




**NARUC**  
National Association of Regulatory  
Utility Commissioners

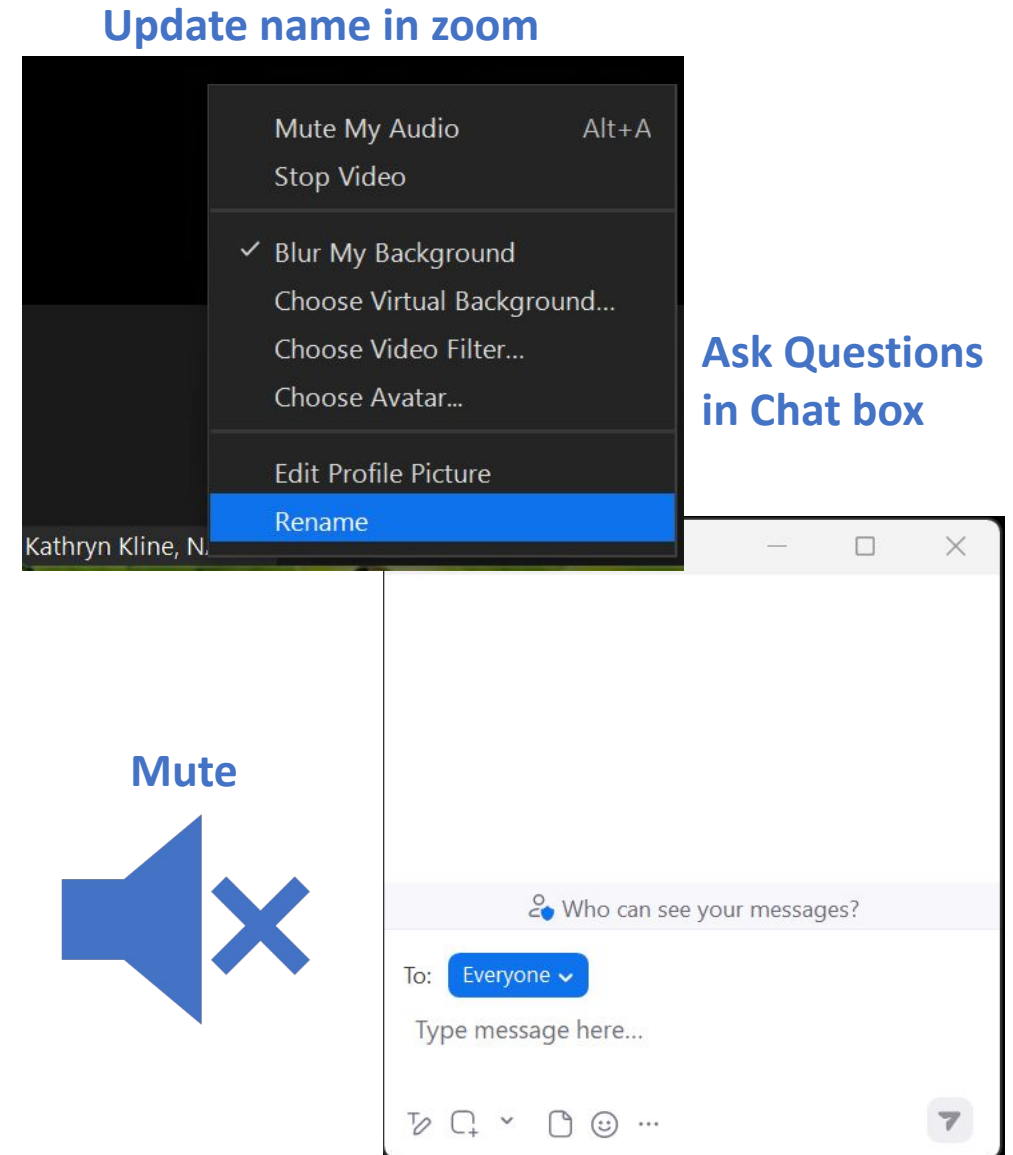
# NASEO-NARUC Microgrids State Working Group Webinar: Powering Data Centers through Microgrids

December 3, 2024



# Webinar Housekeeping

- 1 Please remain on mute during the webinar.
  - 2 Ensure your zoom profile name includes your **name** and **affiliation** (ex. John Doe, OCC) You can do this by right clicking on your name and selecting “rename”.
  - 3 Enter questions into the chat box. The moderator will ask panelists questions from the chat box after the presentations.
  - 4 Be respectful of other attendees.
-  Disruptive participants will be removed from the meeting.



