



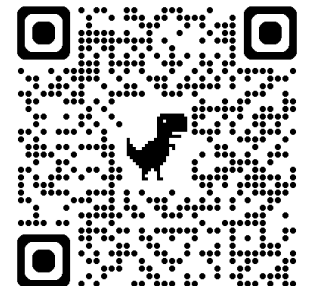
Enabling the Smart Grid Through Data Coordination, Analytics and AI

ACEF 2026, ADB | Debbie Lew, Executive Director | June 2026



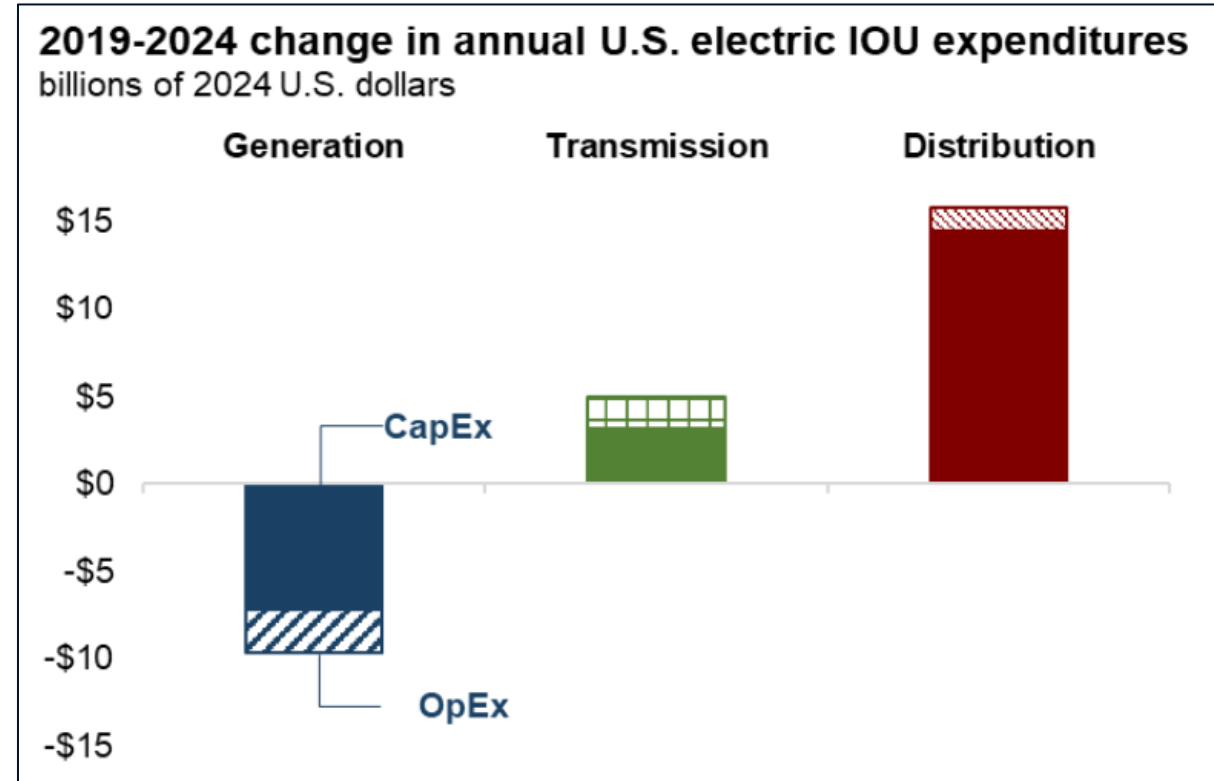
Energy Systems Integration Group (ESIG)

- ESIG is a member-driven, educational non-profit organization that addresses technical challenges for transforming energy systems, through collaboration, education and knowledge sharing.
- Over 300 global members broadly focused on decarbonization and systems integration. Members join working groups and task forces to collaborate on solving system planning and operations issues.
- Workshops, webinars, reports available freely on our website (<https://www.esig.energy/>) and on YouTube ([@EnergySystemsIntegrationGroup](#)). Join our mailing list!



