

Global Governance and Energy

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Over the past several years, energy policy has assumed a prominent role on national policy agendas around the world. Yet there has been remarkably little effective coordination across borders on energy issues. In the absence of such coordination, it is unlikely that any national government will be able to develop and sustain energy policies that can balance the competing objectives of affordable energy services, reliable supply, environmental sustainability, and geopolitical security.

There is no single overarching international organization that is mandated to address any one of the collective action issues that energy policy poses, and that is not accidental. Rather, it reflects the way that the global energy sector has evolved over time. For instance, the International Energy Agency (IEA), despite its name, is actually a creature of the Organization of Economic Cooperation and Development (OECD); it has only twenty-seven members, and it addresses only a small portion of the energy issues

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outlined in this chapter. Furthermore, the IEA has no regulatory powers and is ill-equipped to play any oversight role.

Energy needs are met largely through market forces (often heavily distorted by government policies), but global energy markets are extremely volatile and poorly regulated. The governments that regularly distort energy policies would also make up the bodies that would have to foster a mandate for an energy-governing entity. Thus, it is unlikely that a single international organization would emerge to address energy issues. Instead, progress is more likely to occur through relatively incremental changes in the mandates and performance of the multitude of relevant institutions. Taken together, those changes could facilitate a significantly improved global environment for good energy policy.

This chapter presents a preliminary examination of the formal institutions of global governance that have been tasked with addressing various components of energy policy. These formal intergovernmental bodies are only a piece of the energy governance puzzle, but they are crucial. Nonetheless, they have largely escaped systematic analytic scrutiny with regard to their impact on energy policy.

The chapter begins by identifying the broad range of problems that international energy policy should address and then looks at the existing mechanisms for addressing those problems. It continues with a brief history of how and why some of those institutions arose and an analysis of how well they deal with the global energy agenda; the chapter concludes with an assessment of various options for improving global energy governance.

Where Governance Is Needed

It is clear that global energy policy is in urgent need of dramatic change. According to a 2008 International Energy Agency report, staying on our present path would bring about a 70 percent increase in oil demand by 2050 and a 130 percent rise in CO₂ emissions. A rise of such magnitude would have a significant, perhaps disastrous, impact on the environment.¹ The IEA report, which presented various scenarios on deep emission reductions, stated that in order to bring the global CO₂ emissions back to current levels by 2050, an estimated \$17 trillion in additional investments would be needed. That estimate assumes that the technologies already exist or are in an advanced state of development. If CO₂ emissions were reduced by 50 percent from the current levels by 2050, the more ambitious goal that climate scientists argue must be achieved to stave off potentially catastrophic

climate change, the additional investments needed would be a massive \$45 trillion.² But money is only part of the problem. Changing course to a politically and environmentally sustainable energy system for the world would require even more—not in terms of funding, but in terms of institutional and organizational development, along with a hefty helping of political leadership.

The first step in evaluating the state of energy governance is to define what problems governance is needed to solve. Managing the supply of and demand for energy involves dealing with four issues that require cooperation across borders:

- energy security
- environmental sustainability
- economic development
- respect for human rights.³

Energy Security

Energy security—that is, reliable and affordable access to energy supplies—is inextricably tied up with military and national security. Ever since the British converted their fleet from coal to oil on the eve of World War I to make it faster than its German counterpart,⁴ major powers have looked on access to oil as a vital national interest, and any threats to that access may trigger a military response. The attack on Pearl Harbor—triggered when the United States, which supplied the vast majority of Japan’s oil, responded to Japan’s invasion of Indochina by freezing Japan’s U.S. assets and cutting off oil exports—has been described as the “first energy war.”⁵ After the 1973 oil price shock, Henry Kissinger argued that U.S. security had been directly affected:

In the last three decades, we have become so increasingly dependent on imported energy that today our economy and well-being are hostage to decisions made by nations thousand of miles away. . . . The energy crisis has placed at risk all of this nation’s objectives in the world. It has mortgaged our economy and made our foreign policy vulnerable to unprecedented pressures.⁶

Concerns about such vulnerabilities and fears that competition over energy resources could turn violent continue today. As one recent report noted, “with new oilfields being discovered at a slowing rate and alternative

energy yet to fully deliver on its promise, the resulting competition, and attempts to secure their safe delivery, could constitute a potential trigger for interstate tensions, even conflict.”⁷

Oil vulnerabilities and tensions are, however, only a portion of the problem. Electricity shortages and blackouts have disrupted life in the United States, Europe, Russia, and many developing countries. As the market for natural gas expands both regionally and globally, new vulnerabilities emerge in that sector. Al Qaeda has threatened to attack the world’s critical economic infrastructure, of which energy clearly is a key component. As leading energy analyst Daniel Yergin has pointed out, the challenges of energy security are enormous and growing:

In the United States alone, there are more than 150 refineries, 4,000 offshore platforms, 160,000 miles of oil pipelines, facilities to handle 15 million barrels of oil a day of imports and exports, 10,400 power plants, 160,000 miles of high-voltage electric power transmission lines, and 1.4 million miles of natural gas pipelines. None of the world’s complex, integrated supply chains were built with security, defined in this broad way, in mind. . . . The challenge of energy security will grow more urgent in the years ahead, because the scale of the global trade in energy will grow substantially as world markets become more integrated. Currently, every day some 40 million barrels of oil cross oceans on tankers; by 2020 that number could jump to 67 million. . . . The amount of natural gas crossing oceans as LNG [liquefied natural gas] will triple to 460 million tons by 2020. . . . Assuring the security of global energy markets will require coordination on both an international and a national basis among companies and governments, including energy, environmental, military, law enforcement, and intelligence agencies.⁸

The public debate often confuses energy *security* with national energy *independence*, which would require a country to meet its energy needs from sources within its own borders. Energy independence is neither feasible for most countries nor especially desirable as a goal in itself. Dependence on a world market that functions well is beneficial, not harmful—and that is as true for energy as for all other globally traded goods and services, for which specialization and trade demonstrably lower costs and increase economic efficiency for all.⁹ Energy policy needs to ensure that markets function reliably and efficiently—a classic governance task.

