

# Welcome

## Smart Grid Technologies

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EEBA™

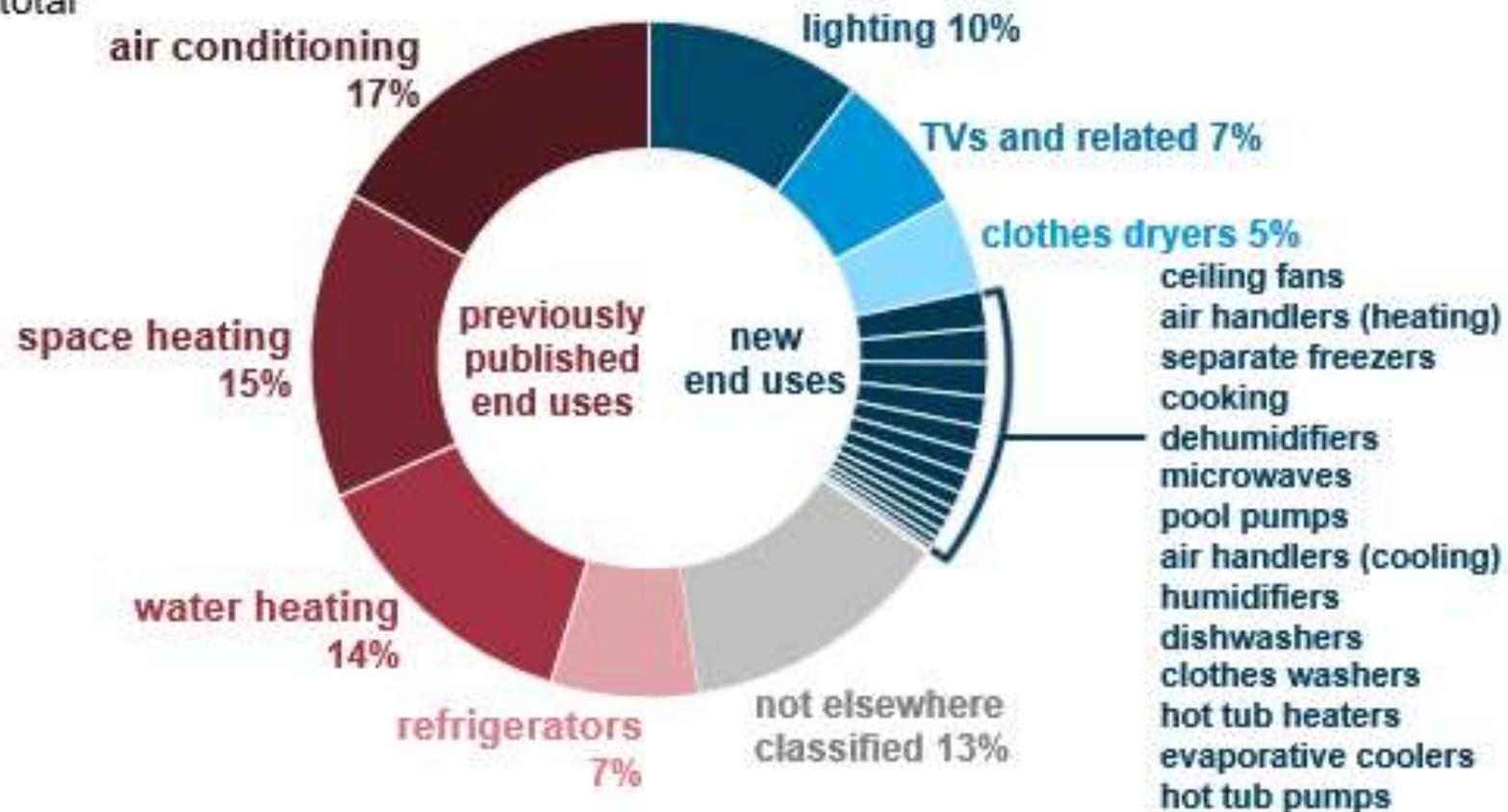


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# US EIA - Residential Energy Consumption Survey

Residential electricity consumption by end use  
percent of total



# Energy Efficiency and Energy Savings

## Strategies & Techniques:

-  • Unplug Devices
-  • Efficient Lighting
-  • Air Seal and Duct Seal
-  • Insulate the Home
-  • Heating & Cooling
-  • Water Heater
-  • Energy Star Appliances



# Smart Home Technologies



# What is a Smart Home?

A smart home is a convenient home setup where appliances and devices can be automatically controlled using a mobile or other networked device.



# Smart Home Technologies



# Poll Question

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**Which emerging technology are you most excited about?**

