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SUSTAINABLE DEVELOPMENT LAW & POLICY



EXPLORING HOW TODAY'S DEVELOPMENT AFFECTS FUTURE GENERATIONS AROUND THE GLOBE

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EDITORS' NOTE

In the last twelve months, “clean technology” hit prime time in the political arena. Nearly every campaign, every meeting of international leaders, and every town hall has lauded clean and green technology as the solution to the job crisis, the credit crisis, the climate crisis, and every other conceivable modern ill. Through cleaner, greener technologies we can make our air clearer, our planet cooler, and our lives more prosperous. Like any vague promise, these discussions of clean technology have not only fostered hope and brought out the skeptics and cynics, but are also beginning to fuel real debate as to the future of this emerging sector.

In this issue our staff set out to explore the current discourse in the clean technology field, beyond political rhetoric and campaign policy speeches. What we learned is both distressing and heartening. It seems that the world has barely taken a step down the path to cleaner technological solutions, and we have a great distance to travel before the panacea of clean technology can generate the types of benefits we seek. However, as this issue details, the debate is moving forward and countries around the world—from the United States to India—are testing innovative approaches on how to further global cleantech development and trade.

Our contributors from all over the planet examine the distance that we have traveled through proposed and promulgated policies, legislation, and regulations. And more importantly, they examine the road ahead and the major obstacles that we will need to break down, bypass, and overcome. An added feature of this issue of *Sustainable Development Law & Policy* is an introduction that strives to incorporate a perspective often overlooked in cleantech debates: the human perspective. The editors and staff of SDLP feel that throughout both high-level policy discussions and local implementation, we must remember the founding tenets of sustainable development by continuing to make the linkages between its environmental, economic, and social dimensions. In the context of cleantech and global warming, this most certainly includes a discussion of human rights. From there, articles cover the international trade and intellectual property regimes that keep clean technology from being freely disseminated. They scrutinize the current and speculate on the future positions of major international players, like China, India, the United States, the World Bank, and the WTO. And they consider how we're going to pay for it all.

We hope you enjoy this compilation of articles, which we feel provides an excellent overview of a few of the most pressing issues in the clean technology debate. As this debate intensifies in the coming months, we hope this issue of SDLP will help push the discourse beyond rhetoric and towards action.

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PERSPECTIVE: TECHNOLOGY TRANSFER AND HUMAN RIGHTS: JOINING UP THE DOTS

by Stephen Humphreys*

“The States Parties to the present Covenant recognize the right of everyone to enjoy the benefits of scientific progress and its applications.”—International Covenant on Economic, Social and Cultural Rights, Art. 15(1)(b)

The transfer of technology is one of the core mechanisms at the heart of the UN Framework Convention on Climate Change (“UNFCCC”) and a key vehicle for channeling the “equity” demands in that treaty. The UNFCCC recognizes (i) that in order to adapt to climate change and continue to develop sustainably, poor countries will need technological assistance, and (ii) that there is an obligation on richer countries—as their contribution to the cause of climate change is greater and they also have greater technological capacity—to provide that assistance. The treaty further makes developing country participation in the climate regime *dependent* upon “effective” technology transfer from industrial countries. Yet so far, for a variety of reasons, structured technology transfer has not taken place. Despite its centrality, and despite enormous attention in UN negotiating rooms over the years, the subject is infected by obscurity and jargon, it has received little public airing and often seems marginalized or disconnected from other, better known areas of the climate debate. There is no inherent reason that this should be the case, in particular given the central importance of technology transfers to surmounting climate change equitably. It is in that light that many of the articles in this issue of *Sustainable Development Law & Policy* focus on the global transfer of clean technologies and the mechanisms that strive to enable that trade. However, there is yet another important dimension of both technology transfer and the climate debate: the human perspective.

THE HUMAN RIGHTS DIMENSIONS OF TECHNOLOGY TRANSFER

Since the Bali Conference of the Parties in 2007, it has been clear that technology transfer will remain critical to any global deal on climate change, and so there is no room for continuing political deadlock. The resulting impetus has engendered new angles on climate-related technologies, among them increased attention to the human dimensions—sometimes articulated as the *human rights* implications—of this and other areas of climate change activity. More than most topics in the climate change arena, actions and decisions on technology transfer will have significant and specific human rights implications. These are of two main kinds, one immediate, the second longer term.

First, technological solutions will be required to ensure that the expected human rights consequences of climate change impacts are avoided or minimized. In short, technological

solutions are necessary for adaptation, especially where climate change threatens basic subsistence—health, food, water, and shelter, for example, all of which are recognized rights under international law. Expected threats include droughts, water salination and sea-level rise; livelihoods will be at risk as crops, fisheries, livestock, and even land will deplete or vanish. In order to head off the most dire consequences of these outcomes—forced mass migration and conflict—solutions will need to be found and mobilized quickly. In every case, such solutions will rely in part on the availability of appropriate technologies to meet the new conditions of life under a changed climate. These include water treatment technologies for desalination and irrigation, for example, or agricultural solutions to adapt to changing or reduced crop cycles. Protection from hotter temperatures through building materials or techniques, from higher sea-levels through protective walls or other measures, and from increased vector diseases, like malaria, through increased access to quality medicines and healthcare systems to distribute cures and provide care.

However, investment in these technologies is beyond the resources of many of the countries that will be worst hit. Finding a means to make them available at low or no cost is therefore critical to climate change adaptation if appalling human rights consequences are to be avoided. Bringing a human rights analytic to bear on the expected impacts of climate change can help direct attention to where the worst harms are foreseeable, which in turn can orient responses towards the most useful and urgent solutions. Since these solutions will involve—and are likely to some extent to hinge upon—technological know-how, a human rights angle can usefully be fed early on into both technology development and technology delivery agendas. Where these agendas are not yet being set in the climate change debate, attention to the human rights consequence will concentrate minds. Where agendas are being drawn up, looking ahead to human rights needs can provide useful orientation. In both cases, a human rights lens may lead policymakers to recognize the need for an intensive, coordinated, technically, and, in some cases, legally creative response to climate change in keeping with the requirements of the UNFCCC.

Second, long term development, upon which the protection of human rights ultimately depends, will come under immense stress due to climate change mitigation policies. For developed and developing countries alike—but especially for the latter

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where, in many cases, basic human rights still remain unfulfilled—further development will increasingly rely upon access to efficient, clean, and renewable technologies. Indeed, it will in many cases require restructuring of entire economies. Securing human rights over the long term in the face of climate change requires the transfer of technologies for energy generation and distribution and for adequate transport, among other things.

This is not a controversial demand, but once again little attention has been directed to the human rights consequences that will result from a failure to plan well in advance. For example, if technology transfer is slow or not forthcoming, individuals in many countries will inevitably be reliant on carbon-based energy supplies for their immediate developmental needs. A human rights sensitive approach to technology will be attentive to the possibility that access to carbon-intensive technologies may be more, rather than less, needed in some poorer countries, at least in the mid-term. The long-term fulfillment of basic human rights—to food, water, property, health, and shelter, and even culture and livelihoods—will depend, in many countries, on a measured, structured, and informed conversion from carbon to clean fuels. Awareness of these realities provides an appropriate basis for testing and fleshing out promises of future technological progress—which currently remain vague—against hard needs that already exist and will only worsen over time.

In each of the above areas, a human rights optic can bring essential nuance to policy. It can help ensure equitable access to new technologies in recipient countries through sensitivity to the possibility of inequalities of access and participation that mutually reinforce privilege and vulnerability. And it can help determine which of a possible range of technological solutions to choose in a given context, by focusing on the core necessity to maintain basic threshold levels of rights fulfillment for the greatest number over costly experimentation that may suit only a few.

FRAGMENTATION OF INTERNATIONAL LAW?

Among the many obstacles cited for the delay in implementing effective technology transfer, intellectual property rights are often assumed to be the primary problem. International protection of intellectual property is thought to pose an initial hurdle to governments attempting to make transfer effective using public policy tools. Treaty agreements, notably (but not only) the WTO-governed Agreement on Trade Related Aspects of Intellectual Property Rights (“TRIPS”) ensure that the protections of private ownership in a given technology are adequately reflected in the price of that technology. Although TRIPS does not appear to be relevant to all or even most of the technologies needed for climate change adaptation, this complaint deserves attention if only because it has had a chilling effect on technology transfer negotiations.

TRIPS is not the only international legal instrument relevant to climate change or to technology transfer. Climate change technology transfer takes place within the context of a broad web of relevant treaty laws and customary practices, and is relevant to an unusually wide range of areas of science, law, and policy. In addition to intellectual property law, other areas of the international trade regime are clearly relevant, including the

safeguards of private property rights (the rights of investors or technological proprietors) found in free trade agreements and in Bilateral Investment Treaties. The latter frequently include clauses specifically prohibiting host governments from actions to further technology transfer. Where these treaties also include “most favored nation” provisions, as most do, an international regime effectively takes shape universalizing this prohibition.

To these must also be added international human rights law, which is presumptively relevant whenever policy options have human rights implications. Here, the principal instrument is likely to be the International Covenant on Social, Economic and Cultural Rights (“ICESCR”). The 159 states that are party to the ICESCR have undertaken to “progressively realize” the social and economic rights (such as to food, water, health, education, and housing) of those within their territories. Under conditions of climate change, states’ obligations towards their own populations in these areas are arguably reinforced at the international level, where arrangements between states effectively facilitate or impede the capacity to fulfil these rights. In this regard, a rarely cited provision of the ICESCR acquires renewed importance in the context of climate change. ICESCR Article 15(1)(b) guarantees “the right of everyone . . . to enjoy the benefits of scientific progress and its applications.”

To conclude, technology transfer is a necessary and central plank of any global climate change solution, but it often appears stuck in jargon and entrenched positions engendered over years of difficult negotiations. So ironically, whereas everyone acknowledges the critical importance of technology transfer, progress has been slow or absent, and the subject has become unwieldy. Approaching it from a human rights perspective may help overcome the impasse, by allowing all parties to refocus on basic human imperatives and to set historical and ideological differences aside in the interests of dealing pragmatically with questions of real urgency. Locating human rights entry points and priorities can reorient the debate: what technologies are needed where and how urgently? Useful future research agendas may include:

- Predicting human rights threats in specific localities;
- Assessing the best and most efficient technology solutions already in existence to meet them;
- Framing technological research agendas for clean and efficient solutions for the most pressing urgencies;
- Assessing existing channels and barriers for international cooperation;
- Seeking policy solutions for an international regulatory framework;
- Assessing likely blockages and solutions at the national level; and ultimately,
- What sort of research and policy framework is needed to ensure that the right technologies reach the right communities in the most timely manner in order to prevent human rights harms?

These are among the urgent human rights questions faced by climate change negotiators as they seek any technology-based solution for the future and will continue to be extremely relevant to any discussion of clean technology transfer.



AN INTRODUCTION TO THIS ISSUE:

CLIMATE CHANGE AND TECHNOLOGY TRANSFER

by Dalindyebo Shabalala*

The Earth continues to experience record-breaking temperatures caused by increased concentrations of carbon dioxide and other greenhouse gases in the atmosphere. The impacts of this unprecedented warming include increased floods and drought, rising sea levels, the spread of deadly diseases such as malaria and dengue fever, and increasing numbers of violent storms. These impacts threaten to be more severe and imminent than previously believed. An urgent, global response is essential. The UNFCCC and the Kyoto Protocol, however, have failed to live up to their promise, especially in respect to technology transfer. This failure has pushed countries to move towards a new post-Kyoto framework with a focus on ensuring the effective and broad-based transfer of environmentally sound climate-related technologies.

Transfer of technology is a key pillar of any international response to global climate change. The UNFCCC and the Kyoto protocol were built on a basic political bargain. On one side, under the first commitment period, industrialized countries would take primary responsibility for emissions reductions. They would demonstrate carbon-free development, while transferring technology that would enable developing countries to make progress in reaching increasing carbon efficiency. Thus, carbon leakage, i.e. the shifting of polluting carbon-inefficient industries from industrialized to developing countries, would be avoided. The success of the first phase would enable developing countries to take on their own emissions reduction obligations in the second phase.

Industrialized countries, however, have largely failed to provide measurable, reportable, verifiable, and effective transfer of environmentally sound climate-related technologies. This failure was a primary bone of contention during the Bali Conference in December 2007, and it laid behind the refusal of developing countries to agree to take on specific emissions reduction obligations in the post-Kyoto period. The Bali Action Plan identifies technology transfer as a key element leading up to 2012 and beyond. However, there are several other challenges underlying the failure to provide transfer of technology, in addition to the lack of political will from the industrialized countries. These challenges include:

- A lack of criteria and support for conducting needs assessments and identifying priority technologies for transfer;
- A need to properly address the role of Intellectual Property (“IP”) with respect to mitigation and adaptation technologies and to proactively address ways that the IP system can be used or altered to serve the needs of addressing climate change;
- What lessons and best practices to learn from existing technology transfer mechanisms such as that of the Montreal Protocol and existing platforms and mechanisms existing mechanisms for technology transfer in other multilateral environmental agreements;


- A lack of institutional mechanisms at the national, bilateral and multilateral level responsible for implementing transfer of environmentally sound technologies;
- Insufficient programs to enhance absorptive capacity of technologies appropriate to the level of development of each country; and
- A lack of financial resources and financing mechanisms properly targeted at all stages of the technology transfer process, including capacity building.

The fundamental failure in achieving technology transfer has been a lack of responsible institutions and mechanisms.

The papers in this volume provide a broad overview of the range of issues that need to be considered if there is to be a real and sustainable solution to climate change that aims at transforming production and consumption patterns in both developed and developing countries. The role of outside research in producing information on what has gone on before, what is happening on the ground in countries such as China, and how approaches to technology, including the role of private investment, should be framed has become increasingly important to a workable outcome in Copenhagen.

A workable institutional mechanism for measuring, reporting, and verifying the effective delivery of technology transfer is crucial to reaching and successfully implementing any post-Kyoto agreement. Some of the elements covered in the articles in this volume point to the real need for work to be done to:

- Develop methods and criteria for technology identification and prioritization;
- Identify how modes of technology transfer might be implemented in a multilateral context;
- Outline the institutional mechanisms that will be needed at the national level and at the multilateral level to enable all the points in the technology transfer chain from economic actors in one country to economic actors in another country;
- Identify appropriate financing and funding mechanisms; and
- Ensure compliance and monitoring, reporting and verifying of technology transfer obligations

There is a lot of work to be done and not much time in which to do it. I look forward to further research that will contribute to achieving an effective and equitable multilateral agreement that will reduce greenhouse gas emissions, address the very real negative human rights impacts of climate change on vulnerable populations, and ensure a carbon efficient development path for all countries. 

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ABOUT SDLP

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CHINA'S CLEANTECH LANDSCAPE:

THE RENEWABLE ENERGY TECHNOLOGY PARADOX

by Federico Caprotti*

INTRODUCTION: CHINA'S RENEWABLE ENERGY TECHNOLOGY PARADOX¹

Cleantech is playing an increasingly important role as a sector of investment on the international scale, attracting \$8.4 billion in the North American, European, Chinese, and Indian markets in 2008.² This represents a thirty-eight percent increase on the \$6.1 billion invested in cleantech in 2007 in the same markets.³

Within cleantech, arguably the most important area, or sub-sector, of investment is renewable energy technologies and generation systems, which account for over thirty percent of cleantech investment flows.⁴ However, the role of renewable energy technologies at the national scale is also increasing in importance. This article focuses on China, where the development of renewable energy sources is crucial to energy security and to providing alternatives to the carbon economy, which is currently generating many environmental externalities. Renewable energy technology development and manufacturing also provide clear opportunities for the Chi-

nese central government to promote a domestic technology manufacturing base, and to achieve China's 2020 energy generation targets, as will be shown below. Therefore, renewable energy technology will play an increasingly important role in China's energy landscape. At the present time, renewable energy is both a current generation reality and a future technology opportunity: by 2005, renewable energy provided eight percent of the country's total energy consumption and sixteen percent of its total electricity output.⁵ This is expected to more than double by 2020.⁶

At the same time, research reveals that the Chinese renewable energy technology market presents a paradox: a market of opportunity based on a need for the development of generating capacity from renewable sources, coupled with the existence of policy, fiscal, and technological obstacles which hamper the potential of China's cleantech market in renewable energies. China is depicted as a leading cleantech market in the short to

medium term, especially in renewable energy technology, project infrastructure, and manufacturing.

However, many researchers have also highlighted the problems which seemingly go hand in hand with China's status as a predominant emergent renewables market in the short term, and as a projected market leader in the next five to ten years. These issues are not only restricted to the renewables business; they extend across the wider political and cultural context, bringing to

light the importance of a network approach to renewable energy technology development, manufacturing, and deployment. In short, China's renewable energy market presents an opportunity with clear challenges. The following provides an analysis of the main obstacles facing and currently affecting the renewable energy market in China.

OBSTACLES: POLICY, TAX, AND LONG-TERM MARKET DEVELOPMENT

Energy landscapes can be uneven landscapes. This can be due to a variety of factors. However, above all, the existence of obstacles to the development of cleantech landscapes

in a national context can mostly be related to policy, fiscal, and economic issues which can be deeply local. At the same time, global economic influences—both at the firm level and at the level of international economic policies—intersect with national regulatory and technology landscapes to constitute a complex environment in which clean energy technologies develop. China's cleantech landscape, and specifically its renewable energy market, is an example of the interplay of these forces. The following highlights some of the main issues facing the renewable energy market in the country today, focusing on energy pricing

Changes in import duties need to be stable in order to truly promote technology transfer into China; fiscal policy stability aids foreign technology businesses' long-range strategy and planning.

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policy, technology transfer, private investment, and the need for emphasis on energy conservation as well as monitoring and evaluation.

PRICING POLICY SHORTFALLS

China's 2006 Renewable Energy Law attempts, among other things, to set pricing standards for energy generated from renewable energy sources.⁷ The law's broad aims are to increase the capacity generated from renewables in the country, and are part of a wider national strategy aimed at increasing power supply as well as diversifying the generating base, as a result of rising demand and a need for energy security.⁸ The law's renewable energy pricing mechanisms are based on "feed-in" tariff models of the kind applied to European energy markets;⁹ however, the link between pricing at source and grid distribution in China is proving problematic.¹⁰ This is largely because utility companies have, in many cases, little incentive to connect a renewable energy project, such as a wind farm, to the grid. Once such projects are connected, utilities are required to purchase power generated by the projects; the price for renewables-generated power is higher than for coal-generated power, generally due to government-mandated subsidies and tariff levels (which are aimed at generating project revenue as well as paying off interest and loan principals required to build renewables projects in the first place).¹¹ Therefore, the current renewable energy landscape—especially in the case of wind power—features a backlog of completed projects which are not actually connected to the grid.¹²

TECHNOLOGY TRANSFER: UNCERTAINTY OVER IMPORT TARIFFS

Uncertainty also exists over the stability of China's current import duties on renewable energy technology and associated machine components. This uncertainty is an especially important factor in hampering already established technologies like wind turbines. For example, ninety-seven percent of large-scale (non-micro) wind turbines currently installed in China are imported (this includes components).¹³ The Chinese government's import duty strategy for wind technology has varied widely since the dawn of large-scale wind generation in 1986, alternatively imposing high and virtually non-existent taxes (see Figure 1).

Uncertainty over power prices hinders the inflow of capital focused on renewable energy projects.

For example, from 1990 to 1995, import duties were largely non-existent as the central government attempted to stimulate partnerships and technology transfer to develop a wind power base for the country.¹⁴ By 1996, the government's strategic focus had shifted to the development of a domestic, national, and localized wind turbine manufacturing market. In order to stimulate domestic manufacturers, the government levied duties on foreign wind technology imports. The imposition of duties

was reversed again in 1998, and a robust domestic manufacturing market is indeed developing: between 2003 and 2005, local wind turbine production rose from \$26 to \$104 million.¹⁵ However, during the same period, the share of imported turbine technology rose from \$35.9 to \$211.9 million.¹⁶

Uncertainty remains over the instability of import duties

and other taxes on foreign technology imports: for example, in April 2008, the central government changed the import context again by refunding value added tax ("VAT") on imported turbine components; this tax refund was backdated to the start of 2008.¹⁷ While this specific measure is aimed at easing the cost of importing wind technology to China, it also inhibits the development of domestic wind turbine manufacturing by providing incentives for importing essential components. Furthermore, changes in import duties need to be stable in order to truly promote technology transfer into China; fiscal policy stability aids foreign technology businesses' long-range strategy and planning. For example, the VAT rebate measure was accompanied by the cancellation of China's tariff-free policy for foreign turbine units with a capacity of less than 2.5 megawatts ("MW"). Although this is in keeping with the central aim of building wind farms with a generating capacity of not less than 100 MW,¹⁸ the resulting shifting import duty and tax landscape is not conducive to transparent cost pricing for importers, domestic manufacturers and, indeed, wind project developers.

PRIVATE INVESTMENT SHORTFALLS

At present, wind power technology and project development in China could be improved by enabling more investment from private sources (see discussion of development needs above). Government subsidies and preferential loan systems exist, but uncertainty over power prices hinders the inflow of capital focused on renewable energy projects. In this respect, the



Figure 1: Timeline of shifting import duties and taxes on foreign technology imports.

