

60. Environmental Kuznets curve as defined in the *Encyclopedia of Energy* from Elsevier Press.
61. IEA, *World Energy Outlook 2007*.
62. To be clear, its role is likely to be much larger if climate policies are widely adopted; the IEA for example finds that its share by 2030 would be 27 percent higher in its alternative policy vs. reference case.
63. Catherine Morris et al., *Nuclear Power Joint Fact-Finding*, The Keystone Center, Keystone, Colorado, June 2007, [http://www.nuclear.gov/pdfFiles/rpt\\_KeystoneReportNuclearPowerJointFactFinding\\_2007.pdf](http://www.nuclear.gov/pdfFiles/rpt_KeystoneReportNuclearPowerJointFactFinding_2007.pdf).
64. See Douglas Frantz and Catherine Collins, "Those Nuclear Flashpoints are Made in Pakistan," *Washington Post*, November 11, 2007.
65. Jim Harding, "Economics of Nuclear Power and Proliferation Risks in a Carbon-Constrained World," *Electricity Journal*, Elsevier, Inc., November, 2007.
66. Joseph Romm, *The Hype About Hydrogen*, (Washington D.C.: Island Press 2004).
67. Tim Moran, "Tanks are key to hydrogen economy's growth," *Automotive News*, November 19, 2007.
68. Ibid.
69. Richard A. Posner, *Catastrophe: Risk and Response* (New York: Oxford University Press 2004).
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# Realism and Idealism in the Energy Security Debate

*Gal Luft and Anne Korin*

In this book we sought to inquire how different actors in the global energy system view energy security, to assess some of the growing energy security challenges that the 21st century holds in store for humanity and, with the help of leading experts, reflect on how the world is likely to address them. This inquiry stemmed from a sense that there is a strong disconnect between the publicly stated policies, coming from officials and experts in net energy producing and consuming countries alike, in praise of international cooperation, collective security, free markets, fair distribution of resources and commitment to sustainable growth and the welfare of future generations, and the reality on the ground, characterized by volatile energy prices, rising geopolitical instability, suppliers using strong-arm tactics against consumers while consumers beat their chests about energy self-sufficiency and boost their military capabilities to ensure their access to energy. If everybody agrees on the bedrock principles of an effective global economic system why do we face today the gravest risks to our energy supply? And why is the maximal degree of energy security we can hope for, according to James R. Schlesinger, a keen observer of the energy and security world, "various degrees of insecurity"?<sup>1</sup>

The short answer, as described throughout the book, is that per capita energy use is growing by leaps and bounds and this makes nations more prone than ever to compete over access to cheap and depleting energy sources. "The diagnosis of the energy crisis is quite simple," reiterated President George W. Bush, "Demand for energy is increasing while supplies of oil and natural gas are diminishing."<sup>2</sup> In the process of securing energy supplies, energy-hungry nations are often forced to compromise other important security, economic and environmental concerns. At the same time, exporters are nationalizing their energy industries, leaving less and less room for the private sector and foreign investors while increasingly using energy as tool to advance their foreign policy agenda.

Under such conditions, agreeing on a unified energy security agenda will be increasingly difficult and each country is likely to pursue its own interests based

on what it perceives as energy security. As the first half of this book showed, one complicating factor in the effort to create a common energy security agenda is that there is no uniform view of what energy security really is. Countries' understanding of energy security depends on their geographical location, resource endowment, level of economic development, system of governance and many other factors. For some countries energy security means producing more energy at home and relying less on foreigners. For others, it is about creating economic and political interdependencies with their suppliers even if those suppliers are unsavory. Some countries are more concerned about natural gas and electricity; others about oil and transportation. Many are dependent on external sources for both. Some place high hopes in the use of military force to secure energy supply; others put their faith in collective security arrangements, loose alliances and even looser international treaties and organizations. For China, energy security means securing supply through government-to-government deals and buying stakes in foreign oil fields—in Sudan, Nigeria, Angola and so on. Others, like India and Japan, prefer to buy oil on the global market, seeing little sense in China's overseas investments. For Russia, OPEC and others who generate the overwhelming share of their governments' revenues from energy exports, energy security is all about security of demand that they hope to achieve by creating a vertical monopoly over the supply of energy, discouraging and undermining consumers' diversification efforts and imposing restrictions on foreign investment in domestic oil and gas fields. A few like Bahrain, Indonesia and even Norway and the UK, whose hydrocarbon sectors have either leveled off or are already in decline, are making the transition from an exporter mindset to that of an importer.

### Variety but Not Variety Alone

Despite variations in the perceptions about energy security, there are few universal principles that dominate almost every country's energy security strategy. The first is the doctrine articulated by Winston Churchill before the British Parliament in 1913, stating that "safety and certainty in oil lie in *variety* and *variety* alone."<sup>3</sup> Different countries have different interpretations of the term "variety." Consumers seek variety of suppliers and supply lanes so that if one or more suppliers go offline the impact can be minimized. Producers are uncomfortable with their dependence on a single market and seek to expand their portfolio of clients. Hugo Chavez' attempts to break Venezuela's dependence on the U.S. market by diverting an increasing part of his country's oil to China is one example. Like consumers, producers want to diversify their supply lanes and avoid blockades or terrorist acts that could devastate their economies. Efforts by both producers and consumers to diversify supply lines have given rise to a new breed of countries in the energy security picture: transit countries. Turkey, Cameroon and Georgia and in the future perhaps Bangladesh, Afghanistan, Israel, Pakistan, Niger, and Colombia are some of the countries that are currently in the process of gaining increasing international status and national wealth by being conduits for oil and gas.

The temptation to be a transit state is great: revenue earning from granting right of way, an influx of foreign investment and increased energy security as some of the oil or gas can be diverted to the transit state's market. But as Necdet Pamir described in the case of Turkey, with the benefits come some diplomatic and security challenges. By enabling Caspian energy to bypass Russia and flow to European markets, Azerbaijan, Georgia and Turkey find themselves at odds with Moscow. The Trans-Saharan gas pipeline that could, if built, connect Nigeria's gas reserves to Europe via Algeria's Mediterranean coast will make Niger, through which 470 miles of the pipeline is planned to traverse, a key contributor to European energy security. EU officials say the pipeline could supply 20 bcm a year of gas to Europe by 2016. But, as in the case of the BTC pipeline, such a project could threaten Russia's security of demand and Nigeria, Niger, and Algeria are likely to come under pressure from Moscow to abandon this effort. Allowing Iranian gas to pass to India through Pakistan's territory would no doubt incur Washington's wrath. The United States would also be equally unhappy if Colombia went ahead and lent its territory to become a land bridge for Venezuelan oil to reach the Pacific coast, from where it can be easily shipped to China instead of the United States. And if Afghanistan somehow succeeded in becoming a conduit for Turkmen gas en route to India that would be a challenge to Iran, which competes over access to the Indian market. Indeed, for every winner there is a loser.

As oil and gas become increasingly difficult to obtain, the definition of variety broadens from *geographical* variety to variety of *energy* sources. In other words, countries seek to diversify their energy basket to include as many sources of energy as can contribute to the grid and the transportation sector. Broadening a country's energy portfolio through increased use of alternative fuels, nuclear energy and renewable energy sources reduces the impact of a disruption in hydrocarbon supply. Even within the oil and gas sector there are calls for increased variety. The definition of oil is expanding to include a variety of nonconventional forms of petroleum made from tar sands, heavy oil, oil shale, coal-to-liquids and gas-to-liquids. Conventional natural gas is now being increasingly augmented by coal-bed methane, shale gas, tight sandstone gas, and, in the future, possibly methane hydrates.

### Redundancy and Liquidity

Redundancy and liquidity are also universal principles of energy security. As described by several contributors, both the power and oil sectors have too little wiggle room to deal with supply disruptions, whether man-made or due to natural reasons. For years, disruptions in the oil sector could be offset by OPEC's spare capacity—the ability of some producers, chiefly Saudi Arabia, to inject extra oil into the market when other suppliers falter. This spare capacity was the oil market's main source of liquidity. In 2002, spare capacity amounted to nearly 10 percent of the 76 mbd global oil market. A year later, with demand climbing to 78 million barrels, spare capacity dropped to about 5 percent. This cushion was sufficient to prevent an oil crisis when a labor strike in Venezuela, ethnic riots in

Nigeria and a war in Iraq took major producers out of the market for extended periods. With global daily demand at 86 mbd spare capacity is barely 2 mbd, which is at the dangerous level of 2 percent. Despite Saudi Arabia's reassurance that it is accelerating plans to bring new oil fields into production, this is all too little, too late. The IEA estimates that spare capacity will rise to 4 mbd in 2010 as new projects come on stream but will fall again toward 2013 as demand continues to grow.<sup>4</sup> As a result, the oil market in the decades to come will resemble a car without shock absorbers: the tiniest bump on the road can send a passenger to the ceiling. Without liquidity, only one mechanism is left to bring the market to equilibrium: rapid and uncontrolled price increases.

To compensate for the erosion in OPEC's spare capacity, major oil consuming countries would have to take steps to insulate their economies from supply disruptions by creating liquidity mechanisms of their own in the form of strategic reserves. More than 4 billion barrels are held in strategic reserves, roughly a third of which is government-controlled (the rest is held by private industry). The United States alone holds an emergency stockpile of some 700 million barrels, a number it intends to increase in the coming years. Japan owns 580 million barrels; South Korea has 150 million; and the EU mandates that each member country keep the equivalent of 90 days of imports. Meanwhile, China is in the process of building a 310 million-barrel reserve, and India, 37 million. The IEA has made clear that the emergency stockpiles of its member countries are for strategic purposes only. But were the United States and Europe to increase their reserves significantly and major Asian nations encouraged to break that constraint and establish larger oil banks, within a few years a new global Strategic Petroleum Reserve could begin to serve as a liquidity mechanism, replacing the failings of OPEC. But it is important to remember that strategic stocks can only strengthen energy security when they are handled properly and when they are activated in a concerted manner as part of an effective international framework. Unfortunately, despite the global nature of the oil market, there is insufficient international coordination of strategic reserves, and most countries have opaque procedures on when and how to fill the stocks and on when oil can be released. Furthermore, the big emerging economies of China and India are not part of the IEA, which coordinates the reserves held by the rich countries. Barring their inclusion in the international emergency management system China and India will be tempted to build massive stockpiles, adding extra demand to an already stretched market. David Victor and Sarah Eskreis-Winkler correctly point out that "a better-run and better-coordinated international system of oil caches could help convince China and India that treating oil as a true commodity and trusting the markets more are better ways to improve their energy security than pursuing oil mercantilism."<sup>5</sup>

Redundancy is also an imperative for producers. In order to bring their product to market energy exporters depend on vast pipeline networks, export terminals and LNG liquefaction facilities. A failure of one of those components in the supply chain would hurt not only the economic well being of the producer but also its image as a reliable supplier. In this, Saudi Arabia is perhaps the most

vulnerable producer. As Ali Koknar described in Chapter 2, the Kingdom's oil system is target rich and extremely vulnerable to terrorist acts. This is not only due to al-Qaeda's strong presence there and its ability to carry out coordinated attacks but also to the structure of the Kingdom's oil infrastructure. Over half of Saudi Arabia's oil reserves are contained in just eight fields, among them the world's largest onshore oil field—Ghawar, which alone accounts for about half of the country's total oil production capacity—and Safaniya, the world's largest offshore oilfield. About two-thirds of Saudi Arabia's crude oil is processed in a single enormous facility called Abqaiq, 25 miles inland from the Gulf of Bahrain. On the Persian Gulf, Saudi Arabia has just two primary oil export terminals: Ras Tanura—the world's largest offshore oil loading facility, through which a 10 percent of global oil supply flows daily—and Ras al-Ju'aymah. A successful terrorist attack on each one of these hubs could take up to half of Saudi oil off the market for an extended period of time and with it most of the world's spare capacity, causing a major economic shock. In addition to this, Saudi Arabia now faces the threat of Iranian blockage of the Strait of Hormuz. Iran possesses a stockpile of mines that could be used to disrupt the flow of transportation and provoke the United States to engage in extended military conflict. Such emerging threats to Saudi access to global markets have revived interest in the Trans-Arabia oil pipeline project that would circumvent the Strait of Hormuz by carrying Saudi oil from Ras Tanura to export terminals in Oman, UAE and Yemen. As Ariel Cohen described, Russia too is increasingly interested in diversification of its supply routes to both the European and Asian markets. Unlike Saudi Arabia, whose primary concerns are terrorism and war in the Persian Gulf, for Moscow supply route diversification is aimed at Russia's dominating access to its markets and preventing competing conduits of Caspian energy from capturing a significant share of the European market.