Managing a dynamic distribution system

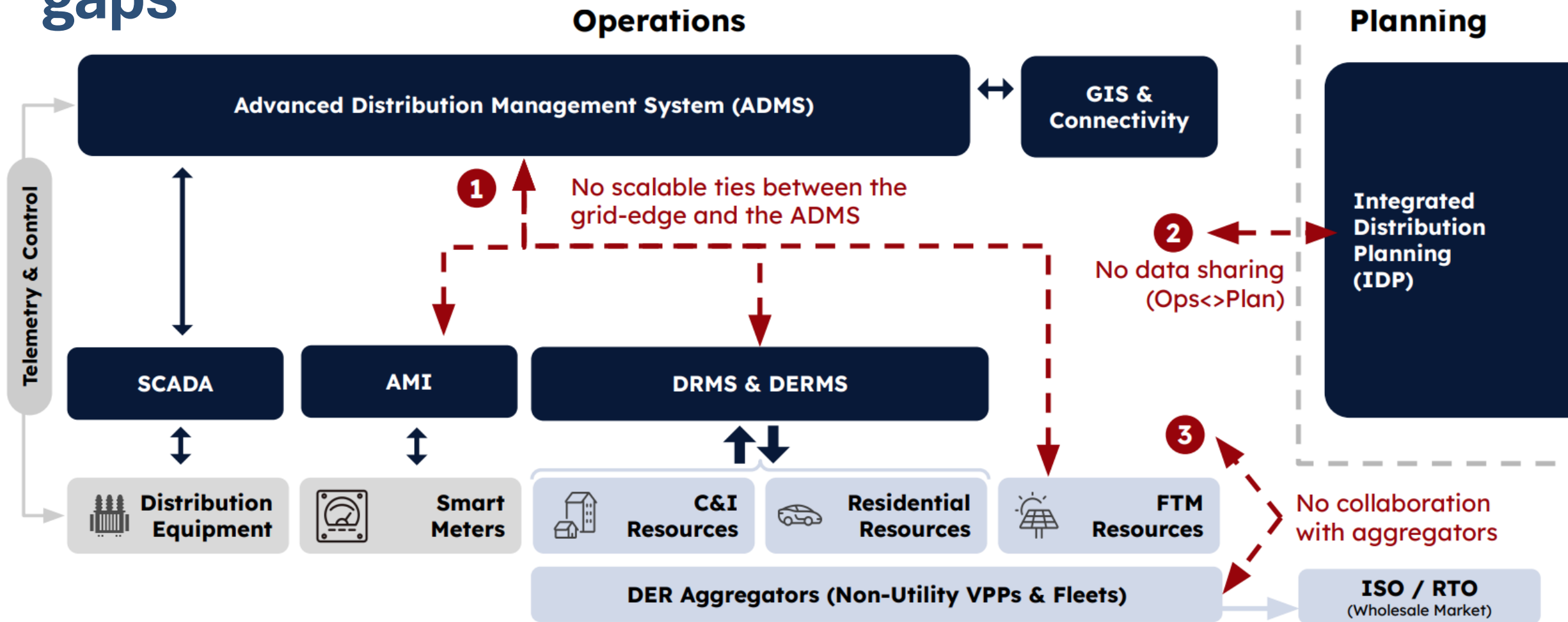
- Technology advancements, DER adoption, and customer behavior makes load forecasting more complex.
- It's difficult to engage customers with DER programs if you don't know what DERs they have.
- Higher utilization factors for the distribution system can enhance affordability.
- DERs or aggregations providing services at both the transmission and distribution levels.
- Enabling this requires data, data exchange, coordination, analytics.



