NASEO

National Association of State Energy Officials

NASEO Powering Up Data Centers and NASEO-NARUC Grid-Interactive Efficient Buildings (GEB) Working Group Webinar

State Action and New Technology for Data Center and Large Load Flexibility

October 17, 2025

About NASEO

- The only national non-profit association for the governor-designated energy officials from each of the 56 states and territories
- Serves as a resource for and about the State Energy Offices through topical committees, regional dialogues, and informational events that facilitate peer learning, best practice sharing, and consensus building
- Advances the interests of the State and Territory Energy Offices before Congress and the Administration
- Learn more at www.naseo.org

NASEO Board of Directors

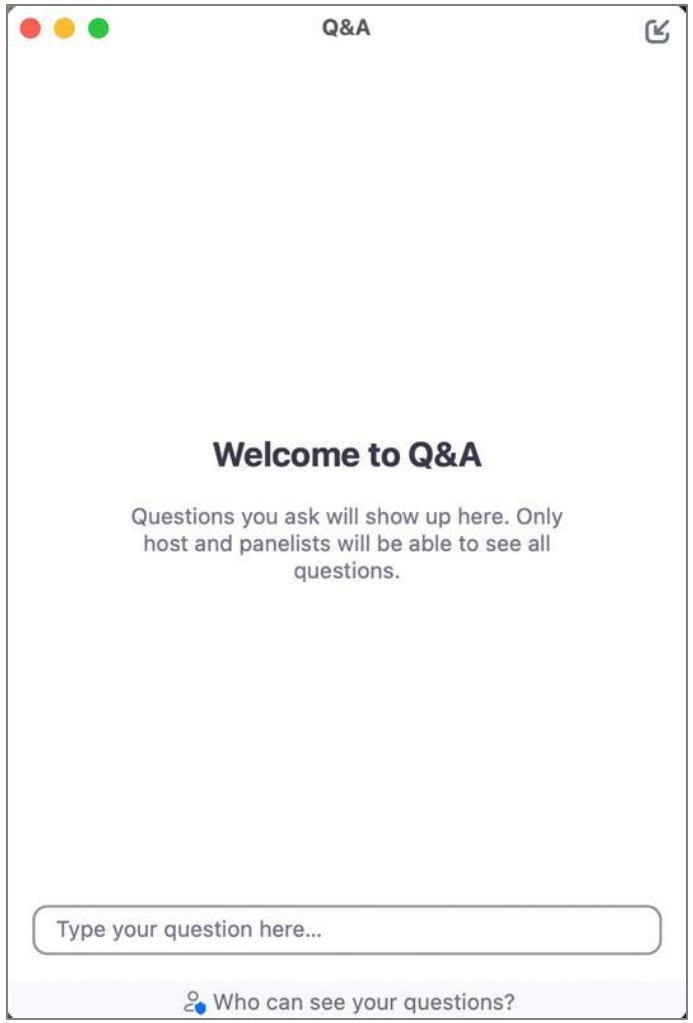
Chair: Molly Cripps, Tennessee
Vice-Chair: Will Toor, Colorado
Treasurer: Eddy Trevino, Texas
Secretary: David Althoff, Jr, Pennsylvania
Member at Large, Julie Staveland, Michigan
Past Chair: John Williams, New York

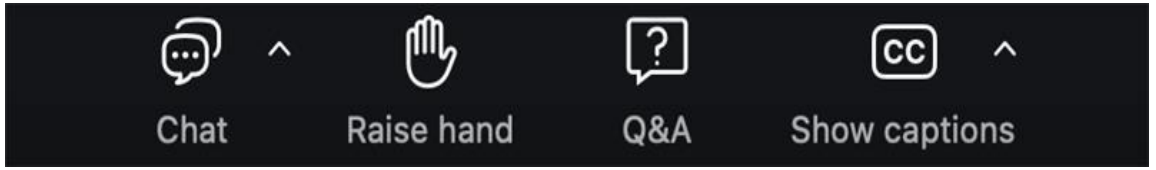
Regional Representatives:
Dan Burgess, Maine
Katie Dykes, Connecticut
Nicholas Preservati, West Virginia
Nick Burger, District of Columbia
Joe Pater, Wisconsin
Emily Wilbur, Missouri
Mitchell Simpson, Arkansas
Kenya Stump, Kentucky
Maria Effertz, North Dakota
Ben Brouwer, Montana
Janine Benner, Oregon
Rebecca J. Respicio, Guam

Webinar Housekeeping

Recording
This webinar is being recorded.

Question and Answers
You are automatically muted during the webinar. To ask a question, please enter your question at any point into the Q&A box.