Redundancy is no less important in the power sector. As David Sweet pointed out, the vulnerabilities of power grids throughout the world to intrusions and terrorist attacks are at all-time highs with potential for major and economically devastating disruptions. Notwithstanding advances in both cyber and physical security as well as attempts to decentralize power sources through DE, the short-term or long-term disruption of electricity to banks, refineries, hospitals, airports, water systems and military installations still presents a terrifying scenario. Power companies, policymakers and regulators throughout the world are waking up to this reality, developing tactics and technologies to defend high impact targets like transformers and supervisory control and data acquisition, or SCADA, systems.<sup>6</sup> In increasingly integrated markets like Europe a main strategy to add redundancy is to interconnect national transmission grids that were initially constructed to be independent and stand-alone.

### Realists vs. Idealists

In most cases the universal principles discussed above are not enough to fulfill countries' energy security needs, and this brings us to the biggest question facing

the energy security community: will humanity manage to peacefully balance the interests of all of the players in the energy security system or will the world descend into a series of diplomatic skirmishes, fierce economic contest and energy wars. Michael Klare's and Chris Fettweis' chapters shed some light on one of the most interesting debates in the field of international relations today between energy security realists and what can be called energy security idealists.

Energy security realists see the world grappling with a cluster of challenges that will only get worse as time goes by. They assume that countries are predisposed to pursue their self-interest using every aspect of their national power. They therefore tend to view energy as a subset of global power politics and a legitimate tool of foreign policy, and they are skeptical of the current energy market's ability to guarantee long term supply. Realists point out that throughout history, certain commodities, and in particular energy commodities, minerals, water and food, have had a strategic value beyond their market price and as such they have been repeatedly used as tools of foreign policy by exporters and have been among the prime catalysts for armed conflict. As the world is evolving into what Michael Klare calls a system of "rising powers/shrinking planet," the risk of energy wars is in the minds of many. Klare's predictions are bleak, seeing the earth transforming into "a barely habitable scene of desolation" due to a series of energy conflicts and environmental degradation, and this view is not uncommon among energy security realists.<sup>7</sup> While realists accept the role of collaboration and interdependencies as a way to enhance collective energy security, they do insist on weighing this against other material forces, together with an understanding of the history, culture and economics of the societies comprising the international system. In a world of jihad, terrorism, proliferation of weapons of mass destruction and deepening divide between Islam and the West, realists cannot ignore the fact that more than three quarters of the world's proven conventional oil reserves and nearly half of its natural gas reserves are concentrated in Muslim countries. Realists recognize the power and threat of the oil cartel, and they sharply distinguish between nationalized resources used as tools of the state and resources owned and commercially handled by international companies that adhere to free market rules. In light of all this, realists see a role for the state in a concerted effort to reduce the strategic value of oil and gas, in effect putting energy policy in the service of foreign policy as opposed to the current situation in which foreign policy is increasingly subjugated to energy policy concerns.

Idealists on the other hand view a slightly rosier future, believing that war to control territories that contain fossil fuels will continue to be a very rare phenomenon as the new century unfolds. Fettweis explains that fighting over energy is futile since it will always be cheaper to buy oil than to seize it. He argues that "the interests of consumers and producers do not conflict—all parties involved in oil production have serious interests in stability, without which no one can benefit," and this reflects the bedrock principle of energy security idealism: strong faith in the power of markets and the concept of "interdependence" as the key to ensure energy security. Idealists point out that because oil and gas are traded

globally, a supply disruption anywhere will affect prices everywhere. They have a fundamental belief that energy market players are rational and motivated by profit maximization. Markets should be left to work and higher prices are not an energy security problem but a solution as they depress demand and increase efficiency. Idealists tend to downplay ideological, cultural and geopolitical drivers, and they view efforts by consumers to insulate their economies through greater self-reliance as futile and undesirable. International competitive and integrated markets, on the other hand, are viewed as tension reducers that increase market certainty and create a healthy equilibrium between the economic interests of consumers and producers. Popular among idealists is the idea of a "grand bargain" among producers and consumers, one that, in the words of World Bank President Robert Zoellick, involves "sharing plans for expanding supplies, including options other than oil and gas; improving efficiency and lessening demand; assisting with energy for the poor; and considering how these policies relate to carbon production and climate change policies."<sup>8</sup> Such calls for improved multilateralism on energy security are not new. The problem is that they do not seem to work. In June 2008, when global oil prices hit a record near \$140 a barrel, the world's major oil producers and consumers, as well as leaders from big oil firms and international organizations convened in Jeddah, Saudi Arabia, to seek ways to bring stability to the international oil market for the benefit of all. At the conference British Prime Minister Gordon Brown called for a long-term deal whereby the oil-consuming nations would diversify energy supplies, moving into nuclear and renewables, and the oil-producing countries would increase production, as well as recycle some of their huge profits into western renewable technologies.<sup>9</sup> But despite these calls for adoption of win-win solutions, tensions between producers and consumers worsened further in the month that followed and the prospects for such a grand bargain, and even, more, the prospects of actors fulfilling their promises, seem highly unlikely.

The belief in the rationality of markets causes idealists to play down the notion that producers would use their energy as a weapon. The Arab oil embargo of 1973, which demonstrated the danger of a conflict between suppliers and consumers, is viewed as a solitary incident that acted as a boomerang, hurting the exporters more than the consumers. The threats of using the energy weapon by Hugo Chavez and Mahmoud Ahmadinejad are viewed as empty rhetoric, and Russia's repeated use of the natural gas weapon can be avoided through stronger integration of European markets and enhanced dialogue with Moscow.

The acolytes of energy security idealism also sweep away views calling for increased energy independence. As Daniel Yergin wrote in *Foreign Affairs*, real energy security requires setting aside the pipe dream of energy independence and embracing interdependence.<sup>10</sup> Pierre Noël alleges that calls for energy independence "reinforce prejudices in China and India about the need for aggressive foreign energy policies—a process that looks like a vicious circle."<sup>11</sup> And Frank Verrastro and Sarah Ladislaw called for "a much more sophisticated approach to energy policymaking, one that more fully appreciates the interdependencies of

global markets, the complex nature of energy security, and the need to manage the trade-offs inherent in energy policy decision making.<sup>12</sup>

If realists are less "sophisticated" in their thinking it is primarily because they assume that most countries—consumers and producers alike—are still motivated by nationalistic sentiments and that market forces and economic interdependence do not guarantee peace and stability. The notion that interdependence reduces the risk of conflict does not pass the test of historical scrutiny. World War I broke among the most economically interdependent countries. Despite high trade levels in 1913–14 German leaders decided to attack, to ensure long-term access to markets and raw materials. In the 1930s, the two most aggressive states, Germany and Imperial Japan, were also the most highly interdependent despite their efforts towards autarky relying on other states for critical raw materials. In fact, Japan had a much higher level of economic interdependence with other countries than it did in the 1920s, but nonetheless embarked on aggressive imperialism.

Energy security realists' skepticism of the ability of energy markets to deliver energy security also stems from their view of energy markets as anything but free. Nearly 80 percent of the world's oil reserves are controlled by governments through their national oil companies. These governments set prices by their investment and production decisions, and they have wide latitude to shut off the spigot for political reasons, just as Libya did as we were writing these lines in October 2008 when it decided to stop oil supply to Switzerland in response to the arrest in Geneva of the son of Libyan leader Muammar Gaddafi.<sup>13</sup>

OPEC countries that rely heavily on energy revenues are inclined to keep prices high. In Winter 2008, as the price of oil plunged from its historical high of \$147 a barrel to under \$40, the IMF assessed that Saudi Arabia must earn at least \$49 a barrel to avoid going into deficit, Iran and Venezuela need \$90 and Iraq \$110 to balance their books.<sup>14</sup> This is the main reason why those countries are likely to continue to constrict supply and restrict access to foreign investment. To this end, Saudi Arabia's King Abdullah ordered some new oil discoveries left untapped to preserve oil wealth in the world's top exporter for future generations.<sup>15</sup> Russia also showed that it aims to restrict production. "The idea of mothballing oilfields seems very interesting to me," Russian Energy Minister Sergei Shmatko said.<sup>16</sup> These are not necessarily displays of greed and focus on short term economic considerations but also a reflection of a different perception of time in some of the producers' cultures. Unlike well-diversified industrialized economies where there is strong belief in the power of technology and innovation to ensure economic progress, countries heavily reliant on energy revenues for their economic well being see their reserves as an insurance policy that guarantees their future economic security. This may also explain exporters' lack of transparency, denying energy markets the information that is so vital to their healthy functioning. Recent nationalization efforts of energy assets in places like Venezuela, Russia, and Bolivia promise more government control and less hospitable investment climates for IOCs in the decades to come. Furthermore, in many countries energy prices are controlled by governments and petroleum products are either sold for

way below market prices or are heavily taxed. Finally, trade barriers on alternative fuels are still prevalent in the United States and EU and are blocking the road to international free and open trade among consumers and producers.

Make no mistake, despite intensive efforts by Western oil companies in recent decades to develop non-OPEC sources of supply in West Africa, the Caspian, Latin America and the tar sands of Canada, the Middle East remains and will continue to remain the world's primary supplier of crude oil. The IEA projects that the share of Middle Eastern members of OPEC of world oil production will grow from 28 percent today to 43 percent in 2030. This will no doubt allow OPEC members to wield tremendous geopolitical power and an ability to manipulate the oil prices to the detriment of the global economy. Russia's recent international behavior is a source of great concern in the West. Just one month after its attack on Georgia, Russia's President Dmitry Medvedev delivered a hard blow to the prospect of multilateralism in energy security when he told the UN Security Council that Russia would unilaterally claim part of the energy-rich Arctic, sidestepping efforts to reach multinational agreement on the future of this region. "This is our responsibility, and simply our direct duty, to our descendents," he said. "We must surely, and for the long-term future, secure Russia's interests in the Arctic."<sup>17</sup>

As we move deeper into the 21st century many of the challenges of the oil market will be duplicated in the natural gas market. Due to high oil prices natural gas will continue to replace oil wherever possible. In addition, because natural gas emits less CO<sub>2</sub> when it is burned than either coal or petroleum, governments implementing national or regional plans to reduce greenhouse gas emissions may encourage its use. As a result, according to the EIA, total natural gas consumption is projected to increase from 104 tcf in 2005 to 158 tcf in 2030.<sup>18</sup> On the supply side, almost three-quarters of the world's natural gas reserves and half of the world's undiscovered reserves are located in the Middle East and Eurasia. Russia, Iran, and Qatar together account for about 57 percent of the world's natural gas reserves. With such growing control over reserves the temptation to create an OPEC-like natural gas cartel will be strong. In January 2007, Iran's supreme leader Ayatollah Ali Khamenei proposed that Iran and Russia create a cartel. Later that year then Russian President Vladimir Putin and Qatari Emir Sheik Hamad bin Khalifa Al Thani agreed to explore the idea. President Abdelaziz Bouteflika of Algeria and President Hugo Chávez of Venezuela are also known to support creation of such a cartel. And in October 2008, Iran, Russia and Qatar announced that they would form a "big gas troika."<sup>19</sup> But many energy security idealists still play down this possibility, pointing to the complexity of natural gas markets compared to oil. Natural gas is less fungible than oil and unlike oil, which is traded on an exchange that constantly updates the market price based on supply and demand, it is sold under tight contracts that allow buyers to lock in prices for up to 25 years. This makes a gas cartel difficult to achieve, according to the skeptics. But as more natural gas is traded in the form of LNG and as fewer countries control its reserves the feasibility of such a cartel and likelihood of its effectiveness increase. Whether or not the 16-member Gas

Producing Countries Forum will evolve into a cartel is hard to tell at this point but many of this group's members are clearly interested in the option. It is worth remembering that OPEC was first formed in 1960, but it did not function as a true cartel until 1999, when Saudi Arabia began to assert its will to push prices higher.

Finally, the financial crisis that began in 2008 and is unfolding as these lines are being written is likely to leave energy-producing countries in a more advantageous position to solidify control over the world's energy system as alternatives to hydrocarbons become less competitive. The collapse of the global credit system has reduced the volume of investment in renewable energy from \$7 billion in 2007 to \$5 billion in 2008 and a forecasted \$4 billion in 2009.