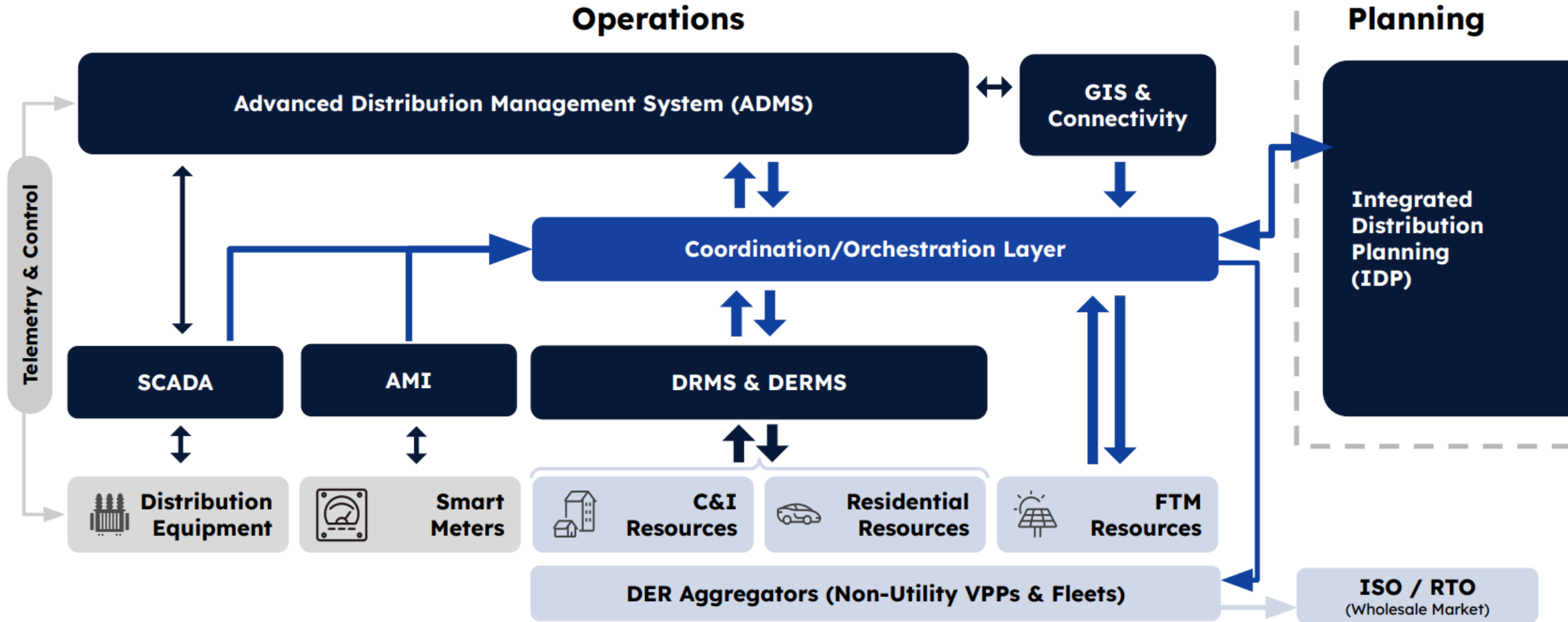
Source: Wiser, et al, LBNL, 2025,
<https://emp.lbl.gov/publications/factors-influencing-recent-trends>

We build T&D infrastructure for peak conditions.
But peak conditions are rare and most of the time we have excess capacity.