Chinese renewable energy technology market is markedly different from other, more established renewables markets such as in European countries or the United States:

[P]rivate investment has become the predominant force in wind farm construction in other countries. For example, around ninety-five percent of investment in wind farms was contributed by the private sector in India . . . ; However, unless a new investment mechanism with incentive policies and regulations is established [in China], and more financial channels are opened up, it [will] be difficult to realize the target of wind energy development.¹⁹

A DECLINE IN ENERGY CONSERVATION INVESTMENT

From the point of view of sustainability discourse and policy, national and regional efforts to promote sustainability in China cannot be seen as separate from efforts to improve energy conservation capabilities. China is currently adding the equivalent of a 2,000 MW coal-fired power plant to its generating capacity *every week*, and has been doing so since around 2000.²⁰ This represents a large annual rise in the amount of fossil-fuel generated power, and a resultant rise in environmental externalities. In 2004, for example, the amount of energy capacity added to China's generation system was roughly equivalent to the amount of energy generated in the whole of Spain or California.²¹ At the same time generating capacity has increased on the mainland, there has been an increased focus on renewable energy sources, especially hydroelectric, wind, and lately, solar power. However, this double trend—large incremental rises in generation capacity based on fossil fuels, and a rising interest in renewable energy sources—has been paralleled by a decrease in investment in energy conservation projects. This has led to the paradoxical situation that, from 1980 to 2000, China benefited from an energy supply surplus; since 2000, even with the added capacity, China has suffered from increasing energy shortages. Indeed, Jiang Lin, a China energy researcher at the Lawrence Berkeley National Laboratory in Berkeley, California, has recently argued that “support and policy commitments to energy conservation in China have weakened considerably during China's transition to a more market-based economy.”²²

MONITORING, EVALUATION, AND USER PERSPECTIVES

A wider issue, applicable across all renewable energy markets, is the need for consistent, transparent, and precise monitoring and evaluation of renewable energy projects after they

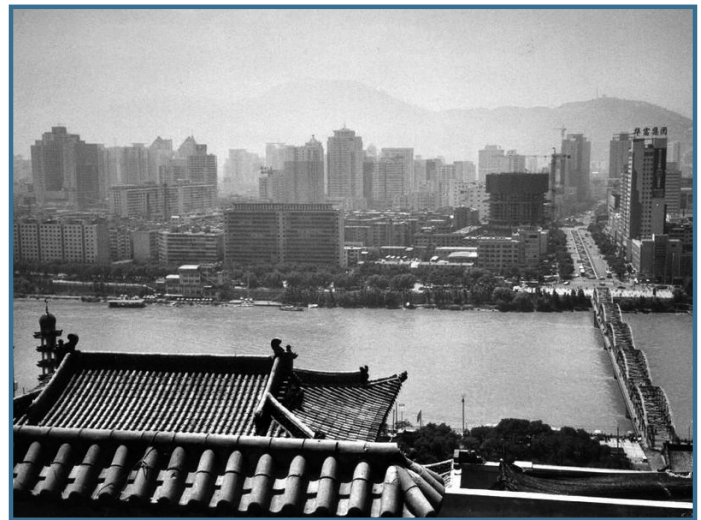


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China features several leading solar power and photovoltaic manufacturing and project companies, active in the domestic as well as in the international cleantech field.

have been commissioned and progressed past the project stage. In particular, recent research has pointed to the need to include user perspectives both in terms of the efficacy of new energy technologies, *and* their wider socio-cultural acceptability within particular contexts.²³ The adoption of effective monitoring and evaluation (“M&E”) programs can in turn be seen as a solution to the lack of connections from renewables projects to the grid. This is because effective M&E programs can be constructed

around a set of key indicators—such as the number of projects connected to the grid, or a series of connections over a specific time span—which clearly track progress. However, underlying grid connection issues, such as electricity pricing and subsidies as well as incentives for utilities to connect renewable generation capacity to the grid, have to be resolved before M&E can be effectively applied.

OBSTACLES OR CHALLENGES?

These factors constitute a very real threat not to the development of China's renewable energy landscape, but to its progress. It would, in fact, be unrealistic to forecast a stalling of the Chinese renewables market, especially after the passing of the 2006 Renewable Energy Law and considering the number of projects still in the pipeline. Furthermore, the current project pipeline may provide a temporal buffer—a year at most—in terms of project development, which could help offset the negative effects of the current credit crisis and oil price declines on the renewable energy spectrum, from research and develop-

ment (“R&D”) expenditure to project development and grid connections.

The main risks posed by the obstacles identified above lie, instead, in the friction which could be exerted on the Chinese renewables technology market. This friction can be expressed in terms of slower growth in what is a dynamic and fast-developing market; erratic policy interventions, ineffective pricing mechanisms, and other factors can be seen as draining the Chinese market of potential energy just after the achievement of its take-off phase.²⁴ If China is to achieve its 2020 target of fifteen percent of national energy generation from renewables,²⁵ as laid out in its latest (2006-10) Five Year Plan, then these obstacles represent serious challenges to be faced before the end of the decade. This is especially relevant in the case of those already established projects, apart from hydroelectric power, which are expected to lead the renewables generation tables: wind power, for example, is expected to account for three percent of national generation capacity by 2020.²⁶ However, the identified obstacles should be considered challenges, not market conditions that will negatively affect the Chinese market in the long run. Indeed, apart from these obstacles, the Chinese renewable energy market is exhibiting signs of vitality, innovation, and opportunity. This article concludes by focusing, briefly, on these avenues of future renewables development.

CONCLUSION: INNOVATION AND OPPORTUNITY

As argued above, the main obstacles facing the Chinese renewable energy market are challenges to be faced in the realms of policy, pricing, and technology development incentives and subsidies. In terms of sustainability, China needs to be able to apply innovative policies to energy conservation and an amelioration of the lived environment, especially in urban areas. Landmark projects, such as those at Dongtan eco-city, mask the fact that conservation and emissions reductions are priorities which are secondary to continued growth. This focus on growth, in turn, leads to a continued focus on a carbon-fueled economy. However, there are some areas in which China’s renewables market is exhibiting clear signs of innovation and leadership, as opposed to reaction to market conditions.

One of these areas is renewable energy technology exports. China is traditionally described as a net importer of renewable energy technology, technical know-how, and project development capabilities. This is especially the case where established technologies—developed mostly outside China—are concerned. In the case of wind power, mentioned above, China imports the

great majority of its turbine technology as well as components.²⁷ However, by 2008, it had become an increasingly important exporter and manufacturer of other renewable energy generation technologies. Solar power is a case in point. China features several leading solar power and photovoltaic (“PV”) manufacturing and project companies, active in the domestic as well as in the

international cleantech fields. For example, Suntech Power Holdings (“Suntech”), a leading solar power player, has been involved in co-developing and investing in several large overseas projects, such as Elecnor, a thirty-five MW solar power plant in Spain, and Alamosa solar plant in the U.S. state of Colorado, an eight MW project.²⁸ Furthermore, Chinese solar companies have been engaged in opening up new markets for their solar expertise, as seen in the construction of Katsrin solar power plant in the Golan Heights, Israel.²⁹ The fifty kilowatt farm is the largest in the country to date, and was constructed by Israeli solar firm

Solarit Doral, in conjunction with Suntech.³⁰ It is where renewable energy technologies are currently in the take-off stage—such as PV technologies—that Chinese renewables companies can be best positioned to compete and gain advantage over non-Chinese rival firms. Government investment in R&D must be rationalized and increased, however, if niche technology developments are to be effectively researched, marketed, and manufactured.³¹

Secondly, China’s focus on large-scale renewable energy generation projects provides a clear opportunity for the pooling of large-scale project expertise; this will be increasingly relevant internationally, as the focus on renewables shifts to projects with larger generating capacities. China’s aim of generating thirty gigawatts of installed wind power capacity by 2020, powering between thirteen and thirty million homes at full capacity, necessitates large-scale, highly-organized project development.³² By 2020, the Chinese renewable energy project landscape is increasingly going to feature large-scale projects, generating more than 1,000 MW in capacity per project, connected to the grid.³³ The lion’s share of these projects’ generation capacity is likely to come from hydroelectric power and wind farms, with wind farms accounting for a majority of projects, at least in number.³⁴ Furthermore, offshore wind farms featuring large-scale wind turbines are going to be an increasingly important feature of coastal renewable energy generation: in November 2006, China’s first offshore wind facility, with a capacity of 1.5 MW, was installed by China National Offshore Corporation using turbines manufactured by Xinjiang Goldwind. By 2009, work was

China’s cleantech market, especially in renewable energy generation technologies, is set to continue its take-off phase and gain altitude and international traction.

underway on large-scale offshore wind farms, including the 102 MW Shanghai East Ocean Offshore Wind Farm.³⁵

The points made in this article show that, in the case of renewable energy technologies within the Chinese cleantech market, China stands at a paradoxical waypoint. On the one hand, the Chinese context and market represent clear investment, development, and generation opportunities. On the other hand, the policy and fiscal obstacles identified in the article represent clear problems which will slow down development and

sap the potential of this market—and of the development of China's energy system towards national 2020 targets—unless they are faced with clear political will at a central as well as a provincial level. China's cleantech market, especially in renewable energy generation technologies, is set to continue its take-off phase and gain altitude and international traction—unless the identified obstacles are allowed to slow down or, in the worst of cases, stall this cleantech trajectory.



Endnotes: China's Cleantech Landscape: The Renewable Energy Technology Paradox

¹ I would like to acknowledge the support of the British Academy's Research Grants program (SG-50780).

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³ *Id.*

⁴ However, estimates about renewable energy technologies' relative importance in investment terms vary. Furthermore, this article focuses on "renewable" as opposed to "clean energy" investments: "clean energy" is a more expansive sectoral definition, including technologies other than renewables, which are the focus of this article. See Press Release, New Energy Finance Limited, 2008 – A Year of Two Halves for New Energy Investment (Jan. 14, 2009), available at http://www.newenergymatters.com/download.php?n=20090114_PR_2008A_year_of_Two_Halves_For_Clean_Energy.pdf&f=pdf&t=pressreleases.

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¹⁴ *Id.*

¹⁵ Gordon Feller, *China's Wind Power Future*, ENERGY PULSE, July 28, 2006, http://www.energypulse.net/centers/article/article_display.cfm?a_id=1307.

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¹⁹ See Liu et al., *supra* note 13, at 761.

²⁰ Estimates that 1,000 MW per week are being added to China's generating capacity are given by Jiang Lin, *Energy Conservation Investments: A Comparison Between China and the U.S.*, 35 ENERGY POLICY 916 (2007). More recent estimates have revised this figure to 2,000 MW per week. See Fred Pearce, *Under a Sooty Exterior, a Green China Emerges*, YALE ENVIRONMENT 360, Nov. 11, 2008, <http://e360.yale.edu/content/feature.msp?id=2083>.

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²² *Id.* at 919.

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²⁴ See Wen-Qiang et al., *supra* note 13.

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³⁴ See Li et al., *supra* note 5.

³⁵ See Offshore Wind China, *China's first offshore wind turbine installed*, Jan. 10, 2009, <http://www.offshorewindchina.com/english/shouye.aspx> (last visited Apr. 11, 2009). See also Clean Development Mechanism in China, Offshore wind China 2009 conference and exhibition to launch in Shanghai in June (Mar. 2, 2009), <http://cdm.ccchina.gov.cn/english/NewsInfo.asp?NewsId=3422>.

AQUAPONICS & LANDFILL METHANE USE:

THESE FETID MIASMATA SMELL LIKE PROFITABLE CONSERVATION

by Blake M. Mensing*

On the surface, aquaponics¹ (a portmanteau word of aquaculture and hydroponics)² and the use of landfill methane for energy³ have very little in common. However, both utilize waste to power another system while reducing the net amount of waste generated.⁴ Reciprocating or symbiotic technologies are a beneficial alternative to traditional technologies because they reduce waste and mimic the closed ecological systems that have garnered the attention of some of the world's greatest scientific minds and some of the world's youngest.⁵ This article outlines the basic processes involved in aquaponics and landfill methane utilization and then proposes that more synergistic systems should be developed and then implemented on a larger scale to minimize total human waste output.

Aquaponics combines fish farming and soilless vegetable production to help to eliminate some of the major shortcomings of each process.⁶ The result of this conglomeration is that the only input required is fish food.⁷ Water conservation is a particularly desirable benefit of combining hydroponics and aquaculture.⁸ The fish produce an effluent rich in plant nutrients, but toxic to the fish in high quantities, so the water is filtered by the roots of the plants and then pumped back to the tanks.⁹ Leafy vegetables and spice plants seem to be able to utilize the nitrogen-rich tank water most efficiently and the crop helps to augment the profits of a fish farmer by producing another saleable good and reducing the costs of filtering the tank water.¹⁰ Another possible benefit of aquaponics is that the harvested fish relieve some of the strain on the world's fishstock.¹¹ When properly monitored, both the fish stock and the hydroponic vegetable crop thrive.¹²

Methane is widely recognized as one of the six major greenhouse gases that are accumulating in the Earth's upper atmosphere and are contributing to the steady uptick in global average mean temperatures.¹³ In the United States, landfills accounted for twenty-three percent of total methane emissions in 2006.¹⁴ The impact of methane is more than twenty-five times greater than carbon dioxide, though fortunately its atmospheric concentration is much lower.¹⁵ One method of reducing methane emissions is to capture and convert the gaseous effluvia from landfills into usable fuel for electricity generation.¹⁶ As the garbage in a landfill breaks down, many different gases are released.¹⁷ The gaseous mixture is made of approximately fifty percent methane,

which can be separated from the remaining gases and used for the generation of electricity.¹⁸ The capture and use of methane from landfills not only reduces the total amount of biomethane generated, but also prevents the release of some carbon dioxide that would be produced through traditional coal-fired power plants.¹⁹

Aquaponics is a sustainable practice because the waste of one system is used to fuel another symbiotic system and the only input is the fish food.²⁰ As long as the fish food used is produced in a sustainable manner, then the pitfalls associated with tradi-

tional aquaculture are more easily avoided.²¹ Similarly, landfill methane capture for energy production is an efficient utilization of a gas that would otherwise be emitted into the atmosphere without being put to use.²² Aquaponic farms could and should be placed near landfills to have their electricity needs met from the methane generated during landfill decomposition,

further reducing total wastes by minimizing the costs of transmitting electricity. In order to further the progress towards sustainable development, scientists and engineers need to train their eyes on systems that use wastes so as to reduce the net impact of human consumption on the environment. The philosophy behind both aquaponics and landfill methane capture is based on reducing the net wastes generated by humans through the utilization of system outputs. When profit maximization and waste reduction collide, both business and the environment benefit.

While neither system is perfect, their underlying foundations are a step in the right direction. Human production processes should be evaluated in light of the success of aquaponics and landfill methane capture because it is likely that the examination will uncover other wastes that have been overlooked as possible inputs. In the instances where a pair of systems could form a symbiotic relationship, humanity should take advantage of that symbiosis to help to reduce our enormous ecological footprint. If clean technology can include a profitable use for fish excrement and the gas gathered from festering garbage, then the scientific and business communities surely have many more ecologically sound profit avenues to explore.



Endnotes: Aquaponics & Landfill Methane Use *continued on page 59*

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*When profit maximization
and waste reduction
collide, both business and
the environment benefit.*

BORDER ADJUSTMENT MEASURES IN PROPOSED U.S. CLIMATE CHANGE LEGISLATION —

“A NEW CHAPTER IN AMERICA’S LEADERSHIP ON CLIMATE CHANGE?”¹

by Stephen Kho, Bernd G. Janzen & Holly M. Smith*

“Delay is no longer an option. Denial is no longer an acceptable response. The stakes are too high. The consequences, too serious.”²

—President Barack Obama

INTRODUCTION

All legislative proposals for a U.S. greenhouse gas (“GHG”) emissions cap-and-trade system released to date have recognized the need to safeguard the competitiveness of U.S. firms that may be required to bear emissions compliance burdens heavier than those borne by their foreign competitors. These legislative proposals have included “competitiveness measures” to ensure that emissions caps imposed on U.S. industries do not erode their competitiveness vis-à-vis imports from jurisdictions with no or lesser GHG emissions restrictions. The problem of “carbon leakage”—the incentive created by declining domestic emissions caps to move emissions-intensive production abroad—is particularly acute for manufacturing industries. Many such industries compete directly with imports, and most would not be able to pass on to their customers the increased costs of compliance or the acquisition of more efficient production technology. A properly designed U.S. climate change system should therefore legally safeguard the competitiveness of U.S. manufacturing industries, while also minimizing the incentive to move emissions-intensive production abroad.

Competitiveness measures can take a variety of forms. For instance, a “border adjustment” measure can impose costs on relevant goods at the time they are imported into the United States, assessed on the basis of either differences in the GHG emission restrictions in the country of origin as compared to the United States, or the emissions-intensity of the production process for the imported goods. Other forms of competitiveness measures include the free distribution of emissions allowances to industries particularly sensitive to foreign competition, the exemption of certain industries altogether from domestic emissions caps, the imposition of carbon taxes, and restrictions on

certain production methods or incentives to adopt cleaner production methods.

This article will focus on the use and consequences of a border adjustment measure, given that it is the competitiveness measure that is most consistently proposed in U.S. legislation, and that seemingly has the most significant exposure to challenges under the World Trade Organization (“WTO”) agreements. This article will first provide some background on the broader climate change discussion in the United States. It will then discuss the reasons for including competitiveness measures in U.S. climate change legislation, the border adjustment measures included in recent U.S. legislative proposals, and the viability of border adjustment measures under the WTO agreements. The article will conclude with a new proposal for an alternative to the border adjustment measures proposed to date.

BACKGROUND

The year 2009 promises to be an exciting year for proponents of strong action to combat GHG emissions in the United States and internationally. Over the past few years, broad political support for such legislation

has grown domestically, while international efforts have continued to progress, in large part without the participation of the United States. Given the recent inauguration of Barack Obama as President, and the goals of the international community to conclude a successor agreement to the Kyoto Protocol in Copenhagen in December of this year, real action is expected to be taken in 2009 to limit carbon emissions both in the United States and around the world.

Domestic competitiveness measures can ensure the equal distribution of costs in the absence of an international agreement limiting emissions.

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President Obama has made numerous statements to date expressing his commitment to addressing climate change. In spite of the uncertainty and turmoil caused by the ongoing financial crisis, he appears to be strongly committed to his original proposals. Specifically, President Obama has called for the implementation of an “economy-wide cap-and-trade program” that will aim to reduce GHG emissions eighty percent by 2050.³ President Obama’s plan is distinguished by his calls for the auction of *all* emissions credits, unlike other plans, under which a portion of credits would be provided at no cost to vulnerable industries as a form of transition assistance. His plan differs further due to his policy of using a portion of the proceeds from such emissions credit auctions (approximately \$15 billion a year) for investment in the “development of clean energy and energy-efficiency improvements, including clean vehicles.”⁴

Importantly, President Obama has also pledged to “re-engage”⁵ the international community through the UN Framework Convention on Climate Change (“UNFCCC”). Since early 2007, international efforts to combat climate change have been focused on developing a successor agreement to the Kyoto Protocol, which remains in effect until 2012. Rounds of negotiations have been held, both to address the future commitments of nations that have already been bound by emissions caps, as well as to reach developing nations and countries such as the United States that are not bound by the Kyoto Protocol. An important breakthrough came at the negotiations in Bali in December 2007, where it was decided that developing countries would not necessarily be excluded from future climate change control regimes.⁶ Other rounds of negotiations have taken place since, leading ultimately to the negotiation of a final agreement in Copenhagen at the 15th meeting of all Framework Convention parties in late 2009 that will replace the Kyoto Protocol.

Given the state of the economy, and previous difficulties in passing legislation to establish a cap-and-trade system, there are significant doubts over whether meaningful legislation curbing GHG emissions will be passed in the United States in 2009. Yet the concurrence of the Obama presidency, the pressure to have emissions limits in place domestically before concluding an international agreement on emissions caps in Copenhagen,⁷ and the increased presence of Democrats in the U.S. Congress, all indicate that the passage of climate change legislation is far more likely now than at any time in the past.

Currently, Senator Barbara Boxer, Chairman of the Senate Environment and Public Works Committee, and Representatives Henry Waxman and Ed Markey, Chairs of the House of Representatives Energy and Commerce Committee and the Energy and Environment Subcommittee respectively, are leading Congressional efforts to develop legislation addressing climate change. On March 31, 2009, Representatives Waxman and Markey issued a discussion draft of their climate change legislation entitled the American Clean Energy and Security Act of 2009 (the “Waxman-Markey draft”). While a draft has yet to come out of the Senate, on February 3, 2009, Senator Boxer and other committee members set out six basic principles for legislation on global warming.⁸ It is likely that the draft produced in the



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Smokestack of a coal-fired power plant in New York.

Senate will rely heavily on the Boxer-Lieberman-Warner substitute amendment (the “Boxer Amendment”) to the Lieberman-Warner Climate Security Act of 2008 (“S.3036”), which was originally introduced on May 21, 2008.⁹ Although the Boxer Amendment has never been debated and considered in Congress to a significant extent,¹⁰ it represents the most advanced and comprehensive legislative effort on the Senate side to date addressing climate change.

Generally, both the Waxman-Markey draft and the Boxer Amendment propose the establishment of a cap-and-trade system to limit emissions domestically, along with a number of measures providing incentives for reduced emissions, and, in the case of the Waxman-Markey draft, the development of clean energy sources, clean technologies, and increased energy efficiency. Importantly, both bills provide for competitiveness measures in the form of a “border adjustment” requiring “covered goods” imported into the United States to be accompanied by purchases of emissions allowances.¹¹

RATIONALE FOR INCLUDING COMPETITIVENESS PROVISIONS

While commentators have expressed concern over the inclusion of certain competitiveness provisions in climate change legislation,¹² there are a number of reasons why such provisions are useful and should be included in any proposed legislation.

First, competitiveness measures can provide an even playing field for U.S. manufacturers and producers to compete in the domestic market against importers of goods from countries that lack emissions caps. Manufacturers in countries such as China and India, which are heavy polluters but currently are not subject to domestic or international limits on their emissions, would enjoy a significant production cost advantage over their counterparts in the United States under a U.S. cap-and-trade regime if no measures were taken to require these manufacturers to compensate for the emissions they created when producing products for import into the U.S. market. In particular, energy-intensive industries, such as cement, glass, paper, chemicals, fertilizer, and metals manufacturers, would be adversely affected by U.S.

declining emissions caps and their inability to compete with foreign producers who are not subject to such caps.¹³

The perceived need for protection of domestic manufacturers is so strong that it is highly unlikely that any climate change legislation could pass the U.S. Congress without competitiveness measures. One reason given for the U.S. refusal to adopt the Kyoto Protocol was the fact that it did not impose binding commitments on developing countries, which even then was perceived as a threat to the competitiveness of U.S. industries. Given the uncertainty over whether developing countries will commit to emissions limits in the successor agreement to the Kyoto Protocol, U.S. legislation will need to include competitiveness measures to compensate for non-participation by developing nations in future international climate change agreements.¹⁴

In fact, in a white paper produced by the U.S. House of Representatives Committee on Energy and Commerce and its Subcommittee on Energy and Air Quality (the “White Paper”), the drafters emphasized the need for competitiveness measures by linking them to the need to engage developing countries.¹⁵ They reasoned that, in the absence of an international agreement binding developing nations, domestic legislation needed to be structured in a way that would encourage developing nations to adopt similar limitations on GHG emissions domestically, and that such “encouragement” could include border adjustment measures, performance standards, and carbon market design conditions.¹⁶

The above emphasizes a second reason for competitiveness measures: they can also serve to encourage foreign countries to adopt their own domestic climate change measures. Foreign countries can be encouraged to adopt emissions limits by providing them with both positive and negative incentives to do so through U.S. legislation. Border adjustment measures could encourage the adoption of emissions limits in foreign countries in response to foreign manufacturers having to raise manufacturing costs by purchasing emissions credits. Alternatively, U.S. legislation could create positive incentives for foreign countries to adopt emissions caps by providing them with greater access to the U.S. emissions credit trading market, which is expected to be vast and lucrative for those able to sell credits on it.¹⁷

Third, the imposition of competitiveness measures can prevent “carbon leakage,” a situation where the benefits of reducing U.S. emissions would be “offset by increased emissions elsewhere by foreign competitors that are thriving as a result of higher costs in the United States.”¹⁸ They could also be used as export adjustments, i.e., by providing emissions credits for free

to U.S. manufacturers to allow them to compete equally in third-country markets with foreign competitors who are not subject to emissions caps.¹⁹

Finally, competitiveness measures would ensure that other countries share the cost of reducing GHG emissions on a worldwide basis, even if they are unwilling to adopt required limits on emissions themselves. Given that the ill effects of climate change are shared globally, the costs and burdens of eliminating emissions should also be shared globally. Domestic competitiveness measures can ensure the equal distribution of costs in the absence of an international agreement limiting emissions.²⁰

EXISTING BORDER ADJUSTMENT PROPOSALS

While a number of border adjustment proposals in draft legislation have been tabled to date, the Boxer Amendment represents the most comprehensive legislative effort to date. Although Senator Boxer currently is drafting new legislation, it is likely that her new proposals will reflect the proposals made in the original Boxer Amendment. While the Waxman-Markey draft and Representative Chris Van Hollen’s Cap and Dividend Act of 2009 represent efforts currently under consideration in the 111th Congress, neither is as specific as the Boxer Amendment on the border adjustment measures.