Agenda

3:05-3:15pm ET
Opening Remarks and Perspective from California
Andrew McAllister, Commissioner, California Energy Commission

3:15-3:25pm ET
State Action on Load Flexibility: Texas Senate Bill 6
Kim Van Winkle, Attorney, Market Analysis Division, Public Utility Commission of Texas

3:25-3:40pm ET
Case Study: Verrus Flexible Data Center Demonstration
Jeff Bladen, Head of Energy, and Ben Wheeler, Head of Product Development, Verrus

3:40–3:50pm ET
Moderated Discussion

3:50–3:55pm ET
Audience Q&A

3:55-4:00pm ET
Closing Remarks/Wrap-Up

NASEO Powering Up Data Centers and NASEO-NARUC GEB Working Group Webinar:

Texas Senate Bill 6

Presented by:

Kim Van Winkle

Attorney

Market Analysis Division

October 17, 2025

Data Centers are Driving Unprecedented Load Growth in ERCOT

- ERCOT is now tracking more than 3 times as many large load interconnections compared to 2024
- Nearly 69% of 189 GW of large load requests are from data centers
- The large load requests in the ERCOT queue—189 gigawatts—equal about 40 percent of the nation's estimated electricity consumption for 2025
- Potential resource adequacy and system reliability issues
- Texas Reliability Entity upgraded the risk of "Disorganized Integration of Large Loads" from Unlikely/Moderate to Likely/Major in 2025

SB6: Tools to Address Grid Challenges from Large Loads While Accommodating Growth

- Support business development while minimizing stranded infrastructure costs and maintaining system reliability
- Load Forecasting Criteria
- Interconnection Standards
- Net Metering Arrangements
- Competitively Procured Reliability Service
- Remote curtailment equipment for transmission-voltage loads
- Transmission Cost Recovery evaluation

Large Load Forecasting Criteria Rulemaking

- Establishing standards for inclusion in ERCOT load forecast to improve accuracy and exclude “phantom” load.
- SGIA, or TSP officer letter substantiated with financial commitments, evidence of site control, disclosure of duplicate service requests, etc.
- Proposed rule published; final rule adoption expected by March 2026.
- Project 58480 implementing PURA §37.0561(m)

Large Load Interconnection Standards Rulemaking

- Support business development while minimizing stranded infrastructure costs and maintaining system reliability.
- Ensure that large load customers contribute to the recovery of the utility's interconnection costs.
- Financial commitments (CAIAC, $/MW), site control, study fee.
- Disclose on-site backup generation capable of serving ≥50% of onsite demand. ERCOT must establish a threshold before or during an EEA when, upon reasonable notice, those customers may be directed to either deploy its backup generation or curtail load (after ERCOT deploys all available market services except frequency response).
- Project 58481 implementing PURA §§37.0561(b) and 35.004(c)(1)

Net Metering Arrangements Rulemaking

- Coordinated ERCOT and PUCT review of new net metering arrangements involving large load customers and existing generation resources.
- ERCOT interim process in place. Published list of stand-alone generation resources as of September 1, 2025.
- 120 day ERCOT study of system impacts, including transmission security and resource adequacy impacts. Recommendation to PUCT.
- Within 60 days, PUCT must approve, deny, or impose reasonable conditions on the proposed arrangement to maintain system reliability.
- Conditions may include curtailment or generation capacity available to the grid during certain events. ERCOT indicated it will recommend that PUCT conditions require these loads to curtail in advance of other firm loads.
- Customers must be held harmless for stranded or underutilized transmission assets.
- Project 58479 implementing PURA §39.169. Proposed rule published.

Large Load Demand Management Service

- Rule to require ERCOT to develop a new reliability service
  - Competitively procure demand reductions from loads ≥75MW
  - To be deployed in the event of an anticipated emergency condition
  - Excludes price sensitive loads and loads participating in another reliability or ancillary service
  - 24 hours notice required

- Staff solicited comments on what policy determinations should be made by the PUCT vs. the ERCOT stakeholder process.

- Project 58482; (PURA §39.170(b))

Curtailment Capability for Transmission-Voltage Loads

- PUCT must require that ERCOT ensures that utilities develop protocols, including the installation of any necessary equipment or technology before the customer is interconnected, to allow the load to be curtailed during firm load shed.
- Applies to large loads interconnected after December 31, 2025.
- The utility shall confer with the customer to the extent feasible to shed load in a coordinated manner.
- PURA §39.170(a)
- TBD if a rulemaking will be needed to address policy questions.

Evaluation of Transmission Cost Allocation

- PUCT must evaluate whether the existing four-coincident peak (4CP) methodology used to charge wholesale transmission costs to distribution providers continues to appropriately assign costs for transmission investment, including:
  - Whether the 4cp methodology ensures all loads appropriately contribute;
  - Whether alternative methods to calculate wholesale transmission rates would more appropriately assign the cost (e.g., multiple seasonal peak demands, demand during different length daily intervals, or peak energy intervals); and
  - The portion of costs that should be nonbypassable.
- Citing grid changes since 4CP adoption, the IMM recommended changing.
- Project 58484 implementing PURA §37.0561; Dec. 2026 deadline

Insights from the Texas Experience So Far

- Workshops and stakeholder feedback inform proposed rules and can help streamline adoption. UT Symposium paper available.
- Contemplate future adjustments to thresholds, financial commitments, other standards, and accommodate if possible.
- Diverse types of large loads may warrant different treatment.
- Settings standards early can facilitate investment by creating certainty.
- Load not used to interfacing directly with regulators (and in some aspects, grid operators). Some processes still go through utilities, QSEs. Dealing with owner/operator vs. end-use customer (tenant).
- Anticipate how legislative and regulatory agenda interacts with system protocols, other external developments

Thank You!

