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MAINTAINING THE ADVANTAGE: Why the U.S. Should Not Follow the EU's Energy Policies

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Executive Summary

Over the past decade, the United States and the European Union have taken markedly different approaches to the electricity markets that power their economies. Seeking drastic reductions in carbon emissions, the EU has emphasized rigid and extensive mandates, market interventions (including a "cap and trade" regime to reduce emissions), and subsidies aimed at promoting renewable energy. The U.S. government, as well as numerous states, while also promoting renewables and seeking lower emissions, has interfered far less. U.S. electricity markets operate more freely than their European counterparts. So, too, do other U.S. energy sectors. This has contributed to the recent boom in extraction of both oil and natural gas in the U.S.

As a result of these policy differences, electricity prices in Europe now are far higher than those in the United States, for both residential and industrial consumers. Between 2005 and late 2013, the average price of residential electricity in the EU rose by 55 percent, and industrial electric rates jumped by 26 percent. The average U.S. household now pays 12 cents per kilowatt-hour—about a third of what the same amount of electricity costs in Germany. European steelmakers now pay twice as much for their electricity as do U.S. manufacturers.

EU policies have raised its electricity costs by:

- Giving large subsidies to wind- and solar-energy producers—subsidies that must be paid for by consumers.
- Mandating the use of renewable energy, which is more expensive and which requires backup power for times when the sun doesn't shine and the wind doesn't blow. Because of this need for backup power, consumers must pay for both renewables and backup gas-fired plants.
- Implementing a flawed cap-and-trade system whose market distortions have discouraged efficiency (and, ironically, increased coal use).

For its higher electricity costs, Europe has not received the benefit of higher carbon-emissions reductions: between 2005 and 2012, U.S. carbon dioxide emissions fell more than those of the EU did. Furthermore, in 2012, Germany's carbon dioxide emissions actually rose by 1.3 percent over 2011 levels, while U.S. emissions fell by 3.9 percent.

Despite this clear contrast between the two economies, some U.S. policymakers—from the president to state legislators—have called on the U.S. to implement EU-style electricity policies.

There is no doubt that such a move would raise U.S. electricity prices and erode, or even eliminate, this country's competitive edge in energy. This paper estimates that the net effect of the U.S. adopting a renewable-energy goal like the EU's would be to increase the monthly electricity bill of an average household by about 29 percent.

California—the U.S. state whose policies are most like Europe's—offers a case study in what not to do. Thanks to the state's renewables mandates, cap-and-trade system, and aggressive promotion of solar power, California consumers are paying far more than their fellow Americans for electricity.

Instead of emulating Europe's failed policies, the U.S. should:

- Eliminate its own renewable-energy subsidies.
- Remove excessive restrictions on coal-fired electricity generation plants.
- Encourage "N2N" (natural gas to nuclear) sources of electricity.
- Not impose unnecessary regulations on the process of hydraulic fracturing, which is essential to the production of natural gas from shale.
- Maintain—and improve—safety standards in all facets of energy production, including drilling, refining, transportation, and storage.

About the Author

ROBERT BRYCE is a senior fellow at the Manhattan Institute's Center for Energy Policy and the Environment. He has been writing about energy for two decades and his articles have appeared in numerous publications ranging from *The Wall Street Journal* to *The New York Times* and the *Atlantic Monthly* to the *Washington Post*. Bryce's first book, *Pipe Dreams: Greed, Ego, and the Death of Enron*, was named one of the best nonfiction books of 2002 by *Publishers Weekly*. In 2008, he published *Gusher of Lies: The Dangerous Delusions of "Energy Independence"*. A review of Gusher of Lies in *The New York Times* called Bryce "something of a visionary and perhaps even a revolutionary." His fourth book, *Power Hungry: The Myths of "Green" Energy and the Real Fuels of the Future*, was published in April 2010 by PublicAffairs. *The Wall Street Journal* called *Power Hungry* "precisely the kind of journalism we need to hold truth to power." *The Washington Times* said Bryce's "magnificently unfashionable, superlatively researched new book dares to fly in the face of all current conventional wisdom and cant." Bryce appears regularly on major media outlets including CNN, FOX News, PBS, NPR, and the BBC. He received his B.F.A. from the University of Texas at Austin in 1986.

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Robert Bryce

INTRODUCTION

The European Union and the United States both rely on abundant and reliable electricity for every sector of their economies. Over the past decade, however, the two economic powerhouses have pursued notably different approaches to their electricity markets. Nations in the EU, in a quest to reduce the carbon emissions associated with fossil fuels, have mandated a shift toward the use of solar, wind, and other renewable-energy sources. The U.S. and its state governments have taken a far less intrusive approach, while at the same time expanding the development of natural gas and other fossil fuels.

As a result of this policy difference, there is now a sharp divide between the two economies on electricity prices and emissions reductions. Prices are higher in Europe, yet emissions reductions are greater in the U.S. Between 2005 and late 2013, the average price of residential electricity in the EU rose by 55 percent, and industrial electric rates jumped by 26 percent.[1] In 2012, the average household price of electricity among the 27 members of the European Union was $0.26.[2] In Denmark—a country that many wind-energy proponents admire—a kilowatt-hour of electricity for residential customers cost $0.41. In Germany—by far, Europe's biggest economy, largest electricity consumer, and most important manufacturer—the cost was $0.35. In Spain, another country that has provided huge subsidies to the renewable-energy sector, it was $0.29.[3]

Meanwhile, in the U.S., the average residential cost of electricity in 2012 was about $0.12.[4]

Even as Americans pay less for electricity because their federal and state governments impose fewer emissions-related mandates and regulations, the U.S. has reduced its emissions more than the EU

has. Between 2005 and 2012, U.S. carbon dioxide emissions fell by 10.9 percent. Over that same time frame, those emissions from the EU-27 fell by 9.9 percent. In fact, European policies have created perverse incentives whose results contradict the policy goals. In 2012, for example, Germany's carbon dioxide emissions *rose* by 1.3 percent over 2011 levels. (That same year, U.S. emissions fell by 3.9 percent.)[5]

Despite this contrast, influential voices in the U.S. federal and state governments—the president, senators and representatives, governors and state legislators—have been advocating (and sometimes implementing) emissions-related regulations that emulate Europe's. They are mistaken. Both the energy price divide and the difference in emissions reductions results are signs that Americans should not copy the EU's approach. Instead, the U.S. should adhere to the policies that have made it a world leader in energy production, electricity generation, and carbon-dioxide-emissions reductions.

I. HISTORY AND EFFECTS OF RECENT EU ENERGY POLICY MOVES

For much of the past decade, the European Union has been using government intervention in the market as a tool to reduce emissions of greenhouse gases. In 2005, the European Commission launched the world's first cap-and-trade system. Two years later, the EU agreed to enact its first "energy action plan," which resulted in the commitments known as "20/20/20": by 2020, European governments agreed that they would achieve three goals: establish legally binding agreements to cut their greenhouse gas emissions by 20 percent from 1990 levels; rely on renewables for 20 percent of their energy; and reduce their energy consumption by 20 percent from 2007 levels.[6]

The EU has indeed seen some reductions in its emissions since these policies were adopted. Between 2005 and 2012, carbon dioxide emissions in the EU-27 fell by 9.9 percent.[7] Nonetheless, it is far from certain that the bloc will meet its 20 percent reduction goal by 2020.

