

End-use Energy Efficiency and the Clean Power Plan

**Physicians for Social
Responsibility
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Clean Power Plan and End-use Energy Efficiency

- End-use EE is a major component of the CPP
- EE can be used to meet 100% of CPP compliance through projects from utilities and states
- With a massive capacity and ready technology, EE is often the lower-cost compliance option



Why the CPP is a Health Issue

- Carbon emissions increase climate change
- Climate change lead to increased:
 - Heat-related illness, especially in urban areas
 - Deaths and damage from extreme weather events
 - Air pollution, thus lung damage, allergies, and asthma
 - Waterborne and vector-borne diseases
 - Agricultural losses and food insecurity

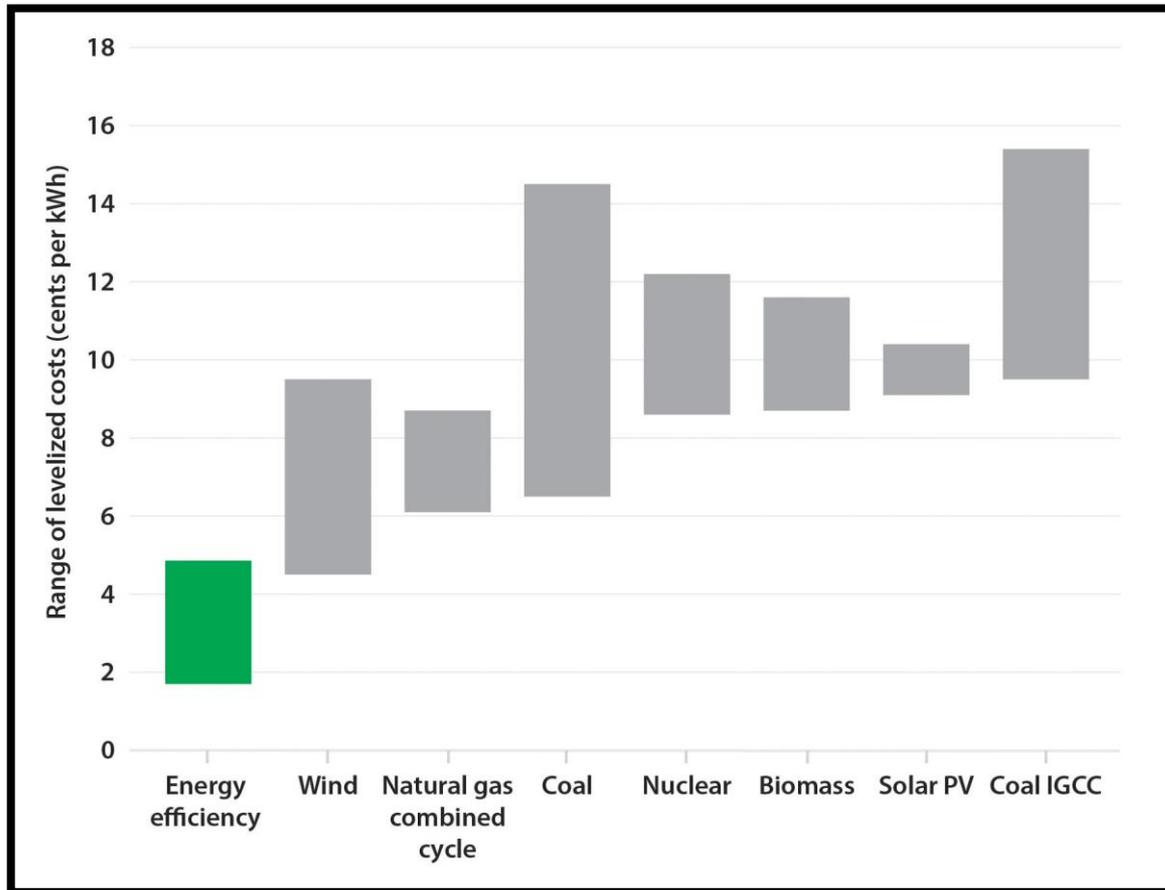


The Most Affordable Way to Combat Climate Change

- Energy efficiency is often the cheapest and most readily available way to reduce GHGs
- Each dollar invested in energy efficiency by utilities results in \$1.24 to \$4.00 in returns
- By 2030, households are estimated to save \$80 per year from the Clean Power Plan's energy efficiency investments



Energy Efficiency: Most-economical Option



Source: ACEEE

Key Terms

This presentation focuses on end-use energy efficiency and the CPP, rather than the efficiency programs for power plants in the CPP.

