



MEETING THE CHALLENGE:

Public Power's Commitment To Reducing Greenhouse Gases

CO₂

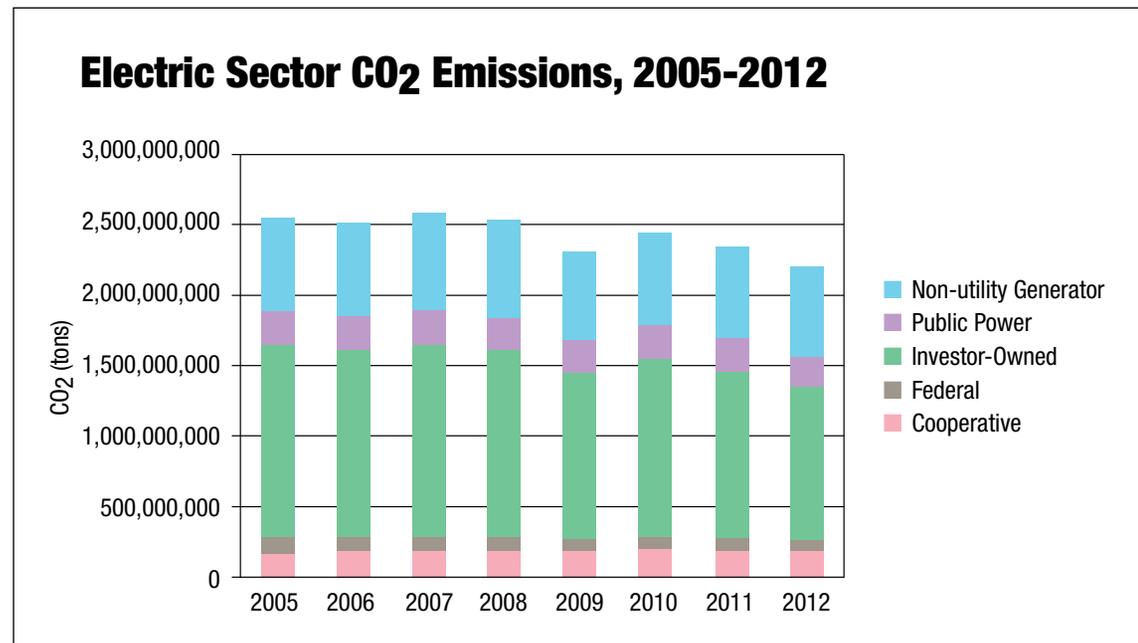
Cover photo: an energy auditor for Loveland Water and Power in Colorado performs a blower door test on a home as part of its energy audit program. Energy audit programs give customers valuable information so they can make informed decisions about their home.

As the nation moves closer to regulating green house gas emissions, primarily carbon dioxide emissions, U.S. utilities have done much to reduce those emissions over the past decade.

In 2012, the electric utility industry's carbon dioxide emissions were at their lowest level since 1994. And since 2007, those emissions have fallen by more than 12 percent. What's more, the decline has occurred in the absence of federal rules or regulations.

Among the factors driving down carbon dioxide emissions are:

- greater use of renewable energy spurred by demand for cleaner energy sources and state renewable portfolio standards and goals, as well as federal and state tax credits
- stricter energy efficiency codes in buildings and appliances
- numerous coal plant retirements
- increased use of natural gas
- state initiatives to establish carbon trading markets
- stagnant economic conditions that have kept demand for electricity flat

