


The background is a solid green color. Four stylized light bulbs are arranged in a circular pattern. Each bulb is white with a black outline and a black base. The bulbs are positioned at the top, bottom, left, and right, with their bases pointing towards the center. The top and bottom bulbs are slightly tilted, while the left and right bulbs are more upright.

Keeping the Lights On

Leveraging Energy Efficiency for Reliability

ILLUME

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As the need for demand management and reliability increases, how can we extend energy efficiency (EE) portfolios to increase demand impacts and improve reliability?


ILLUME is helping our clients identify and reprioritize their energy efficiency measures to capture greater demand response (DR) benefits.

Whether your customers plan to operate a microgrid, use back-up generation, or continue to rely on the grid, EE can help them have security with less restricted energy resources. If electrification and renewables expand quickly, EE can help add life to existing infrastructure while utilities upgrade their systems.

How?



We address this challenge with a staged approach. We start by understanding the intersection of current and emerging grid constraints, the regulatory environment, and the energy efficiency portfolio mix. From there, we conduct deeper research to narrow dozens or even hundreds of measures down to three to ten viable case studies to test for DR inclusion.

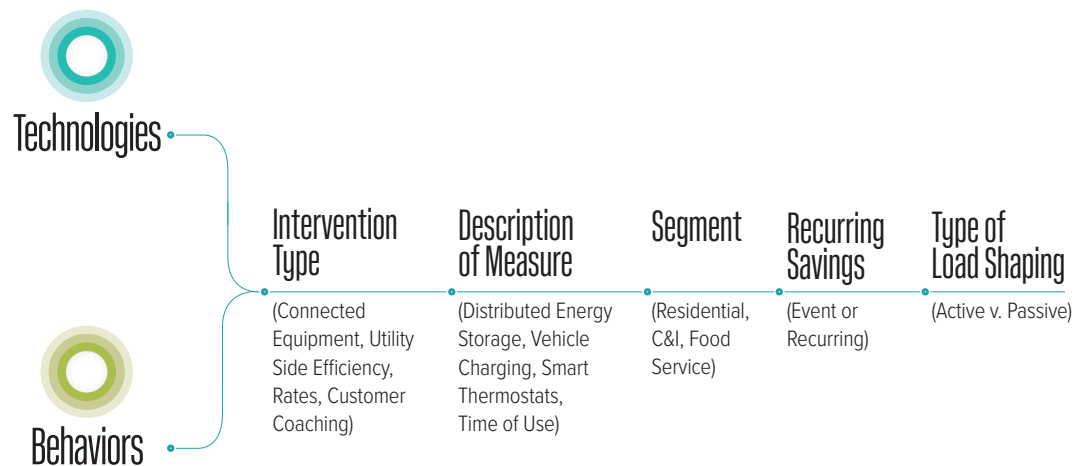


Stage 1: Gather. ILLUME works with our clients to understand current and emerging grid constraints, the regulatory environment, the EE portfolio mix, and other regionally specific contexts. ILLUME uses this background to prioritize measures at the subsequent stages.

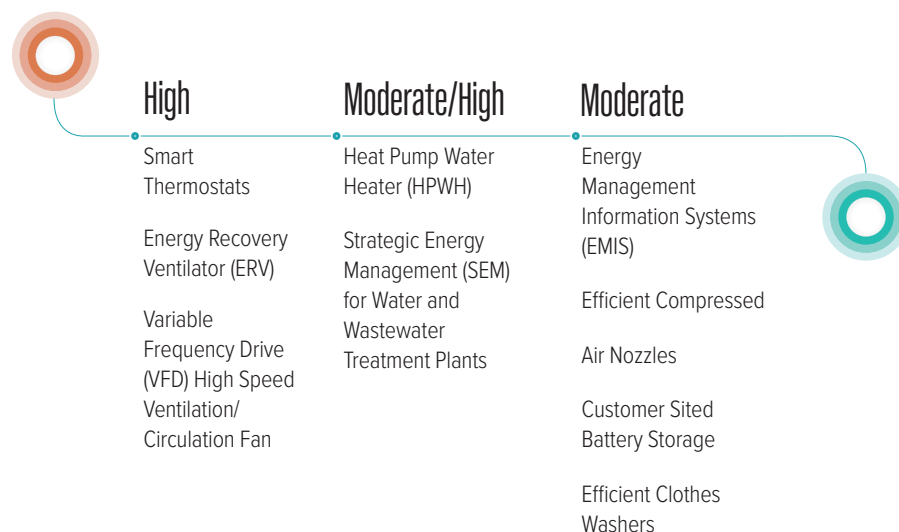
Stage 2: Identify. We then develop an extensive list of measures from the EE portfolio that fit well with the clients' grid constraints, regulatory environment, and other needs. These measures may include emerging technologies like distributed energy storage, behavioral interventions like rate changes, or classic EE measures with ideal savings profiles like heat pumps and energy recovery ventilators.