# Agenda

Topic	Speaker
Welcome and Opening Remarks	Kiera Zitelman, NARUC
Speaker Presentations	<ul style="list-style-type: none"><li>- Karen Onaran, President and CEO, Electricity Consumers Resource Council</li><li>- Craig Gordon, Head of Global Policy and Regulatory Affairs, Mainspring Energy</li><li>- Brandi Frazier Bestpitch, Associate Director Energy Security and Reliability, Virginia Department of Energy</li></ul>
Speaker Q&A	Moderator, Hon. James Van Nostrand, Chair, Massachusetts Department of Public Utilities

# Presenters

- Moderator:

- Hon. James Van Nostrand, Chair, Massachusetts Department of Public Utilities

- Speakers:

- Karen Onaran, President and CEO, Electricity Consumers Resource Council
- Craig Gordon, Head of Global Policy and Regulatory Affairs, Mainspring Energy
- Brandi Frazier Bestpitch, Associate Director Energy Security and Reliability, Virginia Department of Energy



# **NASEO/NARUC Microgrids State Working Group**

*Powering Data Centers through  
Microgrids - An Industry Response*

December 3, 2024



# Contents

1. Intro
2. Terminology: the Grid vs Microgrids
3. IEA Projections
4. Survival of the Speediest
5. Case Study: xAI
6. Macro Benefits of Microgrids
7. Operational Flexibility over Time
8. Conclusion



A 9 MW microgrid charging solution near the Port of Los Angeles. Capable of charging 96 EV trucks simultaneously. Owned by Prologis to serve Maersk's drayage truck fleet.

The microgrid saved at least 2 years relative to the local utility's planned schedule.



# Leveling on terms: The Grid vs Microgrids

	<b>The Grid</b>	<b>Microgrids</b>
Ownership	Hundreds of owners	Single owner
Age	Very old	Shiny new
Condition	Needs major upkeep	High-tech
Relationship w/ load	Independent	Integrated
Operations	Complicated	Simple
Generation model	Central station	On-site
Interconnection times	Very long & expensive	Short & affordable

# International Energy Agency (IEA)

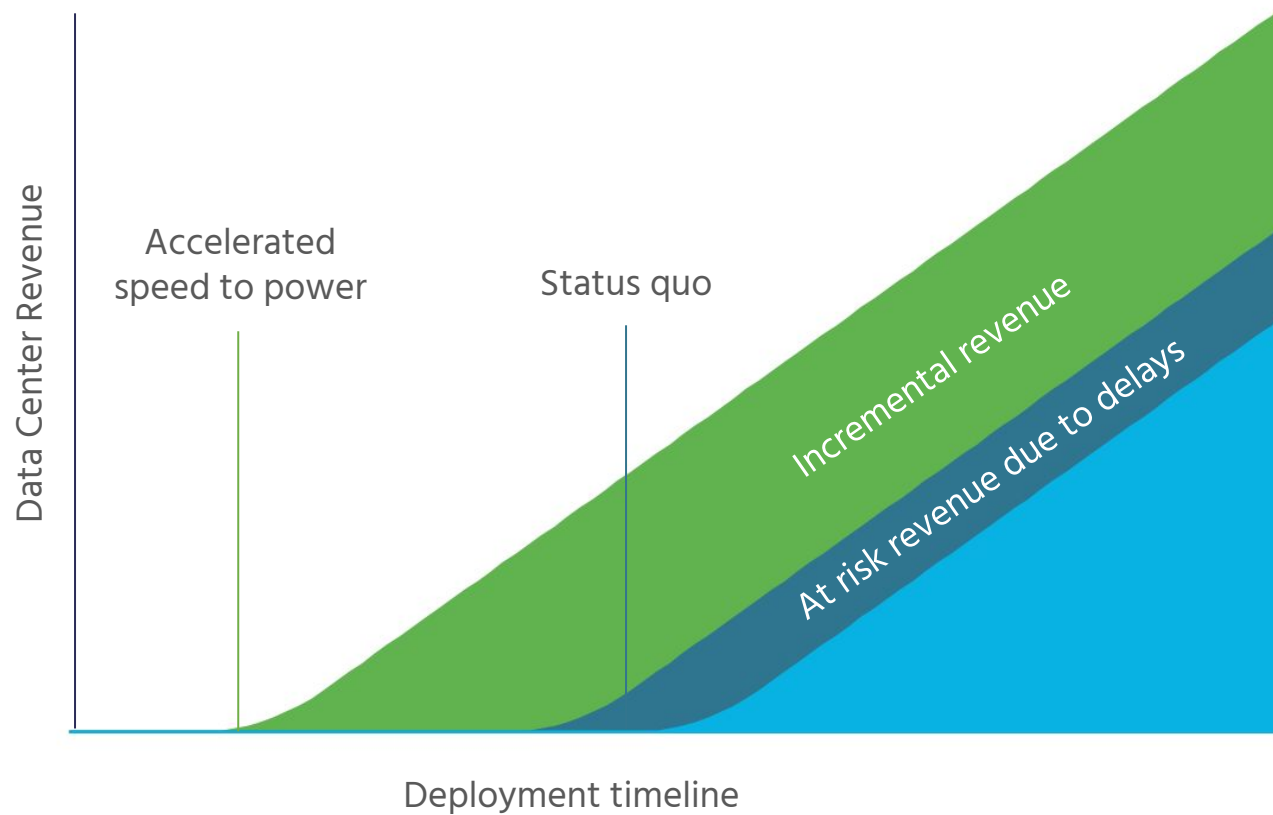
“Electricity 2024”

