

The Global Energy Regime

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This is the first draft of a paper that contributes to a larger project on the origins and effectiveness of global economic governance. This is but a recent step in a long and productive research program of political science in the study of international institutions (“regimes”) and their effectiveness as instruments of governance (e.g., Keohane and Nye, 1972; Krasner, ed., 1983; Koromenos et al., eds., 2001; Kahler and Lake, ed., 2003). This literature has struggled centrally with reconciling interests and anarchy in the international system. On the one hand, governments and their principals find many areas where they could gain from collective action, such as in the setting of banking standards, the regulation of pollutants, and the adoption of norms for protecting human rights. On the other hand, the institutions for facilitating a common effort are generally weak and the principals of self help apply to much of international relations. Within that larger debate, this paper explores the character and effectiveness of efforts at collective action on matters related to the production, trade and consumption of energy.

The field of energy-related international relations is a large one, encompassing not just the international trade in fuels (notably oil and gas) but also the global diffusion of energy

¹ DGV, SJ and NMV are at the Program on Energy and Sustainable Development, Stanford University. DGV is also Adjunct Senior Fellow at the Council on Foreign Relations in New York. This paper explores a hypothesis in all its dimensions and also the places of fit and discord in the historical record. As such it assembles disparate strands of thinking and analysis, represented here at a very early stage. It is part of the early exploratory stages of a larger project on the functioning of international institutions, led by Ngaire Woods and Walter Mattli. We thank them for comments on an earlier conceptual note. We also thank Kal Raustiala for joint work with DGV to develop the concept of a regime complex and apply it in a quite different area of international cooperation, the regulation of plant genetic resources (Raustiala and Victor, 2004). All errors of fact and interpretation, of which there are surely many, remain the sole responsibility of the authors. Draft 16 January 2006

technologies and practices. The regulatory rules include the various mechanisms at the International Energy Agency (IEA) initiated by oil importers in the wake of the Arab oil embargo for coordinating responses to interruptions in oil supply; the regime also encompasses the provisions in OPEC that aid coordination by oil producers. Those two oil-focused trading arrangements have formed the main (yet often conflicting) sets of rules in the regime (Mabro, 2005b). In recent years, rules have also been adopted in an effort to manage regional trade in natural gas—notably in Europe.² A large and growing body of rules has also been adopted to manage the variety of international externalities that arise from production and utilization of energy resources, such as acid rain and global warming. Efforts have also been made, so far with little effect, to tame the problems of internal governance in countries that suffer the “resource curse” arising from improper governance of their mineral riches (Mabro, 2005a). The spillover effects among the different rules have multiplied with the rising number and complexity of rule sets. While the original arrangements were largely contained within oil trading, the expansion to include environmental pollution and natural gas has created interlocking effects across all the primary fuels and energy carriers.

Though highly disparate, the varied regulatory activities are partially interlocking and, with time, have come to constitute a meaningful global regime for energy. In some areas the regime has a modest effect on behavior; in other areas it is weaker and ill-formed. Nonetheless, we advance the hypothesis that it is important to examine the regime as a single organism—a “regime complex” (Raustiala and Victor, 2004)—rather than only looking at the functioning of

² Most natural gas moves by pipeline and thus the trading patterns are fundamentally regional. That pattern is changing for gas with the rise of a global LNG market, but that has not yet spawned much regulatory response.

each individual elemental set of rules atomistically. By contrast, to date essentially all analysis of regulatory regimes on energy-related matters has focused on traditional regimes for which there is a single core set of rules, usually enshrined in a treaty or other formal agreement (e.g., Chayes and Chayes, 1995; Victor, Raustiala, and Skolnikoff, 1998; Weiss and Jacobson, 1998). With the modesty that should attach to an early draft on a woolly and complicated subject, we analyze the driving forces for that regime and its regulatory components.

In addition to arguing that a global energy regime exists, we also argue that it has emerged and evolved in a distinctive pattern. Most elements of the regime have arisen as a response to some widespread dissatisfaction with the status quo—such as the disruptions in western economies following the Arab oil embargo or the disruptions in expected revenues in OPEC members following the periodic collapse of their cartel discipline. The responses have been designed to rectify the dissatisfaction, often with no larger strategic vision or clear evaluation of whether the response will be effective. The architects of these responses put them into place and then learn from practical experience which arrangements actually affect behavior. They also learn about conflicts between regime elements, and much of the evolution in the regime occurs through the process of resolving those conflicts at the “joints” of each rule set. We suggest some key areas and periods where this bottom-up and joint-focused style of evolution has occurred in the regime complex for energy, and we suggest that this may be a normal pattern for evolution of complex and far-reaching rules in an autarkic world where no state or actor can pursue a single strategic vision.

While our focus in this paper is on the rules, we also consider two other factors that exert a large influence on the capabilities and interests of key actors in the regime. First is the control over primary energy resources, notably oil and gas. Over the last 50 years that control has shifted, and so has the structure of the international oil and gas trading relationships. Where oil and gas resources used to be controlled by a small handful of companies operating worldwide that largely served the interests of energy-importing nations, since the early 1970s through nationalizations and accidents of geology those resources now lie mainly in the hands of national oil companies (NOCs) that are controlled by illiberal states. These states have gained immense wealth from their control over these resources—not just from the sheer value of the resource but also because their illiberal character has allowed them to coordinate the development and marketing of energy resources in a way that liberal democratic states would find exceptionally difficult.

The second broad factor that is affecting the evolution of the energy regime is the modernization of the economy. This broad trend has affected the interests of key actors in three ways. First, it helps to explain a general decline in sensitivity to energy prices among the most advanced industrialized nations. While total consumption of all major primary sources has increased, the economy has become much more efficient and flexible in utilizing energy in the production of income. As economic sensitivity to oil shocks has dampened so has the interest in collective action to organize an effective response. Second, economic modernization has favored electricity as an energy carrier, which has led to a bifurcation in energy systems—with oil concentrated increasingly for transportation (where it has no significant rivals) and other energy sources (including oil) for the generation of electric power, where the existence of rivals has

allowed for competition and the concentration of power plants allows for relatively easy control of environmental emissions. Third, the rise in wealth and shift to services (away from manufacturing) that accompanies economic modernization has sharply increased the demand for environmental protection and the availability of resources to spend on fixing such externalities of energy systems.

We will consider these two factors—the control over resources and economic modernization—in the opening two sections of the paper, to offer a framework for understanding the interests that give rise to the energy regime. In the subsequent section, the paper’s most elaborate, we examine the origins, evolution and operation of the regime complex itself—starting with the responses to the Arab oil embargo and then extending to the present day arrangements that include rules on environmental issues as well as regional regulatory systems.

I. The Control of Resources and Markets

Until the early 1970s there was little sustained concern about the formal international regulation of energy markets. Only in the area of nuclear power, the first globally managed energy technology, did the major powers establish an institution (the International Atomic Energy Agency, IAEA, formed in 1957) whose original purposes were to advance a technology and apply some highly limited safeguards against its misuse. The energy business, for the most part, was autarkic.

The lack of much regulation, in part, reflected that the vast majority of energy consumed for all purposes was also produced within the borders of the key nations that had the authority to establish an international regime. Until the 1970s there was almost no international trade of coal and natural gas. A few electric systems relied on uranium, much of it supplied either locally or through bilateral arrangements with some oversight from the IAEA.

Of the major fuels, oil was the only one traded internationally in large quantities. Yet there were no sustained pressures to regulate the flow of oil. The exporting countries that were the largest sources of oil were focused on extracting rents through the production agreements they had with producer firms, not the larger and more daunting task of manipulating the oil trade itself. The importing nations benefited from the fact that most oil trade was controlled by several large integrated international oil companies—all of them western in orientation and some actually owned by important western governments. Although dependence on imported oil was high—notably in some countries, such as Britain, France, Germany, Italy and Japan that produced essentially none of their own—there was no organized pressure for collective action to reduce vulnerability in case of an interruption. Such concerns were academic except in wartime (during which formal regulatory regimes probably would be ineffective anyway). Moreover, the two countries that exerted the greatest influence on the international system—the United States and the Soviet Union—did not have much incentive to pursue regulation. In 1970 the United States produced three-quarters of the oil it consumed and, more importantly, the dominant factor in setting U.S. oil prices was the decision-making by the Texas Railroad Commission. Spare capacity in the U.S. meant that prices formed, in effect, within the U.S. rather than on the global

market. The Soviet Union pursued an autarkic policy and was a small net oil exporter (mainly to other states in the Soviet sphere).

By the end of the 1970s the control over resources had clearly shifted. Geological depletion had reduced the capacity of the U.S. to rely on its own production and its own regulators to set prices. The central role of the Texas Railroad Commission on U.S. prices had effectively disappeared by 1971 with the full utilization of U.S. oil production capacity. U.S. production of oil peaked in 1972 and has declined substantially since then.

