

SECURITY IMPLICATIONS OF THE CHANGING ENERGY LANDSCAPE

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Even before the onset of the credit crunch and the global economic meltdown, energy markets were already in the midst of significant change. Energy demand growth earlier in the decade had eroded existing spare capacity, creating persistently tight markets in which any geopolitical or weather-related supply interruption often resulted in precipitous spikes in commodity prices.

Infrastructure and capabilities limitations, heightened geopolitical and investment risk, volatile costs and prices, and growing concern over the environmental implications of fossil fuel use further complicated the picture. At the same time, the emergence of new global players with increasingly larger energy and geopolitical footprints posed new threats to the ability of the United States to influence and shape the global energy system going forward.

Over the next several decades the world's population is expected to grow from 6 billion to 9 billion people. With population, economic growth, and standards of living expected to increase in already densely populated areas, society will necessarily require more resources such as food, water, land, energy, and other basic materials to fuel and sustain this expansion. As the world struggles to meet these needs, new trends and dynamics are shaping our collective energy future.

As a consequence, even before the current run-up in oil prices, a growing consensus had emerged that the world was on an increasingly unsustainable path with respect to energy and that the time had come to fundamentally “re-set” the system and develop new technologies, policies, and strategies to address simultaneously the economic, environmental, and foreign policy and security challenges related to the way we produce, transport, and consume energy.

This new landscape is characterized by five overarching trends or dynamics: shifting demand patterns; the changing resource base; price volatility and investment uncertainty; new players, alignments, and evolving rules; and the threat of climate change and efforts to impose carbon constraints on a fossil fuel-dependent world.



Shifting Demand Patterns

While most forecasts project a 40 to 60 percent growth in energy demand over the next 25 years, there has been a decided shift in who those consumers are. In the past, the members of the OECD, or developed economies, were the largest energy consumers. That title has now been claimed by the emerging or developing economies, led by China, India, and the Middle East. The overwhelming majority (some 75 percent) of new fuel growth will be determined by the choices these nations make. And while this shift poses considerable challenges for transparency, data reliability, and quality, it also presages new geopolitical alignments and, based on current consumption patterns, increased use of fossil fuels—with attendant climatic impacts.

Changing Supply Choices

Despite the doomsday predictions of the past decade, the good news is that the world's endowment of energy resources—both conventional and unconventional—is enormous. These resources, however, are becoming increasingly challenging and expensive to access, produce, convert, and deliver to where they are needed in a cost-effective, secure, and environmentally benign manner. A disproportionate chunk of the remaining conventional oil and gas resources are geographically concentrated in a relatively few areas of the Middle East, North Africa, and Eurasia, and although the western hemisphere is rich in unconventional fuels such as oil sands, oil shale, unconventional gas, and extra-heavy oil deposits, their extraction and refining present considerable challenges, especially in an age of carbon constraints.

The wave of popular and political unrest that has recently upended governments in Tunisia and Egypt and challenged Libya, Bahrain, Yemen, and others has refocused attention on the reliability of supplies from selected areas. Events have also reinforced concerns related to the adequacy and security of the delivery infrastructure required to transport increasingly larger volumes over long distances and through already crowded and potentially vulnerable “choke points,” such as the Suez Canal and the Strait of Hormuz.

The rapid rise in new technologies and renewable energy sources (albeit from a very small base) presents an optimistic case for transformative efforts. The enormity of global demand needs, however, and the cost for new transmission infrastructure as well as the technological challenges presented by the variability of renewable sources suggest that, absent major breakthroughs, the transformation to lower-carbon energy sources will take decades.

Price Volatility and Investment Lags

Persistent demand and tight supplies along with rising costs for equipment and materials resulted in rapidly escalating oil prices between 2006 and 2008. In the five-year period between 2003 and 2008, prices rose by more than \$100 a barrel, only to drop by more than 50 percent a year later. The hefty increase in prices also resulted in a massive transfer of wealth from consumer nations to producers, many of whom now hold substantial sovereign wealth funds. From the consumer perspective, these outlays present significant balance of payments problems. For newly enriched producers, the cash receipts allow nations to self-finance projects and use those funds to cement geopolitical alliances.

