GRID INTERACTIVE EFFICIENT BUILDINGS

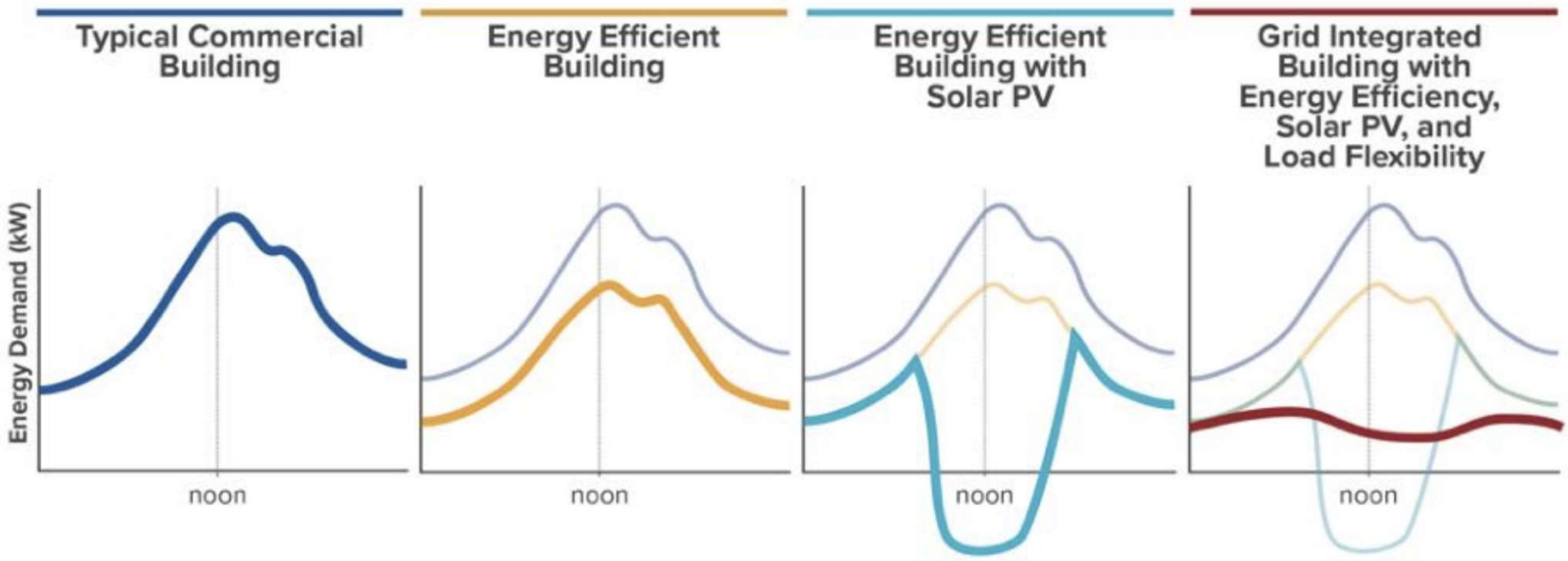
GSA/DOE RFI: Next Steps & Opportunities

Timothy Unruh | NAESCO
Kevin Powell | U.S. General Services Administration
Cara Carmichael | Rocky Mountain Institute

NAESCO

What is a Grid-interactive Efficient Building (GEB)?

Technologies, solutions, and/or energy services that can cost-effectively provide building load flexibility



NAESCO

Key Differentiators of Grid Interactive Buildings

ATTRIBUTE	TODAY	FUTURE
1. Interoperability and intelligence from building to grid	• DR programs, often manual, fairly static	• Ability to receive and respond to utility price signals • Ability to send load flex potential (capacity market participation)
2. Interoperability and intelligence across building systems	• BMS system for major loads (HVAC) • Individual system controls (Lighting, storage)	• Single, overarching integrator to monitor and control all loads, inc. plug loads and storage • Ability to optimize for cost, carbon, resilience, etc.
3. Load flexibility and demand-focused optimization	• Thermal energy storage • Battery storage	• Intelligence to track and map demand, shift or shed rapidly based on inputs such as price, weather, carbon, events, etc.

