
America's Energy Opportunity

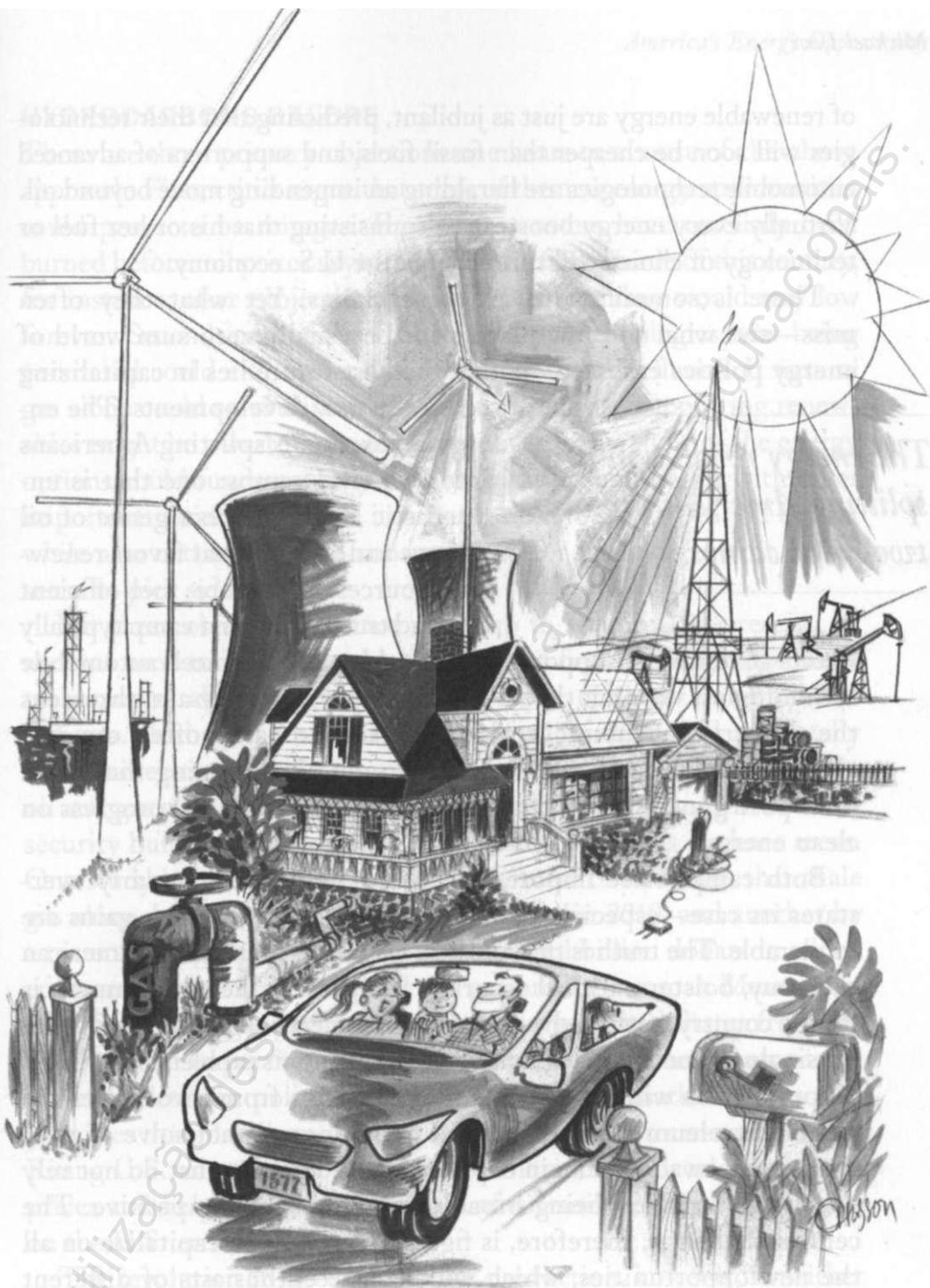
How to Harness the New Sources of U.S. Power

