

# Demand Response, Smart Grid, & Energy Efficiency

## Questions & Answers

### WHAT IS DEMAND RESPONSE?

Demand response refers to the policy and business area whereby electricity customers reduce or shift their electricity use during peak demand periods in response to “price signals” or other types of incentives. At present, the vast majority of electricity customers are on flat, average rates that do not vary by time of day or season, no matter how much the cost to generate or deliver electricity fluctuates as demands on the system rise and fall. Flat rates combined with the growth in the use of air conditioning—one of the highest demands during peak periods—has led to peak power demand growing faster than overall growth in electricity consumption. Rising peak demand is straining the electricity system and threatening the reliability of the power grid. It is also adding costs that all customers pay one way or the other, while leading to increased emissions.

### HOW IS DEMAND RESPONSE DIFFERENT FROM ENERGY EFFICIENCY?

Energy efficiency usually refers to devices or practices that provide the same level of output or benefit by using less energy. Energy efficiency usually focuses on reducing overall energy use, not just at certain times. Demand response improves the overall efficiency of the electricity system (including transmission and distribution) but differs from traditional energy efficiency in that it is more dynamic and controllable, meaning that it can be “dispatched” to meet rising demand in lieu of turning on a power plant. Demand response focuses primarily on reducing use during the peak period, and involves providing customers with price signals or time-based incentives to encourage them to reduce their peak use. Demand response can react to conditions in the market or to threats to system reliability (e.g., blackouts).

### WHY IS IT IMPORTANT TO ADDRESS PEAK ELECTRICITY USE?

To meet the high demand during peak periods utilities and grid operators often start up power plants that are older, less efficient, more expensive and often less clean. The result is higher prices for power and more emissions. Demand response reduces peak demand and the need to use these plants. Over time it can be used to permanently avoid new plants.

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## WHAT TECHNOLOGIES ARE USED IN DEMAND RESPONSE ACTIVITIES?

Demand response technologies are by definition smart grid technologies. They include products or services that help in the active monitoring and dynamic control of electricity usage. Smart meters are one of the most well known examples. Such meters allow measurement in time intervals, which is necessary to send time-based price signals to customers that encourage them to reduce and shift usage. The meters and other technologies also allow new and better information to be generated and used by both the customer and electricity providers. This information can be presented to customers via in-home display devices, which help customers track and better understand their electricity usage. Other technologies include smart thermostats, energy management systems, dynamic lighting controls and dynamic energy storage systems.

## DOES DEMAND RESPONSE HAVE DIFFERENT BARRIERS THAN ENERGY EFFICIENCY?

Yes. While energy efficiency can benefit from certain policy changes, such changes are not necessary for customers to be able to buy energy efficient items and begin implementing energy efficiency practices. Demand response is different, requiring regulators to approve technology investments by utilities (e.g., smart meters) and also approve the introduction of time-based pricing and other time-based incentives.

## DOES DEMAND RESPONSE JUST SHIFT USAGE OR DOES IT DECREASE IT OVERALL?

While demand response by design reduces consumption during peak times, that usage does not always “rebound” at other times of day, and there is usually a net reduction of kWh. For example, reducing lighting in commercial buildings during peak times doesn’t result in the same area being “over-lit” in the off-peak period.

## DOES DEMAND RESPONSE HELP INCREASE ENERGY EFFICIENCY ACTIONS BY CUSTOMERS?

Yes. Demand response not only reduces demand on the grid during peak periods but in almost all cases produces a “conservation effect” that lowers overall electricity consumption, i.e. the amount that is reduced on peak is not replaced in the off-peak period. This total reduction averages around 4%, but can range upwards of 11%. The information feedback and price signals that demand response and its technologies provide have also been shown to lead to consumers becoming more energy efficient overall in their use of electricity. Thus, the deployment of demand response and smart grid technologies can lead to higher and more sustainable levels of energy efficiency and lower greenhouse gas emissions. A smart meter is a green meter in that it serves as a platform for a new era of greater overall energy efficiency.

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