



Integrating Public Buildings with the Grid

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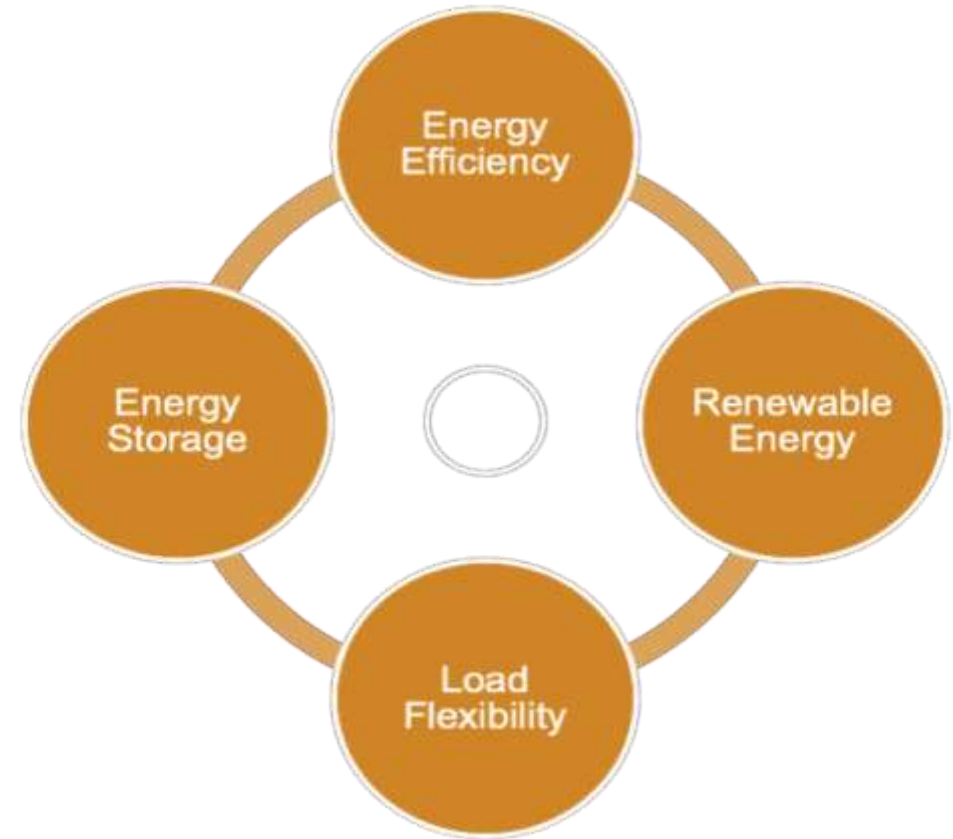
Outline of Today's Discussion

- Understanding Grid-Interactive Efficient Buildings (GEBs)
- GSA Advisory Committee Findings & Recommendations
- GSA GEB Feasibility Study
- GSA GPG & Other Pilots
- Q&A

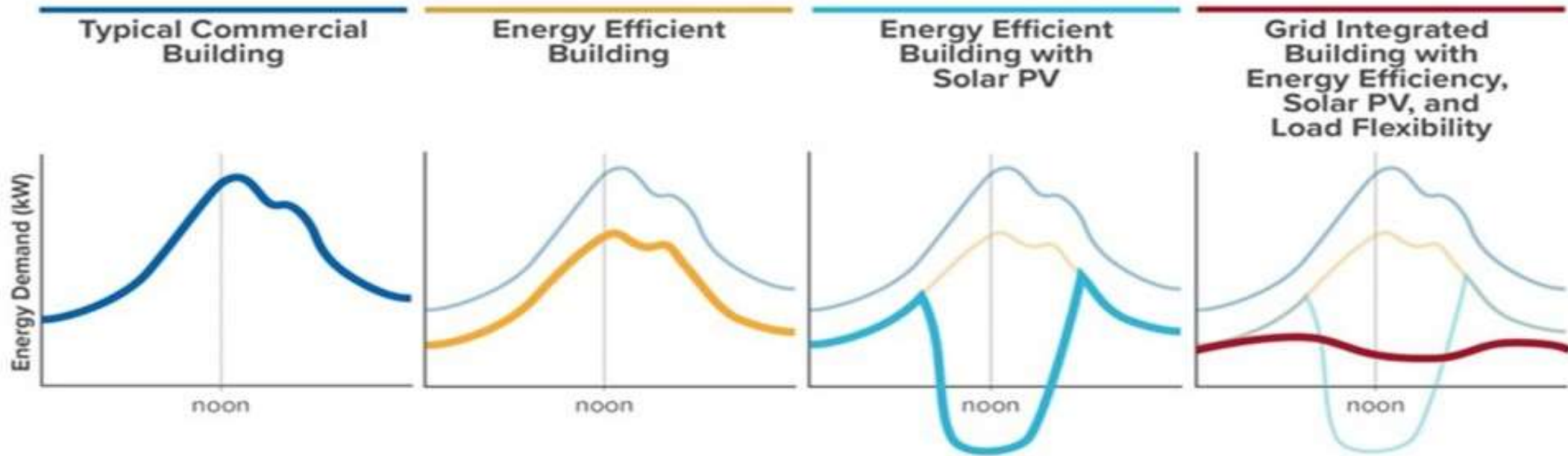


What are Grid-interactive Efficient Buildings (GEBs)?