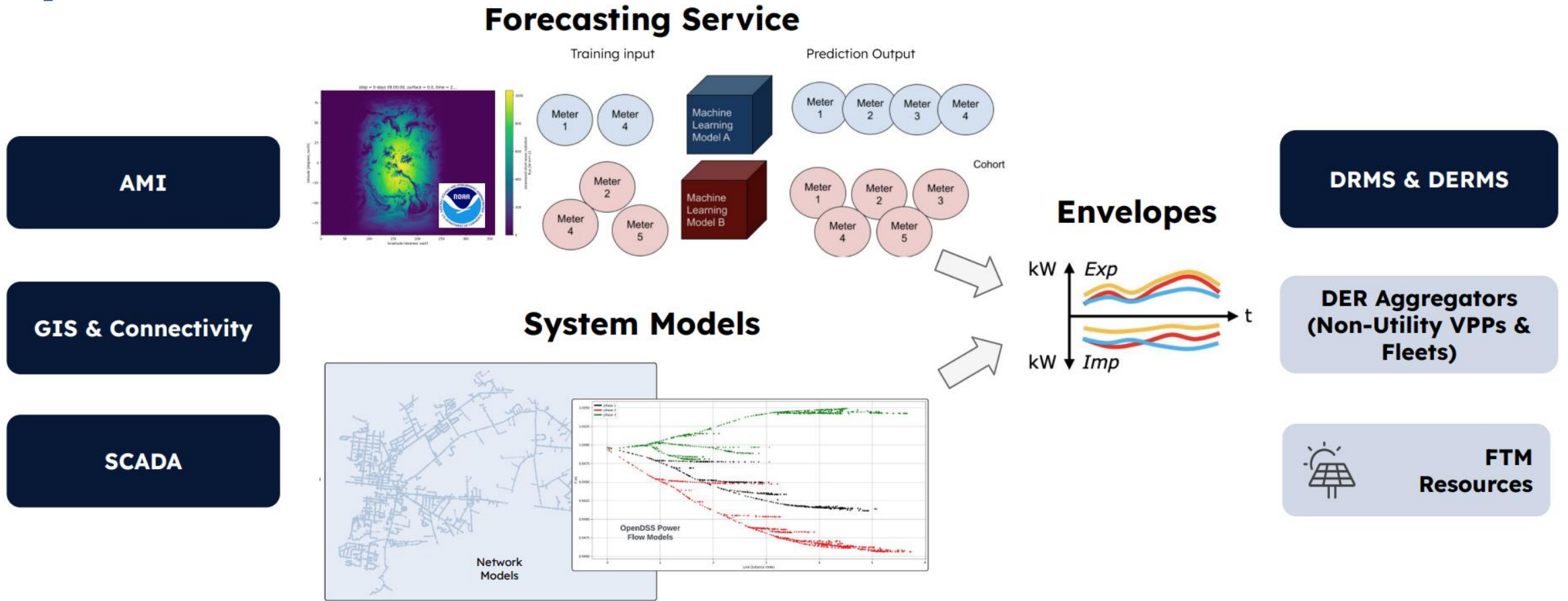
The existing DER management approach has key gaps



Increased data exchange and coordination



Customer, weather, grid, and other data in operations



Confidential | © 2024 Camus Energy Inc

Dylan Cutler, Camus, 2024. <https://www.esig.energy/presentation/session-2a-coordinating-aggregator-participation-in-markets-with-the-dso-for-ferc-order-2222-dylan-cutler/>