Even as oil production within the territory of western nations stagnated, total consumption continued to rise as oil occupied a greater role throughout the energy system. Not only was it prized for transportation, but in nearly all OECD nations oil also accounted for a significant share of electricity production. In many, oil was also used for heating and to this day is used as a petrochemical feedstock. To fill the shortfall, western countries increasingly relied on imports—notably from the Persian Gulf (Figure 1).

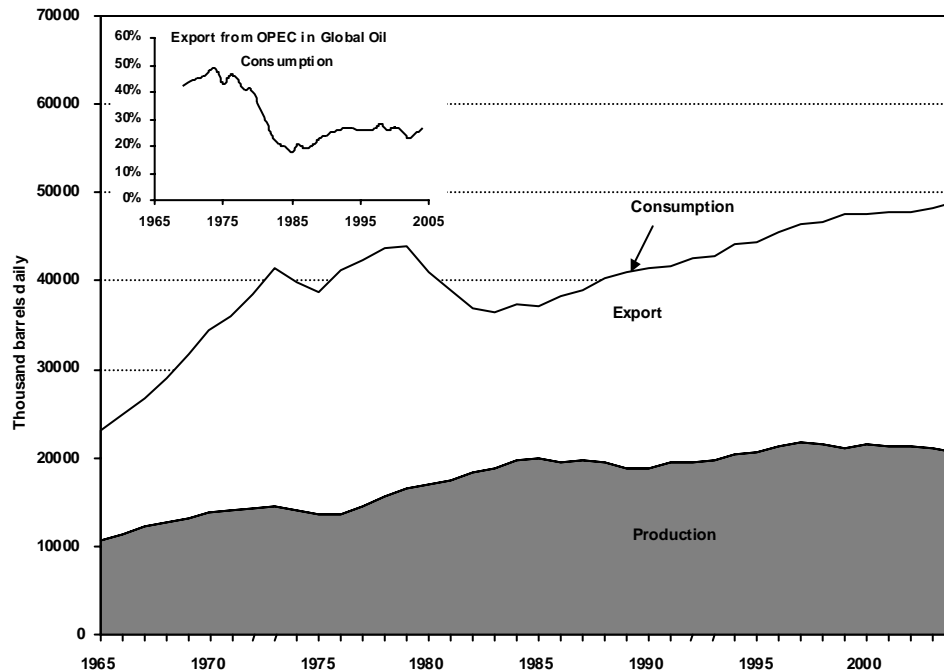


Figure 1. OECD Countries Oil Production, Export and Consumption in 1965-2004. Inset: share of OPEC exports in global consumption. Sources: BP (2005), OPEC (2005)

Those same nations that accounted for a growing share of world oil supply pursued a series of nationalizations that were the culmination of a long series of efforts by these host governments to shift a larger fraction of the rents into their coffers and away from the western oil firms. Those efforts included forced renegotiation of royalty arrangements, reductions in allowable cost sharing, and eventually nationalization. In the 1960s most of the countries of the Middle East created NOCs; as Arab nationalism began to gain ground, there were growing calls to nationalize the concessions held by western companies. By 1976, the host governments of the region (through their NOCs) had taken control of essentially all the oil operations within their boundaries. The state now dominated the sector although in some cases foreign companies continued to play a role, usually in service of the NOCs. The nationalizations not only reflected these countries' desire to maximize rents but also to gain more direct control over investment and operational decisions. At the same time, direct control greatly reduced the problems of

implementing government policy since state-owned companies were less likely than private enterprise to escape the watchful eye of their governmental masters.³ The effects of these nationalizations are evident today, where roughly three-quarters of oil reserves are under the control of national oil companies (Figure 2)

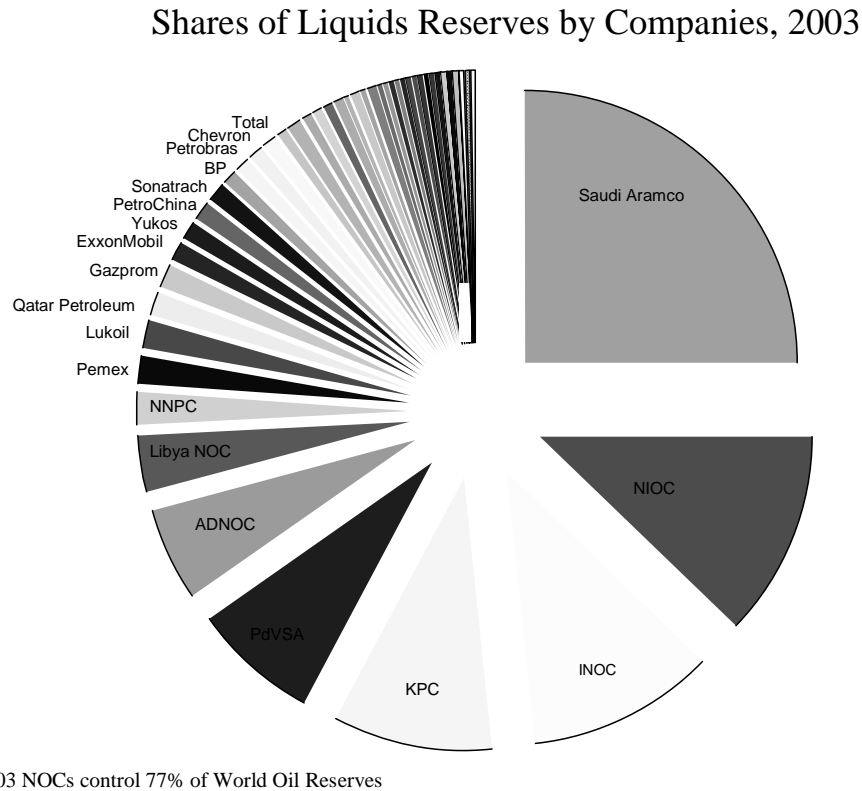


Figure 2. Shares Of Liquid Reserves ordered by controlling firm, 2003. Data Source: Energy Intelligence (2005)

During this same period some entrepreneurs in these states explored the prospects for a cartel, but oil exporters had neither the leverage on the oil market nor the cohesion as a bloc to

³ To be sure, the many national oil companies (NOCs) created during this period were quite varied in their features, and with time they have become more diverse still. Moreover, as these companies developed their own identities and responsibilities and strategies their interests, in many cases, have diverged from those of their owner government—becoming states within the state. The problem of oversight of state enterprises is a large and complicated subject. Here we are making just the simpler point that host governments thought (and in most cases they were correct, at least initially) that state ownership allowed for easier control.

exert a strong influence on the market. Only in the early 1970s could the cartel substantially alter world prices, which was the combined effect of OPEC controlling more than half of world production along with the politically galvanizing event of the Yom Kippur war, which focused the Arab members of OPEC on the need for a collective response. The success of their cartel action (measured as a sharp rise in price and as a political effect in the west) focused subsequent efforts to hold the cartel together as a permanent and effective body.

Importing nations, obviously, viewed their interests quite differently. The nationalizations had caused some alarm because assets had been expropriated, which has proved to be a generic risk for all place-specific capital investments (Vernon, 1971). The risks of insecure supplies were not salient, however, until the Arab oil embargo. The shock caused higher prices and economic damage and became a central concern of economic and physical security.

Thus the fact of the influential Arab oil embargo elicited two quite different responses that corresponded with the different interests and capabilities of the importing and exporting nations. For importers the response was to devise mechanisms that would make it easier to deter and absorb such shocks in the future since, geologically, these nations did not have the capacity to leverage supply directly. (All the importers also invested in programs to control demand, notably through boosting efficiency. The market, itself, also delivered an incentive for frugality through higher prices. But essentially none of these demand measures was the result of international coordination—all, rather, were in the self-interest of importers who faced high fuel

bills and required no overt coordination.) For exporters the response was to attempt to make the influence discovered during the Arab oil embargo into a permanent feature of the oil market.

II. The Origin of Interests

Thus the provisions for regulating the trade in energy—oil, in particular—arose in response to how exporters and importers saw their interests affected by the changing control over mineral resources. Before we turn to the particular regulatory arrangements that were adopted we must consider the origin of interests and the mechanisms by which they have changed over time. Those interests, in turn, inform the design and operation of the regime. In this draft we focus on factors that affect principally the interests of high-income energy importing countries.

Our argument is that the interests and favored regulatory instruments are a function of strong forces that are internal to the organization of the society and the way that its economy uses energy. We focus on four factors.

First, nearly all of the key energy-importing countries are liberal democracies. They have organized their economies essentially through market principles, although the embrace of the market has become much stronger over the last decades. The fundamental origins of that market embrace are not important for our argument (e.g., Fukuyama, 1989). This mode of economic and political organization matters because it has conditioned importing countries to seek market-compatible responses to their energy insecurity. Faced with the OPEC challenge, they have not

sought to erase the commodity market for oil. (By contrast, today China is trying to do just that with the present state-sponsored efforts to acquire equity stakes in oil supplies.) The democratic orientation of these countries has also meant that they are exposed to political forces that organize outside elite channels—including environmentalism, which we consider in more detail later.