Then, we collect high level information on each measure to narrow this list of technology and behavioral measures.

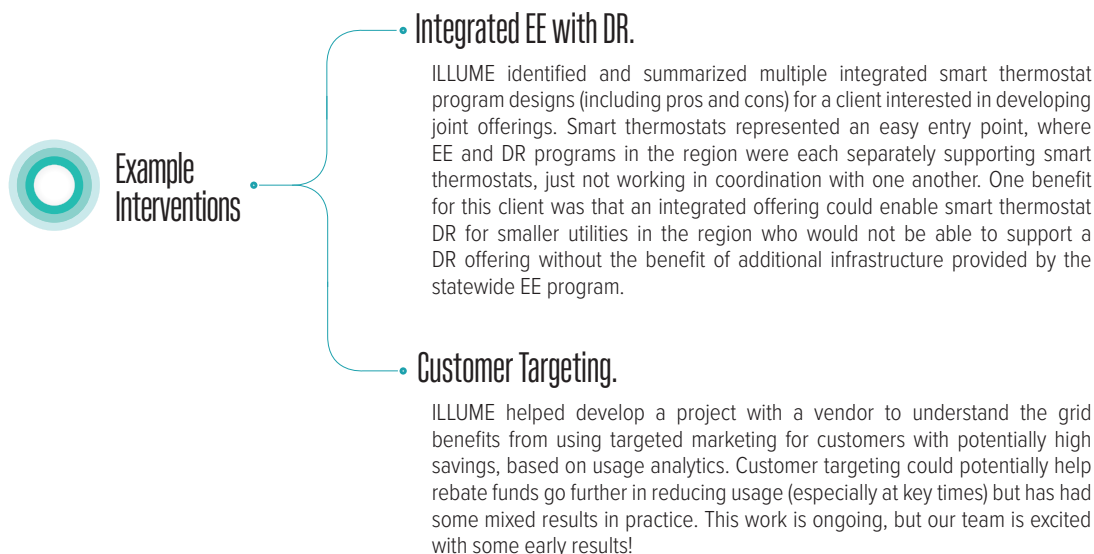
We use criteria such as:



Stage 3: Investigate. After working with the client to identify the top measures from the previous stage, we dig deeper into each measure. Our research at this stage may include reviewing participation data, estimating savings, estimating potential or market size, estimating incremental costs, and researching high level successes and challenges for these measures from secondary sources of information.



Stage 4: Demonstrate. Finally, we work to identify the interventions worth further research. Depending on the client's needs, we may help develop a field demonstration project with a vendor or conduct secondary research on case studies that exemplify a potential path forward for each measure.



Why EE Programs?

What characteristics make energy efficiency measures well suited to prepare against storms, extreme temperatures, and supply and demand imbalances? We sought to answer that question.

Most states' energy efficiency programs were launched in a time when price volatility was creating uncertainty throughout the economy—from urban planning, and investment forecasts, to families' month-to-month finances. Now states are looking at how they can adjust those same programs to support a similar need for reliability in the face of new uncertainties wrought by extreme weather events in a warming climate. As disruptions to the U.S. energy system become more common, new forms of energy generation, transportation, and storage are needed to stave off the worst impacts of climate change. We need better ways to deliver reliable energy services, without disruptions, especially during those times of greatest grid and human vulnerability.