What is certain, though, is that these programs—along with big subsidies paid to renewable-energy providers—have resulted in dramatic increases in electricity prices. Between 2009 and 2013, the average energy bill for EU consumers increased by some 17 percent, while energy costs for industrial users jumped by 21 percent.[8]

The increased prices have not bought a well-functioning regulatory system. Instead, the EU is struggling to fix its cap-and-trade system, the Emissions Trading Scheme. The first and most extensive such system in the world, the ETS sets a cap on the total amount of greenhouse gases discharged by some 11,000 factories and other installations throughout the EU (as well as Iceland, Norway, and Lichtenstein). Each unit has permits to discharge a certain amount of greenhouse gases, and those that need to discharge more must buy capacity from those that need less. In theory, this should create incentives to reduce emissions without crippling industry. But the ETS has never worked so smoothly in practice.

In fact, the ETS has been embroiled in allegations of corruption for years. In 2009, Europol (the EU's criminal intelligence agency) discovered fraudulent activities in the system that had led to the loss of some $7 billion in tax revenue.[9] The ETS has also angered many of the biggest industrial users in Europe, some of which are taking legal action for what they say is an under-allocation of carbon allowances. The companies—which include Dow Chemical, Shell, and ExxonMobil—may seek as much as $5.5 billion in compensation.[10]

But the biggest problem for the trading scheme has been a collapse in its prices. In 2008, the spot price for one ton of carbon credit was about 25 euros.[11] By December 2013, that price had fallen to about 5 euros.[12] The price collapse was due to simple supply and demand. Too many credits were issued at the outset of the scheme. And since the program was created, demand for the credits has fallen. This price collapse has had an unforeseen result: a reduction in gas-fired electricity production. Natural gas–fired power plants emit about half as much carbon dioxide as comparable coal-fired ones.[13] But thanks to the

ETS, utilities have found it less expensive to buy carbon credits and burn coal than to pay Europe's high prices for natural gas.

In fact, coal use in Europe's biggest countries is rising. In 2012, coal use in both Spain and the U.K. jumped by 24 percent over 2011 levels. In France, coal consumption rose 20 percent; in the Netherlands, by 8 percent; and in Germany, by about 4 percent.[14] Along with the ETS, several other forces are also pushing up coal use. These include higher natural gas prices and a surge in low-cost coal imported from the U.S.[15] Another significant factor is the decline in Europe's ability to exploit its own natural gas resources.

In 2012, gas production in the U.K. fell by 14.4 percent when compared with 2011. In Germany, gas production fell by 12.5 percent; in France, by 10.2 percent; in Denmark, by 9.2 percent; and in the Netherlands, by 0.4 percent.[16] But those single-year decline numbers do not tell the full story. Since 2005, natural gas production in the U.K. has fallen by 53 percent. In Germany, production has dropped by nearly 43 percent; in Denmark, production is down by nearly 39 percent; and in Italy, it has dropped by 29 percent.[17]

Even without declines in production, Europe would face a vast gap between its natural gas usage and its production. In 2012, the 27 members of the EU produced about 6 trillion cubic feet of gas while consumption was roughly 17 trillion cubic feet.[18] And the EU will need more gas to meet its emissions-reduction targets because natural gas combustion produces only half the carbon emissions of coal. So the bloc faces a future of rising imports. For many European nations, the only realistic source will be one whose reliability seems open to question: Russia. The Russian gas giant Gazprom has twice cut off gas customers during the winter. It cut off gas supplies to Ukraine in the winter of 2005–06 and in 2008–09.[19] In 2012, Russia provided about 32 percent of the EU's natural gas imports.[20]

Germany: An Object Lesson

No other European country has been as aggressive in pursuing lower carbon emissions as Germany.

The EU's Share of Global CO_2

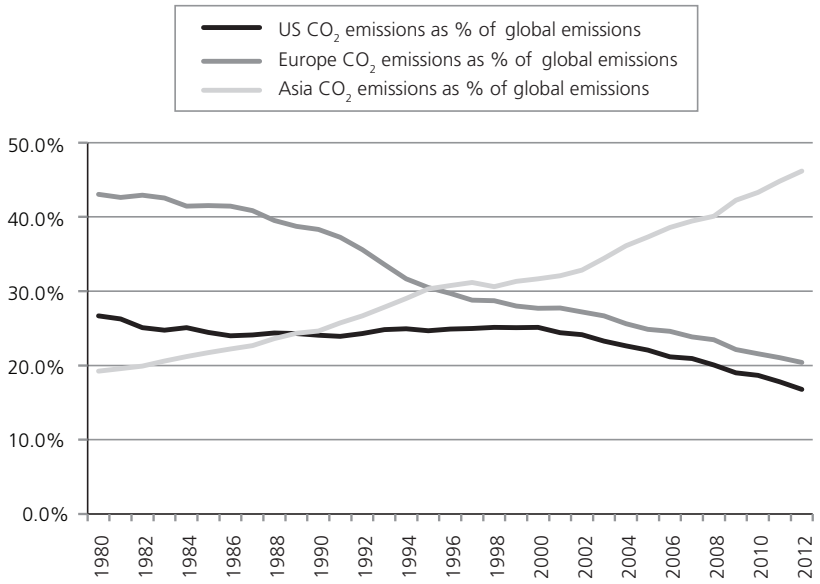
Though the EU is committed to addressing the possibility of climate change, the 27 member countries of the European Union account for only about 14 percent of global carbon dioxide emissions. (In 2011, the EU-27 emitted 4.6 billion tons of carbon dioxide.[21] That same year, global emissions of that gas totaled 33.7 billion tons.) For comparison: between 2003 and 2012, China's total carbon dioxide emissions grew by nearly 4.9 billion tons.[22] Therefore, even if the EU could somehow reduce its emissions dramatically, it's not clear that this would make a major difference in global carbon emissions, given the rapid rise of China and other Asian countries.

