Creating Law for Next Generation Energy Technologies

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Introduction

While some jurisdictions over the past approximately thirty years have enacted new legislation supporting next generation energy technologies, such developments have been ad hoc without any overall coordinated plan for supporting the energy sector in general, and they have been made in response to specific and limited ideas supported by national governments at the time.1 A significant need exists for a coordinated approach to planning a comprehensive legal management regime to support newly emerging energy technologies and to ensure that such a regime is consistent with, and supportive of, sustainable energy development.

This Article seeks to justify the need for a coordinated approach to the development of new legal management regimes to support and promote next generation energy technologies. The Article will also explain the need for separate legal management regimes at both the international and domestic levels. Part I of this Article will provide background on next generation technologies and argue for the adoption of new legal management regimes in the context of next generation technologies. In Part II the Article will describe the current state of public international law regarding next generation energy technologies, including treaties, non-binding declarations, and the role of international institutions. Part III will then examine the contents of the proposed new international and domestic legal management regimes. Part IV will address various difficulties that may arise along the path toward legal management regimes governing next generation technologies.

I. Background

A. The Forces Pushing Next Generation Technologies

Various environmental concerns have begun to push society to adopt policies and laws consistent with sustainable development principles. The most significant of these concerns has been the growing international awareness of climate change and the impact of energy production and consumption. Energy consumption is by far the largest contributor to climate change of all the energy technologies, with oil also contributing substantially.4 Natural gas is the cleanest of all the fossil fuel technologies, although its use still produces significantly more carbon emissions than all the renewable energy technologies, which produce little or no such emissions.5 Some developed countries, notably the United States, have resisted binding international atmospheric carbon emission targets and reductions, such as those set forth in the Kyoto Protocol6 to the United Nations Framework Convention on Climate Change (“UNFCCC”).7 However, the most recent scientific report on the issue by the Intergovernmental Panel on Climate Change (“IPCC”),8 together with the Stern Report,9 has convinced all but the most ardent skeptics of the need to take action at the governmental level to address the problem. The statistical information in the IPCC report demonstrates that there can be no satisfactory solution to the global climate change problem unless the current use of fossil fuels is curtailed.10

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4. Id. at 10.
5. Id.
10. See IPCC, supra note 8, at 2, 37.
Climate change is only one of the societal problems caused by the current predominance of fossil fuels as an energy source. In many developing countries, the major environmental issue is local smog and air pollution in large cities caused by coal fueled electricity production and widespread use of motor vehicles. Sulfur emissions from coal-fired power stations are also responsible for creating acid rain, which has decimated forests and polluted lakes and rivers in many parts of the world, particularly in Eastern Europe, China, and the eastern United States.

Energy security is another major concern for all nations, particularly developed countries that rely on steady oil and, to a lesser extent, coal and natural gas supplies to maintain their affluent living standards. This worldwide dependence on fossil fuels for electricity generation and transportation has allowed the Organization of the Petroleum Exporting Countries (“OPEC”) and other large fossil fuel-exporters to use oil embargos and supply disruptions as political tools to coerce energy-importing nations into supporting their policies. As a result, energy security is increasingly seen as an issue of international peace and security.

The link between energy, poverty, and negative effects on human health and welfare is also a major concern. The lack of international planning in relation to a sustainable energy future is largely responsible for the continuing poverty in many developing countries, particularly in Africa. The United Nations Development Programme (“UNDP”) reported in 2001 that around two billion people worldwide are denied access to modern energy services and are forced to rely, instead, on traditional energy sources such as burning firewood and dung. This reliance deprives children of educational opportunities because no light is available for studying after nightfall. It also prevents women from engaging in economic activities because they must spend a significant proportion of their day searching for firewood.

The negative health effects associated with using traditional energy sources are also significant. Burning solid fuels in traditional stoves in poorly ventilated kitchens causes high levels of internal air pollution in homes. This pollution affects the health of all occupants in the home, especially women and children. Additionally, the lack of available energy to extract clean subsurface water or to boil water increases the risk of drinking contaminated water.

The UNDP advises that renewable energy resources and energy efficiency measures will play a key role in reducing poverty. Solar and wind energy are seen as particularly important because they are capable of fueling stand-alone energy systems. These systems will continue to be indispensable in rural areas of less developed nations, where electrification programs are unlikely to extend beyond major cities and towns.

The only way to break free from these environmental, security, and poverty issues is to rebalance the energy mix worldwide to include next generation energy technologies. While it is unrealistic to expect these technologies to replace fossil fuels in the foreseeable future, many next generation technologies are sufficiently developed and accessible to make a substantial contribution to each nation’s energy production capacity.

B. Defining Next Generation Energy Technologies

It is essential that next generation energy technologies effectively address and resolve the societal difficulties associated with the current energy mix worldwide. These technologies must also support the most significant emerging principle of environmental law: sustainable development.

The World Commission on Environment and Development (also known as the Brundtland Commission) defined sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” To determine which energy technologies are consistent with this principle, it is useful to draw upon the comprehensive list of indicators for sustainable energy development provided in the International Energy Agency’s (“IEA”) report, Energy Indicators for Sustainable Development: Guidelines and Methodologies. Among the most significant of these indicators are that the
energy production must (1) be universally accessible; (2) be affordable; (3) satisfy health and safety requirements; (4) assure efficiency of energy conversion and distribution; (5) promote energy efficiency\textsuperscript{29} in all sectors of the economy; (6) maintain diversification of energy supplies; (7) maximize energy security; (8) preserve soil and water quality; and (9) avoid excessive deforestation.\textsuperscript{30}

These indicators demonstrate that promoting energy efficiency and conservation in all sectors of the economy is consistent with the principle of sustainable development. They also show that sustainable development is supported by the use and adoption of renewable energy resources\textsuperscript{31} with the exception of large-scale hydro-electricity, which can cause landscape destruction, compromise fish stocks, and severely disrupt the lifestyle or threaten the existence of native aboriginal tribes.\textsuperscript{32}

C. Why Are Legal Management Regimes Essential?

In energy policy management circles, the role of law in shaping and implementing energy policy is not always well understood. Over the past two decades, many industrialized countries have shifted from a reliance on regulation to a “free market approach,” with the assumption that the market can regulate energy issues without legal intervention.\textsuperscript{33} In other countries, the emphasis has been on “light-handed” regulation, which focuses on the use of unenforceable guidelines and voluntary negotiated agreements rather than enforceable laws and regulations.\textsuperscript{34}

A recent argument in the context of the climate change debate is that introducing carbon emission trading or similar climate change mitigation laws will render laws promoting next generation energy technologies unnecessary, as such technologies will be automatically promoted by the climate change legislation.\textsuperscript{35} However, a serious commitment to the widespread adoption of next generation energy technologies requires a more comprehensive legislative response than relying on a tangential spin-off effect from other forms of legislation or policies. Legislative barriers to the implementation of the new technologies must be removed and specific forms of encouragement for such technologies will be necessary. Such changes must be implemented by creating effective legal management regimes promoting next generation energy technologies.

Establishing legal management regimes for implementing and supporting next generation energy technologies is essential for a number of reasons. First, investment will not occur without adequate legal protection for consumers and investors. The transition from a fossil-fuel dominant energy sector to clean energy solutions will require massive investment, and interested parties will need assurance that their legal position is protected.\textsuperscript{36} Investment is always risky, and investors will factor sovereign risk and the likelihood of financial returns into their decisions.\textsuperscript{37} Therefore, governments seeking to encourage investment in the energy sector must establish a fair and reasonable legal management regime that protects the interests of consumers and investors and provides adequate forms of legal recourse.\textsuperscript{38}

Second, history shows that energy development requires a legal management regime. No jurisdiction in the world has achieved a prominent energy sector without a comprehensive legal regime, except where the energy sector is nationalized.\textsuperscript{39} In the oil and gas sector, for example, national legislation invariably grants legally enforceable exploration rights to private participants, with further development rights if the

\textsuperscript{29} The term “energy efficiency” has been defined as “a change to energy use that results in an increase in net benefits per unit of energy.” Energy Efficiency and Conservation Act of 2000 (Public Act 2000 No. 14) (N.Z.).

\textsuperscript{30} INT’L ATOMIC ENERGY AGENCY ET AL., supra note 28, at 11–15.

\textsuperscript{31} The IEA equates somewhat with regard to nuclear energy. The last energy indicator listed above appears to suggest that nuclear power stations may be acceptable if the amount of energy they generate far exceeds the problems associated with the radioactive wastes they produce over their lifetimes. It is beyond the scope of this article to determine whether nuclear energy is appropriate and acceptable. Opinions on this issue are polarized. Some countries, such as Belgium and France, rely heavily on nuclear energy for electricity generation. See World Nuclear Ass’n, Nuclear Power in Belgium, http://www.world-nuclear.org/info/inf94.html (last visited Oct. 17, 2010) (stating nuclear energy provides 94% of Belgium’s domestically-generated electricity); World Nuclear Ass’n, Nuclear Power in France, http://www.world-nuclear.org/info/inf40.html (last visited Oct. 17, 2010) (stating that in France, over 75% of electricity is generated by nuclear energy). Others, such as Australia and New Zealand, have outlawed nuclear power. See New Zealand Nuclear Free Zone, Disarmament, and Arms Control Act 1987 (Public Act 1987 No. 86) (N.Z.) (declaring New Zealand a “Nuclear Free Zone”); Nuclear Activities (Prohibitions) Act 1984 (Vic) s 8 (Austl) (prohibiting the construction or operation of nuclear reactors). For the purposes of this article, nuclear energy is not considered a next generation technology because it has existed since the early 1960s.