NAESCO

The Value Potential for GEB in GSA's Portfolio: Key Findings

Purpose	Show the value of GEBs to the GSA, the federal government, and taxpayers; RMI modeled 29 demand focused, GEBs measures across 6 locations
The Value of GEBs	Each model shows a sub-4 year payback The full portfolio can generate $50MM in annual cost savings (20% of the GSA's annual energy spend) GEBs could generate up to $70MM/year in value to grid users while improving resilience and reducing carbon intensity
Key Findings	HVAC, lighting, plug load, renewable energy, and storage measures define the cost-optimal strategy Invest in fully controllable systems, stage large building Consistent demand management delivered more value than peak shaving

RMI study – Aug 2019

NAESCO

GSA Green Building Advisory Committee:

GEB Task Group Key Recommendations

Structure

1. Demand savings should be included and is generally allowed
2. Use actual rates, avoid using blended rates
3. DR programs that provide a fixed monthly payment are the easiest to incorporate, even if only for a period of time (e.g. 3 yrs)

Process

4. Training is needed on both sides of the contract
5. Continuous demand management may require O&M services or greater risk sharing

GSA GBAC Advice Letter – Dec 2019

NAESCO

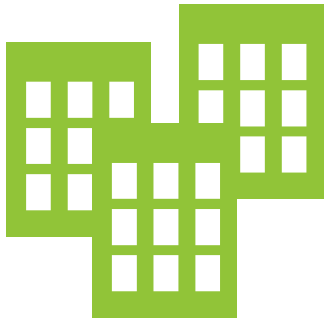
What is the Joint GSA/DOE GEB RFI?

In-field validation of GEB technology's performance

ONE Submission

TWO Programs

Larger portfolio

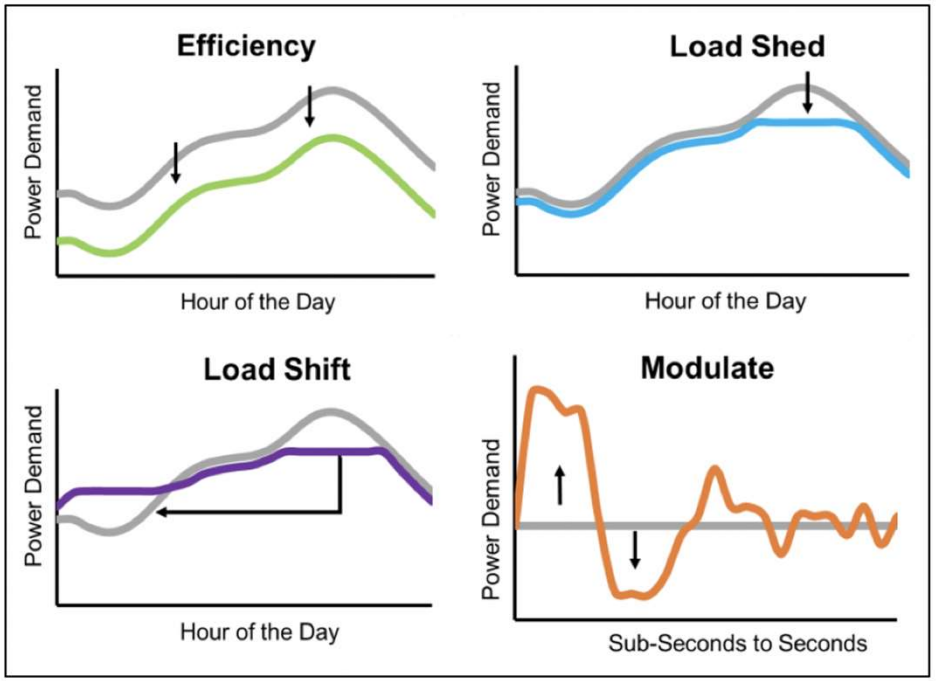


NAESCO

RFI Requirements

Must include 3 out of 4 strategies:

- Energy efficiency
- Load shed
- Load shift
- Modulation of electrical load at the sub-seconds to seconds level



