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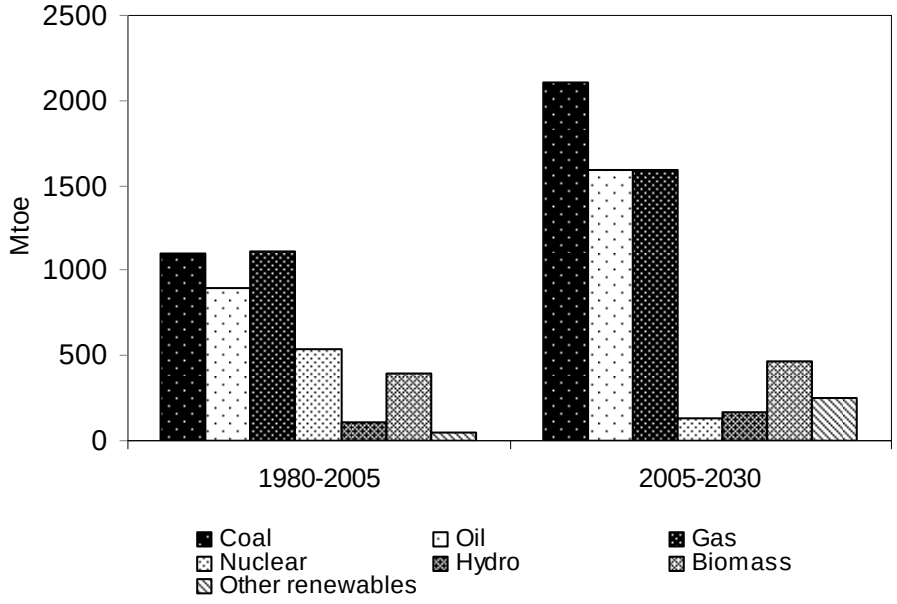
Abstract: Energy has risen to the top of policy agendas around the world. There is now widespread recognition that energy policy has become key to international security, economic development, and the environmental sustainability of modern civilization. Yet this importance is not reflected in the world's institutional infrastructure for managing global problems. A handful of international organizations work in uncoordinated fashion on various pieces of the energy puzzle. No organizational infrastructure exists to support the global conversation that is now badly needed about how to move the world onto a sustainable path that provides appropriate, reliable, and affordable energy services.

Keywords: Energy, governance, global governance, international security, environmental sustainability, development, human rights, international organizations.

Few issues on the global agenda more urgently need fresh governance approaches than energy. Energy policy is being hit by two simultaneous tidal waves. First, the extraordinary economic rise of Asia has transformed global energy markets - as Graph 1 indicates, the IEA predicts that the next few decades will see unprecedented growth in demand for energy resources - while the usual sources of energy supply are severely threatened by political turmoil. Second, the ever-more-convincing evidence on the pace of climate change makes clear that the planet will not allow future economic growth to follow the same fossil-fuel-based path that the industrialized nations have taken.

Graph 1: Increase in demand, by fuel type



Source: Modified from IEA *World Energy Outlook 2007,* p. 77.

"Governance" refers to any and all of the myriad ways in which groups of people attempt to solve collective action problems, deal with externalities, and ensure the provision of public

goods. The term encompasses but goes beyond governmental functions to include the agenda-setting, negotiation, regulatory, implementation, and monitoring roles that are sometimes played by businesses or civil society actors. "Global governance" refers to efforts to deal with the wide range of border-crossing issues involving multiple states and other actors from multiple parts of the world. It includes, but is not limited to, the work of inter-governmental organizations established by governments.

Even by the low standards of most global governance, energy policy fares particularly poorly. On the surface, "energy" comprises quite different policy problems. The policies needed to ensure secure sea lanes for shipping oil supplies, for example, are not obviously connected to the difficulties of dealing with the environmental spillovers from biofuels production, and neither seems tightly bound up with the human rights abuses that plague the extractive industries. Thus, "energy" has been governed piecemeal, if at all, in ad-hoc responses to specific problems involving specific countries or groups of countries. Moreover, the short time horizons of most policy makers do not usually allow for the sustained attention to long-term problems that energy policy inherently requires. And the decision makers and policy analysts responsible for the various energy-related issues work in very different communities that rarely communicate with one another.

