Emerald AI | NASEO-NARUC Webinar

August 2025

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Agenda

1. About Emerald AI

2. Emerald AI's Technology

3. Deep Dive on Emerald AI's First Commercial Demo

4. Where do we go from here?

1. About Emerald AI

Emerald AI seeks to unlock multitrillion-dollar investments in AI data centers *today*, overcoming power grid constraints that threaten the AI revolution

- **Emerald AI transforms energy-intensive AI data centers into AI-powered grid allies through a software-only solution** by orchestrating compute power use to access electric grids and bolster grid stability, without compromising compute service.

- **The opportunity is massive:** Roughly 100 GW of data centers could be connected to existing grids *today* if data centers had just modest flexibility. Emerald AI aims to enable data centers & cloud providers to speed time-to-power and stay compliant.

- **Emerald AI successfully proved its technology suite in a first-of-a-kind commercial demonstration in Phoenix in May 2025 at a hyperscaler data center—power utilities and our cloud and AI partners have shared positive feedback**

- **Emerald AI is the only solution to get data centers access to power now** and will complement other solutions in future.

| 0–3 year solution | 3–5 year solution | 5–10 year solution |

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FERVO ENERGY   Mainspring

OKLO   HELION

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Our team combines expertise in AI, compute and energy

Leadership

Dr. Varun Sivaram, Founder & CEO

Education: Ph.D. Condensed Matter Physics, Oxford University (Rhodes Scholar); B.S, B.A., Stanford University

Boards: Atlantic Council, Stanford University Doerr School of Sustainability

Books: *Taming the Sun* (2018), *Energizing America* (2020), *Digital Decarbonization* (2018)

Awards: TIME 100 Next, World Economic Forum Young Global Leader, MIT Top 35 Innovators

Ørsted
Chief Strategy and Innovation Officer

White House
Sr. Advisor to Sec. John Kerry; Managing Director for Clean Energy, Innovation and Competitiveness

ReNew Power (NDAQ: RNW)
Chief Technology Officer

Council on Foreign Relations
Director, Program on Energy & Climate

McKinsey & Company
Consultant

Prof. Ayse Coskun, Chief Scientist

- *Professor, Boston University*
- *Director, Center for Information Systems and Systems Engineering*

Shayan Sengupta, Head of Engineering

- *Amazon Web Services EC2 Nitro Storage Leader*
- *Led 50+ engineers, managing 100,000 specialized GPU servers for AWS clients*

Aroon Vijaykar, SVP Commercial

- *Sunrun Head of Corp Dev; GM and leadership team of three businesses: AEE Solar; Snapnrack; & VPPs*
- *Investor at Partners Group; Consultant at Monitor Deloitte*

Core Team

Dr. Daniel Wilson

Dr. Philip Colangelo

Chris Williams

Dr. Ciaran Roberts

Jack Megrue

Ethan Tiao

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In July, we announced our seed round & successful demonstration

Institutional Venture Investors

RADICAL VENTURES

NVIDIA

crv

NEOTRIBE

AMPLO

Select Individual Investors

Secretary John Kerry	**Tom Steyer**	**Mark Gallogly**
68th U.S. Secretary of State	*Co-Chair, Galvanize*	*Co-Founder, Three Cairns Group*
Fei-Fei Li	**Jeff Dean**	**John Doerr**
Professor, Stanford University	*Chief Scientist, Google*	*Chairman, Kleiner Perkins*
Malcolm Turnbull	**Kate Brandt**	**Rich Lesser**
29th Prime Minister of Australia	*CSO, Google*	*Chairman, BCG*
Chase Lochmiller	**Lukas Biewald**	**Jonathan Frankle**
CEO, Crusoe	*CEO, Weights and Biases*	*Chief AI Scientist, Databricks*
David Thorne	**Gerald Butts**	**Markus Specks**
52nd U.S. Ambassador to Italy	*Vice-Chair, Eurasia Group*	*Managing Partner, Aventurine*

Select Advisors

Gina Raimondo	**David Rousseau**
40th U.S. Secretary of Commerce	*President, Salt River Project*
Tyler Norris	**Arushi Sharma Frank**
Duke University	*Fmr Energy Policy Lead, Tesla*

AXIOS

Nvidia stakes new startup that flips script on data center power

AI giant Nvidia and boldface names in tech and finance are backing a new startup that aims to transform data centers into flexible grid assets instead of liabilities…. There's growing interest in data centers' flexibility to lower power use for limited stretches.

The Economist

How Managing Energy Demand Got Glamorous

Emerald AI, an American startup, recently showed it can cut power use at AI data centres with software to manipulate computational loads without meaningful loss of performance. The economic logic is compelling.