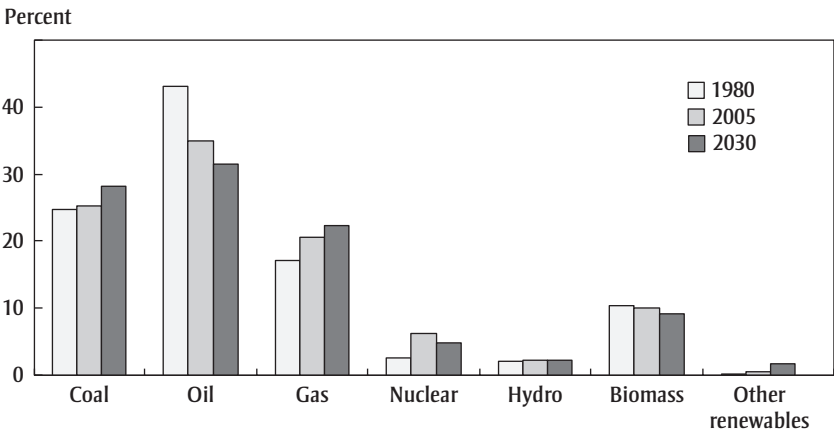
It is not market forces per se that are the problem, but vulnerability to supply disruption and price shocks. Such problems occur in part because energy sources, especially oil, are not evenly distributed around the world. Instead, a large and rising share of the world's known oil reserves are concentrated in a handful of largely volatile and unstable countries—notably in the Middle East, Russia, Nigeria, and Venezuela. Moreover, energy markets, especially the oil market, suffer from significant market distortions, given that most oil supplies are controlled by a handful of government-dominated firms.¹⁰ Energy markets in virtually all countries suffer from varying degrees of distortion by subsidies and taxes. Although some distortions, such as high European petrol taxes, are aimed primarily at addressing a public goods problem, many provide economic rents to powerful sectors, making it politically difficult to change policies to bring about more economically rational energy markets.

For example, energy interests often can be served by shifting regulatory policies from the state to the federal level through rent seeking. A classic example would be the Eastern coal industry convincing the federal government to amend the 1977 Clean Air Act. The amendment required all coal producers to reach a percentage reduction in emissions, requiring the installation of “scrubbers” at new coal-producing facilities regardless of the sulphur content of the coal. Before, the Western coal industry, which produced low-sulphur coal, had a competitive cost advantage over the Eastern coal industry, which had produced high-sulphur coal. Since all facilities now had to install “scrubbers,” coal purchasers had less of a price incentive to transport Western clean coal across the country. The act effectively leveled the playing field by removing the low-sulphur cost advantage of the Western coal industry.¹¹ More recently, the automobile industry in the United States successfully lobbied the federal government for less stringent emissions standards after state law in California required progressively lower-emitting vehicles in the 1990s. The result was that the other states were free to adopt the less stringent federal emissions standard or California's more stringent emissions standard, but not both.¹²

Environmental Sustainability

To date, the major negative environmental externalities associated with energy production have been those associated with the extraction and consumption of fossil fuels. Such fuels constitute the overwhelming share of primary energy sources. As figure 7-1 shows, the situation is unlikely

FIGURE 7-1 . Energy Demand, by Fuel



Source: Modified from IEA, *World Energy Outlook 2007*, p. 74.

to change for some decades. The environmental consequences of continued fossil fuel dependence are severe. By far the lion’s share of attention is currently focused on climate change. Because climate change is the subject of other analyses in this book, it is not addressed in detail here, although this chapter assumes the necessity of a carbon-constrained future. (The latest Intergovernmental Panel on Climate Change report makes clear the overwhelming scientific consensus that human activities are responsible for an unnatural accumulation of greenhouse gases that are causing the atmosphere and oceans to become warmer.)¹³

The burning of fossil fuels also creates other major problems, such as smog and acid rain, issues that have come to plague some emerging-market countries at alarming levels. Transportation of oil leads to contamination of the marine environment, most dramatically in the form of oil spills but also through normal operation of offshore wells, washing out of oil tankers, and storage tank leaks, in addition to spill-off from land-based activities.¹⁴

Yet most nonfossil fuel energy sources pose their own environmental challenges. Nuclear energy technology at present involves such highly proliferation-prone and toxic materials as uranium and plutonium, some isotopes of which need to be safely stored for many thousands of years. The excitement in recent years over biofuels threatens to overlook some

unpleasant realities that have begun to dampen expectations for their role in an environmentally sustainable energy policy. Although these fuels are carbon neutral (they absorb carbon dioxide while growing, then release it when burned), cultivation of crops for fuel raises serious environmental and social dilemmas—soil degradation, deforestation (with associated greenhouse gas emissions when, as is often the case, land is cleared by burning), and “food or fuel” competition over the best use of crops. Furthermore, the potential for biofuels to displace fossil fuels is limited because there is just not enough land or water to produce the quantities needed without negative environmental impacts.¹⁵

Other alternative energy sources also raise environmental issues, although generally to a lesser extent. Hydropower, a major generator of electricity in many countries, requires the construction of large dams, which frequently wreak local environmental havoc and can displace thousands or millions of people.¹⁶ Solar photovoltaic (PV) cells contain toxic substances, and their energy must be stored in batteries, which also contain toxins. Wind power works only in certain locations and is generated by huge metal turbines whose manufacture requires substantial energy. Furthermore, several types of environmental damage are associated with the transmission systems that deliver renewable power to points of consumption: land use conflicts, soil erosion, destruction of forests and natural habitat, noise and interference with radio and television, deleterious effects on birds that collide with power lines and towers, electrocutions, the use of chemical herbicides and vegetation management techniques along rights-of-way, and the human health effects of exposure to electric and magnetic fields (which may contribute to childhood cancer).¹⁷

In short, technology to date has failed to produce any truly environmentally benign large-scale means to satisfy humanity’s apparently insatiable appetite for energy. The need to shift from carbon-intensive energy sources is undeniable, but the alternatives need careful consideration.

Development

While growing use of modern energy sources, particularly fossil fuels, is creating one set of major governance challenges, the lack of access to modern energy sources is creating another. Current energy policies have failed to address the needs of vast numbers of people. Nearly 2 billion lack access to electricity, which is essential to a decent quality of life. The IEA has noted that the number of people who use dirty traditional biomass for

cooking will grow from 2.5 billion to 2.7 billion by 2030 in the absence of new policies.¹⁸

The continuing failure to address the energy needs of the poor threatens prospects for economic development. The transition from subsistence agricultural economies to modern industrial and service-oriented economies inherently requires adequate and affordable energy services. Moreover, reliance on traditional biomass directly threatens human health on a massive scale. Nearly half of all households around the world cook their daily food with unprocessed biomass (wood, coal, or dung). According to the World Health Organization, the result is deadly: “About 2.5 million deaths each year result from indoor exposures to particulate matter in rural and urban areas in developing countries, representing 4–5 percent of the 50–60 million global deaths that occur annually.”¹⁹

For those reasons, the UN Millennium Project—an advisory body constituted by Kofi Annan, then the UN secretary general, to recommend practical steps toward achieving the Millennium Development Goals (MDGs)—argued forcefully that “greater quality and quantity of energy services will be required to meet the MDGs.”²⁰