The border adjustment proposal in the Boxer Amendment essentially requires that, beginning from January 1, 2014, “covered goods”²¹ from countries that have not taken “comparable action”²² to the actions taken in

the United States to limit GHG emissions, must be accompanied by an appropriate number of emissions allowances in order to be imported into the United States.

Specifically, this proposal would be executed by first, establishing a bi-partisan “International Climate Change Commission” (the “Commission”) consisting of six commissioners appointed by the President in coordination with the Senate.²³ The Commission’s key role would be to determine annually which countries have or have not taken comparable action to combat greenhouse gas emissions and to publish those determinations. Countries that are found to have taken comparable action, or that meet certain exemptions,²⁴ are placed on an “excluded” list by the Commission.²⁵ Importers of covered goods from these countries would not be required to submit emissions allowances under these regulations. All other countries would be placed on the “covered” list, and covered goods would have to be accompanied by emissions allowances when imported into the United States.²⁶ The Commission would have enforcement powers

Carbon leakage is a real concern in light of the possibility of a post-Kyoto Protocol international climate change agreement without equivalent obligations undertaken by all heavy GHG emitters.

to penalize companies importing goods without the required emissions credits.²⁷ Such penalties could include payment of a penalty and even a prohibition on importing the goods in controversy for up to five years.²⁸

Under the Boxer Amendment, emissions allowances needed to accompany covered goods would come from a special reserve of allowances established by the Environmental Protection Agency (“EPA” or “Administrator”), which would also be responsible for establishing the pricing methodology²⁹ for these allowances. The Administrator additionally would be responsible for establishing a method for determining the number of allowances necessary for covered goods entirely manufactured and processed in one covered country, using a general formula³⁰ for calculating the number of allowances required “on a per unit basis for each category of covered goods that are entered into the United States from that foreign country during each compliance year.”³¹ The Administrator would further be responsible for establishing the methodology for determining the number of allowances to be applied to covered goods manufactured or processed in multiple foreign countries.³²

Finally, while most emissions allowances would come from the special reserve mentioned above, the Boxer Amendment also allows U.S. importers to submit allowances issued by foreign cap-and-trade programs that are deemed to constitute “comparable action.”³³ U.S. importers may also use credits from international offset projects authorized by the Administrator in lieu of international reserve allowances.³⁴ These international offsets would be authorized as part of Title XIII Subtitle B of the Boxer Amendment, which describes international partnership programs such as the reduction of deforestation.³⁵

The border adjustment measure of the Waxman-Markey draft differs from the Boxer Amendment in significant ways. The principal difference is that while the Boxer Amendment mandates that the border adjustment become effective from 2014, the Waxman-Markey draft gives the President the discretion to impose a border adjustment, after making a determination that compliance with the U.S. cap-and-trade system continues to cause significant reductions in domestic production or domestic jobs, or an increase in greenhouse gas emissions by foreign manufacturing facilities manufacturing covered goods in jurisdictions without “commensurate” GHG regulations.³⁶ This determination is expected to be made no later than June 30, 2017, as part of a reporting process by the President with the EPA.³⁷ If the President decides to impose a border adjustment, he must issue regulations no later than 24 months after the determination.³⁸ From that point on, covered goods may only be imported into the United States with the appropriate number of allowances.³⁹

The Waxman-Markey draft vaguely describes the parameters for the border adjustment program, with the result that there are only a few points of comparison with the Boxer Amendment provisions. One similarity is that both drafts specify exemptions permitted for least-developed countries and countries emitting less than 0.5% of total global GHG emissions (i.e., a *de minimis* rule).⁴⁰ The differences, however, are numerous. For instance,

the border adjustment in the Waxman-Markey draft clearly states its intent of addressing “competitive imbalance” as a result of “direct and indirect” costs of complying with both the U.S. cap-and-trade system and systems of other countries.⁴¹ Moreover, the definition of “covered goods” in the Waxman-Markey draft for purposes of the border adjustment measure does not broadly include imports of “manufactured items for consumption,” but only those designated as “primary products.”⁴²

Another principal difference in the Waxman-Markey draft, which also has significant bearing on this discussion, is that—in order to avoid the problem of carbon leakage⁴³ while preserving the global competitiveness of industries affected by the carbon caps—the draft utilizes another competitiveness measure in the first instance to distribute “rebates” (essentially free credits) to the “owners and operators of entities in eligible industry sectors,” beginning in 2012.⁴⁴ Under this primary competitiveness mechanism, eligible industries would first be determined depending on whether they have an energy intensity or greenhouse gas intensity of at least five percent, and a trade intensity of at least fifteen percent, as calculated by the EPA Administrator according to methods described in the draft text.⁴⁵ According to the draft, the number of rebates given to each eligible entity would equal “the sum of the covered entity’s direct compliance factor and the covered entity’s indirect carbon factor.”⁴⁶ The draft further mandates an annual review of the rebate program, and allows for the EPA, beginning in 2021, to eliminate rebates if the Administrator determines that “more than 70 percent of the global output from a sector . . . is manufactured in countries subject to commensurate greenhouse gas regulation.”⁴⁷

Importantly, the Waxman-Markey draft, unlike a number of earlier proposals, particularly emphasizes the need for the adoption of clean technologies, clean energy sources, and energy efficiency. For example, the draft proposes the adoption of a “smart grid” to improve energy efficiency; the adoption of technologies such as carbon capture and sequestration to reduce emissions in the air; and the provision of U.S. assistance to the developing world to encourage them to adopt clean technologies.⁴⁸

The Cap and Dividend Act of 2009⁴⁹ is the most recent legislation to be introduced imposing a border adjustment measure. The measure differs radically from the Boxer Amendment and Waxman-Markey draft provisions, in that it requires the imposition of “carbon equivalency fees” on all imports of “carbon-intensive goods.”⁵⁰ The carbon equivalency fee would equal the dollar value amounts domestic producers have to pay to acquire carbon permits for the production of their goods, and any carbon equivalency fees paid by importers for carbon-intensive goods used in the production of their final manufactured items.⁵¹ This carbon equivalency fee would in turn be paid out to domestic producers of carbon intensive goods, to make up for the costs they incur.⁵² This provision will be terminated in the event that an international agreement is reached requiring carbon-emitting countries to adopt similar measures, or when carbon-emitting countries unilaterally adopt equivalent measures to those of the United States.⁵³

Prior and subsequent to the Boxer Amendment last year, both the Senate and the House of Representatives had introduced a number of bills containing border adjustment measures, which differed more or less substantially from the Boxer Amendment. S.3036, which the Boxer Amendment replaced, for example, contained significant differences in the timing of implementation, structure of oversight and implementation bodies, and the definition of certain terms.⁵⁴

Two pieces of legislation proposed in the House of Representatives also included border adjustment measures: H.R.6186, the Investing in Climate Action and Protection Act (“H.R.6186”),⁵⁵ introduced by Representative Markey, and H.R.6316, the Climate, Market, Auction, Trust & Trade Emissions Reduction System Act of 2008 (“H.R.6316”),⁵⁶ introduced by Representative Lloyd Doggett.

The terms of the border adjustment measures under H.R.6186 are very similar to, if more simplistic than, S.3036. If H.R.6186 is the House’s counterpart to S.3036, then H.R.6316 serves as the House’s counterpart to the Boxer Amendment. Much of the terms and structure of H.R.6316 replicates the proposals in the Boxer Amendment. The fact that H.R.6316 was the latest piece of climate change legislation introduced into the House, and that it so closely echoes the direction and details of the Boxer Amendment, again reinforces the notion that these pieces of legislation will likely form the basis of some of the future legislative efforts to regulate GHG emissions, particularly on the Senate side.⁵⁷

ARE THE EXISTING BORDER ADJUSTMENT PROPOSALS CONSISTENT WITH WORLD TRADE ORGANIZATION RULES?

This section provides a brief overview of WTO rules that could be implicated by the border adjustment proposals described in the previous section, and discusses whether the proposals would survive scrutiny under those rules. Because the proposals for U.S. legislation are incomplete and likely to be substantially revised prior to passage, it is difficult to reach definitive conclusions about the outcome of any future WTO challenge. However, notwithstanding this uncertainty, it is already quite clear which WTO rules would be implicated in such a challenge, and these rules provide an important roadmap for legislators hoping to “appeal-proof” a final bill.

At least three distinct WTO agreements could come into play in a challenge to U.S. border adjustment measures. The first is the General Agreement on Tariffs and Trade (“GATT”).⁵⁸ The relevant GATT provisions can be divided into two groups—first, the fundamental trade principles that WTO Members must uphold, and second, defenses that may be asserted to justify a breach. Thus, a finding of a violation of one or more of the fundamental principles may not necessarily lead to termination of a challenged measure if a legitimate defense is available.

One fundamental trade principle likely to come into play if legislation like the Boxer Amendment enters into force is the most-favored nation (“MFN”) clause of GATT Article I. The MFN clause at Article I:1 provides, writ large, that if a WTO

Member gives advantageous treatment to imports of a given product from one WTO Member, it must provide the same advantageous treatment to imports of the “like product” from all the other Members as well. In short, a WTO Member may not discriminate by providing better treatment to imports from some countries than to imports from other countries. The obligation set forth in Article I:1 is broad, applying “with respect to all rules and formalities in connection with imports.” Yet, the Boxer Amendment at Section 1316(b)(3) would seem to *require* this very mode of prohibited discrimination by imposing the importer allowance requirement on imports from countries deemed not to have taken “comparable action” to the United States to combat climate change, while relieving imports from other countries of this obligation. The MFN clause would thus seem to present a significant hurdle under the WTO rules for border adjustment mechanisms like the Boxer Amendment that treat imports from different countries differently.

Another GATT principle potentially implicated by border measures is set forth in Article II, pursuant to which WTO Members have agreed to “bind,” or fix, their customs duties on imports at levels laid out in national schedules of concessions. Under Article II:1(b), WTO Members have committed not to impose customs duties in excess of their bound levels. Notably, this obligation extends to “all other duties or charges of any kind.” The terms “all” and “of any kind” in this provision appear to encompass an importer allowance requirement of the sort proposed by the Boxer Amendment.

The GATT contains another important prohibition on trade-discriminatory treatment—the national treatment provisions of Article III. The general thrust of these provisions is that a WTO Member must accord treatment to goods imported from other WTO Members that is no worse than the treatment accorded to domestically produced “like” goods. Any border adjustment measure that imposes higher compliance burdens on imported goods than it imposes on domestically produced goods could run afoul of this national treatment requirement. Two elements of Article III are most likely to come into play in challenges to border adjustment measures. The first is the requirement of Article III:2 that imports shall not be subject to “internal taxes or other internal charges” that exceed those applied to the “like” domestic products. The second is the requirement of Article III:4 that imports shall be subject to regulatory treatment that is no less favorable than that accorded to “like” products of domestic origin. A considerable body of WTO jurisprudence helps define the scope of these obligations—including the perpetually tricky question of how to define a “like” product.⁵⁹ Unlike the vulnerability of an importer allowance program under the above-mentioned GATT provisions, it seems possible for lawmakers to craft a program that would impose comparable burdens on imported and domestically produced goods alike. However, there is no broad guarantee that such an effort would succeed; if challenged, compliance with national treatment principles may have to be assessed on a product-by-product basis, and any incremental increase in the compliance burden imposed on importers could render the program vulnerable.

Yet another GATT provision that may be implicated by border measures is Article XI:1, pursuant to which WTO Members may impose “no prohibitions or restrictions [on imports] other than duties, taxes, or other charges.” This proscription could readily be seen as applying to border measures intended to deter carbon leakage such as importer allowance requirements—particularly if the market price for allowances were to rise to a level rendering importation cost-prohibitive.

As noted, a WTO Member may violate one of these fundamental principles, but still be able to justify the violation. Doing so would require invocation of one or more of the “General Exceptions” set forth in GATT Article XX. Two of the enumerated exceptions are generally understood as providing possible cover for border adjustment provisions in a GHG emissions cap-and-trade scheme. The first is sub-article (b), for measures “necessary to protect human, animal or plant life or health,” and the second is sub-article (g), for measures “relating to the conservation of exhaustible natural resources if such measures are made effective in conjunction with restrictions on domestic production or consumption.” Both of these exceptions appear sufficiently broad for lawmakers to craft border measures to fit within their parameters. Further, as a matter of intent, the GATT appears to leave room for WTO Members to pursue their own environmental policies and does not attempt to harmonize national policies.

However, fitting a measure within one of the Article XX sub-articles is not the end of the inquiry. Any defense of a measure under Article XX must also survive the test laid out in the chapeau of that Article itself, which provides that the measure may not be applied “in a manner which would constitute a means of arbitrary or unjustifiable discrimination,” or a “disguised restriction on international trade.” In short, Article XX does not shield protectionism masquerading as environmentalism. Would border adjustment measures that are, on their face, intended to safeguard U.S. industries from foreign competitors deemed to have an unfair cost advantage survive scrutiny under the Article XX chapeau? Opinions on this question vary, and the answer would ultimately depend both on the final wording of U.S. legislation as well as how it is implemented.

Further, a considerable body of WTO jurisprudence now exists on the Article XX chapeau, and provides some considerations likely to be applied in any challenge to U.S. border adjustment measures. For example, in the recent *Brazil-Tyres* case, the WTO Appellate Body struck down a Brazilian import ban on retreaded tires that exempted imports from MERCOSUR⁶⁰ countries. In a key passage in its holding, the Appellate Body reasoned that the trade discrimination (i.e., imports were generally prohibited, but not if originating in MERCOSUR countries) at issue was not “rationally related” to the environmental objective of the import ban.⁶¹ Another consideration likely to arise in any challenge to final U.S. border adjustment measures stems from the much-cited *U.S.-Shrimp* case, in which the WTO Appellate Body explained that the legitimacy of an environmental measure with a trade-discriminatory impact may be shown through earnest attempts by the importing country to negotiate an international agreement that would ensure equal treatment of

all affected trading partners. Under this test, a “serious, good faith effort” to discuss a global climate change mitigation regime may be sufficient.⁶²

A second WTO agreement that may be invoked to challenge U.S. border adjustment measures in cap-and-trade legislation is the Agreement on Technical Barriers to Trade (“TBT Agreement”). The TBT Agreement guides the application of technical regulations and standards in order to avoid unnecessary obstructions to trade. Technical regulations are defined in Annex 1 of the TBT Agreement as “document[s] which [lay] down product characteristics or their related processes and production methods, including the applicable administrative provisions, with which compliance is mandatory.”⁶³ This definition may extend to requirements dealing with packaging, labeling, and marking. In the context of border adjustment measures, if the measures require that products be produced in accordance with certain emissions control criteria in order to be imported freely into the United States, for instance, this could trigger a TBT Agreement challenge. Although none of the current proposals contain criteria that could be defined as a “technical regulation” for purposes of the TBT Agreement, the alternative proposal described at the end of this paper—as well as other proposals by commentators⁶⁴—could trigger a challenge under these provisions.

There are four possible ways in which a challenge may be raised against border adjustment measures under the TBT Agreement. First, like the MFN and national treatment clauses described in the GATT discussion above, TBT Agreement Article 2.1 requires that technical regulations must apply “no less favorably” to “like products” of WTO Members than to “like products” of national origin or of other countries.⁶⁵

Second, under Article 2.2 of the TBT Agreement, technical regulations must not be drafted or applied in a way that creates an “unnecessary obstacle to trade,” or more specifically, must not be “more trade-restrictive than necessary to fulfill a legitimate objective.”⁶⁶ However, under Article 2.2, legitimate objectives may include protection of the environment. Therefore, if the U.S. Government were able to prove adequately that its technical regulations were designed to fulfill the objective of protecting the environment, and did not do so in an overly-restrictive manner, then the technical regulations could survive a challenge under this provision.

Third, the TBT Agreement mandates under Article 2.4 that, where international standards exist, they must be used as a standard for WTO Members’ technical regulations.⁶⁷ In this case, no such global standards exist, but if new standards were adopted pursuant to the UN climate change negotiations, then these would necessarily have to serve as the basis of any technical regulations adopted in the United States, and if not, U.S. regulations could be subject to a challenge under this provision of the Agreement.

Finally, TBT Article 12 requires that WTO Members take into account developing countries in applying technical regulations, particularly to ensure that such technical regulations do not impose unnecessary obstacles to trade with these developing countries.⁶⁸ Although most border adjustment measures

proposed so far specifically exempt countries designated by the UN as “least developed” countries, any legislation imposing technical regulations should take this requirement into account as well.⁶⁹

The third WTO agreement that may come into play in a challenge to a U.S. competitiveness provision more generally is the Agreement on Subsidies and Countervailing Measures (“SCM Agreement”).⁷⁰ Exposure to claims under the SCM Agreement could arise in several ways. One possibility, applicable to a competitiveness measure that allocates emissions allowances to some domestic manufacturing industries (but not others) at no charge, would be a claim that the provision of free allowances under such circumstances constitutes an actionable subsidy.⁷¹ Such a claim could be premised on a definition of “subsidy,” at Article 1.1(a)(ii), which covers government decisions to forego revenue that is otherwise due.⁷² However, for such a claim to succeed, the alleged subsidy would also have to be “specific” for purposes of Article 2—i.e., limited by law or in fact to certain enterprises or industries. Further, a complaining WTO Member could only prevail in such a case by demonstrating, under Article 5, that the alleged subsidy is causing “adverse effects” to its interests.⁷³ The obstacles to success in such a challenge would be relatively high.

While not directly related to the adoption of competitiveness measures, a second way in which the SCM Agreement might be implicated in relation to a national cap-and-trade program is through the government’s use of proceeds from the sale of emissions permits. As noted earlier, President Obama’s climate change agenda calls for substantial government investment in a range of clean energy technologies. It seems feasible that such expenditures might be challenged by foreign governments seeking to nurture competing industries as impermissible or actionable subsidies under the SCM Agreement. Notably, the SCM Agreement at its inception contained provisions insulating certain “green box” subsidies described in Article 8.2(c) from challenge.⁷⁴ However, these exceptions were of limited duration, and expired in 2000 when the WTO Members could not agree on their continuation.⁷⁵ The expiration of these provisions injects further uncertainty into the WTO risk analysis for any national cap-and-trade system designed to promote clean energy technologies.

Finally, the prospect of a WTO challenge to any competitiveness provisions that might ultimately be adopted raises litigation risk questions entirely apart from the application of the above-mentioned rules. One of the worst-case scenarios would be the imposition of different types of competitiveness provisions by different jurisdictions, spawning multiple and overlapping WTO challenges. The Director-General of the WTO, Pascal Lamy, has referred to such a scenario as a “spaghetti bowl,” and described the institutional problems it could raise for the WTO.⁷⁶ In this scenario, the WTO’s dispute settlement process may well be overwhelmed, both by the magnitude and complexity of the legal issues as well as the unprecedented trade values affected by the challenged measures. Further, regardless of the results of any WTO challenge to climate competitiveness measures, the

imposition of the measures themselves may poison the ongoing UN negotiations towards a new global accord and invite retaliatory action.

These fears, even if speculative, point to the need for an international climate change agreement in which all countries—developed and developing—accept responsibility for reducing worldwide GHG emissions. Indeed, this is the only viable solution to the climate change problem, and the only “exit strategy” for countries that have or will unilaterally implement cap-and-trade systems domestically. Even if competitiveness measures pass WTO muster, they are only temporary measures until a global solution on climate change is achieved. In the meantime, domestic political reality in the United States (and in other advanced economies) dictates that no domestic GHG cap-and-trade scheme can achieve adequate political support if it does not ensure the competitiveness of domestic manufacturing industries in light of the developing countries’ current stance on prioritizing “development” over carbon reduction. Thus, designing competitiveness measures—and specifically border adjustment measures—to maximize their chances of surviving a WTO challenge, to the extent permitted by domestic political reality, remains the task at hand.

MINIMIZING THE RISK THAT A BORDER ADJUSTMENT MEASURE WILL RUN AFOUL OF WTO RULES

The preceding sections show that robust border adjustment measures are a *sine qua non* of any final U.S. cap-and-trade system that may be enacted, but also that any such measure could be subjected to a dizzying array of claims under WTO rules. How, then, might the risk of reversal in WTO dispute settlement proceedings be reduced?

As noted in the previous section, one of the key design challenges for border adjustment measures from a WTO risk reduction perspective is how to avoid overt—and unlawful—trade discrimination. One way to avoid at least the surface appearance of discriminatory treatment would be to design a measure so that it does not apply at the border at all, but at the point of consumption within the U.S. economy, for all emissions-intensive goods deemed to be vulnerable to carbon leakage.