Smart Lighting

Smart Appliances

Smart Thermostats

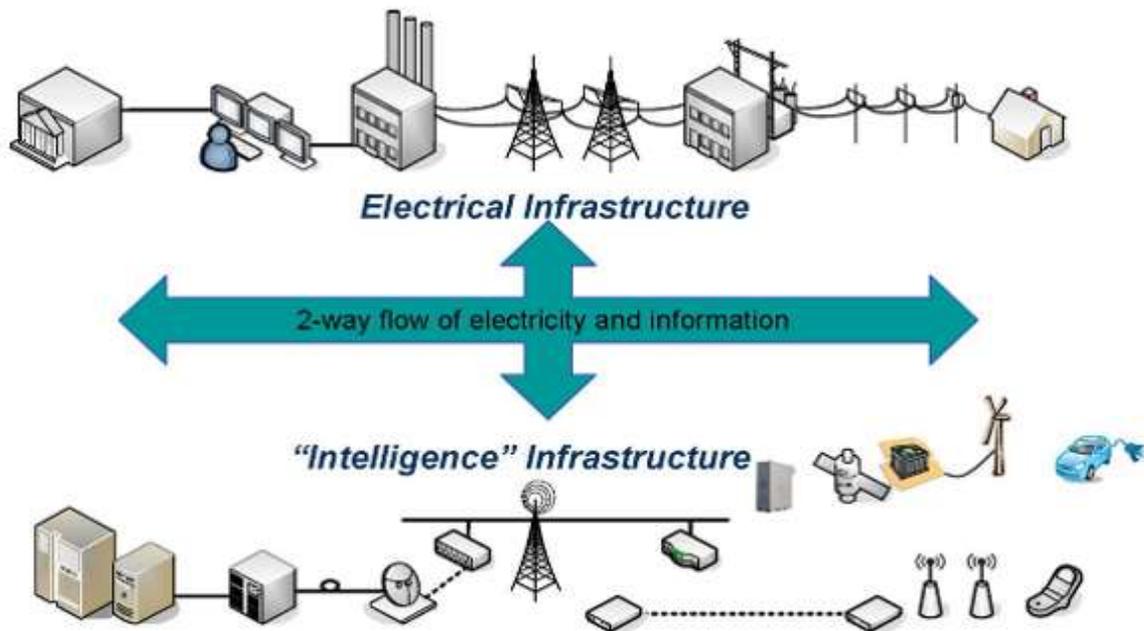
Smart Security Systems

Smart TV's and Entertainment

Whole Home Energy Monitoring Devices

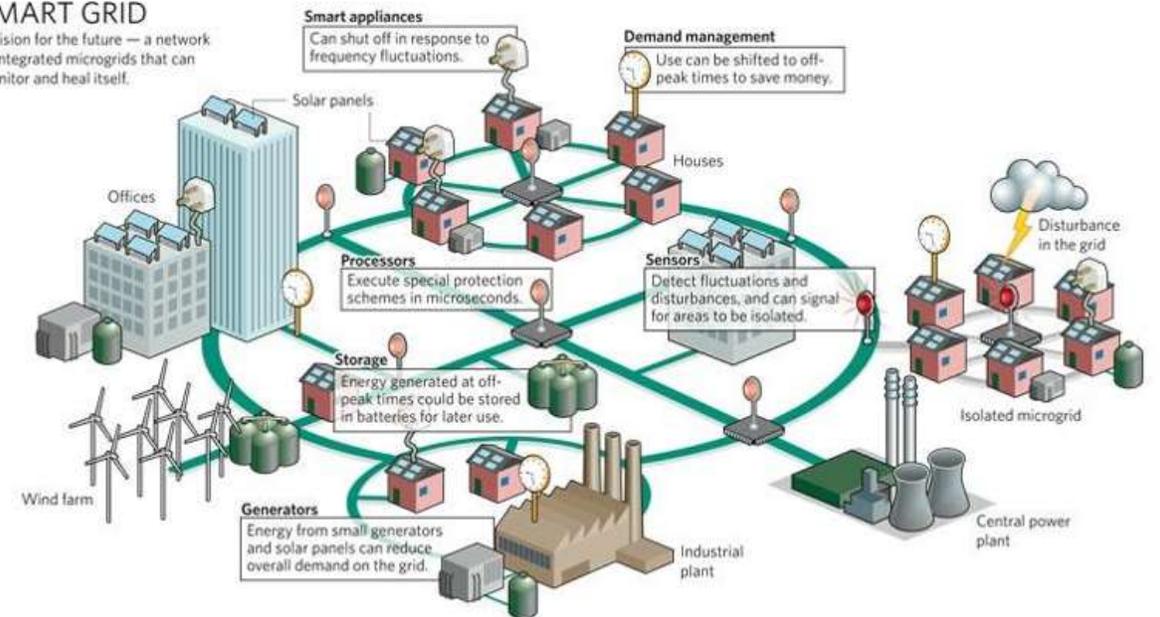
# What is a Smart Grid?

A smart grid is an electricity network allowing devices to **communicate** between suppliers to consumers, allowing them to **manage** demand, **protect** the distribution network, **save** energy and **reduce** costs.



## SMART GRID

A vision for the future — a network of integrated microgrids that can monitor and heal itself.



# Reliability, Resiliency and Hardening

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Reliability – planning for common, frequent events

Resiliency – planning for infrequent, highly critical events

Hardening – changing infrastructure to be less susceptible to damage



# Critical Industries

- Hospitals
- Utilities and Pipelines
- Water and Wastewater Facilities
- Transportation Infrastructure (railroads, mass transit, airports)
- Telecommunications and Data Centers
- Continuous Process Manufacturing
- Financial Industry



# Smart Grid Technologies



# Advanced Metering Infrastructure (AMI)

Smart meters are electric meters that communicate directly with your power company.

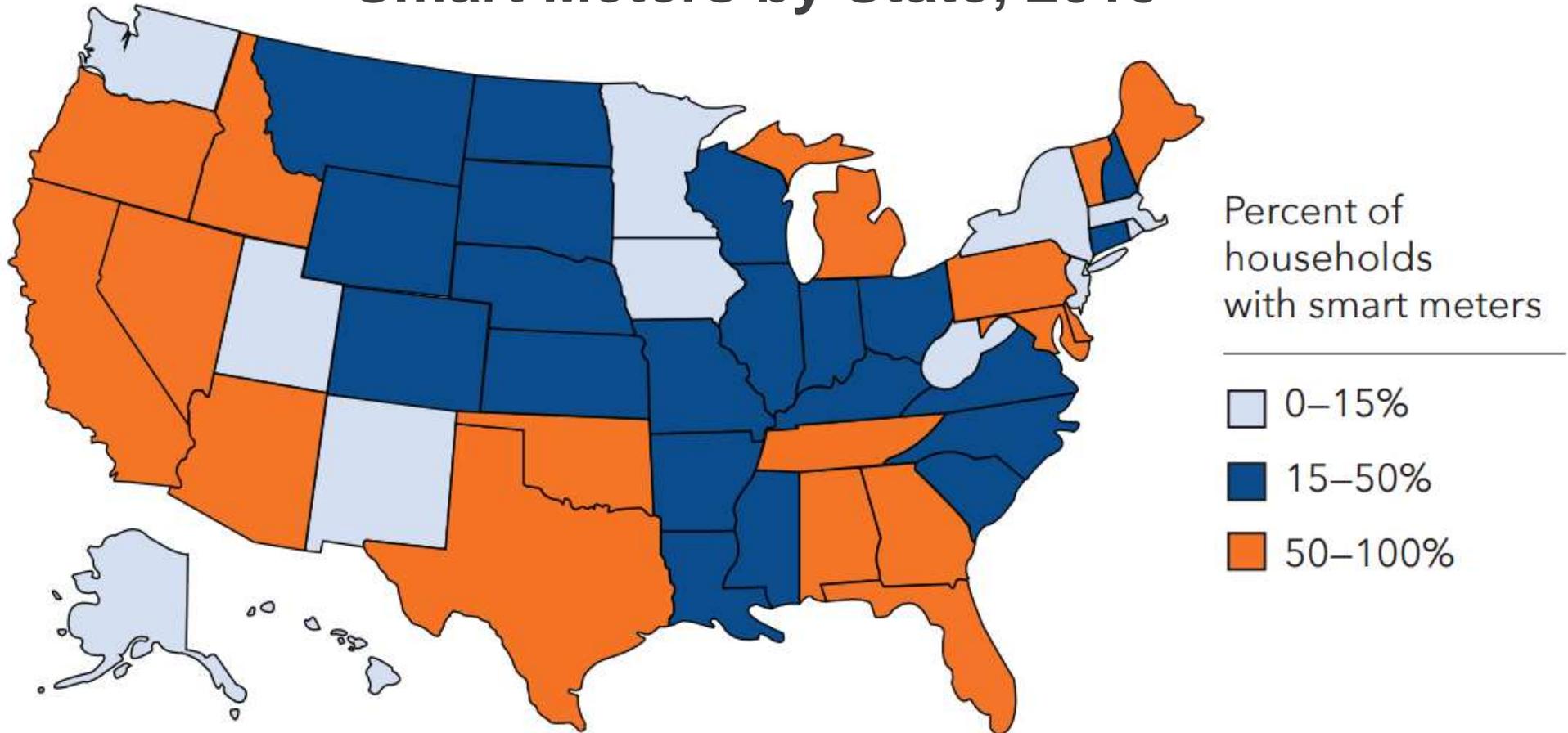
AMI supports the transition to a smart grid by enabling better data collection and analysis.

By improving the quality of meter data and analysis, electric companies can also enhance their customer service and operations.

