NASEO
National Association of State Energy Officials

NARUC
National Association of Regulatory Utility Commissioners

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

December 3, 2024

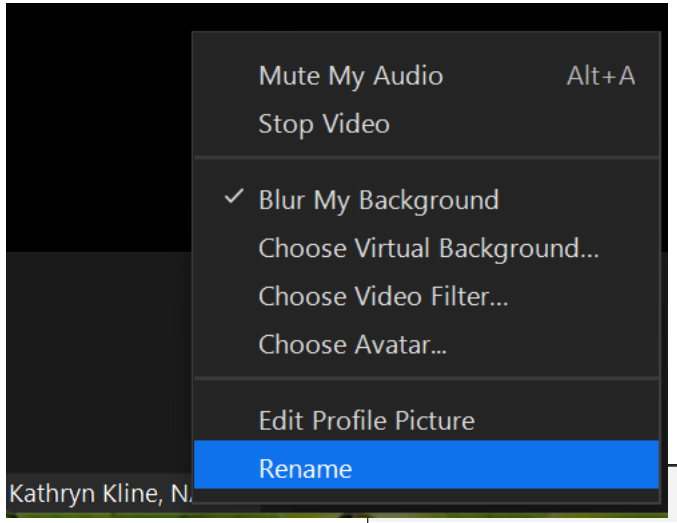
Source: RL Martin

Webinar Housekeeping

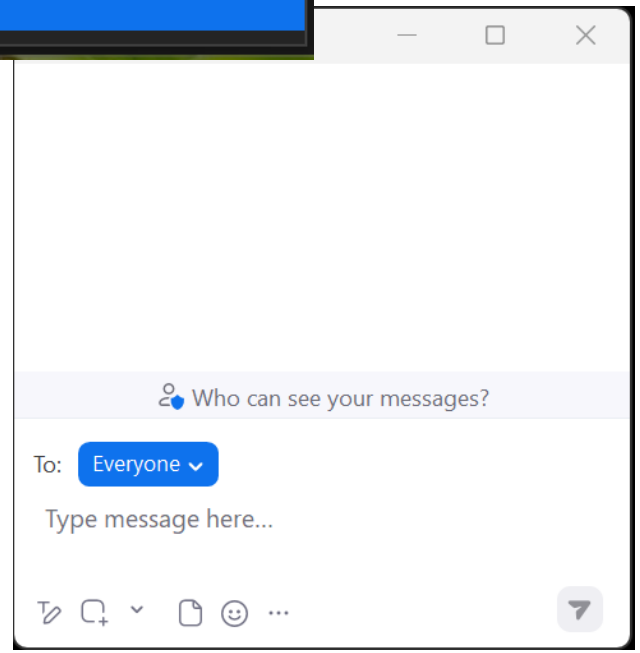
1. Please remain on mute during the webinar.
2. Ensure your zoom profile name includes your **name** and **affiliation** (ex. John Doe, OCC) You can do this by right clicking on your name and selecting “rename”.
3. Enter questions into the chat box. The moderator will ask panelists questions from the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

Disruptive participants will be removed from the meeting.

Update name in zoom



Ask Questions in Chat box



Mute

Agenda

Topic	Speaker
Welcome and Opening Remarks	Kiera Zitelman, NARUC
Speaker Presentations	- 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
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

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Contents

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.

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Leveling on terms: The Grid vs Microgrids