Contact:

Kim Van Winkle

Kim.vanwinkle@puc.texas.gov

PUC.TEXAS.GOV

verrus™

Verrus Data Centers

The world’s most flexible and sustainable data centers

GRID AWARE, CARBON AWARE, COMPUTE AWARE™

October 2025

Verrus: The world's most flexible and sustainable data centers

Building and operating modular, customizable data centers with a new approach to power management

New approach. Groundbreaking design

Verrus is redefining what a data center can be - engineered to deliver unprecedented efficiency to customers, serve as an asset to the grid, and help communities meet their economic and sustainability goals.

Experienced team

Verrus is purpose-built to solve the challenges of today and shape the future of the industry, with decades of experience leading hyperscaler and energy industry innovation.

Strong financial backing

Verrus was founded by Sidewalk Infrastructure Partners (SIP), a holding company that focuses on technology-enabled infrastructure. SIP Is backed by anchor investors Alphabet, Ontario Teachers' Pension Plan, and StepStone Group.

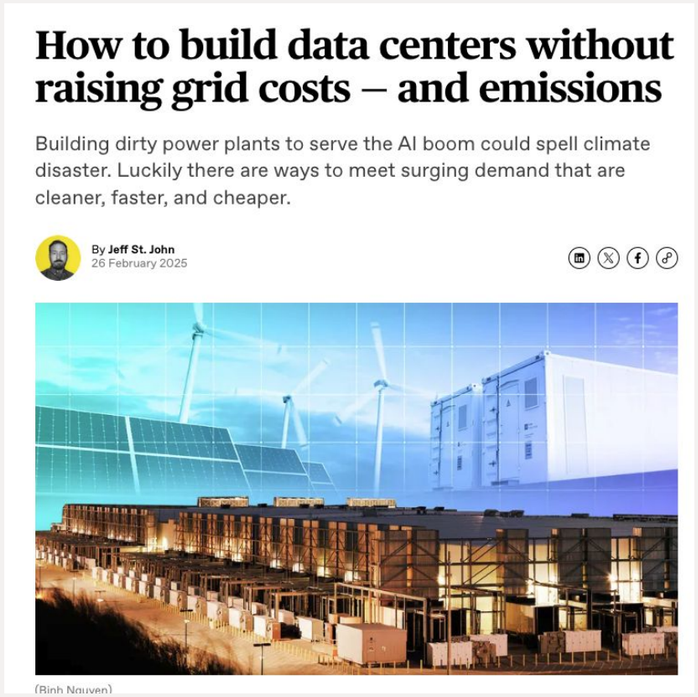
BRINGING EXPERIENCE FROM:

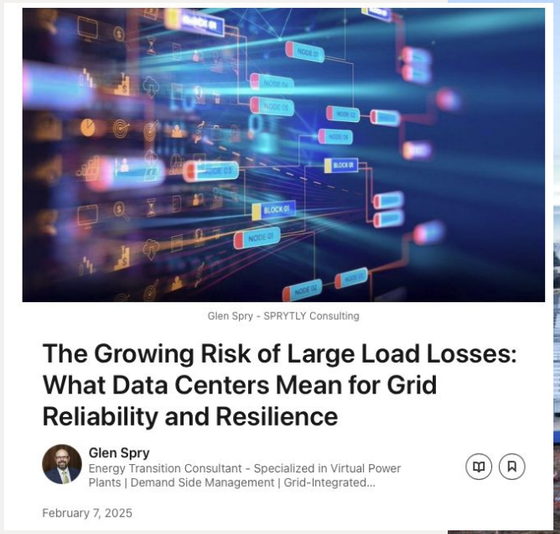
Google, X, pjm, Meta, Microsoft, IBM, intel, Constellation, edgeconnex, aws, MISO, DIGITAL REALTY, cisco, ...and many more

