



Cutting Carbon Pollution While Promoting Economic Growth

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Recent experiences in the United States and abroad call into question the conventional wisdom that a country's economy and its carbon dioxide emissions are coupled—that is, that one cannot grow without the other growing as well. Between 2005 and 2014, the U.S. economy grew by 13 percent, while U.S. energy-related carbon pollution fell by more than 8 percent. The U.S. economy is becoming more energy efficient, and its energy mix is cleaner and less carbon intensive than it was a decade ago. As a result, the Energy Information Administration, or EIA, predicts that—absent new climate-related policies—the economy will continue its upward trajectory, and carbon pollution will remain flat. Additionally, in 2006, California passed emissions reduction legislation, and the member states of the Regional Greenhouse Gas Initiative, or RGGI, instated a carbon cap-and-trade program in 2009. Both California and RGGI have experienced strong gross domestic product, or GDP, growth amid declining emissions.

Internationally, global carbon emissions from the energy sector remained static in 2014, marking the first time since the International Energy Agency, or IEA, began collecting data in the early 1980s that global emissions have stalled or decreased for reasons other than an economic slowdown. Between 2007 and 2012, member countries of the Organisation for Economic Co-operation and Development, or OECD, reduced their carbon and other greenhouse gas emissions by 7 percent while their total GDP grew by nearly 13 percent. Of the OECD countries, Germany is one of the greatest success stories, achieving high levels of productivity and economic growth through strong environmental and energy policies. In Canada, British Columbia established North America's first carbon tax and has decreased its emissions significantly with no detriment to the province's economy.

With the right mix of policies, countries and localities can reduce their carbon pollution while improving their economies. Achieving significant reductions in carbon pollution is essential to averting the most costly impacts of climate change, the price tag of which will become ever more expensive the longer the world waits to act. Additionally, the impacts of climate change on human health are too great to ignore, as rising temperatures will worsen air pollution that causes asthma, trigger dangerous heat waves, and increase the frequency of extreme storms.¹ The time is ripe for the United States to take action as a world leader to reduce carbon emissions—and avoid the incredible risks of failing to do so.

Cutting carbon pollution and spurring economic growth

Industry groups that want to block action on climate change often argue that the United States cannot curtail carbon emissions without harming the economy. For example, the U.S. Chamber of Commerce argued last year that proposed Environmental Protection Agency, or EPA, regulations to cut carbon emissions would place a burden on American businesses, threatening the U.S. economy and jobs.²

However, new research and real-world experience show that this is a false choice: Americans do not need to choose between a healthy economy and a safe, low-carbon future. A working paper by the New Climate Economy project—conducted by a team of partner institutions managed by the World Resources Institute—posits that smart policies to limit carbon emissions could spur economic growth. According to the report, “key drivers of further economic growth—namely greater resource and energy efficiency; investment in infrastructure; and enhanced innovation—can also be key drivers of greenhouse gas emissions reductions, if they are done right.”³

The study highlights policy opportunities that can reduce greenhouse gas emissions and benefit the economy. For example, the study looks at RGGI—discussed later in this paper—which caps emissions in the Northeast and has lowered electricity bills for consumers while simultaneously creating jobs.⁴ In another example, Wisconsin’s energy efficiency program is projected to contribute \$900 million and more than 6,000 jobs to Wisconsin’s economy over the next decade.⁵

The study also demonstrates that technological progress often helps create opportunities for emissions reductions and economic growth. In many markets, wind and solar power are cost competitive with coal for electricity generation, and new natural gas-fired plants are now 19 percent to 44 percent cheaper to operate than plants that burn coal.⁶ On the energy efficiency side, technological advances in product development have created opportunities for customers to reduce energy use while saving money. The study cites lightbulb technology as a prime example. Light-emitted diodes, or LEDs, cost 80 percent less in 2014 than they did in 2012 and use one-seventh the amount of electricity that incandescent lightbulbs require. For every traditional bulb that consumers replace with an LED bulb, they save \$140.⁷

As the following case studies illustrate, the United States and countries around the world have found that new energy technologies and smart regulatory policies can drive down carbon emissions while allowing economies to thrive.

