

INTELLIGENT EFFICIENCY: ACHIEVING CLEAN POWER PLAN GOALS



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Energy efficiency is a critical component of the proposed Clean Power Plan. It offers states a least-cost pathway for reducing carbon dioxide emissions from the power sector. This factsheet provides an overview of the potential contributions from information and communications technology (ICT) solutions under the proposed rule, based on efforts already underway and in development.

Energy efficiency is the least-cost way for a state to meet its carbon reduction goals under the proposed Clean Power Plan. States are expected to include energy efficiency programs in their implementation plans that can reduce electricity end-use, minimizing cost impacts to all classes of consumers, including households, businesses, industry, and government.

Recent studies have suggested that the use of intelligent efficiency—a systems-based approach to energy efficiency that is enabled through the networking of efficient devices and sensors to facilitate more dynamic energy management—could reduce U.S. energy use 12 to 22 percent by 2020. Implementing these ICT solutions can significantly reduce energy use across many economic sectors while only marginally increasing direct energy use from the ICT sector.

Intelligent efficiency can help cities, states, businesses, and federal agencies be more sustainable while enhancing productivity. Yet ICT solutions face slow adoption due to such barriers as a lack of funding for investments, split incentives between multiple parties, and entrenched habits or organizational patterns. States and cities can play an active role in advancing the deployment of intelligent efficiency, especially through the Clean Power Plan.

EXAMPLES OF INTELLIGENT EFFICIENCY ACROSS THE POWER SUPPLY CHAIN

Many states and municipalities are already using ICT solutions to improve efficiency and reduce emissions in:

- **Generation:** A combination of ICT solutions can increase the operational efficiency of power plants. Ravenswood, one of New York City's largest power plants, optimized operations using new technologies and increased output 5 percent using the same amount of fuel.
- **Transmission:** A combination of ICT solutions can improve the grid's ability to handle more intermittent generation from renewables and distributed generation while improving reliability. The Hawaiian Electric Company addressed overload and reliability concerns in East Oahu by installing an intelligent substation that can cut outages from several hours to a few minutes.
- **Distribution:** An integrated system of smart meters, communication networks, and data management systems (also known as advanced metering infrastructure) can improve energy efficiency and expand deployment of demand response. After installing 250,000 smart meters and implementing conservation voltage reduction solutions, Dominion Virginia has reduced annual energy consumption 3 percent.
- **Industrial end use:** Advanced controls for industrial processes can minimize energy use while increasing plant capacity. Ann Arbor Municipal Water Treatment Plant deployed advanced controls and monitors to track real-time energy use and cut energy usage up to 10 percent.
- **Commercial buildings:** Energy management systems can increase the energy efficiency of com-

Intelligent Efficiency across the Power Supply Chain

GENERATION

Generation optimization
Renewable integration
Distributed generation
Microgrids

TRANSMISSION & DISTRIBUTION

Grid optimization
Reliability & demand forecasting
Asset monitoring
Energy management systems

END-USE CONSUMERS

Smart meters
Building energy management systems
Smart appliances
Smart manufacturing equipment



mercial buildings. Rudin Management, one of the largest privately-owned real estate companies in New York, developed a smart building management system that cut energy use 7 percent for one building, and plans to deploy the system to its other buildings.

- **Home energy management:** While pioneered for large buildings, energy management systems for the home are gaining in popularity. Three recent studies found Nest smart thermostats could reduce consumer electricity bills by about 15 percent by using less energy and better scheduling when energy is consumed.
- **Street lights:** Cities have turned to light emitting diodes (LEDs) with controls to reduce energy consumption and maintenance requirements. Los Angeles has replaced 160,000 existing streetlight fixtures, reducing electricity use by more than 60 percent.
- **Data centers and cloud computing:** Increased deployment of ICT solutions would require more back-end computing power, resulting in a marginal increase in direct energy use in the ICT sector. While this marginal increase is offset by the significant reductions across the rest of the economy, the ICT sector could further reduce emissions by shifting to large-scale, energy-efficient data centers. A C2ES case study found shifting from a traditional server environment to more efficient cloud computing could reduce energy consumption by at least 85 percent.

ADVANCING INTELLIGENT EFFICIENCY

States have already taken steps to promote energy efficiency. Twenty-one states have established mandatory long-term energy savings targets through an energy efficiency resource standard, and five other states have a non-mandatory energy savings goal. These states rely on measurement and evaluation protocols to quantify the energy savings from a wide range of traditional energy efficiency measures. To help realize the full potential of ICT solutions, energy efficiency groups, state officials, and businesses are developing measurement and evaluation protocols for intelligent efficiency to quantify its impact.

As a “first choice fuel,” energy efficiency programs are expected to be universally adopted by states implementing the Clean Power Plan. ICT solutions existing today can play a critical role in helping states cost-effectively reduce carbon dioxide emissions from generators, optimize and increase the efficiency of the power grid, and reduce energy use from the residential, commercial, and industrial sectors. ICT solutions are also vital in evaluating, monitoring, and verifying energy savings. States and cities should look for ways to promote intelligent efficiency between and across sectors.



The Center for Climate and Energy Solutions (C2ES) is an independent nonprofit organization working to promote practical, effective policies and actions to address the twin challenges of energy and climate change.