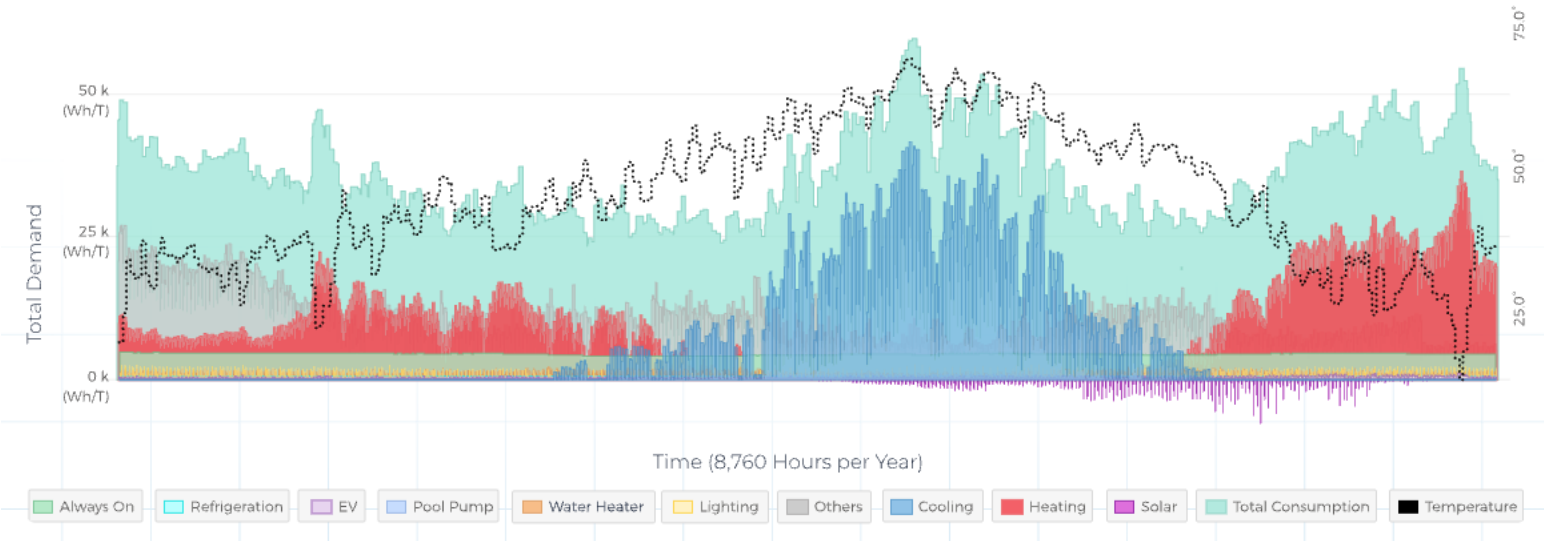


Example – Forecasting customer demand

- Utilities use machine learning with historical load data and weather forecasts and other data to forecast customer demand.
- Forecasts are more accurate if the utility knows what DERs the customer has.
- New techniques using smart meters (AMI 2.0) and grid-edge analytics can disaggregate the customer load into DER components
- Utilities can forecast more accurately; they can set up customers on DER programs

AMI 2.0 has fast sampling to detect “signatures” of EVs, heat pumps, rooftop solar

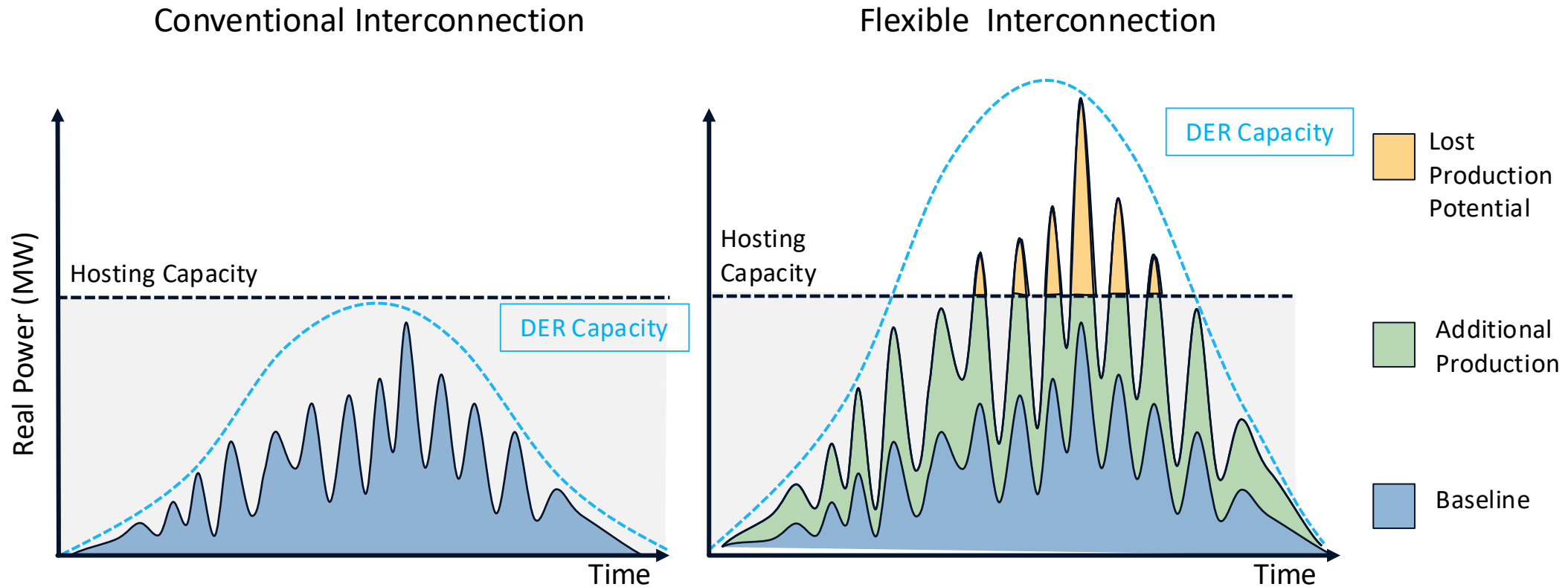
AMI 2.0 generates a huge amount of data but analytics on the grid-edge reduces need for data transfer and storage