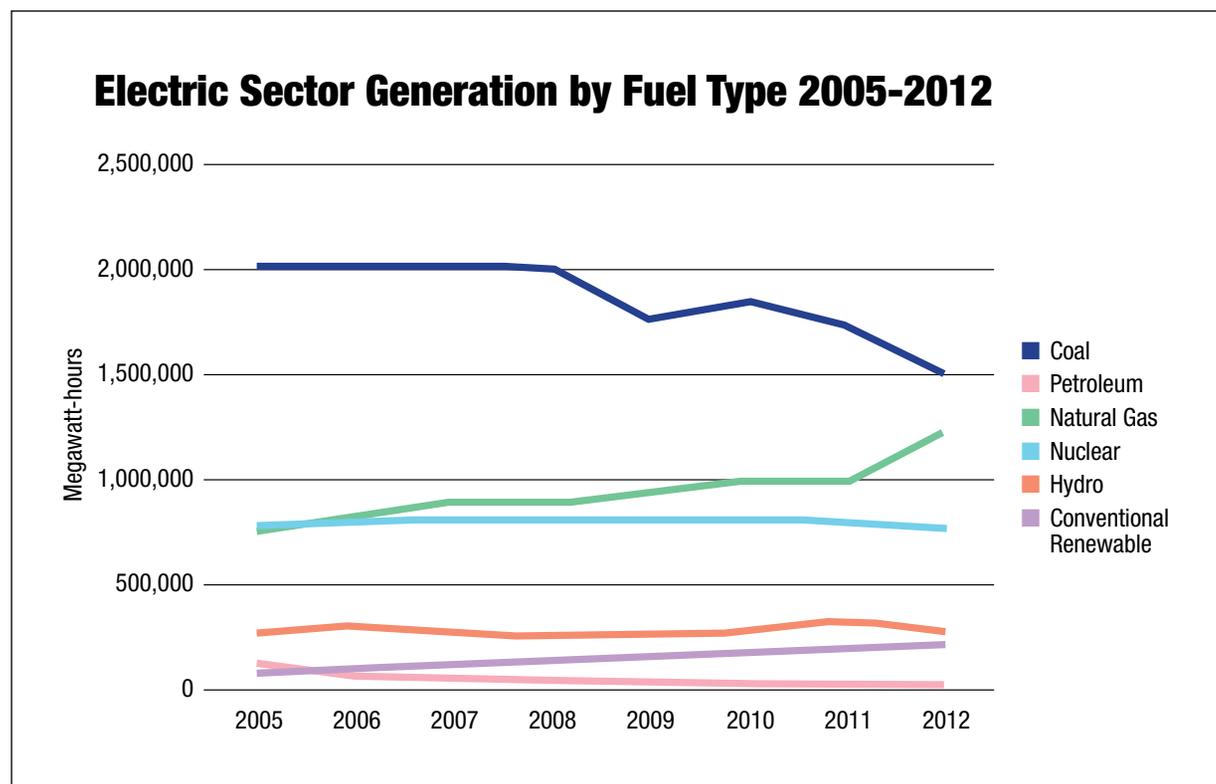


Renewable energy use. One factor boosting the use of renewable energy for electricity generation has been state renewable portfolio requirements. Twenty-nine states and the District of Columbia have renewable portfolio standards, which in most cases require that renewable energy resources account for a given percentage of electricity generation by a specific date. Another seven states have set renewable energy goals that are voluntary. Often, these state requirements and goals are not legally applicable to public power utilities in deference to local authority. Nevertheless, public power generally meets or exceeds these requirements because their customers want more clean energy.

Most state RPS deadlines fall between 2015 and 2025, which means that the percentage of renewable energy generation is likely to continue rising while greenhouse gas emissions are likely to continue their decline.

Tax credits, including production tax credits, also have boosted the development of wind, solar, biomass, hydropower, geothermal, and other renewable resources.

Approximately 12 percent of the electricity produced by U.S. utilities in 2012 came from renewable energy resources, up from 7 percent in 2001. In some cases, utilities own the renewable energy facilities; in other cases, they buy electricity from them.



Energy efficiency improvements. Electricity use by U.S. consumers has dropped to its lowest level in more than a decade, thanks to more efficient homes, appliances, and technical devices. Since 2010, electricity use has been falling and that decline is expected to continue in 2014, according to the Energy Information Administration.

Natural gas use. Because of the boom in shale gas production, prices for natural gas began falling in 2006. As prices tumbled, more U.S. utilities began choosing natural gas for new power plants or switching from coal to natural gas at existing plants due to the cost of meeting recent EPA regulations. Natural gas is also increasingly used to back up - or fill in the gaps created by - renewable energy sources such as wind and solar that vary in output depending on how hard the wind is blowing or the sun is shining. Natural gas emits roughly half the amount of carbon dioxide as coal. Natural gas accounts for approximately twice as much electricity generation as it did in 2006.

Coal plant retirements. Since 2010, more than 100 coal-fired power plants have shut down or announced plans to close. Many of these closures were due to the high costs of complying with recent EPA regulations. By 2020, 60 gigawatts of U.S. coal-fired capacity is expected to be retired, mainly in the Eastern part of the country, according to the Energy Information Administration.* Coal accounted for roughly 48 percent of electricity generation in the United States in 2008, but fell to roughly 37 percent in 2012.

State greenhouse gas reduction initiatives. State renewable portfolio standards or goals are one way of promoting the development of resources that avoid greenhouse gas emissions. Another approach is that employed by the Regional Greenhouse Gas Initiative, a coalition of nine Northeastern and Mid-Atlantic states that has introduced a cap-and-trade system to reduce greenhouse gas emissions from power plants. Proceeds from RGGI's program are used to fund investments in energy efficiency and renewable energy.