	The Grid	Microgrids
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

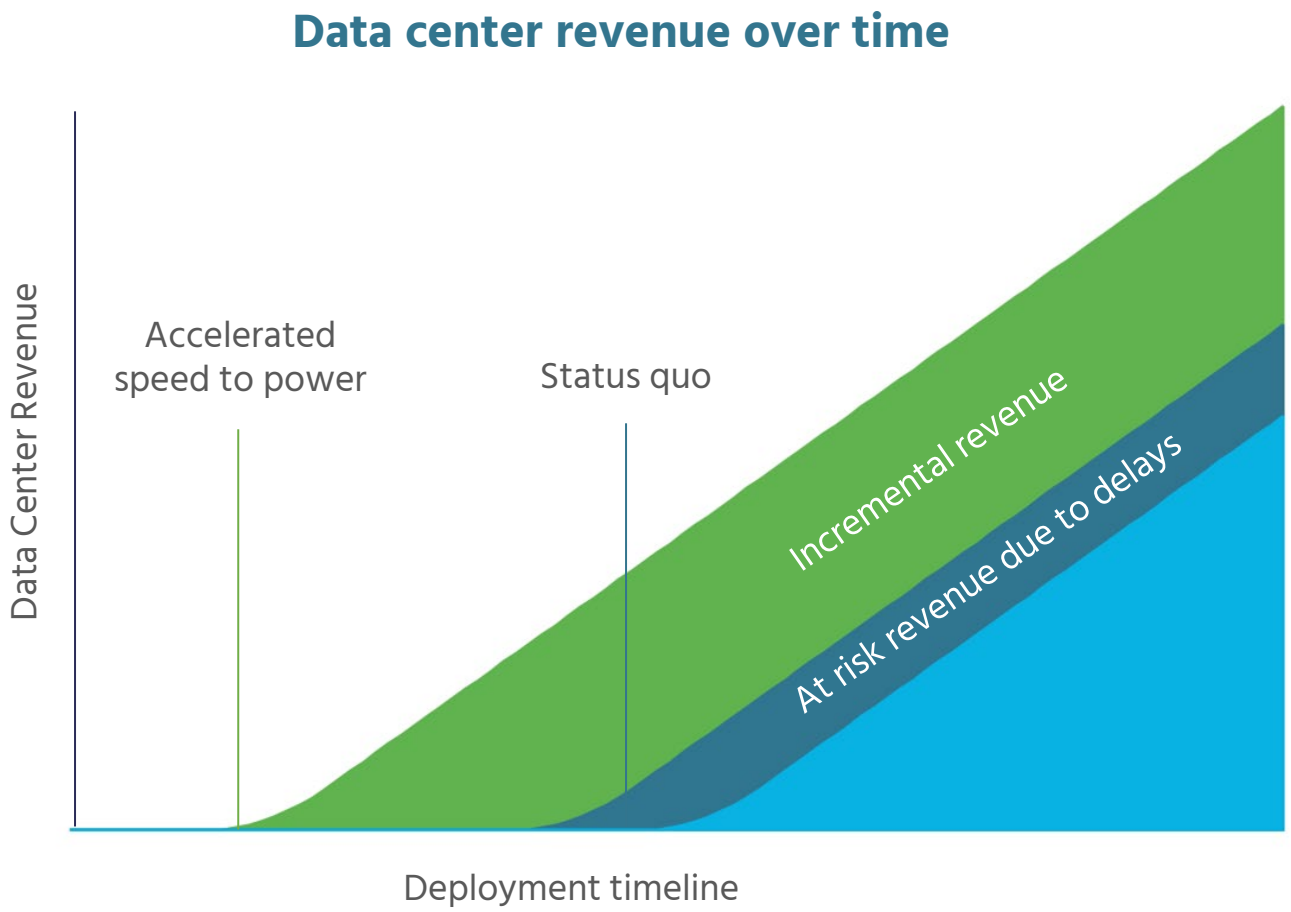
International Energy Agency (IEA)

"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



- 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

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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

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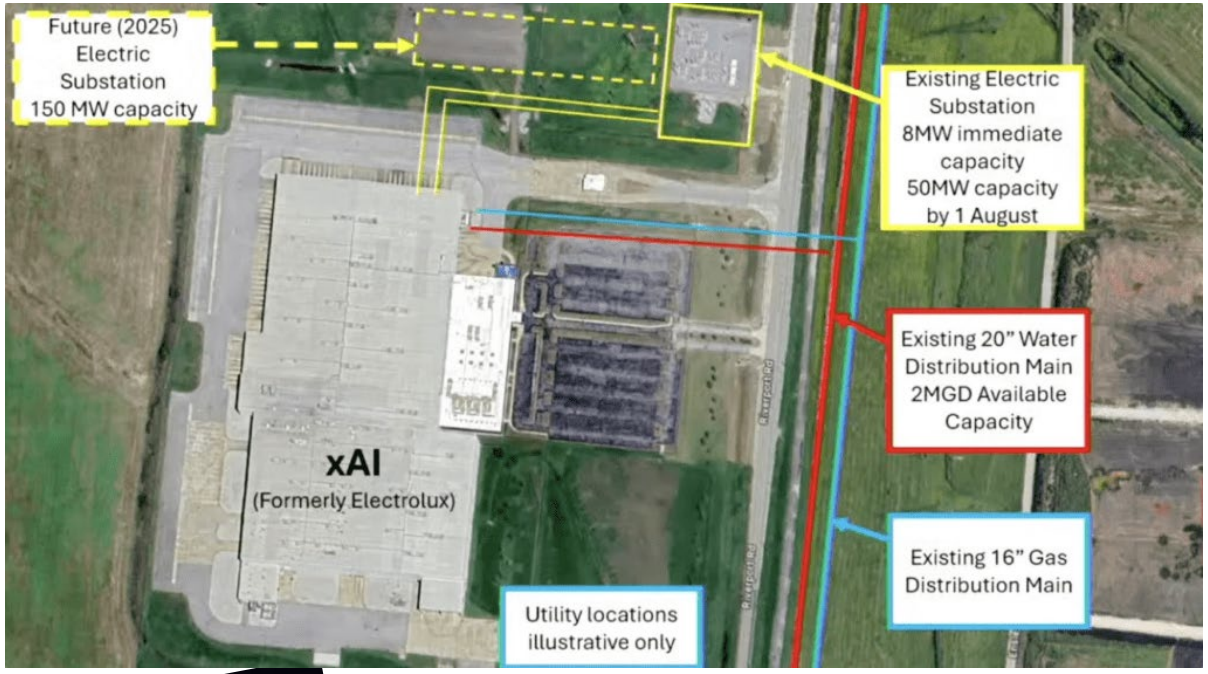
A “Colossus” Example - xAI (the world’s largest supercomputer)