Michael Levi

An energy revolution is unfolding in the United States—but unlike most past or promised revolutions, this one is not confined to a single fuel or technology. After falling for more than two straight decades after 1985, U.S. crude oil production has now risen for four consecutive years, and in 2012, it posted its largest one-year increase since the dawn of the oil industry more than 150 years ago. Meanwhile, in 2011, natural gas surpassed coal as the United States' biggest source of domestically produced energy, thanks to surging output and plunging prices. And all this growth in U.S. fossil fuel production has not prevented the rise of zero-carbon energy sources: the amount of electricity generated from cutting-edge renewables—wind, solar, and geothermal—has doubled since 2008, and prices have plummeted. Moreover, as technological innovations have made U.S. motor vehicles more fuel efficient, the country's oil consumption has fallen by nearly ten percent since 2005, reversing what previously seemed to be an interminable upward trend.

The U.S. energy landscape has not undergone such drastic changes since the 1960s and 1970s, which witnessed the emergence of nuclear power, peak U.S. oil production, two oil crises in the Middle East, and the birth of the environmental movement. Not surprisingly, the present transformation is prompting big predictions about the future. Oil and gas enthusiasts are projecting such massive growth in production

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that the United States might soon grasp the Holy Grail, energy independence; natural gas, meanwhile, is being hailed as a one-stop solution to climate change and a replacement for petroleum. Advocates

of renewable energy are just as jubilant, predicting that their technologies will soon be cheaper than fossil fuels, and supporters of advanced automobile technologies are heralding an impending move beyond oil. Virtually every energy booster is also insisting that his or her fuel or technology of choice will turbocharge the U.S. economy.

There is something to all these claims. Yet what they often miss—and what too few players in the usually zero-sum world of energy politics embrace—is that the best future lies in capitalizing

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on all the new developments. The energy revolution is splitting Americans into two rival camps: one that is enthusiastic about the resurgence of oil and gas and another that favors renewable sources and more fuel-efficient cars and trucks. The first camp typically

rejects government support for renewables and advanced automobile technologies, warning that it wastes taxpayer money and threatens the country's economic health. The second camp often opposes efforts to enhance U.S. oil and gas production, arguing that these fuels pose grave risks to the environment and could kill progress on clean energy.

Both camps raise important concerns, but each regularly overstates its case—especially when it claims that the other's gains are intolerable. The truth is that the best way to strengthen the American economy, bolster national security, and protect the environment is for the country to take advantage of all the new energy opportunities. No single fuel or technology can solve the country's problems: increased oil production will not free the United States from involvement in global petroleum markets, natural gas alone will not solve climate change, renewables remain expensive, and vehicles that do not rely on oil are far from being broadly economically competitive. The central challenge, therefore, is figuring out how to capitalize on all the new opportunities, which will require enthusiasts of different energy sources to start cooperating, or at least to stop fighting so bitterly. Leaders around the country, and particularly in Washington, need to adopt a most-of-the-above approach: carefully increasing opportunities for energy production of all kinds, while penalizing dangerous energy consumption that would worsen climate change and sustain U.S. dependence on oil.

HYDROCARBONS GALORE

There are three primary objections one hears to a most-of-the-above approach. First, critics argue that some of the new energy opportunities could prove to be mirages. Energy forecasters have certainly been burned before: oil prices skyrocketed in the first decade of this century, for instance, after projections in the 1990s that they would stay low forever. Second, one of the fuel sources or technologies now being promoted could end up rendering the others superfluous. If natural gas alone could solve climate change, for example, supporting renewables might be a waste of time and money. Finally, some of the energy options could fundamentally conflict with one another or with other important national goals. If it is impossible to boost U.S. oil output while also cutting U.S. oil consumption, for instance, then it makes sense to pick sides.

But these objections do not stand up to scrutiny. At present, oil and gas production, renewable energy, and fuel-efficient automobile technologies all show great promise. None of them alone offers a panacea. And the continued pursuit of all of them will not fatally undermine any central U.S. objective. Consider recent increases in oil and gas production, which benefit the U.S. economy and national security but cannot solve all energy-related problems in those areas. One study by the energy consulting firm IHS CERA claims that shale gas alone supported 600,000 American jobs in 2010, and another by a team at Citigroup projects several hundred billion dollars in added economic output if domestic oil and gas production soar. Meanwhile, growing natural gas production has freed the United States from dependence on importing the fuel by tanker, sparing the country from entanglements in politically charged global gas markets. (Gas also promises to replace some oil that is currently used in cars and trucks.) Rising U.S. oil production, moreover, will moderate world petroleum prices and help mitigate the impact of turmoil in global oil markets on the U.S. economy.