POLITICO

Nvidia-backed startup wants data centers to be grid assets

A new software startup backed by chipmaker Nvidia aims to solve a crucial problem as data centers proliferate: how to stop the power-hungry operations from crashing the grid. Emerald AI…orchestrates and coordinates artificial intelligence workloads in real time to avoid straining the grid in times of peak demand.
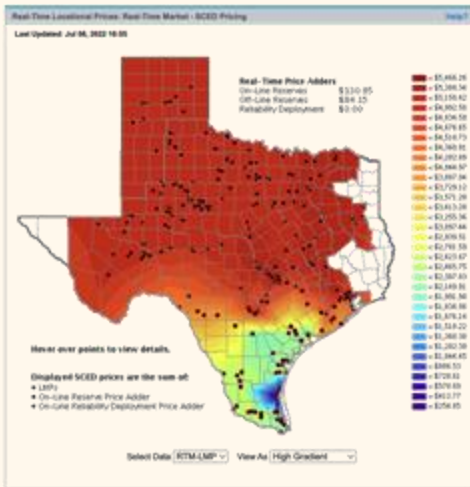
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2. Emerald AI's Technology

Emerald AI
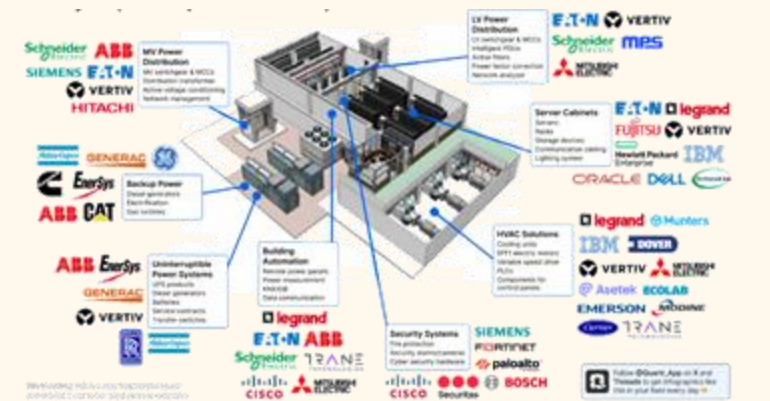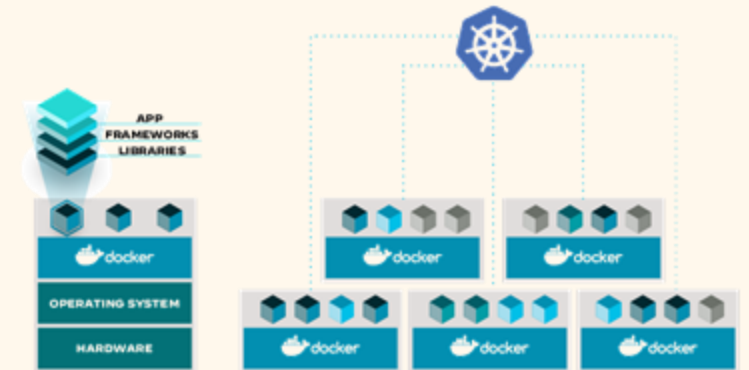# Turning energy-intensive data centers into AI-powered grid allies

Emerald
Conductor

Power Markets & Grid Signals

Data Center Physical Infrastructure Controls

Computing Workload Orchestration

Building Intelligence at the Grid-Data Center Interface

Ultimately, Emerald AI's technology stack will address transient power fluctuations from AI workloads to hours-long grid demand response performance—and everything in between

Fig. 1. Large power fluctuations observed on cluster level with large-scale synchronized ML workloads

15MW

Milliseconds

Hours

Generation resources not available to meet projected demand.

Generation available and scheduled

Demand Response Dispatch

Electricity Demand

00:00   12:00   24:00

Time of Day
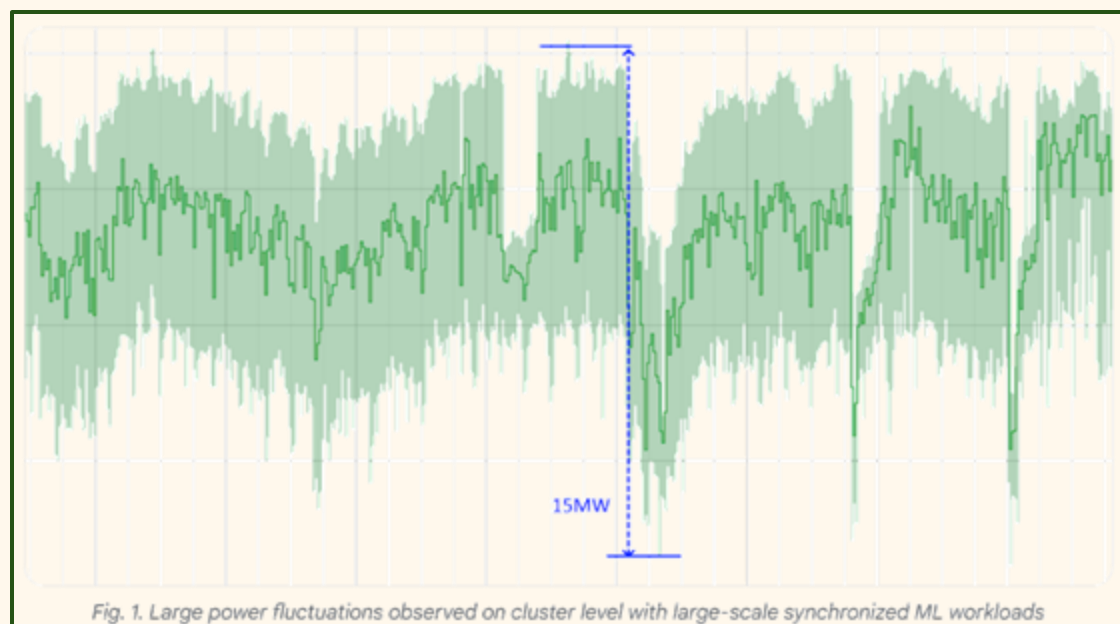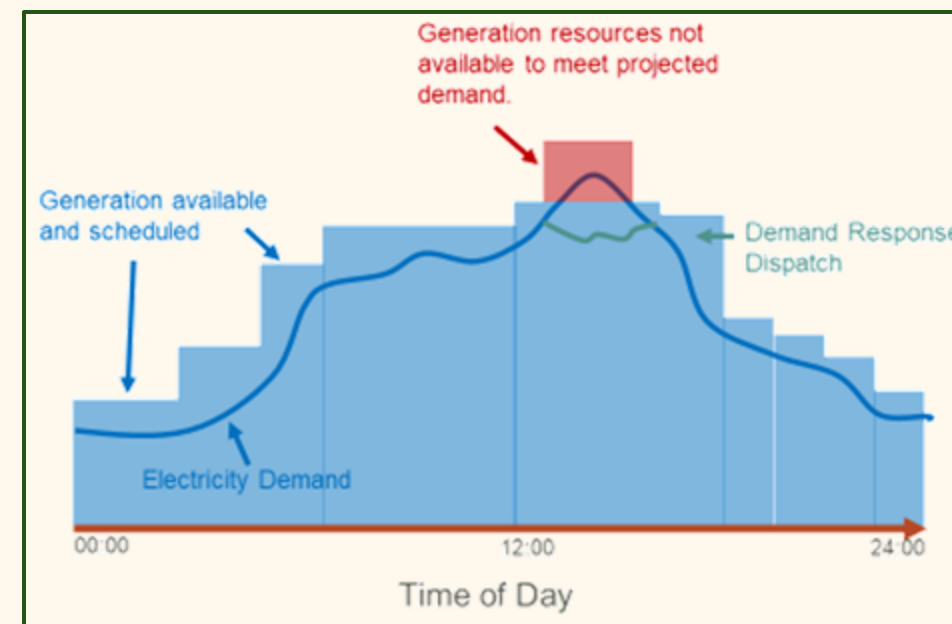
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The Emerald Conductor software platform orchestrated a real-world compute cluster to follow a 4-second PJM Regulation Reserve signal