- End-use efficiency – more efficient use of energy by consumers after it is distributed
- Energy efficiency – same service for less energy
- Energy conservation – using less energy
- Demand-response – mechanisms such as time-of-use pricing to incentivize consumer behavior
- Demand-side management – encompasses efficiency, conservation, and demand-response to pay consumers to reduce energy usage

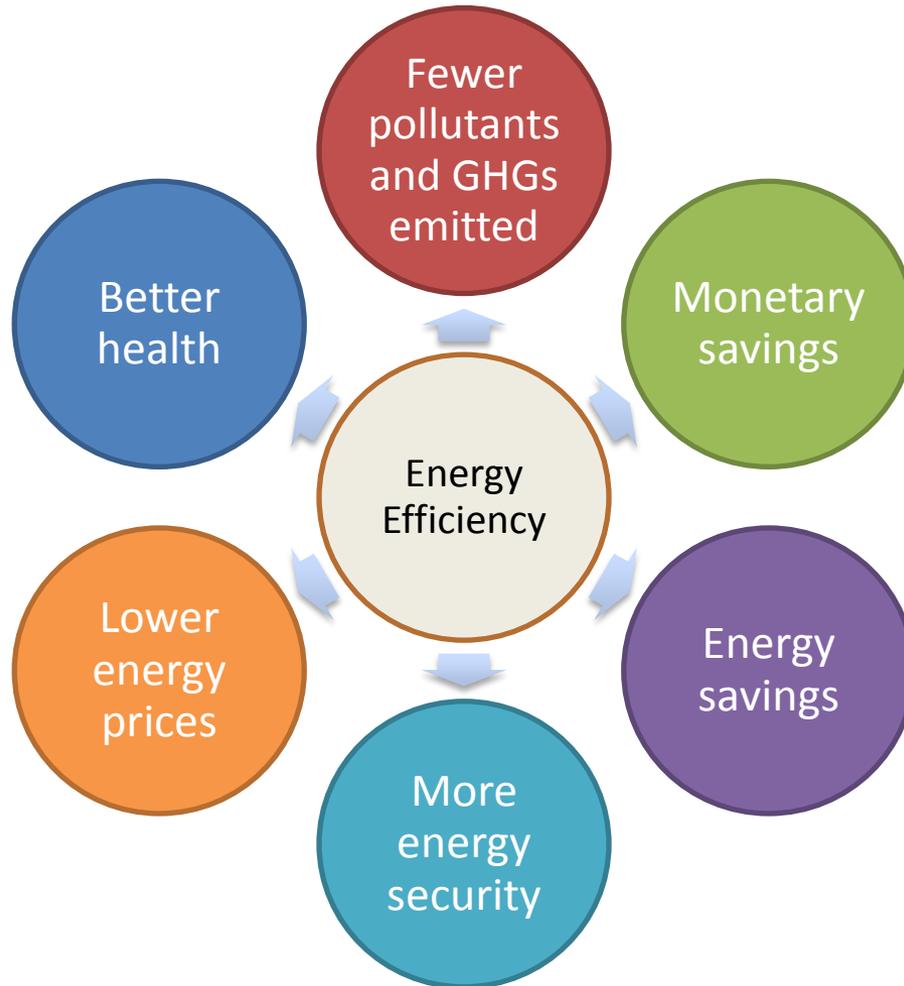


Energy and Fossil Fuels

- In 2014, about 67% of US electricity came from fossil fuels
- Globally, around 80% of electricity comes from fossil fuels
- Less electricity used = less fossil fuels needed to burn