The revolution in U.S. oil and gas production, however, is neither an economic nor a foreign policy cure-all. The economic gains that even bullish analysts project fall far short of what the U.S. economy needs to get back on track. And even if domestic production and the replacement of oil with natural gas allowed the United States to eliminate all petroleum imports (a massive stretch), the country would still not be energy independent in a meaningful sense. Because the price

of oil is largely set on world markets, disruptions in the Middle East and other major oil-producing regions would continue to trigger price spikes for Americans at the pump. The only way out of this problem would be to try to block oil exports from North America in times of crisis. But such a strategy, if it worked, would inflict severe pain on allies by taking additional oil off world markets and could easily result in blowback if those who were hurt by Washington's moves retaliated economically.

Just as increases in oil output will assist, but not ensure, strong U.S. economic growth and freedom of action in foreign policy, gains in natural gas production will ease, but not solve, the climate change problem. Abundant natural gas supplies present a major opportunity to cut U.S. greenhouse gas emissions. Burning natural gas to generate electricity produces roughly half as much carbon dioxide as burning coal does. As recently as 2010, coal-fired electricity accounted for a third of U.S. carbon dioxide emissions, and mainstream projections at the time anticipated that this fraction would increase slightly in the immediate future. But in the years since, coal use has dropped sharply, and even more significant, cheap natural gas has scuttled plans to build new coal-fired power plants, which are no longer economically competitive. Once built, coal plants often remain operational for over half a century, so preventing new construction today will help reduce carbon dioxide emissions well into the future.

Nevertheless, cheap natural gas alone cannot solve the United States' climate problems. Absent government assistance, natural gas production will not decrease coal usage much more than it already has. Furthermore, for global temperatures to stabilize, total greenhouse gas emissions will eventually have to fall to nearly zero. Natural gas by itself cannot accomplish this task. To meet U.S. demand for electricity while essentially eliminating emissions, either nuclear power, renewables, or technologies that capture and store emissions from gas- and coal-fired power plants will have to fill the gap.

GREEN AND CLEAN

New developments in renewable energy and automobile technologies are almost as astonishing as those in fossil fuels. Costs have been falling thanks to technological innovation and government support, making wind, solar, and other technologies ever more attractive tools for reducing carbon emissions. Between 2008 and 2012, for example,

the cost of a solar module fell by 80 percent. Yet given current prices, shifting from coal to natural gas is usually still a cheaper way to cut emissions than moving all the way to renewables. Looking into the future, moreover, it is unclear whether renewable energy, nuclear power, or technologies that sequester carbon dioxide will be most useful in bringing down U.S. greenhouse gas emissions. So long as this uncertainty remains, and renewables stay relatively expensive, the United States will be better off switching from coal to natural gas while moving forward on a wide range of zero-carbon energy fronts.

Meanwhile, in recent years, the combination of high oil prices, technological innovation, and new government regulations has spurred the development and use of increasingly fuel-efficient cars and trucks. This trend is poised to continue over the next decade. New fuel-efficient vehicles are reducing American demand for oil and, in turn, tempering global oil prices. Lower oil use in the United States is helping shield the country from the economic consequences of volatile world petroleum markets—although declining oil use will not come close to eliminating the United States' vulnerability to oil price shocks anytime soon.

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Still, cars that use no oil-based fuels are far from being broadly competitive with traditional vehicles, and since the typical car stays on the road for about 15 years, change will be slow to penetrate.

Some critics argue that further increases in U.S. oil and gas production could be catastrophic for both the development of clean energy and efforts to curb American oil consumption. These concerns are understandable but ultimately overwrought. There is a simple way to square rising U.S. oil output with lower oil use: fewer imports. To be sure, greater U.S. petroleum production will reduce world oil prices, which will encourage slightly more U.S. oil consumption. But American petroleum use tends to go up only modestly when prices fall, so the net result will still be that the United States spends less money on oil. Moreover, since U.S. regulation is a central driver of the shift to more fuel-efficient cars and trucks, lower oil prices will have a smaller impact on petroleum consumption than one might assume—so long as regulations are kept in place and extended over time.