There is no doubt that in the era of globalization countries become increasingly interdependent in a variety of fields. There is also little dispute that in a perfect world interdependence is a wonderful idea. But the world is far from perfect and the world's top energy exporters are the most imperfect of all. Regretfully, to date, the idealist approach to energy security has proven ineffective in checking the emboldened posture of energy exporters and the overt challenges they pose to global energy security and to international security writ large. This is particularly true for Europe, where the approach of soft security is applied to energy security as well and where energy security idealism is therefore pervasive. European action in face of Russia's coercion has been weak, disunited and unfocused. This has given the Kremlin greater political influence, to the detriment of Europe's economic security. The EU's purported policy of promoting greater competition in energy supplies and diversification of the continent's natural gas sources has been largely unsuccessful, and projects like Nabucco, which could help diversify European energy supply, seem to have gained little traction. High level European officials who publicly lament the EU's inability to diversify its sources are often the same ones who give endorsements to Russian projects that are going to make things worse. As Robert Bell noted in Chapter 17, energy security idealism is one of the main reasons behind some EU governments' reluctance to enable an expanded role for NATO in energy security, believing that the discussion on energy security in the framework of NATO would send the wrong signal to Russia. Pierre Noël's assertion that "NATO for energy is a dangerous nonsense" is reflective of this mindset.<sup>20</sup>

When it comes to Washington, the idealists' approach to energy security also leaves much to be desired. The years of the Bush administration were dedicated to promotion of anti-terrorism best practices abroad and collaboration on critical energy infrastructure protection as well as an effort to promote political reforms in energy-producing regions and democratize Arab regimes in the hope that such policy could put U.S. relations with such regimes on a sound political footing and hence ensure security of supply.<sup>21</sup> But the Middle East is slow to embrace democracy, and while as of this writing it is premature to determine whether or not the Iraqi experiment is a success, in other parts of the region, as well as in other key energy producing countries like Russia, Kazakhstan, and Venezuela, freedom and

democracy are in retreat. In fact, the Middle East is becoming increasingly volatile as most of the region's players have declared their intentions to follow Iran's path and develop nuclear capabilities, albeit for "peaceful purposes."

### Environment and Security

In recent years, climate change concerns have been injected into the discussion on energy security, exposing another divergence of opinion in the energy security community. Some security experts hold that climate change poses a serious threat to international security. According to this view projected climate change acts as a threat multiplier in already fragile regions, exacerbating conditions that lead to failed states—the breeding grounds for extremism and terrorism—and adding to tensions even in stable regions of the world.<sup>22</sup> Those who view climate change as a global security threat of equal urgency to the current energy security challenge demand that the potential national security consequences of climate change be fully integrated into national security and national defense strategies, and that energy security solutions should only be applied if they also address climate change concerns. In Chapter 22, Deron Lovaas shows how difficult the tradeoffs are between energy security and environmental challenges. Energy security concerns can breed policies that environmentalists consider devastating. One example is coal-to-liquids. During the apartheid years, South Africa faced economic sanctions, which threatened its oil imports. The country addressed its energy security challenge by building coal-liquefaction facilities. Today, coal-rich countries like China and the United States, eager to cut petroleum dependence, are increasingly interested in similar coal-to-liquids technology, which is profitable as long as crude oil remains above \$60 a barrel. But, for environmentalists, using coal to displace oil is a nightmare scenario, as coal-derived fuel produces twice as much CO<sub>2</sub> as petroleum-based fuel. Coal is not the only source of energy that improves energy security while increasing CO<sub>2</sub> emissions. Canadian tar-sands and oil shale have tremendous potential for additional liquid fuels, but the environmental impact of extracting them far exceeds that of conventional oil. Indonesia's attempt to supply the world with biodiesel made from palm oil led it to burn its rainforests, releasing such vast amounts of CO<sub>2</sub> that the country turned into the world's third biggest emitter after China and the United States.

While some put greater emphasis on energy security at the expense of the environment, others are willing to sacrifice energy security in order to address environmental concerns. The prime exhibit here is Germany, whose chancellor Angela Merkel named confronting climate change as her country's top priority. The German government announced that it will seek to totally phase out the country's coal-mining industrial sector by 2018. It also intends to phase out its nuclear-power industry by 2020 (this despite the fact that nuclear power plants do not emit CO<sub>2</sub>). Considering the fact that 80 percent of Germany's electricity comes from coal and nuclear power, these are astonishing decisions. Replacing these sources of base load power with Russian natural gas and a slew of renewable-energy

technologies, many of which are not yet competitive, could put the German economy at the mercy of the Kremlin, which has shown no compunction in using energy as a geopolitical weapon.<sup>23</sup> India also highlights the challenge in squaring security and climate-change considerations. India's growing demand for electricity puts it on the horns of dilemma: As Jeremy Carl showed, as owner of 10 percent of the world's coal reserves it could provide for most of its own power needs. Coal power for one billion Indians means a lot of CO<sub>2</sub>. Yet, security-minded people are even more concerned about India shifting to the cleaner alternative to coal, natural gas. Should India decide to power its turbines with natural gas it is likely to become increasingly dependent on neighboring Iran, the world's second largest natural gas reserve. Pressuring India to reduce its emissions may slow down the melting of the ice-caps, but such a policy will send India right into the welcoming arms of Iran, undermining Western efforts to isolate Iran economically.

If there is an inconvenient truth relating to our energy system it is that we may not be able to address both issues in one strike, and too much emphasis on one could worsen the other. This is not to say that there are no policies that could successfully address both. Investment in efficiency, conservation, and clean technology is desirable and should be promoted. Renewable sources of energy like solar, wind and geothermal are critical. So are technologies to recycle CO<sub>2</sub> into usable liquid fuels like methanol and biodiesel from algae. But if one is to look at the big picture, such agreeable-to-all-sides remedies in and off themselves cannot solve problems of this magnitude. In times of peace and prosperity, security and the environment tend to compete for resources and public support on an equal footing, and the challenge policymakers face is to find an optimal balance between the two. But history shows that as geopolitical and economic concerns loom larger, environmental concerns tend to be put on the back burner, sometimes with painful long term consequences.

### The Choice to Have Choice Is Ours

Nice as it would be to have a global energy system in which consumers, producers and transit states work harmoniously to the benefit of all, the current realities leave little room for optimism. Turning a blind eye to the destabilizing elements, indulging in wishful thinking or kowtowing to unsavory regimes all on the altar of interdependence is exactly what brought to some of the worst calamities of the last century. To reach true and lasting energy security we must understand the strategic value of energy resources and most specifically the implications of maintaining oil's monopoly in the transportation sector. As both Gal Luft and Paul Werbos pointed out in their chapters, the unique strategic importance of oil to the modern economy stems from the fact that the global economy's very enabler, the transportation sector, is utterly dependent on it. More than 95 percent of transportation energy is petroleum based. And yet, throughout the world, the energy debate is focused, from a foreign policy perspective—as articulated by the Carter Doctrine—on ensuring uninterrupted access to oil including

by military force if necessary, and from a domestic policy perspective, on policies that increase either the availability of petroleum or the efficiency of its use. The reality is that efforts to expand petroleum supply or to crimp petroleum demand do not address the roots of the energy vulnerability: oil's monopoly in the transportation sector (the reason oil is a strategic commodity), and the stranglehold of OPEC over the consuming nations' economies. To enhance energy security there should be a focus on transformational policies that aim to reduce oil's strategic value through choice and competition in the transportation fuel market—in effect expanding Churchill's variety doctrine to include variety of fuels. Since oil's strategic status derives from its domination of ground transportation, this requires, first and foremost, vehicles that can run on a variety of fuels—not just petroleum-based fuel. Such vehicles reduce the importance of any one feedstock or fuel to the transportation sector. Cars that can run only on gasoline prevent significant market penetration of alternative fuels and thus maintain the monopoly of oil in the transportation sector and with it the excessive power of the oil cartel. As Paul Werbos described, for a cost of roughly \$100 extra compared to a gasoline-only vehicle, automakers can make virtually any car a flex-fuel vehicle, capable of running on any combination of gasoline and a variety of alcohols such as ethanol and methanol, made from a variety of feedstocks, including agricultural material, waste, coal, and natural gas. (Alcohol does not just mean ethanol, and ethanol does not just mean corn.) Flex-fuel vehicles provide a platform on which fuels can compete and let consumers and the market choose the winning fuels and feedstocks based on economics. Electric cars and plug-in hybrid electric vehicles (PHEVs) also provide access into the transportation sector to non-petroleum energy sources, placing electricity—which in net consuming countries is for the most part not generated from oil—in competition with liquid fuel. Flex-fuel PHEVs enable electricity and alcohols from a variety of energy sources to compete against petroleum based fuel, thereby breaking oil's monopoly in the transportation sector and with it OPEC's growing control over the world's economy. Policies that accelerate the shift to competition-enabling cars are key to stripping oil of its strategic status. When cars and trucks throughout the world become platforms on which fuels can compete, oil will be forced to compete at the pump (or the socket) against other sources of energy like coal, biomass, natural gas and the broad spectrum of electricity sources. Such competition will not only drive down the price of oil but it will also alter the geopolitical balance of power in favor of oil importers and developing countries with resources to become alternative fuels producers.

The rise in oil prices constitutes a regressive tax on the world's poorest nations—many of which are located in Africa, South Asia and Latin America—with an adverse impact on global security. At the same time, these nations have a significant potential for energy production through their agricultural sectors, particularly considering the large swaths of degraded land suitable for cultivation of energy crops. Instead of importing their oil from OPEC, poor developing countries could export alternative fuels (not to mention supply fuel to their own

markets), driving world development and facilitating healthy economic interdependencies. An international focus on breaking oil's transportation fuel monopoly would therefore be an engine for world development and poverty alleviation. According to author Robert Zubrin, "We could take something like a trillion dollars a year now going to the oil cartel, and redirect it to the world agricultural sector instead—about half going to advanced sector farmers and the other half going to the third world. This would create a huge financial engine for world development, and allow hundreds of millions of people to be lifted out of poverty."<sup>24</sup> Unfortunately, progress in this direction is thwarted by trade barriers put in place by developed nations, one example being the 54 cent per gallon tariff the United States imposes on ethanol imports.

A fuel choice strategy would enable the two fastest growing oil consumers, China and India, to avoid tying their transportation sectors exclusively to oil, a course that could become a complicating factor in their future relations with the West and with other regional powers. Maintaining oil's monopoly in the transportation fuel market bears the risk of putting the United States and China on a collision course over access to oil as demand increases. It is therefore in the interest of both countries to strive for fuel choice by utilizing their coal and biomass endowments as well as a broad spectrum of electricity sources, all of which can displace oil in the transportation sector.

But none of this will happen without committed leadership and government action to remove barriers to competition, through policies affecting technology (e.g., by enacting an open fuel standard, as discussed by Luft and Werbos) and trade (e.g., by repealing import tariffs on alternative fuels). Consuming countries will have to strike the right balance between security and environmental concerns and work in concert against anti-market forces and coercion by non-democratic energy exporters. And yes, there will be times that aircraft carriers will be put to use in the service of energy security.

Sheikh Zaki Yamani, a Saudi who served as his country's oil minister three decades ago is known for his reflection that "The Stone Age did not end for lack of stone, and the Oil Age will end long before the world runs out of oil." But whether or not the world is running out of oil 150 years after the discovery of oil in Titusville, Pennsylvania, the age of oil and gas is showing the first signs of slowing down and the curtain is being raised on a new energy era. What this era will look like, who will be its power brokers and how smooth will be the transition to it is premature to determine. What is clear is that it will be up to consumers to raise the curtain and do so pulling all their weight, as defenders of the old order are guaranteed to try to drag the curtain down to prolong the economic system on which they thrive. The ultimate question is who will pull harder.

