American Energy Security in a Changing Global Energy Market

https://www.e-ir.info/2013/07/27/american-energy-security-in-a-changing-global-energy-market/

ROBERT COPPER, JUL 27 2013

Introduction

Language and communication play a vital role in shaping government policies, and energy security is no exception. The struggle to coherently define and articulate a sound definition of energy security in American policy discourse has impeded the country's ability to adequately address[1] the diverse risks to its energy security. Consistent, long-term policy approaches to managing insecurity are needed to ensure economic growth, international peace, and global governance regarding common issues.

This paper seeks to answer the question: what is a holistic definition of energy security for America and what is the best way to address insecurity? This paper seeks to construct a holistic definition of energy security based on review of the relevant literature, and argues that responsible technological advancement is the best long-term approach to addressing energy security. Before examining the concept of energy security in America, its change over time, and ways to address insecurity, the paper presents historical background and contemporary developments that are critical to understanding the complexities of energy security.

The Importance of Energy Security in America

America, along with the countries generally referred to as the developed world, can be classified as greatly benefitting from the first and second great expansions of economic growth based on modern energy consumption. The first such expansion was the Industrial Revolution of the early 19th century when the majority of energy consumption was based on coal, and the second such expansion was the rapid, post-World Wars development fueled by cheap oil from the Middle East in the mid-20th century. The global trade in energy is responsible for the world being as productive as it is today. However, this global flow has gone through various peaks and troughs of availability, price, and geopolitical tension.

America has been the center of the international energy system for over a century. According to the Energy Information Agency (part of the Executive Branch), the US is the second largest consumer of energy in the world, accounting for about 20% of total consumption. Of that energy consumption, 36% is petroleum used mainly for transportation, 25% natural gas used mainly for heating and industry, 20% coal, 9% renewables, and 8% nuclear which are used mainly for electricity production. The US is also the second largest exporter of energy in the world, thanks to rich reserves of coal, oil, and natural gas.

Technological advances and discoveries of newly usable reserves have greatly increased US production in the past few years. The International Energy Agency (part of the OECD) projects that the US will be a net exporter of natural gas by 2020 and a net exporter of crude oil by 2030, although the dates tend to fluctuate based on the constantly advancing energy sector. A more sobering statistic is that the US is the second largest emitter of carbon dioxide, emitting 5,490.63 million metric tons of CO^2 in 2012. Nevertheless, energy consumption, carbon intensity (CO^2 per dollar of economic output), and carbon emissions have all been declining since the recent recession.

It is important to remember that energy security is not merely an economic question, but also a political and military concept. As prominent energy security expert Daniel Yergin said in 2006: "energy security does not stand by itself, but is lodged in the larger relations among nations" (69). The US produces an immense amount of energy, but consumes so much that it is forced to rely on other nations for imports, mostly in the form of oil. Oil is the most interdependent commodity market in the world, and the focus of the politicized concepts of energy security. The Oak Ridge National Laboratory estimated that from 1970 to 2004, American dependence on foreign oil supplies cost between $5.6 and $14.6 trillion (Brown and Sovacool). Ensuring a secure global supply of oil has been a major US priority since at least the 1970s (Stokes).

Shifts in Global Energy Markets

Energy demand has flat-lined in the industrialized world, while non-OECD countries are projected to represent 93% of global energy demand growth by 2035 (IEA). Last year, 84% of total US energy demand was satisfied by domestic production, while imported petrol products still made up 40% of the US trade deficit (EIA). US oil imports peaked in 2006 and have halved since then, while an ever-larger percentage of those oil imports comes from non-OPEC countries. Emerging markets are more dependent on Middle Eastern producers than OECD countries are, while Europe has become largely dependent on imported Russian natural gas. Global energy markets are clearly shifting, but the ramifications are not well understood.

The underlying structure of energy production is also changing. Theories of "peak oil" have been consistently revised throughout history, leading some researchers to assert that the term "depletable" does not apply to global energy reserves in the same way that it does to individual reserves or regions (Bradley 7). Calculations of available reserves are constantly in flux, but the general trend is upward thanks to improved technology. In fact, by the end of the 20th century, oil reserve estimates were fifteen times greater than they were in 1948 (Bradley).