\textsuperscript{38} Regulatory Framework on Consumer Protection, supra note 36, at 239, 245.

exploration results are positive. While drafted to provide adequate financial return to governments from royalties and to protect the national interest, effective legislation also contains sufficient financial incentives and legal rights to private participants to encourage substantial financial investment in an inherently risky enterprise. Third, the need for adequate legal protection for investors is not altered merely because many next generation energy technologies are less centralized than traditional fossil fuel industries and may be implemented at local and regional levels. For example, individuals will be hesitant to invest in solar energy appliances, such as solar water heaters or solar photovoltaic cells for electricity generation, if their investment might be rendered ineffective by a large building or tree on a neighboring property shading their solar collector panels. For this reason, investment in this field necessitates an adequate law of solar access protection. Failure to adopt even simple laws of this nature can hinder the development of solar energy by individuals and businesses.

Fourth, the flexibility of legal responses is often underestimated or misunderstood by non-lawyers. A legal management regime need not consist solely of traditional regulation, but may include financial incentives to investors. It may also act as a form of education to consumers and society generally. In the energy sector, some jurisdictions have already adopted education-based legal measures, such as energy labeling laws, which require manufacturers of specified forms of electric appliances including refrigerators, washing machines, and air conditioners, to attach a government-approved label in a prominent position on the appliance specifying its energy performance. The purpose of such a law is to encourage public awareness of energy efficiency and to educate the community about its importance.

Finally, the credibility of next generation energy technologies requires governments to enact a legal management regime. In light of the comprehensive legal regimes enacted in respect of fossil fuel industries, the absence of such a regime would indicate to investors in particular, and society in general, that clean energy solutions are regarded by the government as peripheral or second-best.

Having justified the need for legal management regimes, it is necessary to consider how to frame them. While the emphasis to date has been on the development of national laws to promote next generation energy technologies, an appropriate legal response will require the development of management regimes at both the national and international level.

D. The Contents of an International Legal Regime

Traditionally, the legal regulation of energy issues has been regarded as a matter of domestic rather than international law, and a matter exclusively reserved for individual states. This has been particularly true in relation to renewable energy and energy efficiency. This traditional approach has changed for a variety of reasons, largely involving international trade. First, there has been an exponential leap in energy consumption in developed countries since the end of the Second World War. Second, energy use is rising rapidly in emerging economies and is expected to rise exponentially as more developing countries experience significant economic growth. Third, there is growing recognition of the environmental issues associated with energy use and production, especially climate change and acid rain, which have international impacts. For these reasons, energy concerns are playing an increasingly important role in the development of international environmental law.

Unfortunately, as a result of resource constraints and inadequate capacity building, many developing countries are largely unaware of the appropriate policy and legal initiatives that they should take to promote sustainable development in the energy sector. It is essential that governments adopt sustainable development policies worldwide; otherwise the rapid growth of developing countries may lead to environmental catastrophe. To prevent this from occurring, developing countries must learn from the mistakes made by developed countries and engage in “technology leapfrogging” to achieve their developmental goals.

41. See id. at 44–46 (describing taxation scheme and social and environmental controls governing oil extraction in Colombia).
43. See id.
45. See id. at 262.
47. Eco-Labelling, supra note 46, at 45.
48. Lyster, supra note 1, at 35.
49. See Catherine Redgwell, International Legal Responses to the Challenges of a Lower-Carbon Future: Climate Change, Carbon Capture and Storage, and Biofuels, in Beyond the Carbon Economy: Energy Law in Transition 85, 85, 100 (Catherine Redgwell et al. eds., 2008).
50. Lyster, supra note 1, at 35.
51. Id.
53. Lyster, supra note 1, at 36.
54. See id. at 55; Redgwell, supra note 49, at 85, 100.
II. The Current State of Public International Law Regarding Next Generation Energy Technologies

What has international law achieved to date in this field? Despite being widely applicable to environmental issues, customary international law has only minor and indirect relevance to the promotion of next generation energy technologies. The major relevant sources of international law in this context are treaties and soft-law instruments.

A. Treaties

The Preamble to the UNFCCC contains the following principles relevant to next generation energy technologies: that the earth’s climate and the adverse effects of climate change are “a common concern of humankind” while noting there are uncertainties in predictions of climate change. That developed countries should take immediate action to develop comprehensive strategies to address climate change; that the climate system should be protected for present and future generations (intergenerational equity); and “that responses to climate change should be coordinated with social and economic development in an integrated manner.” The precautionary principle is also recognized as a guiding principle for all signatories to the UNFCCC.

The most relevant commitments in this context are: to enact effective legislation to achieve the objectives of the UNFCCC; to formulate, implement, publish, and update national and regional programs to mitigate climate change; and to take climate change into account when undertaking environmental impact assessments. Developed countries are required to take the lead in reducing emissions by adopting national policies to mitigate climate change. All parties are expected to undertake and share appropriate research on global climate change, while educating the public about global climate change and its effects. The parties are also required at Conferences of the Parties to regularly review progress made in implementing the UNFCCC.

At the third Conference of the Parties in 1997, signatories to the UNFCCC developed the Kyoto Protocol, which entered into force in 2005. The most important feature of the Protocol is that Annex B parties agreed to specific individual targets for reducing greenhouse gas emissions, so that their emissions in the first commitment period (2008-2012) would be at least five percent below 1990 levels. Developing countries did not commit to any binding targets under the Protocol, although those that ratified the UNFCCC remain obliged to comply with their commitments under the Convention.

Significantly from the energy perspective, parties to the Kyoto Protocol must formulate cost-effective national and regional programs to mitigate climate change from the energy, transportation, industry, agricultural, and other sectors. They must submit information on these programs to the Conference of the Parties. Pursuant to Article 10, parties are also expected to promote strategies for technology transfers, to cooperate in scientific and technical research, and to develop education and training programs. To achieve the Kyoto targets, Article 2 specifies that each party should implement, inter alia, the following policies and measures: the enhancement of energy efficiency; research on renewable and environmentally sound technologies; reduction of market imperfections; encourage reforms in relevant sectors to reduce greenhouse gases, for example, transportation; reduce methane in waste management; and share and exchange information.

The Energy Charter Treaty and its associated Protocol on Energy Efficiency and Related Environmental Aspects (hereafter referred to as the “Treaty” and the “Protocol,” respectively) also created new international law with respect to renewable energy and energy efficiency. The Treaty has

58. See Development of Renewable Energy Technologies, supra note 11, at 113.
60. UNFCCC, supra note 7, at 165.
61. Id. at 166.
62. Id.
63. Id.
64. Id. at 167.
65. Id.
66. Id. at 168.
67. See id. at 170.
68. Cf. id. at 171 (requiring nations to take climate change into account when developing “national policies,” which may include formal legislation).
69. See id. at 170.
70. Id. at 171.
71. Id.
72. Id. at 175.
fifty-three contracting parties, consisting of European countries plus Japan and Australia, the European Community and the European Atomic Energy Community (“EURATOM”). The participating countries quickly reached an agreement on the terms of the Protocol, which currently has fifty-one signatories and entered into force in April 1998.

The major terms of the Treaty relate to issues of international energy investment and trade. Environmental issues, including renewable energy and energy efficiency, are limited to Article 19(d), which requires each state, in its pursuit of sustainable development and minimizing environmental degradation, to “have particular regard to [i]mproving [e]nergy [e]fficiency, to developing and using renewable energy sources, to promoting the use of cleaner fuels and to employing technologies and technological means that reduce pollution.”

Unfortunately, Article 19 is drafted in non-binding language, foreclosing any possibility of international enforcement of these obligations. Article 19, therefore, represents no more than a hesitant first step towards the goal of promoting renewable energy and energy efficiency in the international law arena. While it is an important achievement to secure international agreement to legislate on the topic, the terms of Article 19 appear susceptible to being ignored or, at best, being paid lip service to, by nations which do not wish to take action in this field.

The Protocol imposes more meaningful obligations in relation to energy efficiency, although there are still many shortcomings. One of the stated objectives of the Protocol is “the promotion of energy efficiency policies consistent with sustainable development.” Another major objective is that energy markets should be based on “a fuller reflection of environmental costs and benefits.” This makes obvious reference to the “polluter pays” principle. As with Article 19 of the Treaty, the Protocol’s commitment to this principle is only partial, as the word “fuller” indicates that a total adherence to the principle is neither demanded nor expected.

The Protocol imposes obligations on contracting parties to take action in support of energy efficiency at both the national and international levels. The national obligations are contained in Articles 3, 5, and 8. Article 3 requires the parties to develop and implement “energy efficiency policies, laws and regulations,” while Article 8 states that each party “shall develop, implement and regularly update energy efficiency programmes best suited to its circumstances.” The interrelationship between the sections is by no means clear, as the Protocol does not attempt to explain the difference between policies in Article 3 and programs in Article 8.

Article 3(2) requires states to establish energy efficiency policies and appropriate legal and regulatory frameworks which promote, inter alia, the efficient functioning of market mechanisms including market-oriented price formation and a fuller reflection of environmental costs and benefits; the reduction of barriers to energy efficiency, thus stimulating investments; mechanisms for financing energy efficiency initiatives; education and awareness; the dissemination and transfer of technologies; and the transparency of legal and regulatory frameworks.

Pursuant to Article 3(3), “contracting parties shall strive to achieve the full benefit of energy efficiency throughout the energy cycle. To this end they shall, to the best of their competence, formulate and implement energy efficiency policies and cooperative or coordinated actions based on cost-effectiveness and economic efficiency, taking due account of environmental aspects.” Article 5 states that: “Contracting Parties shall formulate strategies and policy aims for Improving Energy Efficiency and thereby reducing Environmental Impacts of the Energy Cycle as appropriate in relation to their own specific energy conditions.”

