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Bringing Data Center Flexibility into Resource Adequacy Planning

ESIG Summer Large Loads Workshop, June 17, 2026



Why should we be thinking about flexibility from large loads for resource adequacy?



Decrease total capacity needs



Utilization of existing behind-the-meter generation for capacity



Key tool for maintaining resource adequacy during scarcity events



Supply chain constraints → delayed timelines/high costs for new capacity

Important note for resource adequacy use cases...

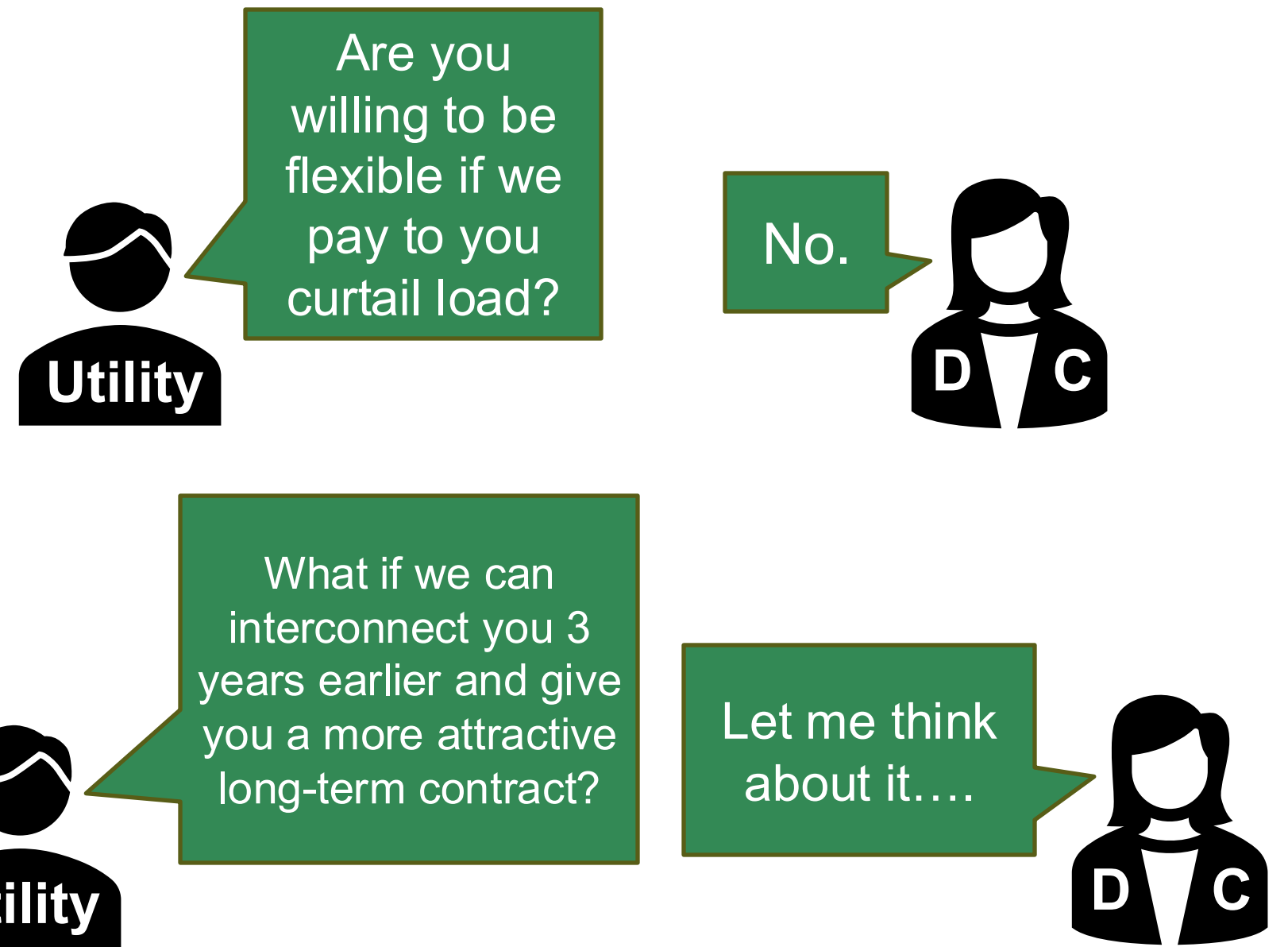
Flexibility is **not required on a regular basis** but can be reserved for exceedingly rare events that may only occur a couple times per year or fewer.