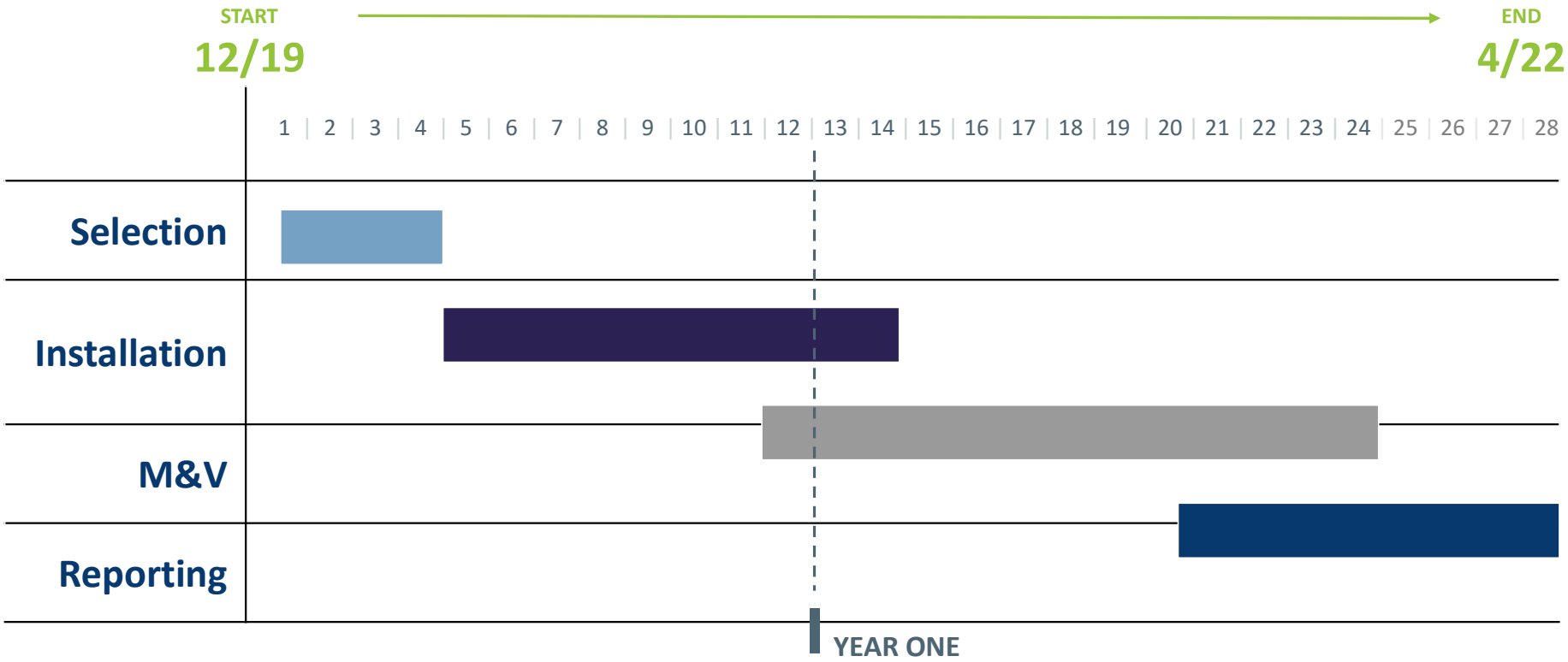
NAESCO

Common Themes Across Solutions Submitted to RFI

- Leverage existing **energy-saving, energy generating, and/or energy storage technologies**
- **Require** modern building automation system (BAS) and engaged building manager
- **Include emerging software solutions** that integrate, coordinate and sometimes automatically control multiple building end-use systems, distributed energy resources (DERs) and onsite storage to shed and shift loads
- **Require ancillary energy/engineering services** to deliver a comprehensive solution
- **Uncharted opportunity space** to reduce owner energy costs, improve facility resilience and serve as a resource to the electric grid

NAESCO

Assessment Timeline



NAESCO

In Conclusion

GEB solutions promise improved resiliency and cost savings

- Both are priorities for DoD and GSA
- Opportunity space for ESCO project financing

GEB solutions are large and complex

- Required component systems are often state of the art
- Strategies to orchestrate siloed systems are promising, but pre- commercial

Price signals are uncertain

- Utilities have indicated interest but tariffs are evolving
- Will cost savings, rather than energy savings fit within ESCO model?

NAESCO

On the Horizon

Relevant Research:

- LBNL – load flexibility metric development
- NBI – Grid Optimal rating system
- DOE/NREL/RMI Smart and Connected Communities research
- GSA Proving Ground RFI

Upcoming:

- DOE BTO – Has issued a NOI about an upcoming FOA for Grid-interactive Efficient Buildings and Smart and Connected Communities
- GSA – GEB best practices in ESPC/UESC

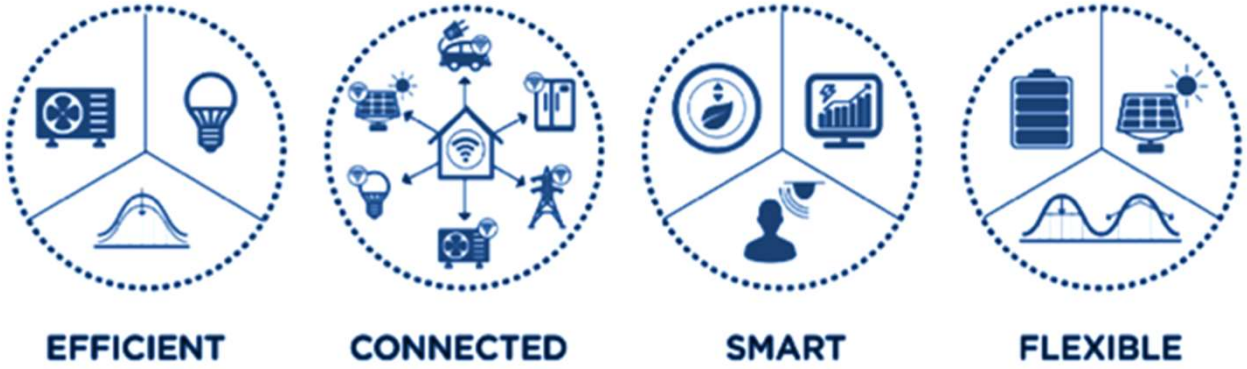
NAESCO

Additional Resources

- Rocky Mountain Institute - Grid interactive buildings and GSA Value analysis: (https://rmi.org/gebs)
- U.S. General Services Administration – Green Building Advisory Committee - GEBs Task Groups
  - 1. Policy recommendations and 2. GEB in ESPC/UESC guidance
- DOE BTO – GEBs Homepage
- Laurence Berkeley National Lab – FlexLab
- New Buildings Institute – GridOptimal Initiative
- NASEO – NARUC GEB Working group
- More from ASHRAE, NREL, ACEEE…