Second, all of the growing liberal economies have shifted from heavy industrial manufacturing, an energy-intensive activity, to lighter industrial activity and services that are much more efficient in their use of energy (and other material inputs) for creating economic output. This shift has arisen as the normal byproduct of the search for comparative advantage and has accelerated with the opening of economies to competition through trade and investment. Today commentators usually call these wealthy liberal economies the “advanced industrialized nations” when, more accurately, they should be called the postmodern countries because their economic output most fully embraces low-material services (Bell, 1973). In addition to this structural shift in economic output, open economies have generally become more efficient although the rate of change in efficiency has varied substantially with the cost of energy. Over the last half century most OECD nations have reduced their energy intensity (i.e., energy required per unit of GDP) about 1% per year. For the two decades that followed the first and second oil shocks of the 1970s that rate of improvement jumped to about 2%. The energy system can change, but slowly with the turnover of the capital stock.

The net effect of these forces—structural change and efficiency—is that oil intensity of all the major oil consuming nations has declined by about half since the first oil shock; in effect,

these economies are much less vulnerable to abrupt changes in price (Figure 3). They remain vulnerable to rigidities in the mechanisms by which revenues from sharp price changes get recycled; with the liberalization of financial markets that vulnerability has declined as well. This decline in vulnerability explains the less panicked response to the recent rise in energy prices when compared with the earlier rises of the 1970s.

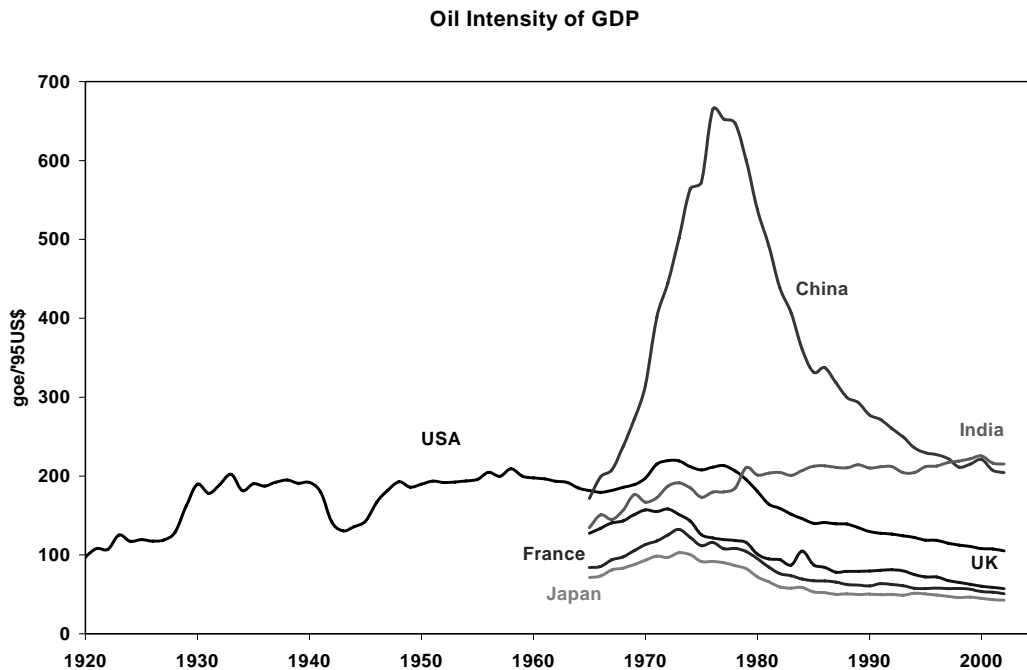


Figure 3. Oil Intensity of GDP in China, India, Japan, France, UK and USA. Units are grams of oil (goe) per US\$ in constant 1995\$ converted at market exchange rates. Sources: EIA (2005), BP (2005), WB (2004)

Third, all economies—whether state planned or liberal—have become highly electrified over the last century. In 1900 practically none of the primary energy used in the United States was converted to electricity before final consumption. In 1950 the fraction stood at 14%. Today, about 40% of primary energy is consumed in the electric sector (Figure 4a). Most other advanced industrialized countries have seen similar patterns of electrification (Figure 4b). The

flexibility of electricity as an energy carrier, the substantial improvement of electric technologies over the last century, and the need to achieve zero levels of pollution in the compact living of cities and industrial complexes—where an increasing fraction of people and economic activity are found—all explain the seemingly inexorable shift to electricity. Central planners also saw the benefits of electrons and power grids for organizing the modern industrial economy. Lenin famously proclaimed “Communism is Soviet power plus electrification of the whole country.” H.G. Wells branded the vision a utopia, but Stalin’s Soviet planners delivered the promise—building in the 1930s, for example, the world’s largest hydroelectric plants. The Soviet approach to electrification extended that imprint to most other centrally planned systems in the Soviet sphere.

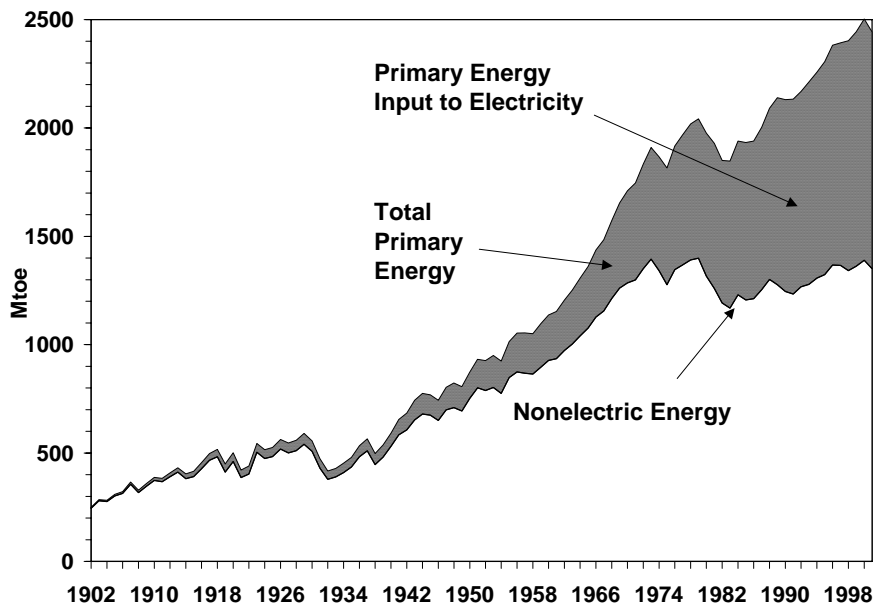


Figure 4a. Primary energy consumption in the United States and the amount converted to electricity prior to final consumption, 1902-1999. Sources: Mitchell (1993), U.S. Department of Commerce (1975), and IEA (2000)

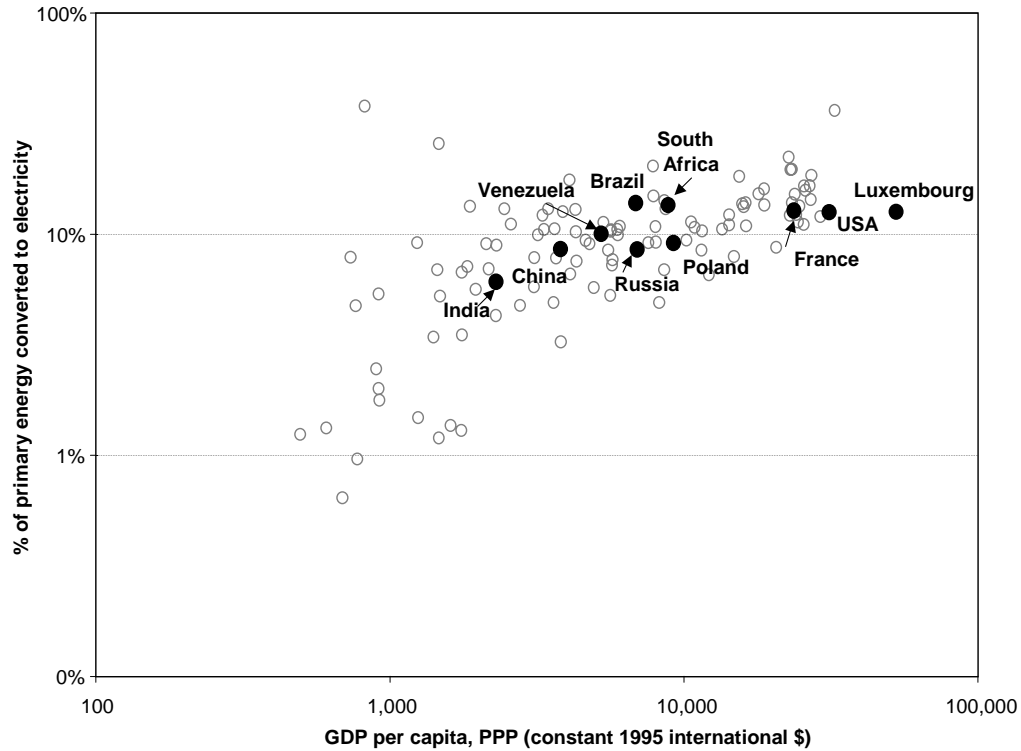


Figure 4b. Share of Primary Energy Converted to Electricity as a function of GDP per capita for Various Countries in 2001. GDP is in constant 1995\$ converted by purchasing power parties. Source: World Bank (2004)