Lower oil prices will prompt other countries to boost their oil consumption—a development that, no matter how small, spells bad news for the climate. But gains in U.S. oil production are likely to encourage other states, such as Saudi Arabia and the United Arab Emirates, to curb their own output in an effort to avoid lowering prices significantly. As a result, increased U.S. petroleum production will likely have only a marginal effect on total world oil supplies and consumption, muting the impact of the U.S. oil boom on global emissions. Even a boost in U.S. oil production that eliminated all imports—a highly improbable outcome—would probably add just one or two percentage points, at most, to global emissions.

Natural gas presents a different challenge. Currently, natural gas is replacing far more coal than it is renewables and other zero-carbon energy sources. That makes its net impact for climate change an immediate positive, even if it is pushing aside some zero-carbon fuel. Bigger problems, however, may loom in the future, since emissions will ultimately need to drop down close to zero, which is unlikely to happen if zero-carbon energy prices do not fall substantially.

The real near-term risk from natural gas, then, is that it could undercut innovation and prevent prices from falling in the clean energy sector. Even if gas displaces relatively little renewable energy compared to the size of the U.S. energy system, the impact could be substantial relative to the size of renewable energy markets. The natural gas boom, therefore, has increased the importance of the U.S. government's efforts to ensure that zero-carbon innovation persists.

WHERE WASHINGTON COMES IN

Fortunately, the United States does not need to make a stark choice; it can take advantage of all the major changes under way in the energy world by pursuing a two-pronged strategy. First, Washington should expand and sustain opportunities for energy production across the board by reforming regulations and making investments in innovation. Second, in order to blunt broad economic, security, and climate risks, it should pursue an ambitious policy, focused on how the United States uses energy, that reduces U.S. carbon emissions and oil consumption.

The first prong of the strategy would involve new efforts in three areas: environmental regulation, infrastructure development, and energy innovation. Striking the right balance when it comes to environmental protection and permitting processes is difficult. On the one hand,

excessively onerous regulation can render energy development unprofitable and, in turn, undermine the benefits of the policy. It would be particularly unwise to severely curtail certain activities, such as shale gas development and offshore drilling, when effective regulation is a viable alternative. On the other hand, exerting too little effort to protect the environment would not just be dangerous and unfair; it would put development at risk of being thwarted by political opposition. A good model of balance is the International Energy Agency's list of 22 "golden rules" for shale gas development, which go a long way toward protecting the environment and add only an estimated seven percent to the cost of a typical shale gas well.

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Too many energy developers seem to believe that stricter regulation is unnecessary so long as they adhere to sound practices themselves. But affected citizens tend not to discriminate between companies. The 2010 Deepwater Horizon oil spill, for example, hurt offshore drilling prospects not only for **BP**—the primary culprit—but also for every other developer. More recently, bad behavior by a handful of shale gas developers in Pennsylvania has prompted concerns from landowners in neighboring New York, threatening shale gas firms uninvolved in the misconduct next door.

It is not just oil and gas producers, moreover, who spark environmental opposition. Many champions of renewable energy believe that their preferred fuels should be immune from environmental concern—no wind turbine or solar plant, they point out, has ever sullied a beach with toxic goo or poisoned an aquifer. But producing renewable energy often uses a lot of land and, consequently, provokes intense resistance. Other zero-carbon sources face similar challenges: nuclear power must deal with plant safety and waste disposal, and carbon sequestration requires locals to accept underground repositories. Policies that safely expand opportunities for development are essential for all sources on both sides.

The second critical area that Washington should promote is long-distance energy transport infrastructure. Oil and gas are developed only in places where the geology is favorable, and these locations are frequently far from refineries, power plants, and homes. To encourage

development, pipelines are needed to connect the waypoints – and policymakers should resist placing unnecessary barriers in their way. Meanwhile, the sunny expanses and windy tracts that are necessary for renewable power generation are also often remote from the metropolises where energy is in greatest demand. To make renewable sources more viable, Washington should create a better investment climate for private developers who can build power lines that span these long distances.