In contrast, flexibility for energy or ancillary markets would require regular, day-ahead and real-time use.



The benefits of load flexibility must be considered up front in planning

- Investment deferment in exchange for flexibility can be a **win-win** for data centers, utilities, and ISOs / RTOs.
 - Data centers **interconnect faster** (speed-to-power #1 motivator).
 - Utilities can provide **expedited service** while avoiding time consuming and expensive capital upgrades and investments.
 - ISO participants benefit from **less capacity** needing to clear the market.
- To achieve these outcomes, however, **investment deferment must be considered in planning** (i.e., IRP procurement or capacity market auctions), where investment decisions are evaluated or incentivized.



Large Load Flexibility Types and Mechanisms


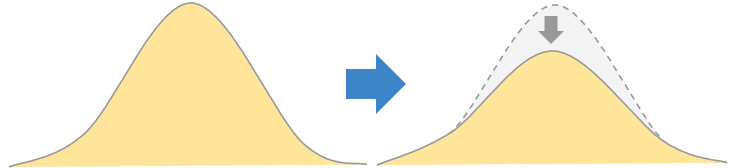
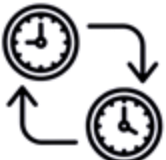
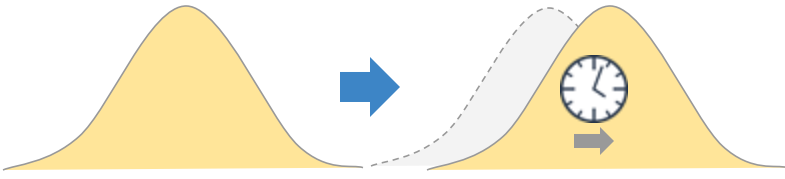

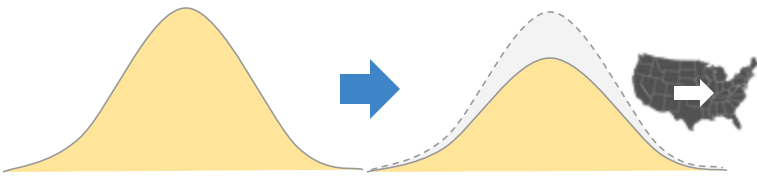
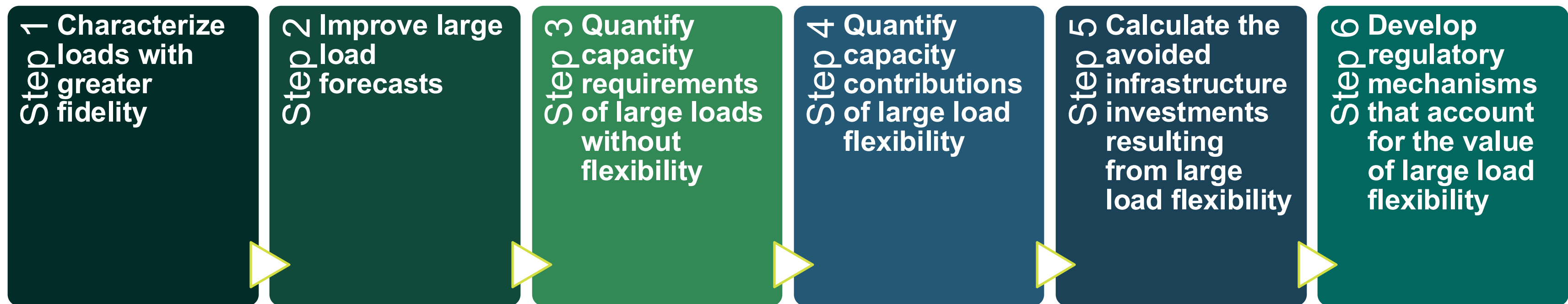
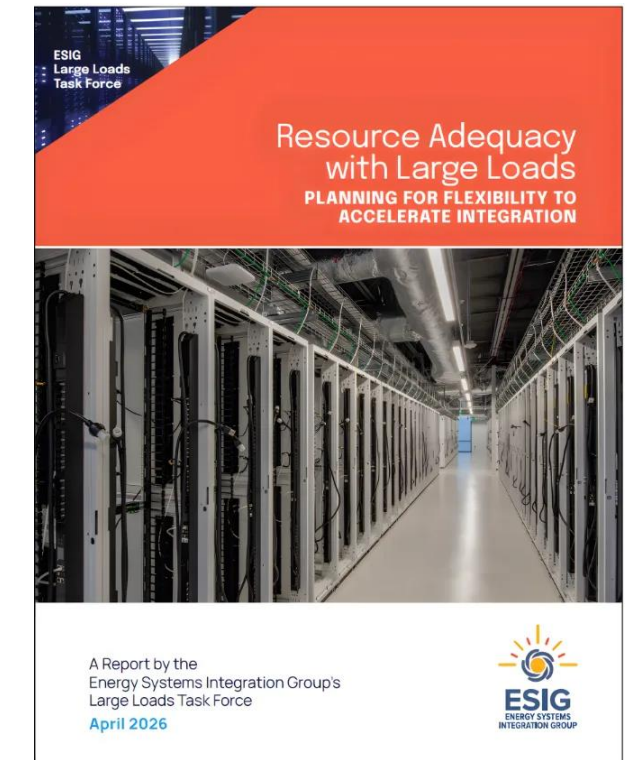
| Flexibility Types | Net Load Impact | Asset-driven Mechanisms | Process-driven Mechanisms |
|--|--|--|--|
| <p>Load Reduction</p>  |  <p><i>Temporarily reduces load and does not shift to another time or region</i></p> | <ul style="list-style-type: none"> Onsite Generation DERs Increased water usage for cooling systems | <ul style="list-style-type: none"> Voluntary Curtailment: (dimming lights, turning off workloads/ production lines) |
| <p>Time Shifting</p>  |  <p><i>Loads shift to periods before or after time of constrained supply</i></p> | <ul style="list-style-type: none"> Onsite Energy Storage HVAC optimization Thermal Energy Storage (TES) | <ul style="list-style-type: none"> Workload scheduling and coordination Production line rescheduling |
| <p>Location Shifting</p>  |  <p><i>Loads are relocated to a neighboring region where reserves are higher</i></p> | <ul style="list-style-type: none"> N/A | <ul style="list-style-type: none"> Workload relocation |

