



U.S. DEPARTMENT
of **ENERGY**

Office of Critical Minerals
and Energy Innovation

Building Technologies Office

Take a Load Off: Building Technologies that State Energy Offices Should Know About

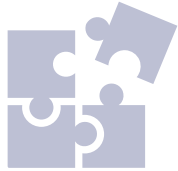
Brian Walker, Chief Scientist

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Barriers still exist to scaling demand flexibility



Energy system stakeholders prioritize tried-and-true approaches to minimize risk

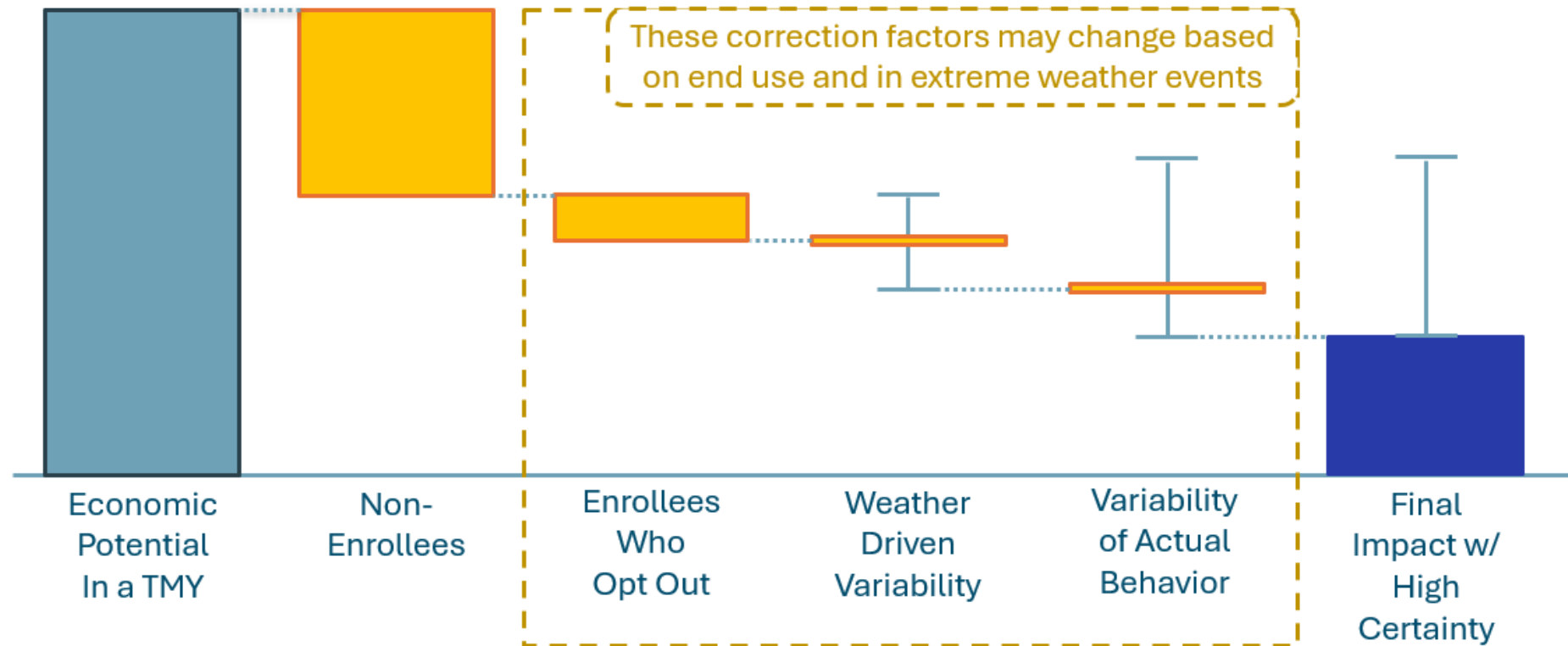


Patchwork of grid and control architectures



Disconnect between energy system design and modern needs

The impact gap is clearer. Next: need to move beyond pilots.



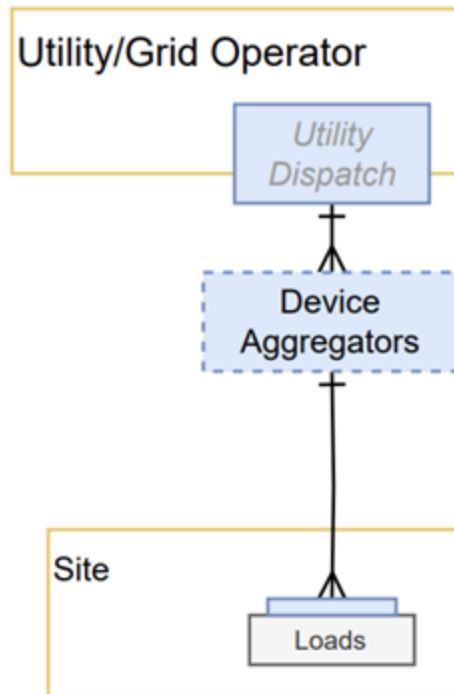
[Major Investor-Owned Utility]: Need to grow from early adoption to broader market participation for:

- Better data and approaches to enrollments, opt-out, and behavior gaps
- Benchmarking modeled data to measured field data

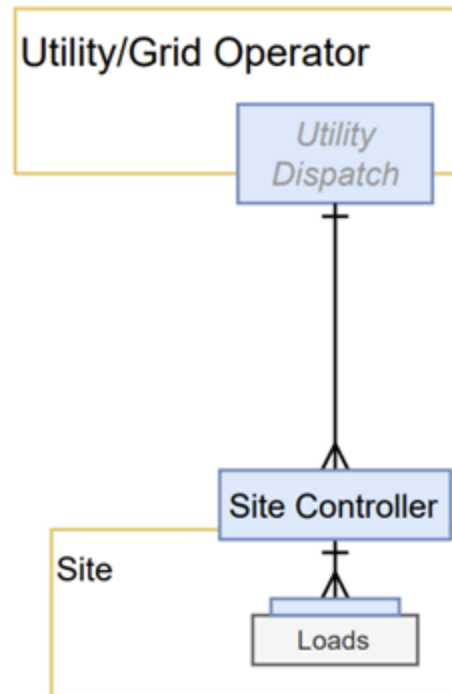
Three control archetypes emerged from field validation

Projects within these archetypes share some common barriers and needs

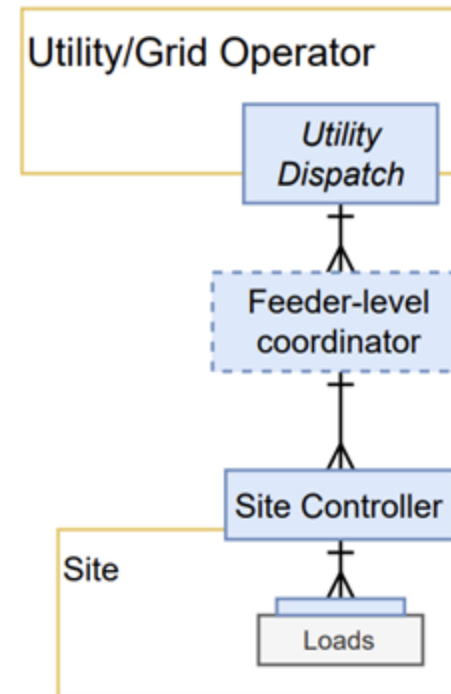
Device Aggregation



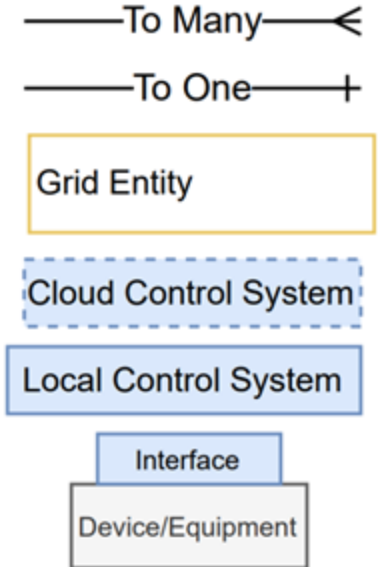
Site Optimization



Distribution Optimization



Legend



Control architectures differ based on methods, assets, lead

DIFFERENCES IN PILOTS

- What grid services are called
- How resources are coordinated to deliver those services
- How customer assets are controlled
- What assets are used

TWO TAKEAWAYS

- Flexibility is possible w/o full DSO integration or dispatch
- Anyone can lead, and solutions can meet you where you are

		Site Optimization				Device Aggregation			Distribution Optimization			
	Features	P1	P2	P3	P4	P5	P6	P7	P7	P8	P9	P10
Lead Stakeholder Types	Utility											
	Technology Provider											
	Site Owner or Developer											
	Other											
Grid Services	Blackstart											
	Distribution Capacity											
	Energy											
	Power											
Building Types	Large Commercial											
	Small Commercial											
	Multi-family											
	Single-Family											
Example Customer Assets	Battery energy storage											
	Water heating											
	HVAC											
	Other											

Paul, L., et. al. 2024. [“Architecting the Future”](#)

To secure the integrated energy system, watch the edge

Our checklist for digital security in demonstrations: Fundamentals, with a different focus

Cybersecurity Plan (CSP) Phase A

1. Project overview
2. Approach for reasonable use of standards and best practices
3. Approach for cyber defense
4. Cybersecurity criteria for 3rd party selection
5. Consequence analysis that addresses mission risk

Cybersecurity Plan (CSP) Phase B

1. Updates to existing *Project Overview* (system diagrams)
2. Updates to existing *Approach for cyber defense* (design info)
3. Threat analysis
4. Vulnerability analysis
5. Summary of risks and mitigations
6. Cybersecurity test planning matrix

Cybersecurity Plan (CSP) Phase C

1. Implementation appendices
2. Results appendices

Cybersecurity Plan (CSP) Phase D

1. Project end of life appendices
2. Updates throughout the CSP

- Opportunity: shared benefits for customers, owners, and system operators
- Threat: Connectedness is exploitable

Thank you

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