Enables more accurate forecasts, targeted DER programs

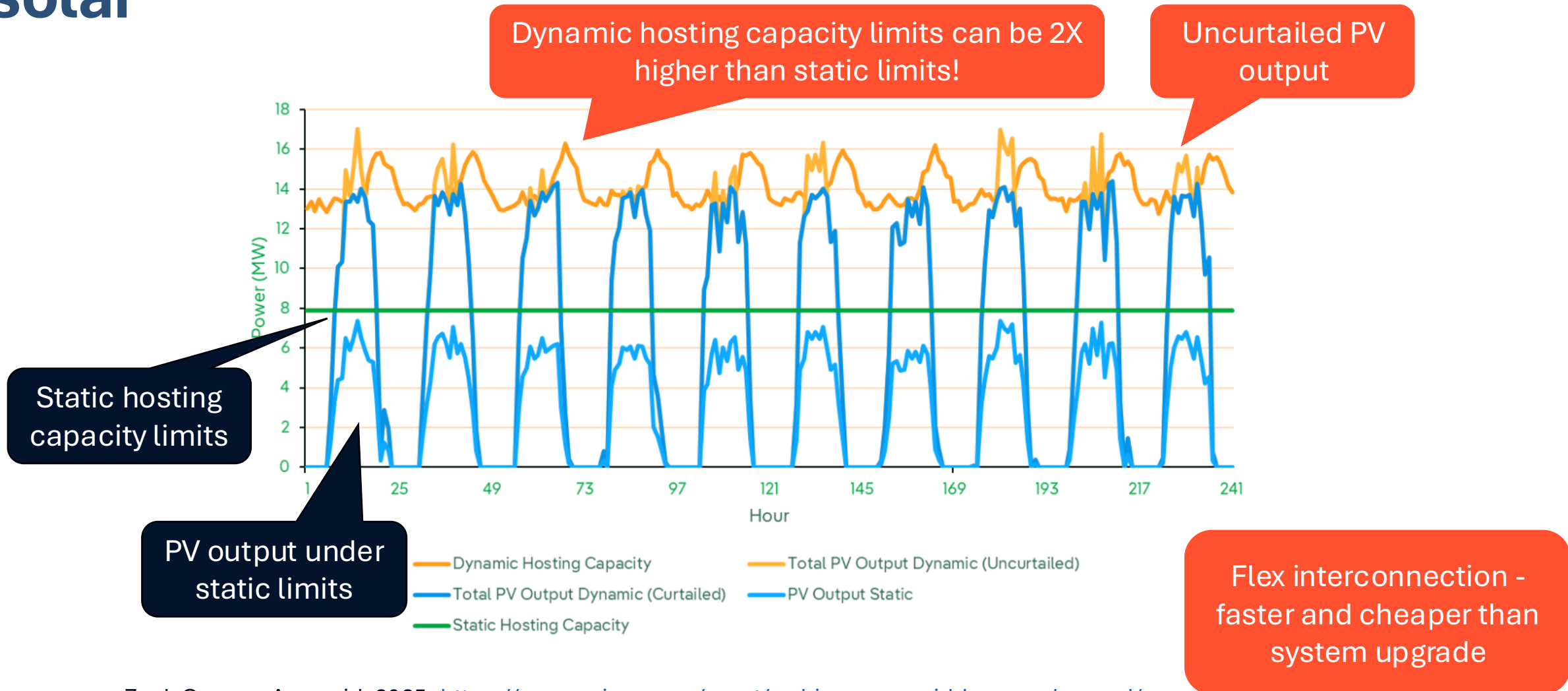
<https://www.bidgely.com/disaggregation>