- Electricity consumption from data centers, AI, and the cryptocurrency sector could **double** by 2026.
- Full AI implementation in search tools like Google could lead to a **tenfold increase** in electricity demand.
- A typical Google search uses **0.3 Wh**; OpenAI’s ChatGPT requires **2.9 Wh** per request. With 9 billion daily searches, **this could add nearly 10 TWh annually**.
- By 2026, AI industry's electricity consumption is expected to grow tenfold compared to 2023.

[Source](#)

# Survival of the Speediest

## Data center revenue over time



- There is intense competition to power-up new data centers as quickly as possible, as large as practical
- Profits and market share are at stake
- Inability to energize new data centers quickly means irrelevance

# Industry Feedback

"I have customer contracts that I cannot fulfill due to **lack of power.**"

"I have data center inventory but no power. We're **at risk of losing customers** we've worked hard to get."

"Our sales team is constrained on what they can sell, and we are **concerned about them leaving.**"

-Industry feedback

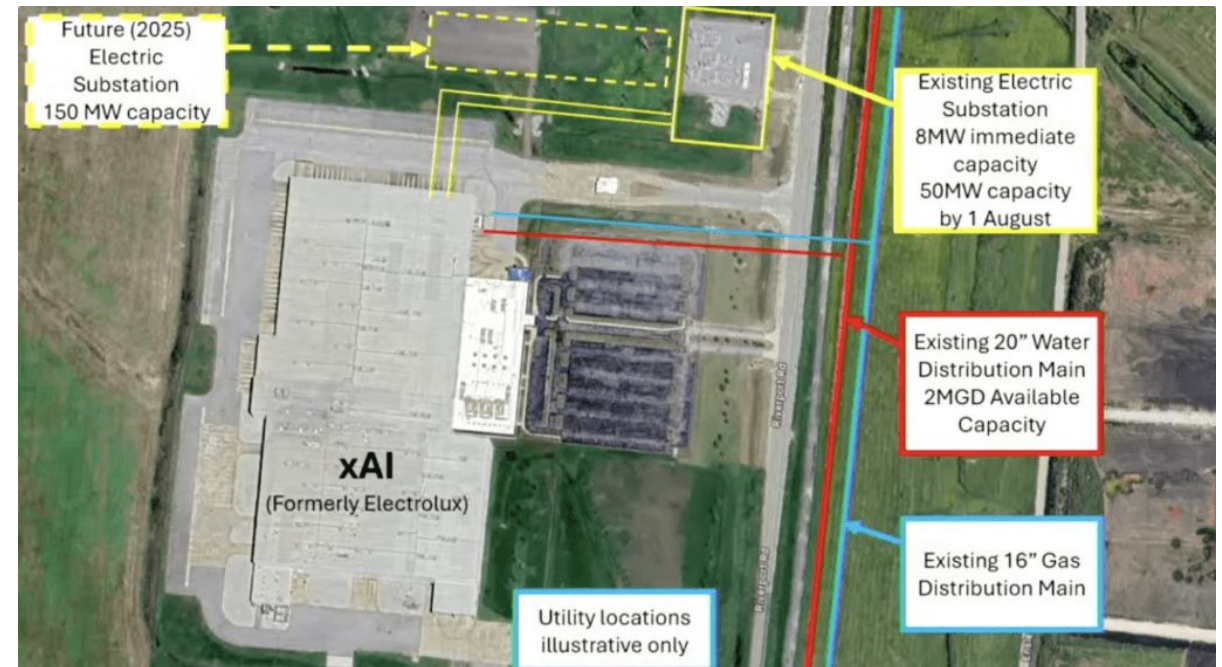
"Such rapid growth has ultimately raised concerns that the US electric utility industry will be **unable to respond quickly to the rise in power demand** because of a swelling backlog of projects in line to connect to the grid."