Consequently, Germany—even more than Europe as a whole—has experienced major increases in the cost of energy. Germany also provides a good example of how the rapid push for renewable energy has interfered with electricity markets and forced consumers to subsidize both renewable and conventional electricity generation. (This year, according to calculations done by the *Financial Times*, the cumulative cost of the subsidies given to renewable energy in Germany since 2000 will hit $149 billion.)[2]

In 2013, the surcharge that is added to German customers' electric bills to offset the cost of renewable-energy subsidies was 5.3 euro cents (7.25 U.S. cents) per kilowatt-hour.[24] This year, that surcharge was increased by nearly 19 percent, to 6.3 euro cents (8.5 U.S. cents) per kilowatt-hour. Today, then, the surcharges for renewables on German electricity amount to about 70 percent of the *full average retail price* of residential electricity in the United States.[25]

In 2013 alone, thanks to fees and surcharges for green energy, German consumers were charged some $26 billion for electricity that had a market value of just $4 billion.[26] Enormous additional costs are looming. Germany's environment minister recently estimated that over the next two and a half decades, the country may have to spend as much as $1.3 trillion as it tries

Figure 1. Regional GHG Emission Shares Since 1980



Source: BP Statistical Review of World Energy 2013

Since 1980, the share of global carbon dioxide emissions coming from the U.S. and Europe has declined dramatically. Over that same period, Asia's emissions have more than doubled their share. Therefore, any reductions in carbon dioxide emissions that are achieved by the U.S. or Europe are having a smaller effect over time.

to reach its emissions-reducing targets: producing 35 percent of its electricity from renewables by 2020 and 80 percent by 2050.[27]

In addition to the high costs, the rush to adopt more renewables has distorted the country's electricity markets so much that Germany now pays natural gas–fired generators to keep their units available when they are needed to keep the electric grid from going dark. Furthermore, rather than cut Germany's need for hydrocarbons, the *Energiewende* (or "energy revolution," as the program is called) has caused coal consumption in Germany to surge. The reason, as we have described above, is that buying emissions permits on the ETS is far less expensive than burning natural gas.

In 2012, Germany consumed about 1.6 million barrels of oil equivalent per day in the form of coal. That's the highest level since 2008.[28] In 2013, coal provided fully half of Germany's electricity, an increase of about 5 percent over 2012. Going forward, Germany's coal needs are likely to continue rising. About 7,300 megawatts of new coal plants are scheduled to come online by 2015.[29]

Nuclear energy might have provided a long-term alternative to coal. (In 2012, nuclear reactors provided about 100 terawatt-hours of electricity to Germany's electric grid, thus accounting for about 16 percent of the country's power. For comparison: in 2012, wind energy provided about 28 terawatt-hours, and solar provided about 46 terawatt-hours).[30] But in the wake of the Fukushima disaster in 2011, Germany shut down eight of its nuclear reactors.[31] And the German government has committed to retiring all its remaining nuclear reactors by 2022.[32] That move will also help drive the nation back to coal.

The combined rush to adopt renewables and quit nuclear power has had devastating effects on Germany's utility companies. Since 2008, E.On, the country's biggest utility, has seen its market capitalization fall by about two-thirds.[33] RWE,

Germany's second-largest utility, has had similar stumbles, with its stock price down by more than half since 2010.[34] One RWE official recently told *The Economist* magazine that "conventional power generation, quite frankly, as a business unit, is fighting for its economic survival."[35]

Of course, Europe's ailing economy, which has reduced demand for power, has also contributed to the problems facing Germany's electricity providers. Nevertheless, the price of electricity has fallen much further than it would have in an unencumbered market. The cause is the subsidies given to solar and wind generators. Between mid-2011 and late 2013, wholesale electricity prices fell from more than 60 euros per megawatt-hour to less than 40 euros. Those price reductions have made many conventional power plants uneconomic. The result: utilities across Europe are shutting gas-fired power plants. By one estimate, some 30,000 megawatts of gas-fired generation capacity have been shuttered since 2008.[36] Yet the traditional generators are still needed for periods when the sun isn't shining and the wind isn't blowing. In fact, the more dependent a region or nation is on renewables, the more it needs a backup supply of absolutely reliable power that won't be affected by shifts in the weather. Without such backup power, a grid that depends on renewables is certain to suffer brownouts and/or blackouts.

Accordingly, Germany has been forced to pay electricity generators to keep open gas-fired power plants that were rendered unprofitable because of the subsidies being paid to the renewable-energy providers. Those subsidies led to a surge of electricity production from wind and solar that helped drive down the price of power in the wholesale market. In early 2013, for example, E.On threatened to shut down a new gas-fired power plant, the Irsching-5, in Bavaria. The plant, which had cost $500 million to build and could generate 846 megawatts at top capacity, was operating only 25 percent of the time. Under Germany's energy policies, E.On's CEO in March 2013 declared that it was "not possible to operate gas-fired power plants however clean, efficient and good for the climate and the country they may be."[37]

After weeks of negotiations, E.On announced that it had struck a deal with German regulators and a regional grid operator, in which the operator agreed to pay the company tens of millions of euros per year in "capacity payments"—or, to put it more simply, subsidies—to keep open both the Irsching-5 plant and a second facility, the Irsching-4.[38]

Consequently, Germany's electricity consumers are now paying high energy bills to subsidize *both* renewable and conventional electricity generation.

The Backlash Against Expensive Regulations

The expensive governmental interventions in the EU's energy markets have provoked a backlash from industry. In September 2013, the Federation of German Industries (BDI), an influential trade association, declared that the costs of *Energiewende* had become an enormous burden and that "the international competitiveness of German industry is in danger."[39] And the BDI's director-general, Markus Kerber, warned that companies in Germany "are already starting to lower investments" in the country.[40] At about the same time, the German Chemical Industry Association said that "spiralling energy costs will soon drive us into the wall. It has become dangerous."[41]

In late 2013,giant German industrial company BASF estimated that it could save nearly $700 million per year in energy costs if it were to relocate all its plants to the U.S. That clearly will not be happening but is indicative of the energy-cost advantage that the U.S. now enjoys. And that advantage does have practical consequences. BASF, the world's biggest chemical maker by sales, has doubled the amount of capital that it invests in the U.S. In 2010, the company was investing about $500 million per year in the U.S. By 2013, that figure had jumped to $1 billion per year, and BASF expects to continue its annual investments at that level through 2017.[42]

The soaring cost of energy is also hurting individual Germans. In September 2013, *Der Spiegel*, one of Germany's most respected publications, reported that some 300,000 German residences were

having their electricity cut off because of unpaid bills. Soaring energy costs are creating a situation where increasing numbers of Germans are living in "energy poverty"—a state of deprivation due to low consumption of energy. It is striking that the term, which is usually used in discussions of poor people in developing nations, should be useful in describing Germany, one of the world's richest countries.