- A GEB strategy enables achievement of ambitious climate & resilience goals by bringing buildings & the grid together
- GEBs draw from a toolbox that includes energy efficiency, renewables, energy storage and load flexibility
- GEBs employ these capabilities to flexibly **reduce, shed, shift, modulate or generate** electric load as needed
- In response to utility price signals, a GEB can reduce costs and enhance resilience for both building and utility



The GEB Concept



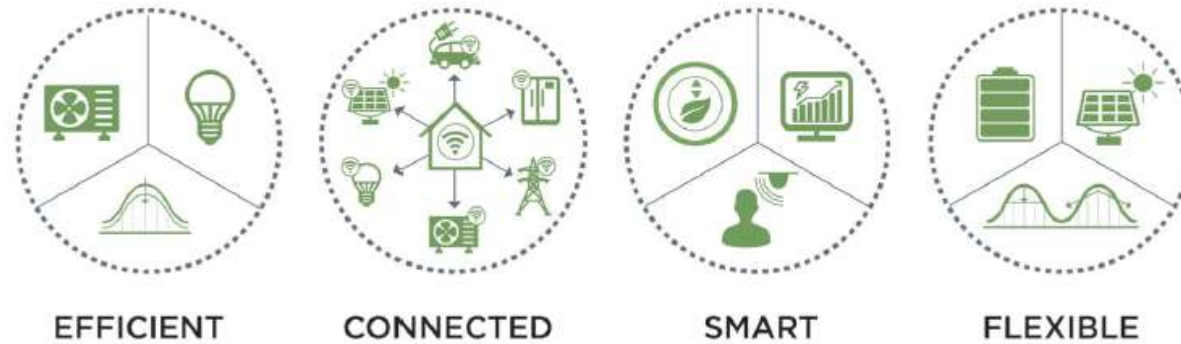
- Enhancing the capabilities of buildings to flexibly reshape loads can address multiple challenges at once:
 - Energy efficiency, cost savings, carbon reduction, renewable energy deployment, grid resilience, smart technology adoption, etc.

How Can GEBs Save Building Owners Money?

- Overall efficiency
- Demand charges:
 - Reduce charges utilities use to bill customers for highest demand periods
- Demand response:
 - Sell power reduction as a service to grid via utility or ISO/RTO programs
- Time of use rates (or other dynamic pricing):
 - Take advantage of special rates that vary based on time of day
- Utility rebates and incentives

*Note: grid integration may *not always* save overall energy or GHGs, e.g., depending on strategies or how batteries are operated

Foundational Federal Work on GEBs



- DOE Building Technologies Office (BTO)
 - Identifying definitions, metrics, technologies, tools
 - Convening & educating states and businesses
 - See www.energy.gov/eere/buildings/buildings-grid-integration
- GSA Green Building Advisory Committee
 - A board of federal & non-federal expert advisors
 - Developed recommendations to federal agencies: at www.gsa.gov/gbac under Advice Letters & Resolutions

Challenges Identified by Advisory Committee

- Lack of Information and Resources
- Lack of Supportive Policies
 - Example of CA Dept. of General Services
[Automated Demand Response policy](#)
- Need for Greater Price Incentives
- Security Concerns
- Operational Knowledge Gaps and Lack of Control
- Lack of Integration Among Strategies & Technologies
- Inadequate Financing/Contracting Models



The ESPC/UESC Challenge

- Advisory Committee's ESPCs & UESCs findings & recommendations:
 - There is no policy *against* including demand savings
 - Yet they rarely are included
 - Exceptions: energy storage, CHP
 - Fear of unpredictability & savings failing to materialize
 - Need policy, guidance and training
 - Avoid blended electricity rates
 - Longer term, work with utilities on special rates

