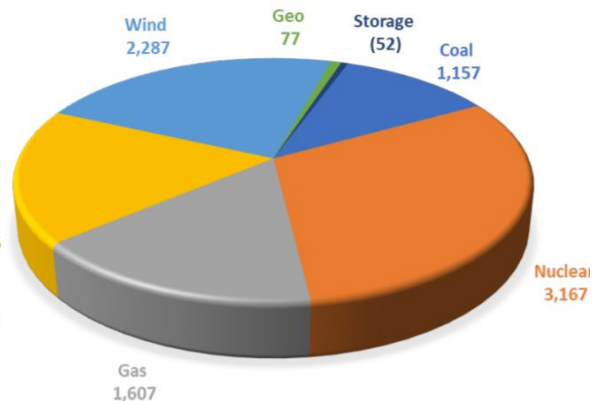
2025 PNM CAPACITY (MW)



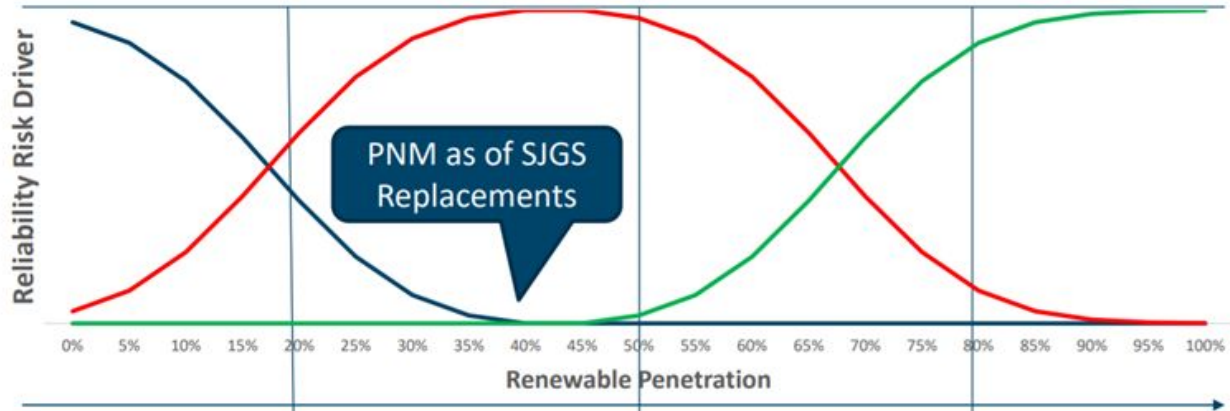
2019 PNM ENERGY (GWH)



2025 PNM ENERGY (GWH)



# RESOURCE PLANNING BECOMES MORE DIFFICULT POST 2030



Expected technology progression to meet RPS and CO2 requirements. If technologies mature quicker they will be considered earlier in time based on cost-effectiveness. This is not an exhaustive list, the list of technologies is still growing and evolving. At this point nothing should be prematurely excluded.

	<u>2020-2030</u>	<u>2030-2040</u>	<u>2040+</u>
	<ul style="list-style-type: none"> <li>• Wind</li> <li>• Solar PV</li> <li>• Natural Gas</li> <li>• Lithium Ion (2-6 hr)</li> <li>• Transmission</li> <li>• Demand Response</li> </ul>	<ul style="list-style-type: none"> <li>• Compressed Air Storage</li> <li>• Pumped Hydro Storage</li> <li>• Thermal Storage</li> <li>• Liquefied Air Storage</li> <li>• Flow Batteries</li> <li>• Gravitational Storage</li> </ul>	<ul style="list-style-type: none"> <li>• Hydrogen</li> <li>• Synthetic Gas (Non-Carbon Emitting)</li> <li>• Small Modular Reactors</li> </ul>

# THE DISTRIBUTION SYSTEM IS EVOLVING

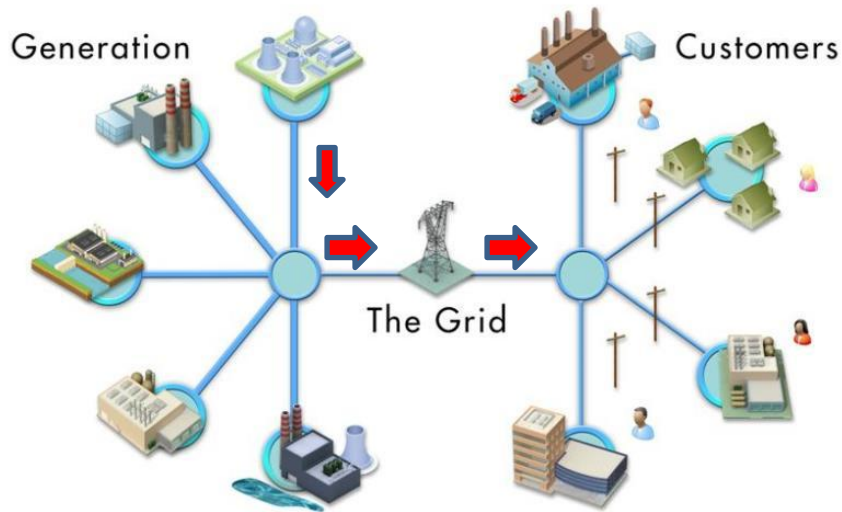
There are many discussions about the impacts to the resource mix and the bulk electric system impacts due to zero carbon goals. But how might that affect the grid edge?