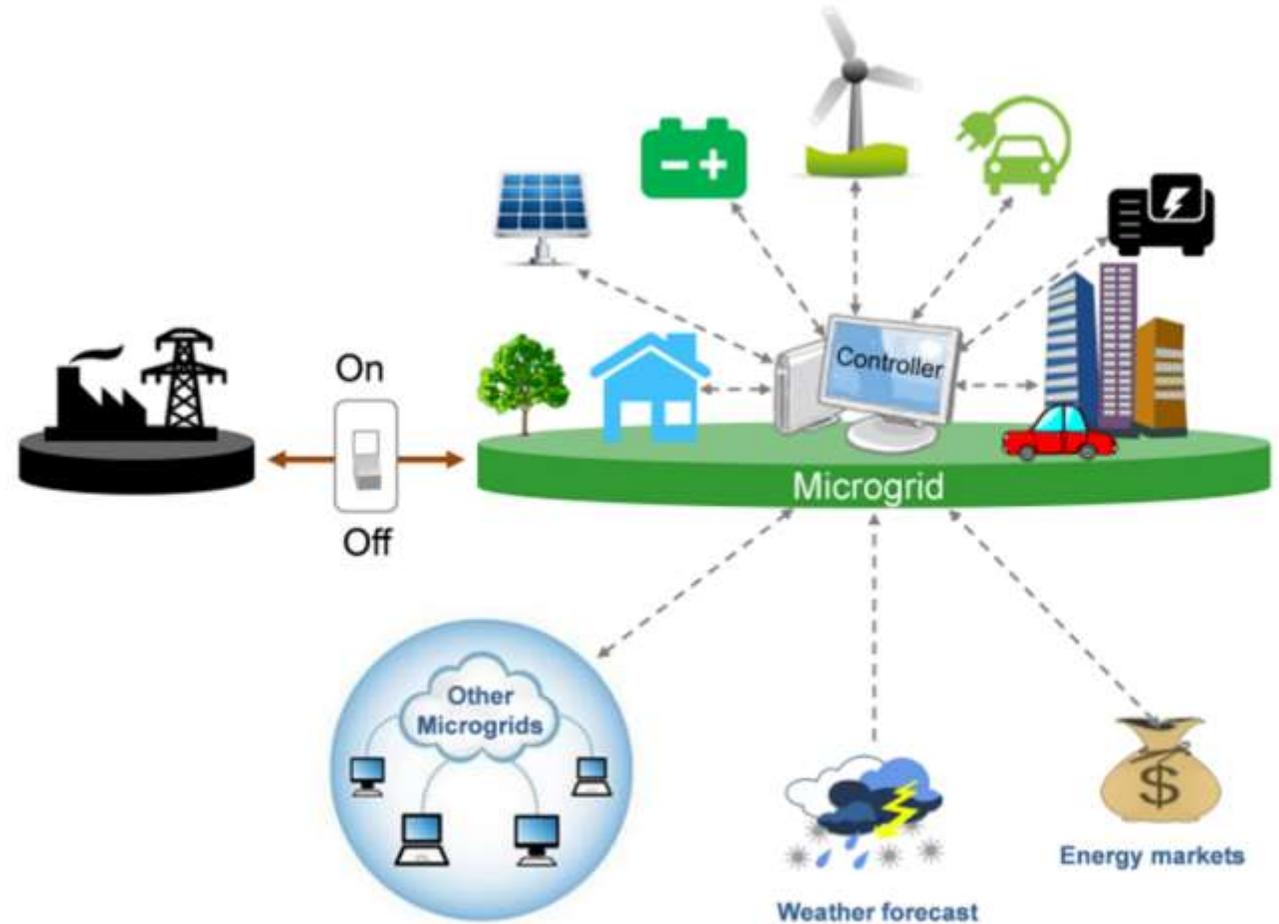


# Smart Meter Infrastructure

## Smart Meters by State, 2015



# Microgrids and Energy Storage



# Renewable Energy Integration

Flexibility and additional capacity will facilitate more renewable energy integration



# The Benefits of a Smart Grid

- Lower power costs for consumers
- More efficient transmission of electricity
- Quicker restoration of electricity after power disturbances
- Reduced peak demand and reduced operations and management costs
- Increased integration of large-scale renewable energy systems
- Better integration of renewable energy
- Improved technology and security



# Heron's Nest Case Study

- Located on Brunswick EMC's system in Shallotte, NC



# Connected Neighborhood



## Some of the features:

- LED Lighting
- Low E-Glass
- Efficient Heat Pumps
- Energy Star Appliances
- ecobee 4 Smart Thermostats
- Smart Water Heaters
- Pre-wired for EV's
- Microgrid Application



# Poll Question

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**What would be your preferred backup power source?**

In-Home Battery Energy Storage

Community Energy Storage System

Backup Gasoline or Propane Generator

I Rarely Lose Power / Have Not Thought About It

# Reed's Crossing Case Study

- Partnership between utility and development: Reed's Crossing
- Described as Resiliency Measures
- Measures align with DR and DERs
  - Smart Thermostats
  - Controllable water heaters
  - Energy Storage ready
  - Solar ready
  - EV ready



MAY 2018  
DESIGN GUIDELINES



# What is Grid Optimization?

## 3 Things (plus some other things)

A. Demand Response

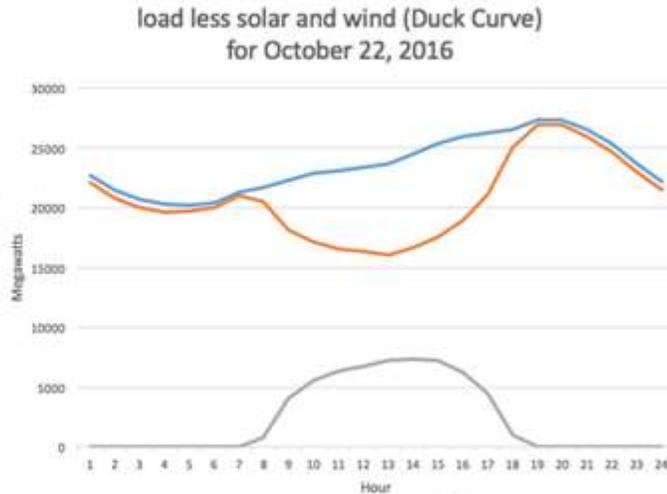
B. Distributed Energy Resources

C. Non-wire Alternatives

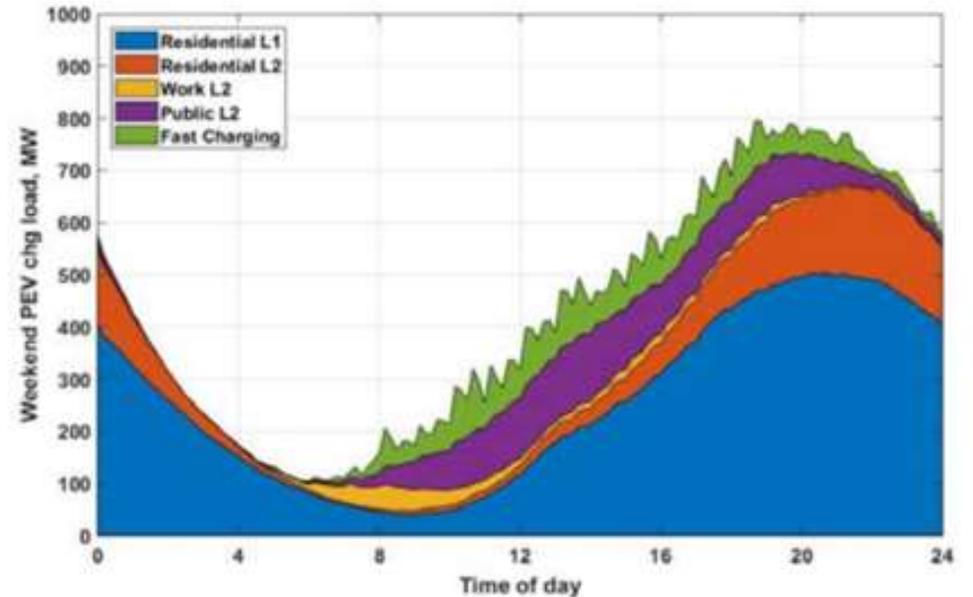
# Which of these are you familiar with?