Article 3(2) has the advantage of comprehensiveness—its component paragraphs are couched broadly and remain non-inclusive. Additionally, this sub-article is phrased in a manner imposing at least a general obligation on all contracting parties to take some action in support of energy efficiency. Unfortunately, Article 3(3) suffers from the same qualifications as Article 19 of the Treaty, inasmuch as states’ obligations to implement national policies are limited to striving to achieve the full benefit of energy efficiency, and to acting to the best of their competence to formulate and implement energy efficiency policies. These obligations are too vague to be enforceable.

Similar problems beset Article 5. While there are significant differences in the energy mix and demands of different countries, and it is unrealistic to require each country to take similar measures in support of energy efficiency, the clause “as appropriate in relation to their own specific energy conditions” effectively gives each country carte blanche to do as much or as little in relation to energy efficiency as it...
chooses. This language renders international enforcement impossible.

The wording of Article 5 is echoed in Article 8(1), which requires each contracting party to “develop, implement and regularly update energy efficiency programmes best suited to its circumstances.” Again, what is “best suited to its circumstances” is a subjective test effectively within the exclusive preserve of each nation.

Contracting parties’ international obligations under the Protocol relate to cooperation and assistance. Pursuant to Article 3(1), contracting parties shall cooperate and, as appropriate, assist each other in developing and implementing energy efficiency policies, laws, and regulations. An “illustrative and non-exhaustive list” of areas of possible cooperation is provided in the Annex to the Protocol. The list is noteworthy for its comprehensiveness both in scope and in detail, including: energy efficiency in power generation and transmission, as well as in the transportation, industrial, and building sectors of the economy; financing measures (third party financing, joint ventures and co-financing); achieving efficiencies in municipalities and local community services (district heating systems, efficient gas distribution systems, energy planning technologies, twinning of towns, energy management in cities and in public buildings, and waste management and energy recovery waste); energy efficiency analysis in refining, conversion, transportation, and distribution of hydrocarbons; and international training and education programs. It is by far the most comprehensive list of energy efficiency measures ever attempted in any legal instrument, international or domestic.

B. Non-Binding Declarations

In recent years, a plethora of soft law declarations has emanated from conferences and summits around the world developing international environmental law. As issues such as energy security, climate change, and peak oil have come to prominence, a number of declarations relating to the promotion of renewable energy technologies and energy efficiency have come to fruition. Obviously, all declarations are not of equal importance. Speaking generally, the most influential are those declarations that emanate from conferences and summits organized by the United Nations and those conferences outside the U.N. framework containing the largest number of high-level government representatives.

The following four declarations are the most significant for the promotion of renewable energy and energy efficiency.

1. Agenda 21

Agenda 21 arose from the 1992 United Nations Conference on Environment and Development (“UNCED”). Chapter 9 makes specific reference to the protection of the atmosphere. It specifies that activities undertaken to protect the atmosphere should be integrated with social and economic development, taking into account the needs of developing countries to achieve sustained economic growth and eradicate poverty. The Agenda 21 program area relevant to this discussion is the promotion of sustainable development though energy development, efficiency, and consumption. Agenda 21 provides that governments should: develop economically and environmentally sound energy sources, including renewable energy systems; “review current energy supply mixes to determine how . . . new and renewable energy systems could be increased;” promote . . . the use of improved energy-efficient technologies; and establish labeling programs for products to inform decision makers and consumers about opportunities for energy efficiency.

2. Johannesburg Plan of Implementation

Leading up to the 2002 World Summit on Sustainable Development (“WSSD”), the U.N. Secretary-General developed the WEHAB initiative, which focused on five key areas: water, energy, health, agriculture, and biodiversity. These themes were regarded as integral to a coherent international approach to the implementation of sustainable development and were specifically incorporated into the Johannesburg Plan of Implementation. The WEHAB Working Group on Energy published a report entitled A Framework For Action on Energy. The report identifies energy efficiency and renewable energy as

102. Id. art. 8.1.
103. Id.
104. Id. art. 3.1. This cooperation may take any appropriate form. Id. art. 9.
105. Id. at annex, para. 1.
106. See id.
112. See id. ¶ 3.
113. Id. ¶ 9.12(a). (f).
114. Id. ¶ 9.12(f).
115. Id. ¶ 9.12(c).
116. Id. ¶ 9.12(f).
118. Id.
120. WEHAB WORKING GROUP, supra note 117.
two of the five major challenges for sustainable energy development in the years ahead. The Framework recommends specific energy efficiency measures, including “energy efficiency standards, appliance and product labelling, demand-side management[,] . . . building and construction standards,” and the development of regional partnerships to set norms and institutional frameworks for energy efficiency. The Framework also identifies renewable energy technologies as “particularly well suited for rural energy development and an environmentally sound alternative to grid extension.” These technologies were declared to be “particularly promising for technology transfer to developing countries.”

Paragraph 20 of the Johannesburg Plan of Implementation deals specifically with energy, calling upon governments, relevant regional and international organizations, and other relevant stakeholders to take action at all levels to, inter alia:

- “Integrate energy considerations, including energy efficiency, affordability and accessibility, into socio-economic programmes[,]”
- “Develop and disseminate alternative energy technologies with the aim of giving a greater share of the energy mix to renewable energies, improving energy efficiency and greater reliance on advanced energy technologies, including cleaner fossil fuel technologies[,]”
- “Combine . . . the increased use of renewable energy resources, more efficient use of energy, greater reliance on advanced energy technologies, including advanced and cleaner fossil fuel technologies, and the sustainable use of traditional energy resources[,]”
- “Diversify energy supply by developing advanced, cleaner, more efficient, affordable and cost-effective energy technologies, including fossil fuel technologies and renewable energy technologies, and their transfer to developing countries on concessional terms[,]”
- “Develop and utilize indigenous energy sources and infrastructures for various local uses and promote rural community participation . . . in developing and utilizing renewable energy technologies to meet their daily energy needs to find simple and local solutions[,]”
- “Establish domestic programmes for energy efficiency[,]”
- “Accelerate the development, dissemination and deployment of affordable and cleaner energy efficiency and energy conservation technologies . . . in particular to developing countries . . . [;]”
- “Recommend that international financial institutions and other agencies’ policies support developing countries, as well as countries with economies in transition, in their own efforts to establish policy and regulatory frameworks which create a level playing field between . . . renewable energy, energy efficiency, and advanced energy technologies[,]”
- “Promote increased research and development in the field of various energy technologies, including renewable energy, energy efficiency and advanced energy technologies, including advanced and cleaner fossil fuel technologies[,]”
- “Develop “[p]olicies to reduce market distortions[,] [thereby] promot[ing] energy systems compatible with sustainable development[,] through the use of improved market signals and by removing market distortions, including restructured taxation and phasing out harmful subsidies,” so that prices of particular energy systems reflect their environmental impacts.

The Plan of Implementation also calls on nations to, “[w]ith a sense of urgency, substantially increase the global share of renewable energy sources with the objective of increasing its contribution to total energy supply,” but does not set any numeric targets. The failure to agree on specific, numeric targets for the adoption of renewable energy technologies at the WSSD was a major disappointment for the environmental movement and is the reason why many in the movement regard the WSSD as a failure with regard to promoting renewable energy technologies.

However, this conclusion is too pessimistic. Even a cursory comparison of paragraph 20 with the terms of Agenda 21 shows that the cause of renewable energy and energy efficiency has improved dramatically over the decade between UNCED and the WSSD. It appears likely that progress in this field will proceed by small increments, with successive conferences and summits taking progressively stronger measures in support of renewable energy and energy efficiency, ultimately resulting in the adoption of a binding convention. In this light, paragraph 20 should be viewed as a significant step forward.
3. The Group of Eight ("G8") Gleneagles 2005 Plan of Action

In recent years, the G8 members have been actively involved in promoting renewable energy and energy efficiency. This involvement resulted from a 2001 report of the G8 Renewable Energy Task Force, which recognized that the cost of renewable energy will be reduced by expanding renewable energy technologies in industrialized countries, and that the development of supportive policy measures, market incentives, and promotion activities can help countries meet rural energy needs.

In its 2005 Gleneagles Plan of Action, Climate Change, Clean Energy and Sustainable Development ("Gleneagles Plan of Action"), the G8 sought to take action in a number of key areas, including transforming the way we use energy, powering a cleaner future, promoting energy research and development, and financing the transition to cleaner energy.

In relation to transforming the use of energy, the Gleneagles Plan of Action identifies some of the most important measures as follows:

- "[P]romote energy efficient buildings [by, inter alia,] inviting the International Energy Agency (IEA) to review existing building standards and codes in developed and developing countries, develop energy indicators to assess efficiency, and identify policy best practices;"

- "[E]ncourage the coordination of international policies on labeling, standard setting and testing procedures for energy efficiency appliances [by, inter alia, asking the] IEA to undertake a study to review existing global appliance standards and codes[,[[ and extending] the use of clear and consistent labeling to raise consumer awareness of the energy consumption of appliances[,[ and work[ing] nationally and in cooperation with other countries to seek improvements in the efficiency and environmental performance of products in priority sectors" and ... explore[ing] the potential to coordinate standards with other countries;"

- "Encourage the development of cleaner, more efficient and lower-emitting vehicles, and promote their deployment, by[,[ inter alia,] adopting ambitious policies to encourage sales of such vehicles in [G8] countries, including making use of public procurement[,[ and ... asking the IEA to review existing standards and codes for vehicle efficiency and identify best practice[,[ and ... encouraging cooperation on technology research, development and ... deployment in ... cleaner gasoline and diesel technologies, biofuels, synthetic fuels, hybrid technology, battery performance and hydrogen-powered fuel cell vehicles[,[ and ... raising consumer awareness of the environmental impact of their vehicle choices, including through clear and consistent labeling for relevant energy consumption, efficiency and exhaust emissions data ..."

