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Opportunities to Advance Demand Flexibility with Building Performance Standards

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Today, the electricity grid is currently undergoing its most rapid period of change since its inception in the mid 1900s, brought on by the growth of variable renewable energy and a new wave of electrification. As these trends accelerate, U.S. buildings have the opportunity to simultaneously accelerate the transition to renewable energy and minimize its cost by becoming active participants in the grid rather than just passive consumers.

Even slight adjustments to when buildings use or save energy can yield massive carbon and dollar savings in the years to come. While some buildings are currently capable of shifting load throughout the day to achieve demand flexibility, the need for such capability will grow exponentially in the near future. Jurisdictions can start laying the groundwork for demand flexibility today by using Building Performance Standards (BPS) to accelerate the adoption of grid interactive technology in buildings.

With this in mind, this document is written to guide state and local governments that are developing a BPS in thinking through how a BPS might encourage demand flexibility.

Buildings Can Support A Renewable Grid through Demand Flexibility

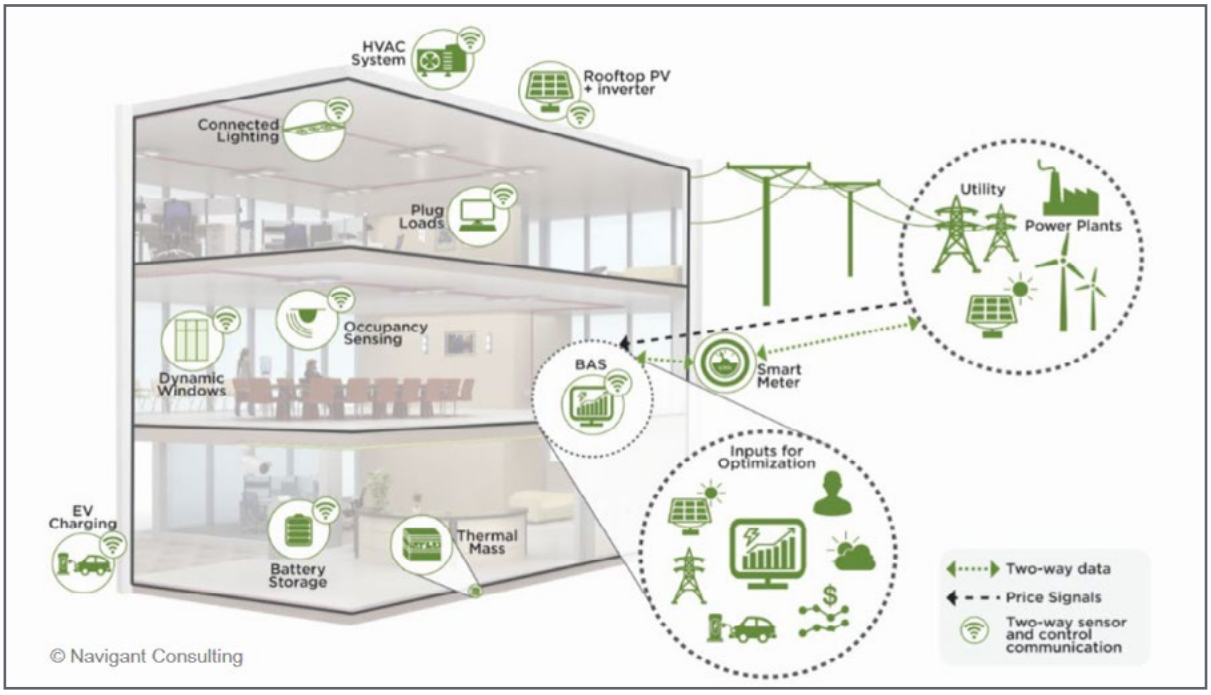
Buildings that actively contribute to meeting grid needs are call Grid-Interactive Efficient Buildings (GEB). They do so by combining a smart building automation system (BAS) with distributed energy resources such as solar power, battery storage, or smart hot water heaters, to enable the whole building to automatically respond to grid signals.

Grid signals can indicate a variety of conditions to which buildings can adapt. For example, if there is plentiful solar energy available, grid signals could trigger the building's BAS to charge its battery and plugged-in electric vehicles (EVs), heat water, and pre-cool the building rather than undertaking these activities at other times of the day when there is more carbon-intensive electricity on the grid. Alternatively, grid signals could indicate an anticipated reliability issue, triggering the building to use energy already stored in the battery, EVs, and hot water, and to minimize its heating or cooling efforts, which helps alleviate grid congestion so other communities can still receive power.