Human Rights

The extractive industries in general suffer frequent accusations of gross human rights abuses. The UN’s special representative on business and human rights, Harvard University professor John Ruggie, found that oil, gas, and mining firms “utterly dominate[d]” a survey of sixty-five instances of egregious human rights abuses, as reported by nongovernmental organizations (NGOs), accounting for two-thirds of the total.²¹ The alleged abuses included such acts as “complicity in crimes against humanity, typically for acts committed by public and private security forces protecting company assets and property; large-scale corruption; violations of labor rights; and a broad array of abuses in relation to local communities, especially indigenous people.”²² As Ruggie notes, the predominance of extractive industries is no great surprise:

No other [sector] has so enormous and intrusive a social and environmental footprint. At local levels in poor countries no effective public institutions may be in place. This authority vacuum may compel responsible companies, faced with some of the most difficult social challenges imaginable, to perform *de facto* governmental roles for which they are

all ill-equipped, while other firms take advantage of the asymmetry of power they enjoy.²³

Many oil resources in particular are located in countries whose track record on human rights is less than stellar. The oil firms that do business in those countries find themselves tarred with the same brush. Shell Oil faced widespread criticism for alleged complicity in human rights violations in Nigeria in the 1990s.²⁴ Unocal found itself in U.S. federal court facing lawsuits over its alleged complicity in Myanmar, which it settled out of court in 2004.²⁵ Chinese oil companies in Darfur faced their turn in the spotlight after the turn of the century.²⁶

In addition to claims of involvement in human rights abuses, advocacy groups have issued numerous reports documenting what they allege to be systematic complicity in misuse of government revenues from oil and gas by firms operating in repressive or poorly governed countries.²⁷ As one step toward countering such corruption, in 2002 the United Kingdom spearheaded the launch of the Extractive Industries Transparency Initiative (EITI), calling on governments that receive substantial energy revenues to publish accounts of those revenues.²⁸ The EITI puts the onus on governments, rather than corporations, to become transparent. Advocacy groups point out that very few governments have yet complied with the EITI requirement to publish fully audited and reconciled EITI reports.²⁹

Governing Energy: Who Are the Governors?

Although there is no comprehensive global energy agency, a multitude of intergovernmental bodies and nongovernmental groups play some role in addressing global energy issues. They include large multilateral organizations that focus on energy, such as the IEA, the Energy Charter Treaty, and the International Energy Forum; a variety of small-scale, public-private partnerships and multi-stakeholder processes; bodies that focus on a specific energy source, such as the International Atomic Energy Agency; funders such as the multilateral development banks that include energy projects in their loan portfolios; and various business organizations, advocacy groups, and research institutions. A number of other institutions address energy as well, such as the G-8, the European Union (EU), and Asia Pacific Economic Cooperation (APEC). No single chapter can address more than

a fraction of the entities involved. This one looks in depth at a few key organizations and governance processes to draw lessons about how global energy governance might, and should, evolve.

The International Energy Agency

Before 1974, no explicit agreements existed among governments to govern the actions of states and multinationals with regard to oil, the most easily transported and heavily traded energy source.³⁰ Then came the Arab-Israeli war of 1973. Members of the Organization of Petroleum Exporting Countries (OPEC) seized the opportunity to increase oil prices (and thus revenues) and simultaneously send a powerful political message by embargoing oil sales to countries that they considered overly friendly to Israel.³¹ By December, global oil supplies had fallen by 7 percent.³² Initially, oil-consuming nations responded competitively, in a manner uncomfortably reminiscent of the everyone-for-himself economic policies of the 1930s, when competitive devaluations and trade barriers turned a stock market crash into the most severe depression of the twentieth century. The nine-member European Economic Community (EEC) issued a pro-Arab resolution, which succeeded in easing Arab oil restrictions for those countries. However, Holland, which had maintained a publicly pro-Israeli stance, did not benefit from the easing of restrictions. Similarly, Portugal, while not a member of the EEC, suffered from oil restrictions because it had allowed the United States to use the Azores as a logistics base to channel U.S. weapons to Israel.³³ Many governments pressured oil companies to grant them priority in the allocation of available supplies. (The companies by and large declined to play favorites, instead allowing their customers to share the pain equally.)³⁴ The OECD secretariat proposed an oil-sharing arrangement to calm the panic, but to no avail.

In early 1974, the United States convened an international energy conference, at which the assembled governments agreed to create the International Energy Program, which established the IEA. By the end of 1978, the IEA was fully operational, housed at the OECD in Paris and comprising most OECD members (although not France). In what appeared to be a significant derogation of national sovereignty, the emergency oil-sharing system created under the agency's auspices delegated to the secretariat the authority to declare an emergency and thereby bring the system's operations into play. The agency also established systems for reporting on prices, supplies, and stock positions. Things seemed so tranquil in 1978 that many companies reduced their stockpiles of oil.³⁵

The Iranian revolution destroyed that tranquility. With Iranian production down to almost nothing in early 1979, importing governments initially responded just as competitively as they had in the 1973 crisis. The scramble for supplies doubled prices, sparking a major increase in production that nonetheless failed to bring prices back down. The IEA secretariat never invoked the emergency oil-sharing system; instead, it attempted—unsuccessfully—to coordinate its members' actions informally.³⁶

One IEA aim was to set oil import targets for each member. At a meeting in 1980, members approved a set of targets, but they were so high that they had no real effect on limiting demand. Over the next couple of years, IEA members tried but failed, despite strong U.S. support, to negotiate an agreement on a set of objective criteria by which the IEA could set national import targets. The debate over import targets proved useful as a way of bolstering the case for conservation efforts by keeping the need to control energy consumption on the agenda—but the failure to reach agreement showed the difficulty of getting governments to limit their sovereign autonomy for the greater good. IEA members were similarly unable to agree on a formal rules-based approach to managing and using oil stockpiles.³⁷

The IEA also tried to set a minimum safeguard price (MSP) for crude oil. The MSP was supposed to be set at a level that would help stimulate investment in alternative energy sources—that is, to make investments in alternative energy sources financially worthwhile. The IEA's Standing Group on Long-Term Cooperation (SLT), which was in charge of energy conservation, development of alternative energy resources, and designing measures to reduce the dependence of member countries on oil, spent much of 1976 deliberating on the MSP.