## What is the duck curve anyway?

- No solar, loads grow throughout day
- Solar production peaks around mid-day
- Impact is a “duck” shaped curve
- Impact to utility generation?



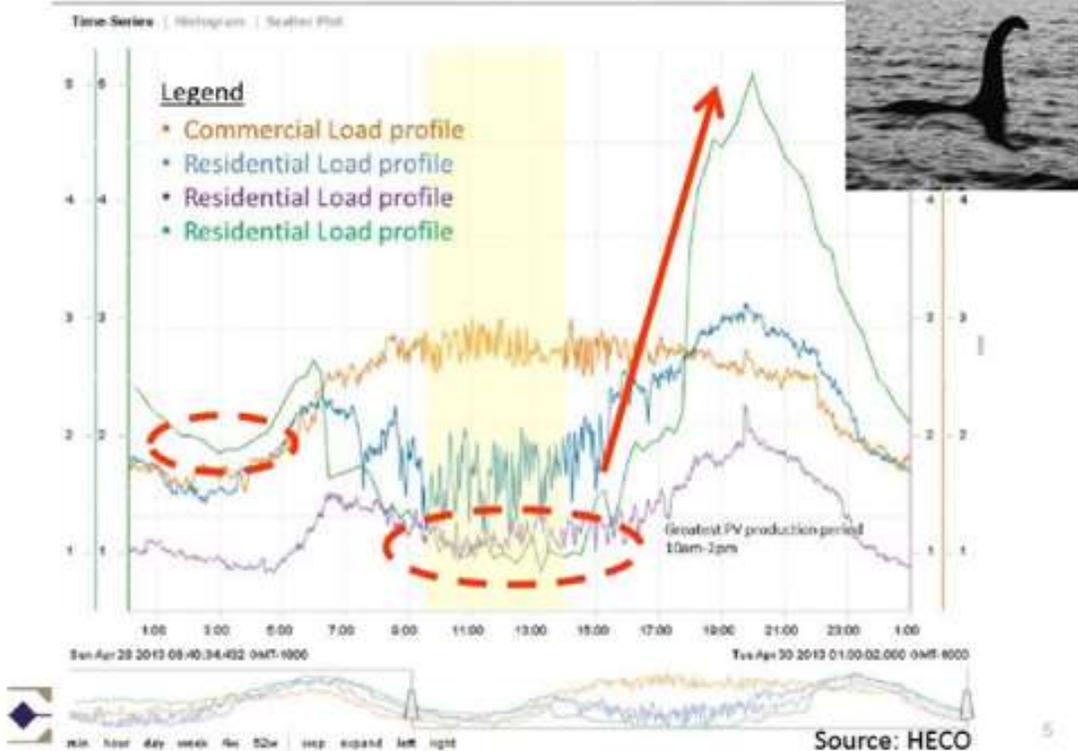
## Dragon Curve



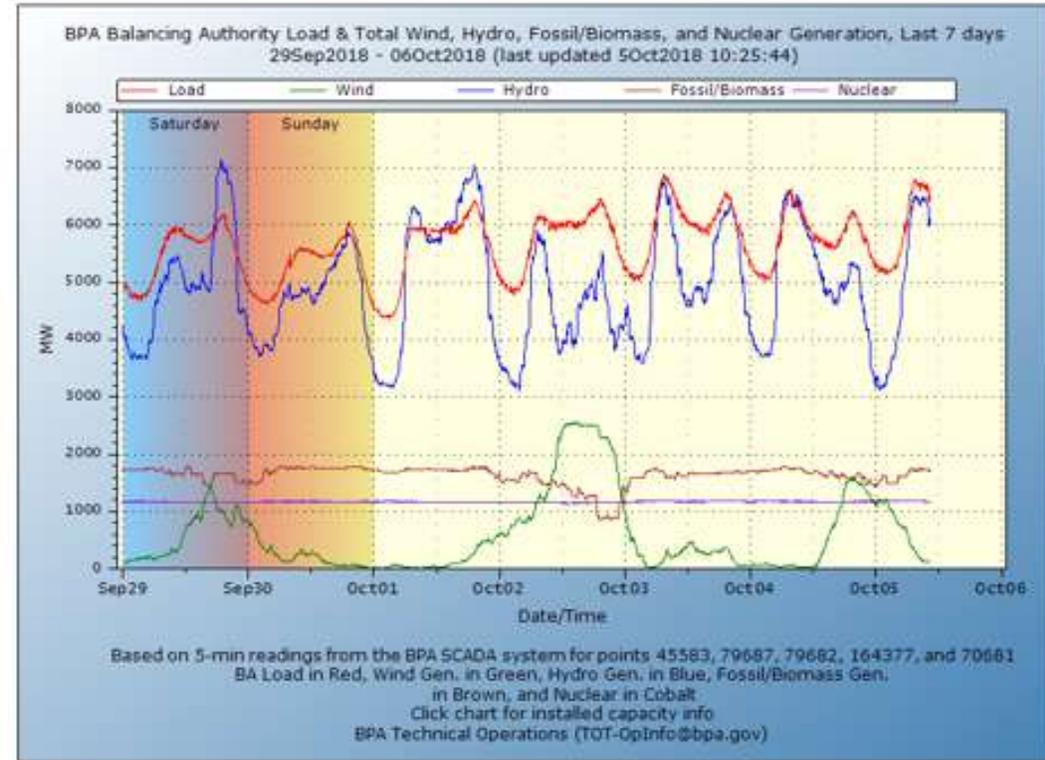
# Which of these are you familiar with?