Image adopted from Verrus



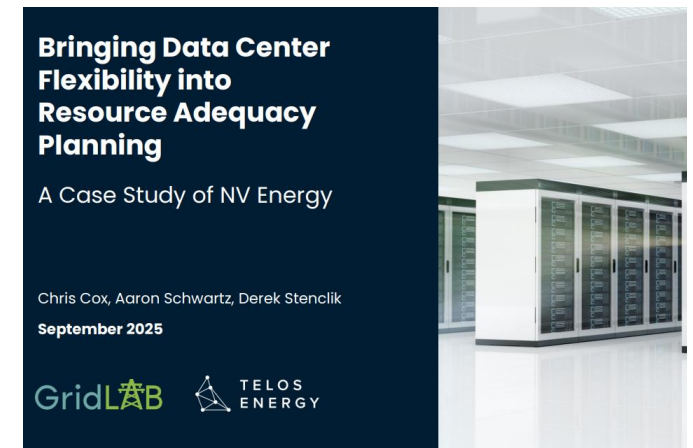
Why should we be thinking about flexibility from large loads for resource adequacy?



Key Outcome: Proactively plan for flexibility **up front** in the capacity procurement process.



Applying the Six Steps: Analytical Framework for NV Energy Data Center Flexibility Study



A **Step A:** Prepare Load Data

Hourly Demand

Pull Out DC Load

Adjust DC Load

Adjusted DC Load

Output: Adjusted hourly load shapes

B **Step B:** Run CEM Baseline w/o DC Flexibility (LT)

Base Portfolio

Output: Baseline capacity, costs, & emissions

C **Step C:** ELCC Study (MT/ST)

| | | | |
|------|-------|-------|-------|
| | 99.9% | 99.7% | 99.5% |
| 1 GW | A | B | C |
| 2 GW | D | E | F |

Output: DC flexibility ELCCs

D **Step D:** Run CEM Baseline w/ DC Flexibility (LT)

ELCC Matrix Scenario A

ELCC Matrix Scenario B

ELCC Matrix Scenario C

...