When facing new or evolving challenges, decision makers in large organizations often struggle between creating new task forces or adjusting the mission of existing ones; these challenges are no different. Our take is that the right answer is somewhere in the middle, and success depends on execution. Existing energy efficiency programs already improve reliability and can be adjusted to further manage supply and demand imbalances. Still, there is value in developing targeted demand management and reliability initiatives with their own goals. Ultimately, the test for utilities is whether they can identify the right places to use existing energy efficiency programs to support and scale their demand management and reliability plans.

We already incentivize technology and equipment that does this, so emphasizing reliability only involves small tweaks to priorities and eligibility.

Balancing Tech and Human Needs

Technology



Integrated EE With DR Measures with Savings at Peak Times are Ideal Candidates

- For many energy systems, times of imbalance between supply and demand are driven by heating/cooling end uses and occur during times of high/low temperatures, and typically not during shoulder season.
- Thus, improving the efficiency for heating and cooling loads can directly mitigate supply and demand imbalances in many regions.
- Promising measures include weatherization, HVAC interventions, energy recovery ventilators, and even heat pump water heaters, where water heating loads can vary seasonally.



DR-Ready Appliances are an Easy Path to Success

- The success of smart thermostat DR clearly demonstrates the value in increasing adoption for DR-ready appliances – Bring Your Own Thermostat (BYOT) DR programs can easily ramp up into the thousands and tens of thousands of participants within a few months of launching.
- Other appliances are beginning to follow suit, as ENERGY STAR® now requires DR capabilities for their designation in residential water heaters.¹
- While we saw mass adoption of DR-ready smart thermostats across the U.S., other DR-ready appliances may need more support to achieve similar levels of market penetration, and we see EE programs as being able to play a major role. These programs already have the infrastructure in place to drive the market, with their connections to trade allies/vendors/manufacturers/distributors, their market knowledge, and the processes they have in place to track their success and continually improve.

People



DR Opportunities That Could Benefit from Shared Infrastructure, Market Knowledge, and Connections

- Energy experts are actively working on cost-effectiveness tests for DR, which might not yet appropriately value DR for all its benefits, including reliability.
- In the meantime, EE programs can identify DR offerings that may not be able to launch without the support of shared EE infrastructure.
- For example, statewide EE programs can support smaller utilities to launch smart thermostat DR by aligning themselves for easily integrating EE/DR offerings with the various DR providers in the region. They may be able to share the same implementers, websites, evaluators, and other infrastructure. Similarly, for Strategic Energy Management (SEM) programs, participants may be interested to leverage the SEM EE infrastructure and existing relationships for support with their demand charges, which could alleviate supply and demand imbalances.
- Some of the key infrastructure to consider for supporting these DR opportunities includes:
 - Relationships:** vendor, implementer, evaluator, research team, manufacturer, retailer, distributor, and trade-ally networks
 - Approaches/process:** reporting timelines, stakeholder groups and meeting schedules, Technical Reference Manuals (TRMs), approved methods for balancing rigor/cost
 - Market knowledge:** what types of offerings have/haven't worked, who is buying what appliances

The Takeaway

When facing new or evolving challenges, decision makers in large organizations often struggle between creating new task forces or adjusting the mission of existing ones; these challenges are no different. Our take is that the right answer is somewhere in the middle, and success depends on execution. Existing energy efficiency programs already improve reliability and can be adjusted to further manage supply and demand imbalances. Still, there is value in developing new demand management and reliability initiatives with their own goals.

While traditional EE programs help manage peak demand and support reliability through efficiency measures, there is a larger role for EE programs to mitigate future demand to the benefit of customers and the utility. These programs possess the infrastructure and market knowledge to prioritize technologies, drive adoption, and monitor progress which makes them well suited to administer these directives. Through targeted research, utilities and program administrators can uncover a wealth of knowledge to further assess strategies for enhancing programs. Ultimately, the test for utilities is whether they can identify the right places to use existing energy efficiency programs to support and scale their demand management and reliability plans.

1. "Program Requirements for Residential Water Heaters," ENERGY STAR, 2021. https://www.energystar.gov/sites/default/files/ENERGY%20STAR%20Version%204.0%20Water%20Heaters%20Final%20Specification%20and%20Partner%20Commitments_0.pdf.