- "[Encourage the improvement of energy efficiency in industry by, inter alia,] work[ing] with the multilateral development banks (MDBs) to expand the use of voluntary energy savings assessments as a part of major investments in new or existing projects in energy intensive sectors[,[ and invit[ing] the IEA to develop its work to assess efficiency performance and seek to identify areas where further analysis of energy efficiency measures by industry sector could add value[,[ and develop[ing] partnerships ... with industry to reduce the greenhouse gas emissions intensity of the major industrial sectors of [G8] economies ..."

In relation to powering a cleaner future, the Gleneagles Plan of Action states that the G8 "need[s] to diversify [its] energy supply mix, including increased use of renewables." It also states that the G8 "need[s] to capitalize on all the opportunities available to improve the efficiency along the entire process chain, from extraction, to energy generation and transmission, and to maximize the large and untapped potential of lower-emitting alternative sources of energy."

As for renewable energy, the Gleneagles Plan of Action proposes to "promote the continued development and commercialization of renewable energy by[,[ inter alia,] working with developing countries to provide capacity-building assistance, develop policy frameworks, undertake research and development, and assess [the] potential for renewable energy." The G8 also proposes "launching a Global Bioenergy Partnership to support wider, cost effective, biomass and biofuels deployment[.""

Finally, the Gleneagles Plan of Action proposes a range of measures for financing the transition to cleaner energy,"
based on the parties’ understanding that “[p]ositive investment climates and effective market models are critical to the uptake of new technologies and increased access to energy for economic growth.”154 These include the following notable measures:

• “support[ing] a market-led approach to encouraging energy efficiency and accelerating investment and the deployment of cleaner technologies[,]”155

• “promot[ing] dialogue on the role, suitability, potential synergies and timing of various policy approaches within the context of each country’s national circumstances[,]”156

• “invit[ing] multinational development banks to increase dialogue with borrowers on energy issues[,]”157

• “continu[ing] to work through [their own] bilateral development programs, in line with [their own] national priorities, to promote more sustainable energy policies worldwide[,]”158 and

• “work[ing] through multi-stakeholder partnerships to develop the policy, regulatory and financing frameworks . . . to provide a commercially attractive balance of risk and reward to private investors.”159

Given the breadth of its coverage, “[t]he Gleneagles Plan of Action is certainly the most comprehensive and supportive international instrument to date in relation to sustainable energy issues” and the promotion of energy efficiency and renewable energy.160

In addition to drafting the Gleneagles Plan of Action, the G8 established an on-going “Dialogue on Climate Change, Clean Energy and Sustainable Development” between its members and invited participation by “other interested countries with significant energy needs.”161 The purpose of the Dialogue is to allow continued, informal discussion of issues surrounding climate change and energy systems, monitor progress on the implementation of the Gleneagles Plan of Action, and share information on best practices.162 The G8 countries hoped that the Dialogue would also help create the condition for more constructive negotiations within the U.N. framework.163 While the G8 is, by its constitution, limited in membership to the wealthiest seven nations plus the Russian Federation, its recent emphasis on the advancement of sustainable energy goals represents a refreshing change from past attitudes, and may well serve as a catalyst for more sustained and effective action by member countries and from other international agencies and nations.

4. Beijing Declaration on Renewable Energy for Sustainable Development

The Beijing Declaration,164 which contains the conclusions of the Beijing International Renewable Energy Conference 2005,165 represents the most recent non-binding international law declaration relevant to renewable energy and energy efficiency. The Declaration “emphasizes[s] the multiple benefits of increased energy efficiency and the use of renewable sources of energy for improving access to energy services.”166 It also states that the international community, especially developed countries, should stress its commitment to scaling up renewable energy development and use,167 take further action “at the national, regional and international levels to accelerate the market uptake of renewable energy technologies,”168 create “a positive investment climate to attract private capital for renewable energy”169 and recognize “the need for making technical assistance for renewable energy widely accessible to developing countries.”170 The Declaration notes that necessary actions for scaling up the use of renewable energy will include “creating supportive policy, legal, and institutional frameworks.”171

C. The Role of International Institutions

A significant weakness in the current international institutional arrangements for promoting renewable energy and energy efficiency is the lack of an entity with the express purpose and function of promoting these technologies. This can be contrasted with nuclear energy, which has received ongoing support since its inception from the International Atomic Energy Agency (“IAEA”). The United Nations established the IAEA in 1957 in order to promote nuclear energy.172 Within the U.N. system, “the Regional Economic Commissions play an important capacity building role” in the field of renewable energy.173 The United Nations Environ-

151. Id. ¶ 21.
152. Id. ¶ 22(a).
153. Id. ¶ 22(c).
154. Id. ¶ 25.
155. Id. ¶ 26.
156. Id. ¶ 29.
157. Lyster, supra note 1, at 76.
158. The Gleneagles Communiqué, supra note 140, ¶ 9.
159. Id.
162. Id. ¶ 1. This conference was hosted by the Chinese Government with support from the European Commission. The conference was held at the initiative of the German government as a follow-up to the Bonn 2004 Renewable Energy Conference.
164. Id. ¶ 7.
165. Id.
166. Id. ¶ 9.
167. Id. ¶ 11.
168. Id. ¶ 8.
ment Programme ("UNEP") and the UNDP have also been important actors to date.\textsuperscript{171} Some other specialized U.N. agencies, including the World Health Organization ("WHO") and Food and Agriculture Organization ("FAO") have addressed renewable energy and energy efficiency within their portfolios in recent years, and the Commission on Sustainable Development ("CSD") has included these technologies within its work plan for the near future.\textsuperscript{172} Renewable energy is also supported by intergovernmental organizations such as the IEA and the Organización Latinoamericana de Energía ("OLADE"), but none of these focus specifically on renewable energy and energy efficiency.\textsuperscript{173}

As for financing, the World Bank and the regional development banks have financed a significant number of renewable energy projects in various parts of the world, sometimes in cooperation with private enterprise.\textsuperscript{174} Critics contend, however, that the World Bank has been too focused on large-scale projects, sometimes with questionable environmental results.\textsuperscript{175} Additionally, the Global Environment Facility ("GEF") "operates more than 100 programmes for the promotion of energy production and consumption from renewable energy . . . mainly with a domestic scope." However, its "[p]rojects do not address issues such as taxation, subsidies or trade law on a global scale."\textsuperscript{176}

III. Toward a Future of Legal Management Regimes

A. Future Directions of Public International Law

As documented above, many international instruments promoting renewable energy and energy efficiency technologies already exist, both in the form of conventions or protocols and soft law declarations. The reality is, however, that these are of limited effect and much more needs to be done by the international community in this field. The UNFCCC and the Kyoto Protocol have very few references to renewable energy and energy efficiency, and those that exist are couched mainly with a domestic scope.\textsuperscript{177} While the Energy Charter Treaty and its accompanying Protocol on Energy Efficiency contain many more provisions and details relevant to the subject at hand, and in this sense amount to a significant improvement compared with the UNFCCC and the Kyoto Protocol, the provisions are also non-binding.\textsuperscript{178} A further problem is that the Energy Charter Treaty and Protocol on Energy Efficiency have only some fifty signatories, and many of the major energy consuming and producing nations, such as the United States, China, and India, are excluded.\textsuperscript{179}

Turning to the current soft law instruments in this field, the Gleneagles Plan of Action is significant in that it makes a clear commitment to the promotion of renewable energy and energy efficiency technologies and amounts to a ‘state-of-the-art’ declaration of current international practice and the way forward for the future.\textsuperscript{180} Encouragement can be drawn from the fact that many nations that were initially wary of or hostile to international instruments promoting renewable energy and energy efficiency have been willing to sign declarations and non-binding commitments in this field.\textsuperscript{181}

In what directions should policymakers be looking to involve public international law in this field? The following directions are suggested.

In the short term, the goal should be to achieve a comprehensive soft law instrument, preferably in the form of a United Nations General Assembly declaration, promoting renewable energy and energy efficiency technologies. This could contain binding targets for the adoption of renewable energy in electricity generation and a reduction in energy intensity in all the sectors of the economy (industry, buildings, appliances, and transportation). These are the same targets that many environmental groups were hoping to see included in the WSSD Plan of Implementation. A draft of a possible non-binding declaration, entitled Draft Non-Legally Binding Statement of Principles for a Global Consensus on Sustainable Energy Production and Consumption, has been prepared by the author and published elsewhere.\textsuperscript{182} For each nation, this draft proposes comprehensive objectives, common principles, measures for improving efficiency in energy supply systems and consumption, appropriate energy pricing measures, the mitigation of environmental impacts, actions to promote consumer information and environmental education, and international cooperation.\textsuperscript{183}

In the longer term, we should strive to achieve a new international convention or protocol to an existing convention such as the UNFCCC, which specifically focuses on and promotes renewable energy and energy efficiency technologies. This instrument should contain binding commitments on the part of the contracting parties. One possibility is to require a timetable specifying commitments to the on-going reduction of energy intensity in all aspects of energy production and consumption by agreed dates. This would have the effect of ensuring the uptake of all available and economically viable energy efficiency and renewable energy technologies. A possible draft of such an instrument has been prepared by the author and published elsewhere.\textsuperscript{184} This draft explores the possibility of a new convention adopting the format