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# Index

- Abe, Shinzo, 53
- Aden-Abyan Islamic Army (Muslim group), 40
- Afghanistan, 5, 12, 19, 55, 57, 109, 114, 118, 124, 147, 258, 336, 337
- Africa, 11, 51, 73, 347; agreement standards with China/U.S., 246; common energy security interests, 234–35; conflict prevention and resolution, 247; energy security approach, 243–46; importance of, 236–37; interests of China in, 12; promotion of governance, 245; provision of security, 245–46; revenue creation maximization, 8–9; revenue maximization, 244; sustainable development promotion, 244–45. *See also* Economic Community of West African States; U.S.-Africa-China energy triangle
- Africa-Europe Energy Partnership, 167
- African Contingency Operations Training and Assistance Program, 58
- AFRICOM (U.S. African Command), 58–59, 147
- Ahluwalia, Montek Singh, 219
- Ahmadinejad, Mahmoud, 7, 201, 341
- al Qaeda: bombing in Algiers, 47; Saudi Arabia's fight against, 49; threats to oil industry, 19, 23; thwarting by Moroccan government, 39; war with U.S., 68; Yemen attacks, 24. *See also* Salafist group for Preaching and Combat
- al Qaeda in the Islamic Maghreb (AQIM), 23
- al Zawahri, Ayman, 18
- Alaskan National Wildlife Reserve (ANWR), 152
- Algeria, 3, 6, 131, 133, 134, 136; OPEC investments in, 83; OPEC membership, 78; ousting of regime, 48; terrorist attacks, 23, 46–47
- Angola, 47, 150; IMET program, 58; OPEC membership, 78; terrorist attacks, 46–47
- AQIM. *See* al Qaeda in the Islamic Maghreb (AQIM)
- Arab Natural Gas Pipeline Project, 259
- Arab oil embargo (1973), 4
- Arctic: geopolitical friction possibilities, 53–54; oil exploration, 34–35; Russian energy rush, 100–101, 343
- Argentina, 6, 131, 133, 134, 136
- Armed Islamic Group (*Groupe Islamique Armé*), 23
- Arriagada, Genaro, 131
- Asia, 5, 10, 11, 12, 73; Clean Development Mechanisms, 136; energy demands, 50; increasing peacefulness, 73; recession and financial crisis, 80
- Asia Energy Conservation Collaboration Center, 184
- Asia-Pacific Economic Cooperation (APEC), 157
- Association of Southeast Asian Nations (ASEAN), 74, 202

- Atatah, Edward, 44–45
- Australia, 164; oil production declines (2000–2008), 2; uranium supplies, 14
- Automobiles: EU mileage standards, 87; fuel efficiency, 87, 88; U.S. usage data, 146. *See also* Flex-fuel vehicles; Gasoline-ethanol-methanol (GEM) fuel flexibility; Plug-in electric hybrid vehicles (PHEVs)
- Azerbaijan, 24, 53, 57, 69, 92, 147, 337; Caspian Basin involvement, 115–17
- Azimov, Araz, 116
- Baker Institute, 87
- Baku-Erzurum-Ceyhan gas pipeline (Turkey), 9, 57, 94, 97, 254
- Baku-Novorossiisk pipeline, 121
- Baku-Tbilisi-Ceyhan (BTC) pipeline, 9, 12, 24, 25, 69–70, 111, 115, 126, 166, 251, 267
- Balkan wars, 92, 104
- Barroso, Jose Manuel, 267, 269
- Barzani, Massoud, 21–22
- Batman-Dortyol pipeline (Turkey), 25
- BBC reports on Nigeria (2007), 45
- Bell, Robert G., 261–69, 344
- Berdimoukhamedov, Gurbangouli, 112
- bin Laden, Osama, 48–49
- Biodiesel production, 135–36, 205, 225, 325, 326, 345
- Biofuels, 15, 87, 135–37, 285–86; China and, 204, 205; European Union and, 161, 163; India and, 225; U.S.-Brazil Biofuels Pact (2007), 129, 134, 139. *See also* Ethanol
- Biomass, 6, 10, 133–36; environmental tradeoffs, 324–27
- Blue Stream Gas Pipeline, 94, 96–97, 254, 257
- Boiling Water Reactor (Japan), 178
- Bolivia, 6, 10; hydroelectric stations, 133, nationalization efforts, 342
- Brazil: biodiesel production, 136; crude oil supplies to U.S., 129, ethanol production, 134–35; hydroelectric stations, 133; natural gas reserve data, 130; oil reserve data, 132, U.S.-Brazil Biofuels Pact, 134. *See also* Petroleo Brasileiro SA
- British Petroleum (BP), 25, 32, 38, 99; BTC consortium leadership, 27; Statistical Review of World Energy, 91; threat by Iran, 53; TNK-BP joint venture, 99. *See also* Oleoducto Central (OCENSA) pipeline
- Brittle Power: Energy Strategy for National Security* (Rocky Mountain Institute), 156
- Brown, Gordon, 341
- Brownback, Sam, 201
- Burgas-Alexandroupolis pipeline, 96, 252, 259
- Bush, George H. W., 55–56, 147
- Bush, George W., 56, 57, 258; on the energy crisis, 335; establishment of AFRICOM, 58–59; intervention in Afghanistan, 57; invasion of Iraq, 56; 2006 State of the Union address, 146, 157; U.S.-Brazil Biofuels Pact, 134
- Calder, Kent, 203
- California: GEM car deployment, 285; oil spills, 152; rolling blackouts, 5; solar farms, 291–92
- Canada: electricity disruptions, 5; maritime conflict with Surinam, 32; natural gas supplies to U.S., 129; uranium supplies, 14. *See also* CGX Energy; Harper, Stephen
- Cano-Limon-Covenas pipeline (Occidental Corporation), 22, 25
- Car bomb attacks, 23
- Carl, Jeremy, 11, 219–31, 346
- Cars. *See* Automobiles
- Carter, Jimmy, 51, 54–56, 145
- Carter Doctrine (1980), 51, 54–56, 147, 346–46–347; globalization of, 57–59
- Caspian Basin: energy security, 109–24; geostrategic tug-of-war in, 109–10; regional projects/agreements, 121–24; White Stream project, 122. *See also* Azerbaijan; Iran; Kazakhstan, Russia, Turkmenistan; Uzbekistan
- Caspian Pipeline Consortium (CPC), 111
- Caspian Sea, 12, 53, 57, 69–70, 71, 91

- Center for Arms Control and Non-Proliferation (U.S.), 204
- Central America, 134, 135, 136, 139. *See also* Costa Rica; El Salvador; Guatemala; Honduras; Nicaragua; Panama
- Central American Free Trade Agreement (CAFTA), 135
- Central Asia, 10, 11, 91–92, 93, 97, 98, 147
- Central Asia-Center (CAC) pipeline system, 122–23
- Central Europe Pipeline System (CEPS), 268
- CGX Energy (Canada), 32
- Chad: IMET program, 58
- Chaumont* tanker, attack against, 39
- Chavez, Hugo, 4, 7, 130–31, 138, 336, 341
- Chen, Matthew, 198
- Cheney, Dick, 56
- China, 191–209; agreement standards with Africa/U.S., 246; awarding of exploration rights by, 33–34; Caspian Basin involvement, 121; common energy security interests, 234–35; conflict prevention and resolution, 247; diplomacy/military buildup, 201–4; energy consumption data/demands, 1, 73–74; energy security approach, 239–43, 336; growing oil dependence, 7; IEA membership, 12–13; increasing energy demands, 50–51; interest in Africa, 12; interest in Latin America, 10, 11; and Kazakhstani energy, 112; Kennedy's opinion of, 151; liquefied natural gas in, 206–7, 273, 279; local policy, 204–8; national oil companies, 192–93; oil consumption data, 151; oil production declines (2000–2008), 2; oil reserve buildup, 338; oversea ventures, 193–200; policy formation, 192–93; population/economic growth challenges, 11; U.S. dual view of, 151; Zhongyia Petroleum Exploration Bureau, 46. *See also* East China Sea; Ogaden National Liberation Front; Shanghai Cooperation Organization; South China Sea; U.S.-Africa-China energy triangle
- China Light & Power (CLP/Hong Kong), 206
- China National Offshore Oil Corporation (CNOOC), 52, 192, 203, 207
- China National Petroleum Company (CNPC/China), 46, 192
- China North Industries Corporation, 60
- China Petrochemical Corporation (Sinopec), 192
- Chinese Communist Party (CCP), 192
- Churchill, Winston, 336, 347
- CIA-orchestrated Iran coup (1953), 54
- Clean Air Act (1990), 320
- Clean Development Mechanisms (CDM), 136
- Climate change, 14, 137, 161, 162, 319, 328, 329–30. *See also* Global warming
- Clinton, Bill, 56, 57, 147, 264
- Coal: for electricity generation, 6; environmental tradeoffs, 319–22; India's dependence on, 11, 14, 219–31; power plants, 4
- Coal India Limited (CIL), 222, 224
- Coalition for Military Action in the Niger Delta (COMA), 45
- Coal-to-liquid (CTL) technologies, 154, 185, 204, 285, 321, 337, 345
- Coal-to-methanol technology, 154, 204
- Cohen, Ariel, 10, 91–105, 109–24, 339
- Cold War, 67, 71, 72, 151, 265
- Colombia, 8, 12, 164, 336; biodiesel production, 136; crude oil supplies to U.S., 129; natural gas/oil reserve data, 132–33; terrorist attacks, 22. *See also* Ecopetrol oil company; Ejercito de Liberacion Nacional; Fuerzas Armadas Revolucionarias de Colombia
- Common Foreign and Security Policy (CFSP/EU), 171
- Commonwealth of Independent States (CIS), 251
- Comprehensive Political Guidance (CPG), 262
- Congo-Brazzaville: IMET program, 58
- Congress (U.S.): access to oil producing lands, 152; energy resource fund commitment, 145; military seizure feasibility study, 67; 2007 energy legislation, 86–87

- Congressional Resource Service (U.S.), 163  
 Costa Rica, 32, 134, 135  
 Council on Foreign Relations report (U.S.), 153  
 Critical Infrastructure Warning Information Network (CIWIN), 170–71  
 Cyber-terrorism, 4, 314, 315  
 Czech Republic, 92, 163
- Darfur, 7, 46, 60, 145, 199  
 De Hoop Scheffer, Jaap, 261–62, 264  
 Decentralized energy (DE), 15, 308–17;  
 benefits of, 311; cost reductions, 315–16; in Denmark, 316–17; energy security threat resilience, 314–15; fuel cell technology, 310; gas turbine technology, 309; infrastructure vulnerability reduction, 313–14; microturbine technology, 309–10; modular approaches, 313; photovoltaic panel technology, 310–11; reciprocating engine technology, 309; steam turbine technology, 309; Stirling engine technology, 310; supply disruption vulnerability reduction, 311–13; wind turbine technology, 311  
 Defense Industries Corporation of Nigeria, 60  
 Delta Caribe Oriental LNG project (Venezuela), 131  
 Democratic Republic of the Congo, 47  
 Department of Defense (DoD/U.S.), 60  
 Department of Energy (DoE/U.S.), 45, 50–51  
 Directorate General for Justice, Liberty and Security (EU), 168  
 Directorate General for Transport and Energy (DG TREN), 168  
 "Doing Business Report" (2008/ International Finance Corporation)  
 Dominican Republic, 128, 135, 136
- Earth-based solar farms, 291–93  
 East Asia, 35, 74, 183  
 East China Sea, 53, 74  
 East Siberia Pacific Ocean (ESPO) pipeline, 183, 195, 197  
 East-West Energy Corridor strategy, 250, 251, 254, 257  
 Economic Community of West African States (ECOWAS), 167  
 Ecopetrol oil company (Colombia), 132  
 Ecuador, 10; crude oil supplies to U.S., 129; oil reserve data, 131–32; OPEC membership, 78.  
*See also* Ishpingo-Tapococho-Tiputini (ITT) block; Oleoducto Central (OCENSA) pipeline  
 Eesti Gaas company (Estonia), 94  
 Eisenhower, Dwight D., 296  
 Ejercito de Liberacion Nacional (National Liberation Army-ELN), 22  
 El Salvador, 128, 134, 135, 136  
 El-Badri, Abdalla, 87  
 Electric Power Development Corporation (EPDC), 178  
 Electrical Power Research Institute, 287  
 Electricity generation technologies, 290–91  
 Electricity Regulatory Commission (China), 206  
 Electricity supply: power challenges, 4–5; power supplies for, 6; as terrorist target, 20  
 Emergency Law for the Stabilization of National Life (Japan), 178  
 Enel energy company (Italy), 134  
 Energy Charter Treaty, 267  
 Energy Community Treaty, 255  
 Energy Independence and Security Act (2007), 153  
 Energy Information Administration, 6, 128, 152  
 Energy Information Administration (EIA), 6, 128, 132, 152, 279, 321, 323, 329, 343  
 Energy Information Agency, 6, 67  
 Energy Leading Group (China), 193  
 Energy Market Regulatory Authority (EMRA/Turkey), 255  
 Energy Policy Act (2005), 305  
 Energy Policy Committee (India), 222  
 Energy security blueprint, 153–54  
 Energy Security Conference (2007/Lithuania), 122