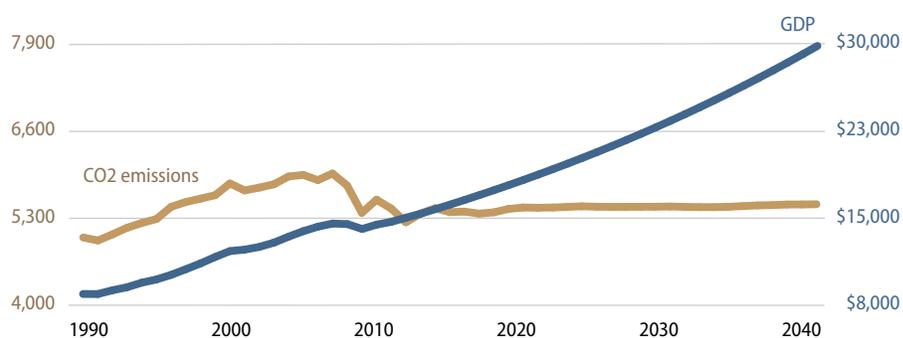
Nationally

Over the past decade, the U.S. economy has grown as carbon emissions have fallen. According to the EIA, energy-related carbon emissions fell 8 percent between 2005 and 2014 while the economy, as measured by GDP, grew by 13 percent.⁸ (see Figure 1) Both energy intensity—the energy used per GDP unit—and carbon intensity—the amount of carbon emissions per unit of energy consumed—declined in the United States from 2005 to 2014.⁹ The nation used 13 percent less energy per unit of GDP in 2014 than it did in 2005 as a result of state and federal policies enacted to make the economy more efficient.¹⁰ At the same time, the country’s energy mix has become cleaner. Electric utilities are substituting natural gas for retiring coal-fired power plants, and state policies and federal tax incentives have driven growth in zero-carbon electricity generation from wind and solar energy sources.¹¹

The EIA predicts that energy-related carbon pollution will remain relatively level through 2040—absent any new carbon policy proposals—while the economy will continue to grow. As a baseline, the EIA projects that GDP will grow by 2.4 percent per year through 2040, while energy-related carbon emissions will rise by an average of 0.2 percent per year. This trend is due to an anticipated 2 percent annual decline in energy intensity, showing that the economy will become more energy efficient, and a slight decline in carbon intensity, showing that the nation’s energy mix will become cleaner.¹² Under the EIA’s most optimistic economic growth scenario, in which GDP increases by 2.9 percent annually, energy-related carbon emissions rise by 0.4 percent per year while overall carbon intensity falls by 2.2 percent.¹³

FIGURE 1
Historical and projected U.S. energy-related carbon dioxide emissions under existing policy, and national GDP, 1990–2040

Carbon dioxide in millions of metric tons, GDP in billions of chained 2009 dollars