However, the negotiation process was difficult, for multiple reasons. The interests of countries with alternative energy sources were different from those of countries without domestic reserves; the former countries wanted to maintain relatively high prices for imported oil in order to protect the public and private investments that went into developing their indigenous oil supply or alternative energy sources when imported oil prices declined.³⁸ There also were concerns about the effects of the MSP on industrial competition and advantage. Several countries argued that the United States and Canada had domestic legislation that allowed oil imports at prices below the MSP, which benefited their industries. Also at issue was chapter V of the Long-Term Cooperation Programme, which included the MSP and under which nondiscriminatory access by IEA members to others' indigenous energy resources was allowed. Several countries

attempted to link their agreement to the MSP with concessions by oil-rich member countries, particularly concessions that allowed access to indigenous energy sources through joint energy projects, which Canada opposed. There also were disagreements on whether member countries would have to demonstrate that they had the administrative and legislative authority to maintain the MSP.³⁹ Nonetheless, an agreement finally was reached and the MSP was set to a relatively low price (\$7 per barrel) in order to achieve consensus. In practice, however, the MSP was ignored and never gained the commitment of the IEA.⁴⁰ Furthermore, prices have since risen well above the \$7 level, rendering the MSP grossly out of date.

Although the outbreak of the Iran-Iraq war in September 1980 drastically reduced available supplies, it had a much less dramatic effect on oil prices than did the Iranian revolution. Markets clearly played a major role in limiting the price impact—oil companies had turned their attention to the development of non-OPEC sources, and the depreciation of the dollar, in which oil prices are denominated, dampened price impacts.⁴¹ The IEA also played a role in keeping oil markets calm. By then, the agency's reporting system was functioning and the secretariat was better placed to use its powers of persuasion on its members.⁴² That helped to prevent the self-defeating cycle of stockpiling and hoarding that had characterized the earlier crises.

Since then, the IEA has helped to coordinate responses among consuming nations to a series of shocks and disruptions in global oil markets: the 1990–91 Gulf war; plans for dealing with Y2K concerns; 9/11; and the Iraq war. Throughout, the existence of the IEA and of its members' more than 1 billion barrels of Strategic Petroleum Reserve (SPR) helped to deter market manipulation.⁴³ In the United States, the Strategic Petroleum Reserve has been tapped twice. The first time was in 1991, the day before the Gulf war began, when an emergency sale of SPR crude oil was announced to ensure the adequacy of the global oil supply. The second time was in September 2005, after Hurricane Katrina devastated the oil production, distribution, and refining industries in Louisiana and Mississippi.⁴⁴

The IEA also conducts energy research and compiles data, producing numerous publications on the latest energy statistics, policy analysis, and recommendations on good energy practices. These publications include the annual *World Energy Outlook* (WEO), which has become a leading source for energy market projections, analysis, and recommendations for governments and the energy business; regular reviews of the energy policies

of individual member countries; oil market assessments; and monthly, quarterly, and annual energy statistics publications that serve as an important source of the information shaping the global energy debate. Also central to the work of the IEA is the fostering of innovation in energy technology, and the agency was asked at the 2005 G-8 Gleneagles Summit to make recommendations to that end. The IEA's subsequent work in the area resulted in the 2008 publication *Energy Technology Perspectives: Scenarios and Strategies to 2050*, which argued that technology was the key to sustainable energy development.⁴⁵

However, serious questions have arisen about the system's capacity to cope with future shocks and disruptions. IEA membership is limited to countries that belong to the OECD. Its twenty-seven members now include all OECD countries except Iceland and Mexico. As oil demand soars among countries that are not members of either group, notably India and China, it is not clear that the agency has the critical mass of oil importers needed to manage a future shortfall.⁴⁶

The Group of Eight

By any standard, the G-8 is an odd institution. With no charter, no permanent secretariat or home, no fixed membership, and no formal admission criteria, it nonetheless has become a fixture on the international scene, bringing together several of the world's most powerful leaders every year for more than thirty years. Although some analysts have come to denigrate the G-8 as nothing more than an inconsequential talking shop, over the years some of the G-8 summits appear to have helped to coordinate international action and establish norms. The G-8 has been especially active with regard to energy policy.⁴⁷

The G-8, despite its name, began in 1975 with only six members (France, Germany, Italy, Japan, the United Kingdom, and the United States) at a summit in Rambouillet, France, initiated by France's president, Valéry Giscard d'Estaing. Canada joined the next year, creating the G-7. The European Community began participating in 1977. Russia took part in the political meetings in the early 1990s and became a full member in 1997.⁴⁸

The G-8's attention to energy has waxed and waned, closely tracking oil prices.⁴⁹ In its early days (1975 to 1981), the G-7 did reasonably well in responding to the turmoil in oil markets. The Rambouillet declaration referred to the need to "cooperate in order to reduce our dependence on imported energy through conservation and the development of alternative sources" and proclaimed its signatories' commitment to "spare no effort

in order to ensure more balanced conditions and a harmonious and steady development in the world energy market.”⁵⁰ In subsequent years, member states made real and sometimes very detailed commitments. One paragraph of the 1978 Bonn Declaration, for example, was an extraordinarily public promise of specific U.S. policy measures:

Recognizing its particular responsibility in the energy field, the United States will reduce its dependence on imported oil. The U.S. will have in place by the end of the year a comprehensive policy framework within which this effort can be urgently carried forward. By year-end, measures will be in effect that will result in oil import savings of approximately 2.5 million barrels per day by 1985. In order to achieve these goals, the U.S. will establish a strategic oil reserve of 1 billion barrels; it will increase coal production by two-thirds; it will maintain the ratio between growth in gross national product and growth in energy demand at or below 0.8; and its oil consumption will grow more slowly than energy consumption. The volume of oil imported in 1978 and 1979 should be less than that imported in 1977. In order to discourage excessive consumption of oil and to encourage the movement toward coal, the U.S. remains determined that the prices paid for oil in the U.S. shall be raised to the world level by the end of 1980.⁵¹

The communiqué of the 1980 Venice summit contained many pages of energy promises, couched in a nearly hysterical tone: “In this, our first meeting of the 1980s, the economic issues that have dominated our thoughts are the price and supply of energy. . . . Unless we can deal with the problems of energy, we cannot cope with other problems.”⁵² By 1982, however, oil prices were in decline. The G-8 was left in disarray by U.S.-European feuding over the proposed pipeline to bring natural gas from Russia’s rich fields to energy-hungry Europe. Oil prices remained low through most of the next two decades, and despite continuing concern about nuclear proliferation, energy barely earned a mention in G-8 documents, other than a blip in the 1991 London communiqué due to the Gulf crisis.⁵³

That began to change toward the end of the millennium. Japan, as host of both the 1997 Kyoto Protocol negotiations on climate change and the 2000 G-8 summit, wanted a strong new initiative on renewable energy.⁵⁴ At its Okinawa summit in 2000, the G-8 tried something new, creating the G-8 Renewable Energy Task Force, which was co-chaired by Sir Mark Moody-Stuart, the head of Shell Corporation, and Corrado Clini, director

general of Italy's Department of Environment. Its membership drew not only from G-8 governments but also from business and civil society and from non-G-8 countries.⁵⁵ The task force report, delivered to the G-8 in July 2001, laid out a compelling case for a major shift to sources of renewable energy and set out recommendations for using market forces and a variety of funding mechanisms to bring about that shift.⁵⁶