- **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



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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

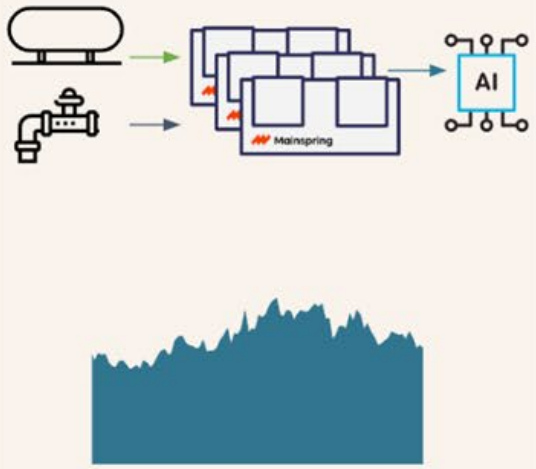
Sustainability mandates promote cleaner, easily permitted, fast-ramping, fuel-flexible capacity with the greatest long-term benefits to the local grid

Operational Flexibility over Time

Pre-Interconnection

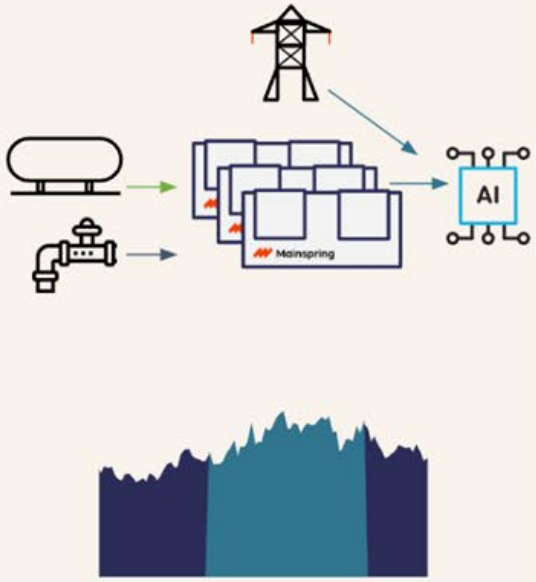
Option 1:

Prime power with fuel redundancy



Option 2:

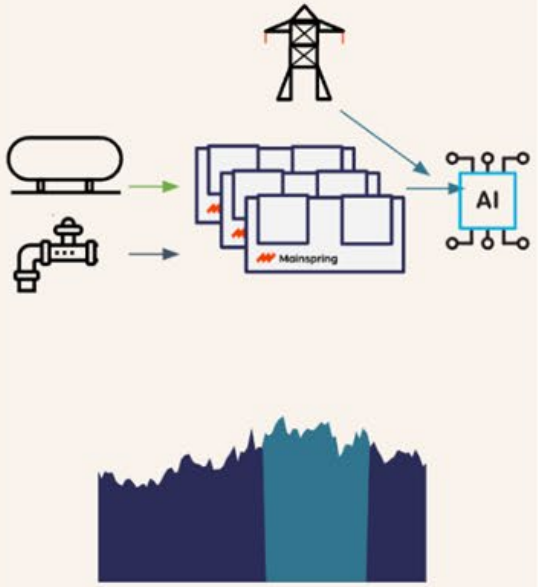
Interruptible electric tariff with fuel redundancy



Post-Interconnection

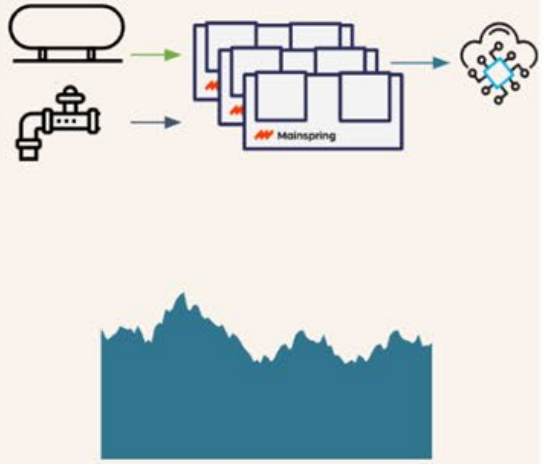
Option 1:

Peak load shaving + reduced diesel backup



Option 2:

Relocate to new capacity constrained site



Mainspring Energy Grid

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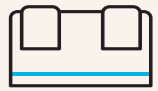
Micro Benefits of Microgrids

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.