Electrification matters because it has forced a radical change in the way that primary energy is used in the economy. In much of the world, a substantial fraction of electric power had been generated with oil until the high price of oil, starting with the 1973 oil embargo, forced its concentration into areas of highest value. Thus today oil is used predominantly in transportation where its high power density and liquid form make it unrivalled in service. And other primary energy sources concentrate in electric power. Natural gas has become the bridge between the two since the few areas where oil is used outside transportation it competes on the margin with gas, and thus gas prices track oil. Today, most economies—and the world as a whole—are dominated by oil and gas (Figure 5).

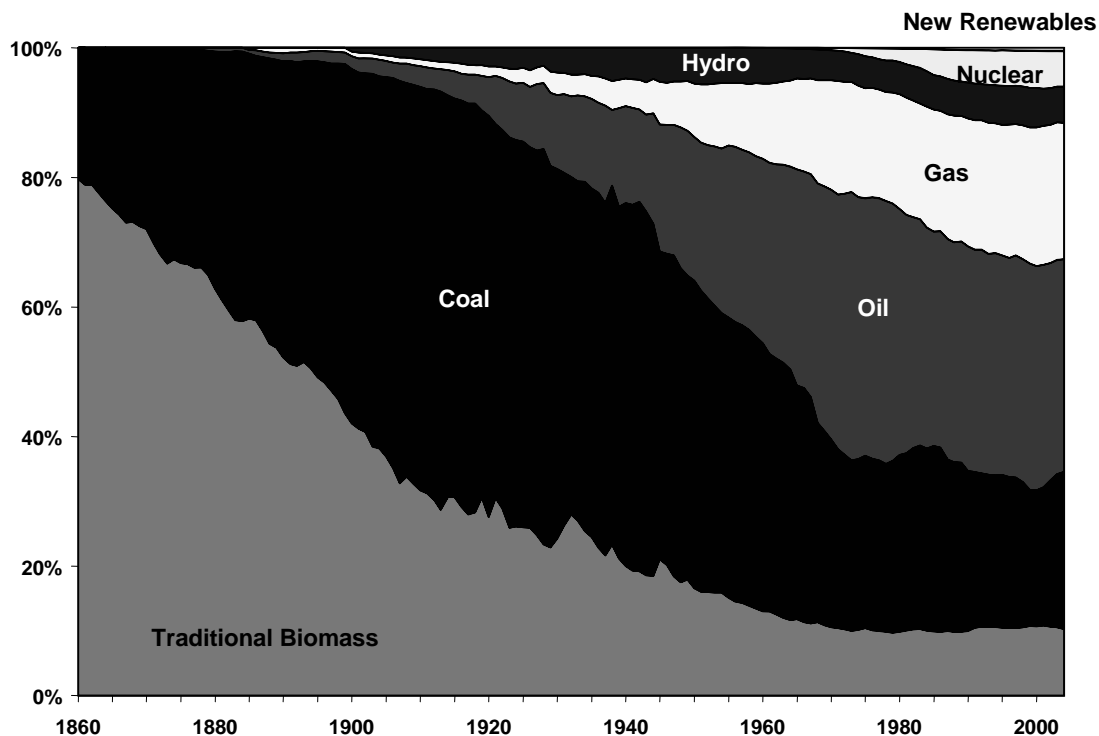


Figure 5. World Primary Energy Consumption by Fuels, 1860-2003. Sources: IIASA (1998), IEA (2005)

The growing dominance of liberal democracies has also contributed to a fourth driving force—the rise of environmentalism. Although partly a backlash against the extremes of unchecked energy systems—London’s “killer smog” of December 1952 earned its moniker—the driving forces of environmentalism have been wealth and freedom of association. Wealth has afforded a range of concerns beyond immediate survival, and at higher incomes the amenity of environment has been valued as well. This wealth phenomenon is evident nearly everywhere, and there are strong learning effects that have accelerated the embrace of environmental protection. In the U.S. environmentalism gathered steam in the 1960s when average per-capita incomes were about 14,000 USD/capita (in 2000\$). Today the main urban areas of China are pressuring government to invest in environmental protection although per-capita incomes in

these centers are perhaps one-third that of the U.S. in the 1960s and the nation's per-capita income overall is barely \$1000.

Wealth alone does not create investment in environmental protection. The opportunity to organize public concerns is also important. To the extent that societies invest broadly in environmental cleanliness—and especially in environmental protections whose benefits are distant in time and place—the pressure to do so often arises from the broader public. The absence of those public pressures helps to explain the lack of Soviet investment in environmental protection, except where it coincided with the interests of the Soviet state. The Soviet Union participated centrally in the efforts to manage transboundary air pollution in Europe because the issue mattered for western states who, in turn, made certain trade and diplomatic benefits for the Soviet Union conditional on participation (Levy, 1993; Darst, 2001). Only with the liberalization that has accompanied the post-Soviet era has Russia invested more heavily in environmental amenities, but those efforts have been halting with the uncertain prospects for environmental NGOs and have been concentrated in highly visible urban areas where high incomes and concentration have created additional interest in protecting the environment. In China, growing investments in environmental protection reflect not just the backlash against horrendous environmental practices of the past but also the relative freedom of association that is afforded to environmental groups (Economy, 2005). In India, despite low incomes and exceptionally bureaucratic government, environmental groups flourish and are effective in mobilizing political pressure for environmental policies and also using the courts to impose change.

In short, with higher incomes—along with learning effects and some freedom of association—governments have come to include environmental issues in their priority of interests. In nearly every society, environmental investments concentrate initially on acute and local problems and then, with wealth and experience, extend to problems of longer time scale and broader geography—including international environmental problems. These forces explain how environmental externalities have become part of the regime complex for energy.

III. The Regime Complex for Energy

Now we turn to the regulatory response. Our argument, in brief, is that so long as western-oriented companies controlled the supply of oil, worries about supply interruption were hypothetical and there were no significant collective efforts to regulate the international market. The oil companies, themselves, played the central regulatory roles through their control over the pace of investment in oil production capacity and, as integrated firms, their control over the transport and marketing of crude oil and products. In most retail markets the price of final products was, in effect, regulated by national (or subnational) governments according to local preferences and without any international coordination. Insofar as there was an international price at all it was formed principally through the operation of the U.S. market (which imported about 35% of the oil it consumed in 1970). Yet in the United States until 1971 the price arose through decisions of local regulators (mainly the Texas Railroad Commission, which controlled the utilization of spare capacity with the goals of dampening volatile prices and preventing oilmen from driving each other out of business). Western importing countries could pretend to

believe in a laissez faire approach to oil trading because, in fact, trading relationships were highly specified. Exporting countries could pretend to be maximizing their share of the rents from their mineral resources because they each pursued an autarkic policy of squeezing outside investors. Beyond oil, there was almost no international trade in primary fuels. Vulnerabilities, if they arose at all, were matters of internal policy.

The regime complex for energy initially arose in response to the sudden realization of the shift in power that arose with concentrated control through nationalizations in OPEC and rising imports in the West. Those imports, in turn, were the result of many factors including geological depletion, economic growth (which spurred demand for fuel), and low oil prices that discouraged investment in supply and did not reward efforts in efficiency and conservation.⁴ It consisted of two quite different visions for the order of energy trading—what we will call “master rules.” On the one hand, OPEC’s members sought to extend a world in which it dominated a structured market and behaved as a cartel. On the other hand, importing countries sought to protect themselves against the vagaries of uncertain supply. In the next two sections we discuss each of these two regulatory efforts—“elemental regimes”—and then we examine how those regimes have interacted and evolved. While the elemental regimes, themselves, have changed (e.g., OPEC has changed its methods of coordination and enforcement), the main effects of the regime

⁴ The full story of low production in the West is more complicated than we portray here. For the U.S. the dominant effect was depletion of already well-explored areas. (New areas of production, notably the Gulf of Mexico and Alaska, later partly offset this depletion.) In most of the rest of the West the dominant effect was the lack of incentive to explore for oil. Britain and Norway, both major producers today (accounting for more than 5 million barrels per day of production in 2004, which is roughly equal to the exports of Iran and Venezuela combined), had essentially zero production in 1970. Nationalizations in the Persian Gulf focused importing governments as well as multinational oil companies on the need to find new reserves, with the North Sea production as one of the starkest outcomes from those new incentives.

complex are found in how incongruities at the joints between the rules of the different elemental regimes have been ironed out.