\textsuperscript{171} Id.
\textsuperscript{172} Id.
\textsuperscript{173} Id.
\textsuperscript{174} Id.
\textsuperscript{175} Id.
\textsuperscript{177} See Steiner, supra note 170, at 154 tbl.7.1.
\textsuperscript{178} See supra notes 59–82 and accompanying text.
\textsuperscript{179} See supra notes 83–107 and accompanying text.
\textsuperscript{180} See supra notes 138–160 and accompanying text.
\textsuperscript{181} See supra text after note 160.
\textsuperscript{183} Id.
of the Kyoto Protocol and its central feature of proposing more onerous commitments on developed country parties in recognition of their greater economic status and their past responsibility for wasteful usage of energy supplies.\textsuperscript{185} The draft convention includes specific articles relating to the fundamental principles underlying the convention, specific principles guiding the objectives and implementation of the proposals, the commitments of developed country parties and all other nations, the definition and estimation of energy intensity, the role of environmental impact assessment, the settlement of disputes, and the provision of financial resources for less developed nations.\textsuperscript{186}

While much has been achieved by various U.N. agencies in relation to international institutional arrangements, as outlined above, much of their work in this field has been ad hoc and subordinated to work in other sectors. Renewable energy and energy efficiency are of sufficient importance in modern times to justify the establishment of a specialized agency dedicated to their cause. The IAEA could serve as an appropriate model. There is at least an equal justification for the existence of such an agency in relation to renewable energy and energy efficiency, which have actual and potential application worldwide, as there is in respect of nuclear energy, which is limited to a minority of countries.\textsuperscript{187}

B. The Contents of a National Legal Regime

This section considers the contents of an optimal national legal management regime governing all next generation energy technologies. A proposed new international legal instrument will be needed to instruct such a regime. The Gleneagles Plan of Action is particularly useful in this regard because it contains a comprehensive list of appropriate measures and policies for national governments to adopt.\textsuperscript{188}

It is unrealistic to expect governments to agree to a public international law instrument that would prescribe a form of national legislation promoting next generation energy technologies. The appropriate legislation will depend on the availability and distribution of resources. Thus, for example, there is no point in adopting legislation controlling geothermal energy exploration and production in countries where little or none of the resource exists. Geographical and climatic factors will also dictate the appropriate form of the local laws. While solar access protection is important in urban areas of developed nations in temperate latitudes, such legislation would be redundant in less developed states where high-rise buildings do not exist and in equatorial regions where the sun is sufficiently high in the sky that shadows do not pose problems for solar energy users. Wind regimes will also vary enormously from country to country. While some countries may rely heavily on wind for energy purposes, this form of energy will not be economical in other countries where the average wind speeds are insufficient for electricity generation.

Another variable factor between nations is the level of development. For example, complex building laws in developed states mandating prescribed energy efficiency measures have no place in less developed states where the majority of the population lives in native dwellings. Although international law can give guidance to states as to the best practices in terms of legislation supporting next generation energy technologies, each state must be left free to choose the types of national laws to adopt in this domain.

The majority of developed states have enacted some next generation technology legislation, but none have enacted a full range of measures across the entire legal spectrum. An examination of the existing laws suggests an implicit assumption among legislators that it is impractical to enact one law to cover the whole range of legal issues affecting next generation energy technologies. Instead, a range of separate enactments will be required. With regard to energy efficiency, there appears to be an implicit consensus that separate laws will be required with respect to each sector of the economy—transportation, industry (including cogeneration), buildings, and consumer products. As for renewable energy technologies, while there may be a need to enact an overarching law concerning the generation of electricity by such energy sources, other aspects of their exploration and development require the enactment of separate laws specific to each type of renewable energy.

1. Energy Efficiency

a. Transportation

Ground transportation represents one of the greatest areas of challenge for energy efficiency. Road vehicles consume approximately fifty percent of the world’s produced oil.\textsuperscript{189} With few alternative fuels available, oil remains the primary energy source for transportation.\textsuperscript{190} Various forms of fuel substitutes such as ethanol, liquefied petroleum gas (“LPG”) and compressed natural gas (“CNG”) have been developed, but each of these options suffers from various disadvantages or inconveniences.\textsuperscript{191} In the long term, hydrogen may prove to be the ideal substitute fuel, but even ardent proponents of a hydrogen economy concede that this will not occur in the near future.\textsuperscript{192}

\textsuperscript{185} Id. at 61.
\textsuperscript{186} Id. at 71–90.
\textsuperscript{188} See supra notes 140–157 and accompanying text.
\textsuperscript{190} Id.
The following legal options exist for inclusion in national legislation:

- Enact planning and zoning laws to ensure that public transportation can provide adequate services to new developments, and minimize the need for travel within urban areas. This is particularly important in light of the continuing world population increase and the rapid urbanization of many developing states;\(^\text{193}\)

- Enact planning laws to ensure that urban consolidation is promoted, so as to improve accessibility to centers and other important hubs;

- Implement various demand management programs to reduce the need for urban travel, the amount of urban travel, and the impact of this travel. Such measures include: the use of staggered working hours and the deregulation of weekend working; the use of high occupancy vehicle lanes; passing laws that allow every car to function as a taxi by permitting drivers to pick up pedestrians at designated areas; improvement of traffic flow by the use of traffic management measures; regulatory control of access to city centers for private vehicles; the increase of parking controls, including increased fees and restrictions on the number of parking places available; the installation of road pricing controls, such as imposing fees for vehicle use of certain key roads; and the modification of taxation laws to discourage companies from providing company cars to their senior employees, such as the imposition of income tax liability on employees for the value of company cars;

- Require private vehicles to be labeled with fuel consumption information;

- Require that fuel efficiency information is included in all model-specific motor vehicle advertising;

- Develop fuel economy standards for vehicle manufacturers;

- Create a compulsory system of annual inspections for motor vehicles, as vehicles with tuned motors can lead to significantly higher fuel efficiency than poorly maintained or neglected vehicles;

- Implement a “feebate” system, imposing higher sales/ goods and services tax for inefficient vehicles with tax rebates for relatively efficient vehicles. Such a system would specify a sliding scale of charges for vehicles of lower efficiency (gas guzzlers) and incorporate a sliding scale of rebates for vehicles of higher efficiency (gas sippers);

- Skew motor vehicle registration fees towards higher charges on inefficient vehicles;

- Increase the petroleum excise tax, payable by consumers at the point of sale on a cents-per-liter basis;

- Provide for income tax rebates or credits on the purchase of motor vehicles that meet specified fuel economy standards;

- Promote ethanol production by offering financial incentives to farmers to grow the necessary crops. Such incentives might include direct grants or loans on favorable terms, modifications to the local income tax legislation to allow for a tax deduction or rebate for the associated costs of development and investment, or an investment allowance;

- Support the redesign of motor vehicles so that engines are capable of using a higher ethanol blend.

### b. Industry

One of the major means of improving energy efficiency in industry is through the use of cogeneration plant technology;\(^\text{194}\) New national legislation should require local electricity utilities to adopt and support schemes for electricity generation by cogenerators.

There is a wide range of possible legal measures to improve energy efficiency in industry. One interesting possibility, of Japanese and Chinese origin, would be a provision requiring the establishment of energy officers by industry, whose task would be to monitor energy consumption and to suggest various means of reducing consumption.\(^\text{195}\) This provision would apply initially to industries using more than a designated amount of energy per annum, but could later be varied to lower levels when the appropriate infrastructure is in place.\(^\text{196}\) The designated amount would be left to the discretion of individual governments.\(^\text{197}\) This provision could be accompanied by a system of minimum efficiency or performance standards for various specified types of industrial equipment.\(^\text{198}\) New industrial equipment would also be required to meet the designated standards before being permitted to enter the market.

In addition to these measures, new legislation could impose the requirement that companies spend a designated percentage of their payroll or profits each year towards implementing energy efficiency measures.\(^\text{199}\) A scheme of this nature would need to be coupled with a compulsory energy audit, which

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193. Urbanization in developing countries leads to increased fuel consumption in part because in urban centers for the developing world, “car ownership is often seen as one of the first symbols of emerging prosperity.” Energy Information Administration, supra note 189, at 135. For a discussion of the world population increase, see U.S. Census Bureau, World Population: 1950-2050, http://www.census.gov/ipc/www/idb/worldpopgraph.pdf (last visited Oct. 17, 2010).


196. Id. at 163.

197. Id.

198. Id.

199. Id. at 155.
would identify areas of potential savings. The annual levy would be applied until such time as all the areas of energy waste identified in the energy audit were rectified.

c. Consumer Products

The adoption of a policy of sustainable energy involves the introduction of a wide range of consumer products incorporating renewable energy and energy efficiency technologies. These products include household electrical goods, solar water heaters, solar swimming pool heaters, wind turbines, and solar heat pumps. Consumer confidence is essential to the widespread introduction of these consumer products. Unfortunately, consumer confidence in these products appears to be lacking and there are many reported instances of consumer fraud.

In the United States, several states have enacted legislation designed to give specific protection to the purchasers of renewable energy devices against faulty manufacture, improper installation, and a wide variety of consumer fraud. For example, New York has enacted the Solar Products Warranty Act, which requires express warranties to purchasers of all solar energy products in the state, regardless of use. Minnesota has also established quality and performance standards for different types of solar energy equipment and requires solar manufacturers to make a full disclosure at the time of sale regarding the extent to which the system meets or exceeds the relevant quality standards.

Recently, consumer product standards for electrical household goods have been a common feature of sustainable energy legislation. These standards have been enacted not only by developed states, but also countries such as the Republic of Korea and the Russian Federation. To ensure maximum compliance and to increase consumer confidence, it is important that all standards can be legally enforced. The simplest method of achieving this would be to enact legislation giving the appropriate government agency the power to prescribe a standard and to enact regulations to protect and enforce standards.