Another multi-state initiative, the Midwestern Greenhouse Gas Reduction Accord, is a regional agreement by governors of six states Minnesota, Wisconsin, Illinois, Iowa, Michigan, and Kansas and one Canadian province to reduce greenhouse gas emissions. Governors from two other states, Indiana and South Dakota, are observers.

California has a cap-and-trade program that covers several greenhouse gases, of which carbon dioxide is the most significant. Power plants that supply electricity to the state and industrial facilities in the state that have historic carbon dioxide equivalents of 25,000 metric tons are required to comply. Power plants importing electricity into California are required to comply regardless of their historic emissions level.

It's clear that America's utility industry has significantly reduced its carbon dioxide emissions. That trend is expected to continue over the longer term, although there will be variations from year to year because of changes in fuel prices and demand. In 2012, for instance, greenhouse gas emissions fell by 3.8 percent. In 2013, they rose by 2 percent because U.S. utilities burned slightly more coal and slightly less natural gas.

President Obama's Climate Action Plan calls for a 17 percent reduction in America's greenhouse gas emissions below 2005 levels by 2020. That's a goal that the nation's public power utilities and their customers are likely to meet.

Here's how they are doing it.

Public power utilities have relied on various technologies to help them reduce their greenhouse gas emissions over the past decade.

Among the technologies:

- Renewable energy
- Waste-to-energy
- Nuclear energy
- Demand response/load management
- Energy efficiency/green buildings

In these efforts, public power utilities have been and continue to be guided by a key principle: keeping costs to their customers as low as possible.

* One gigawatt of generation can provide energy to more than 45,000 homes.



The Omaha Public Power District has an agreement with the Nebraska Public Power District to buy up to 25 MW of wind energy from NPPD's Elkhorn Ridge wind farm in Bloomfield, Neb., in Knox County, and up to 10MW from NPPD's Ainsworth wind farm in Brown County, Neb.

Many Renewables, Many Choices

Among the renewable resources used to generate electricity by public power utilities are wind, solar, hydropower, biomass, and geothermal. This electricity is supplied to customers both through utility-owned facilities and power purchase agreements with third-party facilities.

Between 2005 and 2012, public power utilities' generation using non-hydro renewable resources grew by approximately 12 percent.

Wind energy

The production of electricity from wind farms grew fourfold between 2005 and 2012, accounting for roughly 0.3 percent of all public power utility generation at the end of that period.

Wind energy is an important source of electricity for the Nebraska Public Power District. "NPPD has been systematically increasing its access to renewable wind resources, which comprise about 9 percent of our customers' energy supply and contribute to a

reduction in our system's carbon intensity," said Pat Pope, NPPD president and CEO. Primarily because of its wind resources and its Cooper Nuclear Station, he said, the utility has a generation portfolio that is more than 40 percent carbon free.

At the beginning of 2014, the Omaha Public Power District in Nebraska met 7 percent of its net energy requirements from wind. "By 2016, that share will jump to 30 percent when two additional wind farms come on line," said Jodi Baker, media specialist at OPPD.



The city of Palo Alto has nearly 600 photovoltaic arrays on customer homes and businesses, enough to power 1,000 homes.

Solar thermal and photovoltaics

Solar energy technologies have accounted for a dramatic increase in the share of electricity provided by public power utilities, rising twelvefold between 2002 and 2012.

The City of Palo Alto in California has nearly 600 photovoltaic (PV) systems installed on customer homes and businesses, which represent 3.5 percent of the city's total average electric load. In addition, the city has authorized three major power purchase agreements with large-scale PV facilities.



Tacoma Power owns four hydro facilities such as the Mayfield Dam above which provide clean, renewable energy to its customers.

“Palo Alto Utilities is a significant player in the city’s effort to reduce its carbon footprint,” said Debra Katz, utilities communication manager. “By the end of 2016, we expect to get roughly 25 percent of our electric power from solar.”

Hydropower

Hydropower accounts for approximately 90 percent of the renewable-generated electricity supplied by public power utilities.

Tacoma Power in Washington state owns four hydro facilities and purchases power from others. “About 96 percent of the energy we use to serve customers is renewable and carbon-free,” said Pat McCarty, the utility’s general manager.

AMP, based in Ohio, is developing several run-of-the-river hydro projects that will add 250 MW to their resource portfolio.