International Energy Agency (IEA)

The IEA formed in 1974 largely in response to the industrial countries' perceived vulnerability to the organization of oil producers in the aftermath of the 1973-1974 Middle East War. Leveraging the "seller's market" of the time for economic and political objectives, oil-exporting Arab nations began in October 1973 to reduce oil production from 20.8 mbd to about 15.8 mbd (Scott 1994). Predictably, this shortfall in supply depleted spare capacity and oil prices rose to about 400% above previous levels. The major industrialized nations each scrambled to secure their own supply.

Leaders of industrial countries soon realized that international institutions were under informed and ill-equipped to effectively address these countries' new vulnerabilities. In the early 1970s the OECD was principally responsible for economic crises faced by industrialized markets in Europe, North America, and Asia. The OECD systems that addressed energy concerns however the lacked the agility to enact a timely response to an oil supply shock. While the OECD's Oil Committee and Energy Committee had in place an oil apportionment mechanism to address energy emergencies, these measures required unanimous support to be activated – a burdensome provision.

The U.S. initiated the creation of a more effective collective response. It convened (in February 1974, four months into the oil shock) a Washington Energy Conference. Later in 2004, representatives from seventeen oil-consuming countries as well as the OECD and the Commission of the European Communities convened in Brussels to follow-up the initiative and lay the groundwork for what became the IEA.⁵ The Agency was established with the mandate to promote international co-operation on energy matters, institute emergency provisions, and promote research and development. It is an inter-governmental institution, led by a Governing Board (consisting of energy officials from member countries) and staffed with a well-regarded professional secretariat whose principal tasks involve collecting and analyzing energy data and assessing the domestic policies of member countries.

The IEA represents a departure from its predecessors within the OECD in its emphasis on oil supply disruption preparedness. In reaction to the 1973-1974 oil crisis, the OECD's oil committee attempted to facilitate the exchange of information and some coordination among its members, but these efforts were ineffective and pointed to the need for a larger and stronger coordinating infrastructure; in 1974, the committee recommended an agency catered to implementing emergency sharing be created. Established within the IEA is the International Energy Program, which requires member countries to maintain at least a 90-day reserve stockpile of oil at all times and implement specific energy conservation measures in the event of an oil shock. The Program stipulates that if any IEA country's oil supply falls by more than 7%, an

⁵ In November 1974 (after substantial debate over its functional relationship to the OECD) the Agency was "established as an autonomous body within the framework" of the OECD.

emergency sharing system would be enabled. The IEA has also aimed to encourage petroleum production within its member countries through the implementation of price floors (Morse 1986). The efforts to alter prices have had no apparent effect on oil markets; the mechanisms for coordination of IEA member decisions have had some effect at crucial times. The requirement to hold stockpiles has probably exerted a deterrent effect that has calmed the markets at some times, although such effects are difficult to measure and some observers claim that those stockpiles have been worthless (Taylor and Van Doren, 2005).

The IEA's coordinating mechanisms were in place by 1978, and their deficiencies were immediately exposed in the 1979 oil crisis. In January of that year, Iran halted oil exports and world prices doubled (Keohane, 1984). Regardless of the IEA's requirements for coordination, importing governments responded much as they did during the first oil shock. The IEA did allow its emergency sharing system to be activated, but changing stock levels and poor data made it difficult to detect the 7% threshold. Governments did not coordinate their responses. Some withdrew from their stockpiles while others added to stocks (which exacerbated the shortfall). The U.S. didn't even have pumps installed to access its stockpiles. The IEA enacted a policy that required its members reduce imports by 2 million barrels per day (Keohane, 1984). Absent any enforcement mechanism, however, imports into IEA countries actually increased. The IEA was able to learn from its mistakes, however, and when the war between Iran and Iraq broke out in 1980, the Agency immediately scheduled routine meetings. This time, instead of focusing on restricting demand and setting import targets, the Agency concentrated its efforts on coordinating its members' use of oil stockpiles. Here, the IEA was effective in lowering stocks and acting decisively in preventing traders to bid up oil prices (Martin and Harrje, 2005).

In subsequent crises the IEA generally has been more effective—partly because it has learned where it can have leverage, partly because it has learned to work with OPEC, and partly because more recent crises have not been as disruptive as the 1970s oil crises. During the first Gulf War, the IEA promoted transparency in the oil markets and also notably worked closely with the Bush administration to facilitate increases in production. More important than the IEA's efforts was bilateral pressure from the U.S. on Saudi Arabia to boost supplies. In January 1991, the Agency activated its plan to begin drawing down oil stockpiles in Germany, Japan, and the U.S. While the oil price initially increased dramatically, markets quickly returned to normal as a prompt end to the war became widely anticipated.

In September 2005, Hurricane Katrina unexpectedly reduced Gulf Coast oil production by 89% in just a matter of days. The IEA immediately coordinated efforts by its member nations to increase oil production by 2 million barrels per day for the next 30 days. Coordinating with the IEA, the U.S. released for sale 30 million barrels of oil from its Strategic Petroleum Reserve (SPR) and loaned 9.1 million barrels from the Reserve to oil companies (EIA 2005). As the markets calmed, some of the SPR oil remained unsold. More important than the effects on crude markets was the disruption to oil products. (Many key U.S. refineries are located on the Gulf Coast in Katrina's path; at this writing they are still not fully restored.) The IEA played a modest role in facilitating the export of products to the U.S., although without the IEA the outcome probably would have been the same.

OPEC

The Organization of Petroleum Exporting Countries (OPEC) came into force in 1960 when Iraq convened representatives from Iran, Iraq, Kuwait, Saudi Arabia, and Venezuela to discuss cooperative oil production strategies. While throughout most of the 1960s OPEC enjoyed only modest success in manipulating oil prices, the member countries increased cooperative efforts in research and economic planning. By 1969 these countries had realized the potential benefits of coordinating output and thus utilizing the “oil weapon.” Leveraging their cartel power, the countries began designating prices without first negotiating with oil companies. Throughout the 1970s and 1980s, OPEC was successful in systematically increasing oil prices and thus slowing overall growth in industrialized nations (Figure 6).

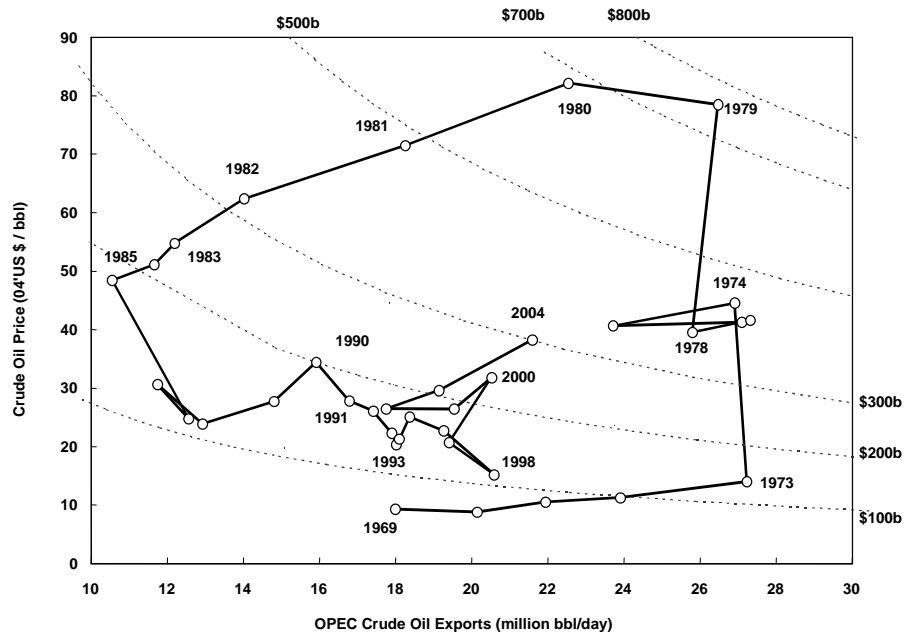


Figure 6. Crude Oil Price versus OPEC Crude Oil Export, 1969-2004. Isoquants show constant export revenues in billion 2000US\$. Sources: OPEC (2005), BP (2005)

Today OPEC has 11 members, supplies 40% of the world's yearly oil supply, and sits on 75% of the world's proven oil reserves. The cartel's market share is expected to increase over the next few decades as non-OPEC sources of oil mature, extraction costs increase, and demand increases. However, the cartel has suffered its share of internal weakness and strife. Compliance among OPEC members has been difficult to enforce, informal alliances have formed within the cartel, and cheating and squabbling are not uncommon. In many instances, target prices and quantities are highly politicized and have little to do with market conditions. OPEC's instruments of market manipulation are imperfect as well. Supply cuts have not always resulted in expected price increases as energy efficiency, oil-intensity, and climate change concerns have become a priority for much of the industrialized world, and as new reserves have been discovered in non-OPEC countries such as Russia and Kazakhstan. OPEC relies on tacit coordination with non-OPEC nations (e.g., Russia and Norway), but leverage over decision-making in those countries (and in OPEC's members as well) is highly imperfect.

