



Buildings and grid modernization

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Buildings can be used for Grid Services

In the context of buildings, grid services are actions buildings can take in response to real-time grid conditions that provide value through avoided costs.

Grid services can be subdivided into services that:

- Avoid **generation** costs by offsetting generation capacity investments, load-shifting to lower-cost generation, or providing ancillary services (frequency regulation and operating reserves)
- Avoid **delivery** costs by offsetting transmission and distribution capacity investments, or supporting distribution-level voltage control



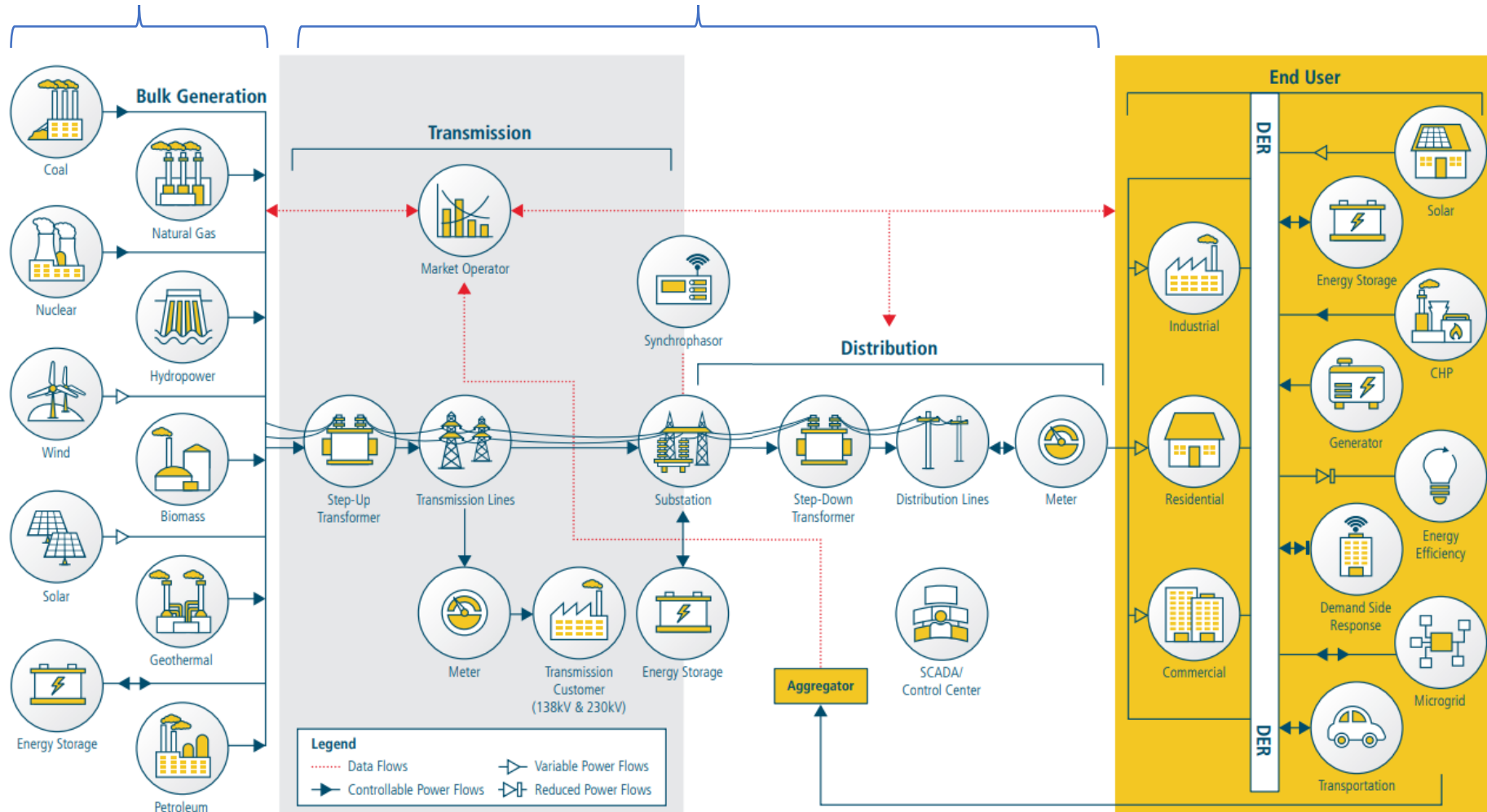
How can buildings plug into the grid?