Countries throughout the European Union have begun scaling back their subsidies and mandates for renewable energy because of soaring costs and dubious environmental gains. The big news came on January 22, 2014, when the European Commission scrapped plans to mandate that a predetermined percentage of electricity come from renewables by 2030 in member nations. Instead, it set an EU-wide goal for renewables of "at least 27 percent." That's an increase over the 20 percent goal that EU members are supposed to achieve by 2020, but far short of what renewable-energy lobbyists wanted. One wind lobbyist called the new goal "very weak" and a "non-target."[43]

Meanwhile, throughout the European Union, countries have been slashing renewable-energy subsidies. In 2012, both France and Germany cut subsidies for solar energy.[44] And Germany has said that it will end its solar subsidies completely next year.[45] In 2013, Spain—where the government has piled up some $35 billion in debt (known as the tariff deficit) by subsidizing renewable energy—announced that it, too, was cutting payments for renewables.[46] In late 2013, the U.K. and Romania announced that they also would cut subsidies for renewables. The U.K. is reducing subsidies for onshore wind and solar.[47] Romania is cutting subsidies for wind, solar, and small hydropower projects.[48]

Price Comparison

As European consumers and industrial users struggle with mounting energy costs, matters look very different across the Atlantic. Electricity and natural gas prices in the United States are significantly lower than they are in Europe, giving the U.S. a competitive advantage. Industrial rates for electricity in the U.S. are less than half those in Germany and about 38 percent lower than industrial rates in the Netherlands. In December, the Center for European Policy Studies, a Brussels-based think tank, found that European steelmakers pay twice as much for electricity and four times as much for natural gas as steel producers operating in the U.S.[50] American consumers are also benefiting directly from the U.S. energy market by paying far less for electricity than Europeans are, as we have described above. In 2012, the average German residential electricity customer was paying nearly

Germany's Share of Global CO_2

In 2012, Germany emitted 815 million tons of carbon dioxide, or about 2.4 percent of global emissions of that gas. While it's true that Germany has had success at cutting its emissions, which fell by 7.7 percent between 2005 and 2012, it's also apparent that Germany's actions alone will not have a major effect on global emissions. Meanwhile, the U.S.—without imposing nationwide renewable mandates or cap-and-trade policies—has had better success at cutting its carbon dioxide emissions than Germany has. Between 2005 and 2012, U.S. carbon dioxide emissions fell by 708 million tons—a reduction nearly as large as the emissions of the entire German economy.[49]

Figure 2. Residential Cost of Electricity in US Versus Other Developed Countries in 2012

Country	Cost per kilowatt-hour (in US dollars)
EU	$0.26
Denmark	0.41
France	0.19
Germany	0.35
Ireland	0.26
Italy	0.28
Japan	0.26
Netherlands	0.24
Spain	0.29
Sweden	0.25
Switzerland	0.22
U.K.	0.20
U.S.	**0.12**

Source: Eurostat and International Energy Agency (IEA)

Figure 3. Cost of Natural Gas and Electricity for Industrial Users in European Countries and the U.S., 2012 (in U.S. Dollars)

Country	Natural Gas	Electricity
Belgium	$35.99	$126.61
Czech Republic	48.82	144.87
Denmark	N/A	104.15
Finland	45.75	103.89
France	51.14	116.33
Germany	51.04	148.71
Greece	66.76	133.74
Hungary	47.85	131.57
Ireland	45.58	155.2
Italy	N/A	291.79
Luxembourg	50.53	111.7
Netherlands	38.62	109.51
Poland	43.96	114.59
Portugal	52.70	147.3
Slovak Republic	52.53	169.74
Slovenia	64.38	117.77
Spain	43.97	N/A
Sweden	63.32	89.19
Switzerland*	71.71	130.24
Turkey*	41.15	148.22
U.K.	38.45	134.17
U.S.	**12.74**	**66.98**

Source: IEA, Key World Energy Statistics 2013, 43

*Not a member of the European Union
Note: Natural gas prices are calculated on the gross calorific value of 1 megawatt-hour of electricity generated from natural gas. Electricity prices are for 1 megawatt-hour.
N/A: Data not available from IEA

three times as much as his U.S. counterpart. The average Dane was paying about 3.4 times as much.

The price differences for electricity are paralleled by a similar gap in natural gas prices. The U.S. now has a price advantage for natural gas that is second to no other country on the planet, with the possible exception of Qatar. Since 2009, U.S. natural gas prices have averaged about $4 or less per million BTU.[51] In the EU, that same amount of gas will cost three to four times as much. In Japan, it will cost about five times as much.[52] That kind of price differential has important consequences for industry. Between 2010 and 2012, for example, the cost of gas for steel production in the EU jumped by 34 percent.[53] (Over that same time period, the spot price of natural gas in the U.S. fell by 37 percent.)

2. BEHIND THE U.S. PRICE ADVANTAGE

Like Europe, the U.S. has seen a push for the use of renewables in electricity generation. Over the past decade or so, a majority of U.S. states have implemented renewable portfolio standards or renewable-energy goals.[54] The result of those mandates, along with significant subsidies at the state and federal levels, has been rapid growth in the production of non-hydro renewable energy. Between 2005 and 2012, the production of energy from wind, biomass, and solar grew by about 72 percent. In 2012, those non-hydro renewables provided 2.3 percent of domestic energy use, or about 1 million barrels of oil equivalent per day.[55]

However, U.S. policies have been neither so extreme nor so centralized as those of Europe. Moreover, governments in the U.S. have supported—or, at least, not suppressed—a remarkable boom in the supply of natural gas, brought about by new technologies for its extraction. (A notable exception is the state of New York, which continues to have a ban on hydraulic fracturing.)

Over the past half-decade or so, domestic drillers have perfected the use of horizontal drilling and hydraulic fracturing, and in doing so have dramatically increased their ability to produce oil and natural gas from shale formations. The result has been dramatic increases in oil and natural gas production, which has lowered the price of natural gas and thus helped keep electricity prices far lower than they are in Europe.

In 2013, U.S. oil production rose by about 1 million barrels per day, the biggest year-on-year increase since record keeping began back in 1859.[56] Production gains are so dramatic that the U.S. could soon surpass both Russia and Saudi Arabia in daily production. (To put that increase in perspective, consider that in 2013, *just the increase* in U.S. oil production equaled the combined energy output of all the solar panels, wind turbines, and biomass-to-energy plants in the country.)

Meanwhile, in the realm of natural gas, the U.S. has already surpassed Russia as the world's biggest producer. In 2013, U.S. natural gas production averaged 70 billion cubic feet per day, a record high for domestic production and a 41 percent increase over 2005 levels.[57]

That surge has helped lower natural gas prices and spur dramatic increases in consumption. For instance, between 2005 and 2012, natural gas consumption jumped by 1.7 million barrels of oil equivalent per day. In contrast, over that same period, non-hydro renewable production increased by 604,000 barrels of oil equivalent. Thus, over that seven-year period, *just the increase* in natural gas consumption in the U.S. was nearly triple the increase in energy production that was seen in solar, wind, and biomass production.

Even as it has increased its oil and gas production, the U.S. also has seen a significant *decrease* in its carbon dioxide emissions. Between 2005 (when the EU implemented its Emissions Trading Scheme) and 2012, U.S. emissions of carbon dioxide fell by 10.9 percent.[58] The U.S. has not imposed national renewable-energy mandates, an emissions trading system, or a carbon tax; yet it has seen a bigger percentage decline in its carbon dioxide emissions than the EU has.