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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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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

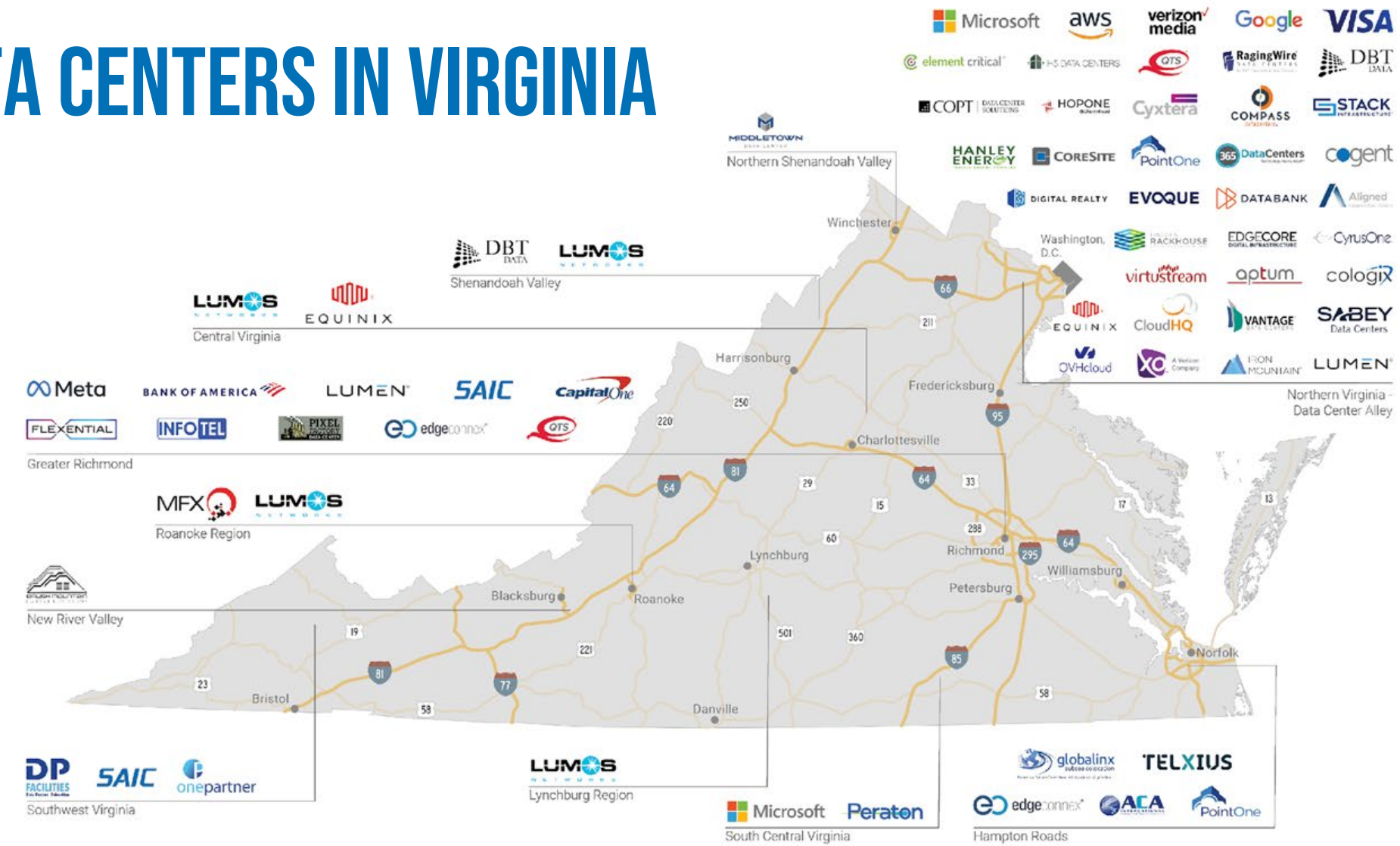
December 3, 2024

VIRGINIA Energy

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

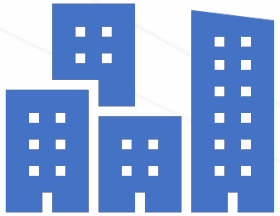
GRID RESILIENCE AND INNOVATION PROGRAMS (GRIP)

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:

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Q & A

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