## Nessie Curve

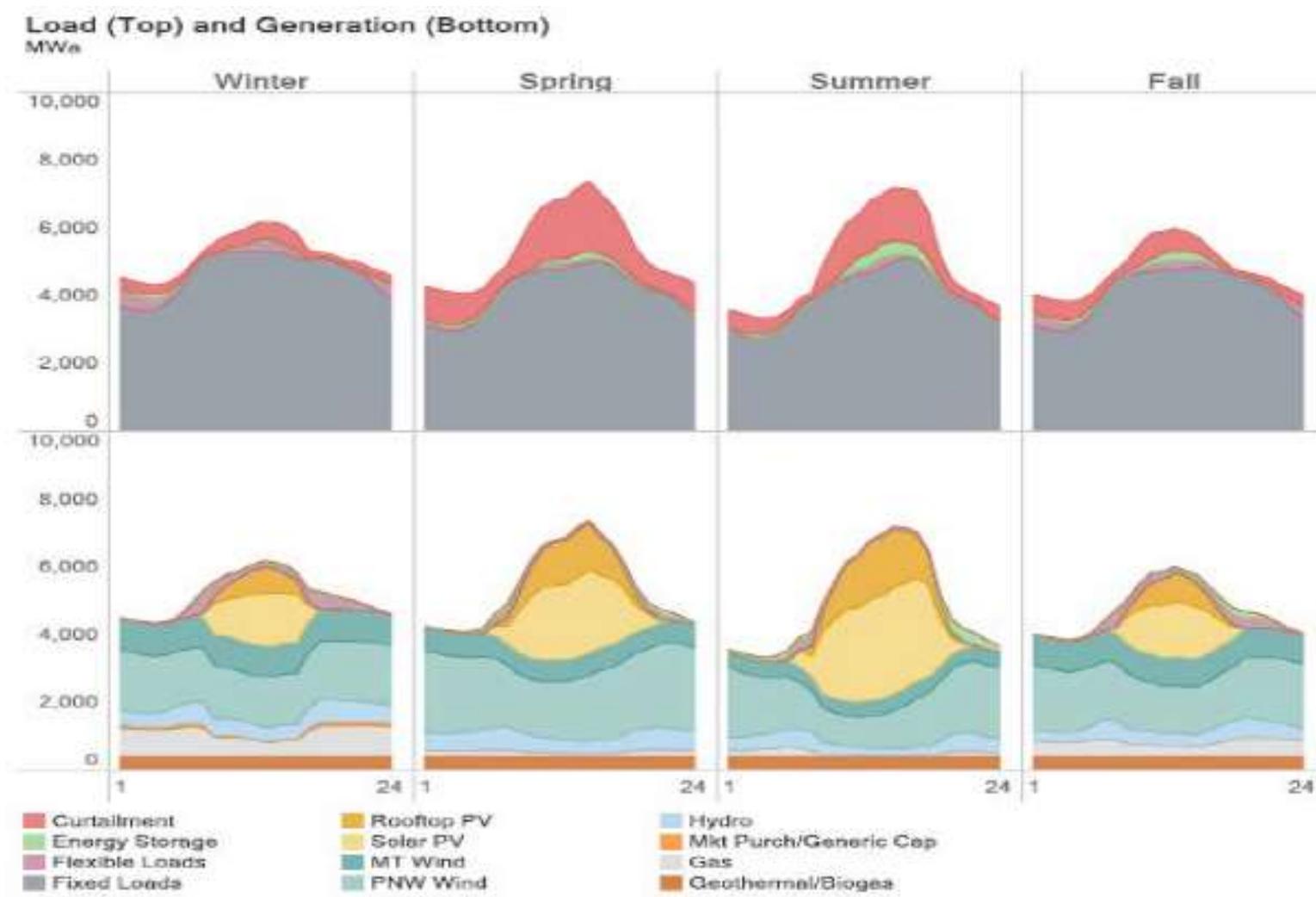
### Trending Hi-Pen Circuits (12kV) – Loch Ness Profile



## Bipolar Camel

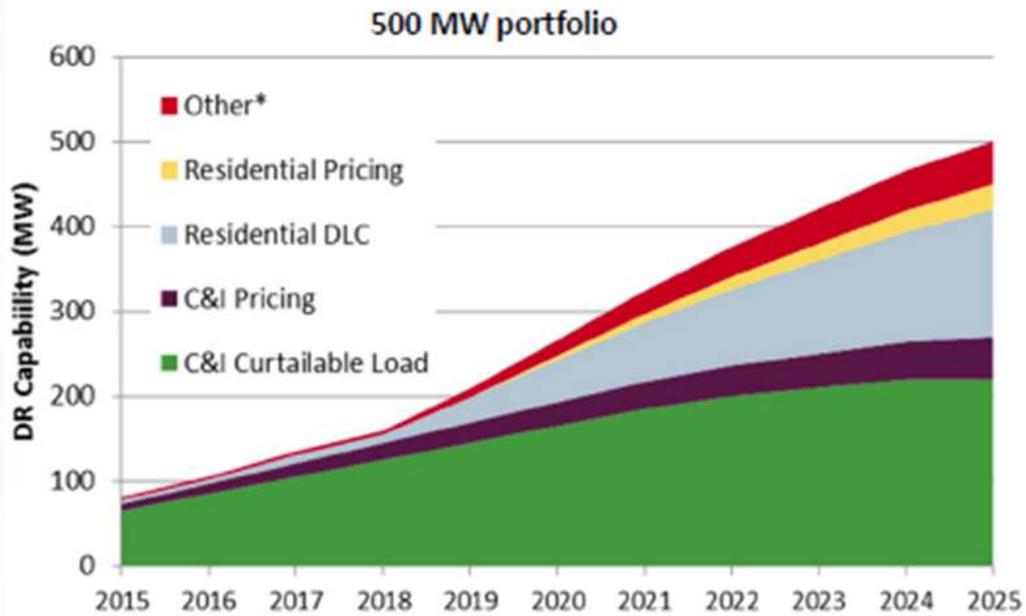


# Flexible load can be available throughout the day



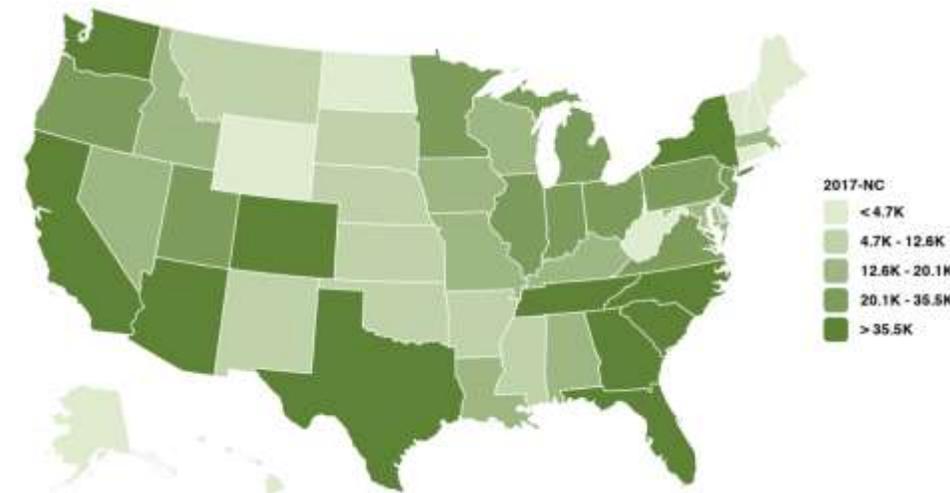
# Is Residential New Construction the Answer?