A system of compulsory labeling of designated appliances for energy consumption is an important means of educating the public as to the significance of energy consumption in purchasing decisions. Such legislation exists already in the United States. Appliance labeling was first introduced in California by the Warren-Alquist State Energy Resources Conservation and Development Act, which empowers the State Energy Resources Conservation and Development Commission to prescribe energy consumption labeling programs on a state-wide basis for appliances that, in the opinion of the Commission, require a significant amount of energy. The United States government also legislated in this area with the Energy Policy and Conservation Act of 1975. Compulsory systems of labeling have been introduced in many other developed and developing countries in recent times.

The other area of difficulty encountered by consumers is improper installation of renewable energy devices and energy equipment. Two possible solutions to this problem would be to develop a course of education for installers and to implement a system of trade accreditation. Such programs could be supported by legislation prohibiting the installation of renewable energy devices and energy efficiency equipment by unqualified persons, and prescribing in detail the minimum educational standards required for a person to receive a license. The possible forms of any such legislation are many and varied. There are numerous state statutes in the United States that could serve as a precedent. For example, legislation in Arizona requires all contractors installing solar equipment to pass a state examination covering problem areas in solar installations. Under former Hawaii legislation, all dealers of solar equipment were required to post a bond with the Director of Regulatory Agencies; customers were given a first claim on the bond if the equipment did not perform as the dealer claimed, provided that the consumer first tried to settle any dispute with the dealer.

200. Id.
201. Id.
202. United Nations Economic and Social Commission for Asia and the Pacific, Environment and Development Division, http://www.unescap.org/esd/energy/information/efingo.asp. As long ago as 1978, the Law Reform Committee of South Australia reported that it had received many submissions concerning the growth of “fly-by-night” manufacturers, inaccurate claims made by some manufacturers as to energy savings realized by solar devices, and poor performance of some devices. Law Reform Committee of South Australia, Solar Energy and the Law in South Australia 72 (1978).
204. See MINN. STAT. § 216C.25 (2009).
207. See, e.g., Trade Practices Act 1974 (Cth) ss 65C-65E (Austl.).
d. Buildings

There is considerable potential to economize energy production in many countries by ensuring that buildings are energy efficient. Adequate thermal insulation is needed throughout the world to ensure that energy is not wasted in unnecessary heating and cooling. Legislation in this field must be applicable to residential and commercial buildings, to existing and newly constructed buildings, and to owner occupied and rental buildings. This latter point is particularly important as neither landlords nor tenants have any incentive to improve energy efficiency. Landlords are often reluctant to make improvements as they are not responsible for the fuel bills, while tenants often resist paying for improvements to another person’s property.

Legal measures addressing both builders and occupiers are required. In relation to the building industry, measures should mandate energy efficiency requirements in all new buildings. Five basic types of regulations could, if enacted, drastically increase energy efficiency at a low cost to homeowners: (1) mandatory building performance regulations; (2) mandatory prescriptive regulations for building materials; (3) mandatory or voluntary energy rating or labeling systems for buildings; (4) a mandatory system of assigning energy and resource option points to buildings; and (5) a mandatory system requiring the building’s vendor to disclose the insulation installed in the building in the contract of sale. Examples of all five types of energy efficiency measures exist in different jurisdictions.

When weighing these alternatives for the purposes of determining the contents of new legislation, the building industry should be given as wide a range of choice as possible to achieve energy efficiency improvements. Rather than simply specifying minimum standards of insulation, the legislative framework should create minimum building performance standards, which could be satisfied by a wide range of means. This could be implemented by creating a system of efficiency points, whereby each building would be required to achieve a minimum number of points. Points could be awarded for factors including roof insulation, wall cavity insulation, solar water heating, hot water systems of prescribed efficiency standards, reduced area of non-south glazing, insulated exterior doors, hot water pipe insulation, air filtration rate below a prescribed level, or passive solar features. Such a system has been adopted by a number of U.S. municipalities after being pioneered by Boulder, Colorado.

An alternative form of implementing building energy performance standards was exemplified by the Australian Capital Territory’s adoption in 1997 of a system requiring all design and site applications for new dwellings to be accompanied by a house energy rating assessment based on a system of star-ratings. Though later repealed, under this system an accredited assessor conducted the assessment and, except in special circumstances, a minimum energy rating of four stars was obligatory. The star rating was made available to all prospective purchasers of the building. Currently, “[a] less sophisticated system of this nature also exists in Denmark under the Danish Building Regulations for Small Buildings 1985.” According to the Danish law, “the label ‘low energy house’ is bestowed on houses whose net energy need for heating and ventilation is not more than fifty percent of the maximum energy needs of the building, calculated pursuant to a formula prescribed by the legislation.” A further variant of this system has recently been introduced in Queensland, Australia. Pursuant to Part 5 of the Property Agents and Motor Dealers Act 2000, before the seller of a house, unit, or townhouse offers to sell the building, the seller must prepare and sign a sustainability declaration in the prescribed format. The seller or the agent must not give any person a document (such as a brochure) advertising the sale without including a copy of the sustainability declaration. At a property inspection, the seller or agent must make a copy of the sustainability declaration available to the potential purchaser. If a person buys a building and the declaration is materially false or misleading or is prepared without reasonable skill and care so that the buyer incurs a loss or expense, the seller is liable to compensate the buyer.
2. Renewable Energy Resources

  a. Electricity Laws

Except in countries where the electricity industry operates as a national monopoly or is state-controlled, national electricity laws control the operations of the private electric utilities and provide protection for consumers. The creation of law for sustainable energy development will involve certain amendments to this legislation. There are three crucial issues to address: the promotion of renewable energy; the compulsory buyback of electricity generated from renewable sources by private suppliers; and universal access to electricity supplies.

i. The Promotion of Renewable Energy

Some national governments in recent years have attempted to promote the use of renewable energy by utility companies through Mandatory Renewable Energy Targets (“MRET”). In some cases, the targets are simply government policy and do not have the force of law; in other cases they have been legislated into effect. One illustration of a legislated target is Australia’s legal scheme. The initial scheme, established in April 2001, placed a legal liability on wholesale purchasers of electricity to contribute proportionally to an additional 9,500 gigawatt hours (“GWh”) of renewable energy per year by 2010. The scheme also established a system of renewable energy certificates (“REC”) and a REC market. The newly-elected Labor government instituted a challenging renewable energy target of creating twenty percent of the nation’s energy from renewable sources by 2020. This amounts to 45,000 GWh of renewable energy supply. To discharge their obligations under the MRET, liable entities must surrender the prescribed number of RECs to the regulator. The actual number of RECs that must be surrendered by a liable entity each year is determined by a legislated formula. If an insufficient number of certificates are surrendered, the entity has a REC shortfall and must pay a statutory shortfall charge.

As an alternative to the MRET scheme, a number of countries as well as many states in the United States have introduced Renewable Portfolio Standards (“RPS”), which specify that each electricity supplier must acquire a set percentage of total electricity sales from renewable energy sources. For example, in the first year of operation of the UK Renewables Obligation, designated suppliers had to source three percent of their electricity from eligible renewable energy facilities. By contrast, the Australian MRET sets a target amount in GWh of electricity that must be sourced from additional renewable energy sources for the whole country and is to be met by wholesale purchasers of electricity according to their market shares.

ii. The Compulsory Buyback of Electricity Generated from Renewable Sources by Private Suppliers

One of the major reforms in many states in recent years has been the introduction of “feed-in” tariffs. Feed-in tariffs permit electricity consumers who install renewable energy devices that generate more energy than needed by the installer the right to feed their excess electricity back into the local grid and to be reimbursed at a fixed amount per kilowatt-hour. Feed-in tariffs were pioneered by Germany and have proven to be so popular that renewable energy now accounts for fourteen percent of all electricity generated in the country. Germany also has fifty-five percent of the world’s installed solar capacity. Feed-in tariffs have since been enacted in a range of jurisdictions worldwide and have been proposed for national adoption in the United States.


233. Explanatory Memorandum, Renewable Energy (Electricity) Amendment Bill 2009 (Cth) 2 (Austl.).


235. See Renewable Energy (Electricity) Amendment Act 2009 (Cth) (Austl.).

236. This equated to an increase of two percent in the amount of electricity contributed nationally from renewable energy resources, representing an increase from 10.5% to 12.5% of total electricity generation. Alexandra S. Wawryk & Adrian J. Bradbrook, Australian Initiatives Promoting Renewable Energy Resources in Electricity Generation, 23 J. ENERGY & Nat. RESOURCES L. 188, 189 (2005).


238. See Explanatory Memorandum, Renewable Energy (Electricity) Amendment Bill 2009 (Cth) 2 (Austl.).


240. Id.


242. Id. at s 36.


244. The Renewables Obligation Order, 2002, § 6(2), sch. 1 (Eng.).

245. See Renewable Energy (Electricity) Amendment Act 2009 (Cth) (Austl.).


249. Id.

Feed-in tariffs represent one of the major steps that governments can take towards increasing the popularity of solar and other renewable energy resources among individuals and private companies. Until the introduction of the German scheme, many earlier schemes failed to specify a reasonable rate for the feed-in tariff and/or imposed high additional expense requirements for the purchase of new meters or other administrative charges. Legislation will be required to introduce a new scheme of this nature, although the exact level of the tariff will be a political and economic decision.

iii. Universal Access to Electricity Supplies

As discussed above, studies undertaken by the United Nations have shown that almost two billion people worldwide lack access to electricity supplies. The problem is mostly limited to developing nations, in particular Sub-Saharan Africa and South Asia. The lack of access to electricity constrains the ability of the populations of developing states to benefit from opportunities for economic development and increased living standards. While there may be some opportunities in developing countries to construct new grid systems and extend existing electricity grids, experts anticipate that by and large, these countries will depend upon standalone systems to generate electricity with renewable energy resources.