- Energy terrorism: epidemic of, 18–28; mitigation of, 25–28; perpetrators of, 19–20; targets of, 20–25  
 Energy triangle. *See* U.S.-Africa-China energy triangle  
 Environment and energy security, 318–31, 345–46; biomass tradeoffs, 324–27; carbon dioxide/climate change, 329–30; coal tradeoffs, 319–22; hydrogen tradeoffs, 329; nuclear energy tradeoffs, 328–29; oil and natural gas tradeoffs, 322–23; renewable (other) tradeoffs, 327–28; unconventional oil and gas tradeoffs, 323–24  
 Equatorial Guinea, 26, 58, 150, 199, 236, 237, 247  
 Eskreis-Winkler, Sarah, 338  
 Ethanol, 6, 87, 88, 134–35, 154, 325  
 Ethiopia, 24, 46  
 Eurasia: control of resources by Russia, 97–98; as terrorist target, 24–25  
 European Command (EUCOM) of the U.S. Army, 27  
 European Commission Directive, 163  
 European Critical Infrastructures (ECIs), 168  
 European Gas Confederation (Eurogas), 171  
 European Neighbourhood Policy, 167  
 European Program for Critical Infrastructure Protection (EPCIP), 168–70  
 European Security and Defense Policy, 171  
 European Union, 80, 160–73, 338, 344;  
 auto mileage standards, 87; biofuels target, 163; Caspian Basin interests of, 109–10; common external policy, 172–73; Council Directive (2008), 168, 170; critical energy infrastructure protection, 168–70; dependence on Russian gas, 11; energy security approach, 160–61; energy sources, 161–63; external dimensions, 165–68; and greenhouse gases, 163; High Representative for Foreign Policy, 262; internal market bundling/un-bundling, 164–65; internal mechanisms, 161–64; and Kyoto Protocol, 162; pipelines, 170–72; Reform Treaty, 171; role of NATO, 261; Trilateral Commission report, 161; 2006 oil/natural gas consumption, 91  
 Europol Gaz company (Poland), 94  
 Exclusive Economic Zones (EEZs), 31  
 Expert Committee on Energy Policy (India), 220  
 Exportation of oil, 8–13; Caspian routes, 70; infrastructure fragility, 68; Iraq's loss of revenue, 21–22; Nigeria's loss of revenue, 22–23; Saudi Arabia data, 23, 26. *See also* Carter Doctrine; Organization of Petroleum Exporting Countries  
 Exxon Valdez oil spill, 22
- Facing the Hard Truths About Energy* (NPC), 50  
 Fang Yixian, 197  
 Federal Energy Regulatory Commission (U.S.), 41, 272  
 Ferguson, Charles D., 295–306  
 Ferrero-Waldner, Benita, 167, 172  
 Fettweis, Christopher, 8, 66–75, 340  
 Finland, 14, 95, 162  
 First Coal Program (Japan), 178  
 Five Year Plans (China), 193, 205, 208  
 Flex-fuel vehicles, 153, 347  
*Foreign Affairs*, 341  
 Foreign Military Sales (FMS), 58  
 Foreign Military Sales Financing (FMSF) programs, 58  
 Forman, Johanna Mendelson, 128–40  
 France, 6, 162, 302  
 Front for the Liberation of the Cabina Enclave (FLEC), 47  
 Fuerzas Armadas Revolucionarias de Colombia (Revolutionary Armed Forces of Columbia-FARC), 22, 133  
 Fukuda, Yasuo, 53
- Gaddafi, Muammar, 342  
 Gas Authority of India Limited (GAIL), 222  
 Gas Exporting Countries' Forum (GECF), 100  
 Gas infrastructure: as terrorist target, 20–21

- Gas Producing Countries Forum, 344  
 Gas-combined cycle technology (GCC), 181  
 Gasoline-ethanol-methanol (GEM) fuel flexibility, 284–86, 288–89, 293  
 Gas-to-liquids technology, 185  
 Gas-to-liquids technology (GTL), 185  
 Gazprom (Russian state energy monopoly), 92, 94–95, 98, 99, 116, 166, 258, 265, 279  
 Georgia (country), 9, 12, 92, 94, 336, 337  
 Geothermal power, 6, 15, 133, 134, 139, 156, 180, 260, 314, 327, 346  
 Germany, 14, 94, 100, 162, 163, 177, 255, 258, 299, 302, 321  
 Global jihad, 3, 18, 49, 340  
 Global Nuclear Energy Partnership (GNEP), 306  
 Global War on Terror, 57, 58  
 Global warming, 6, 140, 184. *See also* Climate change  
 Globalization of Carter Doctrine, 57–59  
 Goldwyn, David, 11, 233–47  
 Gore, Al, 156  
 Government Accountability Office (GAO/U.S.), 277–78  
 Greater Nile Petroleum Operating Company (GNPOC), 46, 59, 198  
 Greenhouse gases, 4, 13–15, 154, 162, 163, 164, 184, 287  
 Grid concerns in the U.S., 155–56  
 Group of Eight (G8), 93  
*Groupe Islamique Armé* (Armed Islamic Group-GIA), 23  
*Groupe Salafist pour la Prédiction et le Combat* (Salafist group for Preaching and Combat), 23  
 Guatemala, 134, 135, 136  
 Guler, Hilmi, 251  
 Gulf of Aden, 38, 39  
 Gulf of Mexico, 32, 71, 82, 148, 237, 272, 314  
 Gulf War (first), 8, 147, 148, 225, 231, 251  
 Gunboat diplomacy, 53  
 Gyurcsany, Ferenc, 116  
 Haiti, 128  
 Halliburton Company, 46–47  
 Harper, Stephen, 35  
 Helsinki Pact (1975), 92  
 Hitler, Adolf, 7, 92  
 Honduras, 137  
 Horn of Africa, 39  
 Howard, John, 14  
 Howell, Sabrina, 11, 191–209  
 Hu Jintao, 195, 197, 201, 208  
 Human Rights Watch, 199  
 Hungary, 94, 97, 104, 122, 254, 259  
 Huntington, Samuel, 72  
 Hurst, Cindy, 13, 271–80  
 Hussein, Saddam, 8, 21, 51, 68, 258–59  
 Hybrid vehicle technology. *See* Plug-in electric hybrid vehicles (PHEVs)  
 Hydrocarbons, 8, 13, 72; Algeria and, 47; Azerbaijan and, 53; Beijing and, 12; Caspian region and, 32, 110, 251; China and, 33; Latin America and, 129–33; Russia and, 10, 92, 104, 260. *See also* Greenhouse gases  
 Hydrocarbons Law (Venezuela), 130  
 Hydroelectric power, 6, 10; in China, 207; in India, 229–30; in Japan, 179; in Latin America, 128, 133; in Turkey, 251; in the U.S., 143  
 Hydrogen, environmental tradeoffs, 329  
 ibn Saud, Abdul Aziz, 54  
 Ickes, Harold, 177  
 Idealism in energy security, 335–48  
 India, 5, 11, 219–31; coal data, 222–23; oil reserve buildup, 338  
 Indonesia, 32, 78, 83, 164  
 Integrated Policy Committee (India), 222  
 International Atomic Energy Agency (IAEA), 179, 298, 299  
 International Center for the Settlement of International Disputes (ICSID), 138  
 International Energy Agency (IEA), 1, 2, 11, 12, 50, 87, 157, 166  
*International Energy Outlook* (2007), 6  
 International Maritime Bureau report (2004), 39  
 International Maritime Organization (UN), 36  
 International Military Education and Training (IMET) program, 58

- International oil companies (IOCs), 93, 192, 196, 199, 200, 342  
 International Seminar on Petroleum (OPEC), 86  
 International Ship and Port Facility Security Code, 31  
 Iran, 53, 69; Caspian Basin involvement, 119–20; gasoline rationing policy, 7; global standings, 9; live-fire naval exercises, 36; oil price adjustments by, 82; oil production declines, 2; OPEC investments in, 83; OPEC membership, 78; relationship with India, 228; South Pars gas field, 167  
 Iran-Iraq War (1980–1988), 51, 55, 71, 147  
 Iran-Pakistan-India (IPI) gas pipeline, 197, 198  
 Iran-Turkey (natural gas) pipeline, 250, 254  
 Iraq, 2, 3, 8; Kirkuk-Ceyhan pipeline, 21; OPEC losses in, 83; OPEC membership, 78; power line attacks, 20; terrorist attacks, 21–22; war with United States, 68  
 Iraq-Turkey (Kirkuk-Yumurtalik) pipeline (ITP), 251–52  
 Ishpingo-Tapococho-Tiputini (ITT) block (Ecuador), 132  
 Islamic Movement of Uzbekistan (IMU), 118  
 Israel, 207, 228, 252, 254, 336  
 Ivanov, Sergey, 98  
 Jaffee, Amy Myers, 78–89  
 Jamaat al-Muwahiddin terrorist group, 24  
 Japan, 7, 11, 80, 176–86, 338; economic adjustments, 180–82; energy insecurity history, 176–78; energy security challenges, 182–83; hostilities vs. China, 176–77; Maritime Self-Defense Force, 53; Matsunga Plan, 177; nuclear power, 179; oil output, 1; path to diversification and efficiency, 178–80; policies for the future, 184; technology development, 184–86; Teikoku Oil Company, 52  
 Japan Atomic Power Company (JAPC), 178  
 Japan National Oil Company (JNOC), 178  
 Japan Petroleum Development Corporation (JPDC), 178  
 Jemaah Islamiyah terrorist group, 39  
 Jihad, global, 3, 18, 49, 340  
 Johnson Thermo-Electric Converter (JTEC), 292  
 Johnston, Alistair Iain, 74  
 Joint Oil Data Initiative (JODI), 157  
 Joint Revolutionary Council (JRC), 45  
 Jupiter natural gas deposit, 6, 130  
 Justice and Equality Movement (JEM), 46  
 Kalam, A.P.J. Abdul, 220  
 Kandym-Khauzak-Shady-Kungrad project, 118–19  
 Kang Wu, 193  
 Kansai Electric Power Company (Japan), 179  
 Kansteiner, Walter, 58  
 Karachaganak oil field (Kazakhstan), 97  
 Karamanlis, Kostas, 259  
 Karimov, Islam, 98, 118  
 Kashiwazaki-kariwa plant (Japan), 179  
 Kazakhstan, 57, 69, 96, 110, 147, 166; Caspian Basin involvement, 111–12; IEA membership, 12–13; SCO membership, 60; uranium supplies, 14  
 Kazakhstan-China pipeline, 201  
 KazMunayGaz energy company (Kazakhstan), 111, 112  
 Kennedy, John F., 151  
 Khamenei, Ayatollah Ali, 343  
 Khelil, Chakib, 84  
 Khuzistan, 51  
 Kirkuk-Ceyhan pipeline (northern Iraq), 21  
 Kissinger, Henry, 66  
 Klare, Michael, 340  
 Klare, Michael T., 8, 44–61  
 Kocharian, Robert, 117  
 Koknar, Ali M., 18–28, 339  
 Korin, Anne, 1–16, 335–48  
 Krapels, Edward, 79  
 Kurdistan Workers Party (*Partiya Karkaren Kurdistan*), 24  
 Kuwait, 2, 36, 51, 55–56, 71; oil industry reintegration efforts, 80,