Ideally, such a mechanism—which could take the form of a requirement to submit certain standardized amounts of GHG emissions allowances or offsets per quantity of the products at issue⁷⁷—would apply to all GHG-intensive products, regardless of country of manufacture. Refunds or rebates would then be provided to suppliers able to certify that the products were produced subject to a requirement to submit such allowances or offsets (regardless of jurisdiction of submission).⁷⁸ In other words, this adjustment measure would be geared to an objective emissions standard that is not, on its face, based on the country of manufacture of the product. The difficulty, of course, would be in the determination of the amount of allowances or offsets required per product, which could raise concerns under the TBT Agreement as previously noted.


The appearance of discriminatory treatment could be further reduced if suppliers would be permitted to satisfy the standard

based on the emissions intensity of the manufacturer of the product at issue, as opposed to average emissions intensity for the sector in the country of manufacture, as currently envisioned under the Waxman-Markey draft. This would have the added benefit of encouraging the adoption of more efficient manufacturing technologies—*regardless* of the country in which they are deployed.

The above approach, while reducing the chances of being found to violate the GATT's non-discrimination principles and border requirements, could also help buttress a defense under GATT Article XX. As noted in the previous section, a GATT Article XX defense can succeed only where the challenged measure does not constitute a means of arbitrary or unjustifiable discrimination or a disguised trade restriction. Succeeding with such a defense is more difficult where the measure at issue, on its face, distinguishes between products based on their country of manufacture. In such cases, the measure would likely have at least the appearance of unwarranted trade discrimination—especially if the ostensible purpose of the provision is to safeguard the competitiveness of domestic manufacturing industries. However, if the operation of the competitiveness measure can be moved from the border to the point of consumption in the U.S.

economy, as proposed above, and where it operates based on an objective standard of manufacturing emissions intensity, it should be easier to demonstrate that the measure truly advances an environmental goal covered by one of the Article XX exceptions, and does not constitute a disguised trade restriction.

CONCLUSION

It is our hope that this article generates additional thought and discussion as part of the U.S. legislative process in 2009 to craft an effective domestic cap-and-trade system, including the ability to successfully safeguard the competitiveness of U.S. firms that would likely have to bear heavier emissions compliance burdens than most of their foreign competitors. Carbon leakage is a real concern in light of the possibility of a post-Kyoto Protocol international climate change agreement without equivalent obligations undertaken by all heavy GHG emitters. An effective and WTO-consistent adjustment measure (whether applied at the border or at the point of consumption)—among all of the competitiveness measures—appears to stand the best chance of encouraging developing countries to meaningfully participate in a global solution to a global problem. 

Endnotes: Border Adjustment Measures in Proposed U.S. Climate Change Legislation

¹ Bryan Walsh, *Despite the Economy, Obama Vows to Press Green Agenda*, TIME MAGAZINE, NOV. 19, 2008, <http://www.time.com/time/health/article/0,8599,1860431,00.html> (quoting President Barack Obama, Taped Remarks at the Governors' Global Climate Summit (Nov. 18, 2008)).

² *Id.*

³ WhiteHouse.gov, *The Agenda – Energy and Environment*, http://www.whitehouse.gov/agenda/energy_and_environment/ (last visited Apr. 20, 2009).

⁴ Barack Obama: New Energy for America: Reduce our Greenhouse Gas Emissions 80 Percent by 2050, http://my.barackobama.com/page/content/new-energy_more (last visited Dec. 9, 2008).

⁵ *Id.*

⁶ The Bali Action Plan states that countries will act to enable the full implementation of the UNFCCC, through “measurable, reportable and verifiable nationally appropriate mitigation commitments or actions . . . by all developed country Parties” and through “nationally appropriate mitigation actions by developing country Parties . . .” Conference of the Parties, Report of the Conference of the Parties on its thirteenth session, held in Bali from Dec. 3–15, 2007, *Addendum, Part Two: Action taken by the Conference of the Parties at its thirteenth session*, ¶¶ 1.(b)(i)-(ii), U.N. Doc. FCCC/CP/2007/6/Add.1* (Mar. 18, 2008), available at <http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=3>.

⁷ See Kent Garber, *On Climate Change, Environmental Groups Want Obama to Reverse Troubled Bush Legacy*, U.S. NEWS AND WORLD REPORT, NOV. 19, 2008, <http://www.usnews.com/articles/news/national/2008/11/19/on-climate-change-environmental-groups-want-obama-to-reverse-troubled-bush-legacy.html>.

⁸ The six principles are:

1. Reduce emissions to levels guided by science to avoid dangerous global warming.
2. Set short and long term emissions targets that are certain and enforceable, with periodic review of the climate science and adjustments to targets and policies as necessary to meet emissions reduction targets.
3. Ensure that state and local entities continue pioneering efforts to address global warming.
4. Establish a transparent and accountable market-based system that efficiently

reduces carbon emissions.

5. Use revenues from the carbon market to: Keep consumers whole as our nation transitions to clean energy; Invest in clean energy technologies and energy efficiency measures; Assist states, localities and tribes in addressing and adapting to global warming impacts; Assist workers, businesses and communities, including manufacturing states, in the transition to a clean energy economy; Support efforts to conserve wildlife and natural systems threatened by global warming; and Work with the international community, including faith leaders, to provide support to developing nations in responding and adapting to global warming. In addition to other benefits, these actions will help avoid the threats to international stability and national security posed by global warming.
6. Ensure a level global playing field, by providing incentives for emission reductions and effective deterrents so that countries contribute their fair share to the international effort to combat global warming.

Senator Barbara Boxer, Principles of Global Warming Legislation (Feb. 3, 2009), http://epw.senate.gov/public/index.cfm?FuseAction=Files.View&FileStore_id=14dc734d-74c9-4fb3-8bf2-6d5d539226d1.

⁹ The Boxer Amendment was proposed as a substitute to S.3036, a piece of legislation which was originally introduced into the Senate in October 2007 as S.2191, the Lieberman-Warner Climate Security Act of 2008. S.2191 was considered, and a revised version later reported to the Senate on May 20, 2008, by the Senate Environment and Public Works Committee. On the same day, a nearly identical version of S.2191 was reported by Senator Boxer, containing a slight amendment to render the legislation budget-neutral. This version was renumbered from S.2191, becoming S.3036. Brent D. Yacobucci & Larry Parker, *Climate Change: Comparison of S.2191 as Reported (now S.3036) with Proposed Boxer Amendment (Congressional Research Service Report for Congress No. RL34513, 2008)*, available at <http://ncseonline.org/NLE/CRS/abstract.cfm?NLEid=2127>.

Endnotes: Border Adjustment Measures in Proposed U.S. Climate Change Legislation *continued on page 59*

AVOIDING THE DERAILMENT OF WIND POWER DEVELOPMENT: WHY FEDERAL SITING REGULATIONS ARE NECESSARY NOW FOR U.S. WIND DEVELOPMENT

by Nathan Borgford-Parnell*

In the United States and around the globe, governments are responding to climate change and energy security concerns by shifting their energy policies to facilitate the rapid development of renewable energy.¹ Today, wind energy is the fastest growing renewable technology,² but in the rush to combat climate change, officials have often ignored another brewing conflict which looms larger with every turbine erected. It is a conflict between two would-be allies, wind developers and wildlife conservationists, which if left unchecked has the potential to derail wind energy development in the United States.³

The dispute centers around the dark secret of the wind industry: the fact that poorly sited turbines can kill large numbers of birds and bats.⁴ As wind farms spread across the country, many scientists and conservation groups are concerned that the cumulative effect will be devastating to already threatened bird and bat populations.⁵ Pressure is growing from conservation groups to enforce wildlife protection laws that the government has only lightly enforced against wind farms so far.⁶ To date, the U.S. Fish and Wildlife Services (“FWS”), which is responsible for protecting bird and bat populations, has refused to initiate legal action against wind developers for their illegal taking of endangered bird species.⁷ Three federal statutes under the FWS’s jurisdiction—the Endangered Species Act, the Bald and Golden Eagle Protection Act, and the Migratory Bird Treaty Act—could all be enforced against wind farm developers that illegally kill endangered or protected birds and bats.⁸ However, even the threat of such litigation could potentially be enough to end wind energy development in the United States by making development too costly or too risky for investors.⁹ Under the Migratory Bird Treaty Act, for example, every knowing illegal taking of a migratory bird could lead to a \$250,000–\$500,000 fine and up to two years in prison.¹⁰

While conservation groups agree that protecting wildlife from the unnecessary danger posed by turbines is a significant concern, most agree that climate change poses a greater threat to wildlife and their habitat than do wind farms.¹¹ Stopping all wind development is not a viable solution to the problem. Fortunately there may be a middle ground.

Studies show that bird fatalities are extremely varied from wind farm to wind farm and even between turbines in the same site, with some turbines producing almost no fatalities and others killing hundreds.¹² The Altamont Pass in California is the site of one of the oldest wind farms in the United States and is also a migratory bird route and home to North America’s largest

population of Golden Eagles.¹³ It is estimated that every year 4,700 birds are killed by turbines at Altamont Pass, compared to less than a hundred at similarly sized wind farms sited with avian impacts in mind.¹⁴ This provides strong evidence that a wind farm’s impact on birds and bird habitats can be greatly mitigated through proper siting, design, and management.

Globally, avian mortality has typically not been part of wind farm impact assessments, but in 2003 the Council of Europe for the Bern Convention responded to this growing issue with recommendations and guidelines for including avian impact assessments in wind farm development proposals.¹⁵ Since then, wind farm planning in the EU has included avian impact assessments and a number of wind farms have been rejected due to their potential deleterious impact on birds and bird habitat.¹⁶ European conservation groups are also creating bird impact maps to help planners assess the potential impacts of specific wind projects on birds and bird habitat.¹⁷

The United States now needs mandatory federal regulations that provide clear wind farm siting guidelines that include bird impact assessments. Unfortunately, there are currently no mandatory federal guidelines, and few state or local guidelines, regulating turbine siting. However, in 2007 the FWS convened a Wind Turbine Guidelines Advisory Committee to develop recommendations regarding minimizing the impacts of wind farm development.¹⁸ In March 2009 the Committee came back with its recommendations which include conducting pre-development wildlife impact studies and avoiding locations identified as having a high potential risk to birds or bats, establishing non-disturbance bird and bat buffer zones, and not locating turbines between daily roosting, feeding, and nesting sites.¹⁹ The Committee’s recommendations are expected to become the basis of new federal turbine siting guidelines.²⁰ Such strategies will help reduce the building pressure between wind developers, conservation groups, and officials by giving them a common means of collaboration without resorting to legal actions that have the potential to significantly impede wind energy development in the United States.



Endnotes: Avoiding the Derailment of Wind Power Development
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THE CLEAN TECHNOLOGY FUND AND COAL:

A CAUTIONARY TALE FOR COPENHAGEN

by Steve Herz*

INTRODUCTION

In the absence of concerted action, global greenhouse gas emissions are projected to almost double by 2050. Much of this increase will come from industrialization in developing countries.¹ Due to resource constraints and the conviction that developed countries must take responsibility for their historical emissions, most developing countries are unlikely to act aggressively to restrain their emissions growth without substantial help from the developed world. Accordingly, the Bali Action Plan calls for a global deal in which developing countries take enhanced “nationally appropriate mitigation actions” supported by technology, financing, and capacity building from the developed world.² This will require a substantial transfer of resources and capacity. The Stern Review estimated the incremental costs of necessary low-carbon investments in developing countries to be at least \$20–30 billion per year.³ So far, however, little assistance has been forthcoming. One of the most important potential outcomes of the United Nations Framework Convention on Climate Change (“UNFCCC”) negotiations at Copenhagen will therefore be the creation of a publicly-funded mechanism that can provide sufficient concessional resources to help developing countries transition to lower carbon growth trajectories.

A critical issue that the negotiators will have to resolve is how to define the mechanism’s funding criteria to ensure that its concessional funds are used most effectively. This poses an important strategic choice: will the mechanism focus exclusively on initiatives that can help catalyze transformational changes in existing emissions patterns, or will it also provide support for marginal improvements in the efficiency of existing technologies and practices? While the case for targeting concessional public funding towards emerging low-carbon technologies is compelling, there undoubtedly will be significant political pressure from developing countries to allow support to also be used for incremental improvements in high-emitting sectors.

The recent decision by the World Bank-administered Clean Technology Fund (“CTF”) to authorize support for certain coal-fired power plants may provide some insights into how the UNFCCC may resolve this issue. The CTF has an explicit mandate to finance “transformational action” to help developing countries transition to a low-carbon development path.⁴ Nevertheless, its new financing criteria authorize support for coal technologies that may be only slightly more efficient than those that are already preferred by the private-sector, and that include carbon capture and storage (“CCS”) readiness criteria that have little chance of ever resulting in the capture or storage of any carbon dioxide (“CO₂”).

The CTF’s willingness and ability to contravene its mandate to catalyze transformational change with regard to coal does not bode well for Copenhagen. The World Bank is likely to have some influence in the structure of a UNFCCC mechanism, and has an institutional interest in promoting the CTF standards. Regardless of whether the World Bank plays a role in the UNFCCC mechanism, the negotiators may look to the CTF standards as precedent.

Moreover, many of the broader political forces that produced the CTF standards will also be at play in Copenhagen. Participating countries have not called the CTF to account for its incrementalism because it largely reflects their policy preferences. Many participating countries are not yet ready to concede that the Earth’s dwindling carbon sink capacity can no longer support development strategies based on the relentless expansion of fossil fuel consumption. Unless this political dynamic is altered at Copenhagen, there is little reason to expect the Parties to agree to markedly more ambitious criteria for a new UNFCCC mechanism.

THE CLEAN TECHNOLOGY FUND

The Clean Technology Fund is one of two Climate Investment Funds (“CIFs”) created by the World Bank and other multilateral development banks (“MDBs”) to provide an interim source of concessional financing while the UNFCCC mechanism is being negotiated.⁵ The CTF will support public- and private-sector investments that contribute to “the demonstration, deployment and transfer of low-carbon technologies with a significant potential for long term greenhouse gas emissions savings.”⁶ Eligible investments include low-carbon power and transportation projects, and large-scale energy efficient initiatives and other demand management projects.⁷

Although the CTF is administered by the World Bank, its decision-making process is partly independent of the governance structure of the Bank and the other MDBs. Every project funded by the CTF must be approved by both the board of the implementing MDB and a separate Trust Fund Committee of the CTF.⁸ Unlike the weighted voting at the MDBs that heavily favors donor governments, votes on the Trust Fund Committee are equally apportioned between eight representatives selected by the donor countries and eight representatives selected by the

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recipient countries. The committee also includes a non-voting representative from the World Bank, the other participating MDBs, and the host country of any investment proposal that is under consideration.⁹

THE CTF'S FOCUS ON TRANSFORMATIONAL CHANGE

The stated objective of the CTF is to support “transformational” actions that represent a “step change” over current practice.¹⁰ Towards this end, the CTF provides support for low-carbon technologies that are approaching the point of “market take-off,” and that have the potential to significantly reduce emissions.¹¹ Two categories of technology are eligible for assistance. As a matter of priority, the CTF focuses on technologies that are already available commercially, but need incremental assistance to compete with conventional options in the recipient country.¹² It will also finance technologies that have been proven to be technically viable, but have not yet been commercially deployed at scale. The CTF will not support technologies that are still in the research stage.¹³

In theory, this is a sound strategy for targeting public subsidies. Left to their own devices, private markets may let important new technologies languish in the “valley of death” between laboratory success and commercial viability.¹⁴ Innovations that mitigate social costs are particularly vulnerable to getting bogged down at this stage of development. Well-targeted public subsidies can provide a critical push to accelerate their commercial uptake.¹⁵ Accordingly, the CTF should target its scarce concessional funds at assistance that can help accelerate “near market” renewable energy technologies down the cost and learning curves to the point where they are competitive with fossil fuels.¹⁶ And to its credit, the CTF has recognized that the potential to reduce deployment costs and increase learning for future investments should be key considerations in its decision to support a proposed investment.¹⁷

AN INCREMENTALIST APPROACH TO COAL

Yet, in practice, the CTF has subverted its strategy of facilitating the uptake transformational technologies by authorizing support for certain coal-fired power plants. Under its new guidelines, the CTF may provide subsidies for coal-fired plants that meet specified energy efficiency standards and are considered to be “ready” to capture and store carbon.¹⁸ This is a conspicuously ill-advised use of scarce concessional financing for climate mitigation. Any coal plant financed by the CTF will emit enormous quantities of CO₂ for the foreseeable future. Concessional funds for bringing transformational technologies to market are

relatively scarce. Instead of squandering these limited resources on incremental efficiency improvements for incumbent technologies, the CTF should focus on helping zero-emission alternatives, such as base-load solar, become cost competitive. Indeed, using concessional public money to subsidize coal—however efficient—does nothing to hasten the day when low-carbon technologies can reliably out-compete coal and other fossil fuel-based energy sources.¹⁹

The CTF has compounded this strategic error by adopting permissive criteria for efficiency and CCS-readiness. The CTF ostensibly precludes the use of its funds to support sub- or super-critical coal power plants.²⁰ Its financing criteria, however, are not adequate to the task. *The Criteria for Financing Low-Carbon Opportunities in Coal and Gas Power Investments* (“Criteria”)

Many participating countries are not yet ready to concede that the Earth's dwindling carbon sink capacity can no longer support development strategies based on the relentless expansion of fossil fuel consumption.

note that “typical” supercritical coal-fired power plants with emission factors of 0.80 tons CO₂ per megawatt hour (net) (t CO₂/MWh (net)) are now “the system of choice for new commercial coal-fired plants in many countries.”²¹ Nevertheless, the Secretariat has set the proposed baseline carbon-intensity threshold for CTF investment at 0.795 t CO₂/MWh (net), a mere 0.005 t CO₂/MWh (net) below the emission factor for the current “system of choice.”²² In addition to being incredibly incrementalist, this standard may not be consistent with the commitment not to finance super-critical plants. As the World Bank's own private sector lending arm has noted,

super-critical coal plants can achieve even lower emissions factors.²³

Worse, the 0.795 t CO₂/MWh (net) threshold is only an initial benchmark; it can be adjusted upward based on specified site- and country-specific conditions.²⁴ This flexibility is not clearly constrained in the CTF Criteria. The Criteria do not (a) explain the circumstances in which these upward adjustments will be allowed; (b) propose any guidelines for MDB staff to implement them; or (c) establish maximum allowable adjustments. Under the Criteria, then, the CTF could presumably finance coal projects that are substantially more carbon-intensive than the baseline 0.795 t CO₂/MWh (net) would appear to require, or even than the super-critical plants that the Trust Fund Committee has excluded.

The Criteria also fail to require the use of control technologies for capturing other air pollutants, such as flue gas desulfurizers (“FGD”), selective catalytic reducers (“SCR”), and low-nitrogen oxide (“NO_x”) burners. These technologies are not necessarily required in developing countries, and their use reduces the efficiency (and thus increases the CO₂ intensity)

of a coal-fired plant.²⁵ In the absence of specific pollution control standards, the Criteria may allow (or implicitly encourage) operators to meet CO₂ emissions standards at the cost of increased emissions of other pollutants. This, too, is hardly transformational.

THE FALSE PROMISE OF CARBON CAPTURE AND STORAGE-READINESS

Arguably, the CTF could finance coal projects while meeting its strategic objectives by limiting eligibility to CCS demonstration projects that would help drive innovation and force down costs. However, the CTF has explicitly eschewed such a role. Because CCS technology is currently at the research and development stage, it is not eligible for CTF co-financing, even on a pilot or demonstration basis.²⁶ Instead, a new coal-fired power plant need only be “CCS-ready” to be eligible for CTF financing. Under the CTF Criteria, a plant will be considered CCS-ready if the project sponsor has:

- a) provided adequate space in the design of the facility for the equipment needed to capture CO₂;
- b) identified feasible options to transport CO₂ to a storage reservoir that is large enough to hold the lifetime emissions of the plant; and
- c) conducted an analysis of CCS options and the viability of plant with CCS operation.²⁷

Due to cost considerations, capital investment in CCS technology is not required.²⁸

The most likely outcome of this approach is that CTF-financed coal plants will remain “ready” for CCS indefinitely, but will never actually capture or store any CO₂. As one wit has put it, calling these plants CCS-ready is like calling my driveway “Ferrari-ready:” my driveway can certainly accommodate a Ferrari, but the chances of one being parked there are vanishingly small.²⁹ Although the basic technology is well understood,³⁰ commercial-scale CCS is not expected to be widely available for at least 15–20 years.³¹ In the best-case scenario, then, these plants will spew CO₂ for the first third to half of their operational lifetimes. In reality, however, there is little reason to believe that CTF-financed plants will be early adopters of CCS technology. Since the CTF does not actually require retrofitting, and since CCS is expected to be extremely expensive and reduce plant efficiency by as much as a third,³² operators will not retrofit on their own. Only strong regulatory requirements, a steep price on carbon, or a robust concessional financing regime will have the potential to induce a plant operator to undertake such an investment.