From a legal perspective, there appear to be two alternative ways to ensure universal access to electricity. Countries with domestic human rights legislation could amend existing law by declaring that the right to a basic supply of electricity is a human right. The alternative option is for electricity legislation to impose an obligation on private utility companies to expand their networks or to provide standalone remote area electricity supply systems in all areas currently unconnected to an electricity grid.

A useful illustration is South Africa’s legislation. The Electricity Act of 1987 § 10(1) requires that electricity service providers make electricity available to every applicant who is in a position to make satisfactory arrangements for payment. This obligation on electricity service providers has been interpreted by the South African High Court as a right of applicants to access electricity supplies if they have satisfied the payment requirements. Of course, neither option may be practicable unless sufficient funds are made available to ensure that electricity supplies can be made universal. The funding required for this purpose would be substantial and would be beyond the means of developing countries without funding from international sources, such as the Global Environment Fund, the World Bank, or the Asian Development Bank.

b. Solar Energy

Solar energy can be effectively promoted by the enactment of amendments to national electricity laws along the lines referred to in the preceding sub-section. In addition, some further legislative measures specific to the promotion of solar energy should be considered.

Although there is a wide range of solar technologies, all of them share the need for solar access to solar collector panels. To work effectively, approximately six hours of daily access is required, centered on the zenith position of the sun. Except when the sun is directly overhead, the sun’s rays will have to pass through the skylapse of one or more neighboring properties, during which time they may be blocked by vegetation or buildings. Legislation is required to protect the solar user’s right of solar access, as shading will render solar appliances worthless.

While common law in certain jurisdictions may protect solar access through easements, restrictive covenants, or nuisance, some commentators have dismissed these rights as inadequate and have called for a legislative response. Many possible alternatives are either in effect or have been canvassed. These alternatives use either property law or planning law to fashion a solar right. Property law can be used to recognize the right of solar access as a separate interest in property, which could be protected by lodging the interest in the local land titles office. This solar right could be

259. See id. at 16.
263. Id. at 239.
265. See, e.g., Adrian Bradbrook, The Development of an Easement of Solar Access, 5 U.N.S.W. L.J. 230 (1982); see also infra note 266.
267. See, e.g., Goudkamp, supra note 266, at 79–88; Australian and American Perspectives, supra note 266, at 257.
268. See Australian and American Perspectives, supra note 266, at 246.
claimed under the principle of prior appropriation, as water rights are granted under water laws of the western states of the United States. Some commentators prefer the planning law approach, since the importance of solar access and the question of the suitability of the various forms of control vary from one municipality to another. In addition, solar access protection is closely interrelated with important planning issues concerning building height and setback requirements, block sizes and orientation, as well as the orientation of streets.

For new land developments, governments can best protect solar access by requiring the local planning authorities to take solar access into account when determining whether to approve a planning application. In many jurisdictions, particularly at the municipality level, solar access is not even listed as a relevant consideration. Three possible systems of solar access protection in planning law could be adopted by legislation. First, there is the system of solar access permits and registration, whereby solar users seeking to safeguard their right to solar access apply to a local council for a permit, which, if granted, is registered. After such a permit is issued, no future building permits conflicting with solar access will be granted. A second possibility is a system of solar building envelopes, whereby a building envelope is established to determine a three-dimensional space for development of each block of land. A legal remedy would exist where a structure was built on neighboring land outside the permissible envelope. The third alternative is the system of hypothetical solar fences, pioneered by the City of Boulder, Colorado. Under this system, no building or tree may be erected or planted on one block of land if it would cast a shadow on neighboring land longer than the shadow that would be cast by an imaginary fence of a designated height on the property boundary line between specified hours on the shortest day of the year. The amount of shade protection depends in each case on the height of the hypothetical fence; the lower the height of the fence, the more effective the shade protection.

Legislation will also be required to remove a number of legal barriers to solar energy utilization. Many jurisdictions have legislation impeding the installation of solar devices. This legislation differs from jurisdiction to jurisdiction, but commonly includes heritage legislation designed to protect buildings of historic significance, legislation designed to enhance the environmental qualities of a particular area (for example, restrictive covenants imposed by homeowner associations), legislation granting the local council power to erect tree plantations on streets and public land, and ordinances preventing the transmission of electricity across boundary lines or other limitations on the commercial sale of electricity. Another legal barrier is regulations controlling the construction and design of buildings. These regulations are often drafted without taking solar development into account and leave basic questions, such as building permits and setback requirements, unresolved. While requiring a building permit may be reasonable in the case of a large-scale, independently sited solar device, such as a thermal power station or photovoltaic array, it would seem unreasonable and unnecessarily bureaucratic in the case of common domestic solar systems attached to the roofs of houses. These devices should be granted an exemption to the application of the building regulations.

Finally, there is the problem of various covenants on land titles designed to enhance the amenity of a neighborhood, which, while not aimed directly at solar devices, have the effect of legally excluding such devices. An example would be a covenant that imposes height and/or setback requirements from the front boundary line, or which excludes appliances and installations on roofs. In many cases these covenants were imposed several decades ago, long before the current public interest in sustainable energy arose. National legislation should contain a provision entitling the courts in their discretion to discharge such a covenant when it is in the public interest.

272. Id. at 171.
274. Id. at 186.
275. Id. at 187.
276. Id.
279. Id. at 188.
281. See id.
c. Wind Energy

Like solar energy, governments can effectively promote wind by enacting amendments to national electricity laws along the lines of those measures discussed above. In addition, some further legislative measures specific to wind energy should be considered.

The major legal difficulty associated with the expansion of wind generators is the application of local planning laws. These laws raise complex issues because the planning legislation and the local planning schemes in most jurisdictions seldom contain specific and precise controls relating to the siting of individual wind generators or wind farms. Wind generators or farms are usually classified as a permitted use, but a permit is required in each case. The issue of a permit is usually subject to determination or challenge before a state planning tribunal, which possesses broad discretion as to whether and on what terms to grant planning approval. These decisions are often inconsistent and appear to mirror the emerging jurisprudence on climate change litigation, where the outcome of planning disputes appears to turn on the individual judge’s or tribunal member’s level of concern for, or awareness of, the importance of renewable energy for the mitigation of climate change. Frequently, judges or tribunals can reconcile environmental concerns associated with individual wind farm planning applications with climate change and energy considerations by imposing conditions or restrictions on the development without rejecting the proposal outright.

The proper role of planning laws in the case of conflicting land use is to balance the respective interests of the parties. Wind energy users should be legally entitled to have their development interest rank alongside the interests of those who may be against the creation of individual wind generators or wind farms. One possible solution is to enact guidelines for the determination of planning issues involving wind generators. In Australia, a document of this nature has recently been drafted by the Environment Protection and Heritage Council, although it has not yet been enacted into law. This could serve as a useful precedent for other jurisdictions.

The other major legal issue associated with wind energy is access to the resource. Because the power obtained from the wind depends on wind velocity, even relatively minor obstructions to the wind are capable of causing a large reduction in the production capacity of a wind generator. A legal means must be found to protect access to wind generators. As with solar access, property laws and planning laws can be used to protect wind access.

In relation to property, it would be possible to add a provision in the legislative framework giving the courts a discretionary power to grant a right of access to the wind generator as a separate property interest. This interest would be obtainable under the principle of prior appropriation and registered under the local system of land titles. As a further alternative, local courts could be given the discretionary power to create an easement or restrictive covenant against the wishes of the neighboring owner where it is deemed reasonable.

In relation to planning, the possible remedies appear more restricted than in the case of solar energy because the erratic nature of wind does not lend itself to the use of building envelopes or hypothetical fences. Thus, the only viable option would appear to be a system of wind access permits. Like building permits, these would be obtained from local government authorities. They would not replace building permits, which wind users would not be able to obtain unless they satisfy various specified safety and planning requirements. Once granted, the permits would prevent neighboring landowners upwind from using their properties in ways that would impede the free passage of wind access across their land to the wind generator.

A final legal problem associated with wind energy is product safety and manufacturing standards. Unlike with solar energy, the wind user may incur legal liability to neighboring landowners in certain circumstances. The possible hazards associated with wind energy generation include noise, vibration, blade throwing, fire damage, interference with television or radio reception, and microclimate modification. While reducing a wind user’s liability either in whole or in part would be both unrealistic and unfair to neighboring landowners,
other forms of legislation might be appropriate. One method of minimizing the possibility of the above-mentioned hazards and ensuring that the advantages and safeguards of modern technology are built into wind generators in the future is for national governments to either prescribe product safety standards or to prepare a standard relating to the manufacture of wind generators. Legislation could make non-compliance an offense punishable by a substantial fine, and an injunction could be issued to restrain a person from engaging in conduct that constitutes a contravention of the prescribed standards.

d. Geothermal Energy

Of the various types of geothermal energy throughout the world, the most significant are magmatic reserves, vapor-dominated systems, hot groundwater, and hot dry rocks. From a legal perspective, with a few exceptions relating to environmental protection measures, all of these types appear to raise similar legal issues, and therefore can all be treated together in the same enactment.

The most pressing need relating to geothermal energy is for the establishment of an appropriate allocative and management regime for the resource. The crucial issue is whether the allocation and management of the resource can be effectively conducted through amendments to existing legislation controlling one or more other types of natural resources or whether new legislation specifically controlling geothermal resources is required. If the former approach is adopted, geothermal water or steam could be deemed a "mineral," a "gas," or "groundwater," so as to trigger pre-existing legislation regulating minerals, oil and gas, or groundwater.