Distribution System innovation drivers:

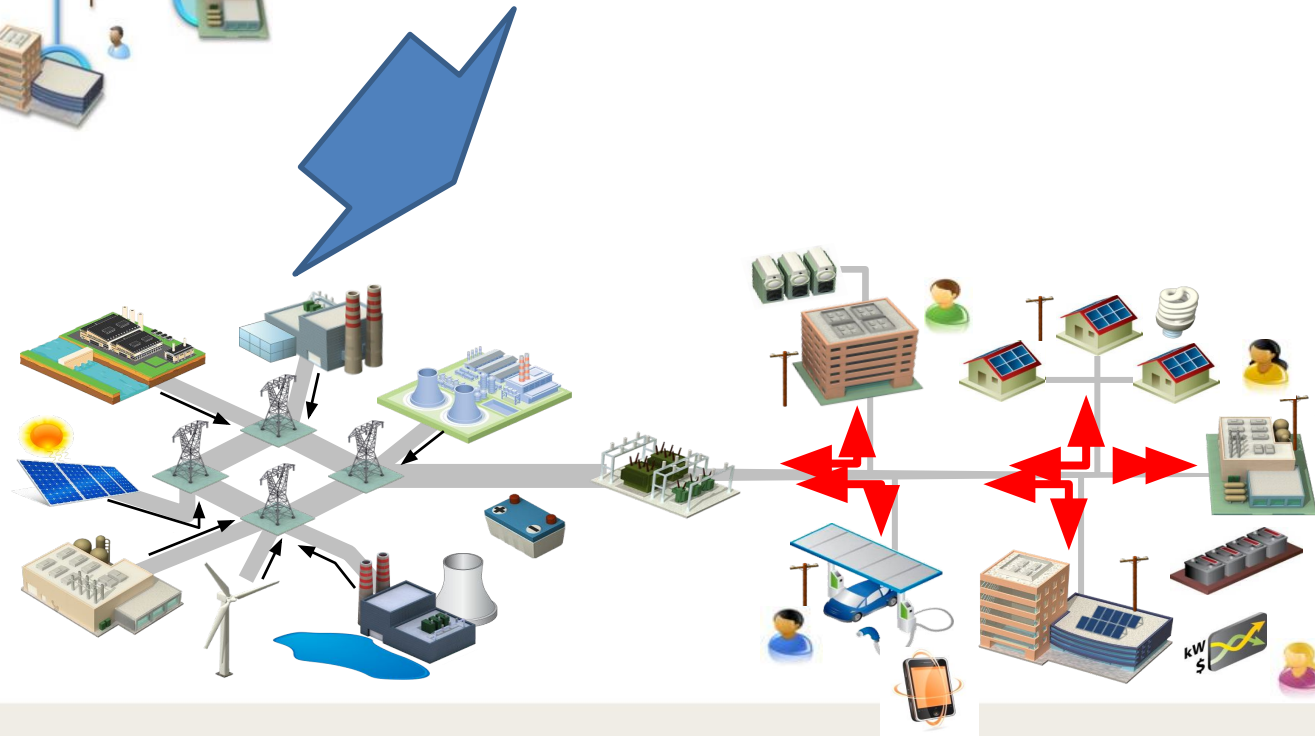
- Customer desires for green technologies
  - Distributed Generation
  - Electrification and increased usage
  - Energy Storage
- Utility grid operations