- OPEC investments in, 83; OPEC membership, 78  
 Kyoto Protocol (1997), 162, 184, 220  
 Kyrgyzstan, 12–13, 60
- Ladislaw, Sarah, 341  
 Las Lomas Wind Farm (Peru), 133  
 Latin America, 2, 128–40, 147, 343, 347; biomass, 133–36; challenges in energy sector, 137–38; Clean Development Mechanisms, 136; deployment of U.S. forces, 8; energy resource abundance, 10; geothermal electricity generation, 134; hydrocarbon potential, 129–30; interests of China in, 10, 11; oil and gas usage data, 129; Organización Latinoamericana de Energia, 138; renewable energy, 133–36; revenue creation maximization, 8–9  
 Law Concerning the Rational use of Energy (Japan), 178  
 Liberation Tigers of Tamil Eelam (LTTE), 39, 40  
 Libya, 2, 78, 83, 342  
 Limburg supertanker, attack on, 39–40  
 Limits on the Continental Shelf (UN Commission), 101  
 Limpet mines, 39  
 Liquefied natural gas (LNG), 13, 271–80, 343–44; advantages to energy security, 273–75; attack/security concerns, 40–41; in China, 206–7, 273, 279; Delta Caribe Oriental LNG project, 131; developmental background, 271–72; disadvantages to energy security, 275–78; in Europe, 272; European infrastructure development, 121; global energy security impact, 278–80; in India, 223, 227–28, 273; in Iran, 258; in Japan, 179, 185, 272; in South Korea, 272; tanker attacks, 38; in Turkey, 252, U.S. usage data, 128. *See also* Natural gas  
 Liquidity principle, 337–39  
 Lithuania, 93–94, 111, 122, 162  
 Lovaas, Deron, 318–31, 345  
 Luft, Gal, 1–16, 11, 143–58, 335–48
- Lugar, Richard, 144, 269  
 LUKoil gas company, 118
- Maastricht Treaty, 170  
 MacArthur, Douglas, 177  
 Malacca Straits piracy, 195  
 Malaysia, 32, 37–38  
 Mammadyarov, Elmar, 115  
 Marine Self-Defense Force (MSDF), 183  
 Maritime piracy, 31, 36–38. *See also* Seizure of oil fields  
 Maritime security, 3, 31–41; the Arctic, 34–35; NATO and, 261; oil and natural gas conflicts, 31–32; the Spratleys/South China Sea, 33–34; threats to oil and natural gas shipping, 35–36. *See also* United Nations Convention on the Law of the Sea  
 Maritime Self-Defense Force (MSDF/Japan), 53, 183  
 Maritime terrorism, 38–41  
 Maritime Transportation Security Act (U.S.), 31  
 Matsunga Plan, 177177  
 Mazeikiu Nafta refinery (Lithuania), 93–94  
*Medium-Term Oil Report* (IEA/2008–2012), 50  
 Medvedev, Dmitry, 98, 343  
 Merkel, Angela, 269, 345  
 Mexico, 134; attacks on power lines, 4–5; crude oil supplies to U.S., 129; oil production declines (2000–2008), 2. *See also* Gulf of Mexico  
 Middle East, 2, 6, 8–9, 51, 54, 57, 109, 165. *See also* Carter Doctrine  
 Militarization of energy security, 7–8, 13, 147–48  
 Military Committee Working Group (NATO), 263  
*Military Power of the People's Republic of China* report (DoD/U.S.), 60  
 Ministry of Economic, Trade and Industry (METI/Japan), 181, 183  
 Ministry of International Trade and Industry (MITI/Japan), 180, 181  
 Ministry of the Petroleum Industry (MIPI/China), 192

- Mitigation of energy terrorism, 25–28; alternative energy route creation, 26; government-to-government aid, 26–27; increased protection, 25–26; outsourcing, 27–28  
 Moeller, Robert, 59  
 Moreira, Susana, 128–40  
 Movement for the Emancipation of Niger Delta (MEND), 22–23, 44, 46  
 Mòzdok-Gazi-Magomed gas pipeline, 24  
 Mueller, Robert, 39, 72  
 Mugabe, Robert, 204  
 Munich Conference on Security Policy (2006), 262  
 Musharraf, Pervez, 197
- Nabucco Gas Pipeline Project, 96, 167, 254–55, 257, 259  
 Nagorno-Karabakh conflict, 117  
 Naimi, Ali, 86  
 National Critical Infrastructure Protection Program (EU), 170  
 National Development and Reform Commission (NDRC/China), 192  
 National Energy Policy (NEP/2001), 58, 149  
 National Energy Strategy (Japan), 184  
 National Intelligence Estimate (U.S.), 56  
 National Liberation Army (*Ejercito de Liberacion Nacional*), 22  
 National Petroleum Council (NPC) report, 50, 153  
 National Renewable Energy Laboratory, 287  
 National Thermal Power Corporation (NTPC), 222  
 NATO Forum on Energy Security, 262  
 NATO. *See* North Atlantic Treaty Organization  
 NATO-Russia Council (NRC), 267, 268  
 NATO's Military Authorities (NMAs), 261  
 Natural disasters, 3  
 Natural gas, 6; environmental tradeoffs, 322–23; India reserve data, 227–28; pipelines of Turkey, 252–55; Russia reserve data, 91; shipping threats, 35–36. *See also* Liquefied natural gas (LNG)
- Natural Resources Defense Council, 287  
 Nazarbayev, Nursultan, 97  
 Nazer, Hisham, 79–80  
 Network of Energy Security Correspondents (NESCO), 171  
 New Energy Development Organization (NEDO), 180, 181, 184  
 New Exploration and Licensing Policy (NELP/India), 226  
 Nicaragua, 32, 134, 137  
 Niger Delta Vigilante terrorist group, 23, 45  
 Nigeria, 6, 48; ethnic riots, 337; IMET program, 58; insurgency and separatist warfare, 44–47; OPEC losses in, 83; OPEC membership, 78; terrorist attacks, 22–23. *See also* Atatah, Edward; Coalition for Military Action in the Niger Delta; Defense Industries Corporation of Nigeria; Joint Revolutionary Council; Justice and Equality Movement; Movement for the Emancipation of Niger Delta; Okah, Henry  
 Nincic, Donna J., 31–41  
 Nixon, Richard, 72, 145  
 Niyazov, Saparmurad, 110, 112  
 Noël, Pierre, 341  
 North Atlantic Council, 264–65  
 North Atlantic Treaty Organization (NATO), 13, 92, 201, 261–69, 264, 344; coordination with European Union, 267–68; energy security crises (potential), 265–67; energy security role, 263; fundamental purposes, 263–65; infrastructure protections, 268. *See also* Riga Summit Communiqué; Treaties  
 North Sea, 2, 35, 71, 164, 267  
 North Stream pipeline (Russia), 14, 94–96  
 Norway, 72; energy security approach, 336; infrastructure attacks study, 21; oil production declines (2000–2008), 2  
 Nuclear power, 4, 13, 14, 79, 138, 162, 179, 295–306; in China, 302; energy security contribution, 299–304; environmental tradeoffs, 328–29; in France, 301; fuel cycle, 295–99; Global

- Nuclear Energy Partnership, 306; global reactor data, 301; impediments to growth, 304–6; in India, 302; India data, 228–29; International Atomic Energy Agency, 179, 298, 299; in Japan, 301, 302; in North Korea, 302; in Russia, 301; in South Korea, 301, 302; Three Mile Island accident, 300; in the United Kingdom, 301; World Association of Nuclear Operators, 299
- Nuclear Power Corporation of India Limited (NPCIL), 222
- Nuclear Regulatory Commission, 300
- Obama, Barack, 86–87, 153
- Occidental Corporation, 25
- OCENSA pipeline (BP), 25
- Odom, William E., 201
- Ogaden National Liberation Front (Ethiopia), 24, 46
- Oil: economic factors of terrorism, 25; environmental tradeoffs, 322–23; global demand for, 1, impact of disruptions, 70–71; India data, 224–27; infrastructure as terrorist target, 20–21; 1973 embargo, 79; OPEC's influence on price, 78–79; price declines, 2; production declines (2000–2008), 2; shipping threats, 35–36; utility of seizing, 68–70
- Oil and Natural Gas Corporation (India/ONGC), 226, 227
- Oil curse, 48–49
- Oil dependence, dangers of, 145–47
- Oil exploration: in the Arctic, 34; awarding of rights by China, 33; awarding of rights by Nicaragua, 32; in Brazil, 132; China's awarding of rights, 32, 33; forced conflict by Iran, 53; in India, 225; Nicaragua's awarding of rights, 32, 33; Vietnam's awarding of rights, 32
- Oil shale, 13, 15, 152, 153, 324, 337
- Oilfield contractors, 23
- Okah, Henry, 44–45
- Olah, George, 322
- Olcott, Martha Brill, 70
- Oleoducto Central (OCENSA) pipeline (British Petroleum), 22, 25, 131
- Open Standards for Digital Television, 293
- Operation Iraqi Freedom (2003), 147
- Organización Latinoamericana de Energía (OLADE), 138
- Organization of American States (OAS), 128
- Organization of Economic Cooperation and Development (OECD), 11, 88
- Organization of European Oil and Gas Producers (OGP), 170
- Organization of Petroleum Exporting Countries (OPEC), 78–89, 337; Arab members, 66; and Asian recession/financial crisis, 80; member countries, 78; 1998 oil price collapse/agreement, 80, 82; objectives of, 78; oil demand (2003–2007) data, 87; oil industry reintegration efforts, 79–80; oil price influence, 78–79; oil production data, 2; oil supply side dominance, 9–10; original member countries, 78; producing countries as consumers, 84–86; regulation of oil in market, 152–53; spare capacity erosion, 338; sustainable production capacity data, 83; threats to security of demand, 86–89; and U.S.–Iraq war, 82
- Ormat Technologies (U.S.), 134
- Pacific Northwest National Laboratory, 286
- Pahlavi, Reza Mohammed, 54
- Pakistan, 228, 336; electricity infrastructure, 4; terrorist attacks, 24
- Pamir, Necdet, 12, 250–60
- Panama, 134
- Panama Canal, 3
- Paraguay: biodiesel production, 136
- Partiya Karkaren Kurdistan* (Kurdistan Workers Party-PKK), 24
- Pelletreau, Robert H., 55
- Penrider* tanker, piracy against, 37
- People's Republic of China *See* China
- Persian Gulf, 35, 36, 39, 51, 56, 57, 71, 144, 339
- Persian Gulf War (first), 8, 147, 148, 225, 231, 251
- Peru: hydroelectric stations, 133; Las Lomas Wind Farm, 133

- Peru, power grid terrorism, 20
- Petro Ranger* tanker, piracy against, 37–38
- Petroleo Brasileiro SA (Brazil), 132
- Petroleos de Venezuela (PDVSA) hydrocarbon company, 130–31
- Petroleum Stockpiling Law (Japan), 178
- Petroleum Supply and Demand Optimization Law (Japan), 178
- PetroVietnam, 203
- Philippine Islands, 33–34
- Philippine National Oil Company, 203
- Piebalgs, Andris, 115
- Pipelines, 3, 9, 18, 20–25. *See also* individual pipelines throughout the index
- Piracy (maritime), 36–38, 39; Gulf of Aden, 38; Malacca Straits, 195; Marine Self-Defense Force, 183
- PKN Orlen (Polish company), 94
- Plug-in electric hybrid vehicles (PHEVs), 155, 286–89, 347
- Poland, 94, 96, 100, 122, 266
- Polaris Geothermal (U.S.), 134
- Porous sedimentary rocks, 152
- Prikaspiisky pipeline, 96
- Private Participation in Infrastructure Database (World Bank), 137
- Private Security Contractors (PSC), 25
- Production-sharing agreements (PSAs), 53
- Public Safety Consequences of a Terrorist Attack on a Tanker Carrying Liquefied National Gas Need Clarification* (GAO), 277–78
- Putin, Vladimir, 93, 97, 100, 111, 259, 343
- Qatar, 147, 343; OPEC investments in, 83; OPEC membership, 78; visit by Putin, 100
- Reagan, Ronald, 55, 147
- Realism in energy security, 144, 335–48
- Red Sea, 26, 35, 199
- Redundancy principle, 94, 268, 337–39
- Reform Treaty (European Union), 171
- Regional conflict, 49–54
- Reinforced North Atlantic Council (R-NAC), 262
- Renewable electricity sector, 15, 229–30
- Report on National Energy Security*, 208
- Resource curse, 47–49
- Revisionism in Russia, 92
- Revolutionary Armed Forces of Columbia (*Fuerzas Armadas Revolucionarias de Colombia*), 22
- Rice, Condoleezza, 115, 128, 144
- Richardson, Bill, 82
- Riga Summit Communiqué, 261, 262–63, 268
- Risks of power competition and conflict, 59–61
- Rocky Mountain Institute, 156
- Roosevelt, Franklin D., 176
- Rosner, Kevin, 11, 160–73
- Ross, Michael, 2–3, 46
- Royal Dutch Shell oil company, 23, 45
- Russia, 2, 69, 91–105; Caspian Basin involvement, 119; control of Eurasia's energy, 97–98; emergence of gas OPEC, 100; energy independence of, 6; energy security approach, 336; energy security role, 257; energy security vs. China/U.S., 219; gas cutoff to Ukraine, 7; gas reserves data, 91; global standings, 9–10; Group of Eight presidency, 93; IEA membership, 12–13; increasing energy demands, 50; internal consolidation, 98–100; invasion of Georgia, 92; liquefied natural gas in, 223, 227–28; nationalization efforts, 342; natural gas data, 227–28; natural gas imports from, 165–66; nuclear power data, 228–29; oil data, 224–27; oil exports to Europe, 91–92; oil exports to Japan, 195; policymaker's view of energy security, 220–22; renewable electricity data, 229–30; revenue creation maximization, 8–9; revisionism in, 92; rush for Arctic energy, 100–101; SCO membership, 60; terrorist attacks, 24; use of oil wealth vs. U.S., 145; view from the Kremlin, 92–94. *See also* Baku-Tbilisi-Ceyhan (BTC) pipeline; Gas Exporting Countries' Forum; Gazprom; North Stream pipeline;

