Hard Choices Ahead for US Energy Policy

Elias Hinckley

On July 18, 2010, the *Wall Street Journal* ran a story about China's primary energy use surpassing that of the United States—signaling the end of the US status as either the largest consumer or supplier of energy.[1] While not without influence, the United States can no longer be counted on to maintain low, stable prices without resorting to either outside support or military intervention. Importantly, this is not simply a question of the market fundamentals of fossil fuels. Efforts to manage costs through efficiency and new energy sources along with efforts to control emissions and climate change are driving what is perhaps the fastest evolution of energy technology ever. Globalization has spread technology development and ownership. Failure to move to the forefront of technological development or otherwise control a significant share of these new technologies will further impair the influence of the United States over global energy.

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Elias Hinckley (ehinckley@kilpatricktownsend.com) is a partner with the law firm of Kilpatrick Townsend & Stockton. Additionally, he is an adjunct professor of international energy policy at Georgetown University. He can be reached via phone at (202) 824-1444.

Without any form of market control or decisive leadership in new energy technologies, the United States will become increasingly vulnerable to existing energy markets and the market shifts caused by new technology. It is this vulnerability to price volatility, potential supply disruptions, and external pressure that will require a clear and comprehensive national energy plan. A foundation of US growth is easy access to inexpensive energy—both electricity and liquid fuels for transportation. Eight of the last nine recessions have been preceded by spikes in the global price of oil. US economic well-being is tied to its ability to maintain stable supply and stable prices for energy, and while that correlation is not as strong as it once was, the notion of long-term prosperity in the face of real instability in energy supply, or price, is impossible.

This very clear signal about the US energy future should act as a roadmap for US energy policy. However, it is not clear that this new position of the United States has come to be really understood in policymaking circles. Additionally, to the extent that policymakers have begun to address these challenges, traditional political divisions, driven by both ideology and influence as well as the extraordinary complexity of building a sound national energy policy, have created enormous hurdles.

While these hurdles cloud the near-term policy discussion, it is worth noting that there is a growing awareness in the energy policymaking circles that this divisiveness is impeding policy development. Efforts are under way in Washington to invigorate productive discourse on energy policy. The centrist Bipartisan Policy Center has been increasingly active in energy

 DOI 10.1002/gas

policy advocacy; a collaboration of the Brookings Institute, American Enterprise Institute, and the Breakthrough Institute recently collaborated on "Post-Partisan Power,"[2] which calls for a comprehensive national energy innovation strategy. Another Washington-based organization, the Our Energy Policy Foundation, is working to overcome these obstacles by inviting energy experts of all backgrounds and agendas to engage in public dialogue on OurEnergyPolicy.org.

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Another reason why there has been so little progress on a national energy policy is because policy decisions in the United States are nearly always reactive. This reactive nature of policymaking is especially true in today's hyperpolarized (and partisan) environment in Congress. Thus, while the drivers for establishing a strong national energy policy are building, the pace of development of such a policy remains unclear. However, against this uncertainty, long-term needs and some fundamental lessons about the creation of policy platforms and fundamental policy tools can inform some parameters for the near term (now to five years), the midterm (five to 15 years), and the long term (beyond 15 years). To better understand how this will play out, an understanding of policy tools will allow some prognostication on the near-, mid-, and long-term developments.

POLICY TOOLS

The policy tools used to modify behavior of markets can generally be grouped into three broad categories, and although the lines of where one tool ends and another begins can be opaque, and there are often overlaps, this characterization provides a framework for anticipating likely policy evolution.

Incentives

Payments to encourage the use or development of a technology are typically the first tool used by the US government. The cost for these subsidies is absorbed by society through higher taxes or less government support elsewhere. In energy contexts, the goal is to make relatively small investments to drive technical evolution and scale, both of which create downward pressure on prices.

An example would be the tax credit for cellulosic ethanol, where the cost is absorbed by the government. The credit is designed to provide enough additional value for the cellulosic ethanol that a company can pursue technology and production despite an underlying process and product that is not yet competitive.

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Regulation

If the goal is more rapid modification, either through a perceived need for rapid change or a failure of incentives to create enough change, typically the next step is to regulate. The government regulates by establishing a set of rules that alter the economic balance of traditional transaction, generally by adding requirements for continuing the activity. A clean energy standard is an example of a regulatory program, by requiring utilities to show some percentage of power was derived from select sources, the production of power from those sources becomes a more economically viable activity.