Early evidence of OPEC's lack of internal discipline came in 1982 when the cartel attempted to arrange output restrictions following weak global demand and a drop in oil prices. Meeting in Qatar, OPEC members determined their production should not exceed 17.5 mbd and assigned quotas accordingly. However, several players including Iran, Libya, and Venezuela refused to accept the quotas or failed to implement them; working around the quota system they used a variety of mechanisms such as disguised credits and bartering. This resulted in a two-tiered system where OPEC's cohesion, when it existed at all, relied on the actions of a central group of quota abiders while violators enjoyed a free ride. Ultimately, the difficulties in setting and implementing quotas forced OPEC to lower its official price. However, even this compromise was impossible to sustain because it relied on Saudi Arabia to carry heavy losses for

the benefit of the larger cartel. Saudi Arabia backed out, and the agreement collapsed, when it became clear that it would not be compensated for its losses (Parra, 2004).

Despite the many examples of OPEC's awkward coordination, the cartel has endured through its members' shared interest in economic stability and high export prices. OPEC, however, has not been immune to the forces that have arisen within its key members and caused instability. Through the late 1990s key OPEC members were opportunistic—adding exports to the world market in an effort to boost their share while also driving the price to historic lows. All oil exporting economies suffered greatly. By 1998, as oil prices dipped below \$10, even the industrialized world became concerned that OPEC nations' difficulties would adversely affect the world economy; the periodic musing about the political collapse of the Saudi regime reached a fever pitch. The Russian government, dependent on hydrocarbon exports, defaulted on its debt. Within a few years the pendulum has swung the opposite direction—also for reasons outside OPEC's influence. Demand for oil has risen steadily (especially in the recovery following the Asian financial crisis). And shifts of political power, notably in populist Venezuela, advocated stronger national control over oil resources and a much more politicized process of setting quotas and manipulating prices. These factors, along with uncertainty created by fresh conflicts in Iraq and growing isolation of Iran, boosted prices to historic highs. OPEC's official price bands followed the rise; OPEC had little to do with the change although it has played some role in sustaining the high prices once they were realized. High prices also stem from factors internal to OPEC members and to the geopolitical neighborhood of key oil supplies—factors that OPEC itself is unable to influence. These include the organizational difficulties in mustering and

applying the resources needed for additional investment in key supply areas as well as the severe geopolitical uncertainties in the Persian Gulf.

Evolution at the Joints: IEA, OPEC and Tacit Cooperation

At the time that these two elemental regimes emerged it was hardly clear how the world's energy markets would be ordered. OPEC had a substantial share of world production (about 50% in 1975) and with time controlled nearly all the spare capacity in the market (Energy Information Administration website). Yet most of the market was still contestable and OPEC itself faced enormous difficulties in arriving at a coordinated cartel-like response and in policing its members. Similarly, the open market philosophy of western importers was not a reality within most of the western markets themselves. Most of these governments intervened heavily in their oil markets, especially in times of crisis, and the mechanisms for coordination performed generally poorly. The two master rules were in direct conflict, and it was hardly clear whether either group of countries could realize its objectives through the regulatory regimes that they established.

The remedy to this conflict can be found by looking at how both groups of countries—OPEC and the West—changed internally and at how the conflict between their two elemental regimes was resolved. Internally, the western countries invested heavily in energy efficiency and also, partly independent of actions in the oil market, restructured their economies to make them more flexible and market-oriented. Across the economy price controls and quotas were

largely dismantled, including those on energy. This higher efficiency and flexibility conferred much greater implicit power on oil-consuming nations because it made them more resilient to shocks. This market approach, however, also limited the ability of western governments to intervene (even strategically) in the operation of the oil markets.

Members of OPEC and the IEA discovered areas where interests overlapped and where the conflicts between the regime elements could be accommodated. For western importers what mattered was a scheme that assured the steady supply of oil at prices that were not too volatile. For exporters what mattered was the ability to curtail supply sufficiently to lift prices while not unraveling the ability of OPEC's members to make collective decisions nor evoking too vigorous a retaliation by users. The result was prices that were moderately above those that would have arrived from an open market—except for brief periods when crisis produced expected shortages (e.g., the first Gulf War) or failures of OPEC to agree on a common strategy (e.g., the middle 1980s and again in the late 1990s).

The two elemental regimes, although they formally embraced quite different master rules, co-existed through tacit cooperation and occasional jawboning. As recounted earlier, prior to the first Gulf War, the IEA and its members worked directly with key OPEC suppliers to deliver additional production to the world market. In the early months of the current runup in oil prices, the head of the IEA worked informally with OPEC to expand production and temper prices; key importing governments, notably the United States, did the same.

The Regime Complex deepens: regional integration and the Energy Charter Treaty

So far, we have examined rules that operate at the global level and affect the oil markets. The regime complex for energy also has deep roots in some regions, notably in Europe where there is the longest history of policy coordination on a wide range of topics and also where traded energy plays a particularly large role. These efforts began in a way that has had little formal relationship to the global energy regime. Only through other regulatory rules—notably those on the environment, which we examine later—have these regional and global arrangements become more closely interconnected.

Signed in December 1994, the Energy Charter Treaty (ECT) sought to establish greater economic cohesion and cooperation on energy matters throughout post-Cold War Europe. It was conceived at a time that many European institutions were branching eastward—in an effort to bind the post-Soviet states to the West through investment, common infrastructures and economic growth. Energy had a special role in this process because from the early 1970s western Europe had become highly dependent upon imports of Russian gas. In practice, the Soviet Union had been a highly reliable supplier of gas, and cold war fears (raised especially in the United States) that Soviet gas would be a sword held over Western Europe’s security were never realized (Stern, 1993; Victor and Victor, in press). But the sudden appearance of “new” countries along the transit routes—notably Ukraine—created uncertainty about the reliability of Russian supply. As if on cue, in the fall of 1995 a contract pricing dispute with Ukraine resulted in gas shortfalls in the West. The Treaty entered into legal force in April 1998 and has to date been signed by fifty-one states and the European Communities. Ultimately, the ECT imposes

obligations on all contracting states that provide an international legal framework for a more secure energy-investment environment. Broadly, the Treaty addresses five areas of cooperation among its contracting parties: investment, trade, transit, energy efficiency, and dispute settlement. The treaty requires the contracting parties afford one another “non-discriminatory” favorable nation treatment and institutes bilateral investment protection rules for existing investments. A follow-on Supplementary Treaty is currently being discussed and would extend these obligations to “pre-investment” negotiations. The Treaty’s Trade Amendment promotes trade liberalization through rules similar to those practiced by the WTO, but concerning only energy-related imports and exports. This Amendment seems useful principally to those parties who are not presently WTO members, which is a shrinking set, and in any case the WTO rules regarding energy trade are practically nonexistent.

It is difficult to assign much effectiveness to the Energy Charter Treaty. In areas where rules governing the export of gas have had some effect it is not because of the Energy Charter Treaty but, rather, because of the emerging EU rules on a common gas market. Where those rules have been weak it has been due to political compromises within the EU rather than any feature of the Energy Charter Treaty. Similarly, there has been a significant rise in investment in the former centrally planned nations of Eastern Europe and the Soviet Union. But the patterns of investment reflect mainly private investor assessments of risk that have not been altered by the presence of the Energy Charter Treaty. Some government-orchestrated investment has taken place, but most of that has arisen through the European Bank for Reconstruction and Development (EBRD) or bilateral lending and grant programs (e.g., German investment in Ukraine’s gas infrastructure) rather than the Energy Charter Treaty. Even on the focused issue of

transit risk—a topic on which the parties are presently negotiating a special protocol—it is hard to see the Treaty having much influence over geographical facts about the location of pipelines and the power conferred upon a transit country. The key country in energy trading relationships, Russia, has not even ratified the treaty.

We see the Energy Charter Treaty as an example of the kinds of aspirational agreements that are often negotiated in response to a particular problem (in this case, the problems associated with securing energy supplies and also promoting investment) while not embodying a strategy for leverage. The IEA began as such an institution and evolved with experience to play a critical (if limited) role in affecting behavior. In the IEA's case, the urgency and persistency of the underlying problem forced the search for effectiveness. In the case of the Energy Charter Treaty the problems are perennial and rarely acute; one of the key participants (Russia) refuses to cooperate; and other stronger institutions (notably the EU) are available to perform many of the needed functions.