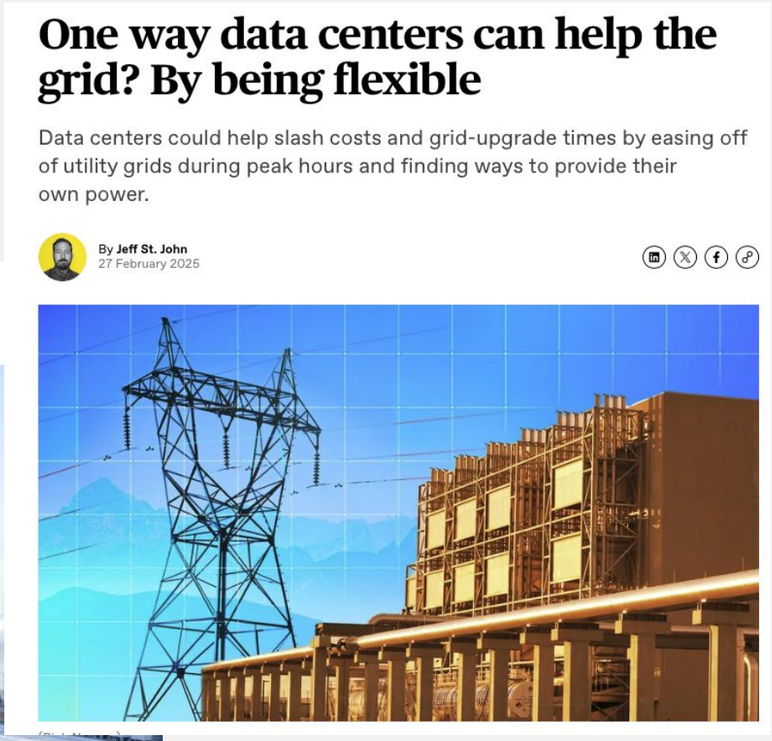
Industry Snapshot

Extraordinary growth of “large” loads will strain the grid

Grid not built for high volume of inflexible hyper scale large loads







Verrus

A new type of data center company

A New Kind of Data Center: What sets Verrus apart?

Verrus is redefining what a data center can be - engineered not just for tenants, but for the entire ecosystem it touches. We design facilities that deliver value across three interconnected stakeholders:

Customers

Reliable, high-density capacity engineered for maximum productive utilization per megawatt.

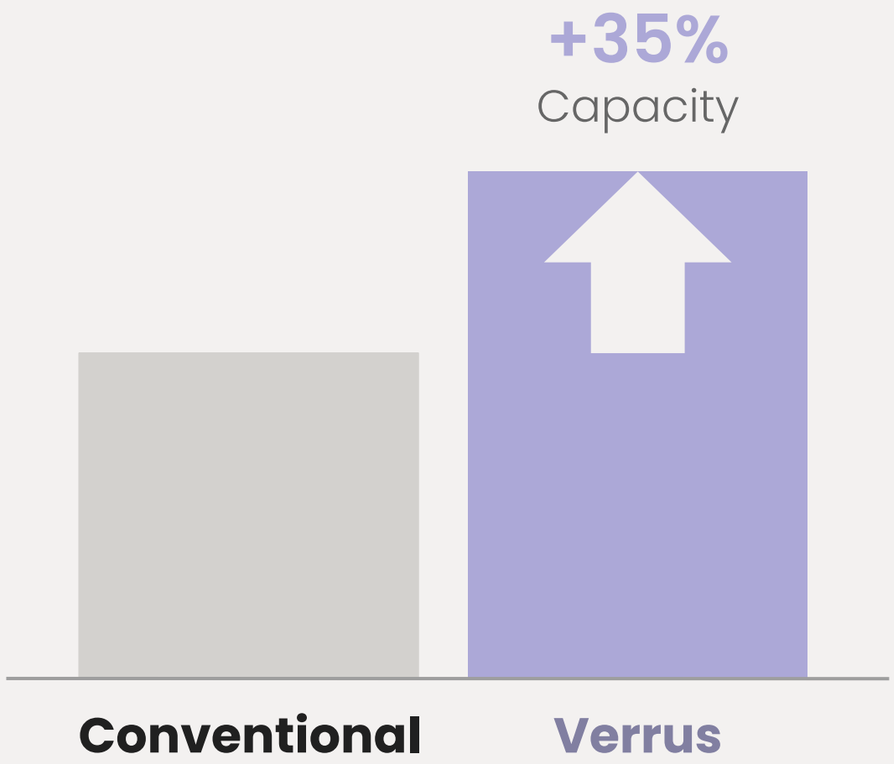
Utilities

Flexible, grid-interactive assets that provide dispatchable load, stability, and capacity where it's needed most.

Communities

Smart, low-impact developments that strengthen local economies and align with regional sustainability goals.

Do More with Every Megawatt



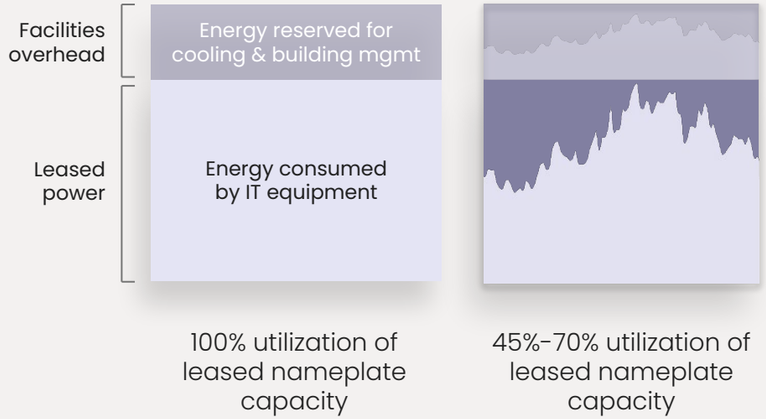
$7M
Savings per MW
(10 year lease)

$345M
Savings per 50 MW lease

Verrus data centers deliver **35+% more serving capacity** per leased megawatt vs. conventional providers

How?

Verrus data centers have been engineered from the ground up to help customers extract more productivity out of every available watt.



100% utilization of leased nameplate capacity

45%-70% utilization of leased nameplate capacity

Up to **20%** more leasable capacity from the same utility interconnect

+

Up to **35+%** increase in utilization of all leased nameplate capacity

=

Up to **50+%** increase in utilization of available interconnect energy

PowerFlow™

Smarter electrical design and energy management

Verrus' proprietary PowerFlow™ technology ensures that every watt is precisely managed to keep more capacity available for server loads at all times.