3. Deep Dive: Emerald AI's First Commercial Demo

Overview of May 2025 Phoenix, AZ Technology Demonstration
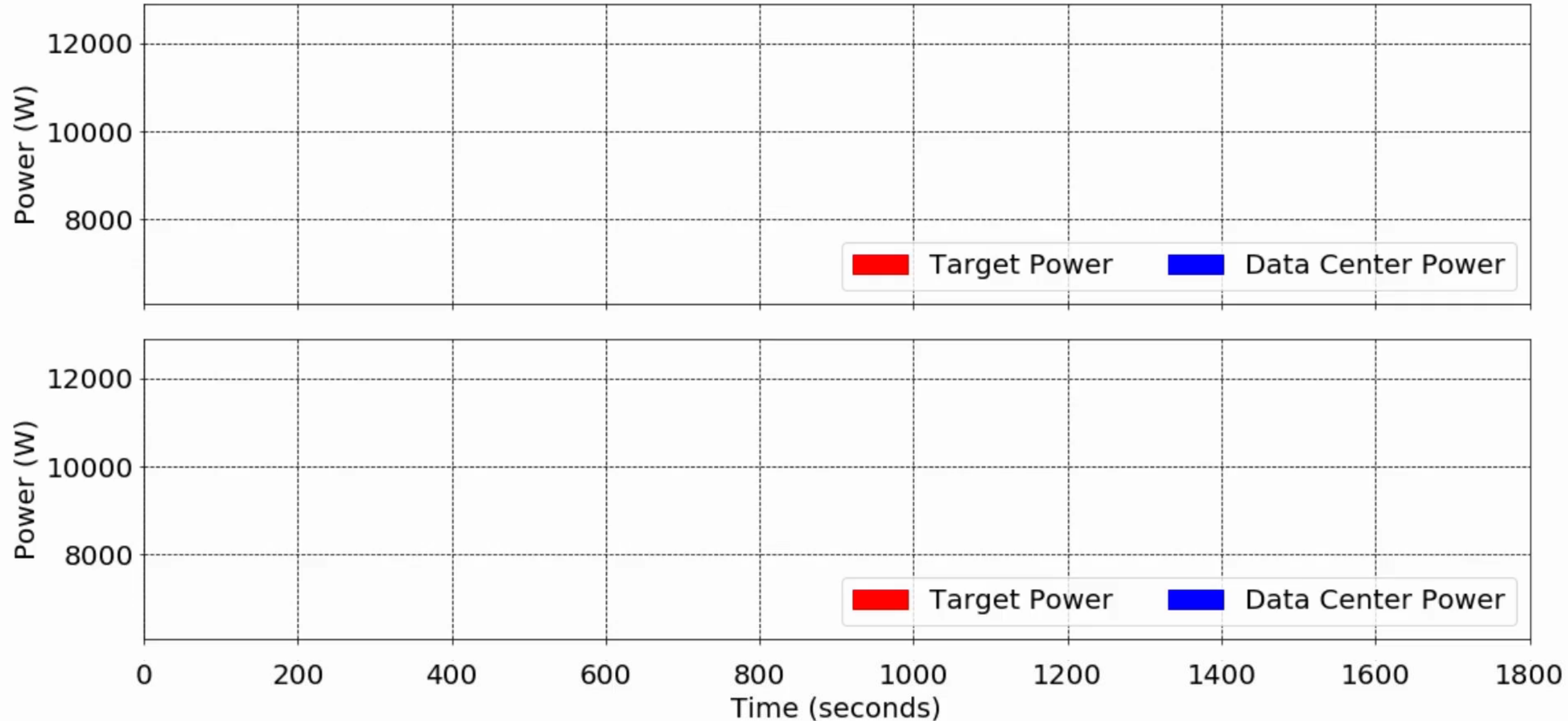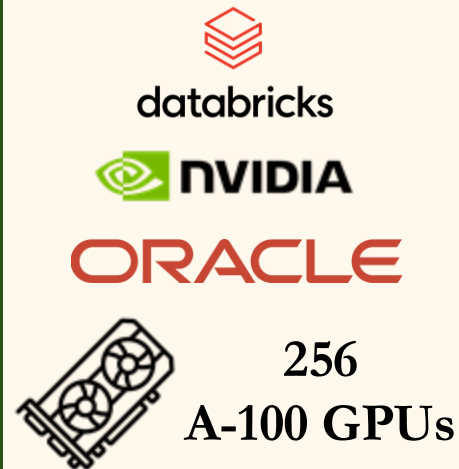
The Phoenix demonstration convened Oracle (hyperscaler), Databricks (AI customer), NVIDIA, EPRI, and local power utilities, to orchestrate a GPU cluster to meet grid AND compute user needs

