

# Demand Response, Smart Grid, and Climate Change

## 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 also is adding costs that all customers pay one way or the other, while leading to increased emissions.

### WHAT TECHNOLOGIES ARE USED IN DEMAND RESPONSE ACTIVITIES?

Demand response technologies are by definition smart grid technologies. They include any 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 essential to being able to send time-based price signals to customers that encourage them to shift usage from one period to another. 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.

### HOW DOES DEMAND RESPONSE ADDRESS CLIMATE CHANGE?

Demand response and smart grid technologies address climate change by increasing energy efficiency and use of renewable energy—the accepted cornerstones of climate change mitigation—and by helping to support the effective administration of climate change policy and regulation.

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## HOW DOES DEMAND RESPONSE INCREASE ENERGY EFFICIENCY?

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 can serve as a platform for a new era of greater overall energy efficiency.

## HOW DOES DEMAND RESPONSE SUPPORT GREATER USE OF RENEWABLE ENERGY?

Demand response can enable greater use of renewable energy. But many renewable energy resources are intermittent or only available off-peak. For example, much of the wind energy resource in the country is not available during the peak period of the day. Demand response is specifically designed to manage and reduce demand during peak periods, including via dynamic energy storage, making it an ideal complement to wind and other intermittent resources and allowing it to help support the increased deployment of renewable energy. It also can serve to meet unexpected needs on the grid when renewable resources that are normally available suddenly become unavailable. This was the case in the State of Texas in March of 2008, when an expected contribution from wind suddenly was not available and demand response had to be dispatched to prevent a large scale blackout.

## HOW DOES DEMAND RESPONSE SUPPORT THE ADMINISTRATION OF CLIMATE CHANGE POLICY AND REGULATIONS?

Climate change regulation will become increasingly dependent on the ability to verify and validate reductions in energy consumption. For example, the awarding of tradable “carbon allowances” for reductions in energy use requires the ability to measure those reductions precisely and reliably. Smart meters and other smart grid technologies that enable demand response are designed with this ability, and they can provide the infrastructure that will support the implementation of responsible climate change policy.

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DRSG Coalition

1615 M Street, NW, Suite 900

Washington, DC 200036

[www.drsgcoalition.org](http://www.drsgcoalition.org)