Behind-the-Meter (BTM) Energy Storage

Grid-connected Battery Energy Storage Systems (BESS) play a crucial role in peak shaving and load shifting, optimizing energy use on the both the facility and utility sides of the power interconnect. During times of peak demand, it serves as a reliable buffer to absorb spikes in demand.

Cooling optimization

Onsite thermal storage and temperature optimization, coordinated with PowerFlow™, reduces energy demand for cooling during peaks. This 'peak-shaving' lowers peak PUE and frees capacity for more IT equipment.

Transparent real-time data sharing

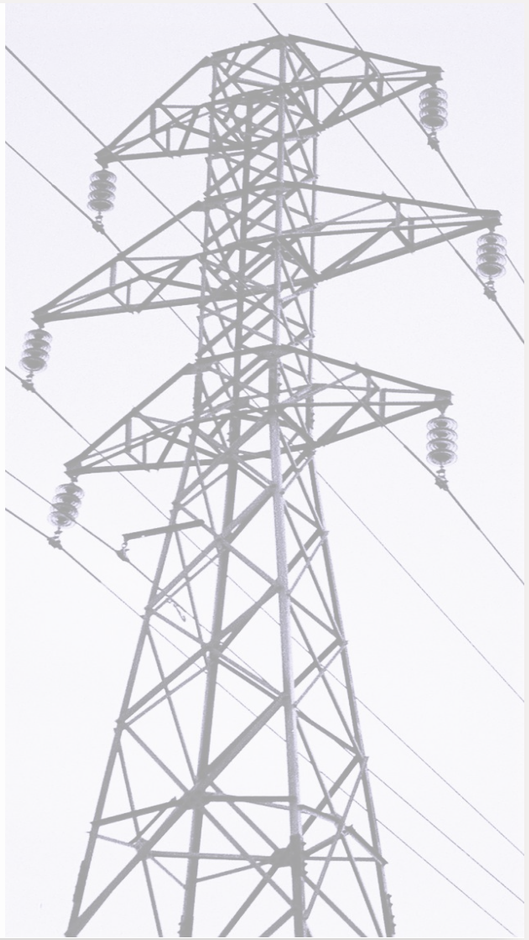
Real-time facility data lets customers manage server deployments and workloads with confidence, helping to identify unused capacity headroom for the addition of more IT equipment.

Verrus: Data Centers that Benefit the Grid

What sets Verrus apart for utilities?

A data center that is an asset to the grid & surrounding community, rather than a pain point

1	Firm Demand Response at MW scale	Verrus data centers are purpose-built to deliver megawatt scale load flexibility via bespoke utility products, including **demand response and ancillary services, that are 100% committable** due to our dispatchable, grid-tied battery energy storage capacity.
2	Benefit to ratepayers	Utilities can factor Verrus' dependable Demand Response commitment into their rate plans leading to a higher system capacity factor and more energy revenue without the need to invest in new peak generation and transmission assets - thus resulting in **lower energy prices for ratepayers**.
3	Stable power interconnection	Utilities are becoming increasingly concerned about the effects of large, abrupt workloads swings in AI training data centers. Verrus' grid-following BESS design **acts as a "shock absorber", helping to mitigate the effects** of such swings as perceived by the utility at the point of interconnection.
4	Ability to add renewable generation	In regions where renewable generation is capped by demand during peak periods, Verrus' battery storage can serve as a high capacity curtailment asset, **raising the ceiling for renewable generation on the grid**.



Load Flexibility: Firm Demand Response at MW Scale

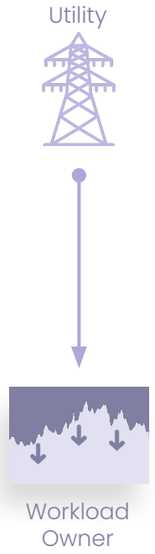
How Verrus is differentiated among existing “flexible data center” initiatives

The idea of flexible data center workloads is not new. There have been research papers and hyperscaler pilots going back at least as far as 2016. More recently the DC Flex initiative was announced in 2024, followed by a well circulated paper by Duke university’s Nicholas Institute.

Those initiatives have primarily focus on workload flexibility in **direct response** to utility Demand Response requests.

This has led to slow adoption for two reasons:

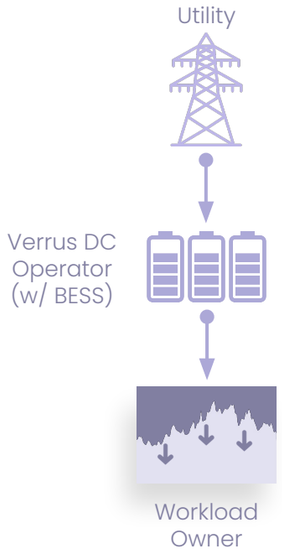
Typical “direct response” flexible-workload data center



1. **For utilities:** The lack of predictability in workload reduction is less valuable as a resource for utilities than a firm dispatchable asset
2. **For workload owners:** There is reluctance to make firm commitments on reduction/shifting for fear of missed revenue from running workloads or impacting customer SLAs