Regional Integration and NAFTA

A second regional effort—geographically removed from the Energy Charter Treaty—is the 1992 North American Free Trade Agreement, which entered into force in 1994 and aims to foster trade between Canada, Mexico, and the U.S. The Agreement proscribes import fees, quotas, and minimum or maximum export or import price requirements, except under tightly specified and limited circumstances. NAFTA prohibits export taxes unless the same tax is

adopted on exports of goods to all Parties and on goods destined for domestic consumption. Most of NAFTA concerns trade in goods and services broadly, and on that score it has been highly successful. In NAFTA's first ten years, total trade among the United States, Mexico, and Canada more than doubled.

NAFTA's provisions on energy trade are more limited. It has helped to coordinate the removal of tariffs on natural gas, which was achieved between the U.S. and Canada in 1996 and then between the U.S. and Mexico in 1998 (Energy Information Administration website). By 2000, 36% of the U.S.'s energy was imported from Mexico and Canada (Pastor, 2004). During the 1990s U.S. imports of natural gas from Canada grew from a relatively low level to about 15% of total U.S. gas consumption. NAFTA has also played a role in the emerging gas trade between the U.S. and Mexico. (Mexico is a net importer of gas from the U.S., but with the building of LNG terminals in Mexico the country is poised to become an exporter.) And while Mexico maintains tight investment restrictions on its petroleum industry, enshrined in the Mexican Constitution, since 1994 the sector has opened to some limited forms of foreign investment; NAFTA, especially its provisions for enforcement of contracts, have played a role in that larger investment. NAFTA has also established the Commission for Environmental Cooperation (CEC), which has played a role in facilitating the management of common environmental problems such as the border zone between the U.S. and Mexico where much growth in the Mexican economy has concentrated and where programs to shift from polluting fuels to cleaner natural gas has, in part, played a role in lightening the pollution that blows downwind to the United States.

Evolution at the Joints: Environmental Issues and Electricity

Until now we have described a series of institutions that do not interconnect in a strong fashion. The IEA and OPEC have discovered, with experience and failure, some areas of common interest and have engaged in some informal coordination. The Energy Charter Treaty, although on paper an omnibus agreement that could provide an integrated framework for all energy matters in the European region, in fact has little effect on anything. NAFTA has played a role in promoting trade in gas and electricity as well as cross-border investment, but it is limited to just the North American region and its links to the global energy regime appear to be tentative.

We suggest that the strongest interconnections—what make a nascent global energy regime—arise through the varied efforts to protect the environment. Those efforts have gained momentum with rising incomes and also knowledge about transboundary environmental issues, which is strikingly recent in origin. Here we focus on acid rain and on global climate change, two air pollution problems whose principal causes are the use of energy. The hypothesis that acids caused by pollution would build up (and eventually kill) lake ecosystems was floated only in the late 1960s, and the strong evidence that that process was under way in Europe arrived only in the 1980s. The hypothesis of global warming is a century old, but sustained attention to the dangers of warming arose only in the 1980s and the incontrovertible evidence of humans affecting the planet's climate is less than a decade old.

Both these problems are forcing a more holistic approach to energy management since both are the byproduct of the many different ways that energy is utilized. In the case of climate

change, the global problem has given rise to a fundamental challenge in the sustainability of carbon-based fossil fuels since CO₂ from the oxidation of those fuels is the main cause of global warming.

The earliest sustained effort to manage energy-related international environmental issues concentrated on the problem of acid rain in Europe. After creating a framework for cooperation between East and West, the first regulatory protocol was negotiated in 1985 and focused on sulphur dioxide, a byproduct mainly of burning coal. Subsequent protocols have focused on nitrogen oxides (also from power plants, as well as from automobiles), particulates, and photochemical smog. By the middle 1990s all of these pollutants were under some form of regional treaty-based regulation in Europe; most of the treaties formally took the form of protocols to the Long-Range Transboundary Air Pollution (LRTAP) Convention (Levy, 1993). The first regulatory efforts in this area concentrated on simple coordination of policies that most governments already favored for internal reasons. For example, the first regulations on SO₂ required a 30% cut in emissions; in fact, most of the signatories made much deeper cuts and some had already complied when they agreed to make the cuts. The history of efforts to regulate NO_x have a similar history yet were more demanding and thus required extra effort by the signatories. With each successive effort the expectations have risen, and most countries have been willing to adopt more stringent commitments because public pressure to protect the environment has grown and the countries in Europe that care most about environmental issues have used a series of transfer payments and linkages (e.g., through the EU) to entice the participation of others (Levy, 1993; Wettstad, 1998). Most striking, however, has been the rise of overt efforts to optimize spending on pollution control. As countries have regulated multiple

pollutants and are making deeper cuts, the misallocation of resources from poorly designed policies has increased. Thus the European air pollution regime has been the locus of a long-standing and successful air pollution modeling effort that has helped governments to design (and codify into treaty) rational strategies for controlling emissions. Moreover, those pollution efforts have touched on all the major uses of energy—notably transport (where oil dominates) and electricity (where coal and gas dominate).

The integration across pollution sources has been even more marked as governments focus on climate change, in particular the emissions of CO₂ from burning fossil fuels. Here we will examine the European response most closely because it is, by far, the most advanced; as other countries implement serious efforts to manage CO₂ we expect that they will follow similar patterns. Following the commitment in the Kyoto Protocol by all 25 EU members to cut emissions 8% below 1990 levels, the EU reapportioned the burden; members that have the greatest concern about climate change and the greatest capacity to control emissions are making the steepest cuts while reluctant members are expected to do little or nothing. For example, climate-concerned Germany is required to cut 21% while Portugal is allowed to raise its emissions 27%.⁶ Each country has devised its own plan for meeting its targets; broadly, however, all the plans share some common elements. Emissions from buildings and transportation (each about one-third of EU emissions) are regulated by a series of direct rules

⁶ Current policies are unlikely to produce full compliance with the Kyoto targets. However, the EU's Emission Trading System (ETS) has provisions that allow for the import of credits from overseas. Most observers expect that the EU members will implement significant policies on their own to control emissions and then import permits to cover whatever shortfall arises. We have written about this elsewhere (Victor et al., 2005; Victor and House, 2004); for the purposes of our argument here all that matters is that the EU members will be engaged in nontrivial efforts to tame carbon.

such as emission standards, codes, and voluntary agreements. Emissions from large industrial sources, including power plants, are regulated through an emission trading system.

Tackling carbon is forcing an integration of the energy regime for two reasons. First, EU governments have learned that the most attractive areas for controlling emissions are stationary sources—notably in electric power. While much of European baseload electricity is fired with coal, the most carbon-intensive way to generate electricity, at the margin most new plants are expected to burn gas. Not only does gas produce half the CO₂ per unit energy when burned, but gas plants are also more efficient than coal in most settings and thus the shift to gas will moderate (but hardly eliminate) concerns about CO₂ emissions. Until a few years ago, it was widely assumed that the interim strategy for managing the climate problem would involve burning large amounts of gas. The sharp rise in gas prices that has accompanied the higher cost of oil, along with new insecurities in gas supply to Europe, are forcing a rethinking of the gas strategy. In its stead, countries are looking more closely at new nuclear reactors and at advanced techniques for burning coal that make it possible to sequester the CO₂ underground. All of these technologies produce the same fungible and useful commodity (i.e., electrons), and as the European continent becomes increasingly electrified such options rise in their importance to the overall carbon control strategy.

Second, the process of planning national carbon control strategies has forced many of the EU member states to focus on the relative cost of emission control options. They have learned that they must look across the full range of energy options available within their borders. The option of trading has also required them to look at the proper expenditure of resources

worldwide. The Kyoto Protocol includes schemes that allow industrial countries to honor credits for projects that reduce emissions in the developing world; nearly 600 such projects are under way at this writing, most of which are financed with an eye to selling the credits in the European market. In effect, policy makers examining tradeoffs are, albeit tentatively, looking at the whole world's energy system. With an eye to participating in that market, policy makers in the developing world and in Russia are, themselves, looking for the least cost ways to control their own emissions. In addition to the parts of the global regime on energy that regulate the physical flow of energy, this new part—which binds the elemental regimes together—is concentrated on the physical and financial flow of the externalities from using carbon-based energy.

IV. Conclusions: The Regime Complex for Energy and Theories of International Relations

Finally, we revisit the history of the global energy regime to focus on its implications for the study of international regimes. Along the way, we will answer the questions that are organizing the larger study—on the preferences and capabilities of major actors, the interests and goals of regulation, and the accountability.