The fundamental components of a GEB are:

- A central BAS sophisticated enough to communicate with both the equipment used in the building and the grid,
- Primary end uses of the building that are themselves smart and controllable through the BAS,
- Smart utility meters that track energy use at a granular level, including submeters, and
- Educated and engaged building operators.

Example grid-interactive efficient commercial building



Source: Department of Energy

Design Building Performance Standards to Enable Demand Flexibility

Building Performance Standards (BPS) are dynamic policies that require building owners to meet one or more standards of building performance that increase over time. In addition to creating standards on energy or carbon performance, a BPS can include a demand flexibility standard, which would ensure the jurisdiction's buildings are prepared to operate in the clean grid of the future. A demand flexibility standard requires building owners to invest in the ability of their buildings to shed or shift load. There are three main opportunities to do this within a BPS ordinance:

1 Set a standard based on demand-response capability

Jurisdictions could develop a metric that describes a building's ability to provide demand response or other grid services. This metric would refer to the building's capability to shed or shift load over specific periods of time and could be designed to be in line with existing or planned utility programs. This standard can be simple to implement, and could even be designed as a binary standard. It ensures that buildings have the required equipment for building-grid interaction, which achieves some near-term benefits, such as energy and carbon savings, and prepares buildings for the future when demand flexibility will be in high demand due to a highly renewable grid.

However, since the standard is based on building *capabilities*, not actions, meeting this standard does not guarantee that the building is shedding or shifting load in response to grid signals. Jurisdictions should concurrently work with their electric utility or other energy service providers to develop a market for demand flexibility services to the grid from building owners, which would put building capabilities required by the BPS into action.

2 Set a peak demand standard

A building's coincident peak demand represents the building's energy use when total demand on the utility's entire system is at its highest. A peak demand standard requires buildings to develop load-shifting capabilities to move load away from peak periods. The metric could also refer to the building's local coincident peak demand as it relates to the electric substation that feeds the building so that the building must shift load according to the substation's peak, yielding more local savings. Jurisdictions interested in a peak demand standard should consider using the Grid Peak Contribution metric developed by the New Buildings Institute.

3 Set a time-of-use standard

The most powerful metric, and the most difficult to execute, is a time-of-use metric that set a standard for energy use or carbon emissions on an hourly (or more granular) basis. This directly aligns building energy use with varying grid needs. However, securing granular utility data and delivering sufficient certainty to building owners so that they can plan equipment and operational changes to enable demand flexibility are substantial barriers to deploying BPS metrics based on time of use.

IMT recommends that jurisdictions interested in a time-of-use metric start by drafting an ordinance that empowers the implementing office to develop time-of-use metrics for future compliance cycles. This gives the implementing jurisdiction time to develop the metric and sends a clear signal to the building community. As an example, New York City's Local Law 147 (an amendment to Local Law 97 [LL97], the city's BPS ordinance) empowers the ordinance administrator to create an optional time-of-use emission conversion factor that building owners can select for compliance under LL97. NYC is currently working with ConEd, the New York Independent System Operator, and a consultant group to develop these metrics.

Promote Demand Flexibility through Complementary Processes

Although demand flexibility standards are an ambitious undertaking, jurisdictions can use opportunities created under any BPS law to encourage that any new equipment installed in the course of BPS compliance is "GEB-ready," meaning able to be connected to and controlled by a smart BAS system. This is critical as equipment replacement generally locks in the functionality, as well as energy source and associated emissions, for up to 25 years and retrofitting equipment for connectivity and remote control can be problematic and expensive. Jurisdictions can encourage "GEB-ready" equipment installation by educating the building community and working with their local utilities to create compliance guidelines and incentives or programs for building owners.

The jurisdiction has to make clear that demand flexibility is a priority outcome of the BPS and that all buildings will have to eventually achieve this goal. The jurisdiction should generate or adapt general education materials, clearly linking the intended outcomes of building-grid interactions with the outcomes of the BPS. Education materials should be clearly targeted for building owners, operators, and the energy service community. Additionally, utility cooperation is essential to securing data for developing the standard, creating equipment incentives to buy down the cost of installing GEB-ready technology, and developing programs to create a market for grid services in buildings. Jurisdictions should engage with their utility early on and throughout the development of the BPS to create programs to encourage active demand flexibility.

Building Performance Standards are powerful tools to blaze the path for grid-interactive efficient buildings, a key component of a highly renewable grid. Jurisdictions should start laying the groundwork for demand flexibility now through their BPS.

For more information, visit **imt.org/BPS**.