As energy problems take center stage on the world's agenda of pressing issues, the inadequacies of such a scattershot approach are becoming all too obvious. The apparently unrelated issues that fall under the "energy" rubric are in reality all woven of the same cloth. At root, the issue is how best to achieve the services energy provides - heating, cooling, lighting, cooking, transportation, industrial power.

A sustainable and secure energy policy would start with a broad assessment of existing and likely future needs for those services, and would examine the full range of benefits and costs (including the environmental and social costs not currently included in price signals) of various energy sources. Such an assessment could not be carried out on a purely national basis, given most countries' inability to meet their own energy needs from purely domestic sources and the various spillover effects of energy production and consumption.

Such assessments are not taking place today. Even if the political will and the resources existed, the institutional mechanisms for countries to come together in the needed conversation do not. Nor do adequate mechanisms exist to monitor or enforce agreements that might aim to coordinate energy policies.

The invisible hand of the market alone will not substitute for effective global energy governance. Energy policy is overwhelmingly about scarcities that market mechanisms are not well suited to resolve - not enough supply at affordable prices (particularly for the poor), not enough infrastructure to deliver that supply, not enough carbon sinks to absorb carbon emissions. Such scarcities drive policy makers to pursue any (or all) of three options:

1. to fight for larger shares of the pie (the zero-sum approach)
2. to use technology to increase the size of the pie
3. to use rules and policy change both to increase the available pie and to fairly allocate its slices where scarcity remains unavoidable

This paper explores what could be accomplished via the third approach. This focus is not meant to denigrate the need for massive investment in technology development. Clearly,

technological change is essential to meet the world's growing energy needs in a way that does not overwhelm the environment on which we all depend. The need for rapid improvement and innovation in energy technology is well recognized, and significant funds are flowing, both from governments and from the private sector.[2] But technology development alone will not suffice to overcome the collective action problems of the energy sector.

This paper starts by identifying the broad problems that energy policy should address. It then looks at the existing mechanisms for addressing those problems, with a brief history of how and why some of those institutions arose and an analysis of how well they deal with the agenda. It ends with an assessment of various options for improving global energy governance.

Where Governance is Needed

It is clear that global energy policy is in need of dramatic and urgent change. Just to stay on the current fossil-fuel-intensive path would require some $22 trillion in new investments between now and 2030, according to the International Energy Agency.[3] 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 poses four sets of problems that require global governance:

- energy security;
- environmental sustainability;
- economic development; and
- respect for human rights.[4]

Energy security: Energy security – usually defined as reliable and affordable access to energy supplies - is inextricably tied up with military and national security. Ever since the British fleet converted from coal to oil on the eve of World War I to makes the British fleet faster than its German counterpart,[5] major powers have looked upon access to oil as a vital national interest, and threats to that access may trigger a military response. The attack upon Pearl Harbor - triggered when the U.S., 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".[6] After the 1973 oil price shock, Henry Kissinger argued that US security had been very 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.[7]

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 inter-state tensions, even conflict.[8]

But oil vulnerabilities and tensions are only a portion of the problem. Electricity shortages and blackouts have disrupted life in the US, 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 is clearly 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, 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 202, that number could jump to 67 million… The amount of natural gas crossing oceans as LNG 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.[9]