-Data Centre Magazine, April '24

# A “Colossus” Example - xAI (the world’s largest supercomputer)

- **Challenge:** Memphis facility lacked sufficient grid power to support 100,000\* Nvidia H100 GPUs on short notice
- **Innovative Solution:** Brought in mobile, natural gas-powered turbines to provide supplemental energy
- **Quick Implementation:** Turbines were deployed rapidly, avoiding delays typical in securing permanent grid upgrades
- **Energy Requirement:** Secured approval for an additional 100 megawatts from TVA to meet long-term needs
- **Outcome:** Achieved operational readiness in just **122 days**, setting a record for such large-scale data center projects

\* Each Nvidia H100 costs approximately \$25,000; total cost of GPUs for this DC is \$2.5 billion



# Macro Benefits of Microgrids

## Reduced rates & volatility

Local data center loads relieve upward pressure on capacity and T&D rates

## Economic development

Rapid addition of DC power benefits local governments via a growing tax base, without impacting ratepayers

## High-reliability capacity at load

Redundancy in DC systems ensures available capacity

When utility connections come, the high-reliability capacity resource benefits the local grid

## Cleaner capacity

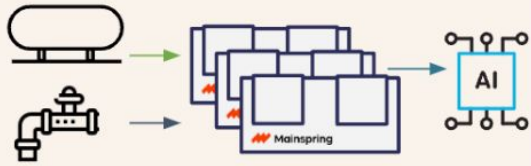
Sustainability mandates promote cleaner, easily permitted, fast-ramping, fuel-flexible capacity with the greatest long-term benefits to the local grid

# Operational Flexibility over Time

## Pre-Interconnection

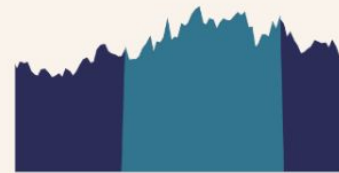
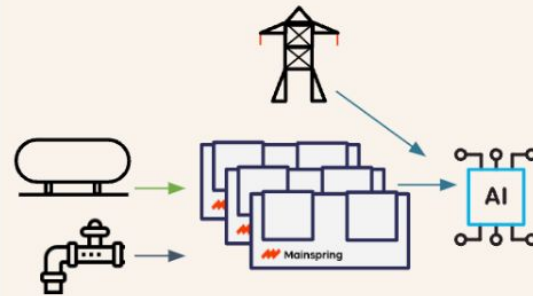
### Option 1:

Prime power with fuel redundancy



### Option 2:

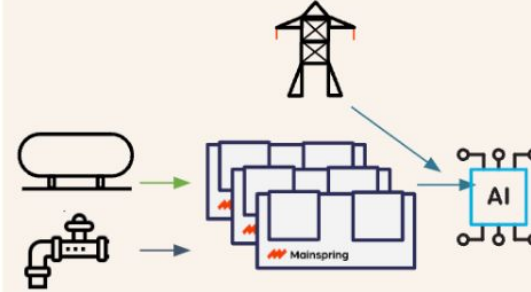
Interruptible electric tariff with fuel redundancy



## Post-Interconnection

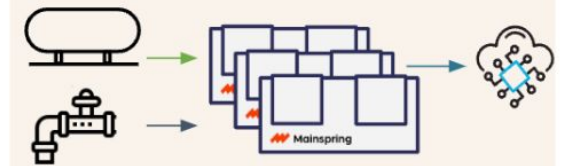
### Option 1:

Peak load shaving + reduced diesel backup



### Option 2:

Relocate to new capacity constrained site



 Mainspring Energy  Grid

# Micro Benefits of Microgrids



## High 9s availability

Modular & scalable architecture results in exceptional availability at a lower cost for any system size.



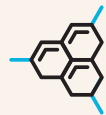
## Rapid deployment

Factory-assembled and tested units enable fast, modular construction; low emissions expedite permitting and enable higher capacity below onerous federal regulations.



## Modularity

Units can scale up as data center demand increases, and can be relocated once the grid connection is made.