## DR Growth Trajectory of the Portfolio

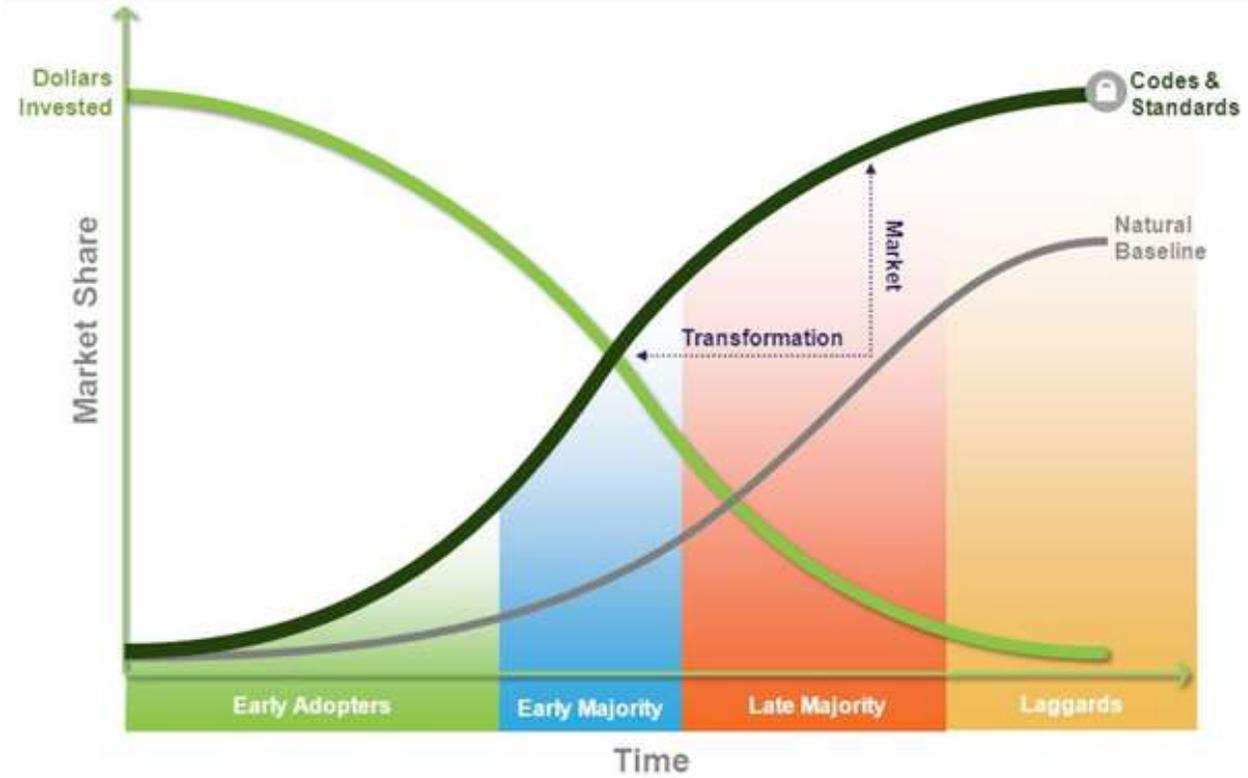
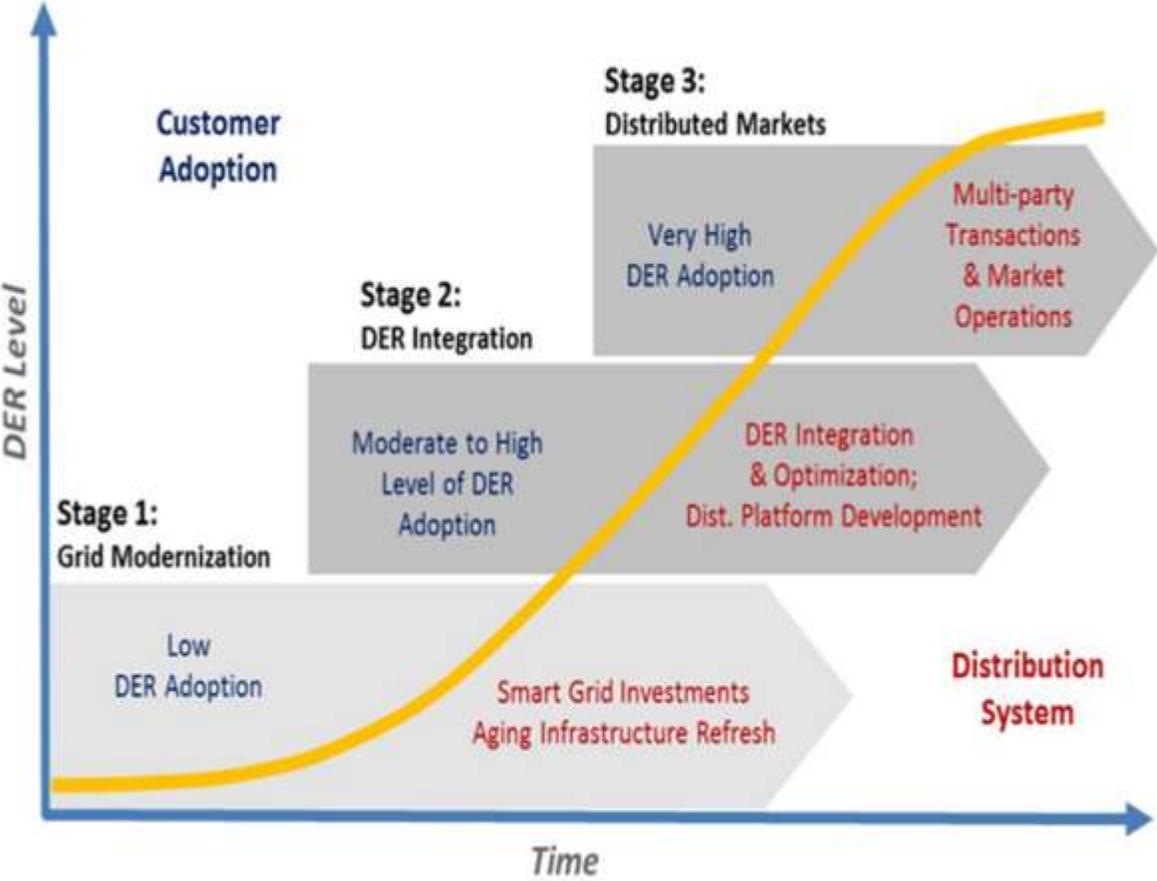


\* Examples of "Other DR" programs include electric vehicles, industry-specific (e.g., agriculture) and generator programs, etc.

- Existing programs continue to grow, or phase out
- Some programs may reach maturity/saturation quickly
- Pricing may be contingent on AMI