None of these potential drivers of CCS uptake currently exists in the developing world, or is likely to be implemented

in the near to middle term. Few if any developing countries are seriously considering carbon emissions regimes that would be stringent enough to eventually induce or require plant operators to retrofit their facilities with CCS technology. And assuming such regulations were to be enacted, there is little reason to be confident that they would be well-enforced. Even in countries with relatively effective regulatory and enforcement regimes, utilities have proven to be remarkably adept at avoiding or delaying mandates to upgrade their facilities to improve environmental performance.³³

It is also unlikely that any country that might host a CTF-financed coal project would implement policies to internalize the cost of carbon. In the current political environment, such a proposal would be a non-starter. But even if that were to change over time, the cost of carbon emissions would have to rise significantly before it would make economic sense to implement

CCS technology. A recent study by McKinsey estimates the cost of emissions reductions through CCS to begin at about \$75–115 per ton, and to decline by half after 2030 when the technology has matured.³⁴ By way of comparison, the price of carbon emissions under the European Trading Scheme is currently about € 13 per ton (approximately U.S. \$17 per ton).³⁵

The most likely way that CTF-financed projects would ever implement CCS technol-

ogy, then, is by accessing further concessional funds to finance the retrofit. But even this is highly speculative and, at best, a distant prospect. First, CCS is not currently eligible for credits under the Kyoto Protocol’s Clean Development Mechanism, the most important existing conduit for such financing.³⁶ While this would likely change if the technology matured, the availability of carbon credits would not provide sufficient incentives for operators to retrofit until the cost of abating emissions through CCS falls below the price of carbon credits. This is not expected to occur until at least 2030.³⁷ Second, it is also possible that a new UNFCCC financing mechanism could support the retrofit CTF-financed projects. But even if concessional funds were made available for CCS retrofits, there is little reason to believe that CTF-financed projects would be the best candidates for these funds. Commercial scale CCS is so embryonic that it is too soon to say which of the currently available coal combustion technologies will prove to be the most cost-effective to retrofit.³⁸

CONCLUSION: A CAUTIONARY TALE FOR COPENHAGEN

The best that can be said for the CTF’s willingness to finance coal-fired power plants is that, on its own terms, it is not likely to have a momentous impact on international efforts to redirect

Although the basic technology is well understood, commercial-scale CCS is not expected to be widely available for at least 15–20 years.

developing countries toward lower-carbon development paths. To date, donors have pledged relatively small sums of money,³⁹ some of which may not be disbursed. And at least some of the money that eventually reaches the CTF will go to more appropriate technologies. Indeed, the first three loans under consideration by the CTF, totaling U.S. \$900 million, will support renewable energy and urban transport initiatives, not coal.⁴⁰ In any event, the CTF is intended to be a short-term mechanism that will wind down its operations once the new UNFCCC financial architecture has been put in place.⁴¹

The critical question raised by the CTF's embrace of coal, then, is what that decision may portend for the criteria to be adopted by the UNFCCC financing mechanism that is to be created in Copenhagen in December 2009. That mechanism is expected to be the primary conduit for developed countries to meet their obligations to finance the deployment and diffusion of low-carbon technologies in developing countries. Moreover, under the Bali Action Plan, the mitigation efforts that developing countries will be expected to undertake will be explicitly linked to the kinds of financing and support that is provided by developed countries.⁴² As a result, the financing criteria adopted by the UNFCCC mechanism will be a key component of the effectiveness of the Copenhagen agreements.

The CTF's affiliation with the World Bank is likely to enhance its relevance in the Copenhagen negotiations. The World Bank will continue to be an influential player in Copenhagen, and appears to be positioning itself to play a key role in the implementation of the UNFCCC mechanism. But even if the World Bank is not afforded a direct role in the UNFCCC mechanism, the negotiators may consider the CTF standards to be an important precedent for the UNFCCC's financing criteria. Historically, there have been numerous examples of World Bank internal environmental and social standards being widely treated

as international best practice, regardless of their substantive shortcomings.⁴³

Apart from the World Bank's role, there are other reasons to be concerned that the criteria adopted by a UNFCCC mechanism may not be demonstrably better than those of the CTF. Some developing countries are skeptical of renewable alternatives—particularly those technologies that are not yet commonly employed in developed countries. These countries would prefer to continue to rely on coal despite its environmental disadvantages.⁴⁴ This preference was expressed in the Trust Fund Committee's deliberations over the proposed standards, in which influential recipient country representatives endorsed the inclusion of coal and questioned the need for CCS-readiness criteria. It has also been expressed by the Parties to the Kyoto Protocol. At the CoP-11/CMP-1 in Montreal, the Parties instructed Annex II countries, and Annex I countries “in a position to do so” to give priority to “[c]ooperating in the development, diffusion and transfer of less greenhouse-gas-emitting advanced fossil-fuel technologies, and/or technologies relating to fossil fuels that capture and store greenhouse gases, and encouraging their wider use”⁴⁵

It remains to be seen whether the same political forces that shaped the CTF criteria will define the parameters of the UNFCCC mechanism. There is some reason to believe that the dynamics may be shifting. The U.S. Congress for example, recently refused to fund the CTF out of concern by some members over the coal financing criteria.⁴⁶ And perhaps the leadership of the new U.S. administration, or the urgency and heightened public scrutiny of the Copenhagen meetings, will create space for negotiators to take a more ambitious approach to mitigation financing than was evidenced by the CTF. But unless the political dynamic is changed, there is little reason to expect that the outcomes will be any different.



Endnotes: The Clean Technology Fund and Coal: A Cautionary Tale for Copenhagen

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THE IMPORTANCE OF VENTURE CAPITALISM TO CLEAN TECHNOLOGY AND THE GOVERNMENT'S ROLE IN FOSTERING ITS DEVELOPMENT DURING THE RECESSION

by Janet Hager*

Technological advancement in clean energy has become a key U.S. initiative because of its potential for spurring economic growth and creating energy independence.¹ Any attempt to encourage the development of clean technology in the United States must also foster venture capitalism in the sector.²


Venture capital plays an important role in the U.S. economy by creating jobs and revenue.³ Venture capital firms pool the resources of many investors, which include individuals, pension funds, corporations, charities, and college endowments.⁴ The firms then invest the pooled fund into new companies.⁵ Venture capital has backed some of the most successful and innovative companies in the United States, including Apple, Google, Starbucks, and Whole Foods.⁶ Venture capital is particularly important to technological innovation for two reasons. First, venture capital funds innovative projects that cannot gain access to traditional banking funds.⁷ Second, venture capital drives technology forward by financing projects that will not be funded by larger companies because of their disruptive nature in the marketplace.⁸

Encouragingly, venture capital firms have already begun to tap into the new market of clean technology.⁹ Market trends indicate a continual pull away from unsustainable sources of energy like petroleum and natural gas, so venture capitalists have begun to favor investments in renewable energy.¹⁰ The clean technology sector has seen an extraordinary boom in investment capital in recent years.¹¹ In 2001 venture capital in clean technology made up less than one percent of total venture capital investments.¹² By 2008 however, venture capital in clean technology made up fifteen percent of the total venture capital invested.¹³ Unfortunately, there are signs that the recession has finally caught up to venture capital investments in the industry.¹⁴ In the first quarter of 2009, investments in the clean technology sector fell by forty-eight percent from the first quarter of 2008.¹⁵

The government does have the power to indirectly curb the effects of the recession on the clean technology venture capital market by implementing policies that make investments in the sector more attractive.¹⁶ On February 17, 2009 Congress enacted the Recovery and Reinvestment Act of 2009, which includes eighty-three billion dollars of clean technology incentives.¹⁷ The act emphasizes clean technology as a way to drive the economy and create jobs.¹⁸ It will promote investments in clean technology in three key ways: direct grants, tax incentives, and loan

guarantees.¹⁹ The incentives are primarily targeted at “smart grid technologies, advanced batteries, fundamental renewable energy research and a host of energy efficiency projects.”²⁰ Further, because venture companies in clean technology stand to benefit from the new influx of funding from the government, it is likely that investments of venture capital into these benefited companies will also be spurred.²¹

However, in order for the various new stimulus funds to be effective in helping the survival of clean technology companies struggling in the recession, the funds must be distributed quickly and effectively.²² The ability of the government to meet this goal is questionable. For example, one loan guarantee program, established in 2005 by the Department of Energy (“DOE”) under the Energy Policy Act of 2005, was plagued by a four-year hold on disbursement, where none of the available grant money was distributed.²³ The stimulus bill allotted an additional six billion dollars to this same loan grant program.²⁴ The new funds in the stimulus need to be distributed much more quickly than they have been under the Energy Policy Act of 2005 if they are to stand a chance at preventing “a raft of potential bankruptcies or crippling retrenchments through 2009” among clean technology companies.²⁵

Quick disbursement is all the more essential as other countries enter the race to develop the best new clean technologies. Recently, China announced that it intended to become the world's leader in hybrid and all-electric vehicles.²⁶ This announcement comes at the same time as the United States' first all-electric mass-manufactured vehicle is waiting for federal aid from the DOE's loan guarantee program.²⁷ Encouragingly, however, there are signs that the inertia in federal government to disburse funds is coming to an end. The DOE has gained momentum with the arrival of Stephen Chu, the new Secretary of Energy.²⁸ Chu has made disbursement of the loan guarantees a priority, and the first alternative energy loan was finally awarded.²⁹ If more releases of stimulus funds into clean technology follow, there is reason to be optimistic that venture capitalism in clean technology will recover as the funds put new life into the industry.³⁰ 

Endnotes: The Importance of Venture Capitalism to Clean Technology *continued on page 64*

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OVERCOMING INSTITUTIONAL BARRIERS TO BIOMASS POWER IN CHINA AND INDIA

by Craig A. Hart & M.L. Rajora*

INTRODUCTION

Biomass offers a potentially ideal source of fuel for cleaner power generation and the support of sustainable development in developing countries.¹ It is the fourth largest source of primary energy in the world and the largest source of renewable energy, supplying about ten percent of 2004 total primary energy supply.² Biomass could account for in excess of thirty percent of the world's primary energy by the year 2050.³

Biomass power generation technology is mature, yet deployment of this technology on a wide scale faces significant institutional barriers related to the difficulty associated with sourcing a reliable and affordable supply of biomass. Biomass power production at a large scale also poses significant water and food security issues if not managed properly.

The authors review China and India's laws and policies regarding biomass supply in order to assess their institutional arrangements for application of biomass technology. We selected China and India for study because they are the world's largest countries in terms of population, their economies and energy demand are rapidly growing, and they have large agricultural sectors. Biomass will be increasingly important to these countries as they seek to meet energy demand in a sustainable manner.

This article examines the advantages of biomass energy for developing countries; the barriers posed by difficulty in obtaining an economical, adequate, and reliable supply of biomass; and how China and India have prepared for biomass generation by addressing these barriers through legislation. It describes policies and programs developed by China and India to encourage expansion and integration of this important technology into the existing energy infrastructure.

ADVANTAGES OF BIOMASS FOR DEVELOPING COUNTRIES

In developing countries, biomass typically accounts for as much as twenty to thirty percent of energy supply and in a

number of countries can reach fifty to ninety percent of total energy supply.⁴ In these countries, biomass is used as the primary source of energy for home heating and cooking in rural areas.⁵ However, the burning of biomass, which typically occurs in enclosed areas, poses threats to human health, and is a primary cause of respiratory diseases in developing countries.⁶

Biomass electricity generation can provide household energy without the adverse health impacts of using biomass directly in homes. Further, biomass power generation can significantly reduce sulfur dioxide and nitrous oxides, mercury, particulate emissions, and greenhouse gas ("GHG") emissions

compared to coal power plants.⁷ Coal currently supplies eighty percent of China's power,⁸ and sixty-nine percent of India's power.⁹ As is well-known, pollutants from coal power plants cause serious health effects, such as birth defects, as well as cancer and respiratory illness; they also pollute land and water and poison food supplies.¹⁰

Biomass power generation can also help reduce the use of chemical fertilizers in agricultural production and promote the development of organic agriculture. The ash product of a biomass power plant can be

processed into fertilizer for use by farmers. In turn, the greater reliance on organic fertilizers can reduce the negative effects of chemical fertilizers on soil and ultimately significantly promote water conservation.¹¹

For China, estimates for the amount of agricultural biomass available range from approximately 250 to 376 million tons per year, out of a total of approximately 726 million tons of crop residue generation.¹² This could supply cooking fuel for over half a billion people.¹³ China's forests produce additional bio-

Biomass power generation can significantly reduce sulfur dioxide and nitrous oxides, mercury, particulate emissions, and greenhouse gas emissions.

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Crop	Production Million Tons of main crop	Types of Residues	Production of main crop to residue ratio	Quantity of residues in Million Tons/yr	Typical Uses of Residues
Rice	90	Straw	1.3	117	Used as cattle feed in Southern and Eastern India. Generally burnt in the fields in the North.
		Husk	0.3	27	Used as a fuel by small industry.
Wheat	80	Straw	1.5	120	Used mainly as cattle feed.
Coarse Cereals	30	Straw and Husks	1.8	54	Used as cattle feed and as fuel.
Sugarcane	320	Bagasse	0.3	96	Mainly as a captive fuel by sugar plants, partly as raw material for papermaking.
		Tops	0.05	16	Used as cattle feed
		Trash	0.07	20	Mostly burnt in the fields.
Coconut	14 billion nuts	Shell	0.13 kg/nut	0.2	Partly as domestic fuel. Used partly, for making mattresses, carpets, etc.
		Fibre	0.2 kg/nut	2.8	
		Pith	0.2 kg/nut	2.8	No productive use. Disposal is a problem.
Cotton	3.5	Stalks	3.0	10.5	Partly as domestic fuel
		Gin Waste	0.1	0.35	Used as a fuel for brick making and by small industry.
Oilseeds	20	Straws and husks	1.1	22	
Pulses	14	Straws	1.3	18	Partly as a domestic fuel
Jute/Mesta	2.0	Stalks	2.0	4	Used partly as fuel for processing tobacco leaves/domestic fuel
Total				499	

Figure 1: India's Estimated Annual Biomass Production

Source: Ministry of Agriculture, Government of India. *Note: Based on 2006–2007 production.*

mass residue of about 24.77 million cubic meters per year using sustainable forest management practices.¹⁴

For India, biomass has long been the main energy source for cooking and heating. India produces approximately 500 million tons of biomass per year.¹⁵ Biomass has emerged as an increasingly attractive option for power generation due to the growing demand for power, recurrent power shortages throughout the country, a projected shortage of coal for power generation, and the high cost of diesel and other fossil fuels.

Biomass electricity generation plants could potentially help farmers by providing supplementary income from their farm waste to aide in stabilizing farming communities and land use patterns and provide permanent and seasonal employment in rural areas. Biomass for electrification should be integrated into existing property and cultural patterns without requiring the consolidation of small farms into larger operations.

If planned properly, biomass power plants should be able to use only waste biomass that would not require additional water or displace food crops. Further, biomass plants using waste should favor food security by increasing income to rural farmers and

keeping land in production. However, if the adoption of biomass power generation changes indigenous agricultural practices, the biomass power plant could potentially require additional water resources or require land that otherwise would produce food to convert to fuel production.

BARRIERS TO BIOMASS AS A FUEL FOR POWER GENERATION

The primary barrier to biomass power generation is the ability to obtain adequate supply of biomass at an economical price. In developing countries, there is typically no organized market for biomass fuel.¹⁶ As a result, there is no price consistency for biomass material. Lack of transportation infrastructure and the cost and availability of transportation fuels limit the development of regional markets, resulting in fragmented and localized biomass markets.¹⁷ The seasonal nature of biomass material, the variation in quantity, and the low density of such material further complicate the development of an organized market for biomass.

Biomass also faces significant transaction costs resulting from the quantities of biomass required to be collected from large numbers of farms.¹⁸ Contracts with small farmers for a guaranteed supply of biomass would not likely be commercially practicable or enforceable, given that natural conditions play a major factor in biomass production and enforcement costs would be prohibitive.

Further, biomass electricity generation competes with many other uses of biomass. As noted, in developing countries, biomass is commonly used for home heating and cooking in rural areas, and it is burnt by farmers to help fertilize growing fields.¹⁹ Other sources of competition include use by ranchers as a source of feed for livestock, use as a source of supply for construction materials such as bricks and roofs, and use by the paper industry as a source of material for making paper.

In addition to market barriers to biomass, there are also environmental and resource barriers. For example, the availability of water for growing crops such as sugarcane or for cooling a power plant can limit the introduction of biomass power generation in certain geographic areas.²⁰

BIOMASS SUPPLY AND COST IMPACTS ON PROJECT FINANCING

Biomass supply requirements for a small-size power plant are substantial. The financial performance of a biomass plant is highly sensitive to the cost of biomass supply. In order to assess the risks associated with fuel supply, we conducted a financial analysis based on the retrofit of a coal plant to a biomass-fueled combined heat and power plant in China.

The financial analysis assumes electricity is priced based on preferential rates provided pursuant to China's Renewable Energy Law, but that no additional subsidies are considered. The project financial analysis further assumes that Clean Development Mechanism certified emission reduction certificates are sold by the project for 90 renminbi ("RMB")²¹ per metric ton carbon dioxide for a three-year period.

We calculate that a combined heat and power biomass power plant with energy capacity of 24 Megawatts ("MW") requires 270,000 tons of straw (assuming a moisture content of twenty-five percent) per year. Such a power plant would require three ten-ton truckloads of biomass every hour continuously in order to operate at full capacity.

Based on the average size of farm in China (approximately 3 mu, or 0.002 square kilometers), we estimate that each farm produces 1.2 to 1.8 tons of straw per year, and that the power plant will require straw from an average of 180,000 farms. In our example, supply must be sourced within a 75 km radius of the plant so that transportation costs are acceptable, however the cost and risk to the plant increases with distance. A plant operator would likely require much shorter distances to ensure profitability. Further, in terms of sustainability, we estimate that more than half of all transportation related carbon emissions in biomass production can be avoided if the supply is located within 25 km of the power plant.

In rural China, the average annual income in 2005 was 3,255 RMB per year. If straw could be sold for 125 RMB per ton, we estimate that the average farm supplying 1.5 tons of straw per year could increase their annual income by almost 200 RMB/year, an increase of almost six percent that could be very helpful to a low-income household.

The project's financial performance is highly sensitive to the price of straw. For our hypothetical 24 MW project, a 25% increase in the price of straw reduces the project's the internal rate of return ("IRR") on equity from 28.4% to 21.5% and the debt service coverage ratio ("DSCR") from 2.25 to 2.02, assuming a 70% debt-to-equity ratio. In contrast, a one million RMB increase in initial costs slightly decreases IRR on equity from 28.4% to 28.3%, and the DSCR from 2.25 to 2.24.

While our example still shows very good returns, the increase in straw price can result in a significant reduction in profit, and ultimately cause a marginal project to fail. If the market is thin or fragmented, as is typical, the potential for local biomass prices to spike as a result of the introduction of a biomass power plant are real and could render the project uneconomic.

Plant Size	3 MW	6 MW	12 MW	24 MW
Best Case (assumes Straw Price 130 RMB/Ton)				
IRR Equity %	27.8	14.2	23.0	28.4
DSCR	2.19	1.69	2.03	2.25
Initial Cost (RMB millions)	114	183	315	547
Straw Price Increases 25%				
IRR Equity %	24.3	8.9	17.0	21.5
DSCR	2.07	1.52	1.83	2.02
1 Million RMB Increase in Initial Costs				
IRR Equity %	27.5	12.1	22.2	28.3
DSCR	2.15	1.60	2.00	2.24
Effect of each 1 million RMB increase on IRR	-0.3	-2.1	-0.8	-0.1
Effect of each 1 million RMB increase on DSCR	-0.4	-0.9	-0.2	-0.1

Figure 2: Financial Analysis of Combined Heat and Power Biomass Power Plant in China

Source: Craig Hart, China Biomass Combined Heat & Power Multi-Stakeholder Negotiation, Energy + Environment OpenCourseWare, <http://eeocw.org/environmental-negotiation/china-biomass-combined-heat-and-power-multi>.

Note: The improvement in financial results for a 3 MW power plant results from the use of more efficient technology that is currently only available on smaller scales.

POLICY AND REGULATORY FRAMEWORKS IN CHINA AND INDIA

We review China and India's laws and policies regarding biomass supply in order to assess their institutional arrangements for application of biomass technology.

CHINA

China's National Development Reform Commission set targets for development of renewable energy, including 30 GW of biomass renewable energy to be built by 2020.²² In support of this goal, the country has developed a series of laws, regulations, and policies with the intention of achieving this substantial increase in biomass use.

China's Renewable Energy Law supports various kinds of renewable energy, including biomass, through a system of preferential electricity prices that vary on a regional basis.²³ The law also provides additional payments for electricity generated with low sulfur emissions.²⁴ Subsidies for biomass electricity and desulfurization abatement equipment terminate after 15 years.²⁵ The Renewable Energy Law guarantees sale of renewable electricity to the power grid.²⁶

China also offers various financial incentives for biomass. This includes subsidies supporting R&D, low interest loans to projects, and grants to rural households for wood-stoves and bio-gas systems.²⁷ China also provides tax incentives, including reduced customs taxes for imported equipment and an income tax holiday for industries whose main inputs are wastes.²⁸

All land and natural resources in China are owned by the state, and leased to land users. China's property laws and regulations do not, to our knowledge, contain any provisions providing for biomass to be supplied to power generators. China does, however, forbid the direct burning of crop residues within the vicinity of roads, and railway and transportation infrastructure.²⁹ The measure is intended to increase the utilization of crop residues as fertilizer, materials for industrial use, and straw and stalk gasification.

China's Ministry of Finance issued the Interim Measures for Administration of Special Funds for the Development of Renewable Energy in May 2006 to fund studies, standards formation, resource surveys, production of equipment, and construction of projects in remote areas in the field of renewable energy, including biomass and biofuels.³⁰ The funds provide both cash appropriation and subsidized loans. The Ministry of Finance and the Ministry of Construction issued the Interim Measures for Administration of Special Funds for Using Renewable Energy in Construction in September 2006.³¹ This fund provides financial support to renewable energy, including biomass, used in construction of buildings, such as biomass energy to be used for heating and cooling systems, hot-water supply, electricity for lighting, and cooking.³²

The Ministry of Finance issued the Notice of Interim Measures of Administration on Subsidy Funds for Using Straw as Energy Resource in 2008.³³ This "Special Fund for Straw" supports enterprises that convert crop straw into energy, including densification briquetting fuel, straw gasification, and straw

CASE STUDY: CHINA

CHINA'S MICROTURBINE APPROACH TO BIOMASS TECHNOLOGY¹

The Research Center for Energy and Power of the Chinese Academy of Sciences is developing an innovative approach to distributed biomass utilization for rural electrification, heating, and cooking by adapting the technology to conditions in the biomass market. The approach uses local small-scale pyrolysis facilities to convert biomass to synthetic gas and active carbon ("char"). Pyrolysis is a thermo-chemical process that breaks down biomass, waste, or other substances by heating it to high temperatures (e.g., 300°C to 500°C for various types of biomass), leaving only carbon residue at certain temperatures.²

The synthesis gas produced from the pyrolysis process would then be used for home heating and cooking (replacing direct burning of biomass), and as a fuel source for distributed electric power generation. The approach relies on distributed power plants using micro-scale gas turbines (approximately 100 KW in size) and gas engines. We estimate that a 100 KW gas turbine could require less than approximately 1,500 tons of biomass per year to operate (assuming biomass has twenty-five percent moisture content). The much smaller biomass supply required for a microturbine reduces the risks associated with larger biomass power generation facilities. The active carbon produced from the pyrolysis process can then be used as a natural fertilizer, replacing chemical fertilizers. In addition to increasing agricultural productivity, active carbon also increases the soil's carbon absorption.

¹ Source: Interview with Dr. Xiao Yunhan, Professor of the Chinese Academy of Sciences and China's Ministry of Science & Technology (Apr. 17, 2009).