Benefits of Energy Efficiency



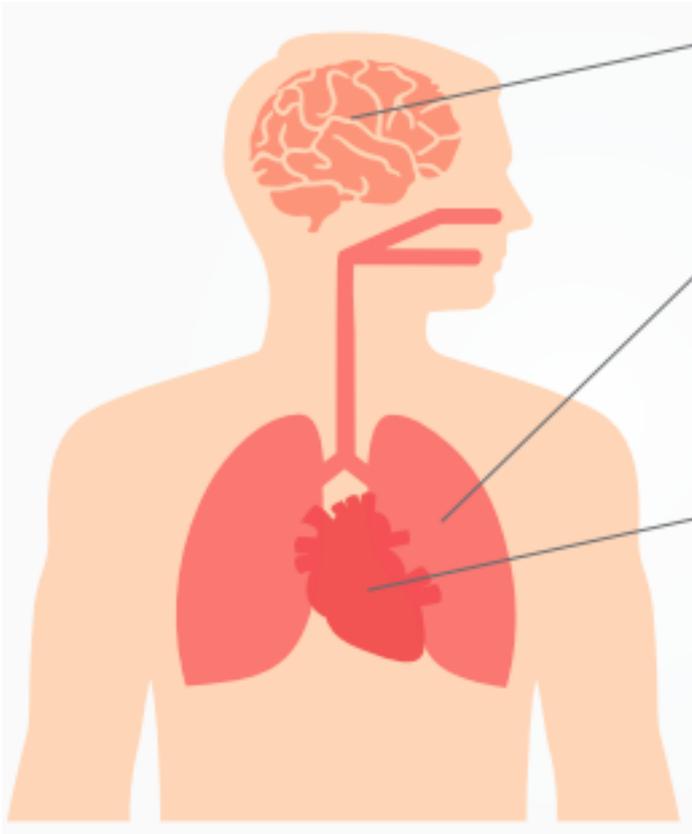
Displacing Pollutants

- Energy efficiency can avoid air emissions from fossil fuel-fired power plants by decreasing the need for operations
- Pollutants such as CO₂, NO_x, SO₂, and particulates all can be significantly reduced



Health Benefits of EE

- By displacing fossil fuels, energy efficiency reduces pollutants and improves our health



Mercury exposure from fossil fuels can damage the brain and nervous system, leading to stroke or loss of intellectual capacity

Pollutants such as particulate matter and nitrogen oxides can harm the respiratory system and cause lung cancer, COPD, and asthma

Fossil fuels can also damage the cardiovascular system which can lead to coronary heart disease, heart attacks, or congestive heart failure

A More Responsive Energy Grid

- Changes in climate can put added stress on the energy system; EE can counter those pressures
- Spikes in peak demand can occur during extreme weather-driven increases more heating or air conditioning use or power outages
- By reducing demand, energy efficiency can help reduce stress during these events and help prevent outages



Benefits of Demand-side Management

- Demand-side management (DSM) pays consumers to implement efficiency and conservation to reduce demand for energy, especially during peak hours
- A study by Jonathan Buonocore, ScD, Jonathan Levy, ScD, and other medical researchers found that DSM had public health benefits comparable to wind and solar in locations around the United States

Savings from CO ₂ , NO _x , and SO ₂ reductions from wind, solar, and DSM				
	Wind	Solar PV	DSM off-peak	DSM peak
Chicago area	\$210 million	\$37 million	\$160 million	\$46 million
Virginia	\$110 million	\$89 million	\$170 million	\$35 million
Cincinnati area	\$210 million	\$100 million	\$200 million	\$20 million
Eastern Pennsylvania	\$110 million	\$51 million	\$130 million	\$5.7 million

Source: Buonocore et al.

States Have Two Options



Mass-based Option

- Measures the total tons of CO2
- As end-use EE projects are implemented, power plants will need to generate less electricity and move towards compliance
- Most states are moving toward this option



Rate-based Option

- Based on the “rate” of pounds of carbon per megawatt hour emitted from power plants
- EE projects can be counted towards compliance through credits

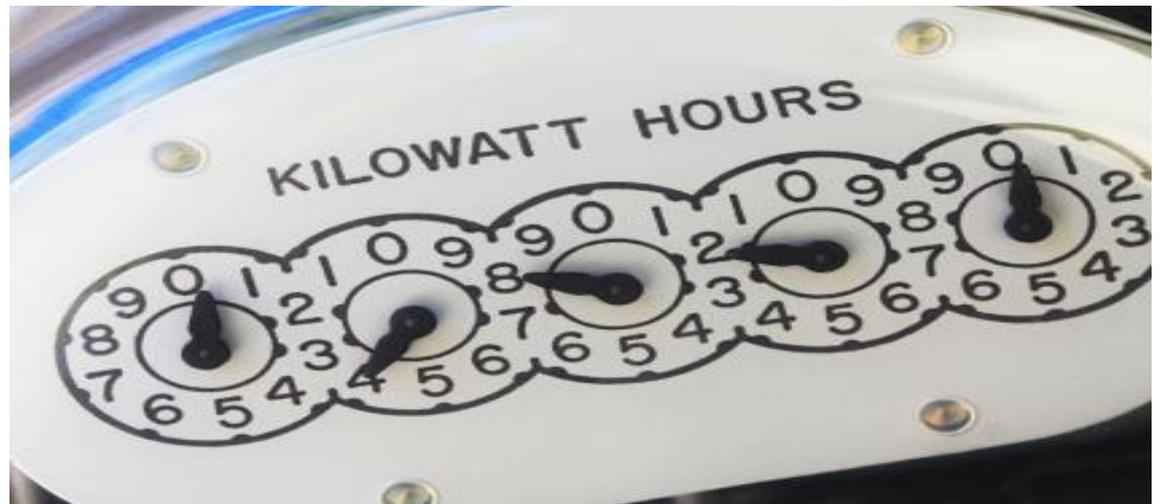
Mass-based Option

- CO₂ emissions would be measured from the smoke stack
- Any EE that reduces CO₂ will contribute to compliance
- Separate measurement not required by EPA to count for compliance but states will likely have to do so anyways
- States need to proactively incentivize EE