## Fuel flexibility

Instantaneous switching between any gaseous fuel without downtime offers multiple fuel redundancy options.



## Dispatchability

Flexible and fast ramping power output from 0-100% enables variable workloads, resilient islanding operations, and fast response to changing capacity needs.



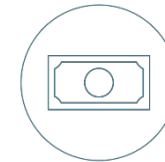
## Future proof

Designed with the future in mind to support multiple operating scenarios after interconnection and offers a seamless transition to zero-carbon fuels such as hydrogen and ammonia.

# Conclusion

## Microgrids...

- Represent the democratization of power
- Offer timely solutions that data centers demand
- Provide the operational flexibility that data centers can afford
- Will become more prevalent as bottlenecks persist on the grid
- Will never fully replace the grid, but will continue to add resilience
- Will be embraced (and owned) by utilities that are willing to reimagine the grid



Affordable



Dispatchable



Clean

**Craig Gordon**

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312-925-5151

# GRID RESILIENCE AND INNOVATION PARTNERSHIPS (GRIP)

## NASEO-NARUC MICROGRIDS STATE WORKING GROUP WEBINAR - POWERING DATA CENTERS THROUGH MICROGRIDS

PRESENTED BY:

**Brandi Frazier Bestpitch**

*Associate Director, Energy Security and Reliability  
Virginia Department of Energy  
State Energy Office*