² Pyrolysis is widely used to convert waste into safely disposable substances, to produce various chemical products, to crack hydrocarbons in the refining processes, and to produce biofuels from animal wastes.

carbonization. In Chinese law, straw includes paddy rice, wheat, corn, legumes, vegetable material that can be pressed to extract oil, cotton, and tuber crops and remains produced during the initial processing of crops. To be eligible for support from the Special Fund for Straw, the following requirements must be satisfied:

- Enterprise must have registered capital of RMB 10 million or more;
- Enterprise's utilization of straw as energy resource conforms to local regulations governing general utilization of straw;

- Enterprise's annual straw consumption is at least 10,000 tons; and
- Enterprise's products are commercialized and has stable customers.

China's energy technology subsidies programs are intended to increase the efficiency of biomass power generation and integrate it with buildings (a major power user), which will help make biomass power generation less expensive and more financially stable. The Special Fund for Straw is intended to directly address the risks associated with biomass supply. However, these subsidies are likely to be temporary in nature. Thus, the long-term strategy should be to increase efficiency of biomass technologies, and to adapt technologies to the conditions of the biomass market.

INDIA

In 1981, India created a government commission with overall responsibility for developing renewable energy and a separate Department of Non-Conventional Energy Sources in the Ministry of Power that eventually evolved into the Ministry of New and Renewable Energy.³⁴ The Ministry of New and Renewable Energy issued the Renewable Energy Power Purchase Guidelines to all States in 1993, followed by the Energy Conservation Act of 2001, which mandated adoption of standards and procedures and prescribed measures for energy conservation.³⁵ The Electricity Act of 2003 guaranteed interconnection for renewable energy sources and provided recommendations for preferential tariffs and quotas for renewable generation.³⁶ Almost all states have implemented some form of preferential tariffs for renewable energy generation, and have set general quotas for renewable energy, but have not specified quotas by energy type. The amount of subsidies depends upon the type of technology used in the project and the equipment's level of efficiency.³⁷ These measures have been strengthened by the National Electricity Policy of 2005, the Tariff Policy of 2006, the Rural Electrification Policy of 2006, and the Integrated Energy Policy Report of the Planning Commission of India in 2006.³⁸ Today, India's power market mostly comprises regulated prices with a few states introducing open bidding on electricity through ten to fifteen year power purchase agreements.

In addition to preferential rates specified by the state regulatory authority³⁹ and guaranteed grid access, a number of cash and tax subsidies are available to aid in the development of biomass. Federal subsidies are available to developers of biomass power plants. The amount of the subsidy depends upon the efficiency rating of the plant. The government exempts imported and domestic equipment from excise duties, and offers accelerated depreciation treatment for energy efficiency and biomass power generation equipment. Finally, the government offers a 10-year tax holiday that applies to biomass power plants.⁴⁰

Regarding the natural resources available for the facilitation of biomass development, abundant sugarcane bagasse is the main raw material for biomass power generation in India. India is the world's second largest sugarcane producing country, following Brazil.⁴¹ In India, bagasse electricity production

CASE STUDY: INDIA

WATER-EFFICIENT SUGARCANE FARMING IN INDIA¹

Sugarcane is traditionally a water-intensive crop, requiring steady irrigation for a full eighteen-months to two-year growing period. Without abundant local water resources, sugarcane requires extensive irrigation that competes against other food crops and can be costly both financially and ecologically. Conventional sugarcane farming also relies heavily on fertilizers and pesticides.

An innovation pioneered by a local farmer in Karnataka, India, replaces the practice of soil flooding with providing enough water to maintain soil moisture. The method involves reducing the number of irrigation channels, building up the soil's organic content and earth fauna, eliminating synthetic fertilizers and pesticides, and adopting no-till practices. Elimination of the water flood and these other changes enhance soil aeration and fertility, and reduce susceptibility to disease.

The method reduces water requirements by as much as seventy-five percent compared to conventional sugarcane farming, increases farming profits by eliminating costs of fertilizer and pesticides, better preserves the soil, and produces comparable or better yields.

Farming associations, such as the Organic Farmers Club, teach these and other techniques; however, these practices have yet to be institutionalized in government policy.

¹ See Special Unit for South-South Cooperation, UN Development Programme, *Water-efficient sugarcane farming; India*, in *EXAMPLES OF SUCCESSFUL ECONOMIC, ENVIRONMENTAL AND SUSTAINABLE LIVELIHOOD INITIATIVES IN THE SOUTH 102* (Sharing Innovative Experiences Series, vol. 3, 2000), available at <http://tcde.undp.org/Sie/experiences/vol3/Water-efficient.pdf>; Food and Agriculture Organization of the United Nations, *Farmers Innovations, Community Development and the Ecological Management in Organic Agriculture, Case Study 1: No-till sugar cane cultivation with alternate row irrigation, Belgaum, Karnataka, India*, in *ORGANIC AGRICULTURE, ENVIRONMENT AND FOOD SECURITY* (Nadia El-Hage Scialabba & Caroline Hattam, eds., 2002), available at <http://www.fao.org/DOCREP/005/Y4137E/y4137e07.htm>.

is generally combined with the production of sugar, with a portion of the electricity used to power the mill, and the excess sold into the grid. The cogeneration of power with sugar production strengthens the overall financial condition of the project.

In order to promote sufficient biomass supply for each facility, sugarcane mills are required to be located a minimum distance from each other by state law. For example, in Uttar Pradesh, India's leading sugar cane growing region,⁴² mills may not be located within a 15 km radius of each other.⁴³


The Indian Renewable Energy Development Agency Limited (“IREDA”), a government-owned corporation that promotes, develops and finances renewable energy and energy efficiency projects, requires biomass power plant seeking financing to demonstrate that, for each MW of nameplate capacity, a plant will have access to at least 10,000 tons of biomass material each year in close proximity to the plant, and an additional 10,000 tons of surplus in the surrounding area. As a general guideline, in order to ensure supply of biomass, IREDA prohibits more than one biomass power plant in a single district and a minimum distance of at least 50 km between power plants. IREDA further requires that the quality of the biomass material have at least 2,000 kilocalories per kilogram. Finally, to be eligible for financing, the cost of the plant may not exceed U.S. \$800 per KW nameplate capacity, depending upon boiler configuration and cooling system.

In the context of a private market, India’s laws provide a degree of protection from over-competition for supply of biomass; this is particularly important where land ownership is predominantly private, as it is in India. Even with these protections, power plant owners still have ample incentive to pay a competitive rate for biomass supply, and to maintain good relationships with farmers. We are aware of examples of power plant owners providing their farm suppliers with financial assistance to purchase fertilizer, offering education on agricultural techniques, and even access to company health care facilities, schools, and other services.⁴⁴

CONCLUSIONS

China and India both plan for biomass power generation to increase significantly. Both countries have provided preferential electricity tariffs and guaranteed sale of biomass and other renewable energy to the power grid. Beyond these steps, the approaches taken by the countries diverge.

India has developed an innovative institutional approach that is appropriate to its market economy and legal system. It relies on private sector generation of power and limiting (without eliminating) competition for the supply of biomass through state law and IREDA’s lending guidelines. In contrast, China’s efforts focus on financial support of developing biomass resources and technology and financial support for the purchase of biomass. China’s technology development efforts include research and development to increase the efficiency of traditional biomass technologies and an innovative program to develop microturbine biomass facilities in an effort to adapt to the institutional and market conditions facing biomass technology in China.

Notably, China and India’s policies focus primarily on the promotion of the use of biomass. Our survey did not identify laws or policies designed to address water and food security issues. Both China and India will need to more fully integrate water resource planning into their energy policies as biomass power generation is scaled up to meet energy demand. 

Endnotes: Overcoming Institutional Barriers to Biomass Power in China and India

¹ Biomass includes crop residues, waste by-products of crop processing (e.g., rice straw, husk, wheat straw, coarse cereals, straws and husk, sugarcane bagasse tops, etc.), woody produce of forests and plantations, and biomass acquired from growths in wastelands.

² INTERNATIONAL ENERGY AGENCY, RENEWABLES IN GLOBAL ENERGY SUPPLY: AN IEA FACTSHEET (2007), available at http://www.iea.org/textbase/papers/2006/renewable_factsheet.pdf.

³ See V. Dornburg & A.P.C. Faaij, *Assessments of future global biomass potentials and their linkage to specific local conditions such as water, land-use, biodiversity, food production and economy*, 2007 PROCEEDING EUR. BIOMASS CONF. EUR. & EXHIBITION 383; see also INTERNATIONAL ENERGY AGENCY, ENERGY TO 2050: SCENARIOS FOR A SUSTAINABLE FUTURE (2003), available at http://www.iea.org/textbase/nppdf/free/2000/2050_2003.pdf; Thomas B. Johansson et al., *Renewable Fuels and Electricity for Growing World Economy*, in RENEWABLE ENERGY SOURCES FOR FUEL AND ELECTRICITY 1 (Thomas B. Johansson et al. eds., 1992).

⁴ See generally VERONIKA DORNBURG ET AL., BIOMASS ASSESSMENT, ASSESSMENT OF GLOBAL BIOMASS POTENTIALS AND THEIR LINKS TO FOOD, WATER, BIODIVERSITY, ENERGY DEMAND AND ECONOMY (2008).

⁵ See, e.g., Martin Donohoe & Emily P. Garner, *Health Effects of Indoor Air Pollution From Biomass Cooking Stoves*, MEDSCAPE TODAY, May 19, 2008, <http://www.medscape.com/viewarticle/572069?src=mp&spon=42&uac=5243EK>.

⁶ *Id.*

⁷ New Mexico Biomass Information Clearinghouse, Benefits of Using Biomass, <http://www.emnrd.state.nm.us/emnrd/biomass/benefits.html> (last visited Apr. 18, 2009).

⁸ U.S. EPA COMBINED HEAT & POWER P’SHIP & ASIA PACIFIC P’SHIP ON CLEAN DEVELOPMENT & CLIMATE, FACILITATING DEPLOYMENT OF HIGHLY EFFICIENT COMBINED HEAT AND POWER APPLICATIONS IN CHINA 10 (2008), available at http://www.epa.gov/chp/documents/chpapps_china.pdf.

⁹ World Coal Institute, Coal Info: India, <http://www.worldcoal.org/pages/content/index.asp?PageID=402> (last visited April 20, 2009).

¹⁰ See Fact Sheet, Nat. Res. Def. Council, Dirty Coal Is Hazardous to Your Health: Moving Beyond Coal-Based Energy (2007), available at <http://www.nrdc.org/health/effects/coal/coalhealth.pdf>.

¹¹ E. M. Morrison, Ash back: Research Looks at Recycling Waste Ash for Fertilizer, Apr. 11, 2008, http://www.farmandranchguide.com/articles/2008/04/11/ag_news/production_news/pro17.txt.

¹² See Eric D. Larson, *Modernizing Biomass Energy*, in CLIMATE CHANGE AND DEVELOPMENT 271, 284 (2000), citing J. Li et al., Assessment of Biomass Resource Availability in China (1998), available at <http://environment.yale.edu/topics/786>; see also CENTER FOR RENEWABLE ENERGY DEVELOPMENT ET AL., Biomass Support for the China Renewable Energy Law: International Biomass Energy Technology Review 1-2 (2006) [hereinafter CRED], available at <http://www.nrel.gov/docs/fy07osti/40626.pdf>.

¹³ See Larson, *supra* note 12, at 284.

¹⁴ See CRED, *supra* note 12, at 2.

¹⁵ See *infra*, Table 1.

¹⁶ See, e.g., N.H. RAVINDRANATH & D. O. HALL, BIOMASS, ENERGY & ENV’T 14 (1995) (examining several challenges to developing markets for renewable energy in India, including ensuring the maintenance of a sustainable supply of biomass).

¹⁷ See generally Stéphane Straub, *Infrastructure & Growth in Developing Countries: Recent Advances & Research Challenges* (World Bank, Policy Research Working Paper No. 4460, 2008), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1080475# (examining the connection between development of transportation infrastructure and economic growth).

Endnotes: Overcoming Institutional Barriers to Biomass Power in China and India *continued on page 64*

THE AMERICAN RECOVERY AND REINVESTMENT ACT AND A NEW ROLE FOR GOVERNMENT IN CLEAN TECHNOLOGY PROJECT FINANCING *by James Hunter**

As a result of the current global economic crisis and credit crunch, financial institutions, governments, and companies recognize that traditional project finance regimes in the realm of clean technology are potentially outmoded.¹ For example, traditional tax incentives that once spurred major financial institutions towards investing in clean technology projects no longer fuel the sector's financial development, as the tax incentives for those investments dried up along with banks' profits in 2008 and 2009.² Additionally, investors are shifting their focus from capital-intensive projects like solar energy technology towards less capital-intensive projects like emerging smart grid technologies.³ Revisions to tax incentives and the revitalization of the Department of Energy ("DOE") Loan Guarantee Program are two innovative responses introduced by the Obama administration and the U.S. Congress through the passage of the American Recovery and Reinvestment Act ("ARRA") that address this realignment.⁴ With these programs, the new administration is signaling that the development and success of a clean technology sector is both the litmus test and poster-child for economic recovery.

The Business Energy Investment Tax Credit ("ITC")⁵ and the Renewable Electricity Production Tax Credit ("PTC")⁶ are among the most important tax incentives for institutional investment into clean technologies. The ITC provides a tax credit on up to thirty percent of expenditures for investment in alternative energy sources, such as solar power, fuel cells, and small wind turbines.⁷ Similarly, the PTC institutes a "per-kilowatt-hour tax credit for electricity generated by qualified energy resources and sold by the taxpayer to an unrelated person" for a specified period of time—usually 10 years.⁸ These corporate tax incentives worked so long as the financial institutions had profits and tax liabilities to be offset by the tax credits; unfortunately, since the financial crash in 2008, this system is no longer sustainable.⁹

In light of this development, Congress and the Obama administration enacted important revisions to the incentive structures of both the ITC and the PTC through the ARRA. The credits now provide for the option to take either the PTC or ITC credit, or to receive an equivalent cash grant from the Treasury Department.¹⁰ Further, the ARRA extended the deadlines of PTC credits and removed an ITC provision limiting the credit for new projects that also receive subsidized financing.¹¹ Critics have applauded this revision, noting that the ability for investors to receive federal cash almost immediately "is much simpler and more affordable than the old periodic tax credit schemes favored by Congress" and will "significantly lower the cost of financing."¹² Effects of the revised tax incentive structure and the

credit crunch are leading some businesses to reassess traditional project financing and business models. For example, the California based utility Pacific Gas & Electric recently announced it would install solar power facilities using its own capital to take advantage of the ITC.¹³

On March 20, 2009, DOE announced the first clean-energy loan guarantee for the California solar company, Solyndra.¹⁴ The \$535 million loan guarantee is the result of a \$39 billion appropriation in the ARRA to DOE for direct investment in backing renewable energy projects.¹⁵ This loan guarantee program is not new—in fact the Energy Policy Act of 2005 first authorized DOE to issue these loan guarantees¹⁶—however, DOE, for various reasons, has failed to disburse any funds until now.¹⁷ Not only will the loan guarantee program assist in revitalizing projects that may have lost financing as a result of the credit crisis,¹⁸ the program will also aid in allaying the fears of risk averse investors who may see potential in projects, but have shied away from investing in capital-intensive and unproven technologies.

Several other noteworthy projects are awaiting review of their loan guarantee applications, including the highly anticipated all-electric Tesla Motors Model S sedan. Tesla requires \$450 million in government funds—\$250 million of which would come from the DOE loan guarantee program, and the remainder from a 2007 Congressional bill authorizing \$25 billion for electric vehicle technologies—in order to continue production of the car.¹⁹ Energy Secretary Steven Chu aims to streamline the loan application process and disburse seventy percent of the ARRA funds by the end of 2010.²⁰

The latter ARRA provisions represent a significant shift from traditional bank backed project finance and help to keep capital-intensive projects afloat in these tough economic times. Additionally, the provisions help stabilize the incentive structure surrounding clean technology investment in order to avoid the historical cycle of "unnecessary fluctuation in tax credits, leading to alternating periods of investment followed by instability when the federal credit terminates."²¹ Despite the controversies surrounding the expenditures required by the ARRA, the provisions regarding clean technology are sound policies in uncertain times.



Endnotes: The American Recovery and Reinvestment Act
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THE MONTREAL PROTOCOL MUST ACT TO PREVENT GLOBAL CLIMATE CHANGE WHILE RESTORING THE OZONE LAYER

by Mark W. Roberts*

INTRODUCTION

“Not everything that is faced can be changed. But nothing can be changed until it is faced.”

—James Baldwin

The Montreal Protocol on Substances that Deplete the Ozone Layer (“Montreal Protocol”) has forced the phase-out of more than ninety-five percent of several classes of chemicals that deplete the ozone layer in developed countries and approximately fifty to seventy-five percent of these ozone depleting substances (“ODSs”) in developing countries.¹ As a consequence of these phase-outs, a significant portion of ODSs that are used as refrigerants and foam-blowing agents are now being replaced with hydrofluorocarbons (“HFCs”). Although HFCs are not ODSs, they are extremely powerful greenhouse gases (“GHGs”) that exacerbate climate change. Most HFCs have a global-warming potential (“GWP”)² hundreds to thousands of times greater than carbon dioxide (“CO₂”). The Montreal Protocol must respond to climate impacts of HFCs by encouraging the use of other energy-efficient ODS substitutes with low GWP.

A second issue that the Montreal Protocol must address is that, although existing stockpiles of ODSs have been taken out of service, ODSs in discarded stockpiles, equipment, and products, collectively referred to as “Banks,”³ are rapidly emitting powerful GHGs into the atmosphere.⁴ The emissions from Banks are delaying the recovery of the ozone layer and exacerbating global climate change. Banks are currently not regulated by either the Montreal Protocol or the Kyoto Protocol of the United Nations Framework Convention on Climate Change (“UNFCCC”). The Montreal Protocol must take responsibility for the Banks, created by the use and effective phase-out of ODSs, before these GHGs are emitted to the atmosphere. The International Panel on Climate Change (“IPCC”) and the Technology and Economic Assessment Panel (“TEAP”) estimated in 2002 that approximately 21 gigatons (“Gt.”) of CO₂ equivalent (“CO₂-eq.”) are contained in Banks.⁵ Unless action is taken now, the IPCC/TEAP Special Report predicts that total direct emissions of CO₂-eq. are expected to reach 2.3 Gt. per year by 2015, nullifying all of the reductions in GHGs achieved under the Kyoto Protocol.⁶

The history of the Montreal Protocol is one of a dynamic and evolving treaty that responds quickly to changes in ozone and climate science, technology, and the needs of industries and countries dependent on ODSs and their substitutes. Following

in this tradition, and consistent with the purpose and spirit of the Montreal Protocol to protect the global environment, decisions should be made to include high-GWP HFCs among the categories of regulated chemicals and to expand the Montreal Protocol’s mandate by covering the destruction of Banks. Critically-necessary actions to achieve these goals include:

1. A decision by the Montreal Protocol to add high-GWP HFCs as controlled substances.
2. A decision by the Montreal Protocol to discourage the production and consumption of high-GWP HFCs and to finance the incremental costs that developing countries must incur to avoid using high-GWP HFCs.
3. Expansion of the Montreal Protocol’s activities to include the management and destruction of Banks worldwide.
4. Coordination with the UNFCCC to: (a) have the phase-out of high-GWP HFCs serve as a case study for effective technology transfer and funding mechanisms that can be incorporated into post-Kyoto Protocol institutions for other GHGs; and (b) develop effective funding mechanisms for destroying Banks before they are released to the atmosphere.

The Montreal Protocol and its Parties have repeatedly recognized the need to address the full environmental implications of their actions.⁷ Regulation of high-GWP HFCs, a class of chemicals that was commercialized directly due to the phase-out of ODSs under the Montreal Protocol, and managing and destroying the Banks of ODSs are the next steps in fulfilling this mandate.

THE MONTREAL PROTOCOL

The Montreal Protocol has been widely touted as the most successful international environmental treaty to date, having phased out the production and consumption of the vast majority of ODSs in accordance with set timeframes. The Montreal Protocol includes the innovative approach of having developed countries (“non-Article 5 countries”) phase out ODSs on a faster schedule than developing countries (“Article 5 countries”), thereby acknowledging both developed nations’ larger

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contributions to historic emissions and developing nations' need to provide for their own future economic and environmental development. Additionally, the Montreal Protocol includes proven mechanisms to assist Article 5 countries in meeting their ODS reduction goals by facilitating technology transfer and providing financial assistance to ensure compliance and the creation of necessary infrastructure.

The most basic tenet of the Montreal Protocol is the Parties' obligation to limit "consumption" and "production" of "controlled substances."⁸ By definition, "controlled substances" include any substance listed in the annexes to the Montreal Protocol, regardless of whether it exists alone or within a mixture.⁹ To enable the Parties to meet their mandate to restore the ozone layer, the Montreal Protocol can add a substance to the annexes of controlled substances when it is recognized as a significant ODS.¹⁰ Additionally, the Montreal Protocol permits Parties independently to regulate substances not included in the Protocol or undertake more stringent control measures than required under the Montreal Protocol.¹¹

It is important to note that, while the Montreal Protocol sets specific timelines for the phase-out of ODSs, it does not specify the manner in which the phase-out goals are to be achieved. This flexibility allows Parties to meet the targets in a manner best suited to their individual situations.¹² Parties are permitted to utilize materials that have been stockpiled, produced, or used as a feedstock in the production of other chemicals.¹³ Moreover, trade in recycled and used chemicals is not included in the calculation of consumption to encourage the recycling of materials as a means of satisfying consumption needs while facilitating phase-out of production.¹⁴

Article 5 of the Montreal Protocol, entitled Special Section of Developing Countries, was negotiated to establish a grace period for compliance with the control provisions to phase out consumption and production of ODSs ranging between ten and fifteen years, depending on the chemical, beyond the deadlines for developed countries.¹⁵ Only those nations with an annual per capita consumption of ODSs of less than 0.3 kilograms per year can take advantage of the more lenient extended phase-out schedule.¹⁶ Article 5 charges developed nations with the responsibility to provide financial and technological assistance to the developing nations in the implementation of technologies and processes with less ozone depleting effects.¹⁷

Under Article 10A of the Montreal Protocol, non-Article 5 countries are required to transfer "best available, environmentally

safe substitutes and related technologies" to Article 5 nations at "fair and most favorable trade conditions."¹⁸ This commitment to facilitate the access of developing countries to relevant scientific information, data, training, and technology was reasserted in the Helsinki Declaration adopted at the First Meeting of the Parties in 1989.¹⁹

FINANCIAL MECHANISM/MULTILATERAL FUND

To address the hesitancy among developing nations to ratify the Montreal Protocol due to concerns over resources required for compliance and impacts on their development,²⁰ mechanisms were incorporated into the Montreal Protocol to provide the financial resources necessary for developing nations to meet their shared obligations. The dominant feature of the financial mechanisms is the Multilateral Fund for the Implementation of the Montreal Protocol ("Multilateral Fund"),²¹ designed to cover incremental costs incurred by developing countries as a result of the phase-out of their consumption and production of ODSs.²²

Every three years, the Parties to the Montreal Protocol determine the budget for the Multilateral Fund for a three-year "triennium," with contributions from over forty developed nations based on a United Nations assessment scale.²³ The Multilateral Fund is managed by an Executive Committee comprised of seven industrialized nations and seven developing

countries, which reports annually to the Meeting of the Parties.²⁴ At the 56th Meeting of the Executive Committee in Doha, Qatar in November 2008, the Executive Committee approved 116 projects and activities for sixty-five countries totaling \$57,347,247 plus \$9,956,600 support costs for bilateral and implementing agencies.²⁵

The Multilateral Fund has helped industry in developing countries replace chemicals and equipment and reorganize production processes, effectively stimulating the redesign of products.²⁶ The Multilateral Fund has played a pivotal role in facilitating the transfer of technology and enhancing capacity building and development capabilities, thereby contributing to the overall success of the Montreal Protocol.