The work of the task force has to go down as one of the major missed opportunities for getting the world onto a more sensible and sustainable energy path. By 2001 the political landscape of the G-8 had changed dramatically. George W. Bush, at his first G-8 summit, seemed to see the task force's work as a Clintonian exercise of no interest to the incoming administration. The 2001 Genoa summit barely acknowledged the report and let the task force die.⁵⁷

By 2004 rising oil prices and the perceived connection between Middle East oil revenues and economic vulnerability and terrorism helped turn G-8 leaders' attention back toward energy policy. By 2005, with climate change at the top of host Tony Blair's agenda, energy policy featured in much of the discussion at the Gleneagles summit, with serious commitments on energy efficiency, cleaner energy technology, and investment in such technologies for developing countries. Given the publicity generated over the G-8 energy commitments, there was much activity by all member states on climate change and renewable energy initiatives.⁵⁸ All member states had participated at the UN Climate Change Conference in November 2005 and had accepted more than forty key agreements. The most significant was the adoption of the 2001 Marrakesh Accords, which established how many of the Kyoto Protocol's mechanisms would be adopted, and an agreement to move forward on post-2012 emissions reduction negotiations.⁵⁹ The member states also adopted various domestic legislative plans to foster renewable energy initiatives. For instance, France announced Plan Climat 2005, which committed France to develop markets in clean energy technology and to increase the availability of the technology in developing countries. France also promised tax credits to private individuals who repurchased electricity from solar panels.⁶⁰ The United Kingdom set a target goal to achieve 15.4 percent of its energy from renewable sources by 2015–16. And the United States announced the Advanced Energy Initiative, which increased funding for clean energy research at the Department of Energy by 22 percent.⁶¹

The St. Petersburg 2006 G-8 summit hosted by Russia had energy as its central focus. Ironically, the Russian state-owned gas supplier Gazprom

had begun 2006 by shutting off the gas pipes to Ukraine over a price dispute. In doing so, Russia violated its obligations under the Energy Charter Treaty, of which it was a signatory but which it had not ratified (certain obligations being incumbent on signatories even as they consider ratification).

A few months before the St. Petersburg summit, John Kirton, a leading Canadian authority on the G-8 (and a strong proponent of the view that the G-8 has been quite successful on energy policy), presented a Moscow conference with a set of eminently sensible recommendations on what the G-8 should do that summer to take advantage of its combined political and economic muscle and its past successes in the energy field. He suggested that the summit focus intensively on energy, framed as “environmentally sustainable energy,” with particular emphasis on mobilizing the market to carry out whatever specific commitments the G-8 would make. Those commitments would include serious attention to rebalancing subsidies, away from nuclear and the dirtier fossil fuels and toward cleaner and more sustainable sources; a shift toward ecological national accounting that would reveal the real costs of existing energy policies; creation of a more global natural gas market using LNG; and greater institutionalization of G-8 energy institutions, at the ministerial, official, and multi-stakeholder levels.⁶²

The G-8 leaders did none of those things. The summit’s Global Energy Security statement was long on what should be done but vague on what exactly the G-8 governments would themselves do. It was silent on subsidies and ecological accounting. Although the statement treated energy efficiency, renewable energy, and new energy technology at length, the most concrete commitment was to “consider national goals for reducing energy intensity of economic development, to be reported by the end of the year.”

At the 2007 G-8 Summit at Heiligendamm, climate change received passing attention with an acknowledgment of a report by the UN Intergovernmental Panel on Climate Change (IPCC) that had concluded that global temperatures were rising because of human activity and that the rise would result in negative consequences for biodiversity and ecosystems (food and water supply). The G-8 also acknowledged an EU proposal for an international initiative on energy efficiency and agreed to explore, along with the International Energy Agency, ways to promote global energy efficiency. Still, no firm plan for action was presented,

only a declaration to “consider” halving global emissions by 2050 and a call for members to participate in the UN process for negotiating a post-Kyoto agreement.⁶³

At the 2008 G-8 Summit at Hokkaido Toyako, the leaders made a commitment to adopt in negotiations on the UN Framework Convention on Climate Change (UNFCCC) the goal of achieving at least a 50 percent reduction of global emissions by 2050. Topics such as improving energy efficiency, use of clean energy, adaptation to the effects of climate change, technology, finance, market-based mechanisms, and tariff reduction were discussed. The G-8 countries, along with China, India, South Korea, and the European Community, established the International Partnership for Energy Efficiency Cooperation. The group made a commitment to increase investment in research and development in innovative energy technology, and to achieve that end members pledged more than US\$10 billion annually in direct government-funded R&D over the next several years. G-8 members also pledged approximately US\$6 billion as a contribution to the Climate Investment Funds, including the Clean Technology Fund (CTF) and the Strategic Climate Fund (SCF).⁶⁴

Although the G-8 process may have helped to focus the attention of great powers on energy issues, to date the process has not proven its ability to serve as a central mechanism for global energy governance.

The Energy Charter Treaty

The end of the cold war seemed to offer a new opportunity to bolster energy markets and thus energy security by incorporating at least one major supplier—Russia—into a rules-based framework. In December 1991, following Dutch prime minister Ruud Lubbers’s proposal for a European Energy Community, a number of European countries signed the Energy Charter, a political declaration of intent to promote cooperation on energy issues. That led three years later to the Energy Charter Treaty (ECT), signed in Lisbon in December 1994, with entry into force in April 1998 upon ratification by thirty members.⁶⁵ Membership now stands at fifty-one countries plus the European Communities, including a number of non-European parties such as Australia, Japan, and all Central Asian countries. Countries and organizations with observer status include China, the United States, Venezuela, Iran, Kuwait, ASEAN, the World Bank, the OECD, the IEA, and the Commonwealth of Independent States (CIS) Electric Power Council, among others. The United States signed the ECT but chose not to ratify it.

The ECT, which started off being inherently European, has become more or less global in its scope, in line with its current ambitions.