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Tax or Penalty

If incentives and regulation both fail, the next step is to penalize or tax the undesired activity—cigarette taxes are an example of this. Clearly defined penalties would increase the cost of the undesired activity (be it foreign oil use or carbon emissions) and make alternative energy more economically competitive. This tool can also be used to raise government revenues where excess profits or an inelastic market make severe market reac-

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tions unlikely—and this plays an important role in energy policy as it develops.

NEAR TERM

In the near term, policy actions will be more discreet and targeted. There does seem to be an increasingly broad acceptance of the notion that the current energy mix, especially on the oil-dominated transportation side of the energy equation mix, is not sustainable for the United States on a long-term basis without significant exposure to risks associated with price volatility and eventual supply disruption. As the focus sharpens on oil consumption, while questions around climate change have become increasingly politicized and in several instances marginalized, it seems clear that policies that are perceived as supporting alternatives to oil in the transportation sector will gain momentum.

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This move to find alternatives in fueling transportation will likely mean several efforts at policies that can directly or indirectly offset some portion of oil consumption with natural gas. This move may be through direct use or it may be through increased gas to electricity production and an acceleration of vehicle electrification (the theory being that natural gas can fill some of this void). The potential to significantly offset oil use in the transportation sector, if technologies and infrastructure supporting direct use of electrification can mature rapidly, will, however, open mid- and long-term concerns about price stability in the natural gas market. Even against the most robust visions of available shale gas, a replacement on a very large scale will not provide much of a buffer before the need for expanding imports (gas or oil) returns. This concern is correct even though this longer-term supply concern does not seem to be having a material effect on current policy discussions.

There was no doubt that at the outset of the 112th Congress, nuclear energy was viewed as having nearly as important a role as natural gas in meeting future demand. Following the disaster at Fukushima Daiichi after the earthquake and tsunami, the path for growth of existing nuclear technology has been obscured. Localized resistance to expansion of nuclear facilities will make every site under development more difficult, and the notion of an actual new development navigating local opposition seems impossibly remote over the near term.

What remains unclear is how policymakers will react. Some amount of policymaking support has been lost, as there has been simply too much discourse devoted to the potential hazards of nuclear power. However, the downside to continuing to champion the role of nuclear energy as part of a secure US energy future appears limited at this stage. There is little nationalized resistance and, as a result, no clear political cost to support nuclear policies, and possibly the benefit of the impression of proactivity on broad energy policy initiatives, and the results may be politicians continuing to champion nuclear power with no real expectation of new facilities being developed over the near or midterm.

In January, there was little doubt that the combination of nuclear power, renewable energy, and natural gas was seen as the focus of near-term policy support. If the goal is to offset foreign oil use through a combination of nuclear, natural gas, and renewable power, then logically it follows that technology for electrification of transportation, more than for the direct use of natural gas (which can support either direct use or electricity), would need corresponding policy support, because the technology necessary to use electricity to power vehicles is not currently scalable on an economically competitive basis with gasoline-based transportation. It is too early to know, but certainly a lack of support for broad nuclear expansion undermines, at least to some degree, the follow-on support for electric vehicles. However, if the support for nuclear remains—even if just the general policy support—electric vehicles will remain a focus of near-term policy support.

DOI 10.1002/gas

The near-term focus on supply stability, especially as it relates to foreign oil consumption, will drive policies for both alternatives in liquid fuels as well as electrification of transportation. **Exhibit 1** shows the likely market evolution that would follow a set of policies designed to reduce consumption of foreign oil.