NAESCO

Why GEBS?

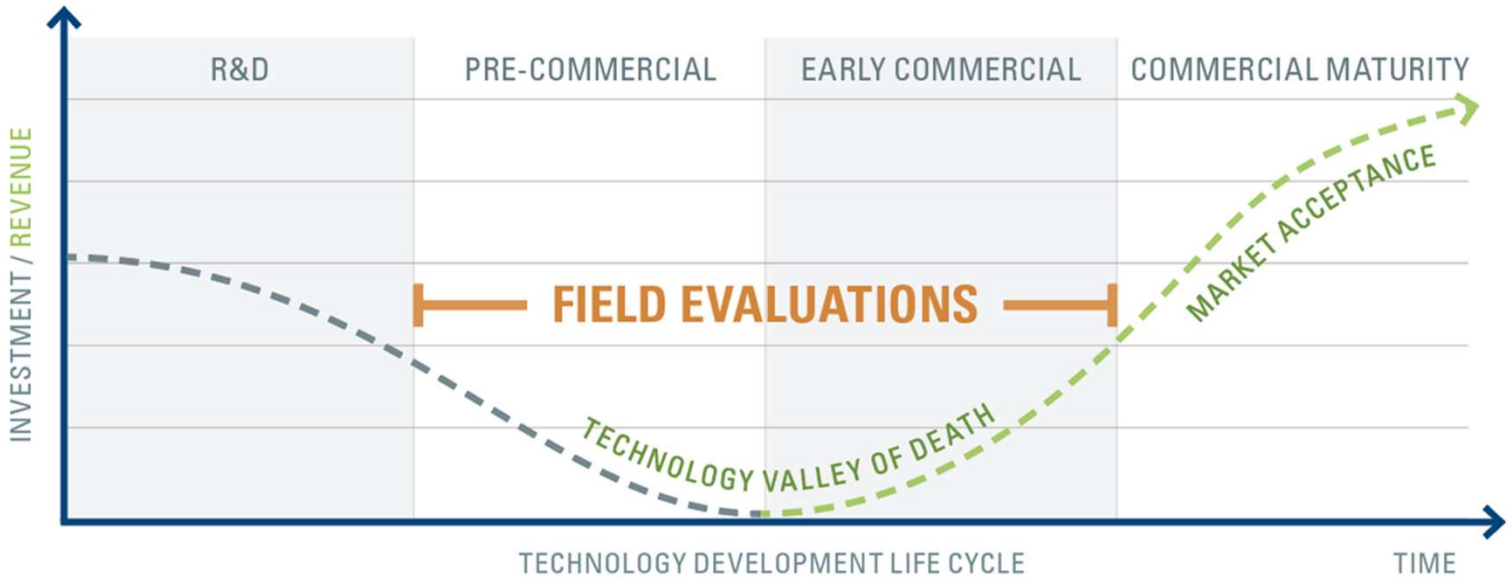


- Buildings consume 75% of U.S. electricity, and drive peak generating capacity.
- Many electrical loads are flexible and, through advanced controls, can be managed to operate at specific times and at different output levels.
- GEBs are key to to reducing energy costs, supporting better grid management and improving facility resilience.

NAESCO

Why a Field Evaluation of GEB Solutions?

Address the lack of objective performance and cost data that inhibit emerging technology from finding its customer base.



NAESCO

GEBs Sample Measures

	Sample Grid-interactive Efficient Building Measure
1	Staging loads: Laptop battery charging, AHU fans and electric resistance heaters (in electric only buildings) to reduce peak demand
2	Space temperature setback to reduce peak demand
3	LED lighting with Advanced lighting controls to enable peak shaving and DR
4	Morning preheat / afternoon precool to shift peak
5	Thermal mass floors to shift peak
6	Grid connected appliances to provide flexibility
7	Interior automated blinds to reduce cooling loads and reduce peak demand
8	Electrochromic windows to reduce cooling loads and reduce peak demand
9	Thermal energy storage to provide flexibility
10	Electric Battery storage to provide flexibility and reduce peak demand
11	Solar PV to provide onsite generation

Source: RMI, NBI GridOptimal

NAESCO