As Europe spends tens of billions of dollars on renewable-energy mandates and subsidies, the U.S. is reaping hundreds of billions of dollars worth of economic stimulus from lower-cost natural gas and oil. A September 2013 study by consulting firm IHS estimated that development of "unconventional" oil and gas (a term that applies to shale and other so-called tight geological formations) is adding nearly $300 billion, or a full 2 percent, to America's annual GDP. IHS also estimated that more than 2.1 million jobs in the U.S. are now supported by unconventional oil and gas activity. That number could rise as high as 3.9 million jobs by 2025.[59]

A few weeks after the IHS study came out, Wallace Tyner, an energy economist at Purdue University, along with two of his Purdue colleagues, estimated that the positive economic impact of the shale revolution on the U.S. economy was even higher—some $473 billion per year, or about 3 percent of GDP and that those benefits would likely continue until 2035.[60]

Those price advantages enhance other competitive advantages that the U.S. has in sectors ranging from transportation and manufacturing to industrial processing and fertilizer production. It is no surprise, then, that low-cost natural gas is attracting foreign investors that are building new industrial facilities to use the resource. Last year, for example, an Egyptian company, Orascom, began construction on a new $1.8 billion fertilizer plant in Iowa,[61] and Vallourec, a French company, opened a new $1.1 billion steel mill in the Rust Belt town of Youngstown, Ohio.[62]

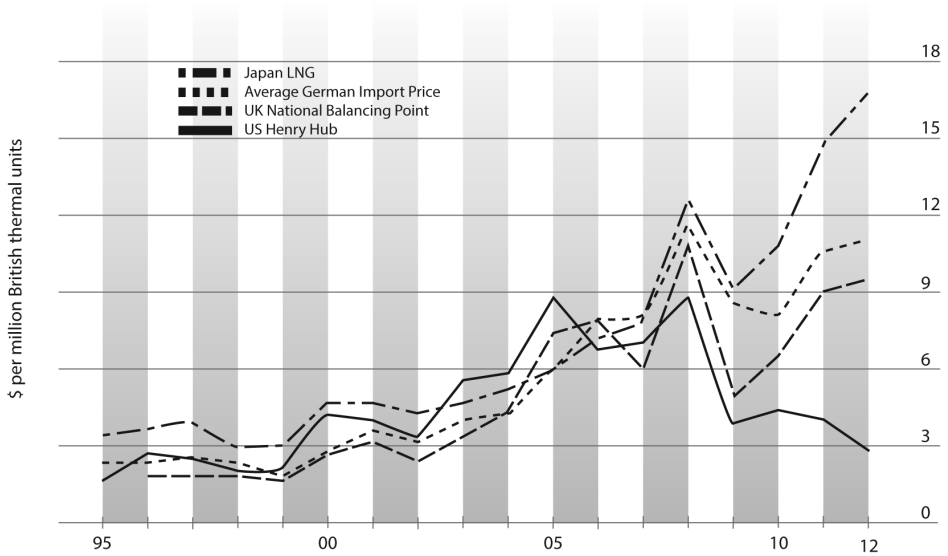
Foreign companies are also investing directly in the U.S. oil and gas sector. Between 2008 and 2012 alone, foreign companies invested more than $26 billion in the U.S. drilling sector.[63]

3. THE RISKS OF EMULATING THE EU'S ENERGY POLICIES

As we have seen, the European Union's mandates for the use of renewables have resulted in higher prices (directly paid for electricity as well as indirectly paid via subsidies extended to renewable and conventional power suppliers). And the EU's cap-and-trade regime has distorted markets, discouraging the use of both nuclear and natural gas power plants and thus helping to spur increased use of coal, which emits far more carbon dioxide for the electricity that it yields.

Despite this record, some policymakers in the U.S. are pushing for this country to adopt the policies that have failed the EU. In 2012, in his State of the Union address, President Obama called for a national clean energy standard that would mandate the use of renewable energy.[64] In December 2013, the president signed a memorandum directing all branches of the federal government to get at least 20 percent of their electricity from renewable sources by 2020. If achieved, this would more than double renewable use by the federal government. In a December 5 press release, the White House claimed that the move would "reduce pollution in our communities, promote American

Figure 4. Natural Gas Prices in the U.S., Germany, U.K., and Japan, 1990–2012 (in U.S. Dollars)



Source: BP Statistical Review of World Energy 2013

Over the past decade or so, while natural gas prices in other major developed countries have been increasing, those same prices in the U.S. have been flat or falling. That low-cost gas is attracting industry and creating jobs.

energy independence, and support homegrown energy."[65] The mandate on renewable electricity use for federal agencies is important because the federal government consumes roughly 57 terawatt-hours of electricity per year.[66] That is approximately 1.5 percent of all the electricity sold in the U.S.[67]

Meanwhile, in the U.S. Senate, Jeff Bingaman (D-NM) introduced a bill in 2012 for a national "clean energy" standard that would have mandated big increases in the use of renewable energy. His bill had eight cosponsors, one of whom was John Kerry, now the U.S. secretary of state.[68]

At the state level, some legislators have already enacted European-style programs for renewable-energy use. Indeed, as we have described in an earlier paper, an ample majority of U.S. states now have renewable-sources mandates in place.[69]

How might EU policies affect U.S. electricity prices? We can estimate that impact by comparing the amount of electricity generated by solar and wind—which provided about 3 percent of the electricity generated in the U.S. in 2012—with the higher costs that would come with ramping up the output of those sources to meet a 27 percent mandate[70] (the level specified in the European Commission's January 22, 2014, press release).

To simplify the calculations, let's assume that there will be no increase in electricity consumption in the U.S. over the coming years. Further, let's assume that half of the mandated increase in renewable electricity production will come from solar and the other half will come from wind and that the costs of those energy sources will remain flat. The 50-50 allocation for solar and wind is reasonable, given the ongoing rural and suburban backlash against large wind projects and the rapid growth in solar. (In 2012 alone, solar capacity in the U.S. grew by 84 percent.) Furthermore, Germany is now producing nearly twice as much electricity from solar as it is from wind.

Now, let's look at the difference in the cost of electricity generated from natural gas with that from

wind and solar. According to the Energy Information Administration, for electricity generation plants entering service in 2018, producing a megawatt-hour of electricity from natural gas will cost $65.60. Generating that same amount of energy from onshore wind will cost $86.60. Therefore, producing a megawatt-hour of electricity from wind will cost an additional $21, or 32 percent, more than producing it from natural gas. Producing a megawatt-hour of electricity from solar photovoltaic modules will cost $144.30. That's an additional $78.70, or 120 percent, more per megawatt-hour.[71] (These calculations are purposely ignoring the even-higher-cost renewable sources of offshore wind, which is expected to cost $221.50 per megawatt-hour, and solar thermal, which is expected to cost $261.50 per megawatt-hour.)

In 2012, domestic electricity sales totaled 3,694 terawatt-hours.[72] Of that sum, we generated about 121 terawatt-hours from wind and 4 terawatt-hours from solar.[73] A 27 percent national goal would mean that 997 terawatt-hours of domestic electricity would have to be generated from wind and solar. If we subtract the existing solar and wind production (125 terawatt-hours) from the mandated sum of 997 terawatt-hours, the U.S. would need to generate an additional 872 terawatt-hours of renewable electricity. And as specified, half of that amount, or 436 terawatt-hours, would have to come from solar, and the remaining 436 terawatt-hours would have to come from wind.