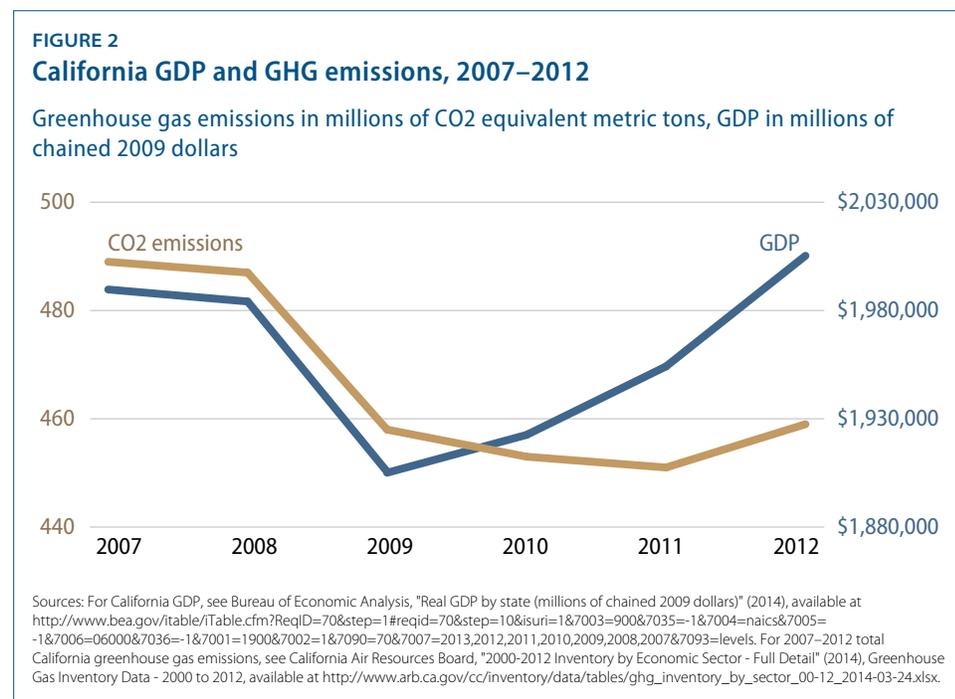


Sources: For 2012–2040 historical data and projections, see Energy Information Administration, Annual Energy Outlook 2015 (U.S. Department of Energy, 2015), table 18, available at http://www.eia.gov/forecasts/aeo/excel/aeotab_18.xlsx. For 1990–2011 data, see Energy Information Administration, U.S. Energy-Related Carbon Dioxide Emissions, 2013 (U.S. Department of Energy, 2014), available at <http://www.eia.gov/environment/emissions/carbon/>. For 1990–2014 GDP data, see Bureau of Economic Analysis, Current and "Real" Gross Domestic Product (U.S. Department of Commerce, 2015), available at <http://www.bea.gov/national/xls/gdplev.xls>. For GDP projections—with an assumed 2.4 percent annual growth rate consistent with the assumption made in the Energy Information Administration's Annual Energy Outlook reference case, see Energy Information Administration, Annual Energy Outlook 2015 (U.S. Department of Energy, 2015), available at [http://www.eia.gov/forecasts/aeo/pdf/0383\(2015\).pdf](http://www.eia.gov/forecasts/aeo/pdf/0383(2015).pdf).

The United States needs to do more to cut its energy-related carbon pollution in order to meet its international commitment to reduce all greenhouse gas emissions by 26 percent to 28 percent from 2005 levels by 2025.¹⁴ The country's progress over the past decade shows that the United States can achieve those reductions while continuing to enjoy economic growth.

California

California has led the country on reducing carbon and other greenhouse gas emissions. In 2006, the state adopted A.B. 32, the California Global Warming Solutions Act, which required it to reduce greenhouse gas emissions to 1990 levels by 2020—at the time, an approximately 15 percent reduction.¹⁵ According to the Greenhouse Gas Emission Inventory for California, greenhouse gas emissions from in-state electric power generation declined by 6 percent from 2007 to 2012, the most recent year for which comprehensive data are available.¹⁶ Meanwhile, the state's economy grew by 1 percent between 2007 and 2012. (see Figure 2)



In 2013, California implemented a cap-and-trade program that affects sources responsible for 85 percent of emissions, including manufacturing and electricity-generating facilities and suppliers of natural gas, gasoline, and fuel oil.¹⁷ The cap will decline annually until 2020 when it reaches 1990 levels.¹⁸

The Environmental Defense Fund examined the economic impact of the cap in its first year. In 2013, California's GDP increased by more than 2 percent, and job growth outpaced the national average. At the same time, capped emissions—those produced by facilities that fall under the cap—dropped by almost 4 percent.¹⁹ California promises to do even more to cut its emissions of carbon and other greenhouse gases. In late April 2015, Gov. Jerry Brown (D) issued an executive order to reduce greenhouse gas emissions to 40 percent below 1990 levels by 2030. In his January inaugural speech, Brown announced goals to generate 50 percent of the state's energy with renewables by 2050 and to achieve other greenhouse gas emissions reductions through building-efficiency measures and land management practices.²⁰

Regional Greenhouse Gas Initiative

RGGI is a group of nine states in the Northeast and mid-Atlantic that apply a regional cap-and-trade system to electric power plants. The participating states include Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York, Delaware, and Maryland.²¹ Allowances for carbon emissions are sold in quarterly auctions. Each state decides how to apply its proceeds from the auctions, and most use the funds to support energy efficiency and renewable energy initiatives and education and job training programs, as well as to offset increased electricity bills for low-income residents.