# The Consumer Adoption Curve



Credit: Peak Load Management Alliance

Source: NEEA

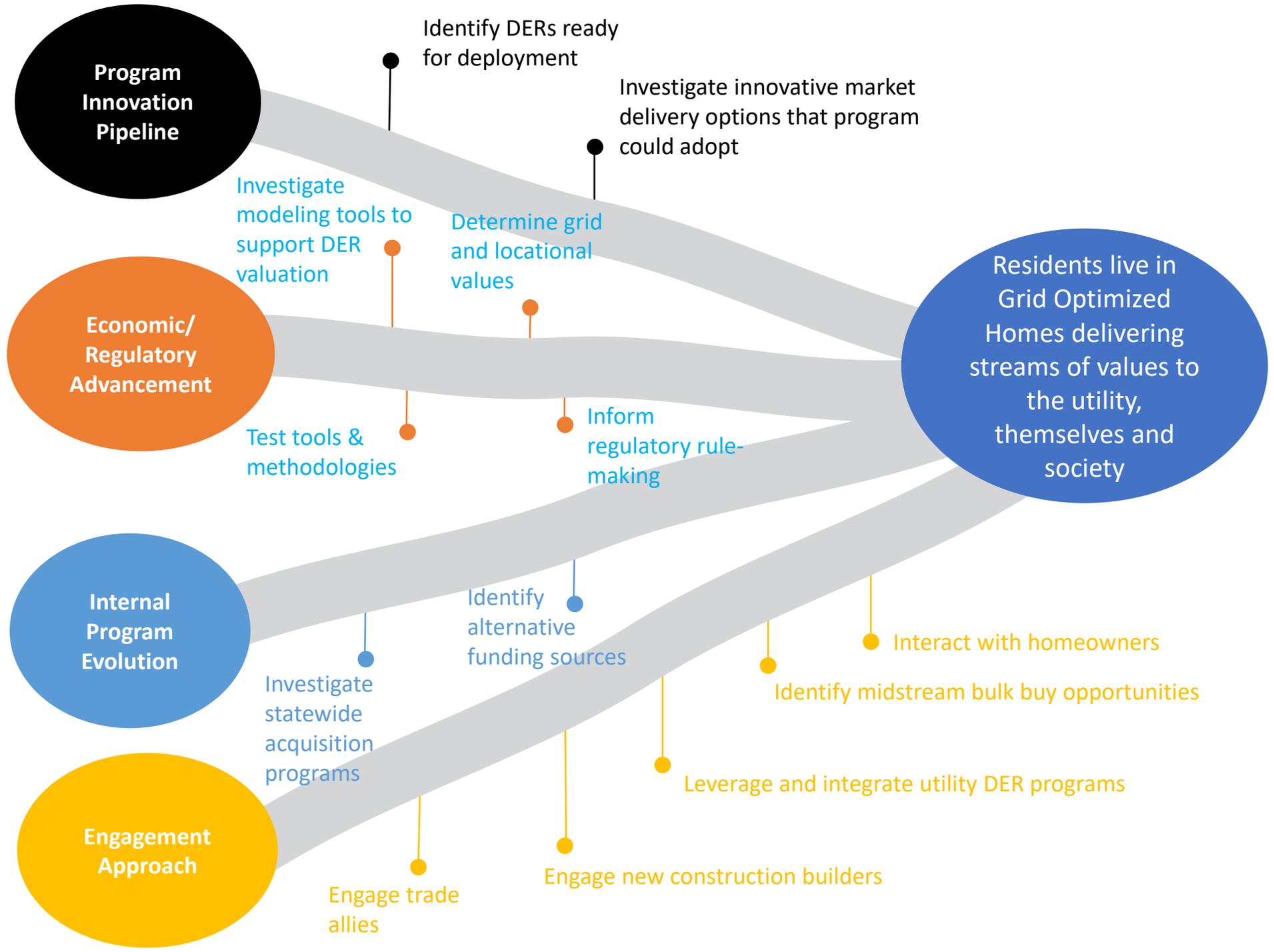
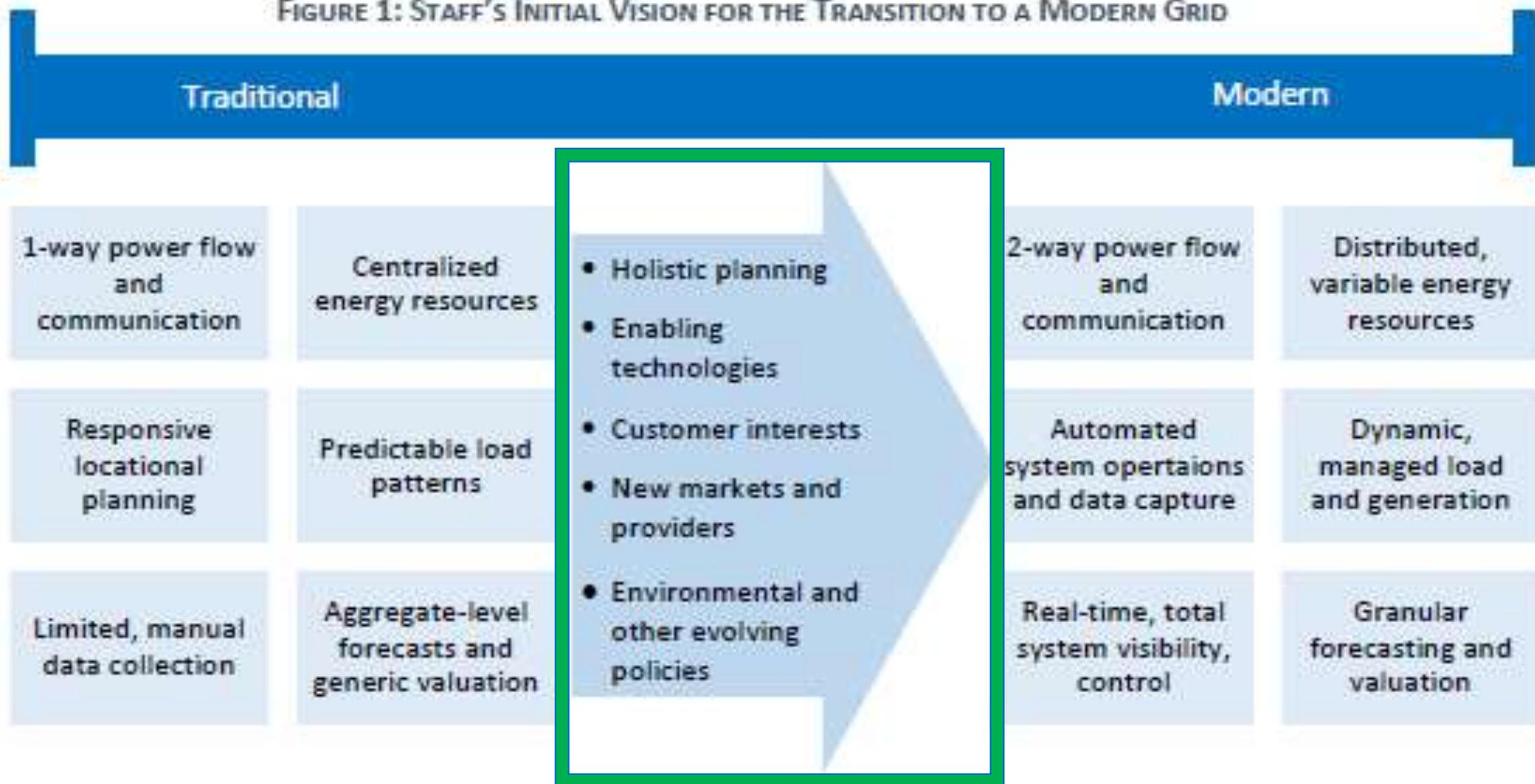
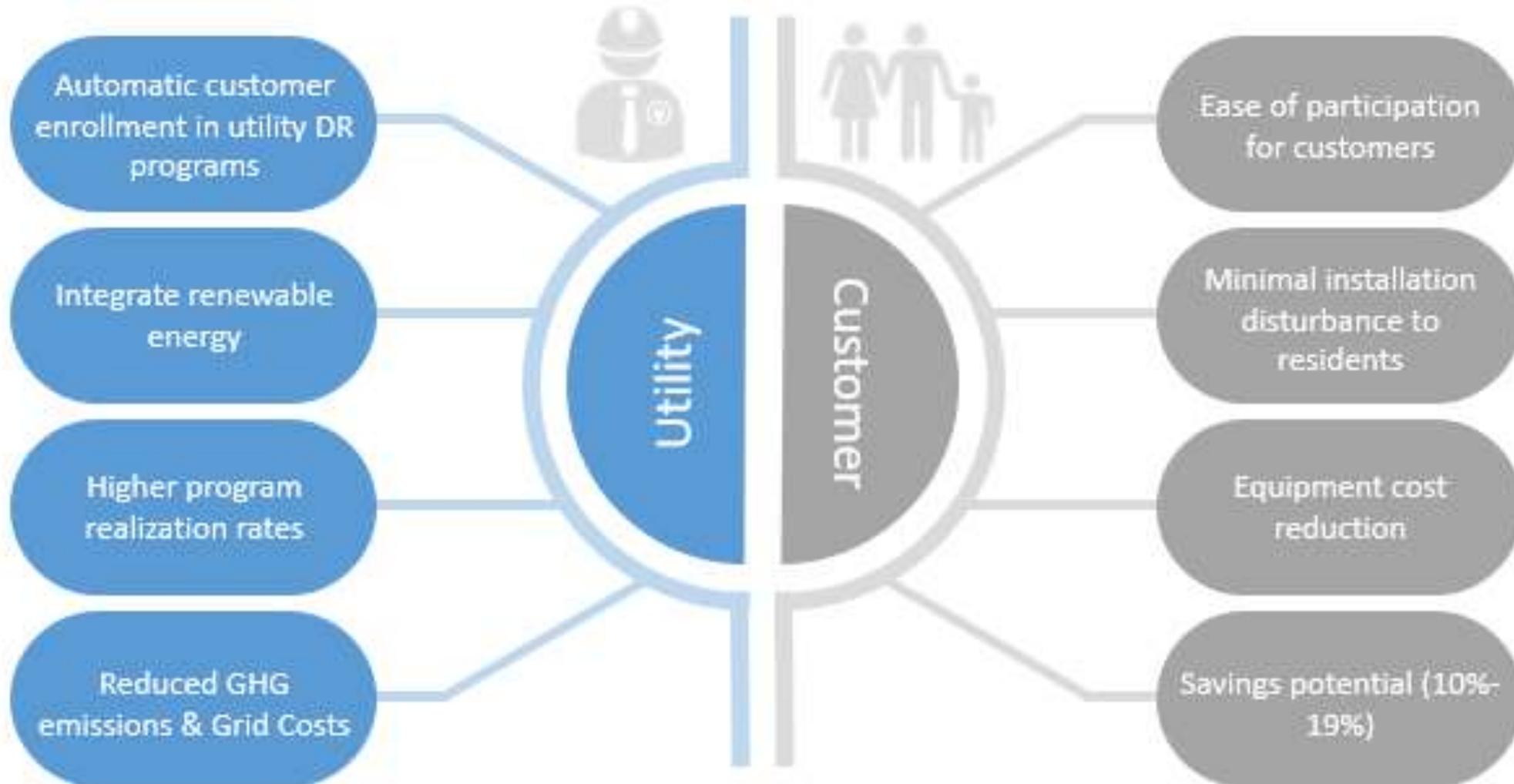