New sources of energy are being developed, although they come with their own challenges. For example, systems for power generation, transmission, and distribution must be updated to handle these new energy sources. The World Energy Outlook published by the IEA in 2012 predicts a cumulative needed investment of $37 trillion for the world's energy supply system by 2035; 61% of that investment will be needed in non-OECD countries (IEA). Even as new, cleaner energy sources come into use in advanced industrial nations, researchers are increasingly aware that some nation is still going to buy those fossil fuels. Energy consumers follow the market: the sources that are cheapest are the ones that will be used, necessitating a global perspective on clean energy advancement.

The Trouble with Energy Security Policy-Making

Energy security is a complex concept, at once transnational and highly localized in its politics. Energy security is affected by multiple factors, and most countries overtly or inadvertently pursue technologies and policies that achieve progress in one energy sector domain only by eroding the progress of another. Energy security demands consistent, long term policy approaches, yet disharmony between state and federal policies, competing interest groups, and short term election cycles harm the effectiveness and coherence of energy policy in the US (Brown and Sovacool). The policy options with the greatest potential to bolster energy security require political consensus, international cooperation, a stable investment environment, technological growth, and an eventual lowering of demand for energy (Deese).

Policy-makers and their constituents need to become more pragmatic about their choices in energy sources and more honest about the trade-offs involved in those choices. However, imprecise language surrounding the energy policy debate provides opportunities for interest groups to leverage and hijack policy outcomes (Littlefield). Energy policy debate has taken on a sensationalist and partisan character. Steven Carmel goes as far as to say that: "policy is not driven by facts but by the public's opinion of facts" (45).

The competing concepts of energy security in American political discourse need to be more rigorously defined and examined to ensure effective policy outcomes. At the same time, different countries define energy security in various ways, and since energy security is a global concept, effective energy security cooperation must incorporate and

reconcile these divergent views (Yergin). The rest of this paper will attempt to analyze the American concept of energy security as it has changed over time, discuss current understandings of the concept, and evaluate the status of energy security in the world today as well as opportunities for the future.

The American Concept of Energy Security over Time

Modern concepts of energy security began in the early 19th century with the need to secure coal and resupply points for ships, and America was blessed with its massive coal reserves (Brown and Sovacool). World War I sparked the age of oil when Britain switched from a coal-powered fleet to an oil-powered fleet to outmaneuver German ships (Yergin). Oil has been the focus of energy security since that time, more recently joined by natural gas. The objective of the National Security Council Resolution 138/1, drafted by the Truman Administration in 1953, was to secure oil resources for the free world, taking a very competitive stance on energy security (Maugeri). The ability to access Middle Eastern and Venezuelan oil fields cheaply had discouraged exploration and diversification of supply, leaving the global energy system unprepared for the OPEC-driven oil shocks of the 1970s.

The extreme rise in oil prices during 1973 is a watershed moment for energy security. 1973 saw the advent of the IEA as part of the OECD, the build-up of national strategic reserves of oil, and the creation of the Department of Energy (DoE) in the US. The concept of energy independence came into vogue, resonating with American political culture and continuing to be discussed even today, with its meaning oscillating between ending all imports, ending imports from the Middle East, or even weaning the country completely off of oil. In 1980, the Carter Doctrine involved the use of force to deter and prevent major global supply disruptions, and created the Rapid Deployment Joint Task Force for the Persian Gulf, a key part of American involvement in the region today (Brown and Sovacool).

Since 9/11, oil and terrorism have been inextricably linked in the public mind, and this has spurred not only increased security for the supply chain, but also renewed efforts to divert exports away from the Middle East and towards North American, South American, and West African suppliers (Littlefield). The birth of a competitive oil market was signaled by the floatation of oil on the New York Mercantile Exchange in 1983, but substantial power still rests with OPEC (Maugeri). The increased opportunity and return on investment for exploration, driven by technological advance, has opened up some space in energy markets, but as seen since the 2008 financial crisis, the price of oil is still volatile and can contribute to an economic downturn.