By calculating the price differential between natural gas–fired electricity and those for wind and solar, it is apparent that the additional cost of meeting the 27 percent renewable-energy mandate would be roughly $43.4 billion per year.[74] While those additional electricity costs will be spread across the residential, commercial, and industrial sectors, the added cost of the renewable mandates will ultimately be borne by individual consumers and households.

There are now about 115 million households in the U.S.[75] Thus, the additional cost per household of a national 27 percent renewable-energy mandate would be about $377 per year, or $31.41 per month. In 2012, the average monthly electricity bill for residential customers in the U.S. was $107.28.[76] Therefore, the net effect of adopting a renewable-energy goal like that adopted by the EU will be increased electric costs across the entire economy that will, in effect, increase the monthly electricity bill of an average household by about 29 percent.

It is important to note, though, that we need not confine ourselves to speculation about the impact of EU policies in the United States. We have a real-world test case, whose history confirms that mandates and market interventions raise electricity costs while failing to achieve globally significant reductions in carbon emissions.

California: EU Policies in an American State

California, often considered a bellwether of national trends, has adopted a panoply of EU-model low-carbon policies: California legislators have passed mandates on everything from renewable electricity to lower-carbon motor fuel. And the state now has its own cap-and-trade system.

As a result, the Golden State has some of the most expensive electricity in the country. The cap-and-trade regime alone will cause rate increases of up to 8 percent, according to the California Public Utilities Commission.[77] The mandates and other interventions will almost certainly make the state's electricity even more expensive. In 2012, the average price of a kilowatt-hour of electricity in California was 13.53 cents.[78] The nationwide average price was 9.87 cents.[79] California also has some of the most expensive industrial and commercial rates in the continental United States. In 2012, industrial electric rates in California were 10.49 cents per kilowatt-hour. Only five other states in the continental U.S.—all of them on the East Coast—had higher industrial rates.[80]

But those figures actually understate some of the energy premiums being paid by California residents. In November 2013, according to the Bureau of Labor Statistics, residential electricity users in the region around Los Angeles were paying an average of 21.5 cents per kilowatt-hour—66 percent higher than average for U.S. residential users that month.

Southern California residents were also paying significantly more for gasoline and natural gas than consumers in other states.[81]

Furthermore, according to the latest data from the Jacksonville Electric Authority, which does quarterly surveys of residential electric rates, California now has the dubious distinction of having three of the six most expensive utilities in the United States. The October 1, 2013, data show that a residential customer who relies on Southern California Edison (which charges more than any other utility in the country) will pay $316.06 per month to consume 1,250 kilowatt-hours of electricity. By comparison, a residential customer in San Antonio, Texas, who uses that same quantity of energy will pay $120.86.[82]

A. The Renewable Mandate

By law, California's utilities are required to get one-third of their electricity from renewable sources by 2020.[84] Implementing that mandate will be costly. In 2009, the California Public Utilities Commission (CPUC) said that the 33 percent goal was "highly ambitious, given the magnitude of the infrastructure build-out required."[85] The CPUC estimated the cost of that infrastructure "at approximately $115 billion between now and 2020."[86] That $115 billion amounts to some $3,100 for every Californian.[87]

Infrastructure needs are part of the reason a 2013 study by Navigant Consulting found that the renewable-energy mandates "will likely lead to increased prices and rates as utilities attempt to incrementally phase renewable energy into their portfolios."[88] The study, which was done for a coalition of business groups called Californians for Affordable and Reliable Electricity, pointed out that renewable-energy resources typically cost more (on a per-unit-of-energy basis) than conventional, fossil-based resources and generally require new transmission capacity.[89] Those facts, combined with the fact that California's biggest utilities will have to add large volumes of new renewable resources by 2020, mean that, according to Navigant, many costs associated with the renewable mandates "have not yet begun to be reflected in rates. Higher cost resources going forward are … being added to their portfolios at a higher rate than before."

More evidence of renewable-energy policies' surging costs can be seen in documents filed by one of the state's biggest utilities, Pacific Gas & Electric, in 2013. The utility said that the cost impact of its renewable-energy contracts have "not yet been captured on customer bills. PG&E forecasts that its energy procurement costs will increase in 2014. The cost of generation from renewable sources is a contributing factor to PG&E's procurement cost increase, which is expected to increase the system average bundled rate by 7.9 percent in 2014."[90]

In exchange for these extra present-day and future costs, California policy counts on lower carbon emissions. But on this point, too, the Golden State's experience is like the EU's: in 2012, the state's carbon dioxide emissions *rose* by nearly 11 percent over 2011

Figure 5. Residential Electric Rate Comparison:
Three of the Six U.S. Utilities with the Most Expensive Electricity Are in California

Location	Entity	Total cost of 1,250 kilowatt-hours
Southern California	Southern California Edison	$316.06
Fairbanks, AK	Golden Valley Electric Association	271.25
Newark, NJ	Public Service Electric & Gas Co.	206.05
Los Angeles, CA	Department of Water & Power	199.73
Milwaukee, WI	We-Energies	184.85
Sacramento, CA	Sacramento Municipal Utility District	180.66

Source: Jacksonville Electric Authority, "Quarterly Electric Rate Comparison"; data current as of October 1, 2013[83]
Note:Costs shown include base rates, fuel adjustment charges, and applicable franchise fees.

levels. The rise was largely attributed to the shutdown of the San Onofre nuclear plant and the subsequent need to burn more natural gas to replace electricity that had come from the reactor.[91]

B. The Storage Mandate

In addition to the cost of renewables and cap-and-trade, the state must also cope with another set of costs imposed by its commitment to renewables. As we have mentioned, gas-fired plants have been required to back up renewables during times when the sun doesn't shine and the wind doesn't blow, so using renewables has been associated with higher carbon emissions. In an attempt to address this problem, the CPUC is requiring the state's large utilities to invest in technologies for storing electricity. Unfortunately, aside from a small handful of pumped-hydro systems, there are no proven large-scale electricity storage technologies currently available. (And pumped-hydro systems are expensive and require the right geography and abundant water resources). Nonetheless, the commission's mandate requires companies to install enough storage by 2024 to power about 1 million homes. In response to the commission's proposal, Southern California Edison has said that the move "could cost up to $3 billion with uncertain net benefits for customers."[92]

C. The Solar Subsidy

California is rapidly adding rooftop-solar installations. Those systems will also add costs. In August, the CPUC released a report on a policy known as "net metering," which allows homeowners, school districts, and businesses to offset the cost of their electricity consumption with the power that they produce from their rooftop solar installations. By 2020, according to the report, the net-metering policy will cost California's *non*-solar customers about $1.1 billion per year.[93]

In short, California, like the EU, has adopted policies that are drastically increasing the cost of energy in the name of climate change. But those policies will, even in the best-case scenario, have only an infinitesimal effect on carbon dioxide emissions and therefore, on global climate.