Hyperscaler Phoenix Data Center

AI Customer Cluster

databricks

NVIDIA

ORACLE

256 A-100 GPUs

DCFlex

Orchestration of Representative AI Ensembles

Training

Large N

Inference

Smaller, varied N

forward

backward

forward

Ensure acceptable Quality of Service (QoS)
- Runtime
- Throughput
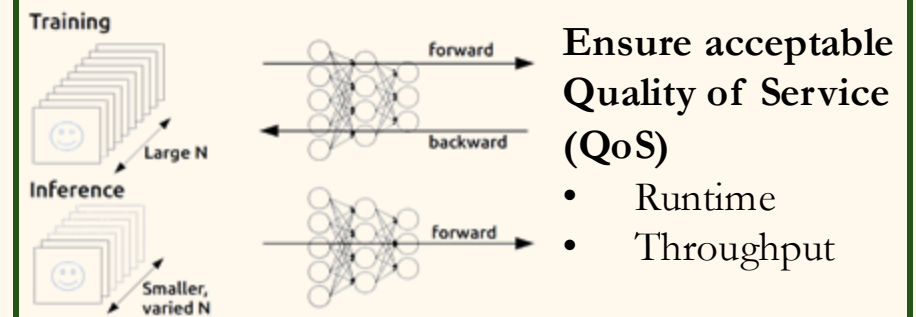
Phoenix Utility Demand Response Demonstration

aps

SRP

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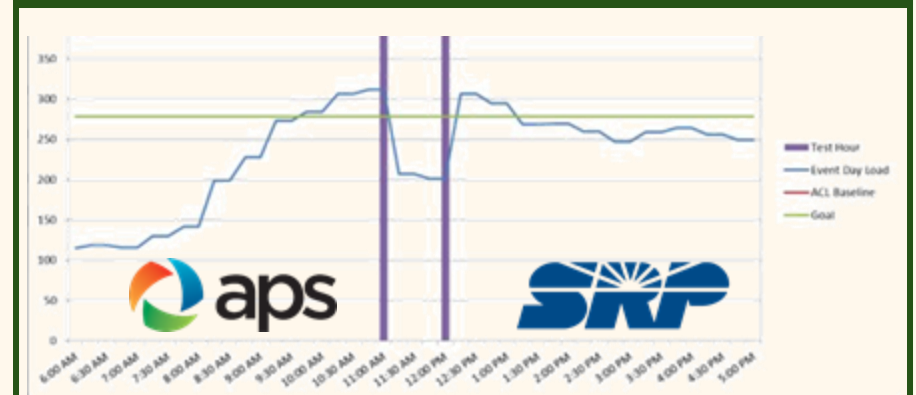
How it works: Flow from Event Trigger to Software Execution

Demand Response Event Trigger	Emerald Simulator *"ES"*	Emerald Conductor *"EC"*

Automated Response

Fully Simulated Future Courses of Action

Verifiable Achievement of Grid & AI Objectives

- In response to a utility demand response signal, the Emerald AI software stack executes a response—**no manual intervention necessary.**
- In future demonstrations, we will build a full telemetry link to the utility to enable demand response on timescales from seconds to minutes.