Current Understandings of Energy Security

The IEA's Model of Short-Term Energy Security characterizes "the four A's of energy security": availability (a question of geology and technology), accessibility (a question of geopolitics), affordability (a question of economics), and acceptability (a question of social and environmental impact). Its formal definition of energy security is: "the uninterrupted physical availability at a price which is affordable, while respecting environmental concerns" (IEA, 2011). State policy towards energy security is usually reactive rather than proactive, and there is some criticism that says "the US has never had an energy policy that articulated a long-term vision for the nation's energy future" (Philippidis, 2). Developing a comprehensive, effective national policy for ensuring energy security will be crucial for both strong economic growth and international stability.

Understandings of energy security have come a long way since Churchill said: "safety and certainty in oil lie in variety and variety alone" (qtd. in Yergin, 69). Early concepts of energy security focused on unilateral state action and policies, aimed at reducing a country's vulnerability to supply disruptions (Deese). The US has concentrated on securing a stable global supply of oil since World War II, but less emphasis used to given to the interdependence of countries in a globalized energy market. Concepts of energy security have now expanded to include that interdependence, as well as an emphasis on critical infrastructure and technological advancement, the environmental impacts of energy use, and trade-offs and choices between different energy sources. These issues continue to be debated in energy policy circles, and it is uncertain what the outcomes will be.

The interdependence of countries in the global energy market is one of the most striking facets of globalization over the past century. In this environment, absolute concepts of energy independence lose their luster. Energy markets

are ensconced in global issues such as climate change and conflict, and independent national action is unlikely to add up to global solutions. These global issues can be made more manageable by working in small groups of relevant countries, finding incentive-compatible commitments that align with national interests and yield tangible joint gains. International cooperation is necessary, but domestic politics is still the key to crafting good policy (Keohane and Victor).

Energy security is perhaps most useful to think about in a comparative context. One country becoming more secure (such as an importing country discovering substantial energy reserves in their own country) may threaten the security of another country (such as that country's main energy supplier), so cooperation and joint gains need to be emphasized. Collaboration is needed between both producers and consumers of energy, from the international treaty level down to local distribution and pricing (Yergin).

This massive, interdependent energy market relies on a complex and somewhat fragile global infrastructure that accesses energy, makes it usable, and distributes it. The concentration of supply and demand centers that are not co-located makes this infrastructure paramount to energy security (Verrastro and Ladislaw). Securing this critical infrastructure requires both a global security focus, and a highly localized one at particular points. Because the infrastructure is so large and distributed, it makes sense to focus on the system's resiliency to disruption, rather than traditional forms of security (Carmel).

At the same time, as technology progresses and new sources of energy become available, the infrastructure must be upgraded to accommodate increased supply and demand from new areas of the globe, and seamlessly integrate those new energy sources into the market. Strong national policies and stable investment in infrastructure are needed for this process to go smoothly. An emphasis on public-private partnerships and R&D spending is necessary for the kind of "portfolio approach" advocated by the Obama Administration, which emphasizes investing in newer, clean energy sources while responsibly expanding fossil fuel extraction and lowering the carbon intensity of the nation's energy consumption (Philippidis).

The increasing realization that energy choices have environmental impacts has contributed to the rise in green technology and clean energy initiatives world-wide. The US has accepted that some level of "diversifying away from these fossil fuels is an urgent and essential step to ensuring our long-term climate stability and economic competitiveness" (Gordon and Kroh, 4). Choosing between energy sources is no simple matter, however. Every form of energy production involves trade-offs, and transitioning to a more sustainable future will be a gradual process. Currently, cleaner natural gas is displacing coal in US energy production, while solar energy is taking off in the Pacific Coast.

Despite the promise of cleaner energy, policymakers must be realistic about the range of potential energy outcomes for the US, and not become bogged down in debates over the complete abolishment of this form or that form of energy (Littlefield). It is economics and technological change that will allow for a transition to take place from dirty to clean energy sources, as people will consume the energy that is cheapest. Transition will take place not when conventional energies fail but when alternatives blossom. Ensuring cost-effectiveness is the only way forward for green technology (Bradley). Government must be a part of these choices, and policy making must take place in an environment of broad consultation and reasoned debate. In fact, regulatory costs and R&D grants may be some of the main criteria for which energy sources remain viable in the future.