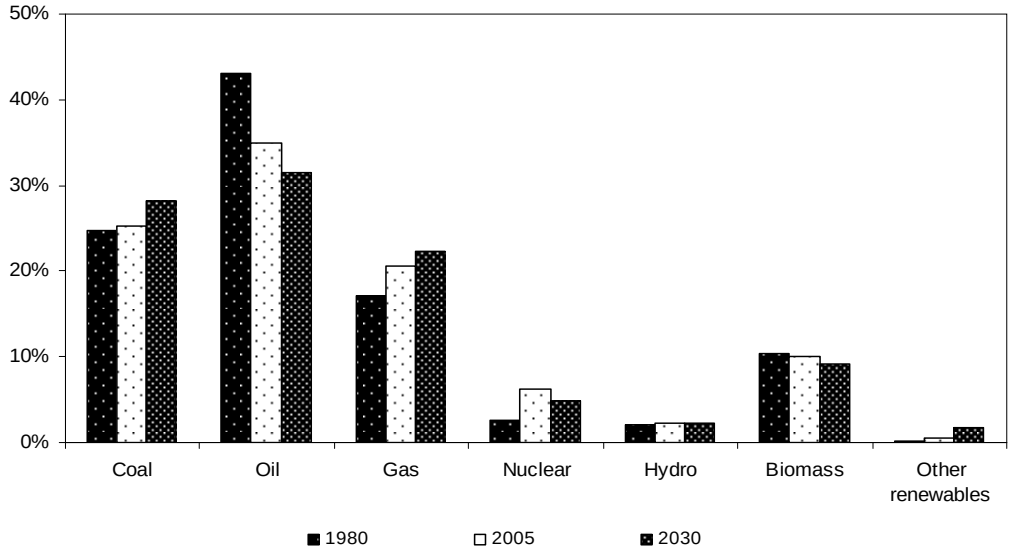
The public debate often confuses energy *security* with national energy *independence*, which would require a country to meet its energy needs from sources within its own borders. Energy independence is neither feasible for most countries nor particularly desirable as a goal in itself. Dependence on a world market that functions well is beneficial, not harmful - this is as true for energy as for all other globally traded goods and services, for which specialization and trade demonstrably lowers costs and increases economic efficiency for all.[10]

It is not market forces per se that are the problem, but vulnerability to supply disruption or 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, especially oil, does not operate as a normal market, given that most oil supplies are controlled by a handful of government-dominated firms.[11] And energy markets in virtually all countries suffer from varying degrees of distortion via subsidies and taxes. Although some such distortions, such as high European petrol taxes, are aimed primarily at addressing public goods problems, many provide undue economic rents to politically powerful sectors, making it politically difficult to change policies to bring about more economically rational energy markets. In short, part of the answer to increasing energy security is to make the relevant markets function more reliably and effectively - a classic governance activity.

Environmental sustainability: To date, the major energy-associated negative environmental externalities have been associated with the extraction and consumption of fossil fuels. Such fuels constitute the overwhelming share of primary energy sources. As graph 2 shows, on current trends that picture is unlikely 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, as is appropriate given 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.[12]

But 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.[13]

Graph 2: Energy demand by fuel source



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

A move to a fully environmentally sustainable energy strategy is not, however, solely a matter of adopting an "anything but fossils" approach. Non-fossil fuel energy sources pose their own environmental challenges. Nuclear energy inherently 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 over biofuels is only slowly giving way to recognition of some unpleasant realities. 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. Even the far more benign renewable energy sources impose externalities. 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.[14] Solar photovoltaic (PV) cells contain toxic substances, and their energy must be

stored in batteries that also contain toxins. Wind power can only work in certain locations and is generated by huge turbines, usually metal, whose production requires substantial energy inputs. (However, the environmental costs of solar phtovoltaics and wind power are trivial (valued at less than a cent per kilowatt hour, versus 11.10cents per kilowatt hour for advanced nuclear and 19.1 for scrubbed coal.[15]

Development: While growing use of modern energy sources, particularly fossil fuels, is creating one set of major governance challenges, the lack of access to these or other modern energy sources is creating another set. Current energy policies have failed to address the needs of vast numbers of people. Nearly two billion lack access to electricity, which is essential to a decent quality of life. As IEA Chief Economist Faith Birol notes, "the number of people using dirty traditional biomass for cooking is set to grow from 2.5 billion now to 2.7 billion in 2030 absent new policies." [16]

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 services-oriented societies inherently requires adequate and affordable energy supplies. Moreover, the 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% of the 50-60 million global deaths that occur annually."[17]

For these reasons, the UNDP has stated that none of the Millennium Development Goals (MGDs) can be met without major improvements in the quality and quantity of energy services in developing countries. The UN Millennium Project, an advisory body constituted by then-UN Secretary General Kofi Annan to recommend practical steps toward achieving the MDGs, argued forcefully that "greater quality and quantity of energy services will be required to meet the MDGs".[18]