- Upon receipt of the demand response signal, **ES simulates numerous orchestration options for AI workloads**
- Understanding the performance constraints of the grid and of the AI jobs, the simulations optimize for the quality of service for the AI customer

- EC leverages the ES results to orchestrate the data center workloads—and **the results match the simulation with high fidelity.**
- Conducts the **optimal outcome for both the power grid objectives and the compute customer's service level agreement**

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AI Cluster Achieves Demand Response Objectives in Phoenix

May 3, 2025 - Time (MDT)

SRP Load (GW)

GPU Cluster Power (kW)
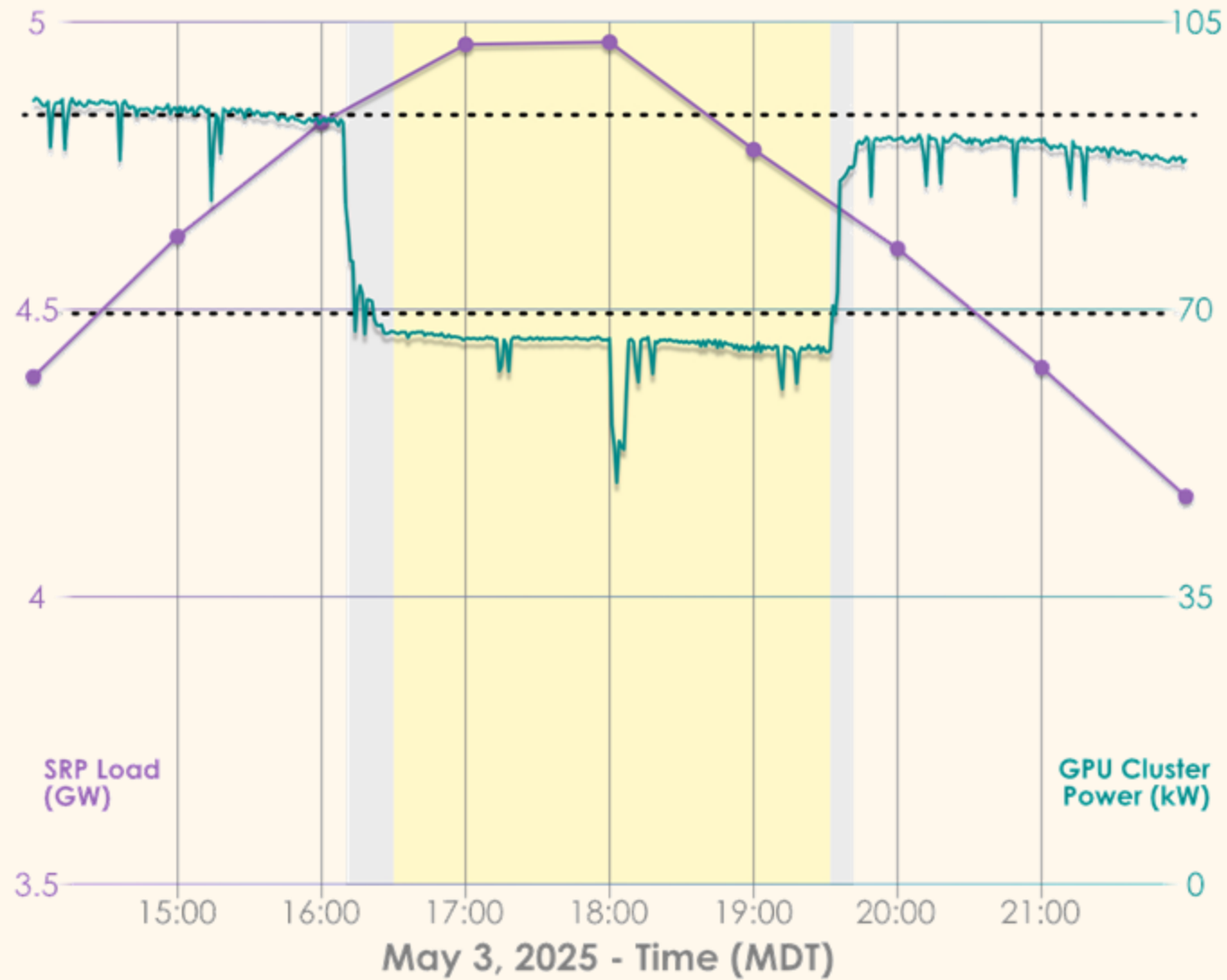
Job Performance By Flex Tier