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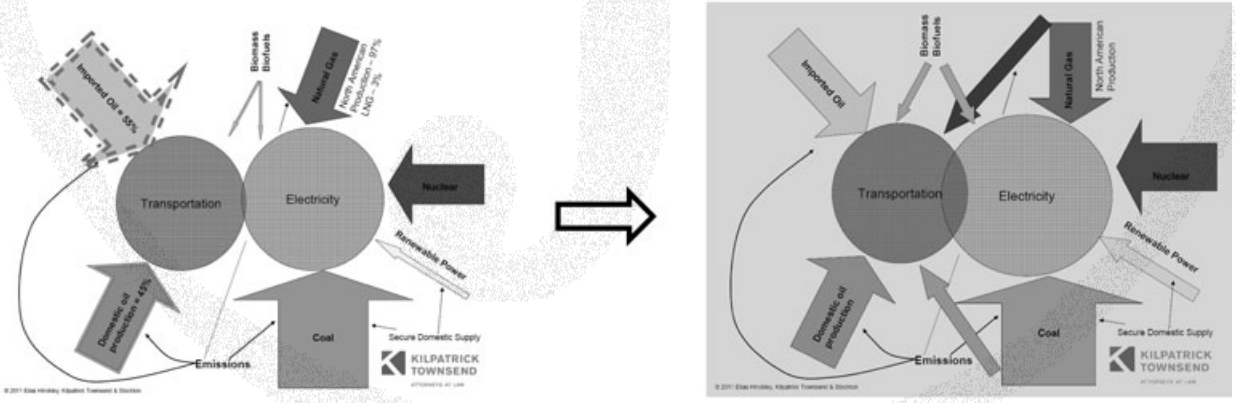
The need for technological advances with renewable power, biofuels, batteries, and other storage, along with policies that support that technology investment, is well documented (and despite likely rhetoric about costs, the existing supports for these technologies will continue). There are also significant technical hurdles with either the direct use of natural gas or electrification for vehicles, and there are additional needs for technological improvements with unconventional gas extraction and nuclear power. The one constant in the near-term policy discussion across all of these directions is in the need for increased spending on research and development. The obvious next step from a policy perspective (and a step that should have been made more emphatically years ago, according to many energy experts) is a substantially greater subsidy for energy innovation and research.

The one constant in the near-term policy discussion across all of these directions is in the need for increased spending on research and development.

Until the most recent election, this approach of more available funding to explore and develop new and improved energy technologies would have seemed a relatively easy political answer. While perhaps a threat to some established industry participants, the threat would have been (and has been) at most indirect. A significant energy research subsidy program would be a catalyst for job creation and would move the nation toward the goal of real energy security.

The early efforts at this approach, like the development of the Advanced Research Projects Agency—Energy (ARPA-E) program under the Department of Energy and significant increases in funding to the national energy laboratories, were definitive steps in this direction. Additionally, programs like the 1603 Treasury Grants, the assorted tax incentives

Exhibit 1. Effect of Policies to Reduce Oil Imports



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for renewable energy, and the Department of Energy's Loan Guarantee program provided some economic support of early-stage deployment of some new technologies. With the new focus on government austerity, however, there is a very real possibility that there will be no additional funding or support for the growth of a broad national program, and making some cuts to existing funding is a growing, though remote, possibility.

Concessions made for something like replacement of aging coal plants with efficient natural gas–fired generation or even advanced coal generation may be necessary. But this addition may in turn erode Democrat support.

While it may not happen under this Congress, another effort at national regulation, likely as a broadly inclusive clean energy standard, also seems likely in the near term. The fate of this effort under this Congress may well be tied to the reaction to the events at Fukushima Daiichi, as this type of energy standard will need to be broadly inclusive of technologies beyond renewables in order to gain enough Republican support to pass through Congress. Without nuclear as a meaningful part of the program, it is possible that concessions made for something like replacement of aging coal plants with efficient natural gas–fired generation or even advanced coal generation may be necessary. But this addition may in turn erode Democrat support, as the inclusion of natural gas or coal may be seen as shifting the competitive balance further away from renewables.

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Also in the near term, state governments, and none more so than California, will drive energy policy activities. This dynamic, with the states leading on policy, will further entrench geographic biases in the dialogue on national policy.

For example, New Jersey would be much better positioned to manage a national clean energy standard than would a state like Virginia, despite better resources in Virginia, because of the investment in solar and other renewable power that New Jersey has already made. For New Jersey, not only would the transition be easier, but these technologies also will be an engine for growth by the companies in New Jersey with already-existing experience. The state-driven policy framework will also add to the ad hoc, inconsistent nature of existing policy, making compliance more difficult.