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 professor John Ruggie, found that oil, gas, and mining firms "utterly dominate[d]" a survey of 65 instances of egregious human rights abuses, as reported by NGOs, accounting for two-thirds of the total."[19] 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".[20] As Ruggie notes, this 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 equipped, while other firms take advantage of the asymmetry of power they enjoy.[21]

Fossil fuel companies are no exception. 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, for example, suffered widespread condemnation for its alleged connection to Nigerian troops who committed serious abuses in the course of protecting Shell personnel and equipment. Shell paid transportation costs and salary supplements to troops living outside their barracks, which Shell later defended as normal practice. The company claimed it had no control over the troops. But the *New York Times* reported that an internal memorandum indicated Shell specifically requested the "mobile" police, who were locally known as the "kill and go" mob.[22] International condemnation of Nigeria's human rights abuses and Shell's alleged complicity exploded in the mid-1990s, when Nigeria executed the noted author Ken Saro-Wiwa and eight Ogoni colleagues who had been campaigning against the devastation of the Niger Delta.[23]

- In 1996, Unocal found itself facing US federal lawsuits over its alleged complicity in human rights violations at the Yadana gas pipeline project in Burma. Yadana is an enormously rich gasfield with more than 5 trillion cubic feet, under the Andaman Sea some 69 kilometers south of Rangoon. The project entails a mostly undersea complex of more than 400 kilometers of pipelines, with only the final 63 kilometers crossing southern Burma to the Thai border.[24] Unocal, one of four parties in the project consortium, was sued under the controversial U.S. Alien Torts Claims Act by the NGO Earth Rights International on behalf of a group of Burmese villagers. The suits alleged that Unocal knowingly allowed the Burmese military to conscript forced labor and carry out a raft of brutal human rights violations.[25] In 1997, the Ninth Circuit Court found that "the evidence does suggest that Unocal knew that forced labor was being utilized and that the Joint Venturers benefited from the practice," and thus concluded that corporations and their executives could be held liable.[26] In December 2004, the parties settled out of court on confidential terms.

- It is not only Western energy corporations that find themselves facing human rights challenges. Chinese oil companies operating in Darfur are now in the spotlight. Amnesty International and Human Rights Watch have targeted CNPC (China National Petroleum Corporation) with accusations of complicity in human rights violations. As HRW puts it, "Their activities are inextricably intertwined with the governmental abuses; the abuses are gross; the corporate presence fuels, facilitates, or benefits from violations; and no remedial measures exist to mitigate those abuses".[27] And China is clearly willing to use its international power, including its veto power in the UN Security Council, to protect the Sudanese regime from international sanctions brought on by its egregious abuses.[28]

In addition to these claims of involvement in human rights abuses, advocacy groups have also 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.[29] As one step toward countering such corruption, in 2002 the UK spearheaded the launch of the Extractive Industries Transparency Initiative (EITI), calling on governments that receive substantial energy revenues to publish accounts of those revenues.[30] 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 EITI requirements to publish fully audited and reconciled EITI reports.[31]

Governing Energy: Who are the Governors?

No overarching international organization is mandated to address any one of the collective action issues that energy poses. 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 International Energy Agency, despite its name, is actually a creature of the OECD with only 27 members, and it addresses only a small portion of the issues outlined in this paper.

Although there is no comprehensive global energy agency, a multitude of intergovernmental bodies and non-governmental groups play some role in addressing global energy issues. These include large multilateral organizations with a specific energy focus, 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; business organizations, advocacy groups, and research institutions. A number of other institutions address energy as well, such as the G8, the European Union, and APEC.

No single paper can address more than a fraction of these. This paper looks in depth at a few key organizations and governance processes to begin the process of drawing out lessons about how global governance of energy 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.[32] Then came the Arab-Israeli war of 1973. Members of the Organization of Petroleum Exporting Countries (OPEC) seized the opportunity to simultaneously increase oil prices (and thus revenues) and send a powerful political message by embargoing oil sales to countries they considered overly friendly to Israel.[33] By December, global oil supplies had fallen by 7%.[34] Initially, 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 20th century. The European Community issued a pro-Arab resolution, which succeeded in easing Arab oil restrictions for those countries. 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 sharing the pain equally among their customers.)[35] The OECD Secretariat proposed an oil-sharing arrangement to calm the panic, but to no avail.