# MODERNIZING THE GRID

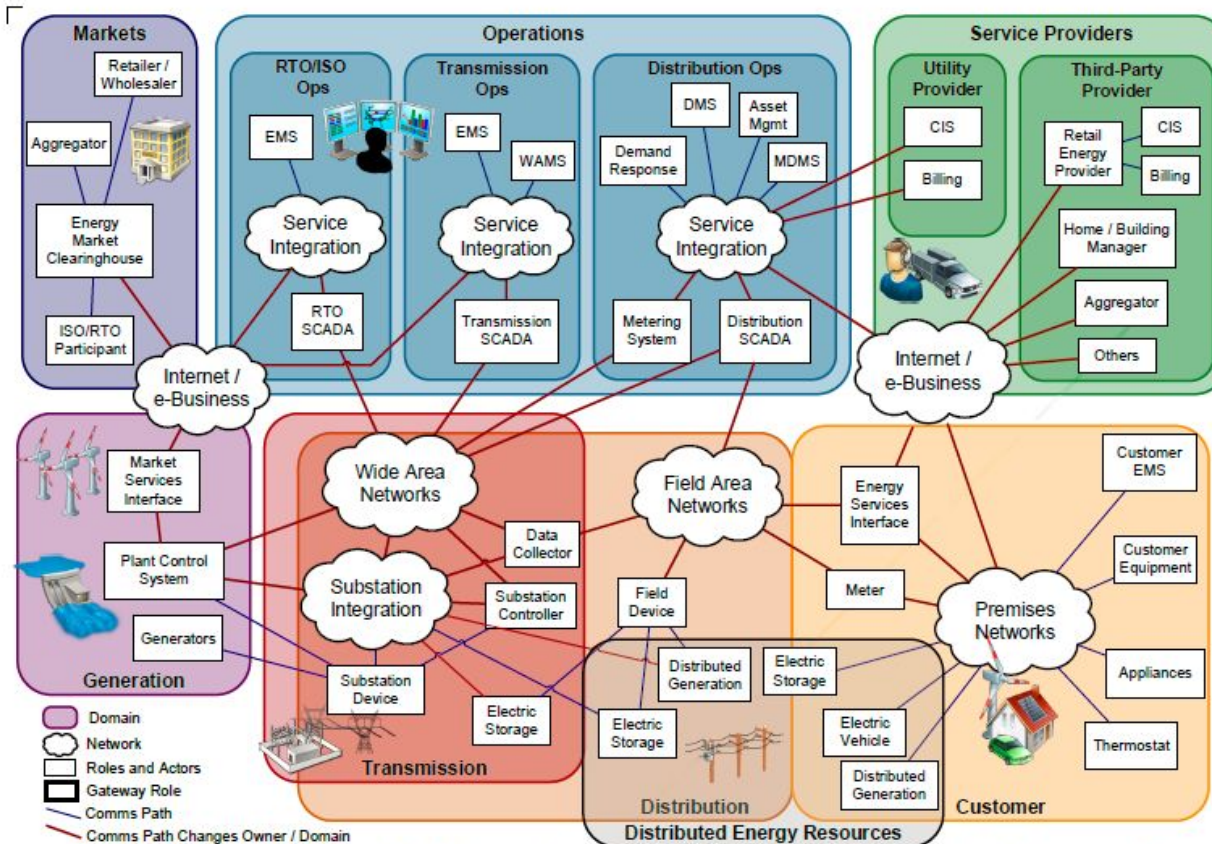


There is still much to do on the distribution system to move toward a 2-way operation with sufficient situational awareness





# DATA AND INFORMATION



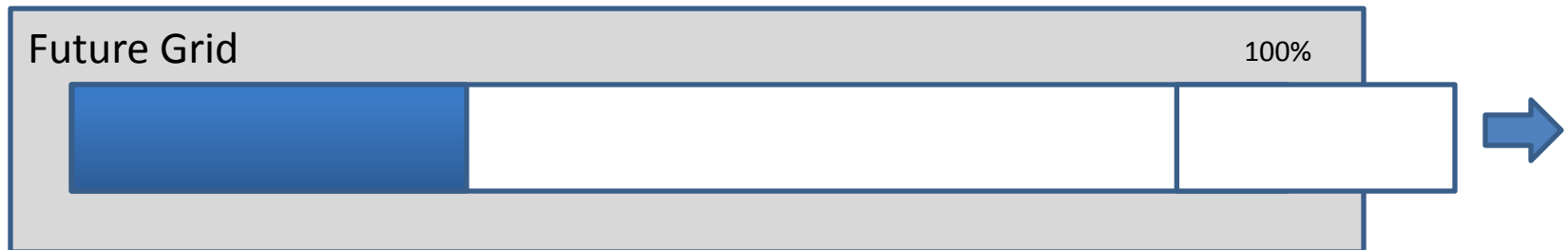
**Figure 5-7. Logical Model of Legacy Systems Mapped onto Conceptual Domains for Smart Grid Information Networks**

NIST Smart Grid Interoperability Standards, Release 3.0

---

## EXCITING TIMES AHEAD

---



It is going to be an exciting time to be a utility Engineer. The grid is already undergoing a big transition, is ripe for much more, and will continue to be a place for innovation and evolution.

# Thank you