Although the ECT includes attention to energy efficiency as one of its five pillars, the ECT's purpose, as its website makes clear, is to stabilize markets and thus enhance energy security:

In a world of increasing interdependence between net exporters of energy and net importers, it is widely recognized that multilateral rules can provide a more balanced and efficient framework for international cooperation than is offered by bilateral agreements alone or by non-legislative instruments. The Energy Charter Treaty therefore plays an important role as part of an international effort to build a legal foundation for energy security, based on the principles of open, competitive markets and sustainable development.⁶⁶

The ECT's other four pillars address foreign energy investment, energy trade, freedom of transit through pipelines and grids, and dispute resolution. On investment, under the terms of the treaty, each party is obliged to extend national treatment (most-favored-nation status) to nationals and legal entities of all other parties that have invested in its energy sector, thus replacing the need for a network of bilateral investment protection treaties. On trade, the ECT accepts World Trade Organization (WTO) rules and standards, extending WTO-type rules to several ECT parties that are not yet members of the WTO.⁶⁷ The dispute resolution procedure relies on arbitration.

It is above all the transit issue that has proven problematic, particularly for Russia. In 1998, a number of Russia's energy-exporting neighbors and transit countries (Azerbaijan, Georgia, Kazakhstan, Turkey, Turkmenistan, and Uzbekistan) raised the issue, arguing that if commercial oil and natural gas pipeline projects were to succeed, an attractive political, technical, financial, and legal environment would have to be created. Since the pipelines cross borders, creating an attractive commercial environment would require an intergovernmental agreement. Attendees at the G-8 Energy Ministerial Meeting that year agreed and established the Transit Working Group. Negotiations on a transit protocol began under ECT auspices in early 2000.⁶⁸

Russia, however, proved unwilling to agree to provisions that in effect allowed non-Russian companies to buy gas in Central Asia and ship it to Europe through Russian pipelines, instead of having to sell it to Russia,

which would then convey the gas to Europe. In late 2006, Russia made clear that it did not intend to give up control of its pipelines and would not ratify the Energy Charter Treaty unless those provisions were renegotiated.⁶⁹ It also seems likely that Russia does not wish to submit to the ECT's arbitration procedures for price disputes and its ban on cutting off supplies.⁷⁰

The difficulties over the ECT are just one piece of a larger global governance failure. The effort to incorporate Russia into a rules-based energy market system has failed spectacularly. Flush with cash and confidence, Russia has bullied foreign energy firms out of the enormous Sakhalin Island project and has cut off supplies to Ukraine and Belarus in pricing disputes.⁷¹ In October 2006, Gazprom reversed a major policy decision, announcing that it would develop the enormous Shtokman gas fields without the foreign investors who previously were to have been allocated a 49 percent share.⁷²

The WTO

As many energy exporters, including OPEC member countries, Central Asian countries, and Russia, negotiate the terms of accession for their entry into the World Trade Organization, the WTO is taking on increasing importance as a focal point for energy-relevant trade rules. Trade rules cover most of the policy instruments that governments have to improve energy efficiency and govern their energy sectors, from taxation to subsidies to standards and labeling requirements.⁷³

Trade rules fit awkwardly with energy policy. WTO rules are meant to address import barriers—tariffs and other measures that countries use to keep out other countries' goods and services. With regard to energy, however, few import barriers exist. Most energy importers are scrambling to increase imports, not exclude them. Instead, the barriers to trade come from exporters, in such forms as export duties, which can raise significant revenues for exporting countries. WTO rules do not address supply monopolies or cartels or issues such as the pipeline transit rules that have derailed Russia's ratification of the Energy Charter Treaty.

In many cases, WTO rules may inhibit good energy policy. Carbon taxes on fuels, which several countries already have adopted, would pass muster.⁷⁴ It is not clear, however, whether the rules would allow tax policy to discriminate between methods of energy production, such as favoring electricity from renewable sources over electricity from other sources. Similarly, direct support to renewable energy industries may fall afoul

of WTO prohibitions on subsidizing specific industries within a sector.⁷⁵ In the meantime, perverse but long-established subsidies—which benefit greenhouse gas-producing energy sources at the expense of cleaner ones—abound. The world's poorer countries (non-OECD members) subsidize oil products to the tune of more than \$90 billion a year.⁷⁶

It has been argued that environmental principles and perspectives have progressed in the WTO through cases brought to the Dispute Settlement Body (DSB) and the Appellate Body. The appellate process is supposed to help to clarify and interpret WTO law and fill the gaps left by negotiators.⁷⁷ However, it is not always clear that trade or investment agreements will help foster clean energy initiatives. In fact, bilateral and regional investment agreements, which have considerably stronger provisions than the WTO agreements do, can actually restrict the effectiveness of government policies that favor clean energy initiatives over less environmentally friendly ones. Such agreements can be open to two types of restrictions, one regarding expropriation and the other regarding fair and equitable treatment. With the former, if a government's new clean energy policy had a significantly negative financial impact on an investment made by a foreign investor, then the investor could argue that his investment was being indirectly expropriated and claim damages. The second restriction simply amounts to unchanged regulatory treatment for the investor; if new environmental regulations adversely affect the finances of a business, that might be a basis for arbitration under the obligation to provide fair and equitable treatment.⁷⁸ Therefore, because trade or investment agreements are open to such challenges, they are insufficient to address the issue of fostering good energy governance.

International Energy Forum

Since its first meeting in 1991 in South Africa, the International Energy Forum (IEF) has brought together the energy ministers of energy-producing and -importing countries every year to exchange views.⁷⁹ Based in Saudi Arabia, it focuses almost exclusively on oil and natural gas, and does not address energy security, diversification, renewable energy, or environmental issues. Its major accomplishment to date is the establishment of the Joint Oil Data Initiative (JODI) to improve the availability and reliability of international data on crude oil, LPG, gasoline, kerosene, gas/diesel, heavy oil, and so forth.⁸⁰ As of November 2007, ninety-seven countries were participating, but JODI was still a work in progress.

The World Bank

Global understanding of the strong connection between energy and development is growing. Over the course of the various global environment and development summits, from the 1972 Stockholm Summit to the 2002 Johannesburg World Summit on Sustainable Development, the topic of energy became ever more prominent.⁸¹ Yet providing adequate financing and an appropriate policy framework for energy in developing countries remains problematic, and an especially egregious shortfall exists in funding to meet the needs of the poorest people. Although most financing for energy development comes from the private sector, various agencies of the UN system and the multilateral development banks, in particular the World Bank, play a key role in setting the terms of the debate and in providing funding.