Performance %
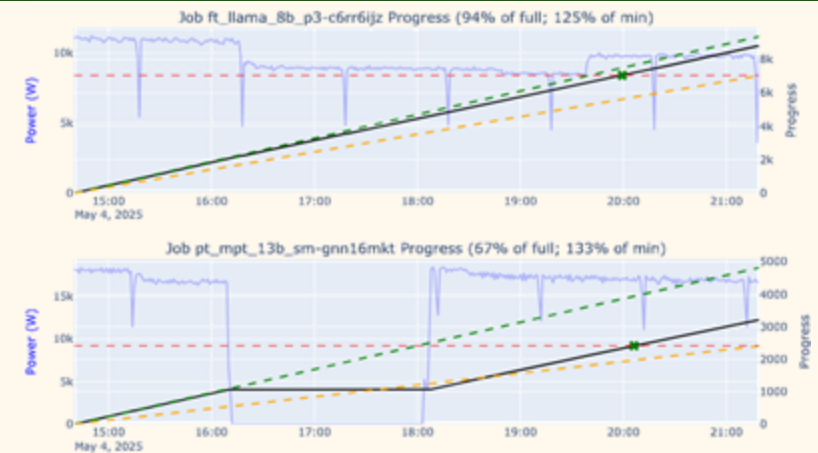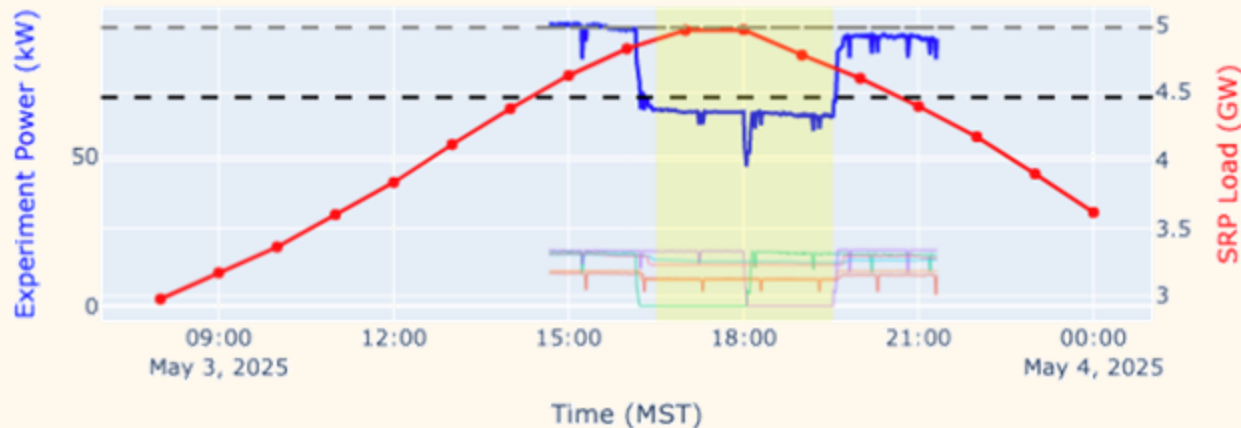
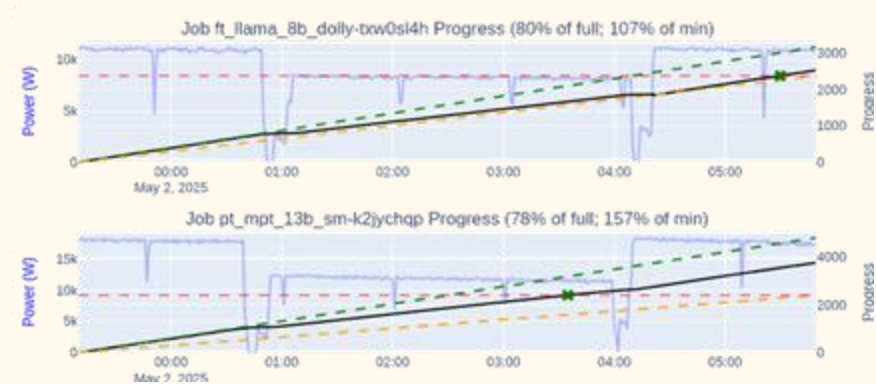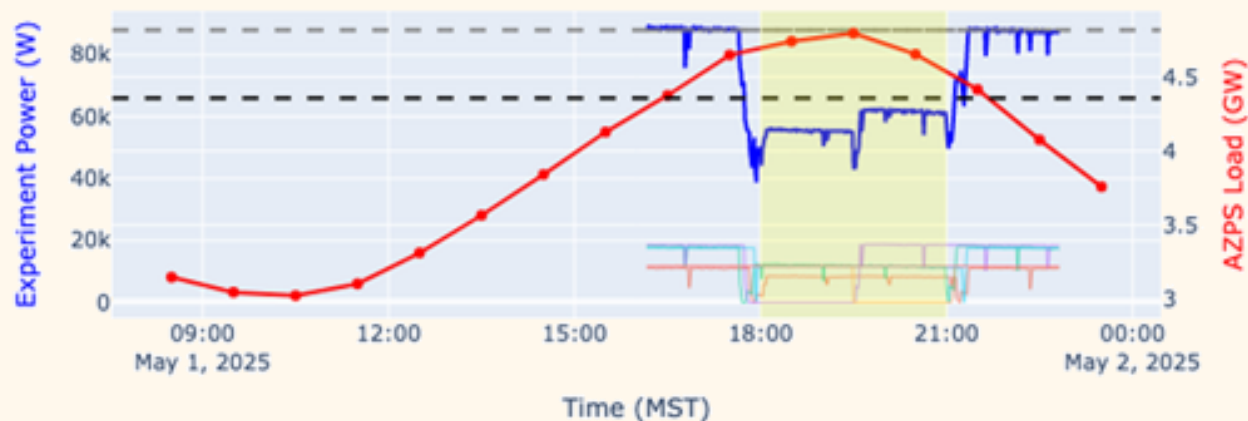Flex 3   Flex 2   Flex 1