Example – Flexible interconnection for distributed solar



Brian Seal, EPRI, 2020, [Principles of Access for Flexible Interconnection Solutions: Rules of Curtailment](#)

Example – Flexible interconnection for distributed solar



Zach Caruso, Avangrid, 2025. <https://www.esig.energy/event/webinar-avangrid-lessons-learned/>

This can work for data centers on the transmission system too

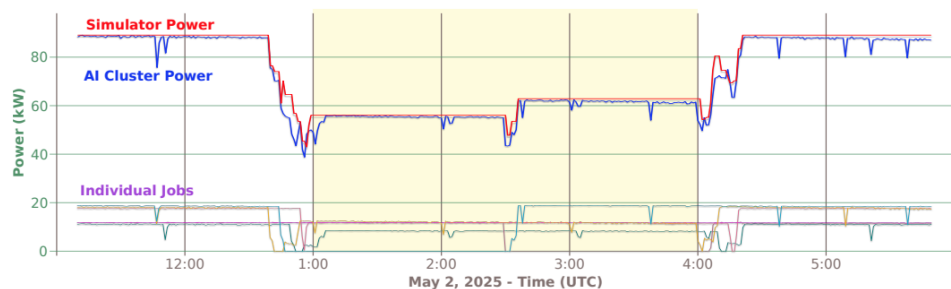
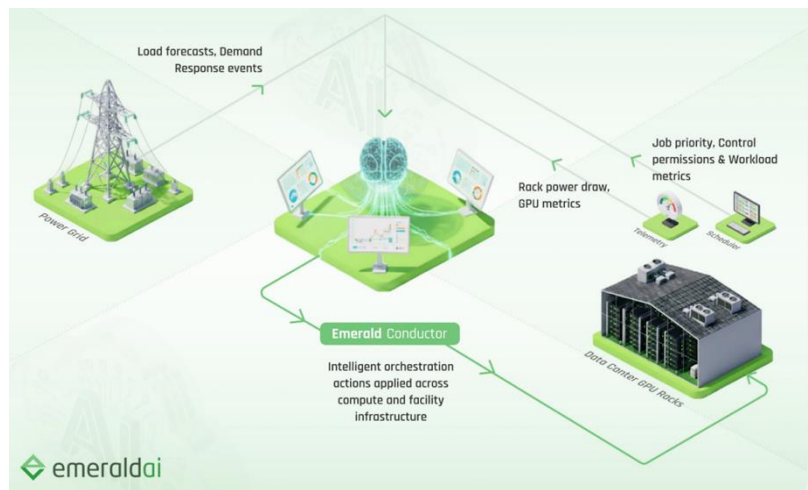


Fig. 5 Power prediction of Emerald Simulator vs. measured power during a power reduction event. The bottom part of the plot also shows the individual controls applied to each job in the workload ensemble running during this event.



- Where does the data center flexibility come from?
 - Generation and storage resources that are behind-the-meter or nearby
 - Some AI and cloud workloads can be slowed or paused when the grid is stressed.
 - Some workloads can be shifted to other regions that have excess power
- Eg, Emerald AI Power-flexible AI Factories that reduce demand with controllable, smooth ramps

Philip Colangelo, et al, [Turning AI Data Centers into Grid-Interactive Assets: Results from a Field Demonstration in Phoenix, Arizona](#), 2025; Emerald AI, [Power Flexible AI Factories](#), March 2026.



Thank You

www.esig.energy | info@esig.energy

Debbie Lew

Executive Director, ESIG

debbie@esig.energy