At the Gleneagles Summit in 2005, the G-8 asked the World Bank to take a leadership role in creating a new framework for clean energy and development, including investment and financing.⁸² At the 2006 annual meeting of the IMF/World Bank Board of Governors, held in Singapore that year, the bank released its strategy.⁸³ The report acknowledged that meeting the MDGs would require far more aggressive action than is contemplated under the IEA's "business as usual" scenario. To address the needs of the poorest, the report called for an action plan that included five components and gave particular attention to sub-Saharan Africa:

- scaled-up programs of household electrification (with better integration of mini-grid and off-grid options to complement grid-based approaches)
- additional generation capacity with associated transmission capacity (including through regional projects) to serve newly connected households and demand from enterprises, public facilities, and other users
- access to clean cooking, heating, and lighting fuels (through sustainable forest management, fuel switching, and diffusion of improved charcoal, briquetting, and clean cooking technologies)
- provision of energy services for key public facilities, such as schools and clinics
- provision of stand-alone lighting packages for households without electricity service.⁸⁴

However, the financing that would be needed to connect all households for electricity by 2030 is substantial, on the order of \$34 billion a year through 2030.⁸⁵

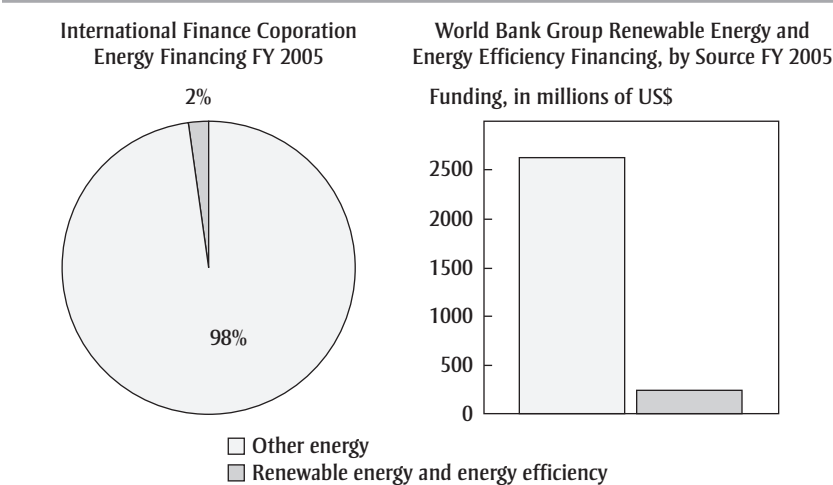
With regard to making the transition to clean energy, the World Bank's report pointed out that despite the existence of some funding vehicles at the various multilateral development banks (the European Bank for Reconstruction and Development's Energy Efficiency Facility, the Inter-American Development Bank's Sustainable Energy Initiative, and the Asian Development Bank's Asia Pacific Energy Efficiency Fund, in addition to the World Bank's funding), the funding available for clean energy projects was negligible compared to the need. It called for the establishment of a new Clean Energy Financing Vehicle (loans) and a new Clean Energy Support Vehicle (grants).

The report was not well received. Developing country governments were highly suspicious of the initiative because of its source—the G-8 and the North-dominated World Bank. The environmental and development research and activist communities claimed that the strategy failed to serve the interests of the poor or to make serious progress toward limiting greenhouse gas emissions. They argued that the bank's proposed investment framework reflected a longstanding predisposition at the bank to use its funding to support a business as usual. In a report also issued at the Singapore meetings, bank critics made a series of pointed criticisms of the bank's approach to energy.⁸⁶ Overall, as the critics point out, the bank's strategy—and indeed its lending portfolio—does little more than tinker around the edges, largely accepting the continuation of business as usual in energy rather than trying to lead the way to a more fundamental transformation of the energy sector. Although the bank, under pressure from NGOs, has repeatedly promised significant changes in its policies,⁸⁷ its actual practices remain firmly wedded to lending for centralized large-scale and mostly fossil fuel-based energy projects, to the tune of \$2 to \$3 billion a year, some ten times the amount made available for other energy sources. As figure 7-2 indicates, both the World Bank and the International Finance Corporation devote very little of their loan portfolios to renewable sources of energy. The bank, for its part, contends that renewables are not available on the scale needed to meet the world's growing demand and that continued investment in fossil fuel projects in poor countries is essential.

Other Initiatives

At the 2002 Johannesburg World Summit on Sustainable Development and thereafter, a wide range of initiatives have attempted to redress some of the shortcomings of energy governance. Many of them focus on renewable

FIGURE 7-2 . World Bank and IFC Energy Funding



Source: Friends of the Earth, *Power Failure: How the World Bank Is Failing to Adequately Finance Renewable Energy for Development*, p. 13 (www.foe.org/camps/intl/institutions/renewableenergyreport10242005.pdf).

sources of energy, reflecting the view among many environmentalists and some development specialists that renewables provide a double whammy—avoiding greenhouse gas emissions and other environmental externalities and often providing local jobs and more easily decentralized energy sources.⁸⁸ A few of the more notable undertakings include the following:

—The EU Energy Initiative for Poverty Eradication and Sustainable Development, launched at Johannesburg, helps developing countries maximize energy efficiency and increase the use of renewable sources of energy.⁸⁹

—The London-based Global Village Energy Partnership, also launched in Johannesburg, aims to help developing countries establish energy action plans and brings together some 1,500 small and medium enterprises (SMEs) and NGOs involved in energy in developing countries with donors and providers of technical assistance.⁹⁰

—The Renewable Energy and Energy Efficiency Partnership (REEEP), launched by the United Kingdom in August 2003 as a multi-stakeholder coalition to promote use of renewable resources and energy-efficient systems, works on policy and regulatory initiatives for clean energy and facilitates financing for energy projects, with the backing of more than 200

national governments, businesses, development banks, and NGOs. It has eight regional secretariats around the world, in addition to the international secretariat.⁹¹

—REN21 (Renewable Energy Policy Network for the 21st Century) grew out of the Renewables 2004 conference in Bonn. Its thirty-two-member steering committee includes representatives from governments, intergovernmental organizations (IGOs), NGOs, industry, finance, regional governments, local governments, and members at large. With a Paris-based secretariat, REN21 hosts meetings, issues publications, and broadly advocates for good renewable energy policies.⁹²

—The Asia-Pacific Partnership for Clean Development and Climate was established by Australia, China, India, Japan, the Republic of Korea, and the United States to accelerate the development and deployment of clean energy technologies and related goods and services. The partnership has set up eight public-private task forces covering aluminum, buildings and appliances, cement, cleaner use of fossil fuel, coal mining, power generation and transmission, renewable energy and distributed generation, and steel. The members represent roughly half of the world's economy, population, and energy use.⁹³

Building Blocks for Energy Governance

The challenge for global energy governance is daunting, given the massive scale of the problem. The IEA's forecast of the need for \$45 trillion in new energy investment by 2050 is almost certainly a gross underestimate, because the IEA does not assume that the world will provide full access to energy services to the world's poor, does not fully account for the costs of adequately protecting the environment (reducing CO₂ emissions by 50 percent from the current levels is only a beginning) or human rights, and does not take into account the costs of protecting energy infrastructure. As the preceding analysis makes clear, existing governance mechanisms are failing to provide energy security, address energy-related environmental externalities, protect human rights from violations during the process of extracting energy resources, or ensure that energy services are sufficiently available to the poor to meet the MDGs and other development goals. However, it is not easy to put forward feasible recommendations for making significant improvements in the processes of global energy governance.