In early 1974, the US convened an international energy conference, at which the assembled governments agreed on an International Energy Program that 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 that would bring the system's operations into play. The agency had also established reporting systems on prices, supply and stock positions. Things seemed so tranquil in 1978 that many companies reduced their oil stocks.[36]

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 attempting - unsuccessfully - to informally coordinate its members' actions.[37]

One IEA aim was to set oil import targets for each member. At a meeting in 1980, members approved a set of targets, but at such high levels that they had no real effect on limiting demand. Over the next couple of years, IEA members tried but failed, despite strong American support, to negotiate 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.[38]

In contrast, the outbreak of the Iran-Iraq war in September 1980, although it drastically reduced available supplies, had a much less dramatic effect on oil prices. Markets clearly played a major role - 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.[39] But 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.[40] This 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 1990-1991 Gulf war; plans for the Y2K concerns; 9/11; and the Iraq war. Throughout, the existence of the IEA, and of its members' more than one billion barrels of strategic petroleum reserves, helped to deter market manipulation.[41]

But now, 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. As of now, its 27 members include all OECD countries except Iceland and Mexico. As oil demand soars among countries that are not members of the OECD or the IEA, notably India and China, it is not clear that the agency retains the critical mass needed to manage a future shortfall.[42]

The Group of Eight: By any standard, the G8 is an odd institution. With no charter, no permanent secretariat or home, no fixed membership, and no formal admission criteria, it has nonetheless become a fixture on the international scene, bringing together several of the world's most powerful leaders every year for more than 30 years. Although some analysts have come to denigrate the G8 as nothing more than an inconsequential talking shop,[43] over the years some of the G8 summits appear to have helped to coordinate international action and establish norms. The G8 has been particularly active with regard to energy policy.

The G8, despite its name, began with only six members (France, Germany, Italy, Japan, the UK, and the US) at a summit in Rambouillet, France initiated by French President Giscard

d'Estaing. Canada joined the next year, creating the G7. 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.[44]

The G8's attention to energy has waxed and waned, closely tracking oil prices.[45] In its early days (1975 to 1981), the then-G7 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," along with a commitment to "spare no effort in order to ensure more balanced conditions and a harmonious and steady development in the world energy market."[46] 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 US 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 twothirds; 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.[47]

The communiqué of the 1980 Venice summit contained many pages of energy promises, couched in a near-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.[48]

By 1982, however, oil prices were in decline. The G8 was left in disarray by US-European feuding over the proposed pipeline to bring natural gas from Russia's rich fields to energy-hungry Europe. Through most of the next two decades, as oil prices remained low, energy (other than continuing concern with the proliferation aspects of nuclear energy) barely earned a mention in G8 documents, other than a blip in the 1991 London communiqué due to that year's Gulf crisis.[49]

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 G8 summit, wanted a strong new initiative on renewable energy.[50] At their Okinawa summit in 2000, the G8 tried something new, creating the G8 Renewable Energy Task Force co-chaired by Shell head Sir Mark Moody-Stuart and Dr Corrado Clini, Director General of Italy's Department of Environment. Its membership drew not only from G8 governments, but also from business and civil society and from non-G8 countries.[51] Their report, delivered to the G8 in July 2001,

laid out a compelling case for a major shift to renewables, and set out recommendations for using market forces and a variety of funding mechanisms to bring about that shift.[52]

But the task force exercise 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 G8 had changed dramatically. George W. Bush, at his first G8 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.[53]

By 2004, rising oil prices and the perceived connection between Middle East oil revenues and vulnerabilities and terrorism helped turn the 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, with serious commitments on energy efficiency, cleaner energy technology, and investment in such technologies for developing countries. The St Petersburg 2006 summit had energy as its central focus.

Although the G8 process may have helped to focus the attention of great powers on energy issues, to date the process has not proven able to serve as a central mechanism for global energy governance. A few months before the St. Petersburg summit, John Kirton, a leading Canadian authority on the G8 (and a strong proponent of the view that the G8 has been quite successful on energy policy), presented a Moscow conference with a set of eminently sensible recommendations on what the G8 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 G8 would make. Those specific commitments would include serious attention to re-balancing subsidies away from nuclear and the dirtier fossil fuels 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 a greater institutionalization of G8 energy institutions, at the ministerial, official, and multi-stakeholder levels.[54]

The G8 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 G8 governments would themselves do. It was silent on subsidies and ecological accounting. Although the statement treated energy efficiency, renewables, 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."