The Verrus PowerFlow™ data center solves these challenges

Verrus PowerFlow™ data center with decoupled Demand Response



Verrus' unique PowerFlow™ architecture solves this by decoupling the utility<>workload interface into two segments:

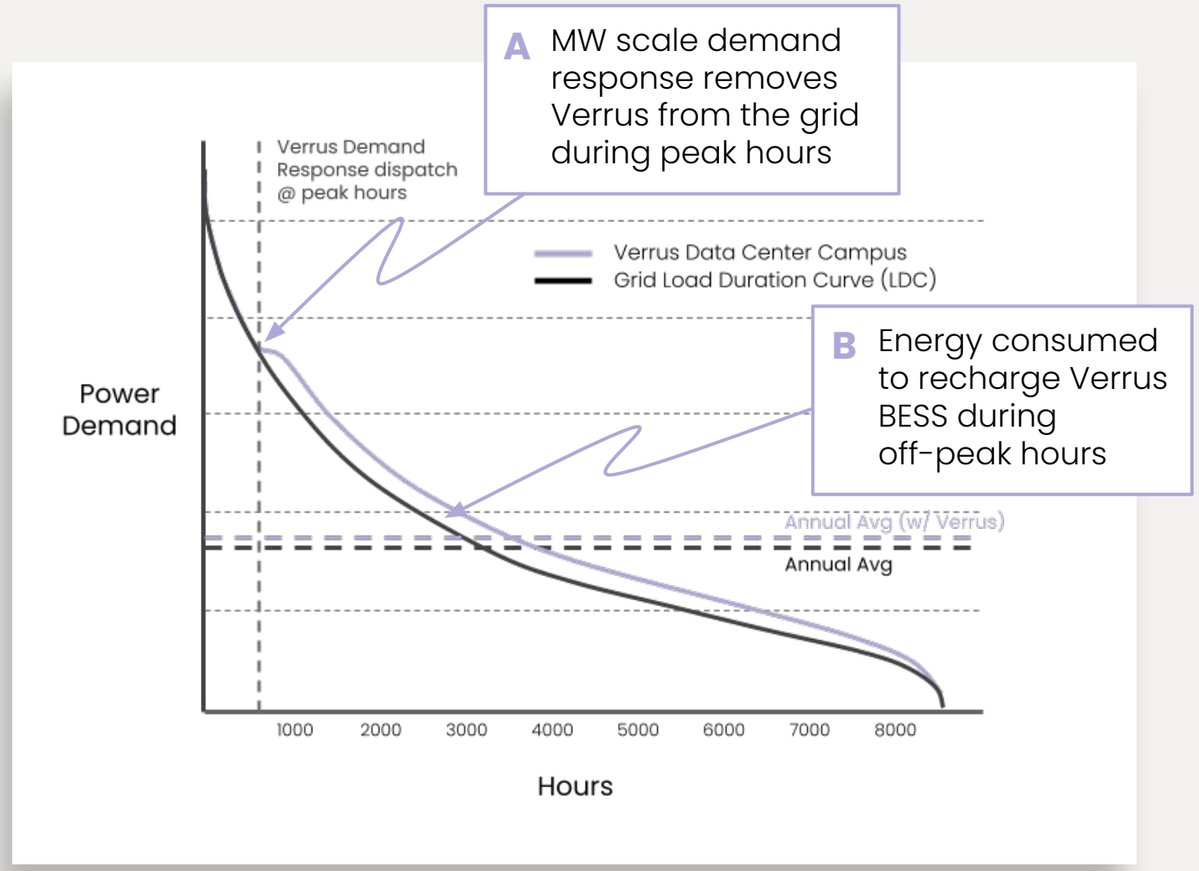
- **Utility-facing:** *Utility->DC operator* DR request with a firm and verifiable commitment, made possible via BESS energy dispatch
- **Workload-facing:** *DC operator-> workload owner* signal to optionally reduce power consumption in order to preserve battery backup runtime

This decoupled design accomplishes two things:

1. **Makes flexible data center DR more valuable to utilities**. Instead of having to treat flexible loads as an opportunistic asset, it becomes a large scale firm, measurable and verifiable commitment that can be used in integrated resource planning.
2. **De-risks customer adoption**: Moves workload modification to a customer trade-off decision between backup runtime vs. workload value. The BESS also provides timing flexibility for customer response.

Load Flexibility: Benefit to ratepayers

Verrus data center campuses help deliver lower prices for utility ratepayers



Representative utility Load Duration Curve (LDC)

A By committing firm, dispatchable Demand Response power the during peak [n] hours of the year, a Verrus data center campus can be added to a utility demand curve without contributing toward net new required generation and minimizing infrastructure upgrades.

B Verrus data center campuses utilize megawatt-scale BESS as the sole dispatchable Demand Response resource - which means they discharge during a utility event with **100% of required energy consumed during off-peak periods**.

= That translates to a higher system level capacity factor and **reduced energy prices for ratepayers**.

What sets Verrus apart for communities?

Verrus builds smarter, low-impact data centers—with reduced traffic, low water use, and grid-friendly technology that reduces emissions and supports local communities from day one.