4. MAINTAINING THE U.S. AADANTAGE

For decades, the U.S. economy has prospered thanks to cheap, abundant, reliable supplies of energy. Domestic policymakers should focus on ensuring that this remains the case. Therefore, they should not follow the EU's lead.

Instead, they should eliminate renewable-energy subsidies and remove excessive restrictions on coal-fired electricity generation plants. If policymakers want to continue reducing carbon dioxide emissions, they should encourage "N2N" (natural gas to nuclear) policies and not impose unnecessary regulations on the process of hydraulic fracturing, which is essential to the production of natural gas from shale. Finally, to ensure the continued growth of the U.S. energy sector, the industry and the government must maintain and even improve its high safety standards.

Eliminate Renewable-Energy Subsidies

For years, the production tax credit, the primary subsidy for wind-energy projects, has paid wind-energy generators for each kilowatt-hour of electricity they produce. That subsidy has been the primary

California's Share of Global CO_2

In 2010, California's carbon dioxide emissions totaled 370 million tons.[94] At that level, the Golden State produces about 1 percent of global carbon dioxide emissions.[95] To put those figures into perspective, consider that since 1982, global carbon dioxide emissions have been increasing by an average of about 500 million tons per year.[96] The vast majority of those emissions increases are coming from Asia, which has been increasing its emissions by an average of about 390 million tons per year since 1982. Therefore, even if California could somehow reduce its carbon emissions to zero, that reduction would not even cover one year of the annual increases in carbon dioxide emissions that are now occurring in Asia.

driver of the expansion of wind energy in the United States. It has also been the culprit in the distortion of U.S. electricity markets, as it has led to a situation known as "negative pricing."

In some markets, in order to collect the subsidy, wind generators have actually been paying grid operators to take the electricity they are generating so that they can collect the tax credit, which, in 2013, was 2.3 cents per kilowatt-hour. In some cases, the owners of wind-energy projects *have been able to pay grid operators as much as $34 per megawatt-hour to take their electricity*—and still make money.[97] When grid operators receive these payments, wholesale electricity prices in some markets have dropped dramatically. As has happened in Europe, those price reductions have been particularly problematic for the companies that own nuclear reactors, which have relatively high fixed costs.

In a 2012 study of the production tax credit, David Dismukes, associate director of the Center for Energy Studies at Louisiana State University, summarized the problem with the subsidy: it facilitates "market distortions in wholesale electricity markets, harming reliability by causing essential conventional generation, such as natural gas, to operate at times at a loss, or simply not operate at all."[98] In addition, the study—which Dismukes wrote for the American Energy Alliance, a conservative advocacy group—concluded that wind generation "has already led to billions in hidden costs for electricity consumers to cover the costs of interconnecting these intermittent, remotely-located resources, and providing backup generation when federally-subsidized wind resources fail to perform."[99]

On December 31, 2013, the production tax credit expired. But that doesn't mean that the subsidies have stopped. Existing wind projects that began generating electricity while the subsidy was in effect will continue collecting the lucrative tax credit. (The subsidy usually lasts for the first ten years of a given project's operation.)[100] And as those subsidies continue to be doled out, the wind industry's preferred status will continue distorting the wholesale power market.

Lobby groups like the American Wind Energy Association have been trying to get the tax credit extended.[101] In 2012, after a lengthy battle, the wind-energy subsidy was extended for one year, at a cost to taxpayers of $12 billion.[102] In late 2013, the congressional Joint Tax Committee estimated that another one-year extension would cost taxpayers an additional $6.1 billion.[103] Policymakers should not renew the production tax credit. Wind energy is now a mature industry that doesn't need more taxpayer handouts.

Remove Excessive Restrictions on Coal-Fired Generators

Although natural gas clearly has a number of advantages over coal, natural gas prices have historically been volatile. Therefore, there is a risk to the nation in relying too much on natural gas. Moreover, coal is the largest source of electricity for about half of all the states in the U.S.[104] In 2013, coal provided more electricity than any other source, with about 39 percent of the domestic market.[105] So the U.S. cannot and should not quit using coal to generate electricity.

The U.S. has about 237 billion tons of coal reserves—about 28 percent of the world's known deposits. That is more than 250 years of supply at current rates of production.[106] To say that the U.S. is the Saudi Arabia of coal is a serious understatement; the U.S. is the OPEC of coal. America's coal resources contain 900 billion barrels of oil equivalent.[107] This is nearly as much as the 1.2 trillion barrels of proven oil reserves held by OPEC.[108]

Despite America's abundance of coal, the U.S. Environmental Protection Agency (EPA) in 2013 declared that it would prohibit the construction of new coal-fired power plants unless they could reduce their carbon dioxide emissions through the use of carbon capture and sequestration, a technology that has never been proved at commercial scale. Furthermore, the Obama administration is moving forward with new regulations including the Mercury and Air Toxics Standards rule and the Cross-State Air Pollution Rule, which could force

about 8 percent of all existing coal-fired power plants to close.[109]

Effectively outlawing the use of coal for power generation in the U.S. would be a serious mistake, particularly given that countries in Asia and Europe continue to build new coal-fired power plants. In fact, global coal demand is growing faster than that for any other fuel. Between 2002 and 2012—a period during which U.S. coal consumption fell by about 21 percent—global coal consumption soared, growing by 26.5 million barrels of oil equivalent per day. The growth in coal demand nearly matches the global growth in consumption of oil, natural gas, nuclear, and wind energy *combined* over that time period.[110] And the International Energy Agency expects coal demand to continue rising. In December 2013, the agency issued a report concluding that "coal demand knows only one direction: up." By 2018, the agency projects that global demand will increase to some 92 million barrels of oil equivalent per day.[111] If that occurs, global coal use could exceed global oil demand.

There is no need to eliminate coal to achieve lower carbon emissions and reduced pollution. The newest coal-fired power plants being built in the U.S. are far cleaner and more efficient than their older counterparts. Consider, for example, the 1,600-megawatt Prairie State Energy Campus, located in southern Illinois, which began operating in 2012. The plant, which cost about $5 billion, uses supercritical combustion technology to wring more electricity from the coal, and it produces about 0.182 pounds of sulfur dioxide and 0.07 pounds of nitrogen oxide per megawatt-hour.[112] At that level, the facility will easily comply with the EPA's Cross-State Air Pollution Rule, which limits power-plant emissions to 0.30 pounds of sulfur dioxide and 0.17 pounds of nitrogen oxide per megawatt-hour.[113]

Four decades ago, Congress made a serious mistake when it passed the Power Plant and Industrial Fuel Use Act, which effectively prohibited the building of new natural gas-fired power plants.[114] Government should not repeat this error by banning any energy source—especially not a source that the U.S. has in superabundance, on which it has relied for more than a century. The U.S. needs coal-fired generation to maintain a diverse energy portfolio. To forgo the use of coal when global consumption of that fuel is growing so quickly would forgo a valuable resource at home while failing to have a significant impact on global carbon emissions (primarily because of rising coal use in Asia, Europe, and elsewhere).