Where Are We Now? Current Problems with Achieving Energy Security

There are three main threats to energy security that will be examined in this section, and potential ways to address them can be found in the next section. The first threat to energy security is government policy. Thanks to advances in technology that seem poised to continue, the supply of fossil fuels is limited chiefly by political issues, and not by availability of reserves until the very long term. At the same time, cleaner energy standards and sources must be supported by government policy in the short term to become viable. The energy policy debate needs to more open and accountable in order to write welfare maximizing policies that balance efficiency with social acceptability. Becoming more energy secure requires a streamlined and expedient regulatory framework that rewards investment,

and tax incentives that help the private sector commercialize new technology (Philippidis). Most of the gains in efficiency and clean energy have been top-down, but stymieing demand growth (the major source of energy insecurity today) is harder for governments to effect (Brown and Sovacool).

The second major problem with achieving energy security is technology; "our energy system is not composed only of the fuels we consume, but also the energy technologies we use" (Webber, 16). Technology advancement has allowed great leaps forward in accessing energy, making existing energy sources more productive, and inventing new ways of creating, transporting, and utilizing that energy. Although the US has been at the forefront of developing many of these technological advances, regulatory policy and long waits for patenting mean that oftentimes the commercialization of these technologies occurs elsewhere (Webber). Even as nations expand their energy sources into new areas, such as nuclear, hydro, wind, solar, and biofuels, they cannot escape the fact that all of these energy sources require trade-offs. Solar energy production requires lots of land; wind power is not feasible for many large cities; and electricity losses over distance make hydroelectric power unusable. It is not a sole reliance on one or a handful of energy sources that the world needs, but rather an integrated energy approach utilizing the technology that is relevant for each region (Gordon and Kroh). Technology can provide new opportunities, but energy choices will always require trade-offs.

The third major problem with achieving energy security is geopolitics and the integration of global energy markets. When energy security is defined as incorporating environmental concerns, the impacts of other countries' energy choices goes beyond those who restrict supply to those who over-consume. Other countries are not static as the US experiments with energy policies; they are actively constantly crafting their own policies that may either support our own or render their effects moot.

For example, as the United States transitions away from a heavy reliance on coal, that resource is increasingly exported to other markets. Advancements in energy security must be viewed in the context of a global-system, as well as relative energy security compared to other countries. The US is more energy secure than most of its major trading partners in several measures, but the integration of markets mean that problems in one area of the globe invariable affect others (Deese).

Another geopolitical problem is that many of the primary suppliers of oil imports are not countries that the US has warm political relations with. This tension between political and economic relationships exists because politics and security are products of elite level interactions, while trade involves the broad swath of society. As long as energy suppliers are scare enough to give certain countries pricing power, the world will have to manage the difficult tensions between getting the energy they need and supporting the economies of countries that they may deem as threatening to their overall energy security (Carmel).

Where Could We Go? Opportunities for the Future

The problems of achieving a comprehensive, yet realistic level of energy security can only be addressed, not solved. The political problems that surround energy policy making begins to be addressed by consulting with a broad range of stake holders, as energy security affects every producer and consumer in the market. Regulations and tax incentives are short-term solutions, but technological development holds the greatest promise for achieving energy security for the US and the rest of the world in a sustainable way.

Technological development is uncertain in its nature and timing, but smart policies can create an environment that fosters innovation, investment, and basic research (Littlefield). Technological development can lead to breakthroughs that decrease prices enough for clean energy to become cost-effective and widespread enough to break individual countries' pricing power over energy. After all, new technologies spread over the globe faster than international regulation treaties can be negotiated.

Policies can also be implemented to better take advantage of our current energy production. Electricity losses are a huge waste of energy and must be improved; about half of all energy currently used for commercial and residential purposes in the US is lost in transmission from generators to consumers (EIA). Smart grid technology and

infrastructure investments can help rectify this issue. The US also needs to increase energy linkages between its various regions, such as pipelines, to move shale gas from the formations in the north to the south, and from refineries along the Gulf Coast to the cities of the northeast.

An accommodative policy environment (a system that rewards innovation and capitalizes on new research) can help overcome the technological barriers to energy security. The US needs to open up its energy markets to investment and convince other countries to do the same in order to promote investment, strong regulatory standards, and cooperation that increase global energy security (Glass). Technological advances create what Robert Bradley calls "positive intergenerational externalities" in which today's knowledge subsidizes tomorrow's resource base and consumption (6). Technologies that create recovery gains are the biggest reason that resource reserve estimates continue to grow (Maugeri). This technology should be shared with the world in order to lower global energy prices. Because fossil fuels are going to be a vital part of the energy mix for a long time to come, more attention needs to be paid to carbon capture and sequestration technology. Luckily, "US ingenuity is a renewable resource" (Webber, 16).