Biomass

Wood is the largest biomass energy source, but plant and animal matter are also used for electricity generation. All types of biomass account for approximately 1.5 percent of the electricity provided by public power utilities

Gainesville Regional Utilities in Florida has signed a 30-year agreement to purchase the output of the Gainesville Renewable Energy center, a 100-megawatt biomass plant. “Biomass greatly expands GRU’s renewable energy portfolio,” said Margaret Crawford,



Gainesville Regional Utilities greatly expanded its renewable energy portfolio with this 100 megawatt biomass plant. Photo courtesy of GREC.

interim marketing & communications manager. “With the addition of the GREC facility, at least 20 percent of GRU’s power comes from local, renewable sources.”

Columbia Water & Light in Missouri is using waste wood in its coal-fired Columbia Municipal Power Plant. “We’re burning 10 percent wood now,” said Connie Kacprowicz, utility services specialist. “But we’re exploring a more durable wood product that could allow us to burn a higher percentage of biomass.”

Geothermal

The use of geothermal energy to produce electricity is growing, although it accounts for less than 1 percent of public power-provided electricity

The Imperial Irrigation District has signed a 10-year power purchase agreement with the Southern California Public Power Agency for electricity from a geothermal facility. Another public power utility, the Los Angeles Department of Water & Power, also will buy power from the facility.

In 2013, the power purchase agreement accounted for 5.73 percent of IID’s energy resources, boosting the utility’s share of renewable energy closer to 25 percent. “The PPA allows IID to continue integrating renewable energy into its portfolio while supporting sustainability in the Imperial Valley,” said Carl Stills, energy manager.



The Imperial Irrigation District’s Hudson Ranch Geothermal plant, located in Calipatria, California, is the first geothermal plant to go online in the Salton Sea area in 20 years.

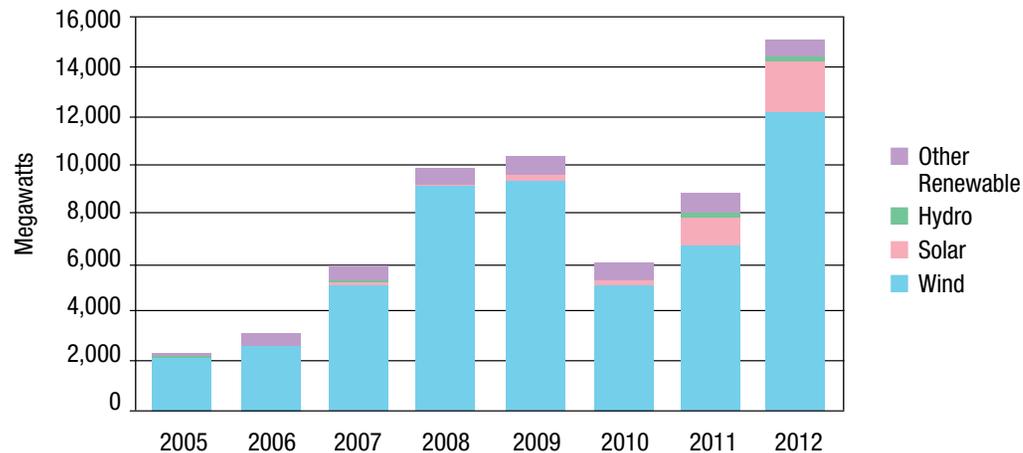
Making the most of waste

A growing number of public power utilities are capturing and using landfill gas to generate electricity. Methane, a highly potent greenhouse gas, comprises 40-60 percent of landfill gas. The use of this gas for power generation prevents the release of methane into the atmosphere.

Missouri’s Columbia Water & Light operates a 3.1-megawatt landfill gas project. “The electricity from the project accounts for 1.12 percent of the utility’s energy portfolio,” said Connie Kacprowicz, utility services specialist. “Electricity from the landfill gas rounds out our renewable energy portfolio nicely,” she said. “We refer to it as our trash-to-treasure project.”

Another form of waste—food waste—can be used to produce electricity. Cleveland Public Power in

Newly Installed Renewable Capacity by Year, 2005-2012



Ohio buys electricity from an anaerobic digester that converts the waste to methane. The methane fuels a 1.3-megawatt generator. The 10-year power purchase agreement represents 0.5 percent of the utility's energy requirements. "This is another step in making Cleveland a 'green city on a blue lake,'" said Ivan Henderson, commissioner of Cleveland Public Power.

Nuclear Energy's Role

Nuclear power plants, which do not emit greenhouse gases, account for nearly 16 percent of all the electricity provided by public power utilities. Between 1973 and mid-2012, the Omaha Public Power District's Fort Calhoun Station accounted for 34 percent of OPPD's generation. When the utility's nuclear output is combined with its wind generation, approximately 64 percent of OPPD's net system requirements will be met by carbon-free sources by the end of 2015.