All Jobs Performance

14
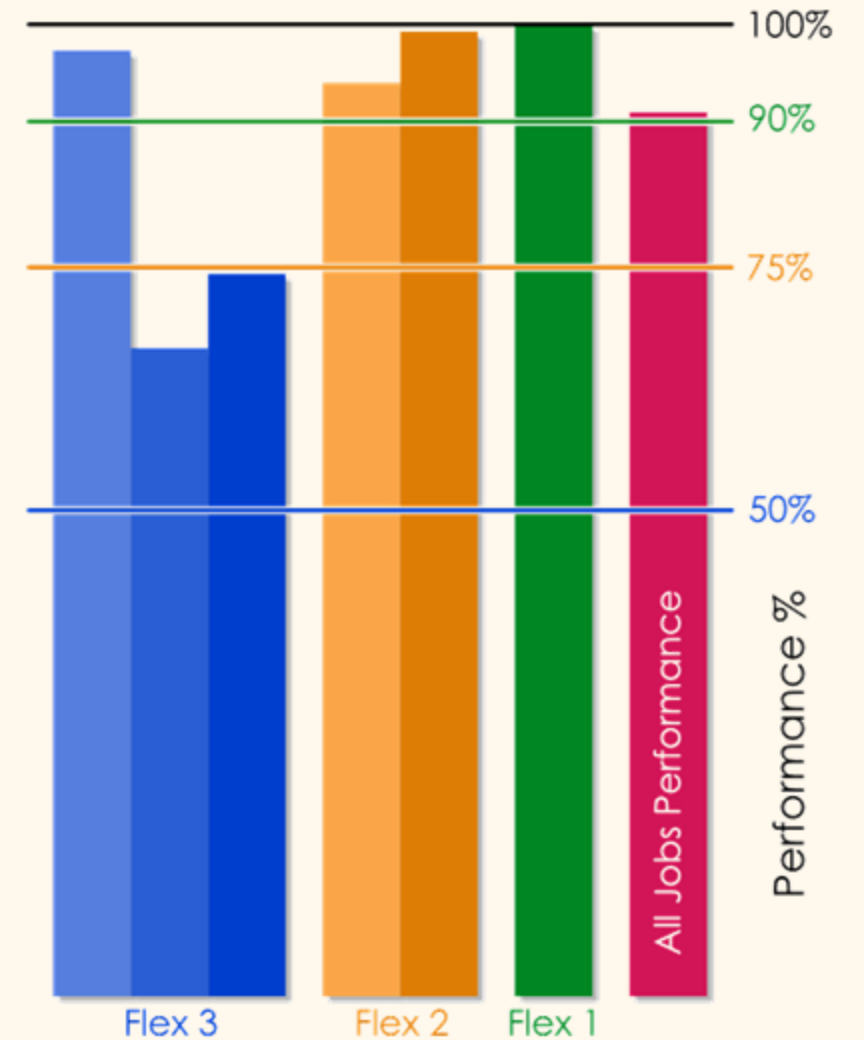
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The aggregate load profile delivered is a combination of unique strategies deployed at the workload & GPU level
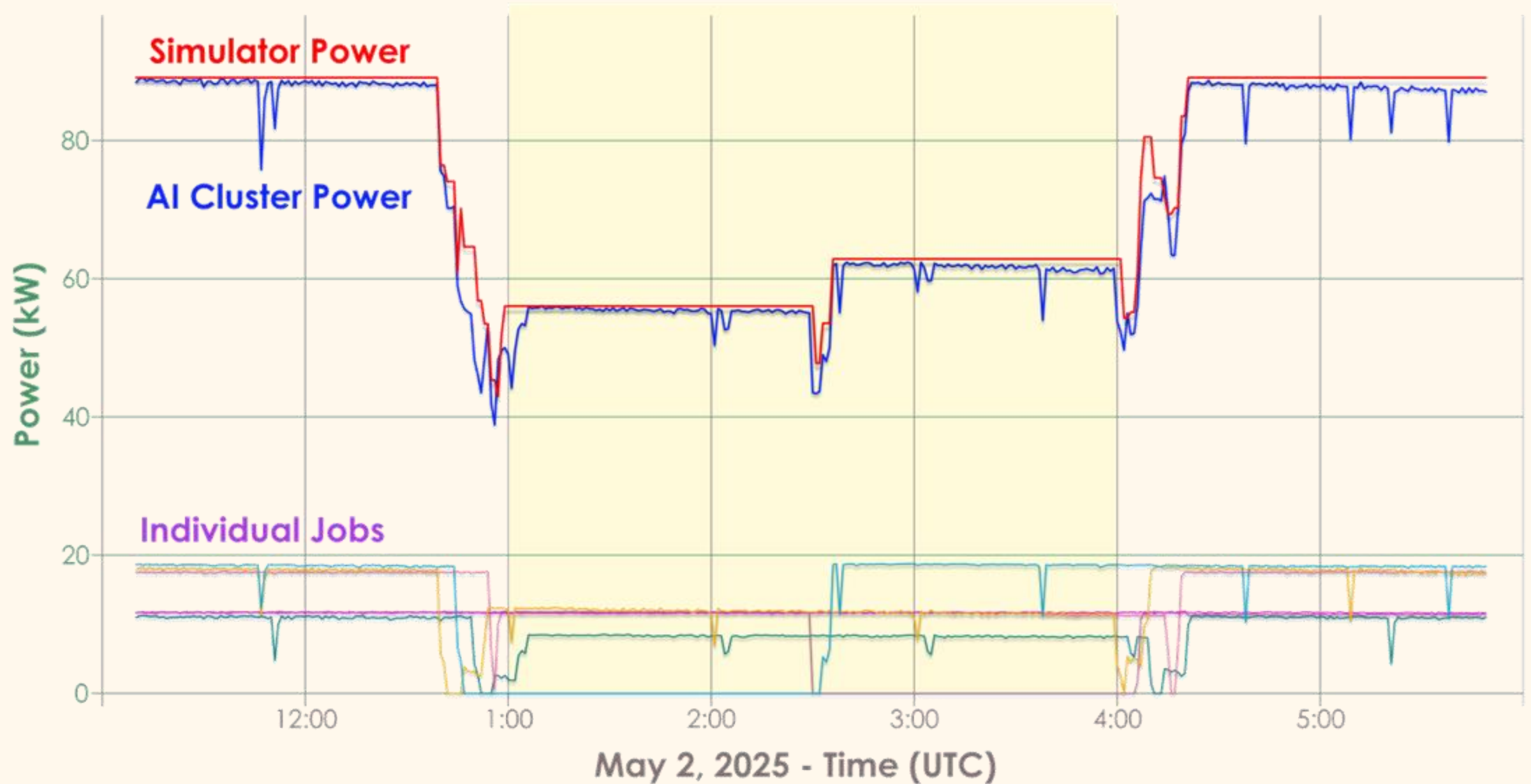