Our argument is that the global energy regime did not arise with a single purpose in mind. Rather, it is an accretion of a series of particular regulatory efforts—each conceived for its own purpose that, over time, have become partially integrated into a collective regime. At present, the global energy regime broadly performs three functions. First, it helps importing countries coordinate their responses to insecure supplies. Originally, that function arose in

reaction to the demonstrated insecurity of imported Arab oil and the resulting higher world prices. Those same capacities for coordination have been utilized for all manner of supply interruptions, most recently the disruption in crude and products markets in the aftermath of hurricane Katrina.

Second, the global energy regime helps the OPEC nations stabilize and lift the total rents they obtain from their exports. The policy of withholding supply has conveniently corresponded with these nations' own difficulties in organizing additional investment. This convenient alignment of interests was sustained so long as there was ample spare capacity and the system was not shocked—as in the first Gulf war due to instability in key supply regions or in recent years due to unexpectedly high demand.

In effect, the preferences of most of the key importers and exporters have partially aligned since the first Arab oil embargo. Importers have learned that it is difficult to exert direct leverage on exporters that want to withhold supplies. They have also learned that they can tolerate semi-monopolistic pricing so long as volatility is not excessive; the economy is adaptive, and the mechanisms for recycling the funds are efficient. A shift to a more market-oriented economy, along with tacit cooperation with OPEC, has satisfied all those conditions. Exporters have learned that it is difficult to police a cartel and that the same factors that allow for centralized decision-making that aids the operation of the multinational cartel—namely, a powerful central government and an integrated state-controlled oil sector—also cut against their ability to attract private investment and to operate efficient national firms. Saudi Arabia, Iran and Kuwait have had the tightest relationship between government decision-making an actual

investment and production decisions because they have the strongest government controls over industry and singular national oil companies; Nigeria and Venezuela, by contrast, have more chaotic industries because the number of actors inside each state is large and (especially for Nigeria) central controls are erratic in their operation. This moderation of the preferences of key actors has occurred at the intersection between the two regulatory regimes that were established—the IEA by importers, and OPEC by some key exporters.

Third, the global energy regime has incorporated various specialized agreements that manage the externalities of producing, transporting and using energy. The most elaborate efforts in this area have been animated by the interests of the wealthiest western nations that have, with time and wealth, embraced a wider array of international environmental issues. They have been forced to cooperate because the environmental problems they encounter are increasingly transborder in structure. At this writing attention is growing on a different kind of externality—the resource curse—but so far there has been very little international coordination to manage the problem. Some countries have adjusted their internal policies to reduce corruption, partly in response to international pressure (e.g., Angola, as described in McMillan, 2005). But internationally coordinated efforts in this area, so far, have been very weak and modest in their influence because state control over mineral resources and a competitive market for investors (who, themselves, have highly varied preferences) allows governments that want to avoid such strictures can do so fairly easily. The most effective examples of overt efforts to manage mineral windfalls arise from within countries that were already governed with an eye to prudent fiscal management—notably Norway.

In pursuing each of these different goals, the architects of the regimes have adopted different instruments with different levels of effectiveness, as shown in Table 1. The effectiveness appears to be a function of three main factors: the master rule, coordination, and leverage. The master rule has constrained the types of instruments that can be adopted, especially for western countries that have sought to create regulatory arrangements that did not conflict with the open market principles that key countries (especially the United States) have imposed on the regime. In effect, the goal of importers was to achieve a measure of control over a market that, fundamentally, they thought should be left to function without much intervention. By contrast, the OPEC nations faced no such conflict since their central goal (to control supply) was fully consistent with their master rule.

All of these regimes exhibit the familiar problems of coordination. Where numbers have been small, coordination has been easier—especially when the coordinating agents speak directly and easily for the principals. Thus OPEC has had the easiest task of coordination as relatively few states needed to be involved and petroleum ministers generally spoke for their industries—often because the minister and the industry derived from the same organization. By contrast, the IEA has had a particularly difficult task of coordination since there are many importing countries, each with little leverage over a global market for a fungible commodity. Perhaps more surprising is the apparently low influence of efforts to manage dependence in Western Europe on Russian gas exports, such as through the Energy Charter Treaty. In that case, coordination problems could be greatly reduced by existing institutions (notably the EU) and leverage is potentially high since Russia has few other options for exporting its gas by pipeline, but the efforts have been hobbled by Europe’s objective of an opening gas market, a desire to keep

Russia integrated with western markets, and the lack of a clear vision for how the Energy Charter Treaty would promote security.

For the most part, the global energy regime has evolved in a Pareto-improving fashion. Within the limits of the fundamental power arrangements, which have given oil exporters considerable potential to affect prices, all parties have seen their interests advanced. As recounted earlier, exporters have gained higher prices and importers have gained a measure of stability—except in periods of severe shocks when their own measures for dampening shocks have been of limited utility. Environmentalists have gained perhaps the most because it has been easiest to graft the management of externalities onto the existing regime—at least in the case of acid rain. Global warming from the burning of fossil fuels may be different because it implies such a strong reorganization of the energy system. Of the main losers, it is hard to attribute any of the loss to the functioning of the regime. Western oil companies have lost access to tens of billions of barrels of oil reserves through the nationalizations of the 1960s and 1970s. But those nationalizations would have happened without OPEC, the IEA or the other elements of the energy regime. Importers have not been able to achieve their vision for price stability and invulnerability to price shocks, but that is a reflection of the weakness of the regime rather than strength that has run the wrong direction. Importers have lost the several hundred billion dollars from higher prices, although we remain skeptical that most of that reflects the real workings of OPEC rather than the accidental tightness in oil supply that has benefited OPEC (and everyone else whose income depends on the price of oil).

We close by suggesting that this history and analysis, which we present tentatively in this first draft, has at least two implications for theories in international relations that pertain to the origins and operations of international regimes. First, the process of regime formation in this area appears to be highly bottom-up in character. The regime complex that exists has emerged from a variety of different strands of diplomatic, economic and technological activity. It has stitched together as a single (albeit loose) regime because the central commodities (notably oil and gas) are fungible across uses and because the effort to manage environmental consequences has affected all energy sources and carriers. It is difficult to imagine that such a regime could ever emerge, *de novo*, as an integrated system from an inter-state negotiation. The interests are too disparate and the selection of topics and instruments emerged from a long period of experimentation and selection—concentrated at the “joints” between individual regime elements where rules and interests clashed. Similar bottom-up patterns, arising from fragmented and narrow efforts, may be evident in other areas of international cooperation.

This fragmented origin of the regime explains not only its dispersed legal and organizational form but also the fragmentation of accountability. Nobody is really accountable for the operation of the regime as a whole, but collections of states and ministries do have accountability for particular elements. This lack of central accountability also appears to contribute to the pattern of evolution in the regime because accountability for individual regime elements helps to ensure consistency within each element, but inconsistencies between elements are not so apparent and, as we have suggested, are the main areas for experimentation, innovation and adjustment.

Second, international relations scholars are again focusing on the importance of the state in international politics. Our study points not just to the origin of different state interests—which vary on energy matters, we suggest, because of differences in resource endowments and income—but also to the large differences in the internal organization of the state. We have suggested that exporting states with strong hierarchical governments and strong control over their energy sector have been able to negotiate more singularly than have states whose governance is weak and leverage over the sector is limited. Importing states generally have been wealthier but also have been open to various NGO influences that have put a premium on environmental protection—those internal characteristics have shifted these countries’ interests to focus on environmental problems while, at the same time, higher efficiency and more flexible economies have made them less vulnerable to traditional energy shocks.

The whole process of evolution in the regime elements has tended to reinforce the master rule of market liberalism. For the largest importers that rule reflects their broad practice of economic organization. For exporters that migration has been tolerated because it has occurred alongside a gaping exception—the large (indeed growing) national and illiberal control of energy resources. How the regime complex will respond to the rise of India and especially China, a new class of importers who profess interest in the same illiberal approach that is favored by exporters—namely, structured exclusive markets rather than a fungible commodity—remains to be seen.

Table 1.

Goal	Key Actors	Instruments	Effect of the Instruments on Behavior
Coordinate responses to shocks in oil supply	<u>Western importing countries</u> , under pressure from key oil-using industries and, occasionally, the broader public	Forums for coordination; required stockpiles; shared cutbacks in case of shortfall	Generally low
Coordinate supply	<u>Key oil exporting countries</u> , especially those that are illiberal in orientation and which have tight control over their industry	Negotiated price bands and export quotas; jawboning and transparency for enforcement	Variable but moderate
Manage externalities: Environmental and Resource Curse	<u>Advanced Western countries</u> , under pressure from NGOs. On the resource curse, some international financial institutions have also focused attention on the issue	Emission targets; data gathering and analysis; summitry to draw attention to the issues and to inspire governments to make promises	<u>Environmental:</u> Modest but generally high when the regime has contributed to environmental awareness and internal pressure for change <u>Resource curse:</u> Generally very low

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