MEAG Power in Georgia and Santee Cooper in South Carolina, for example, are making significant



Nuclear power plants such as OPPD's Fort Calhoun Station account for nearly 16 percent of all electricity provided by public power utilities.

investments in new nuclear power facilities. When completed, Plant Vogtle in Georgia will provide municipal utilities in that state with approximately 500 MWs of emissions –free electricity.

Reducing Demand

Demand response and load management programs seek to encourage customers often through incentives to reduce electricity use at times of high demand. In 2012, municipal utility load management programs reduced electricity use by approximately 55,000 megawatt-hours.

Rochester Public Utilities in Minnesota has a number of programs that conserve energy and thus reduce greenhouse gas emissions. “In 2007, the state adopted the Next Generation Energy Act, which establishes an energy-savings goal of 1.5 percent of average retail electricity sales,” said Dirk Bierbaum, key account representative. “RPU has successfully met this goal every year, and in 2013, we surpassed it by achieving savings of 2.2 percent.”

“In the past three years,” said Bierbaum, “RPU has reduced its carbon dioxide emissions by approximately 70,000 metric tons.”



Demand response programs such as ones represented by this rebate check presentation provide incentives to reduce electricity at times of high demand.

The Omaha Public Power District offers an air conditioner management program aimed at reducing peak demand. The program is an important component of OPPD’s effort to reduce peak demand by 50 megawatts annually. “In 2012, the air conditioner program reduced demand by 17.2 megawatts, one-third of the utility’s total goal,” said Renee Jaksich, product marketing specialist for the utility’s corporate marketing & communications department. “By the end of 2016, our air conditioner program could reduce peak demand by 32 megawatts annually.”

More Efficient Energy Use

Public power utilities across the country are using incentives, including rebates, to encourage their customers to use energy more efficiently. In 2012, municipal utilities saved 14.8 million megawatt-hours through energy efficiency programs.

Loveland Water & Power in Colorado launched its Home Energy Audit Program in 2011 to help customers reduce their energy use. Under the program, customers receive an audit report with recommendations. Customers also receive information on rebates and financial incentives for energy efficiency improvements.

“A home audit is one of the most beneficial steps a homeowner can take to identify energy improvements,” said Lindsey Bashline, customer relations specialist. “We hope to positively impact the local community as well as the environment by promoting energy efficiency.”



Energy improvements such as installing fiberglass insulation can greatly improve a home's efficiency

City Utilities of Springfield in Missouri offers a range of energy management and conservation programs. “The utility estimates that annual electricity savings from these programs are 90 million kilowatt-hours equivalent to the amount of electricity used by 7,881 homes,” said Joel Alexander, communications manager.

Under its EnergyWise program, the utility provides information on energy audits and rebates for residential and commercial customers.

Wyandotte Municipal Service in Michigan implemented a three-year ground-source heat pump project in which more than 50 residential customers participated. The purpose was to evaluate the performance of the system and compare it with conventional heating and cooling systems. “Having a geothermal system on the grid instead of power-hungry air conditioning units helps to lower the peak value and provide an improved load factor,” said Pam Tierney, energy services program manager. “The geothermal system was 20-40 percent more efficient than conventional air conditioning.”

After most of Greensburg, Kansas, was destroyed or severely damaged by a tornado in 2007, the city adopted a Green Initiative. The initiative sought to build a model green community by using energy-efficient construction practices and generating electricity from renewables.



Understanding the house as a system is important to help optimize and improve the home so it is the most effective system possible. That's why with every home energy audit, utilities such as Loveland Water and Power in Colorado also perform various combustion safety tests such as the one pictured here.

Greensburg prides itself on having eight LEED (Leadership in Energy and Environmental Design) certified buildings, the most per capita of any city.

“The LEED program and the Green Initiative have had a tremendous impact on lowering Greensburg's energy consumption and reducing our carbon footprint,” said Mayor Bob Dixon. “These efforts have cut our total energy usage by nearly 40 percent and the LEED buildings are seeing savings of more than 50 percent.”

In Conclusion

The electric power industry has substantially reduced carbon dioxide and other greenhouse gas emissions and will continue to do so. The nation's public power utilities will build on their own significant achievements, generating more electricity from renewables, nuclear energy, and waste products while encouraging their customers to use energy more efficiently. The Environmental Protection Agency and the states should acknowledge and account for these facts in pursuing additional reductions, and do so safely without harming consumers or threatening reliability of electricity supply.

A large, stylized graphic of the chemical formula CO₂ in white, set against a red background. The 'CO' is in a large, bold, sans-serif font, and the '2' is a smaller, bold, sans-serif font positioned to the right and slightly below the 'O'.



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