These projects will not be easy: building pipelines and power lines can be extremely complicated politically. Each one typically crosses hundreds or thousands of individual properties, meaning that huge numbers of owners must be won over and compensated for any given

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project. (In some cases, developers can invoke eminent domain, but that risks sparking popular anger and political opposition.) Part of the problem is that politicians often focus more on local objections to long-distance infrastructure than on the national benefits of it. But Washington can help by taking steps such as requiring state regulators

to consider costs and benefits that extend beyond their borders and possibly eliminating the need for each affected state to sign off on power-line projects. (Pipelines are already handled at the federal level.) Such reforms would go a long way toward helping the United States get the energy transport infrastructure it needs.

The third essential element for boosting energy production opportunities is government support for innovation. Most economists agree that the private sector naturally underinvests in innovation. Breakthroughs made by one person or company are often copied by others, so individual inventors and businesses are frequently unable to capture the full benefits of their investments. As a result, they do not invest as much in innovation as the country needs. The upshot for the energy sector is that there are not enough technologies for the cheap production of renewable energy, the secure generation of nuclear power, the efficient extraction of gas, the safe development of oil, or the effective capture of carbon emissions from power plants.

But observers who agree that the private sector falls short in these areas often disagree about whether and how the government can help.

The furor that followed the collapse of Solyndra, the California-based solar company that went bankrupt after receiving generous government support, is a case in point. Some argue that failed investments are a price worth paying for government efforts to spur innovation; others insist that Washington's tinkering, however well intended, is itself the source of failure.

The truth is that government investment in energy innovation is invariably risky, but staying out of the game entirely is even riskier, because it could severely constrain U.S. energy options down the road. Policymakers can navigate this situation by focusing as much as possible on the earliest stages in the innovation process—namely, research and development—since single bets there will be small and budget allocations can be spread widely. Meanwhile, Washington could support more expensive efforts, such as the commercialization of emerging technologies, by occasionally taking equity stakes in innovative projects and by deploying broad programs with clear and simple rules, such as making cash grants available to all zero-carbon energy systems meeting certain criteria.

A LOW-OIL DIET

Washington must do more, however, than just expand opportunities for energy production. Absent additional initiatives, zero-carbon sources and oil alternatives will struggle to compete in a market dominated by cheaper fossil fuels. Even natural gas will have a hard time displacing still-inexpensive coal. Inaction would represent a failure by the United States to become more economically resilient in the face of volatile world oil markets. It would also leave the country with dangerously high greenhouse gas emissions—unable to be a serious part of, let alone lead, international efforts to combat climate change.

Washington can confront these challenges by helping change the way Americans use energy. The demand side, not the supply side, is where steps that limit U.S. energy activities will be most effective at achieving their intended national goals. Advocates of cutting greenhouse gas emissions have a habit of getting bogged down in debates over technical choices. Some favor cap and trade—a scheme that would make polluters buy scarce permits to cover their carbon dioxide emissions, thus creating incentives to switch to cleaner fuels—while others prefer a carbon tax, which would charge polluters directly for their emissions. Recently, some advocates have focused on a so-called

clean energy standard, which would mandate that electricity producers generate an increasingly large fraction of power from low-carbon sources, including natural gas. And more and more attention is given to Environmental Protection Agency (EPA) mandates that tell power producers and industrialists to cut their emissions. All these approaches have the potential to cut emissions at lower cost than was previously possible because of gains in natural gas and renewables.

The fixation on debating technical policy options, however, is misguided. Instead, the objective should be achieving a combination of ambition and flexibility—ambition because even the most carefully crafted policy is worth little if it does not have the potential to cut U.S. emissions substantially, and flexibility because cuts that do not allow companies and individuals the freedom to decide how to achieve them are a recipe for expensive error. Mandating that all U.S. power eventually be derived from renewable sources, for example, could turn out to be disastrous if their costs do not continue to fall steeply. Forcing power plants to switch to less carbon-intensive sources instead of allowing consumers to adopt new energy-saving technologies in a cost-effective manner could be similarly unwise.