MIDTERM

While the role of climate change in the national energy policy debate has been marginalized after the push for cap-and-trade legislation failed last summer, climate change's role will again become important as we look out toward the end of the decade. First, the underlying notion—that there is a global warming or climate-change trend, and that this trend is leading to increasing weather-related consequences—has been embedded in the American psyche. We are already seeing the leading edge of this correlation, which is increased focus in the press on weather events (arguably, this increase can be attributed to a corresponding increase in actual weather events, but the result is the same—more attention paid to severe and anomalous weather). Second, the enormous growth in the greenhouse gas emissions profile of the developing world will continue to act as a catalyst for linking the potential for climate-change-related damage to fossil-fuel use.

This growing awareness, combined with a developing focus on the perceived *potential* of emissions to climate damage (e.g., even if it is only a 50 percent level of certainty in the broader discussions that emissions have a casual effect on climate change), will lead to climate-change-related damage being measured—actually measured—in real economic terms. The potential savings in mitigating some weather- or climate-related damage, calculated through advanced economic analysis, will add an easily articulable economic consideration into the energy policy debate. While the savings and costs will not have a direct correlation (as the United States is relatively less vulnerable to climate

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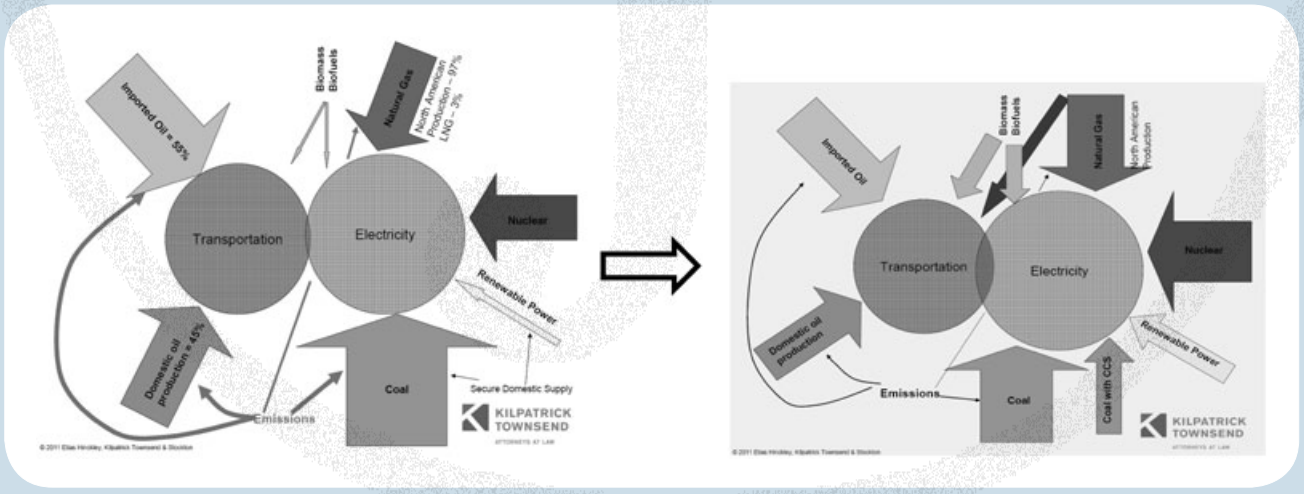
change than many countries and will represent only a portion of global emissions), the United States will still be the second-largest emitter, and even without taking the global costs into consideration, there will still be a defined range of measurable trade-offs.

Exhibit 2 reflects the likely market evolution resulting from aggressive policy measures aimed at mitigating greenhouse gas emissions. It is worth noting that these emission-focused policies will likely lead to a similar set of changes to the national energy mix that fuel security policy will lead to. The resulting policy overlap may lead to early policy adoption, or a more rapid market transition.

There will be investments made to continue to incentivize the development and deployment of new energy technologies in the near term, and there is a likelihood of new federal regulation during that same period, which will further support new energy technologies over some existing energy sources. If, however, the nation has not made substantial progress toward a new energy economy, the energy policy discussion will move toward more dramatic and severe steps. Part of that discourse on dramatic next steps will focus on the last of the policy tools discussed earlier, and a carbon or energy tax looms as a real possibility toward the end of the decade if the United States has not moved out to the forefront in developing new energy and emission management technologies.