At this writing, we are once again in the throes of an accelerated price rise, fueled by the lethal combination of growing demand, geopolitical tensions, a weakened dollar, and speculative investors. Volatility in energy prices, including those for substitutes such as alternative energy forms, has frozen or otherwise restricted new investment and consequently delays the lead times for new sources to be brought to market.

The impacts of the Macondo oil spill continue to reverberate with “spillover” impacts on domestic shale gas development as the industry struggles to rebuild public confidence and address increased regulatory scrutiny. Faced with fiscal constraints, the ability of governments to continue to subsidize alternative energy is under threat. The tragedy at Fukushima in Japan is likely to stall the nuclear renaissance once again, and major infrastructure efforts like the Keystone pipeline or large transmission projects remain under renewed environmental and safety challenges—even as energy demand continues to grow.

New Players, New Alignments, New Rules of the Road

Geopolitical trends continue to have a significant impact on energy production, prices, and trade. Higher prices resulted in a resurgence of resource nationalism and the tendency to exert greater state control over the resource base. They also, in some notable cases, have allowed producers to use en-

ergy resource leverage to further foreign policy and political agendas. Although sovereign nations have always exerted some measure of control over indigenous resources, the revision of legal and regulatory structures and limitations on access to resources have created an atmosphere of limited investment opportunity and uncertainty.

Other factors have emerged as elements of the changing geopolitical landscape affecting energy production, delivery, and use. These include the changing role of geopolitical alliances in forming energy deals; governance and political stability issues; threats to facilities, infrastructure, and transit areas; and a greater focus on human rights, environmental degradation, the threat posed by climate change, poverty alleviation, and energy equity issues. As a result of these factors and high or volatile prices, governments are increasingly concerned about their immediate and long-term energy security.

These changing dynamics are threatening the utility, relevance, and effectiveness of existing institutions, many of which are the result of a post–World War II order that was conceived in a decidedly different environment from the global dynamics we are currently experiencing. The existence and magnitude of recent sovereign wealth funds have recently allowed strategic resource holders and burgeoning economic powers to self-finance new investments, both at home and abroad, without the involvement or structures

of traditional lending institutions such as the World Bank, the International Monetary Fund, and regional development banks.

Similarly, the emergence and desires of growing economic powers like China, India, and Brazil are challenging traditional notions of free trade and globalization. A further complication resides in the fact that as our global challenges increasingly reflect horizontal movement and coordination across sectors, regions, and governments, typical institutional decisionmaking and priorities continue to reflect a more vertical orientation.

Climate Change

Of all the trends identified above, climate change and efforts to decarbonize the energy mix have the greatest potential to fundamentally transform the global energy system. The world relies on fossil fuels for more than 80 percent of its energy needs. Reducing this dependence

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will require significant new investment, technology advancements, and massive-scale deployment sustained over a long period. Transitioning to a low-carbon energy future will require the transformation of an energy delivery system that the world has relied upon for more than a century, moving toward a more sustainable design but one that is largely theoretical, untested at scale, and expensive.

Yet if the projections outlined by the Intergovernmental Panel on Climate Change are anything close to correct, the catastrophic impacts of moderate to severe increases in temperature and sea levels will threaten large portions of the world's population, stress food and potable water supplies, produce flooding and drought, exacerbate the spread of disease, force large-scale migration, and strain the capabilities of governments to respond—including in those regions currently responsible for large portions of global energy supplies.

Lessons drawn from recent food and grain shortages should be instructive about the range of unanticipated consequences; the interrelationships between energy security, economic, climate, and agricultural policy; and the complexities of the global system. In addition, the future geopolitical effects of climate change could also have enormous implications for the geopolitics of energy. ■