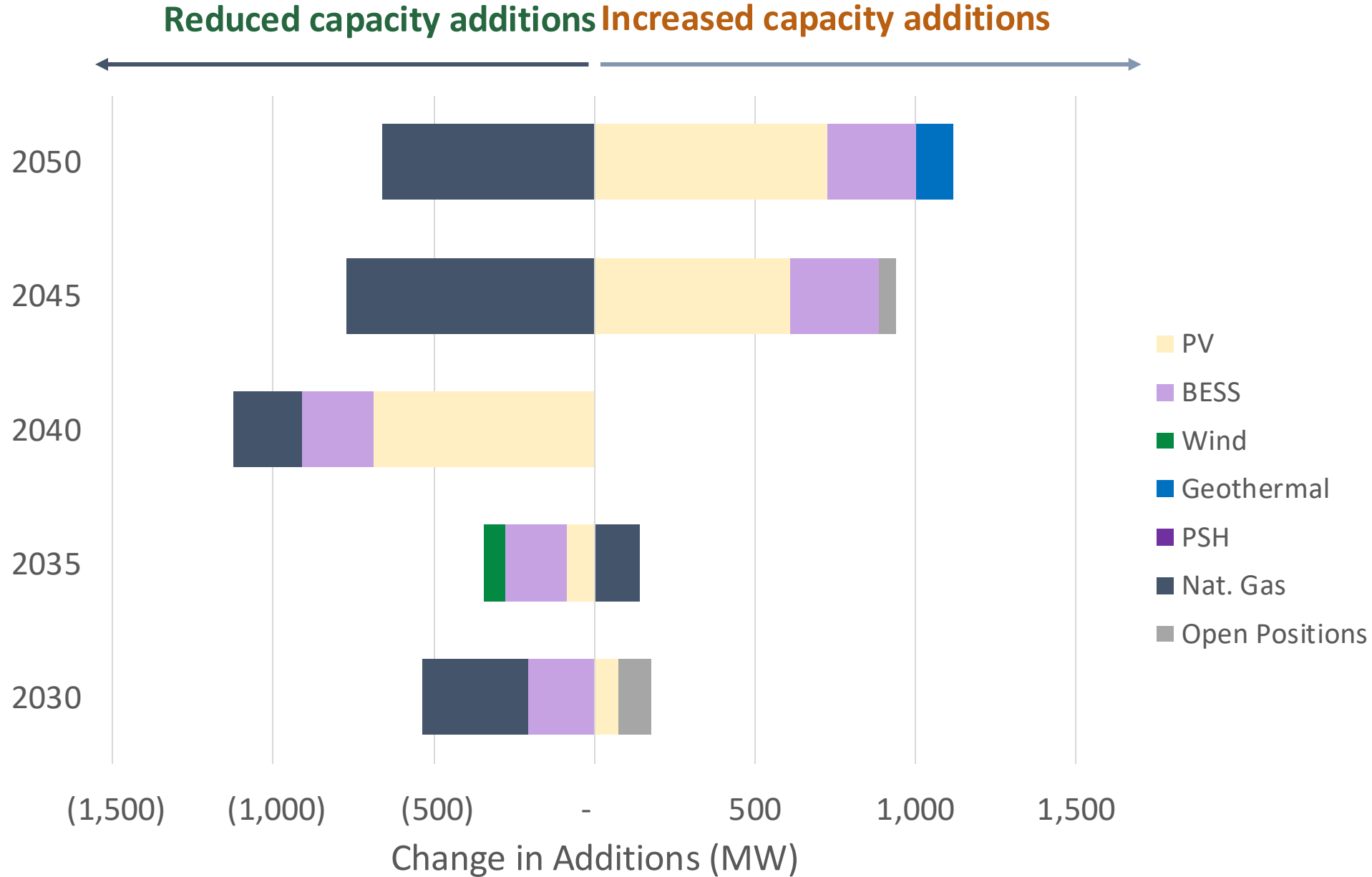
ELCC Matrix Scenario F

Output: Capacity, costs, & emissions across ELCC scenarios

F **Final Output (for each scenario):**

- Avoided capacity needs (MW)
- Avoided costs (NPV)
- Avoided emissions (MMT)

Incorporating flexibility assumptions into planning can reduce capacity needs and portfolio costs



Availability (% Uptime Required by DCs)

| Max Response | 99.5% | 99.7% | 99.9% |
|--------------|-------|-------|-------|
| 1 GW | 87% | 86% | 67% |
| 2 GW | 77% | 66% | 46% |

Benefits
 Reduced CapEx and FO&M
\$586 Million



Costs
 Additional OpEx
\$278 Million

NPV of Savings: \$308 Million



Thank You

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