In 2011, after the initiative's first three years, the Analysis Group performed a study on RGGI's economic impacts and found that all member states experienced positive economic benefits.²² The study concluded that RGGI-related investments created more than 16,000 jobs, saved consumers more than \$1 billion on electricity bills, and gave the region \$1.6 billion in economic gains.²³

Not only have the RGGI states collectively reduced carbon emissions by 40 percent since 2005 but their combined GDP also has grown by 8 percent.²⁴ The RGGI states have outperformed the rest of the country on average. Between 2009 and 2013, the RGGI states cut their carbon pollution by 18 percent while their collective economies grew by 9.2 percent. Carbon pollution in the other 41 states fell by just 4 percent while their collective economies maintained 8.8 percent growth over the same time period.²⁵

Cited by member states as a cost-effective method of reducing carbon emissions to comply with the EPA's Clean Power Plan (see text box), RGGI is a model of an effective market-based mechanism for limiting emissions that has economically benefited participating states.²⁶

The EPA Clean Power Plan: Can states comply by capping emissions and still improve their economies?

The EPA proposed the Clean Power Plan in June 2014 and plans to finalize it this summer.²⁷ The Clean Power Plan, as proposed, includes carbon-pollution reduction targets for each state, including an interim carbon-pollution reduction goal, which is calculated as an average over the 10-year period from 2020 through 2029 with a final goal in 2030. States have the option of complying with state-specific goals for carbon emissions reductions in a variety of ways, including collaborating with other states, capping emissions from power plants by mass, and limiting the rate of carbon emitted per unit of electricity produced. Altogether, the plan would reduce nationwide carbon emissions by 30 percent of 2005 levels by 2030.²⁸

States that chose to comply using a mass-based target would be setting a hard cap on carbon emissions from power plants. The rate-based option, by contrast, regulates emissions through a target rate—measured as pounds of carbon released per megawatt hour of electricity generated—without setting a cap.²⁹

California and the RGGI states serve as models that states can—alone or in partnership with other states—cap emissions to comply with the Clean Power Plan while continuing to enjoy economic growth.

According to a report by the Acadia Center, a nonprofit organization dedicated to advancing clean energy policy, RGGI “provides both a proven template for state action and an example of the capacity to clean up the power sector while benefitting consumers.”³⁰ Acadia’s report further argued that “RGGI’s flexible, market-based system reduces emissions at lower cost than alternative approaches” and provides states with “the flexibility to achieve distinct local objectives.”³¹ It suggested that joining RGGI would be the best way for the state of Virginia to comply with the Clean Power Plan.³²

In its public comments to the EPA on the proposed Clean Power Plan, RGGI highlighted its own success in demonstrating that a multistate collaborative can achieve significant emissions reductions while creating jobs and improving the regional economy. RGGI expressed particular support for the mass-based compliance option—that is, a carbon cap—in the proposal. RGGI noted that its member states “have demonstrated that a regional mass-based approach is a cost-effective way to achieve substantial CO₂ emission reductions.”³³ In its comments, the initiative also encouraged the EPA to facilitate the development of regional mass-based approaches for compliance, calling this the best way for states to reduce emissions “in that the least cost reduction mechanisms may be deployed over a larger geographic region and driven by the market.”³⁴

In the RGGI and California models, power companies lower their compliance costs by reducing their emissions, thereby reducing the number of allowances they have to purchase at auction. This market structure drives innovation and flexibility.³⁵ It also generates revenue for states to reinvest in the public good. A 2014 Analysis Group report found that the RGGI states that reinvested their auction proceeds in energy efficiency programs achieved the greatest economic benefits during the first three years of implementation.³⁶

Case studies: International

The international community has also been able to cut pollution while improving its economies. According to preliminary data released ahead of a special report on energy and climate by the IEA in March 2015, global carbon emissions from the energy sector remained unchanged in 2014, making 2014 the first time in the 40 years since the IEA began to collect carbon emission data that global emissions from energy have stalled or decreased without being tied to an economic slowdown. Emissions froze or declined during the 1980s and in 1992 as well, but these periods were associated with economic downturns. In contrast, the global economy expanded by 3 percent in 2014, apparently disassociating from emissions.³⁷

The IEA points to energy sector reforms in China and member countries of the OECD as being responsible for the emissions standstill, including these nations' efforts to increase renewable energy and energy efficiency programs.³⁸