- Prikaspiisky pipeline; South Stream pipeline; Transneft; YUKOS oil company
- Russia Energy Strategy (2003), 93
- Russia-Belarus natural gas/oil crisis, 166
- Russia-Turkey Western (natural gas) pipeline, 252. *See also* Blue Stream Gas pipeline
- Russia-Ukraine natural gas/oil crisis, 166
- Salafist group for Preaching and Combat (*Groupe Salafist pour la Prédiction et le Combat*), 23, 46–47
- Sandstone, 152, 324, 337
- Saudi Arabia, 71, 337, 338; crude oil processing, 339; energy independence of, 6; global standings, 9–10; International Monetary Fund data, 342; natural gas output data, 91; oil curse, 48–49; oil industry reintegration efforts, 80; OPEC investments in, 83; OPEC membership, 78; renewed friendship with India, 227; terrorist attacks, 23; U.S. protection agreements with, 54, 147–48. *See also* Carter Doctrine
- Saunders, Phillip, 194
- Schlesinger, James R., 44, 66, 335
- Schroeder, Gerhard, 94
- Sea Tigers (LTTE maritime arm), 40
- Seizure of oil fields, 8, 67, 68–70
- Senate Foreign Relations Committee meeting (2005), 44
- Senate Foreign Relations Committee meetings, 44, 144
- Sendero Luminoso* (Shining Path) terrorist group, 20
- Senior Political Committee (SPC/NATO), 263
- Separatist warfare: and insurgency, 44–47
- Seven Sisters (oil companies), 68
- Shale, 15
- Shale gas, 152
- Shanghai Cooperation Organization (SCO), 60, 97–98, 121, 201
- Shmatko, Sergei, 342
- Sik Pride* tanker, attacks against, 40
- Silkworm anti-ship missiles (Tehran), 36
- Singh, Manmohan, 220–21
- Sino-Turkmen gas pipeline, 112
- Sirius Star* tanker, piracy against, 38
- Solana, Javier, 172
- Solar energy, 6, 15, 87, 156; in China, 208; earth-based solar farms, 291–93; in the European Union, 163; in Germany, 14; in India, 229–30; in Japan, 180, 181, 184, 327–28; in Latin America, 133; on Mongolian huts, 15; in Turkey, 261; in the U.S., 145, 146, 156
- South American, 73
- South Asia, 5, 347
- South Caucasus gas pipeline (SCGP), 166, 254, 257
- South China Sea, 33–34, 74, 202
- South Korea, 80, 193
- South Pars gas field (Iran), 167
- South Stream pipeline (Russia), 94, 96–97
- Southern California Edison, 291
- Soviet Union, 67, 73; collapse of, 73, 109; invasion/occupation of Afghanistan, 54–55; pipeline system, 94
- Spratley Islands, 33–34
- St. Kitts, 128
- Stanishev, Sergey, 259
- State Pipeline Transportation Company (Turkey), 258
- Statistical Review of World Energy (BP/2007), 91
- StatoilHydro company (Norway), 47
- Stewart, Devin, 11, 176–86
- Stirling Energy Systems (SES), 291
- Strait of Hormuz, 3, 4, 36, 55, 56, 339
- Strait of Malacca, 3, 35, 39
- Strategic Concept (1999/NATO), 264, 265
- Strategic Energy Dialogue, 269
- Strategic Petroleum Reserve (SPR), 157, 193
- Strategic Pipeline Protection Department, 27
- Sub-Saharan Africa, 5
- Suez Canal, 3
- Suicide attacks, 39
- Sweden, 95
- Sweet, David, 15, 339
- Sweet, David M., 15, 308–17

- Tajikistan, 12–13, 60
- Taliban guerrillas, 4
- Tanaka, Nobuo, 184, 185
- Tang Weibin, 193–94
- Tanker War (1980s), 36
- Tar sands, 13, 15, 153, 304, 318, 324, 337, 343, 345
- Targets of energy terrorism, 20–25; Algeria, 23; Colombia, 22; electrical utilities, 20; Ethiopia, 24; Eurasia, 24–25; gas and oil infrastructure, 20–21; Iraq, 21–22; Nigeria, 22–23; Pakistan, 24; Russia, 24; Saudi Arabia, 23; Yemen, 24
- Task Force on Strategic Unconventional Fuels Resources (U.S.), 152
- Technological solutions for energy security, 282–93; beyond cars and trucks, 289–90; earth-based solar farms, 291–93; electricity generation technologies, 290–91; gasoline fuels, 287; gasoline-ethanol-methanol fuel flexibility, 284–86; plug-in hybrid electric vehicles, 286–87; transportation fuel security, 283–84, 288–89
- Teikoku Oil Company, 52
- Terrorism: commonalities of incidents, 47–49; dangers to LNG, 13; dangers to nuclear power plants, 14; in the maritime domain, 38–41; Mexican power lines, 4–5; United Texas Petroleum worker murders, 24. *See also* Cyber-terrorism; Energy terrorism
- Terrorists: Algeria car bomb attacks, 23; criminal collusion by, 19; motivations of, 19–20
- Three Gorges Dam (China), 207
- Three Mile Island nuclear accident, 300
- Tokai Power Station (Japan), 178
- Tokyo Electric Power Company (TEPCO), 180
- TransAfghan Pipeline, 258
- Trans-Arabia oil pipeline, 26, 339
- Trans-Caspian (TCP) gas pipeline, 96, 111–12, 113–15, 116, 122
- Transneft (Russian state energy monopoly), 92, 93–94, 96
- Transport of oil. *See* Maritime piracy; Maritime security
- Trans-Saharan Counter-Terrorism Initiative, 58
- Trans-Saharan gas pipeline, 337
- Trans-Thrace pipeline, 252, 259
- Treaties: Energy Charter Treaty, 267; Energy Community Treaty, 255; Maastricht Treaty, 170; Reform Treaty (EU), 171; Treaty of Amsterdam, 170; Treaty of Turkmanchay, 115; Washington Treaty, 264–65. *See also* North Atlantic Treaty Organization
- Treaty on the Non-Proliferation of Nuclear Weapons, 198
- Trilateral Commission strategy/report (EU), 161
- Trinidad & Tobago, 129
- Tucker, Robert, 67
- Turkey, 9, 250–60, 336, 337; energy security role, 255–59; importance of, 12, 25, 104, 113, 116, 171; investments in Iran, 167; natural gas pipelines, 252, oil pipelines, 251–52; pipeline attacks, 24; pipeline protection, 27. *See also* Baku-Erzurum-Ceyhan gas pipeline; Blue Stream Gas Pipeline; Nabucco Gas Pipeline Project
- Turkey-Greece gas pipeline, 255
- Turkish Coast Guard, 27
- Turkish Petroleum Corporation (TPAO), 258
- Turkish straits (oil pipeline) bypass projects, 252
- Turkmenistan, 53, 69, 96, 110, 112–15, 166, 258
- “Twenty-First Century Oil Strategy” (China), 193
- UAE. *See* United Arab Emirate
- Ukraine, 7, 24, 91, 94, 97, 111, 112, 122, 166, 169, 171, 252, 265–66
- Underwater demolition teams, 39
- Union Texas Petroleum worker murders, 24
- United Arab Emirate (UAE), 26, 71, 78, 113, 182, 339
- United Kingdom, 2, 72, 272, 299, 301

- United Nations, 36, 51, 68, 105, 197, 299, 354
- United Nations Convention on the Law of the Sea (UNCLOS), 51–52, 101, 202
- United Progressive Alliance (India), 220
- United States, 67, 80, 143–58, 337; agreement standards with Africa/China, 246; aid to Kazakhstan, 57; Caspian Basin interests of, 109; Clean Air Act, 320; coal-fired power plants, 4; conflict prevention and resolution, 247; dangers of oil dependence, 145–47; Department of Defense, 60; Department of Energy, 45, 50–51; diversification of energy resources, 148–50; dual view of China, 151; electricity disruptions, 5; Energy Information Agency, 6, 67; Energy Policy Act (2005), 305; energy policy focus, 143–44; energy security approach, 237–39; energy security blueprint, 153–54; energy security mechanisms, 156–57; energy security militarization, 8; ethanol production, 153; European Command (EUCOM), 27; exercise of Carter Doctrine, 147; Federal Energy Regulation Commission, 41; geothermal electricity generation, 134; grid concerns, 155–56; installation of Pahlavi in Iran, 54; liquefied natural gas data, 128; liquid natural gas imports, 272; Maritime Transportation Security Act, 31; militarization of energy security, 147–48; military seizure feasibility study, 67; National Energy Policy, 58; National Intelligence Estimate, 56; oil field service contractors, 23; oil importation data, 143; oil output, 1, 143; oil use data, 143; port data, 38; Senate Foreign Relations Committee meetings, 44, 144; terrorist reasoning about, 19, 2007 energy legislation, 86–87; war with Iraq, 68 *See also* U.S.-Africa-China energy triangle
- United Texas Petroleum worker murders, 24
- Uranium, 14; highly enriched (HEU), 297–98; low enriched (LEU), 297
- U.S.-Africa-China energy triangle, 233–47; agreement standards, 246; common energy security interests, 234–35; common objectives, 246; complementary African interests, 235–36; conflict prevention and resolution, 247; importance of Africa, 236–37; improved governance support, 246–47; variance in approaches, 237–46
- U.S.-Brazil Biofuels Pact (2007), 134
- USS *Cole* attack, 40
- USS *Quincy*, 54
- USS *The Sullivans*, 39
- Uzbekistan: Caspian Basin involvement, 117–19; IEA membership, 12–13; Kandym-Khauzak-Shady-Kungrad project, 118–19; SCO membership, 60
- Venezuela, 4, 336; crude oil supplies to U.S., 129; declining oil supplies, 130–31; labor strike, 337; nationalization efforts, 342; oil industry reintegration efforts, 80; oil price adjustments by, 82; OPEC losses in, 83; OPEC membership, 78; use of oil wealth vs. U.S., 145. *See also* Chavez, Hugo; Delta Caribe Oriental LNG project
- Verrastro, Frank, 341
- Victor, David, 338
- Vilnius Energy Summit (2007/Lithuania), 111
- Volga-Don Water Channel (Turkey), 251
- Wahhabism religious practice (Islam), 49
- War on Terror, 57, 58, 109, 117, 144, 183
- Wars: fighting for limited oil, 67–68; increasing rarity of, 71–73, and oil production, 3 *See also* al Qaeda; Balkan wars; Cold War, Iran-Iraq War; Persian Gulf War (first); Separatist warfare; Tanker War
- Washington Treaty, 264–65
- Weapons of mass destruction (WMD), 55–56, 340
- Wells, Jim, 278
- Wen Jiabao, 193

- Werbos, Paul J., 282–93, 347
- West Africa, 147, 343
- White Stream project, 122
- Wind power, 6, 15, 87, 133, 139, 145, 146, 156, 163, 180, 208, 229, 290, 311, 314
- World Association of Nuclear Operators (WANO), 299
- World Bank, 137, 341
- World Economic Forum (2008), 186
- World Energy Council, 134
- World Energy Outlook* (IEA/2007), 50
- World Energy Outlook Alternative Policy scenario* (2006), 87
- World Energy Output* (IEA/2008), 2
- World Trade Organization, 157
- Worldwatch Institute, 206, 208
- Yamani, Zaki, 348
- Yar'Adua, Umaru, 46
- Yemen: terrorist attacks, 24; weapon construction, 40
- Yergin, Daniel, 341
- YUKOS oil company (Russia), 93, 98, 99, 104, 182, 183, 201, 202
- Zeng Qinghong, 203
- Zhoungya Petroleum Exploration Bureau (China), 46
- Zoellick, Robert, 341
- Zones of turmoil. *See* Algeria; Colombia; Ethiopia; Eurasia; Iraq; Nigeria; Pakistan; Russia; Saudi Arabia; Yemen
- Zubrin, Robert, 348



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# About the Contributors

**Robert G. Bell** is a Senior Vice President with SAIC. In 1999–2003 he was NATO's Assistant Secretary General for Defense Investment. Prior to that he worked at the White House National Security Council (NSC) as a Special Assistant to President Clinton for National Security Affairs and as the NSC Senior Director for Defense Policy and Arms Control. In 1981–1993, Mr. Bell served on the Senate Committees on Foreign Relations and Armed Services, working for Senators Percy and Nunn, respectively. His career also includes six years at the Congressional Research Service (CRS), including a one year assignment in Brussels, where he served as staff director of the Military Committee of the NATO Parliamentary Assembly. From 1969 until 1975, he served as an air force officer in the air traffic control and communications field. Robert Bell holds a Master of Arts degree in International Security Studies from Tufts University's Fletcher School of Law and Diplomacy and a Bachelor of Science degree in International Affairs from the United States Air Force Academy.