Generation Services

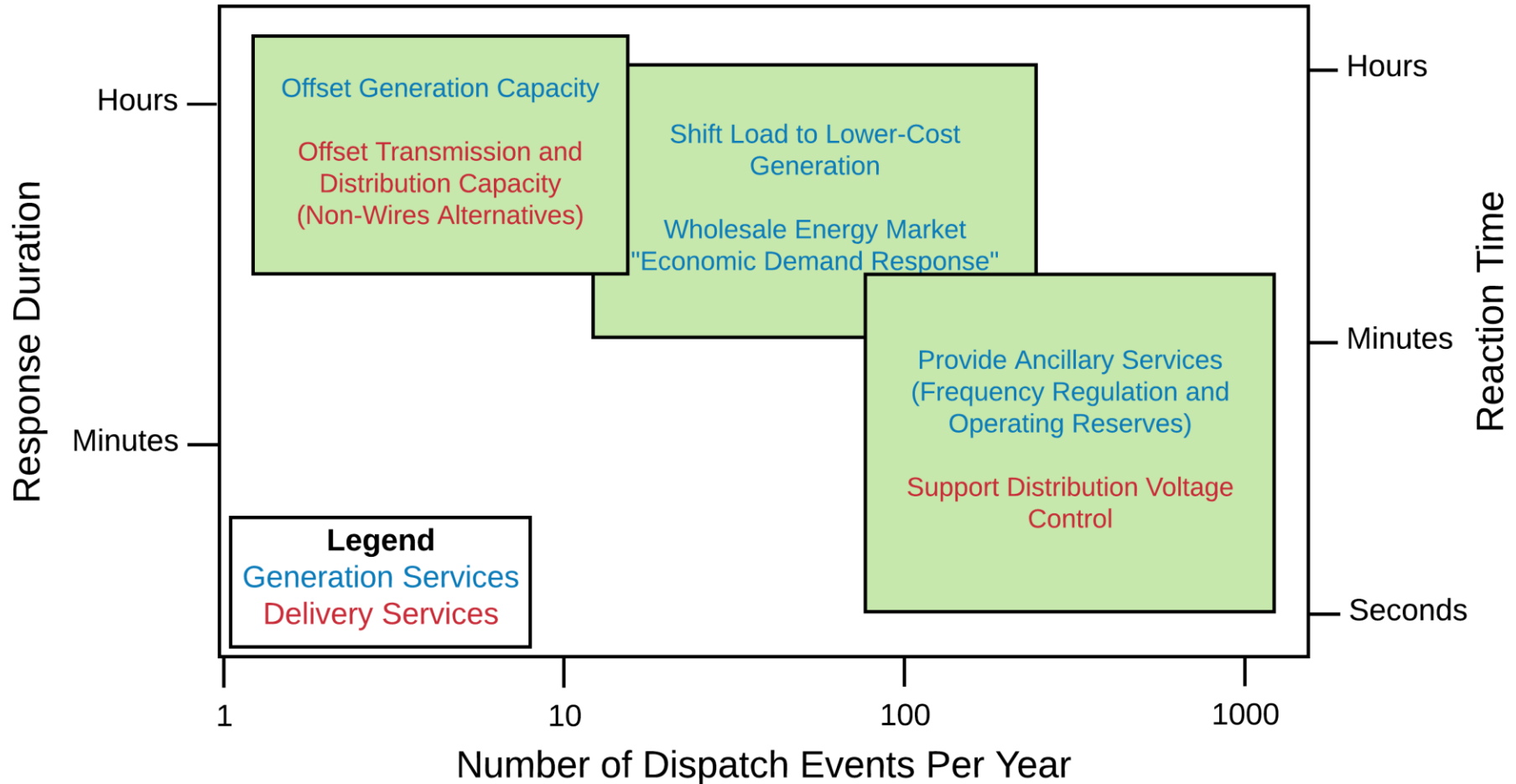
Reduce generation capital and operating costs

Delivery Services

Reduce transmission and distribution capital and operating costs



Different grid services have different technical requirements



Many questions still need to be answered to determine how buildings can be used

Electric Grid

Maintain reliability, safety, and equity of the electric grid

- Where is value on the electric grid?
- What services can provide value?
- When can value occur?
- What are the cost trade-offs between decentralized and centralized resources?

Integration

Coordinate distribution control with building resources

- How are buildings communicated with?
- Who is responsible for integration and control?
- What is the role of inter-building interaction?

Buildings

Optimize behind the meter assets and reduce energy use

- What buildings can be used?
- What technologies can be leveraged and coordinated?
- How do we incentivize / value deployment?

Example: Southern Company Smart Neighborhoods Project

Alabama: 62 state-of-the-art homes connected to the Southeast's first community-scale microgrid



Alabama Neighborhood Features:

- high-efficiency heat pump
- intelligence home comfort system
- voice-activated security
- smart locks and cameras
- interconnected appliances
- triple-pane windows
- LED lighting
- AT&T Fiber Internet

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Purchase of a home permits Southern Company to test the role of homes and the microgrid to provide grid services. Over a two-year period, appliances will be used for demand-response needs and ancillary services.