RECOGNITION OF THE INTERPLAY BETWEEN ODSs AND CLIMATE CHANGE

The Montreal Protocol has already significantly benefited international climate change mitigation. It is estimated that the phase-out of chlorofluorocarbons ("CFCs") and other ODSs will

The Montreal Protocol's continued condoning of the use of high-GWP HFCs conflicts with its precautionary and holistic approach to phasing out ODSs by creating altogether different, but no less dire, environmental consequences.

have reduced GHG emissions by 135 Gt. of CO₂-eq. between 1990 and 2010.²⁷ Both the text of the Montreal Protocol and subsequent decisions by the Parties make clear that the phase-out of ODSs should not occur in a vacuum; rather, relevant scientific information and environmental impacts, including climatic effects, should be considered. The Parties supported this concept by adopting Decision V/8 in 1993,²⁸ requiring Parties to consider ODS substitutes in light of their environmental impacts. The following year, the Parties further expanded their mandate to consider environmental impacts other than ozone depletion by adopting Decision VI/13.²⁹

That requires the TEAP to “consider how available alternatives compare with hydrochlorofluorocarbons (“HCFCs”), with respect to such factors as energy efficiency, total global warming impact, potential flammability, and toxicity.”³⁰

The interplay between the phase-out of ODSs and climate change was again explicitly recognized at the Tenth Meeting of the Parties in 1998 when forty Parties issued a statement making it clear that climate impacts should be considered in the work of the Montreal Protocol. The Parties stated that there are “scientific indications that global warming could delay the recovery of the ozone layer” and “environmentally sound alternative substances and technologies are available for virtually all HCFC applications.”³¹ The Parties urged:

all Parties of the Montreal Protocol to consider all ODS replacement technologies, taking into account their total global-warming potential, so that use of alternatives with a high contribution to global warming should be discouraged where other, more environmentally friendly, safe and technically and economically feasible alternatives or technologies are available.³²

The Montreal Protocol’s contribution to climate change and the high GWP of many ODSs and their substitutes are widely recognized.³³ As a result, in 2007, the Parties decided to accelerate substantially the phase-out of HCFCs, primarily due their emissions contribution to global climate change.³⁴ It is estimated that the more rapid phase-out of HCFCs will result in the following:

- A reduction of potential emissions of HCFCs by approximately forty-seven percent from what would have been emitted if the accelerated phase-out had not been adopted, avoiding the emission of nearly one million tons of ODSs; and
- A transition to low-GWP substitutes for HCFCs that are currently commercially available and under development,

avoiding between 3 and 16 Gt. of CO₂-eq. emissions into the atmosphere.³⁵

The role of the Montreal Protocol in controlling GHGs was explicitly affirmed in the 2007 G8 Summit Declaration, which pledged: “We will also endeavor under the Montreal Protocol to ensure the recovery of the ozone layer by accelerating the phase-out of HCFCs in a way that supports energy efficiency and climate change objectives.”³⁶ Following the historic agreement to accelerate the phase-out of HCFCs, the Leaders Meeting of Major Economies on Energy Security and Climate Change

reaffirmed their commitment to helping the climate by declaring on July 9, 2008: “[R]ecognizing the need for urgent action . . . we commit to . . . actions under the Montreal Protocol on Substances that Deplete the Ozone Layer for the benefit of the global climate system.”³⁷ The explicit focus on climate benefits and energy efficiency, in addition to ozone benefits, when assessing the overall impacts of ODS substitutes and other strategies adopted by the Montreal Protocol, is consistent with the Montreal Protocol’s history of basing actions on sound science and objective technical assessments.

At the Twentieth Meeting of the Parties in November 2008, the impact on the global climate of ODS substitutes was recognized in Decisions XX/7 and XX/8, which began the process of evaluating the management and destruction of Banks and the availability and feasibility of low-GWP alternatives to ODSs.³⁸

PREEMPTIVE ACTION ENCOURAGING THE USE OF LOW-GWP ALTERNATIVES TO ODSs WILL HAVE SIGNIFICANT CLIMATE BENEFITS

The timing is right for the Parties to control the use of high-GWP HFCs as ODS substitutes, even if these substitutes are not ODSs themselves, as the commercialization of high-GWP HFCs is the direct result of the Montreal Protocol’s phase-out of ODSs. The UN Conference on Environment and Development calls on the Parties to “[r]eplace CFCs and other ozone depleting substances, consistent with the Montreal Protocol, recognizing that a replacement’s suitability should be evaluated holistically and not simply on its contribution to solving one atmospheric or environmental problem.”³⁹ The Montreal Protocol’s continued condoning of the use of high-GWP HFCs conflicts with its precautionary and holistic approach to phasing out ODSs by creating altogether different, but no less dire, environmental consequences. This is particularly true where substitutes for ODSs

The regulation and phase-out of high-GWP HFCs under the Montreal Protocol would ensure a more comprehensive approach by all significant producers and users of HFCs on an equitable basis.

with low-GWP, including carbon dioxide (GWP = 1), hydrocarbon and hydrocarbon blends (GWP < 3), and HFC-152a (GWP = 140) are all technically- and economically-feasible replacements for high-GWP HFCs currently used in both automotive and stationary air conditioning and refrigeration units.⁴⁰

The Montreal Protocol has historically regulated refrigerants, foam-blowing agents, aerosols, firefighting chemicals, specialty medical chemicals, and a limited number of other chemicals that deplete the ozone layer. As a result, the Parties have acquired an in-depth understanding of these industries and the uses of ODSs. HFCs are now being used as replacements for ODSs in the same sectors⁴¹ or are being created as by-products of the production of these ODSs.⁴² Therefore, regulating HFCs would be a logical extension of the Montreal Protocol's mandate and consistent with its holistic approach to sectors interacting with and affected by the phase-out of ODSs.

Decision XX/8, adopted in November 2008, requested that the TEAP report on the status of alternatives to HCFCs and HFCs include a description of the various use patterns, costs, and potential market penetration of alternatives.⁴³ The results of the TEAP's investigation are going to be presented at a workshop before the next Open-Ended Working Group Meeting in Geneva, Switzerland in July 2009.⁴⁴ The meeting will address technical and policy issues related to ODS alternatives, with a particular focus on how the Montreal Protocol can address the impact of high-GWP HFCs while maximizing the ozone and climate benefits of the early phase-out of HCFCs.⁴⁵ The UNFCCC has been invited to participate, as HFCs are within the "basket" of GHGs being controlled by the UNFCCC and its Kyoto Protocol. It is anticipated that the results of the investigation and workshop will lead to concrete measures to encourage the use of low-GWP substitutes for ODSs.

Unless the use of high-GWP HFCs is promptly curtailed globally, their rapid emergence as the primary substitutes for HCFCs and other ODSs could significantly negate the climate mitigation benefits achieved by the historic phasing-out of ODSs, offsetting reductions of other GHG emissions under the Kyoto Protocol. Absent coordinated global action under the Montreal Protocol in consultation with the UNFCCC, emissions of ODS substitutes will exacerbate the global climate crisis. The Montreal Protocol has the technical and funding mechanisms in place to implement control measures in order to address the prompt phase-out of high-GWP HFCs and demonstrate how classes of GHGs within specific sectors can be effectively controlled and eliminated. However, having the phase-out of HFCs occur under the Montreal Protocol will require substantial international support. The control of HFCs by the Montreal Protocol would be a model for a UNFCCC sectorial approach to control of GHGs after 2012. The Parties must act with urgency once again to strengthen and expand the scope of the Montreal Protocol by amending it to control high-GWP HFCs before their use and production are widespread and the cost to transition to low-GWP substitutes increases exponentially and becomes potentially prohibitive.

EMISSIONS FROM BANKS POSE AN IMMEDIATE CLIMATE THREAT

Emissions from Banks threaten to delay the recovery of the ozone layer and dramatically impede global efforts to combat climate change. While the use and production of many ODSs have been drastically reduced over the past two decades, ODS Banks still remain in products and machinery throughout the world. ODSs in Banks are continuously being released to the atmosphere, either through leakage or when ODSs or products containing them are disposed of at the end of their useful lives.⁴⁶ However, the Montreal Protocol defines "consumption" as imports plus production minus export, thus excluding the regulation of ODSs in Banks from the Montreal Protocol.⁴⁷ This does not include the atmospheric release of ODSs from Banks and as a result ODSs have not been regulated by the Montreal Protocol to date. Nonetheless, potential solutions exist to remedy this problem.

BANKS CAN BE EFFECTIVELY MAINTAINED AND DESTROYED

The mandate for the Montreal Protocol must be immediately expanded to implement a comprehensive program to address the maintenance and destruction of Banks. The TEAP has estimated that the potential cumulative savings if ODSs were recovered and destroyed across all sectors would be approximately six billion tons of CO₂-eq. between 2011 and 2050, noting that a sizeable portion of those ODSs would require significant collection efforts.⁴⁸ To put this into perspective, this large a release of GHGs would offset all of the gains accomplished under the Kyoto Protocol.⁴⁹ If the world's Banks of ODSs in refrigeration, stationary air conditioning, and mobile air conditioning (i.e., those that are most easily and cost-effectively recovered) were destroyed, it is estimated that the release of approximately 2.8 Gt. of CO₂-eq. would be prevented by 2015.⁵⁰ As these emissions are already occurring continuously throughout the world, the gains that could be achieved by preventing these "super" GHGs from being emitted to the atmosphere are available immediately.

Approximately forty percent of Banks are installed in the refrigeration and stationary and mobile air conditioning sectors, while the remaining sixty percent are in foams, medical aerosols, fire protection, and other sectors.⁵¹ Furthermore, Banks are continuing to increase as the complete phase-out date for ODSs approach⁵² and the phase-out of HCFCs is being expedited. Therefore, Banks will become an increasing problem in the near future.

The Montreal Protocol and the Parties to it have recognized the risk to both the ozone layer and global climate from emissions from Banks. As a result, the scope of the problem and the destruction options and their associated costs have been evaluated for many years.⁵³

In November 2008, at the Twentieth Meeting of the Parties, the Parties took the first concrete steps to manage and destroy Banks. In Decision XX/7,⁵⁴ the Parties agreed to a broad range of actions to evaluate the management and destruction of Banks,

including: (1) evaluating ways to mitigate emissions of ODS from Banks through the Montreal Protocol or by national and/or regional legislative strategies; (2) authorizing pilot projects to evaluate collection, transport, storage, and destruction of ODSs to generate data on how these measures will protect the ozone layer and achieve climate benefits; and (3) evaluating and adopting best practices and performance standards to prevent emissions from Banks, whether by recovery, recycling, reclamation, reuse as feedstock, or destruction.⁵⁵ The Parties also commissioned the TEAP to conduct a cost-benefit analysis of destroying banks of ODSs versus recycling, reclaiming, and reusing such substances, taking into consideration the relative economic costs and environmental benefits to the ozone layer and climate.⁵⁶ Additionally, recognizing that financial constraints limiting the ability to manage and destroy Banks are going to be the decisive factor as to whether emissions from Banks can be effectively destroyed, the Parties scheduled a meeting of experts from funding institutions, such as the UNFCCC, the Global Environment Facility, the Executive Board of the Clean Development Mechanism, and the World Bank, to assess possible funding opportunities before the next meeting of the Open-Ended Working Group.⁵⁷

Twelve technologies have been approved to date under the Montreal Protocol for the destruction of CFCs and halons.⁵⁸ In developed countries, different technologies are in use for CFC destruction on a commercial basis. For instance, in Japan, more than ten technologies were being used in approximately eighty-two ODS destruction plants in operation as of 2006.⁵⁹ Commercial ODS destruction facilities using technologies approved by the TEAP are in operation in twenty countries worldwide.⁶⁰ ICF estimates that ODS destruction capacities range roughly from forty to six hundred metric tons per year.⁶¹ The cost to destroy ODS at these facilities varies by country, technology, capacity, and ODS type. Overall, it was estimated that ODS destruction costs range between two and thirteen dollars per kilogram, with an average of about seven dollars per kilogram.⁶² The pilot studies approved by the Montreal Protocol and a similar study being undertaken by the World Bank⁶³ are intended to determine what technologies work best for which ODSs, to identify ODSs that are actually recoverable, to devise a plan to address ODSs in Article 5 countries, to ascertain the recovery costs for different ODSs, and to suggest methodologies for validation and verification of the destruction of ODSs. These findings can then be incorporated into international carbon off-set regimes.

Tackling the destruction of Banks will require a multi-faceted approach. In non-Article 5 countries, feasible regulatory approaches include requiring producer/retailers to collect and destroy ODSs, providing incentives for ODS destruction, and creating industry-lead programs for this purpose.⁶⁴ Most non-Article 5 countries have available infrastructure and facilities to destroy ODSs effectively in a validated and verifiable manner.⁶⁵ In Article 5 countries, however, there will be a need for financial and technology transfers to store and maintain existing Banks, create destruction facilities, and transport ODSs to existing facilities for destruction, all activities consistent with those

traditionally occurring through the Multilateral Fund. Infrastructure building and personnel training in these countries will also be necessary so that the ODS destruction can be validated and verified.

FUNDING THE DESTRUCTION OF BANKS

To encourage and finance the destruction of Banks in the short available time frame, funding the Multilateral Fund at traditional levels will not be adequate. One way to generate additional funding would be to tap into the funding from Global Environment Facility (“GEF”)⁶⁶ and the carbon trading systems (e.g., the Clean Development Mechanism (“CDM”), Chicago Climate Exchange (“CCX”), and Regional Greenhouse Gas Initiative (“RGGI”). As of September 2008, the CCX is the only carbon-trading platform that has an established protocol for generating credits for the destruction of ODSs.⁶⁷ The CCX has developed a protocol to measure and verify GHG emission reductions resulting from the destruction of ODSs.⁶⁸

Currently, the destruction of ODSs has not been approved as an acceptable offset project under the CDM and therefore cannot generate Certified Emissions Reductions (“CERs”) under the Kyoto Protocol. Under current CDM rules, however, an international body such as the Montreal Protocol can apply to generate CERs by coordinating a Program of Activities comprised of numerous CDM programs. By applying and taking control of ODS destruction programs, the Montreal Protocol could issue CERs and generate significant funds for the Multilateral Fund to distribute to Article 5 countries to ensure the expeditious and controlled destruction of Banks. If the Montreal Protocol takes on the phase-out of high-GWP HFCs, this could generate revenues not only to fund the phase-out and destruction of Banks but also of HFCs as well.⁶⁹

Obtaining funding from the various carbon trading platforms would result in substantial revenues that could be used to facilitate widespread and rapid Banks destruction. However, allowing the destruction of ODS Banks into the carbon trading system has to be structured carefully to maintain the stability of the markets, ensure that the ODSs destruction results in real climate impact, and prevent the increased production of ODSs or high-GWP substitutes simply to profit from the carbon market. Due to the extremely high GWP of many ODSs, the destruction of small volumes of ODSs can result in the potential issuance of very large numbers of CERs. For example, the most common CFCs in reachable refrigeration and air-conditioning are CFC-11 and CFC-12 which have GWPs of 5000 and 8500, respectively.⁷⁰ Therefore, destruction of one ton of these substances would result in the generation of thousands of CERs. It was estimated that there were 218,318 tons of CFCs in refrigeration and air conditioning banks in 2002.⁷¹ Destruction of a fraction of these CFC banks and the resultant issuance of CERs could significantly destabilize the carbon markets and divert funding from other projects that reduce the emissions of other GHGs or to prevent deforestation. These problems could be avoided by having the CERs issued for ODS destruction controlled by the Montreal Protocol and having the number of CERs issued correspond

to the actual cost of destroying the Banks. By tying the CERs issued to the actual cost of destruction, the Multilateral Fund would have the sales proceeds from the CERs to promote quick and comprehensive Banks destruction. This would not create a disproportionate number of CERs or destabilize the carbon markets; rather, it would ensure that the CERs issued were directly tied to the climate benefit achieved.

Destruction of only banned ODS Banks should initially be eligible for CERs in order to prevent the creation of a perverse incentive to produce more ODSs with high GWP simply for the

value of the CERs. This problem has already been identified arising from the production of HCFC-22 (GWP = 1780⁷²), used widely in window unit air conditioners and small refrigerators, which produce HFC-23 (GWP = 14,310⁷³) as a byproduct. CERs can be earned for the destruction of HFC-23 through the CDM. However, as the cost of destroying HFC-23 is very low, approximately \$0.20 per ton of CO₂-eq.,⁷⁴ and the price of CERs is typically between \$5 and \$15 per metric ton of CO₂-eq. reduction,⁷⁵ huge profits could be made from HFC-23 destruction. It has been calculated that the cost of the direct installation of equipment to destroy HFC-23 would only be \$100 million compared to \$6 billion worth of CERs that have been issued.⁷⁶ The CERs for the destruction of HFC-23 are sufficiently profitable that industry

observers have suggested that new HCFC-22 production facilities can be financed on the expected profits from the CERs from the HFC-23 destruction alone.⁷⁷

Bank destruction can be incorporated into the carbon markets without creating such perverse incentives by limiting the issuance of CERs to ODSs that are banned. It will be important to also ensure that funding is available to investigate and prevent illegal production of banned ODSs given the sizeable profits that can be made if CERs are given for their destruction.

COORDINATION OF REGULATION OF HFCs UNDER THE MONTREAL PROTOCOL WITH THE UNFCCC

HFCs are in the “basket” of gases regulated by the UNFCCC’s Kyoto Protocol.⁷⁸ The current regulation of HFC emissions under the UNFCCC should not impede complementary regulation under the Montreal Protocol. The Kyoto Protocol requires industrialized countries that have ratified the Kyoto Protocol to cut their GHG emissions by an average of 5.2% from the 1990

level by the year 2012.⁷⁹ The Kyoto Protocol has currently been ratified by 118 countries, including 32 industrialized countries, collectively representing only 44.2% of 1990 emissions.⁸⁰ Conversely, all the major ODS and HFC-producing and consuming countries have ratified the Montreal Protocol, which has the ability to impose phase-out requirements on all of these Parties. Therefore, at this stage, the regulation and phase-out of high-GWP HFCs under the Montreal Protocol would ensure a more comprehensive approach by all significant producers and users of HFCs on an equitable basis, thereby substantially reducing

the likelihood of illegal trade in HFCs by creating an even economic playing field as a result of the global regulation of HFCs.

In international law, successive treaties on the same subject matter are commonplace, as recognized by the Vienna Convention.⁸¹ International law principles allow a treaty that covers the subject matter of an historic treaty to be entered into force, subject to established rules of interpretation.⁸² To the extent the successive treaties are compatible, the provisions of both treaties are enforceable. When they are incompatible and where the subject matter and parties to the treaties are the same, the language of the later treaty or the more specific treaty generally controls.⁸³

The Parties to the Montreal Protocol have the expertise to regulate high-GWP HFCs by controlling and phasing out their

production and consumption. This is compatible with and complementary to the UNFCCC’s regulation of emissions of HFCs. The technical expertise, mechanism for technology transfer, and Multilateral Fund to assist developing countries make the Montreal Protocol uniquely suited to control and phase out high-GWP HFCs. The Montreal Protocol HFC phase-out would act as a mechanism for developed countries in UNFCCC to achieve deep emissions cuts and act as a technology transfer mechanism to help developing countries reduce their GHG emissions in a measurable, reportable, and verifiable manner. As the UNFCCC negotiates to extend efforts to control GHGs past 2012, it can work in collaboration with the Montreal Protocol to use an HFC phase-out as a tool for Parties to meet strong emissions reduction targets and to ensure that high-GWP HFCs are not needlessly substituted for ODSs in developing countries.

The UNFCCC’s Bali Action Plan⁸⁴ makes it clear that the post-2012 climate framework will emphasize technology transfer for developing countries and sectorial emissions reduction

A successful collaborative effort between the UNFCCC and Montreal Protocols could alleviate some of the tensions in the current climate negotiations. The Montreal Protocol has demonstrated effective technology transfer and funding mechanisms for developing countries.

approaches. Recent submissions by developing countries concerning mechanisms for technology transfers have included the creation of technology assessment panels and encouraged capacity building to enable these countries to address GHGs effectively. These techniques have already been deployed by the Montreal Protocol; therefore, a phase-out of high-GWP HFCs under the Montreal Protocol would serve as a model to demonstrate that these techniques can be usefully applied to control other GHGs.

A successful collaborative effort between the UNFCCC and Montreal Protocols could alleviate some of the tensions in the current climate negotiations. The Montreal Protocol has demonstrated effective technology transfer and funding mechanisms for developing countries. If applied to HFCs under the post-Kyoto Protocol regime, this could build trust between developed and developing countries within UNFCCC negotiations and instill confidence that reductions in all GHGs would occur in an equitable manner, without disproportionately disadvantaging the economies of the developing countries.