Rate-based Option

- Sets ceiling on emissions per unit of energy produced by power plants
- Pounds per MW/hour is adjusted with credits
 - Efficient or low-carbon plants will gain credits which can be traded to dirtier power plants
 - Investment in EE that reduces demand for energy can be counted as credit towards compliance
- EPA lays out certification process to count EE which could be burdensome



Rate-based Scenario

How the Credits Work

There is a dirty power plant in need of one credit to meet CPP goal.

How can the power plant comply with the CPP without actually reducing its rate of carbon per unit of energy?



Energy Efficiency Options

1 credit

Buy credit from utility that saved energy by subsidizing LEDs or other energy efficiency projects

1 credit

Buy credit from utility that invested in energy efficiency for low-income communities

Cleaner Energy Options

1 credit

Buy credits from cleaner power plant that is under the limit

1 credit

Buy credit from utility that invested in renewable energy

Investing in Low-income Communities: Compliance through the CEIP

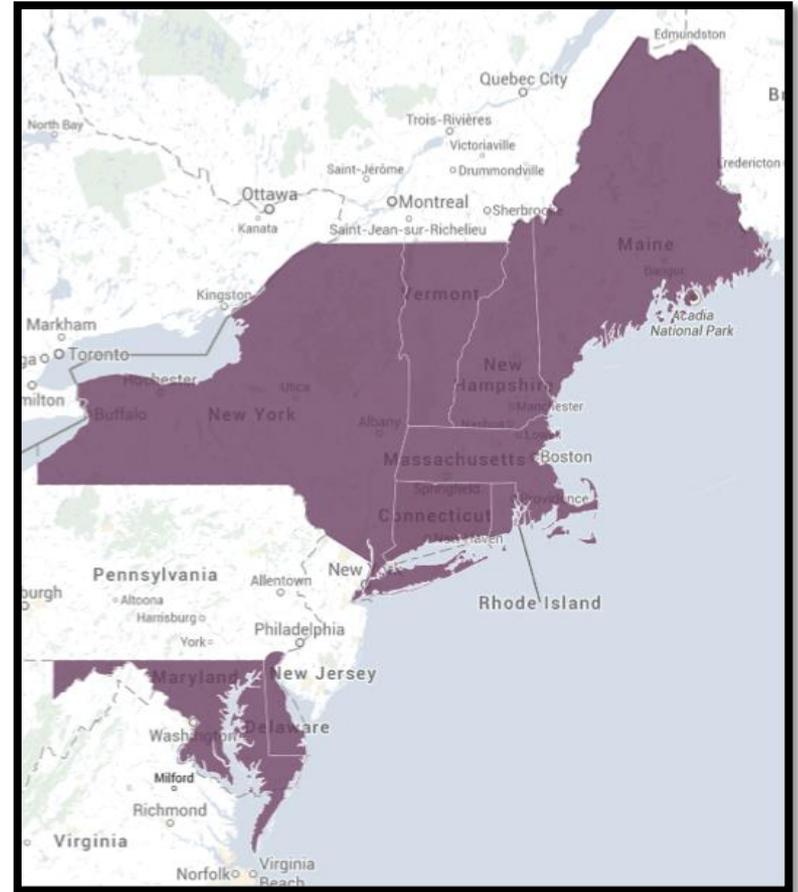
- Through the CPP's Clean Energy Incentive Program (CEIP), states can also get extra credit by providing energy efficiency to low-income communities
- Example: utility or state pays for the weatherization for apartments in a low-income community



Image Source: Penquis

RGGI & Energy Efficiency

- RGGI is an example of a multistate, mass-based approach to reducing emissions
- RGGI states buy and sell at auction their CO₂ allowances
- Proceeds of auctions directly fund investment in energy efficiency



End-use Energy Efficiency and the Clean Power Plan

- Overall, EE is a cost-effective option to reduce emissions from fossil fuels and benefit our health
- As states begin to draft state implementation plans, they should prioritize energy efficiency
- Questions/Comments?