FIGURE 1: STAFF'S INITIAL VISION FOR THE TRANSITION TO A MODERN GRID



*Note: The DSP investigation will provide a clearer understanding of where each utility falls within this continuum.*

# Who Benefits?



# Example Value Propositions

## Value Proposition #1

Low-carb, gluten-free, less-hassle, earth friendly power usage

- Partnering DERs in construction can lead to less reliance on fossil fuel powered peaker generators
- Partners well with Energy Efficiency efforts



## Value Proposition #2

More control and reduced reliance on “the grid/the man”

- Building homes with storage, generation, and complete controls speaks to desire for more control
- App controls for devices, lighting, and appliances control regardless of where you are



# Example Value Propositions

## Value Proposition #3

### Grid and National Energy Security

- Reduce dependence on foreign fuel sources
- Stabilize the reliability of the grid
- The military is pioneering advancements in micro-grids!

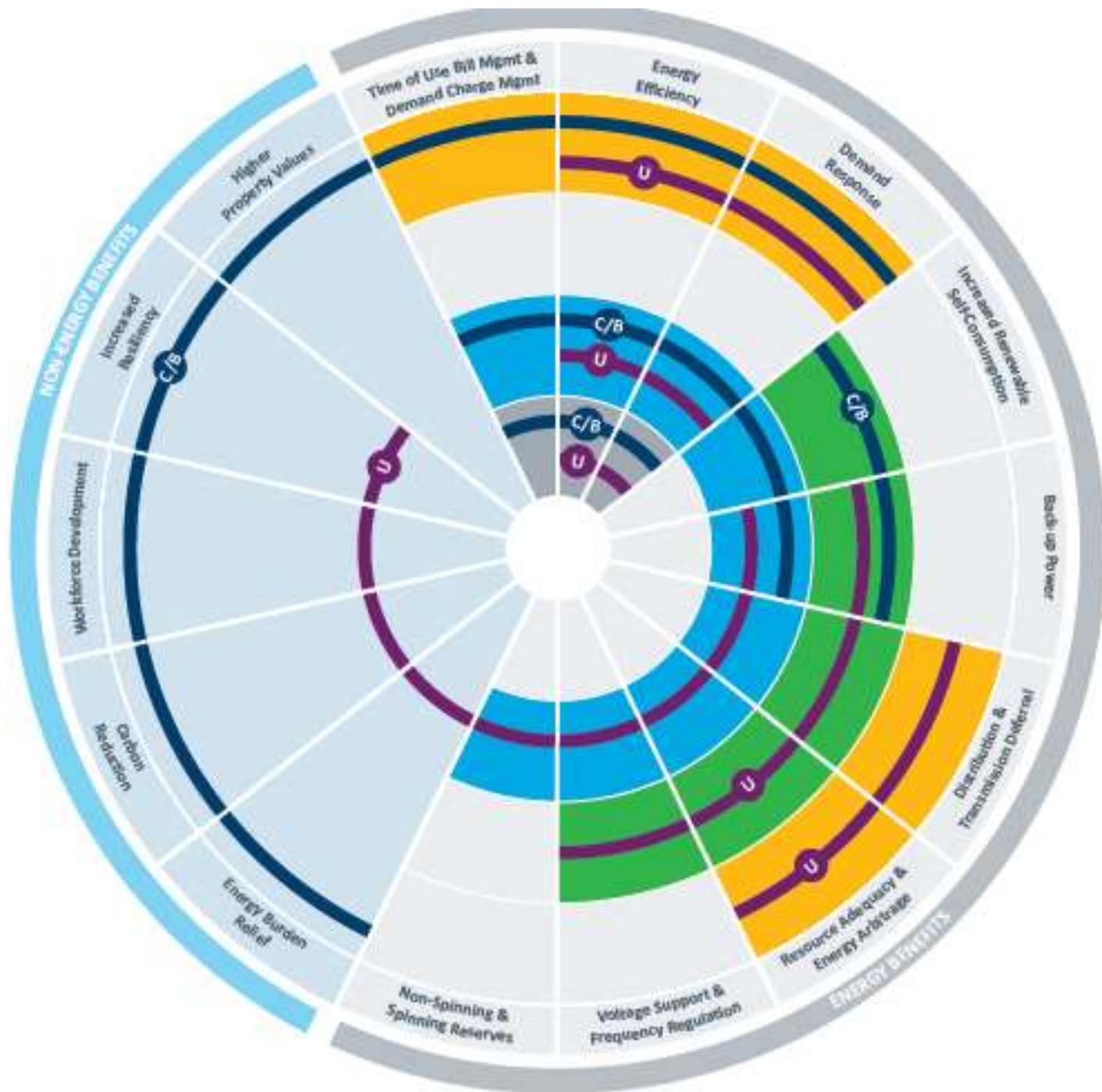


## Value Proposition #4

### Futureproof against code/program changes

- Current reach codes already address these items
- California is already mandating these measures
- States with climate goals or carbon pricing are looking to future codes to help meet goals





Thank You!

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