Additional Resources:

Decoding Grid Integrated Buildings Report
by the Building Decarbonization Coalition

Grid-Interactive Efficient Buildings
by the the U.S. Department of Energy

Grid-Interactive Efficient Buildings: An Introduction for State and Local Governments
by the U.S. DOE's State and Local Energy Efficiency Action Network

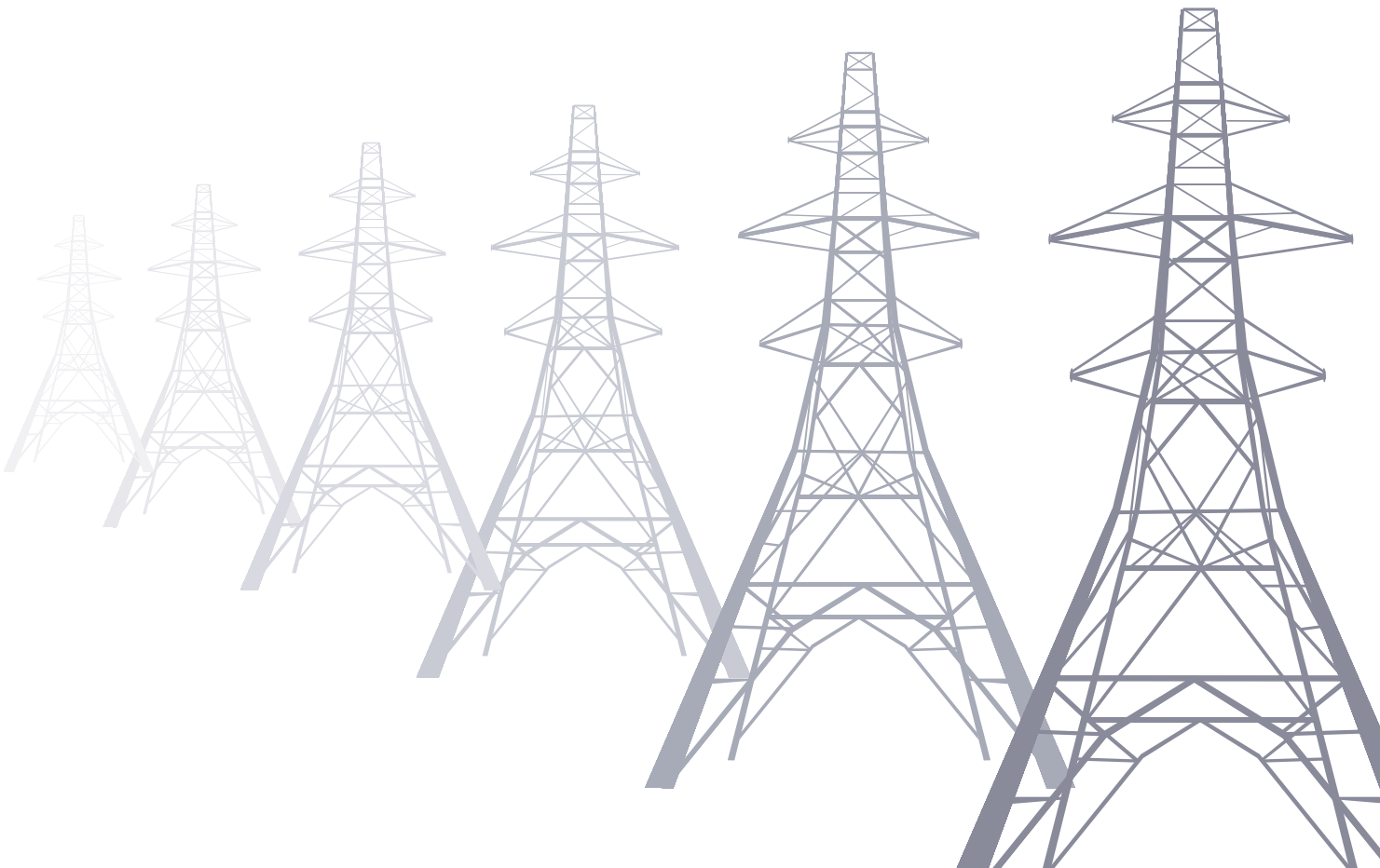
Grid-Interactive Efficient Building Utility Programs: State of the Market
by the American Council for an Energy-Efficient Economy

The GridOptimal Buildings Initiative
by the New Buildings Institute

Local Government Engagement with Public Utility Commissions Mini Guide
by the Institute for Market Transformation

Rethinking Energy Data Access
by the Institute for Market Transformation

Using City-Utility Partnership Agreements to Achieve Climate and Energy Goals
by the Institute for Market Transformation and the World Resources Institute



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