**Jeremy Carl** is a Research Fellow in the Program on Energy and Sustainable Development at Stanford University and research fellow at the Institute for the Analysis of Global Security. He came to Stanford by way of New Delhi, India where he worked on energy and resource economics issues at The Energy and Resources Institute (TERI), India's leading energy think tank. His research interests are in energy security and the political economy and environmental effects of energy development, with a particular focus on India and China. His current research focuses on the political economy and environmental effects of the global coal sector. He received his B.A. with distinction in history from Yale University, and an MPA from the John F. Kennedy School of Government, Harvard University.

**Dr. Ariel Cohen** is Senior Research Fellow in Russian and Eurasian Studies and International Energy Security at The Heritage Foundation. Dr. Cohen is author of *Russian Imperialism: Development and Crisis* (1998); *Eurasia in Balance* (2005); *Kazakhstan: Energy Cooperation with Russia—Oil, Gas and Beyond*; *Kazakhstan:*

*The Road to Independence* (2008) and over 25 book chapters and 400 articles in academic and popular media. Olena Krychevska, a 2007 intern at The Heritage Foundation, has greatly contributed to research and production of the Russia chapter. Carla Bock, a 2007 Heritage intern, has greatly contributed to research and production of chapter on Central Asia.

**Dr. Charles D. Ferguson** is a Fellow for Science and Technology at the Council on Foreign Relations, an Adjunct Assistant Professor in the Security Studies Program at the School of Foreign Service at Georgetown University, and an Adjunct Lecturer in the National Security Program at the Johns Hopkins University. At the Council, he focuses his research and writing on nuclear energy and nuclear security. He wrote the Council Special Report *Nuclear Energy: Balancing Benefits and Risks*. He has worked on nuclear safety issues as a physical scientist in the U.S. State Department. After graduating with distinction from the United States Naval Academy, he served as a nuclear engineering officer on a ballistic-missile submarine. He holds a Ph.D. in physics from Boston University.

**Dr. Christopher J. Fettweis** returned to Tulane University in the fall of 2008, after having spent three years teaching national security studies at the U.S. Naval War College. He is the author of *Losing Hurts Twice as Bad: The Four Stages to Moving Beyond Iraq* and *Angell Triumphant: The International Politics of Great Power Peace*, as well as a number of articles in policy and scholarly journals. He is a research fellow at the Institute for the Analysis of Global Security. He holds a Ph.D. from the University of Maryland.

**David L. Goldwyn** is President of Goldwyn International Strategies LLC, an international energy consulting firm. He is a Senior Fellow in the Energy Program at the Center for Strategic and International Studies (CSIS) and serves on the Council of Foreign Relations (CFR) Task Force on Energy Security and CFR Center for Preventive Action Task Forces on Angola, Venezuela and Bolivia. Goldwyn served as Assistant Secretary of Energy for International Affairs, Counselor to the Secretary of Energy, and national security deputy to U.S. Ambassador to the UN Bill Richardson. Mr. Goldwyn received a Bachelors of Arts degree from Georgetown University, a Masters in Public Affairs degree from the Woodrow Wilson School of Public and International Affairs at Princeton University and a law degree from New York University School of Law.

**Sabrina Howell** is a China expert at the Institute for the Analysis of Global Security, focusing on energy economics and energy security. She has conducted research in Central Asia, China and the Caucasus. She holds a degree in Economics and East Asian Studies from Yale University.

**Cindy Hurst** is a political-military research analyst with the U.S. Army's Foreign Military Studies Office. Her research is centered on various energy issues. She is

a lieutenant commander in the U.S. Navy Reserve and currently is writing a book on the potential global implications of LNG.

**Amy Myers Jaffe** is the Wallace S. Wilson Fellow in Energy Studies at the Baker Institute of Rice University. Jaffe's research focuses on oil geopolitics, strategic energy policy including energy science policy, and energy economics. Jaffe is widely published and served as co-editor of *Energy in the Caspian Region: Present and Future* (2002) and *Natural Gas and Geopolitics: From 1970 to 2040* (2006). Jaffe served as a member of the reconstruction and economy working group of the Baker/Hamilton Iraq Study Group, as project director for the Baker Institute/Council on Foreign Relations Task Force on Strategic Energy Policy, and as a principal advisor to USAID's project on Options for Developing a Long Term Sustainable Iraqi Oil Industry. She is currently serving as a strategic advisor to the American Automobile Association (AAA) of the United States. Prior to joining the Baker Institute, Jaffe was the senior editor and Middle East analyst for *Petroleum Intelligence Weekly*.

**Michael T. Klare** is a Five College Professor of Peace and World Security Studies, a joint appointment of Amherst, Hampshire, Mount Holyoke, and Smith Colleges and the University of Massachusetts at Amherst. He is the author of several books on world security affairs including *Resource Wars* (2001), *Blood and Oil* (2004) and *Rising Powers, Shrinking Planet: The New Geopolitics of Energy* (2008).

**Ali M. Koknar** is an Associate Fellow of the Institute for the Analysis of Global Security. He is a private security consultant in Washington, DC, specializing in counterterrorism and international organized crime. A native of Turkey, he studied law and business management in Turkey and in South Africa.

**Anne Korin** is co-director of the Institute for the Analysis of Global Security (IAGS). She chairs the Set America Free Coalition, an alliance of national security, environmental, labor and religious groups promoting ways to reduce America's dependence on foreign oil. Ms. Korin appears frequently on Capitol Hill and her advice is sought by members of Congress. Her education includes engineering degree in computer science from Johns Hopkins University and work towards a doctorate at Stanford University.

**Deron Lovaas** is vehicles campaign director at Natural Resources Defense Council (NRDC) in Washington, DC. He directs the "Break the Chain" oil security campaign and served earlier as the chief lobbyist on the federal Transportation Equity Act for the 21st Century (TEA-21) reauthorization bill. A graduate of the University of Virginia, Deron has worked in environmental policy and advocacy for more than a decade, including as director of the Sierra Club's "Challenge to Sprawl" campaign and a specialist in transportation and air-quality planning at Maryland's Department of the Environment.

**Dr. Gal Luft** is executive director of the Institute for the Analysis of Global Security (IAGS). He specializes in strategy, geopolitics, energy security and economic warfare. Dr. Luft has published numerous studies and articles on security and energy issues in various newspapers and publications and testified before committees of the U.S. Congress. He holds degrees in international relations, international economics, Middle East studies and strategic studies and a doctorate in strategic studies from the Paul H. Nitze School of Advanced International Studies (SAIS) Johns Hopkins University.

**Dr. Johanna Mendelson Forman** is Senior Associate in the Americas Program at the Center for Strategic and International Studies (CSIS) in Washington, D.C. Her work focuses on the Caribbean, Brazil and Central America. She also serves the executive director of the Jatropa Foundation, an organization dedicated to the development of renewable energy alternatives in the Caribbean and Latin America, and on the board of the Latin American Council on Renewable Energy. A former co director of the Post-Conflict Reconstruction Project and co-author of *Play to Win: a Framework for U.S. Post-Conflict Reconstruction*, framework for rebuilding war-torn societies. Her research includes studies on security-sector reform in conflict states, economic development in postwar societies, and the role of the United Nations in peace operations. She has written extensively about reconstruction programs from Iraq, Guatemala, and Haiti. Recently, she served in Haiti as a senior advisor to the UN Mission (MINUSTAH), where she worked on development of renewable energy programs to sustain rural communities. She holds a J.D. from Washington College of Law at American University, a Ph.D. in Latin American history from Washington University, St. Louis, and a Master's of International Affairs, with a certificate of Latin America studies, from Columbia University in New York.

**Susana Moreira** is a Ph.D. candidate at the School of Advanced International Studies (SAIS), Johns Hopkins University and Summer Intern Scholar, Center of Strategic International Studies (CSIS).

**Dr. Donna J. Nincic** is Associate Professor and Chair of the Department of Global and Maritime Studies at the California Maritime Academy, California State University. She received her doctorate in Political Science/International Relations from New York University, and has held previous positions at the University of California, Davis; the Hoover Institution; and the US Department of Defense. Her research focuses on maritime security, particularly piracy and terrorism. Recent publications include "Sea Lane Security and US Maritime Trade" in Sam J. Tangredi, ed., *Globalization and Maritime Power*, Washington D.C.: National Defense University Press (2002), and "The Challenge of Maritime Terrorism: Threat Identification, WMD, and Regime Response," *Journal of Strategic Studies* (August 2005). Her current research focuses on maritime piracy in Africa, and U.S.-Canadian conflict over the Northwest Passage.

**Necdet Pamir** is an expert in Turkey's energy policy. He is member of the Executive Board of the Turkish National Committee of the World Energy Council, an advisor to the Chairman of the Attila Dogan Construction & Installation Company and General Manager of the Attila Dogan Petroleum Corporation. He writes frequently for various Turkish and international publications including a monthly "Energy Edition" of *Cumhuriyet* daily newspaper. He holds a B.Sc. in Petroleum Engineering Department from the Middle East Technical University.

**Dr. Kevin Rosner** is Senior Fellow at the Institute for the Analysis of Global Security (IAGS) specializing in Russian and European energy security, security of critical energy infrastructure, and international energy-security policy. He is managing editor of IAGS' *Journal of Energy Security*. In 2006 he served as the Co-Director for the NATO Forum on Energy Security. Dr. Rosner is the editor of a series of reports published (2005–2007) by Global Markets Briefings on Russian Foreign Energy Policy covering Russian downstream investment in Central European and FSU energy systems. Past positions held include Senior Oil and Gas Advisor, Thales Information Systems, Senior Security Advisor to the Baku-Tbilisi-Ceyhan pipeline company, Project Director with the Program on Cooperation with the Russian Federation at the OECD, and Project Manager with the UNESCO Science Division in Paris.

**Devin Stewart** is program director at the Carnegie Council for Ethics in International Affairs. Previously, he was Assistant Director of Studies and Japan Studies Fellow at the Center for Strategic and International Studies (CSIS) in Washington, D.C. He remains affiliated with CSIS as an Adjunct Fellow. From 2000 to 2003, Devin was a researcher at the Research Institute of Economy, Trade, and Industry and in 2004 a staff writer for *The Daily Yomiuri* in Tokyo. He also chaired the Korea-Japan Study Group in Tokyo and in Washington. He was also a researcher at the Japan External Trade Organization New York and has served on the staffs of the U.S. Senate Committee on Foreign Relations and Senator Barbara Mikulski. Devin's articles have appeared in more than 10 languages in numerous publications. He received a B.A., cum laude, from the University of Delaware, where he won a scholarship to study Arab immigration in France. He holds an M.A. from the Paul H. Nitze School of Advanced International Studies (SAIS) at Johns Hopkins University in Washington, D.C., and Bologna, Italy. He would like to thank Chris Janiec and Warren Wilczewski for their invaluable contributions to this chapter.

**David M. Sweet** is the Executive Director of the World Alliance for Decentralized Energy (WADE). Prior to joining WADE, Mr. Sweet served as Director of the United States Energy Association, the U.S. arm of the World Energy Council, as Executive Director of the International LNG Alliance, Vice President of the Independent Petroleum Association of America, an attorney in private practice, and as an expert witness on financial, rate and permitting issues at the Federal Energy

Regulatory Commission. Mr. Sweet serves as president of the Natural Gas Roundtable, a member of the North American Energy Standards Board, a vice chairman of the ABA Section of Public Utility, Communications and Transportation Law and its gas committee, a member of the World Energy Council Committee on Cleaner Fossil Fuel Systems, and on the Board of Advisors of the Institute for the Analysis of Global Security. He received his law degree with honors from George Washington University, an M.B.A. from the University of Maryland, and a B.S. degree magna cum laude also from the University of Maryland.

**Dr. Paul J. Werbos** is program director at the National Science Foundation. Prior to arriving full-time at NSF in 1989, he worked at the Energy Information Administration (EIA) of the Department of Energy where he was lead analyst for long-term energy futures and developed the econometric models used in EIA's Annual Energy Outlook for industrial and transportation energy demand and for oil and gas production. He has given a number of major talks to Congress on energy policy, and is a member of IEEE-USA. He holds four degrees from Harvard and the London School of Economics in economics, international political systems, emphasizing European economic institutions, applied mathematics, with a major in quantum physics and a minor in decision and control and applied mathematics.