OECD member countries

The experiences of many OECD countries³⁹ in recent years have also shown that environmental policies and regulation can help the economy thrive rather than hinder it. From 2007 to 2012, OECD countries reduced emissions by 7 percent⁴⁰ while their total GDP grew by nearly 13 percent.⁴¹

According to an OECD policy brief released in December 2014, empirical studies have demonstrated that stringent environmental policies are not correlated with economic burden at any conventional level of significance.⁴² The studies look at the relationship between the level at which a policy impedes competition or entry into a market and the stringency of environmental policies. While the OECD is planning more research to analyze the economic results from employing stringent environmental policies, it concluded from its initial analysis that stringent policies can be implemented without harming economic productivity. Technologically advanced firms in OECD countries reacted to policy stringency increases with a boost in productivity, while many less-advanced firms saw a decrease in productivity or stopped production altogether. The net effect of more-stringent policies, however, was neutral, and net productivity was unaffected. This helped keep economies stable as environmental policies increased in stringency.⁴³ These results also suggest that decreasing policy stringency will not necessarily be effective at helping the economy recover. Implementing stringent policies that send strong market signals can help new business models and technology emerge.⁴⁴

Germany

Of all the OECD countries, Germany has the third-largest economy. In the 2000s, it paired its competitive industrial sector and international trade efforts with progressive climate and environmental policies. Germany's GDP increased during the 2000s, and it reached one of the highest levels of resource productivity of the OECD countries, indicated by the increase of its GDP per unit of material input by almost 50 percent from 1994 to 2010. While productivity increased, total carbon emissions decreased, as did carbon intensity from energy use. Energy use per unit GDP also declined.⁴⁵ Germany's greenhouse gas-emissions reductions surpassed the Kyoto Protocol target of 21 percent of 1990 levels by the period from 2008 to 2012.⁴⁶ In 2007, Germany pledged further reductions of 40 percent of 1990 levels by 2020,⁴⁷ and in 2010, overall greenhouse gas emissions declined to 24 percent below 1990 levels. As of 2013, emissions from the energy sector, which are responsible for 40 percent of Germany's total emissions, had decreased 17.5 percent from 1990 levels.⁴⁸

The OECD attributes much of Germany's success in increasing productivity under stringent environmental policies to a strong waste management policy that emphasizes recycling, implementation of measures to improve agricultural performance, and the reduction of domestic extraction of coal and minerals used in construction.⁴⁹

British Columbia

British Columbia has been an example of the successful use of market mechanisms to address carbon emissions since it issued its carbon tax in 2008, making it the only province in Canada to do so. The tax was initially set at 10 Canadian dollars per ton of carbon dioxide equivalent and rose 5 Canadian dollars per year until it reached 30 Canadian dollars per ton—approximately 7 Canadian cents per liter of gas—in 2012.⁵⁰ The tax is levied on most fossil fuels in the province, including diesel, gasoline, propane, coal, and natural gas.⁵¹ The province's per capita consumption of fossil fuels declined by 16 percent just six years after the tax was established, whereas Canada's per capita consumption rose by 3 percent.⁵² From 2008 to 2012, greenhouse gas emissions from stationary combustion sources and transportation declined by 5 percent, and the province's population grew by about 4.5 percent during this time, resulting in a 9 percent drop in per capita emissions.⁵³ From 2008 to 2013, British Columbia's per capita GDP grew by 1.75 percent—faster than Canada's 1.28 percent growth in the same time period.⁵⁴ Experts point to the economy-boosting effects of returning proceeds from the carbon tax to people and businesses in the form of income tax cuts as possible reasons for British Columbia's above average growth.⁵⁵

Conclusion

The United States and countries around the world have demonstrated that the right combination of policy and technological innovation can cut carbon pollution while encouraging economic growth. As policymakers in the United States and abroad debate new initiatives to cut carbon pollution—and as they consider the potential economic impacts of these initiatives—they also need to remain cognizant of the immense economic impacts of failing to address climate change now. The U.S. Council of Economic Advisers warned in July 2014 that while “delaying action can reduce costs in the short run, on net, delaying action to limit the effects of climate change is costly.”⁵⁶ It estimated that allowing temperatures to rise by more than 3 degrees Celsius could cost the United States \$150 billion every year in perpetuity and could cost even more if warming goes beyond that.⁵⁷

The potential economic and human costs of climate change reinforce the importance of acting now to cut carbon pollution.

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