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' proposal for a European Energy Community, a number of European countries signed the Energy Charter political declaration. Three years later, this led to the Energy Charter Treaty (ECT), signed in Lisbon in December 1994, with entry into force in April 1998 upon the ratification of thirty members.[55] Membership now stands at 51 countries plus the European Communities, including a number of non-European parties such as Australia, Japan, and central Asia. Countries and organizations with observer status include China, the

US, Venezuela, Iran, Kuwait, ASEAN, the World Bank, the OECD, the IEA, and the CIS Electric Power Council, among others.

Although the ECT includes attention to energy efficiency as one of its five pillars, overwhelmingly 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.[56]

The ECT's other four pillars address foreign energy investment, energy trade, freedom of transit through pipelines and grids, along with a dispute resolution procedure. On investment, under the terms of the treaty, parties are 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 WTO rules and standards (see discussion below of energy and the WTO), which extends WTO-type rules to several ECT parties that are not yet members of the WTO.[57] 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, an attractive commercial environment would require an inter-governmental agreement. The G8 Energy Ministerial Meeting that year agreed, and established a Transit Working Group. Negotiations on a Transit Protocol began under ECT auspices in early 2000.[58]

But Russia proved unwilling to agree to provisions that would effectively allow non-Russian companies to buy gas in Central Asia and ship it to Europe via Russian pipelines, instead of having to sell it to Russia which then conveys it to Europe. In late 2006, Russia made clear that it does not intend to give up control of its pipelines and will not ratify the Energy Charter unless those provisions are renegotiated.[59] 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.[60]

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 is failing spectacularly. Flush with cash and confidence, Russia has bullied foreign energy firms out of the enormous Sakhalin Island project[61] and has cut off supplies to Ukraine and Belarus in pricing disputes.[62] 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.[63]

The WTO: As many energy exporters, including OPEC members, Central Asian countries, and Russia all 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 governments have available to them to improve energy efficiency and govern their energy sectors, from taxation to subsidies to standards and labeling requirements.[64]

But 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 those 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 such issues as the pipeline transit rules that have derailed Russia's ratification of the Energy Charter Treaty.

In many cases, WTO policy may inhibit good energy policy. Carbon taxes on fuels, which several countries have already adopted,[65] would pass muster. But it is not clear whether the rules would allow tax policy to discriminate between methods of energy production, such as favoring electricity from renewables 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.[66] 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 over $90 billion a year.[67]

International Energy Forum: Since its first meeting in 1991 in South Africa, the IEF has brought together the energy ministers of energy producing and importing countries every year for exchanges of views.[68] Based in Saudi Arabia, it focuses almost exclusively on oil and natural gas, and does not address energy security, diversification, renewables, or environmental issues. Its major accomplishment to date is the establishment of the Joint Oil Data Initiative (JODI), which was created to improve the availability and reliability of international data on crude oil, LPG, gasoline, kerosene, gas/diesel, heavy oil, etc.[69] By the end of 2006, nearly 100 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/development summits, from the 1972 Stockholm Summit to the 2002 Johannesburg World Summit on Sustainable Development, energy became an ever more prominent theme.[70] Yet adequate financing and appropriate policy frameworks for energy in developing countries remains problematic, with a particularly egregious gap in meeting the needs of the poorest. Although most financing for energy development goes through private sector hands, various agencies of the UN system and the multilateral development banks, and 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 G8 asked the World Bank to prepare an investment framework on clean energy for developing countries.[71] At the 2006 annual meeting of the IMF/World Bank Board of Governors, held in Singapore that year, the Bank released its strategy.[72] The report acknowledged that meeting the MDGs would require far more aggressive action than is contemplated under the IEA's reference scenario. To address the

needs of the poorest, the report called for an Action Plan with five components and with particular attention to sub-Saharan Africa:

(a) scaled-up programs of household electrification (with better integration of mini-grid and off-grid electricity options to complement grid-based approaches);
(b) additional generation capacity with associated transmission (including through regional projects) to serve newly connected households and demand from enterprises, public facilities, and other users;
(c) access to clean cooking, heating, and lighting fuels (through sustainable forest management, fuel switching, and diffusion of improved charcoal, briquetting, and clean cooking technologies);
(d) provision of energy services for key public facilities, such as schools and clinics; and
(e) provision of stand-alone lighting packages for households without electricity service.[73]

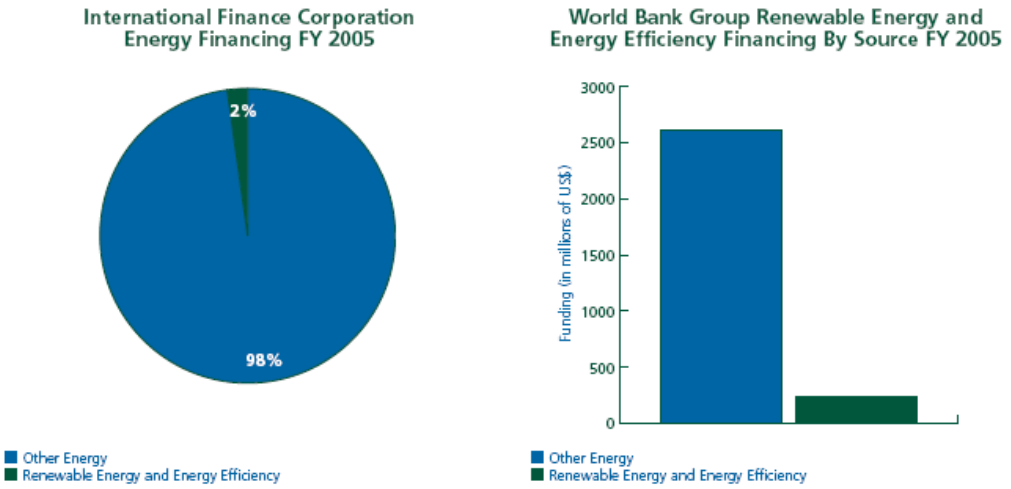
But the financing that would be needed to connect all households for electricity by 2030 is substantial, on the order of $34 billion a year through 2030.[74]

With regard to a 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 EBRD Energy Efficiency Facility, the Inter-American Development Bank Sustainable Energy Initiative, and the Asian Development Bank Asia Pacific Energy Efficiency Fund, in addition to the World Bank's own funding), 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 G8 and the northern-dominated World Bank. The environmental and development research and activist communities claimed that the strategy failed either 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 energy business-as-usual. In a report also issued at the Singapore meetings, Bank critics laid out a series of pointed criticisms of the Bank's approach to energy.[75] Overall, as the critics point out, the Bank's strategy, and indeed its lending portfolio, do little more than tinker around the edges, largely accepting the continuation of business as usual practices in energy rather than trying to lead the way in a more fundamental transformation of the energy sector. Although the Bank, under pressure from NGOs, has repeatedly promised significant changes in its policies,[76] 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 Graph 3 indicates, both the Bank and the International Finance Corporation devote very little of their loan portfolios to renewables. The Bank, for its part, contended that renewables are not available on the scale needed to meet the world's growing demands and that continued investment in fossil fuel projects in poor countries is essential.

Graph 3: World Bank and IFC Energy Funding



Source: *Power Failure: How the World Bank is Failing to Adequately Finance Renewable Energy for Development*, p. 13, http://www.foe.org/camps/intl/institutions/renewableenergyreport10242005.pdf

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 these focus on renewable sources of energy, reflecting the view among many environmentalists and some development specialists that renewables provides a double whammy – avoiding greenhouse gas emissions and other environmental externalities, and often providing local jobs and more easily decentralized energy sources.[77] A few of the more notable undertakings include:

- The EU Energy Initiative for Poverty Eradication and Sustainable Development, launched at Johannesburg, to help developing countries to maximize energy efficiency and increase the use of renewable sources of energy.[78]

- The London-based Global Village Energy Partnership, also launched in Johannesburg, which aims to help developing countries establish energy action plans, and which brings together some 1500 energy SMEs and NGOs in developing countries with donors and providers of technical assistance.[79]