Ideally, the U.S. Congress should put in place some sort of market-based system—whether cap and trade, a carbon tax, or a clean energy standard—and focus on getting that system's ambition and flexibility right rather than haggling over the different options. At least in the short term, however, that is unlikely to happen, so the Obama administration will be left with narrow regulation of major carbon sources as its only viable option. Exercising its existing authority, the EPA should concentrate on maximizing flexibility and calibrating the ambition of its regulations to match. If the Obama administration chooses this route, the least Congress can do is let the EPA's authority stand. In the long term, though, enacting one of the more flexible market-based approaches will be necessary.

Washington should also endeavor to make the country's motor vehicles more fuel efficient. In this area, the Obama administration is already off to a strong start. Last year, it finalized aggressive fuel-economy regulations for the years 2017 through 2025, supplementing those it had already put in place for vehicles sold through 2016. These rules will require automakers to boost the efficiency of their average car or truck from around 30 miles per gallon in 2012 to nearly 55 miles per gallon by 2025. (The Toyota Prius is currently rated at 50 miles per

gallon.) The actual fuel economy that these standards will achieve will be slightly lower than the targets, since automakers can take a variety of alternative steps, such as selling electric vehicles, that give them bonus credit toward the mandates. But the Obama administration has set its sights high.

There are two more simple but controversial policies that Washington should explore. First, lawmakers seeking ways to cut the U.S. budget deficit should consider raising gasoline taxes as part of a broader package of spending cuts and revenue increases. Implemented properly, this sort of move would result in less oil use, greater economic growth, and lower unemployment than a package without it would deliver. Congress and regulators should also consider requiring that new automobiles be capable of accepting biofuels and methanol (a fuel that can be synthesized from natural gas and plant material) in addition to gasoline or diesel. That would reduce the risks for developers of alternative fuels and give consumers more options in the face of volatility in oil markets.

POWER UP

Some people will enthusiastically embrace every element of this agenda. But many others will take issue with one part or another. There will be concerns about the ultimate ends—particularly among people who think that climate change is unimportant or that Washington does not need to protect Americans from turmoil in world oil markets. More frequently, the two major camps will disagree about means, with one side intensely opposing new regulations on industry and additional government spending and the other just as forcefully rejecting any expansion of fossil fuel production. It would best serve both sides, however, to accept a broad approach rather than digging in and fighting narrowly for their ideal outcomes.

Coming around to that conclusion will require both sides to accept two facts. The first is that each has considerably more power to hinder its opponent's agenda than to promote its own. Historically, opponents of fossil fuels have been successful in preventing large expansions of the federal land available to oil and gas development. More recently, opponents of fracking have waged campaigns that have put expanded use of that technology at risk. The opponents of renewables and fuel-efficient automobiles have been even more successful: they have thwarted serious climate legislation and mounted effective resistance

to new government investment in energy innovation. Consequently, the alternative to a path that embraces a diverse set of developments is likely to be not victory for the fossil fuel enthusiasts or for the renewables and fuel-efficiency advocates but rather unending disputes that damage core interests on both sides.

The second fact is that compromise need not be fatal for anyone. People who are worried about climate change are right that unfettered fossil fuel consumption is unacceptable. But that does not mean that accepting some fossil fuel development would destroy their cause—in fact, in the case of natural gas, it would help. Meanwhile, those who are worried about state intervention in the economy are right to criticize inflexible and indiscriminate government regulations. But not all schemes to curb emissions or to protect communities from the downsides of energy development fit that bill. A most-of-the-above agenda would eliminate the genuine deal killers for each side, leaving a package that could deliver the essentials of what both want, take advantage of gains across the board, and avoid the risk of an extended battle that would devastate everyone and satisfy no one.

It would be foolish to expect either side in this decades-old fight to lead the charge for a most-of-the-above approach. It would also be unreasonable to ask the two sides to stop skirmishing over individual decisions, such as opening new areas to oil and gas development or establishing a carbon-pricing scheme. The burden of advancing this agenda ultimately rests with U.S. leaders. President Barack Obama has advocated an energy policy that, as his first term evolved, became increasingly consistent with this sort of approach, but there is much more work to be done. Using legislation and executive action, Obama and a core group of lawmakers should push forward with a most-of-the-above energy strategy. The result would be a stronger economy, a more secure country, and a safer planet. 🌍