**December 3, 2024**



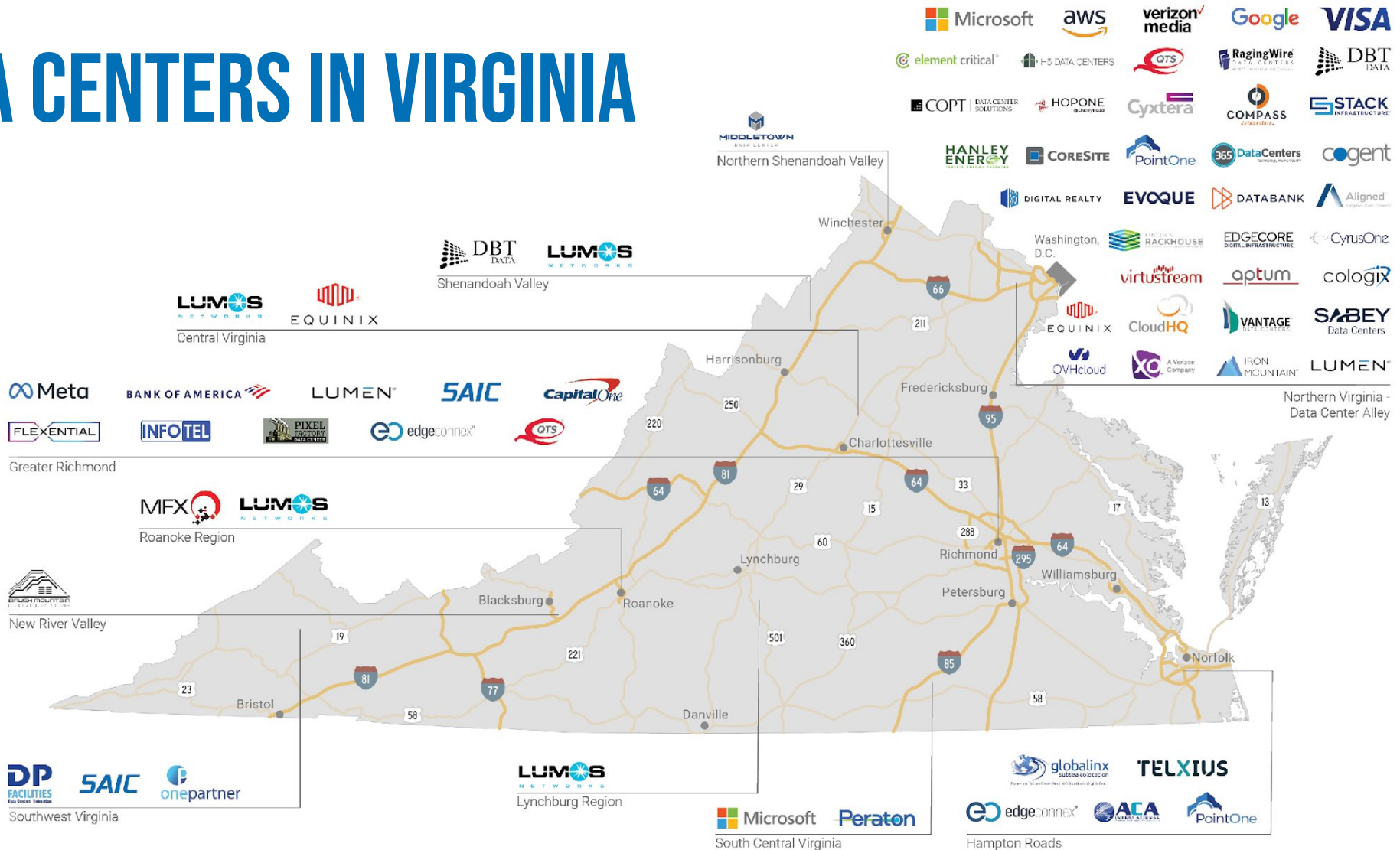


# Agenda

- Importance of Data Centers
- Challenges Virginia Faces
- Potential Solutions
- Grid Resilience and Innovation Partnerships (GRIP) Program
  - Battery Energy Storage Systems
  - Microgrids
- AWS Small Modular Reactor Agreement



# DATA CENTERS IN VIRGINIA



<https://vedp.org/industry/data-centers>



# IMPORTANCE OF DATA CENTERS

- Economic Growth and Job Creation
- Infrastructure Investment
- Tax Revenue
- Attracting Technology Companies
- Digital Transformation and Connectivity
- Global Competitiveness



# CHALLENGES FOR VIRGINIA



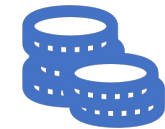
High energy consumption



Water usage for cooling



Land and resource use



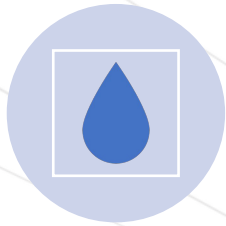
Economic sustainability and Tax incentives



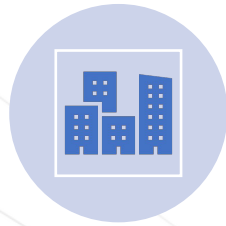
# POTENTIAL SOLUTIONS FOR VIRGINIA



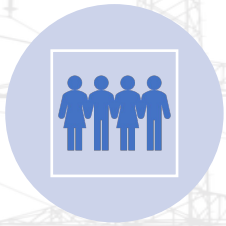
PROMOTING  
CLEAN ENERGY  
SOLUTIONS



ENCOURAGING  
WATER-EFFICIENT  
COOLING



INFRASTRUCTURE  
INVESTMENT



WORKFORCE  
DEVELOPMENT



COLLABORATION  
WITH INDUSTRY  
STAKEHOLDERS



# GRID RESILIENCE AND INNOVATION PROGRAMS (GRIP)



FUNDING  
OPPORTUNITY



CONCEPT PAPER  
SUBMISSION



FULL APPLICATION  
SUBMISSION



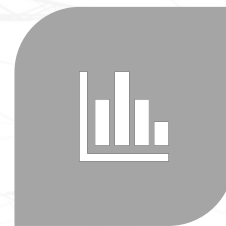
APPLICATION  
REVIEW AND AWARD  
NEGOTIATION



AWARD  
ANNOUNCEMENT



PROJECT  
IMPLEMENTATION



REPORTING AND  
COMPLIANCE



# GRID RESILIENCE AND INNOVATION PROGRAMS (GRIP)

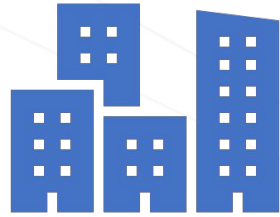
## Data Center Flexibility as a Grid Enhancing Technology

Building flexible, grid-enhancing data centers in Virginia and South Carolina

- **Two projects selected**
  - Iron Mountain data center in Virginia
  - Grace Complex in South Carolina



# AMAZON WEB SERVICES (AWS) SMALL MODULAR REACTOR AGREEMENT



**Expanding data center industry in Virginia with clean energy power solutions**



**AWS and Dominion Energy partner to explore the development of Small Modular Reactor (SMRs) in Virginia**

## **Key Benefits Virginia and Local Communities**

- Energy Security and Reliability
- Economic Growth
- Environmental
- Innovation and National Security



# THANK YOU.

**CONTACT THE PRESENTER:**

**Brandi Frazier Bestpitch**  
**Associate Director, Energy Security**  
**and Reliability**

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**December 3, 2024**





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Q & A



Source: RL Martin