Precedents exist for all of these approaches. In the United States, for example, some states declare the geothermal resource to be "water," some declare it to be a "mineral," and the Ninth Circuit Court of Appeals held in Reich v. Commissioner that the resource should be classified as a "gas" for certain legal purposes. To regulate geothermal energy this way, governments would only need to enact a simple amendment to the statutory definition of "mineral," "gas," or "groundwater." Although it may be easier to incorporate geothermal energy into legislation designed for other purposes, governments should instead enact legislation designed specifically for geothermal energy. This approach is validated by the general experience in jurisdictions where the resource has been significantly exploited in the past. Legislation specific to geothermal energy has been enacted in common law jurisdictions, such as British Columbia (Canada), several states of the United States, and in three Australian jurisdictions. Unfortunately there is no unanimity between the jurisdictions as to the most appropriate system of structuring geothermal legislation.

As the methods of exploration and production of geothermal energy closely approximate those in the oil and gas industry, national legislation controlling geothermal energy can be modeled on petroleum legislation. At a minimum, such legislation should contain the following provisions:

- An exhaustive definition of “geothermal resources” to clarify what is included within the legislation and to ensure that normal groundwater is distinguished from heated water;
- A clarification of ownership rights in the resource;
- A management regime for exploration permits and production leases;
- Comprehensive environmental protection measures, relating to blowouts, atmospheric pollution, land subsidence, water pollution, noise, and well abandonment.

e. Carbon Capture and Storage (“CCS”)

Governments should also seek to pass comprehensive national legislation regarding CCS. As this is a new, emerging technology, there is no law that governs its development and exploitation. Perhaps the most fundamental issue to resolve is ownership rights—specifically, whether ownership

329. Id. at 5.
330. Id.
rights of underground depleted reservoirs and stored carbon dioxide vest in the State/Crown. In the absence of new legislation, common law will govern the respective rights of private companies and/or the government to the underground storage areas. In cases where the CCS disposes into an aquifer, the matter will be resolved by reference to the prevailing water law regime, which in most countries is statute-based.\(^{333}\) Where CCS disposes into a coal, oil or gas formation, the issue will turn on ownership rights in the depleted reservoir. This involves a consideration of the common law maxim, *cujus est solum, ejus est usque ad coelum et ad inferos,*\(^{334}\) with all the uncertainties its application entails. Legislation is needed to determine the procedure for each application of carbon storage and to ensure that there is a prescribed system of property rights and legal duties for all CCS operators with respect to their storage operations.

Besides this obvious property issue, the new technology will not advance unless liability issues surrounding the accidental release of stored carbon are clarified.\(^{335}\) As such storage must continue indefinitely, private investment will not occur in this area without some limitation on the developer’s liability for damages.\(^{336}\) A parallel liability scheme exists with nuclear waste release, where the private operator’s liability is limited by law to a fixed sum.\(^{337}\) The scholarship to date suggests that the most appropriate method of resolving this issue is to require the operator to remain legally liable for accidental damage from carbon release during the injection phase until evidence shows that the carbon has become stabilized.\(^{338}\) After this point, liability should be assumed by the state.

Australia is a leader in introducing new legislation to control CCS operations. The Commonwealth and two of the six states, Victoria and Queensland, recently enacted comprehensive legislation in this field.\(^{339}\) This legislation vests ownership of all gas storage reservoirs in the state,\(^{340}\) establishes a system of exploration and assessment permits\(^{341}\) and gas injection and storage leases and licenses,\(^{342}\) and specifies requirements for well drilling,\(^{343}\) gas storage monitoring,\(^{344}\) and safety management planning.\(^{345}\) With respect to liability, the legislation prescribes a closure assurance period of fifteen years, during which time the operator remains legally liable for any releases from, or damage caused by, carbon storage.\(^{346}\) After this time, the operator may apply for closure of the reservoir. The closure application will be granted if specified conditions are met. Particularly, the gas must be behaving as predicted.\(^{347}\) After closure, future liability is transferred to the government.\(^{348}\)

### IV. Difficulties in the Way of Reform

The creation of an international and a national legal management regime as outlined above will ensure the best opportunity for next generation energy technologies to achieve wide-scale acceptance and adoption in the international community. Such a development will assist in resolving environmental problems relating to the use of fossil-fuel technologies and will help to alleviate the growing problems of energy security.\(^{349}\)

Certain energy-related societal difficulties remain to be resolved, however. Perhaps the greatest of these, and the one that is least often discussed, is the problem of world population growth.\(^{350}\) While the use of renewable energy and energy efficient technologies will assist in preserving fossil fuels for future generations, even a much increased incidence in the use of these technologies will not arrest the growth in energy use worldwide.\(^{351}\) The latest figures from the 2009 British Petroleum Statistical Review of World Energy show a 1.4% annual growth in primary energy consumption worldwide.\(^{352}\) It is difficult to predict how long this growth will continue and how long the world will be able to tolerate it. The growth in energy use coincides with an increase in energy usage per capita in the developed world. However, it is difficult to predict how long this growth will continue and how long the world will be able to tolerate it. The growth in energy use coincides with an increase in energy usage per capita in the developed world. However, it is difficult to predict how long this growth will continue and how long the world will be able to tolerate it. The growth in energy use coincides with an increase in energy usage per capita in the developed world. However, it is difficult to predict how long this growth will continue and how long the world will be able to tolerate it. The growth in energy use coincides with an increase in energy usage per capita in the developed world. However, it is difficult to predict how long this growth will continue and how long the world will be able to tolerate it.

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334. Loosely translated, this means: “The person who owns the land surface owns the property from the center of the earth to the limits of the atmosphere.” For a discussion of the application of this maxim in the resources context, see Adrian J. Bradbrook, *The Relevance of the Cujus Est Solum Doctrine to the Surface Landowner’s Claims to Natural Resources Located Above and Beneath the Land, 11 Adelaide L. Rev. 462, 462 (1988).”


336. Id. at 39.


349. *See supra notes 13–15 and accompanying text (discussing the environmental and energy security impacts of world dependence on fossil fuels for producing energy).*


difficult to imagine significant reductions in this figure given the United States Census Bureau’s forecast that the world human population will increase from six billion to nine billion by 2050. Increasing populations will result in greater energy demand, regardless of how effectively society manages this demand. This problem is exacerbated by the fact that most of the population growth is currently occurring and expected to continue in developing countries, where the process of development largely depends on increasing energy consumption.

Another problem is the lack of capacity on energy issues in developing countries. In many developing countries parliamentarians lack the training, support staff, and general expertise to understand the legal issues and to prepare appropriate legislation. Although significant capacity building exercises on environmental law have been held worldwide, such courses have normally not included energy as a topic. This problem can be addressed only by the input of additional funds.

A useful precedent was the Parliamentary Forum on Energy Legislation and Sustainable Energy Development, a three-day forum held in Cape Town, South Africa in October 2005. This forum, organized by the United Nations Department of Economic and Social Affairs (“UN DESA”) and the Parliament of South Africa, invited energy law experts from developed states to address parliamentary representatives from English-speaking African nations on the appropriate legal means of promoting sustainable energy development at the national level. Due to lack of funds for such projects in the United Nations, the project could only proceed once funding was obtained from a private benefactor in the United States. The promotion of next generation energy technologies in developing countries is too important an issue to be left to the vagaries of private funding.

The final difficulty in the way of legal change is the lack of international cooperation and policy development. While the United Nations is the ideal institution to take responsibility for this issue, its efforts to date have been fragmented. The major problem is that no single agency within the United Nations is responsible for energy. Currently, energy research is conducted by the UNEP, the UNDP, the UN DESA and its six regional Commissions. There is some formal cooperation between these U.N. agencies, but for the most part they operate independently. This can be neatly contrasted with the IAEA, which focuses its efforts solely on promoting nuclear energy and research. A similar agency is needed for sustainable energy technologies. Two options for streamlining the reform process would be to dismantle the IAEA or, alternatively, dramatically increase the scope of its mandate to include all next generation technologies. In the absence of such a reform by the United Nations, the German government has assumed responsibility for launching a new body, the International Renewable Energy Agency (“IRENA”) with its own statute. It is too early to assess the effectiveness of this body, as the statute has not yet achieved sufficient ratifications to enter into effect. The status of this body could be improved if it is eventually incorporated into the U.N. agencies.

Conclusion

Given the current state of domestic and international next generation energy policies, a coordinated approach is necessary to support and promote next generation energy technologies. To address this need for coordination, this Article has argued for separate legal management regimes at both the international and domestic levels.

353. U.S. Census Bureau, supra note 193.
358. See id. at 2–3.
359. Email interview with Richard Ottinger, Emeritus Dean, Pace Law School (Nov. 3, 2010).
361. The regional commissions are: Economic Commission for Africa (ECA), Economic Commission for Europe (ECE), Economic Commission for Latin America and the Caribbean (ECLAC), Economic Commission for Asia and the Pacific (ESCAP), and Economic and Social Commission for Western Asia (ESCWA). See Other UN Offices, Funds, Programmes, & Regional Commissions, United Nations, http://www.un.org/Depts/otherorgs.htm (last visited June 30, 2010).
362. One illustration is the cooperation between the UNDP and UN DESA, together with the World Energy Council (an NGO) in producing the World Energy Assessment. See supra note 16.
364. The IAEA was created in 1957 to promote safe, secure, and peaceful nuclear technologies. The IAEA is an independent international organization relating to the U.N. and regulated by special agreement. See Statute of the International Atomic Energy Agency, Oct. 26 1956, 276 U.N.T.S. 3, 6.