- The Renewable Energy and Energy Efficiency Partnership (REEEP), launched by the UK in August 2003 as a multi-stakeholder coalition that promotes renewable and energy efficiency systems. It 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 additional to the international secretariat.[80]

- REN21 - the Renewable Energy Policy Network for the 21st Century – grew out of the "Renewables 2004" conference in Bonn. Its 32-member Steering Committee includes representatives from governments, 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.[81]

- the Asia-Pacific Partnership for Clean Development and Climate, set up by Australia, China, India, Japan, 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 collectively comprise roughly half of the world's economy, population and energy use.[82]

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 $22 trillion needed in new energy investment by 2030 is almost certainly a gross underestimate, as the IEA does not assume the world will provide full access to energy services to the world's poor, does not account for the costs of adequately protecting the environment 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 woefully inadequate to provide energy security, address energy-related environmental externalities, protect human rights from violations during the process of extracting energy resources, and ensure that energy services are sufficiently available to the poor to meet the MDGs and other development goals. But it is not easy to put forward feasible recommendations for 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 inter-governmental organization, preferably one with teeth. Thus, for example, then-French President Jacques Chirac 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,"[83] which obviously would have significant implications for energy policy. Similarly, it has frequently 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. And the purpose of creating the IEF was to pull together all parties on energy.

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

> …the 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.[84]

Thus, it is not surprising that Chirac's repeated calls for a WEO have not been strongly endorsed by other major powers. Although more than 40 countries supported the proposal, the US, India, China, and Russia all expressed opposition. There seems little likelihood that the IEF, with its intense focus on oil and gas, could be expanded into a broader energy organization.

Even the prospect of IEA expansion 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 90-day oil stockpile, and concerns about the disruption to 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 the system runs to 16 pages of print – 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 US nor the EU is in a position to veto a decision requiring majority vote.[85] Because voting weights are calculated in part on the basis of oil consumption, the addition of India and China would put those countries' voting shares equal to or ahead of all other members except the US.

Conclusion: the Desirable and the Achievable

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 that 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 everyone's most fundamental interests were met.

It may, for example, be more effective to bundle climate change with broader energy issues, rather than 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 geostrategic, environmental (including non-climate change environmental) and development self-interest reasons than it is to persuade developing nations that they should bear a significant part of the burden of countering a climate change problem they had little part in creating. There is at least some hope that such major players as the US and China might be receptive to this broader approach. It appears overwhelmingly likely that the next US Presidential election will reduce if not eliminate US obstructionism on climate change issues, after which China will no longer be able to use US inaction as an excuse for its own non-participation in global governance efforts. And China's public statements on climate change indicate a rapidly growing awareness among Chinese leaders about the potentially disastrous impacts for China itself of global warming.

Already, energy policy is a central focus on such over-arching institutions as the G8 and the EU. With real political leadership from the US in particular, a broad global consensus on a more coherent approach to energy is not out of the realm of possibility.

It is more likely, however, that at least in the short term, improvements in energy governance will be piecemeal and incremental. Such improvements could make a real, if limited, difference:

- The World Bank could put its funding where its rhetoric has long been, with 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.

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

- The Joint Oil Data Initiative could be further developed, and could serve as a prototype for other systems to provide fully, timely, and accurate information on global energy markets.

- More effective diplomacy could help to entice Russia into a more constructive role in the Energy Charter Treaty and other international energy governance regimes.

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

These pieces still leave enormous gaps. There is still a need for full, timely, and accurate information on the environmental externalities resulting from various energy policies. There is still a need for a globally agreed system to develop redundant and therefore resilient infrastructure (pipelines, refineries, decentralized supply, etc.) for providing energy services. And most important, there is still a need for a meeting of minds to ensure that energy is conceived of as a shared interest rather than a 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. But if we redefine the energy problematique 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 shares mutual interests in the development of effective energy markets, coordinated policies on taxes and subsidies, effective responses to climate change, and serious investment in alternative energy technologies for developing countries to put them on sustainable path now rather than through retrofitting.

These are all obvious policy prescriptions, which are repeated in numerous reports. The world has taken at best baby steps in most of these areas. But we will never get beyond baby steps unless we develop far more effective institutional mechanisms.

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