At first impression, the possibility of a meaningful tax on some aspect of the US energy sector seems remote to the point of irrelevance given the strong and broad opposition in Congress to any new taxes. However, a direct tax on energy could very easily operate as zero-sum for taxpayers and consumers, at least to the extent they are rough overlays of one another. A $1.00 tax on gasoline has the same economic impact as $1.00 of income tax to both an individual and to the macroeconomic well-being of the whole population—thus, the question is really one of redistribution rather than economic impact. A tax regime that added $1.00 to a gallon of gasoline would raise roughly $140 billion a year.[3] If these funds were then returned as a credit against income tax as equal payments of $900 a year to all US taxpayers,[4] or $140 billion of total tax credits (perhaps with some bias built in for certain citizens to offset impact on rural consumers or add limits for nontaxpayers, to manage the welfare perception), this tax would have no net impact on overall economic growth in the United States. However, the tax would very certainly change behavior regarding use (arguably driving economic growth in new technologies).

Exhibit 2. Market Evolution From Policies to Reduce Greenhouse Gases



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LONG TERM

By the middle of the next decade, there will be very severe policy initiatives openly discussed as necessary energy policy. Just as likely, looking 15 years into the future, new challenges or other unforeseen events will dramatically reshape the energy policy landscape or the energy marketplace in a way that makes any forecast of policy development nothing more than a guess. The following are some thoughts on what landscape-changing events might occur. Any of these may well occur within the near or midterm, and will have corresponding ramifications across all aspects of energy policy.

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It may be a technological breakthrough like the Laser Inertial Fusion Engine that will be launched as a scaled energy source out of the National Ignition Facility at the Lawrence Livermore National Laboratory. Using lasers to mimic the heat and pressure at the sun's core, which has shown stunning potential for controlled and scalable reactions—controlled fusion—that will actually produce more energy than consumed at levelized costs that will be economically competitive, may alter everything we know about the energy marketplace by the middle of the next decade.

A massive failure of transmission infrastructure, whether by accident or by an intentional act that persists for more than a day or two, would radically skew policy toward reliability and possibly distributed energy sources over price or environmental concerns.

Tensions in North Africa and the Middle East have brought the potential for a collapse of global spare oil capacity into sharp focus, and an escalation and expansion of armed internal conflict in the region could dramatically cut spare capacity. Even a meaningful reduction in spare capacity down to levels under 4 million barrels a day, as was seen in the middle of the last decade, could have dramatic effects on oil prices. A margin thinner than 4 million barrels would push the per barrel price of oil well above $200, which would lead to severe reactions from both consumers and policymakers.

In addition to the internal strife in North Africa and the Middle East, a broad, multinational conflict could dramatically alter the energy landscape in a variety of ways. Several flashpoints around the globe that could draw in a number of places like India, Pakistan, or the Korean Peninsula, and other areas that will emerge in the coming years, could lead to large-scale conflict, which could dramatically increase regional demand during the conflict, or during a rebuilding period, or could cause significant drops in demand due to global recession as a reaction to the conflict.

CONCLUSION

Given the current level of partisanship, gamesmanship, and acrimony in Washington, combined with the complexity of meeting the country's energy needs, the United States almost certainly faces a near-term future without a comprehensive energy policy. There will be regional and local action, which will be the basis for some progress, but almost certainly there is a time that the policy reaction will be sudden and severe, due to continuing changes in fundamentals, or because of some catastrophic unforeseen event. Planning for this policy event will be extremely difficult, though not impossible for the most visionary and sophisticated participants in the US energy landscape. Even without the ability to foresee a paradigm-changing event, the careful observer can discern policy patterns emerging today that will set the rules for success in the energy marketplace of the future.

NOTES

1. Arguably, the United States could surpass China again during a period of economic recovery, and this is a broad aggregate calculation, which does not look strictly at globalized energy commodities. However, the trend lines are very clear, and the underlying concept, that the United States will no longer be a disproportionately large consumer compared to every other nation, is clear.
2. http://thebreakthrough.org/blog/2010/10/postpartisan_power.shtml.
3. Based on Energy Information Administration data showing daily gasoline consumption in the United States at 378 million gallons.
4. Based on Internal Revenue Service data showing approximately 156 million tax filers in 2008.

DOI 10.1002/gas