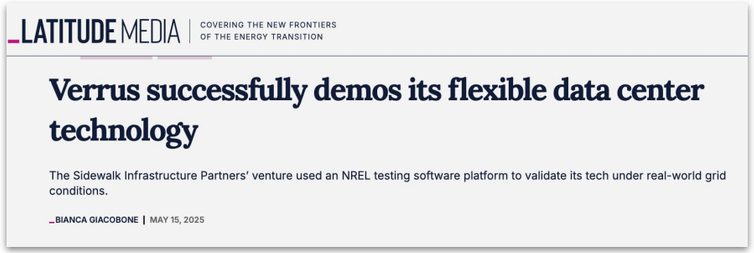
1	**Sustainable Energy Partner**	Verrus data centers utilizes utility-scale demand response and energy storage to efficiently power our facilities without overloading the local grid during peak demand periods, curtailing the need for carbon-intensive peaker plants and making them smarter and more sustainable neighbors.
2	**Low Noise & Air Pollution**	By using Battery Energy Storage Systems (BESS) in lieu of traditional diesel generators for primary backup power, Verrus data centers have significantly reduced noise and CO2 + NOx/SOx emissions compared with other data centers or typical industrial operations.
3	**Low-Water Consumption**	Verrus' efficient closed-loop cooling design peaks at **~150 k gal/day** during periods of extreme heat and humidity but averages 1.5–2 M gal/year, depending on region. That is over **5× less water than a conventional evaporative data center** which can consume up to **875 k gal/day** during peak days.
4	**Reduced Road Demand**	A standard distribution center or e-commerce facility generates around **3,000 vehicle trips per day**. A Verrus data center generates only **600 trips per day** with minimal inflow/outflow of transport trucks, mainly employee commuting - an 80% reduction in daily traffic, significantly easing local road congestion

Verrus' Digital Twin: A Test Platform for Grid-Interactive Data Centers

Advanced simulation of delivering grid flexibility without compromising IT workload SLAs

NREL NATIONAL RENEWABLE ENERGY LABORATORY + verrus™

A first-of-its-kind, 70MW-scale test platform, **"Vulcan"**. developed by Verrus in partnership with NREL, powered by the **NREL ARIES Virtual Emulation Environment**, that emulates a full-scale Verrus data center under realistic grid conditions to test and validate next-generation power control strategies.



LATITUDE MEDIA | COVERING THE NEW FRONTIERS OF THE ENERGY TRANSITION

Verrus successfully demos its flexible data center technology

The Sidewalk Infrastructure Partners' venture used an NREL testing software platform to validate its tech under real-world grid conditions.

BIANCA GIACOBONE | MAY 15, 2025

Why It Matters:

- Demonstrates how purpose-built data centers can act as **flexible, dispatchable grid assets** while **maintaining customer SLAs**
- Built to address urgent grid challenges posed by **surging AI-driven power demand**
- **Bridges the gap** between theoretical potential and operational reality

What It Enables:

- **Digital Real-Time Simulation (DRTS)** of dynamic electrical behaviors across a wide range of grid and data center scenarios—including voltage sag, frequency excursions, and DER coordination—at millisecond resolution
- **Controller Hardware in-the-Loop (CHIL)** integration to test live control systems in closed-loop conditions
- Validated performance for fast load shedding, islanding, and backup transitions
- Tuning of real-time control algorithms to optimize frequency support, ramping, and ride-through capabilities

Enabling a Cleaner, Smarter Grid with Flexible Data Centers

Service Matrix for Grid Operators: *Flexible Large Load backed by Battery Energy Storage with advanced Microgrid Controls as a Reliable & Dispatchable Grid Resource*

Verrus™ is building grid-interactive data centers with integrated megawatt-scale BESS to deliver utility-grade flexibility and reliability. Designed to align with NERC reserve categories and ISO/RTO markets, Verrus provides fast, dependable capacity for contingency response, system balancing, and reserve restoration.

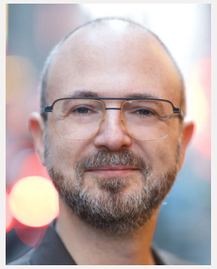
Importantly, Verrus can contractually commit to load curtailment in interconnection agreements, allowing utilities to count our data centers as planning reserves and for transmission contingency support. Backed by on-site BESS, this demand flexibility offers dependable, forecastable capacity for grid reliability and resource adequacy planning.