N2N

Natural gas and nuclear energy have been key contributors to the growth of the U.S. economy. They have also been essential elements in the reduction of America's carbon dioxide emissions. In September 2013, Max Luke, a policy analyst at the Breakthrough Institute, estimated that the combination of natural gas and nuclear energy has reduced America's carbon dioxide emissions by about 54 billion tons over the last six decades. For comparison, Luke found that the wind, solar, and geothermal reduced emissions by just 1.5 billion tons over that same period.[115]

N2N—natural gas to nuclear—provides the best "no regrets" energy policy because natural gas and nuclear provide significant environmental benefits with relatively low economic costs. Natural gas and nuclear are lower-carbon than oil or coal. They emit almost zero air pollution. Better yet, both sources have high power densities, meaning that they generate large amounts of energy from relatively small footprints. And they can be scaled up to meet future demand.

While natural gas consumption in the U.S. is rising rapidly (up by nearly 16 percent between 2005 and 2012), the U.S. nuclear sector is struggling. Several factors, including the age of the reactor fleet, are contributing to the nuclear sector's difficulties. But as we have described, one of the biggest problems for the owners of domestic nuclear reactors is excessive subsidies provided to wind-energy generators. Those subsidies, by driving down the cost of wholesale electricity, severely cut revenue for the owners of reactors.

Since 2005, nuclear production in the U.S. has declined slightly. That decline is likely to continue over the next few years, as a number of reactors have recently been permanently shut down, including ones

at San Onofre in California, Kewaunee in Wisconsin, and Crystal River 3 in Florida. At the end of this year, another reactor, Vermont Yankee, will also be retired. Five new reactors are now under construction (in Georgia, South Carolina, and Tennessee), but four are unlikely to come online before 2018. And given ongoing reactor retirements, the new capacity coming online will likely serve only to keep U.S. nuclear energy production at, or near, current levels.

To maintain a diverse energy portfolio, the U.S. should not abandon nuclear technology, where it has long been a leader. (In fact, the U.S. has long been the world's biggest producer of electricity from nuclear. In 2012, the U.S. produced about 810 terawatt-hours of electricity from nuclear, nearly twice the amount produced by France.)[116] Policymakers should support ongoing research and development of small modular reactors as well as new, passively safe reactor designs. Furthermore, if the U.S. is going to adopt policies aimed at reducing carbon dioxide emissions, it must encourage the deployment of nuclear energy, which is the only zero-carbon source of reliable, 24/7 electricity.

Keep Primary Regulatory Oversight of Drilling and Hydraulic Fracturing at the State Level

Although the environmental and economic benefits of increased natural gas production and consumption are obvious, some "green" groups want to remove regulatory oversight of the drilling sector from the states and hand it to the EPA.[118] This would be a mistake. For decades, the states have done a good job of regulating the drilling sector. Moving that to the federal government could slow the growth of one of America's most important sectors.

Some groups are pushing an even more radical agenda: they want to ban hydraulic fracturing, the technology that drives much of the natural gas boom. Over the last few decades, hydraulic fracturing—a process that uses high-pressure pumps to inject water, sand, and small quantities of chemicals into oil-and-gas-rich rock in order to liberate those hydrocarbons and bring them to the surface—has been used safely on more than 1 million wells in the U.S.[119]

The U.S. Carbon Dioxide Advantage

In May 2012, the International Energy Agency reported that U.S. carbon dioxide emissions had fallen by 92 million tons, or 1.7 percent, since 2011, "primarily due to ongoing switching from coal to natural gas in power generation." The Paris-based agency continued: "U.S. emissions have now fallen by 430 million tons (7.7 percent) since 2006, the largest reduction of all countries or regions." The IEA credited the reduction to "a substantial shift from coal to gas in the power sector."117 In other words, market forces in the U.S. (the flood of natural gas into the marketplace that was made possible by innovation in the oil and gas sector) have done more to cut carbon dioxide emissions in America than all the government-mandated programs in Europe.

Despite that long safety record, activists in New York have persuaded that state's regulators to impose a moratorium on hydraulic fracturing. France, too, has banned hydraulic fracturing.[120] Greenpeace has launched an effort to ban the process in Britain.[121] An American environmental group, Food & Water Watch, says that it wants to implement a ban on the process in the U.S.[122] Furthermore, MoveOn.org, a liberal activist group, has launched petition efforts to ban hydraulic fracturing on all public lands. By late January, that petition had about 61,000 signatures.[123] MoveOn.org has also launched efforts to ban the process in California, Massachusetts, Florida, Illinois, Ohio, Colorado, and elsewhere.[124]

The hard reality is that the U.S. must continue drilling for oil and gas—and it must continue using hydraulic fracturing—if it wants to keep energy cheap, abundant, and reliable. Any attempt to remove regulatory oversight from the states and give it to federal agencies would impose unnecessary costs. Policymakers should resist such proposals, and they should turn away efforts to ban hydraulic fracturing. The shale revolution was made possible by hydraulic fracturing. If it is banned, the U.S. could soon see natural gas prices that are as high, or higher, than what is now seen in Europe.

Remain Vigilant on Safety

If the U.S. is to maintain its energy advantage over the rest of the world, American citizens must be assured that the energy sector is operating safely. Unfortunately, over the past year or so, a number of high-profile accidents involving pipelines and trains have occurred. In March 2013, a pipeline carrying heavy crude burst, spilling about 5,000 barrels of oil near the town of Mayflower, Arkansas. In July, a train carrying crude oil from North Dakota derailed in Lac-Mégantic, Quebec; the ensuing fire destroyed much of the town and killed more than 40 people. In December, another accident and fire involved a train carrying crude oil;[125]tThe accident, which occurred near Casselton, North Dakota, did not result in any deaths but required the temporary evacuation of some 2,000 local residents.[126] Major accidents in the oil and gas sector are rare. But like accidents in the airline industry—which are also very rare—they receive tremendous amounts of media attention.

One way to reduce high-profile accidents on rail lines, of course, is to speed the permitting process for new pipelines, which are a far safer method of transportation. And while the spotlight is now clearly on the transportation of energy, the industry also needs to be vigilant about safety—and continue to improve its safety protocols—in all its operations, from managing refineries and drilling rigs to proper training of its truck drivers.

CONCLUSION

To address the issues of carbon dioxide and climate change, the European Union in general and Germany in particular have rushed to impose mandates and subsidies for renewable energy upon the market. Those policies have resulted in dramatically higher energy costs. Meanwhile, thanks to ongoing innovation in the U.S. oil and gas sector and the profusion of natural gas that resulted from that innovation, the U.S. has reduced its carbon dioxide emissions more rapidly than the EU has, and it has done so at much lower cost. The lesson is clear: markets work, and they work best when governmental interventions are not excessive. U.S. policymakers must take a hard look at the experience of the EU and seek to avoid those same mistakes.

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