New or Expanded Intergovernmental Organizations?

A common response to perceived needs for global governance is to call for the creation or expansion of a formal intergovernmental organization, preferably one with teeth. For example, in February 2007 Jacques Chirac, then the president of France, called for the transformation of the UN's Environment Programme into a "genuine international organization to which all countries belong, along the lines of the World Health Organization," to promote sustainable technologies and behavior patterns and to support "the implementation of environmental decisions across the planet"⁹⁴—a proposal that obviously would have significant implications for energy policy. Similarly, it frequently has been proposed that the International Energy Agency, as the club of major oil importers, should expand its membership to include at a minimum China, India, and other emerging markets. The purpose of creating the International Energy Forum, which unlike the IEA includes most oil exporters as well as importers, was to pull together all parties on energy issues.

Nonetheless, the near-term prospects for new overarching formal organizations or for substantial expansion of their authority are not bright. As one recent analysis of global governance concluded:

[T]he conditions at the beginning of the twenty-first century do not seem ripe for any major systemic breakthroughs that would replace current structures and create new institutions. The vision and sense of urgency, the innovative spirit, and the leadership that brought the IMF and the World Bank into being at Bretton Woods in 1944 and created the United Nations in San Francisco in 1945 are not present today.⁹⁵

It is not surprising, therefore, that Chirac's repeated calls for a "World Environmental Organization" have not been strongly endorsed by other major powers. Although more than forty countries supported the proposal, the United States, India, China, and Russia all expressed opposition.

Even the prospect of expanding the IEA seems uncertain. Aside from the membership criterion of democratic governance (an artifact of the IEA's origin as an OECD creation), there are serious worries over sharing data, doubts about the capacity of China and India to meet the basic requirement to create and maintain a ninety-day oil stockpile, and concerns about disruption of the IEA's internal political balance. The IEA has what must be the

most convoluted voting structure of any intergovernmental organization—one published effort to explain it runs sixteen pages—but the important point is that the system is carefully balanced to ensure that decisions on most issues require either unanimity or special majorities and that neither the United States nor the EU is in a position to veto a decision requiring a majority vote.⁹⁶ Because voting weights are calculated in part on the basis of oil consumption, the addition of India and China would make those countries' voting shares equal to or ahead of those of all other members except the United States.

Intermediate Steps toward Global Energy Governance

In an ideal world, energy governance, like all forms of global governance, would entail fully accountable institutions with widespread participation, able to supply the full range of energy-related public goods. A starting point would be to recognize the connected nature of all the items on the full energy agenda. To that end, it might be useful to take each one of these difficult and intractable big problems and make them bigger. Creating a more coherent framework would have the great advantage of allowing for grand bargains that could ensure that everyone's most fundamental interests were met.

It may, for example, be more effective to bundle climate change with broader energy issues than to treat it in isolation. It is much easier to make a case for why both rich and poor countries should adopt sound energy policies for reasons of geostrategic, environmental (including non-climate change environmental), and developmental self-interest than it is to persuade developing nations that they should bear a significant part of the burden of countering a climate change problem that they had little part in creating. There is at least some hope that such major players as the United States and China might be receptive to such a broader approach. During his 2008 election campaign, U.S. president Barack Obama outlined his New Energy for America plan. In addition to other targets, his plan would implement an economy-wide cap-and-trade program to reduce greenhouse gas emissions 80 percent by 2050 and would invest \$150 billion over ten years to foster private sector efforts to build a clean energy future.⁹⁷ That would make it more difficult for China to use U.S. inaction as an excuse for its own nonparticipation in global governance efforts. China's public statements on climate change indicate a rapidly growing awareness among Chinese leaders of the potentially disastrous impacts on China from global warming.

Energy policy already is a central focus in such overarching institutions as the G-8 and the EU. With real political leadership, from the United States in particular, a broad global consensus on a more coherent approach to energy is not out of the realm of possibility, but that is a goal that will require years of dedicated effort to achieve. And if it is ever to be achieved, it can be implemented only if the capacity for international collaboration on energy is greatly strengthened. It is more likely that, at least in the short term, improvements in energy governance will be piecemeal and incremental. Nonetheless, such improvements could make a real, if limited, difference. Even those steps, however, will require patience and leadership.

—The World Bank could put its funding where its rhetoric has long been by giving much more attention to energy efficiency and to the possibility of a massive, bank-funded shift to renewable energy technologies: wind, solar, modern biomass, geothermal, and small hydropower. To do so would require strong consensus among the bank's member countries and strong support from the World Bank's president.

—Existing IEA outreach efforts to China and India could be expanded to include the development of a more global system of reserves and emergency stocks.

—The Joint Oil Data Initiative could be developed further, serving as a prototype for other systems to provide timely and accurate information on global energy markets. Further development would require a concerted effort to overcome the reluctance of many oil and gas producers to release accurate data on reserves, which many of them treat as national security information.

—More effective diplomacy could help to entice Russia into a more constructive role in the Energy Charter Treaty and other international energy governance regimes. The rapid decline in oil prices in the second half of 2008 opens a (probably temporary) window of opportunity to engage Russia on this subject.

—Expanded political support from both governments and corporations for the Extractive Industries Transparency Initiative could reduce what currently are extremely high levels of corruption associated with the extraction of energy resources.

These proposals still leave enormous gaps. There remains a need for full, timely, and accurate information on the environmental externalities resulting from various energy policies. There remains a need for a globally agreed system to develop redundant and therefore resilient infrastructure

(pipelines, refineries, decentralized supply, and so forth) for providing energy services, a need that will almost certainly go unmet given the current economic downturn. Most important, there is a pressing need for a meeting of minds to ensure that energy is conceived of as a shared interest rather than an object of geopolitical competition.

If we accept the premise that energy is a zero-sum game, there is little room for optimism that global governance can cope. However, if we redefine the energy problem to focus not on particular sources of energy (such as oil) but rather on energy services, the picture is somewhat rosier. Most of the world has a mutual interest in developing effective energy markets, coordinating policies on taxes and subsidies, responding effectively to climate change, and making a serious investment in alternative energy technologies for developing countries in order to put them on a sustainable path now rather than later through retrofitting. These are all obvious policy prescriptions, repeated in numerous reports. What has been lacking to date is a concerted effort to develop better habits of collaboration, to learn from experience, and to develop the organizational infrastructure needed for progress. The world will not be able to shift to energy systems that satisfy the demands for reliable access to energy services for all the world's people at an environmentally acceptable cost unless the international community develops far more effective institutional mechanisms.

Notes

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