Salt River Project ("SRP"), May 3th, 2025
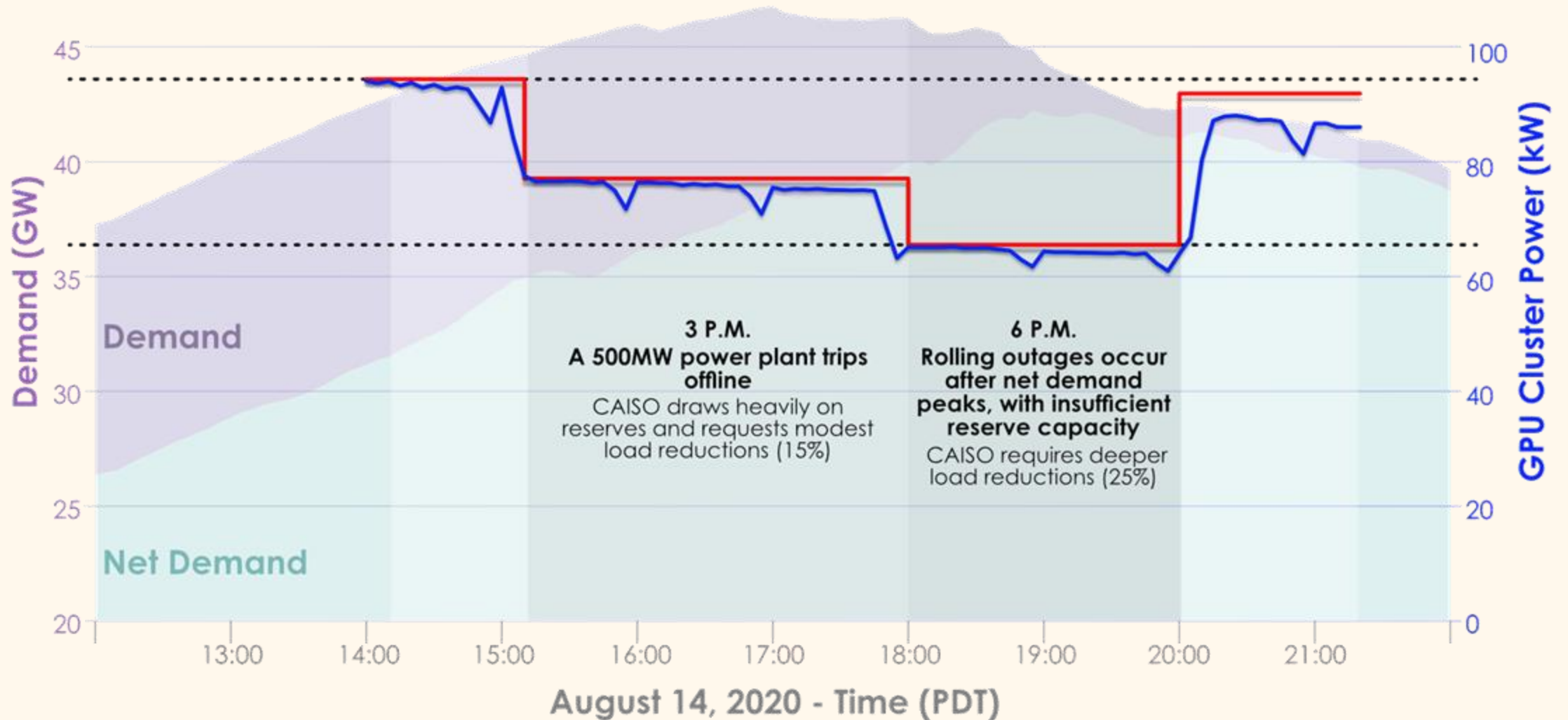
Arizona Public Service ("APS"), May 1st, 2025

Emerald Simulator Accurately Predicts Real-World Power Consumption

May 2, 2025 - Time (UTC)

16

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Emerald AI Responds to Real-World CAISO Reliability Event Through Dynamic Control of AI Compute Load

Demand (GW) vs **GPU Cluster Power (kW)**

Demand

Net Demand

3 P.M.
A 500MW power plant trips offline
CAISO draws heavily on reserves and requests modest load reductions (15%)

6 P.M.
Rolling outages occur after net demand peaks, with insufficient reserve capacity
CAISO requires deeper load reductions (25%)

August 14, 2020 - Time (PDT)

4. Where do we go from here?

Here's how energy and AI leaders can collaborate to scale flexibility

Energy Sector

Develop accelerated interconnection processes for flexible AI factories

Design new approaches to study large flexible loads

Participate in demonstrations at larger scales alongside AI sector participants

AI Sector

Develop 'Power-Flex' SLAs

Develop reference designs and certifications for flexible AI factories

Participate in demonstrations at larger scales alongside power sector participants

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Thank you

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