Advisory Committee Recommendations

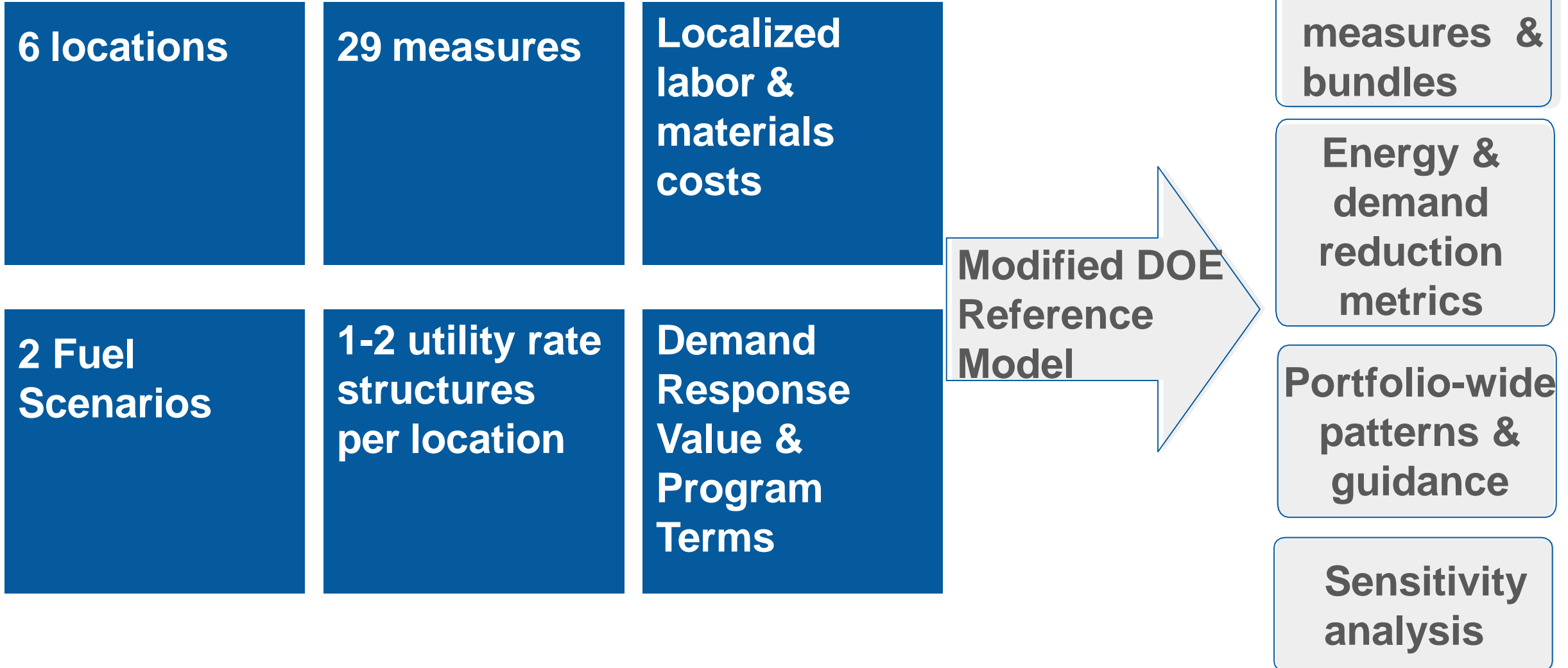
- Set federal building & grid integration policies
- Conduct grid and rate analyses
- Develop design guidance for new & existing federal buildings
- Incorporate demand savings into ESPCs/ UESCs
- Develop building pilot projects

GSA Portfolio GEB Feasibility Study



- Available on Rocky Mountain Institute (RMI) website at <https://rmi.org/insight/value-potential-for-grid-interactive-efficient-buildings-in-the-gsa-portfolio-a-cost-benefit-analysis>

Overview of Methodology



Findings: The Value of GEBs to GSA

- 1. Adoptable measures:** HVAC, lighting, plug load, renewable energy & storage measures define the cost-optimal strategy
- 2. Substantial energy impacts:** These measures can generate **165 MW of peak load reduction and 180 GWh/y in energy savings** across the GSA's owned office portfolio
- 3. Substantial economic impacts:** Each model shows a **sub-4 year payback**. The full portfolio can generate **\$50MM in annual cost savings** (20% of GSA's annual energy spend) and **\$184MM in NPV** over 8 years
- 4. Potential to be price-maker:** GSA is large and concentrated enough to impact grid-level economics
- 5. Persistent savings:** GEB measures enable load flexibility, which ensures savings, even as rate structures change

GSA Pilots

- GSA's Public Building Service (PBS) & DOE's Building Technologies Office (BTO) released a Request for Information (now closed) on GEB technologies:
 - <https://www.gsa.gov/governmentwide-initiatives/sustainability/emerging-building-technologies/request-for-information>
- PBS pilots planned for several GSA locations, with goal of producing findings, guidance & rollout
- We are also working to integrate GEB concepts into our ESPC & UESC projects

Thank You for Your Time

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