Verrus Grid Service	NERC Reserve Definition	verrus™	Availability
Planning Reserve	Capacity planned to meet future peak demand, typically committed via IRPs or long-term contracts.	Contractual curtailment commitments can be incorporated in IRPs and RA plans as dependable load relief.	✔
Operating Reserve – Spinning	Online, synchronized capacity deliverable within 10 minutes to meet real-time system needs.	Sub-10-second response time; dispatchable in increments suitable for ISO ramping and reserve markets.	✔
Operating Reserve – Supplemental	Offline or non-synchronized reserve deliverable within 10 minutes.	Eligible for non-spin classifications in multiple ISO/RTO market structures.	✔
Contingency Reserve	Reserve to cover unexpected generation/load loss, deployable within 10 minutes.	Meets ramp rate and reliability obligations for N-1 single largest generation and transmission (MSSC) events. Biddable into contingency markets.	✔
Replacement Reserve	Resource used to restore contingency reserves within a 90-minute window.	4-hour duration enables backfilling and secondary reliability product participation.	✔
Other Online/Offline Reserves	Resources with dispatchability between 10–90 minutes (e.g., slow-start assets, pre-arranged demand response).	Suited for day-ahead commitment, reserve restoration, or emergency scheduling support.	✔
Regulating Reserve	Capacity under AGC control used to continuously balance ACE deviations.	Technically AGC-compatible. Targeting integration for real-time ancillary market participation.	***Coming soon***
Frequency Responsive Reserve (FRR)	Autonomous, droop-based response within seconds to stabilize frequency deviations.	Capable of inverter-based frequency response with configurable droop curves.	***Coming soon***

Operational Characteristics for Grid Services:

- **Fast Ramp:** Sub-10s response; meets or exceeds market performance requirements for spinning & contingency reserves
- **Duration:** 4 hours of discharge at 50% of data center facility load (customizable to meet utility operational needs)
- **Interoperability:** Designed for integration with utility SCADA + ISO telemetry systems for dispatch, measurement, verification
- **Market Eligibility:** Aligned with FERC 841 and ISO/RTO ancillary services tariffs
- **Future Capabilities:** FRR and Regulating Reserve products slated for market participation as part of roadmap

Verrus team with deep data center experience, ready to deliver



Nelson Abramson - CEO

Nelson brings over two decades of experience overseeing data center infrastructure and large-scale distributed software systems. As the Global Head of Infrastructure for X (formerly Twitter), he led the company's 285-person infrastructure team globally. During his 20 years at Google he oversaw data center site selection, global infrastructure deployments, and new product integration, spending 10 years working with data centers, servers, storage, and networks and 10 years building Google's own resource management systems that span supply chain to cloud.

Anand Ramesh - CTO

Anand brings infrastructure experience across data center engineering, energy, and software product management. Prior to joining Verrus, Anand was the Senior Vice President of Advanced Technology for EdgeConneX, a global data center provider. Anand previously worked for Google for 14 years, including serving as the technical lead for advanced technology and innovation for Google's data center division. In this role, he oversaw Google's data center architecture and technology roadmap.

Jeff Monroe - Commercial

Jeff is a distinguished leader in the data center industry and previously led Verne Global, a pioneering sustainable data center developer, as CEO for 12 years. Before Verne Global, Jeff co-founded DuPont Fabros Technology's wholesale data center business, where he served as Managing Director, pioneering the implementation of the wholesale operational model for customers such as Microsoft, Google, and Meta. Prior to his tenure at DuPont Fabros, Jeff held senior leadership roles at AboveNet Communications, including Vice President of Real Estate, Design, and Construction, as well as Director of Operations.

Krish Sivakumar - Product

Krish is a passionate builder with 20 years of experience developing, and scaling data center products. His expertise spans a wide range of technologies, from physical data centers and servers to cutting-edge virtualization solutions.

Before joining Verrus, Krish led product for Google Cloud's Compute Engine software layer. He also spearheaded the creation of VMware Cloud Foundation, VMware's comprehensive software-defined private cloud offering. Earlier in his career, Krish played a key role in Cisco's Unified Computing System (UCS), leading the development of its management software. Krish has an extensive background in both datacenter and end use infrastructure management and operations at scale.

Jimmy Clidaras - Engineering

Jimmy has over 20 years experience with data centers and was previously a Distinguished Engineer at Google. He is the founder of Google's Data center R&D, Data center Engineering, Platforms Mechanical Engineering, and Platforms Infrastructure Engineering teams, responsible for power, cooling, embedded software, and construction. Jimmy led the design of multiple gigawatts and multiple generations of Google's infrastructure. He holds over 90 patents in the area of data center infrastructure

Jeff Bladen - Energy

Jeff brings over 25 years of experience developing the energy grid. Prior to Verrus, Jeff served as Meta's Global Director of Energy where he led teams responsible for the development and execution of Meta's energy strategy across its data center fleet. Over his career in energy, he also served in multiple executive roles at the Midcontinent Independent System Operator (MISO) supporting development and execution of MISO's markets and technology Strategies, and leadership roles at companies including PJM Interconnection, Constellation Energy, DNV GL Energy and Gamesa.

Maria Poyer - Site Acquisition

Maria brings over a decade of experience in land development and acquisition, having overseen more than $5.6 billion in real estate transactions, contributing to the infrastructure expansion. Maria is passionate about community-building and inclusion, and serves as a board member of CREW Seattle, and on NAIOP's national Executive Board.

Ben Wheeler - Product Development

Ben brings over two decades of experience designing, managing, and scaling infrastructure optimization platforms that unlock efficiencies and accelerate innovation.

Prior to joining Verrus, Ben was the Director of Data Center Engineering, Operations, and Capacity Management at X/Twitter, during which time he oversaw the company's global server footprint and capacity rebalancing strategy. Previously, Ben held leadership roles responsible for infrastructure product development and program management at Twitter, YouTube, Google, and IBM Microelectronics.