Finally, the world must address the global energy market's geopolitical problems. States that get most of their revenue from oil have higher rates of conflict (Colgan). However, trade relations can also give countries a shared interest in stability and peace (Verrastro and Ladislaw). Since energy is the most traded good in the world, it stands to reason that cooperative and mutually beneficial energy markets could be the ultimate expression of such a shared interest in stability. For example, the US needs to be at the forefront of international debates about energy policy in order to shape standards that are transparent, healthy for the environment, improve the resiliency of the global supply chain, and promote shared growth. Emerging countries must take steps to improve their clean energy policies. If technology progresses to a point where green energy is cheap energy, then these countries will not have to sacrifice growth to stay environmentally friendly. US policy and the US energy industry must lead the changes outlined here, and change must start now to ensure that energy security is the foundation for a prosperous future.

Bibliography

Bradley, Robert L., Jr. "The Increasing Sustainability of Conventional Energy." *CATO Policy Analysis* 341 (1999). Web.

Brown, Marilyn A., and Benjamin K. Sovacool. "Competing Dimensions of Energy Security: An International Perspective." *Annual Review of Environment and Resources* 35 (2010): 77-105. Annual Reviews. Web.

Carmel, Stephen M. "Globalization, Security, and Economic Well-Being." *Naval War College Review* 66.1 (2013). Web.

Colgan, Jeff. *Petro-Aggression: When Oil Causes War*. Cambridge,UK: Cambridge UP, 2013. Print.

Deese, David A. "Energy: Economics, Politics, and Security." *International Security* 4.3 (1979): 140-53. *JSTOR*. Web.

Energy Information Administration. Organization of Economic Cooperation and Development. Web. 31 Mar. 2013.

Glass, Todd. "Energy Security Through Cross-Border Investment and Technology." *Natural Resources & Environment* 21.2 (2006): 64-66. *JSTOR*. Web.

Gordon, Kate, and Kiley Kroh. "Regional Energy, National Solutions." (2012): *Center for American Progress*. Center for the Next Generation. Web.

International Energy Administration. International Body Located in Paris, France. Web.

Keohane, Robert O., and David G. Victor. "The Transnational Politics of Energy." *Journal of the American Academy of Arts and Sciences* 142.1 (2013): 97-109. MIT Press Journals. Web.

Ladislaw, Sarah, and Frank Verrastro. "Providing Energy Security in an Interdependent World." *The Washington Quarterly* 30.4 (2007): 95-104. *Project Muse*. CSIS and MIT.
Web.

Littlefield, Steven R. "Security, Independence, and Sustainability: Imprecise Language and the Manipulation of Energy Policy in the United States." *Energy Policy* 52 (2012): 779-88. Science Direct. Web.

Maugeri, Leonardo. "Not in Oil's Name." *Foreign Affairs* 82.4 (2003): 165-74. *JSTOR*. Council on Foreign Relations. Web.

Philippidis, George. "Commentary: Powering America with Sustainable Energy in the 21st Century." *Journal of Renewable and Sustainable Energy* 4 (2012): 1-9. American Institute of Physics. Web.

Stokes, Doug. "Blood for Oil? Global Capital, Counter-Insurgency and the Dual Logic of American Energy Security." *Review of International Studies* 33.2 (2007): 245-64. *JSTOR*. Cambridge University Press. Web.

Verrastro, Frank, and Sarah Ladislaw. "Providing Energy Security in an Interdependent World." *Washington Quarterly* 30.4 (2007): 95-104. Web.

Webber, Michael E. "Energy Tech That's Made in America." *Mechanical Engineering* 1 Apr. 2013: 16. *Academic Search Complete*. Web.

Yergin, Daniel. "Ensuring Energy Security." *Foreign Affairs* 85.2 (2006). Web.

[1] The word address will be used throughout this paper based on the author's assumption that energy insecurity in an interdependent yet anarchic international system cannot be fully solved, but can be effectively addressed or managed through smart policy, international cooperation, and market processes.

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Date written: April 2013