ACTIONS NEEDED TO ADDRESS HIGH-GWP HFCs AND BANKS

Decision to Add HFCs as a Class of Chemicals Regulated and Phased-Out Under the Montreal Protocol, Including a Pledge Not to Use High-GWP HFCs Where More Environmentally Suitable Alternative Substances or Technologies Are Available

To date, the Montreal Protocol has only regulated substances that directly deplete the ozone layer. However, the language of the Montreal Protocol does not so limit its authority, and the Parties should amend the Montreal Protocol to expand its mission to include combating climate change associated with ODSs and their substitutes.⁸⁵ Simple amendments would allow the Parties to ensure that the phase-out of ODSs is accomplished without exacerbating climate change.⁸⁶ The need for the Montreal Protocol to continue its work to find low-GWP substitutes for ODSs is particularly apparent with the projected massive increase in the use of high-GWP HFCs as the result of the phase-out of the ODSs. The objectives of the Montreal Protocol will not be achieved until ODSs have been replaced by substances with minimal adverse impacts to the global environment.

An amendment of the Montreal Protocol specifically to combat climate change caused by high-GWP HFCs, even though they are not ODSs, is consistent with international law principles for treaty interpretation. The first place to look for the intent and scope of a treaty is the text itself, including the Preamble.⁸⁷ When the Montreal Protocol was adopted, the Parties included in the Preamble both the concept that they were “[c]onscious

of the potential climatic effects of” ODSs and that they were “[d]etermined to protect the ozone layer by taking precautionary measures to control equitably total emissions of [ODSs] . . . on the basis of developments in scientific knowledge.”⁸⁸ The text has to be interpreted in the context of all of the decisions made and actions taken by the Parties under the Montreal Protocol.⁸⁹ These actions include all of the decisions cited above,⁹⁰ where the climatic effects of ODSs have been recognized and where

the reduction and phase-out of ODSs have been required to be viewed in the context of broader environmental consequences, including the environmental impacts of ODS substitutes, and the latest scientific and technological knowledge. These actions also include all of the work performed to evaluate the non-ozone implications of the phase-out of ODSs.⁹¹

Expand the Montreal Protocol’s Mandate to Control Management and Destruction of Banks


Developing countries want predictable and sustained financing if they are going to be obligated to maintain and destroy Banks. The Montreal Protocol ties financial assistance to specific goals and projects.⁹² The Montreal Protocol’s Multilateral Fund is one of the mechanisms that has created good relations between developed and developing countries as they have worked to phase out ODSs. By keeping HFCs within the “basket” of GHGs regulated by the UNFCCC, funding for the phase-out of high-GWP HFCs under the Montreal Protocol could become available through the funding mechanisms created by or in conjunction with the UNFCCC to defray some or all of the costs of the phase-out. Financing from the funding mechanisms currently being negotiated within the UNFCCC climate talks, as well as approving the destruction of ODSs to generate CERs, could create substantial new sources of funding for the Montreal Protocol to take on this important work. A phase-out of high-GWP HFCs would again act as a model to demonstrate the efficacy of certain aspects of its financial mechanisms.

CONCLUSION

Some of the recent reductions in ODS use have been achieved by unnecessarily replacing ODSs with high-GWP HFCs. It is now well-established that high-GWP HFCs are adding to the global climate crisis. Likewise, to date, the Montreal Protocol has focused on regulation of production and consumption of ODSs and has not regulated the management or destruction of Banks. The objectives of the Montreal Protocol obligate the Parties to complete the task of restoring the ozone layer without exacerbating the global climate crisis. The Parties can accomplish this by: (1) committing not to use high-GWP HFCs

The objectives of the Montreal Protocol obligate the Parties to complete the task of restoring the ozone layer without exacerbating the global climate crisis.

as substitutes for ODSs if other more environmentally-suitable alternative substances or technologies are available; (2) amending the Montreal Protocol to make clear that the protection of the ozone layer is not going to be accomplished through measures that exacerbate the global climate crisis by (a) actively phasing out the production and consumption of high-GWP substitutes and providing financial incentives for the use of low-GWP substitutes for ODSs, and (b) expanding the mandate of the Montreal Protocol to include the management and destruction of Banks; and (3) coordinating with the UNFCCC to (a) have the phase-out of high-GWP HFCs serve as a case study for effective technology transfer and funding mechanisms that can be incorporated into post-Kyoto institutions for other GHGs and (b) develop effective funding mechanisms for Banks management and destruction.

The climate crisis can be effectively combated if it is disaggregated into smaller, manageable components where the strengths of international, regional, and national organizations and entities can be brought to bear. The Montreal Protocol has the unique capacity to regulate and promote the phase-out of high-GWP HFCs used as ODS substitutes and to manage and destroy Banks. Both the transition to the use of high-GWP HFCs and the emissions from Banks are occurring as of the writing of this article, and the opportunity to control both of these serious threats to the global environment is time limited. The Montreal Protocol must be amended promptly to meet these urgent global challenges. 

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Endnotes: The Montreal Protocol Must Act to Prevent Global Climate Change While Restoring the Ozone Later

¹ Donald Kaniaru et al., *Strengthening the Montreal Protocol: Insurance Against Abrupt Climate Change*, in *THE MONTREAL PROTOCOL: CELEBRATING 20 YEARS OF ENVIRONMENTAL PROGRESS* 165, 165-66 (Donald Kaniaru ed., 2007).

² GWP refers to an index that compares the relative potential of GHGs to contribute to global warming. Many ODSs and HFCs have GWPs in the high hundreds and even thousands (e.g., HFC-23 has a GWP of 11,700 times greater than CO₂). See INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *IPCC/TEAP SPECIAL REPORT: SAFEGUARDING THE OZONE LAYER AND THE GLOBAL CLIMATE SYSTEM: ISSUES RELATED TO HYDROFLUOROCARBONS AND PERFLUOROCARBONS* 30 (2005) [hereinafter *IPCC/TEAP Special Report*], available at http://www.ipcc.ch/pdf/special-reports/sroc/sroc_full.pdf.

³ “Banks” is the term used to describe ODSs contained in “existing equipment, chemical stockpiles, foams and other products not yet released into the atmosphere.” *IPCC/TEAP Special Report*, *supra* note 2, at 9.

⁴ ODSs in Banks are continuously being released to the atmosphere, either through leakage or when ODSs or products containing them are disposed of at the end of their useful lives. See Kaniaru, *supra* note 1, at 174.

⁵ *IPCC/TEAP Special Report*, *supra* note 2, at 9.

⁶ *Id.* at 11. The Kyoto Protocol’s emission reduction target is to reduce GHG emissions by 5.8 percent below a baseline of 18.4 Gt. CO₂-eq. between 2008 and 2012, reducing emissions by approximately 1.1 Gt. CO₂-eq. per year for that period, or approximately 4.3 Gt. CO₂-eq. See UN FRAMEWORK CONVENTION ON CLIMATE CHANGE [UNFCCC], *KEY GHG DATA: GREENHOUSE GAS EMISSIONS DATA FOR 1990–2003*, at 15 (2005), available at http://unfccc.int/resource/docs/publications/key_ghg.pdf.

⁷ See, e.g., Eleventh Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen, Beijing, P.R.C., Nov. 29–Dec. 3, 1999, *Report of the Eleventh Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision XIX/6, UNEP/OzL.Pro.11/10 (Dec. 17, 1999) [hereinafter *Eleventh Report*], available at http://hqweb.unep.org/ozone/Meeting_Documents/mop/11mop/MOP_11.asp (implementing freeze on production of HCFCs due to the adverse impacts of that class of chemicals); Nineteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Montreal, Can., Sept. 17–21, 2007, *Report of the Nineteenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision XIX/6, UNEP/OzL.Pro.19/7 (Sept. 21, 2007) [hereinafter *Nineteenth Report*], available at http://ozone.unep.org/Meeting_Documents/mop/19mop/MOP-19-7E.pdf (accelerating the phase-out of hydrochlorofluorocarbons in part due to the GWP of these substances and their by-products).

⁸ See Montreal Protocol on Substances that Deplete the Ozone Layer, art. 2, Sept. 16, 1987, 26 I.L.M. 1541 (1987) [hereinafter *Montreal Protocol*], available at <http://www.unep.ch/ozone/pdf/Montreal-Protocol2000.pdf>.

⁹ See *id.*, art. 1, para. 4.

¹⁰ See *id.*, art. 2, para. 9.

¹¹ See *id.*, art. 2, para. 11.

¹² See UNITED NATIONS ENVIRONMENT PROGRAMME [UNEP], DIVISION OF TECHNOLOGY, INDUSTRY AND ECONOMICS/GRID-ARENDA, *VITAL OZONE GRAPHICS: RESOURCE KIT FOR JOURNALISTS* 26 (2007), available at http://www.grida.no/_res/site/file/publications/vitalozone.pdf.

¹³ See Seventh Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Vienna, Austria, Dec. 5–7, 1995, *Report of the Seventh Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision VII/30, UNEP/OzL.Pro.7/12 (Dec. 27, 1995) [hereinafter *Seventh Report*], available at http://www.unep.org/Ozone/Meeting_Documents/mop/07mop/MOP_7.asp; see also UNITED NATIONS ENVIRONMENT PROGRAMME, *BACKGROUND: BASIC FACTS AND DATA ON THE SCIENCE AND POLITICS OF OZONE PROTECTION* 4 (2008) [hereinafter *UNEP Background*], available at http://ozone.unep.org/Events/ozone_day_2008/press_backgrounder.pdf.

¹⁴ See Fourth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Copenhagen, Den., Nov. 23–25, 1992, *Report of the Fourth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision IV/24, UNEP/OzL.Pro.4/15 (Nov. 25, 1992) [hereinafter *Fourth Report*], available at http://www.unep.ch/ozone/4mop_cph.shtml; see also *UNEP Background*, *supra* note 13, at 4.

¹⁵ See Montreal Protocol, *supra* note 8, art. 5, paras. 8 bis, 8 ter.

¹⁶ See *id.*, art. 5, para. 1.

¹⁷ See *id.* art. 5, paras. 2-3. Additionally, adjustments to the Montreal Protocol permitted developed nations to increase their production of ODSs by a set percentage specifically to assist developing nations in meeting their basic domestic needs. See Second Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, London, Eng., June 27–29, 1990, *Report of the Second Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Annex I, UNEP/OzL.Pro.2/3 (June 29, 1990), available at <http://www.unep.ch/ozone/2mlonfn.shtml>. In 1995, the Parties adopted a decision enabling developing countries to export ODSs to other developing countries. See *Seventh Report*, *supra* note 13, at Decision VII/9.

¹⁸ See Montreal Protocol, *supra* note 8, art. 10A.

¹⁹ See First Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Helsinki, Fin., May 2–5, 1989, *Report of the First Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Appendix I (Helsinki Declaration on the Protection of the Ozone Layer), UNEP/OzL.Pro.1/5 (May 6, 1989), available at http://ozone.unep.org/Publications/MP_Handbook/Section_3.8_Annexes_Declarations/Helsinki_Declaration.shtml.

Endnotes: The Montreal Protocol Must Act to Prevent Global Climate Change While Restoring the Ozone Later *continued on page 66*

CLEANING UP THE PROBLEM OF POST-COMBUSTION COAL WASTE

by Amanda King*

When a dike at the Tennessee Valley Authority's ("TVA") Kingston Fossil Plant failed on December 22, 2008, 5.4 million cubic yards of coal ash spilled,¹ covering an area forty-eight times larger than the 1989 Exxon Valdez oil spill.² Families in the East Tennessee area filed a lawsuit against TVA for medical monitoring, testing, treatment and procedures, and environmental monitoring and clean-up costs, alleging TVA knew the coal ash containment pond was in danger of releasing the coal waste and had already failed on prior occasions.³ While much of the recent focus on "clean coal technology" has been on lowering the greenhouse gas emissions from coal power plants,⁴ the recent coal ash disaster in Tennessee has shifted attention to the environmental impacts of coal combustion waste. Unlike the capture and sequester technology for reducing global warming emissions from coal fired power plants, which currently is far from achieving any significant impact,⁵ clean technology for coal waste disposal can achieve a large impact today, but only if our regulatory structure encourages it. By classifying coal waste as a hazardous waste and creating stricter standards for disposal sites, we can prevent future coal waste environmental disasters.

Coal waste is typically disposed of in surface impoundments, minefills, landfills, and recycled into other products. Although there has been a recent trend away from disposal of coal wastes in surface impoundments and towards landfills,⁶ according to an Environmental Protection Agency ("EPA") estimate as many as three hundred sites still use surface impoundments.⁷ Unlike a landfill, which only holds dry wastes, a surface impoundment is an uncovered area of hollowed land, made of mainly earthen material, which holds liquid wastes.⁸ Under Subtitle C of the Resource Conservation and Recovery Act ("RCRA"), surface impoundments must have a double liner system to prevent the liquid waste from leaching through the ground to local water supplies.⁹ Due to an exemption in Subtitle C, coal waste is not currently regulated as a hazardous waste, and the regulation of coal waste surface impoundments is left to the states.¹⁰

Although EPA concluded in a 2000 report that coal waste disposal in surface impoundments, underground mines, and landfills should be regulated under Subtitle C as a hazardous waste, EPA reversed its recommendation just a few weeks later.¹¹ In the second regulatory determination, EPA stated that some regulation of coal wastes under RCRA would be necessary to protect human health, but did not state whether Subtitle C regulation was required.¹² Post combustion coal waste is a threat to human health because it contains numerous chemicals including aluminum, arsenic, boron, cadmium, chromium, lead,

manganese, molybdenum, selenium, and sulfate, which can cause health problems such as cancer, birth defects, and central nervous system damage.¹³ Furthermore, with stricter toxics emissions standards for coal-fired power plants, the waste will contain increased levels of arsenic, thallium, boron, barium, and other harmful chemicals.¹⁴ Although clean technology to reduce emissions will help the environment, new emissions technology will make regulating coal waste disposal more important as coal waste becomes dirtier and more toxic.

On March 9, 2009, EPA announced that it planned to propose regulations for coal waste by the end of the year.¹⁵ However, EPA was silent on whether the regulation would be under Subtitle C as a hazardous waste or under Subtitle D's less stringent standards.¹⁶ Subtitle C hazardous waste regulations differ from Subtitle D in that, under Subtitle C, the federal government is authorized to do the permitting for the hazardous waste sites and has set specific standards.¹⁷ Because design criteria of coal waste surface impoundments is not regulated at all under either Subtitle C or Subtitle D, the regulation of landfills provides insight into the difference between the two types of regulations. Under the Subtitle C requirements, landfills must have multiple liners, be made of materials chemically resistant to the waste, and have a system in between liners for collection and removal of liquid leaching from the landfill.¹⁸ In contrast, for Subtitle D landfills EPA specifies only minimum standards, including a composite liner with two components, and gives states the authority to issue landfill permits and set more specific standards.¹⁹

Of the fifteen states that create nearly three-quarters of all the coal combustion waste in the United States, only one requires liners for surface impoundments and only three require liners for landfills for coal waste.²⁰ Although regulating coal waste under Subtitle D could help by creating minimum standards for surface impoundments, based on current regulation of coal waste by the states it is unlikely many would require high enough standards. Coal waste must be recognized and regulated for what it is—a hazardous waste. Regulation of coal waste under Subtitle C and use of currently available technology to contain coal waste are needed to reduce environmental contamination and prevent future disasters.



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CLEAN TECHNOLOGY TRANSFER AND INTELLECTUAL PROPERTY RIGHTS

by Nitya Nanda & Nidhi Srivastava*

INTRODUCTION

It is generally agreed upon that an efficient diffusion and deployment of technology has the potential to mitigate the adverse impacts of greenhouse gas (“GHG”) emissions and to reduce emissions.¹ If developing countries were able to use available technologies to reduce their energy consumption by twenty percent, the currently projected increase between 2000 and 2020 in carbon dioxide (“CO₂”) emissions from developing countries could be cut by almost half.² Although the role of technology transfer in reducing emissions is widely recognized, effective wide-scale transfer has been hindered by a number of factors, including international property rights regimes.

Transfer of technology in the international context commonly refers to sale or licensing of intellectual property, but the term includes any process by which users in one country gain access to and utilize technology developed in another country.³ The term technology implies any practical application of knowledge in a particular area,⁴ but it is usually associated with machines and related infrastructure, and technology is often discussed in this constricted sense. This narrow view combined with developing countries’ large-scale import of knowledge based machinery, products, and process licenses creates the perception of developing countries as “technology users” and “passive recipients” of developed country technologies.⁵

In a globalized world, technology may be transferred from developed countries to developing or between developing countries, based on cost or other considerations, even if similar technology is locally available. Hence, using a foreign source of technology does not necessarily mean a “transfer of technology” has occurred. An analysis of the sixty-three Clean Development Mechanism (“CDM”)⁶ projects that were registered on January 1, 2006 offers a picture of the current state of technology transfer.⁷ Of the twenty-nine overall CDM projects that involved foreign technology, the largest number (twelve) were in hydropower, and the technology for them came from all over the world, including several developing countries like Brazil, China, India, Panama, Peru, and Sri Lanka.⁸ Technology for hydropower is fairly standardized and the use of a foreign source of technology in many CDM projects may not mean that transfer of high value technology was involved.

This paper provides an overview of barriers to technology transfer and specifically examines problems posed by both strong and weak international property rights (“IPR”) regimes. Whether and how IPR regimes act as limiting factor in effective

Technology	Number of projects	Emission reduction [Ton of CO ₂ -eq]	Share of total emission reduction [%]
Biogas	6	387,591	1.4
Biomass	10	302,735	1.1
Energy efficiency	1	6,580	0.0
Fuel switch	1	19,438	0.1
HFC-23 destruction	3	8,233,566	28.9
Hydropower	22	775,471	2.7
Landfill gas	10	2,712,395	9.5
Methane capture	3	410,378	1.4
N ₂ O destruction	2	15,111,165	53.0
Wind energy	5	573,013	2.0
Total	63	28,532,332	100

Figure 1. Emission Reductions by Technology in the 63 Registered CDM Projects.⁹

diffusion are considered and a range of mechanisms to improve technology transfer are proposed.

FACTORS RESTRICTING TECHNOLOGY TRANSFER

Despite clear recognition of the benefits technology diffusion offers to mitigate climate change, not enough has been done to advance that role. There are various factors acting as barriers to efficient and useful technology transfer from advanced and developed countries to recipient developing countries.

The Intergovernmental Panel on Climate Change (“IPCC”) has listed high capital costs, limited access to capital, poor access to information, institutional and administrative difficulties in developing technology transfer contracts, lack of infrastructure to absorb riskier technologies, absence of economic incentives, and intellectual property rights as hurdles for technology

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transfer.¹⁰ Causes may vary not only from country to country, but technology to technology as well.

Both developed and developing countries accept that transfer of technology has been slow and ineffective, but they attribute it to different causes. The Institute for Global Environmental Strategies (“IGES”), in *Asian Aspirations for Climate Change beyond 2021*, has highlighted the contrasting perspectives of developed and developing countries with regard to technology transfer.¹¹ The developed countries hold lack of robust legal mechanisms and domestic institutions in developing countries responsible.¹² Since most of the CDM technologies are developed and owned by a few private companies, developed countries cite the need for friendly domestic policies, institutions, and strong intellectual property rights protection in developing countries to encourage technology diffusion.¹³

On the contrary, from the perspective of developing countries, the failure of developed countries to meet their obligations under the UN Framework Convention on Climate Change (“UNFCCC”), and their lack of awareness and willingness to do so, are cited as primary reasons for inadequate technology transfer.¹⁴ Other reasons often cited are the lack of programs and initiatives at the government level, as well as high capital and licensing costs.¹⁵

INTELLECTUAL PROPERTY RIGHTS (“IPR”)

Intellectual property is a category of intangible rights protecting commercially valuable products of human intellect.¹⁶ It refers to creations of the mind: inventions, literary and artistic works, as well as symbols, names, images, and designs used in commerce.¹⁷ The impact of IPR on technology diffusion is context specific and complex. IPR in the hands of a few has the ability to create a monopolistic situation where dissemination of knowledge is restricted on account of limited access and higher prices for climate friendly technologies. Strongly protected IPR held by supplier firms may also prevent users or recipients from obtaining access to technologies in order to adapt them to suit their own needs and requirements. However, an assurance of one’s IPR being protected may encourage the owner to transfer his technology to another country. Therefore, a lack of adequate protection for IPR in the recipient country can also inhibit transfer of technology.

LACK OF IPR PROTECTION

In its *Special Report on Climate Change*, the IPCC observes that a “major requirement for successful agreement in technology transfer is the guarantee of intellectual property rights.”¹⁸ An effective and enforceable IPR law provides an incentive for private companies to disseminate or transfer their technology. A strong IPR protection may also facilitate transfer of technology through increased trade in goods and services, foreign direct investment (“FDI”) by private companies, technology licensing, and joint ventures.¹⁹ IPR protection may result in larger trade flows, “albeit mainly for countries with imitative capability” involving “substitution of domestic innovation for technology produced abroad.”²⁰

It is generally believed that most developing countries do not fully enforce their IPR protection laws.²¹ Hence, one may hasten to conclude that the lack of adequate IPR protection might have been a factor inhibiting transfer of technologies. Though much is unknown about the actual extent of weakness in the IPR protection regimes in developing countries by way of comprehensive survey, the annual “Special 301” reports, prepared by the Office of the U.S. Trade Representative on the adequacy and effectiveness of IPR protection by U.S. trading partners, can shed some light.²² Along with many developing countries, the EU has been on the list of countries that infringes on IPR and only recently moved off of the list in 2007.²³

It is difficult to infringe on the IPR of a sophisticated technology that requires extensive scientific and technical knowledge. In some cases, the basic scientific knowledge of patented technologies is accessible—what is not available is the right to use such knowledge. If developing country companies are not using such technologies, they are either respecting the patent rights or they are not technologically capable of using them.

IPR-BASED MARKET POWER

A technology protected by a strong IPR regime is less likely to reach a vast number of users in developing countries as there may be high licensing costs.²⁴ In some cases, the owner may refuse to grant a license altogether, halting the spread of the technology. DuPont, for example, refused to grant licenses for the production of chlorofluorocarbon substitutes to Korean and Indian firms that sought to use the substitutes to meet the phase out requirements for ozone depleting substances.²⁵ When a particular technology is not licensed to other users and the owner sells it in the form of products and equipment, a monopoly is created. Monopoly production is often inefficient and pushes prices even higher.²⁶

In the context of most technologies, especially climate change mitigation, gaining access or ownership of the IPR is not the sole and sufficient requirement for a successful diffusion and deployment of technology. The licensing of a technology may have to be accompanied by large investments in developing the skills and know-how to incorporate, adapt, and develop further the technology obtained. Some experts opine that IPR regimes should address factors such as absorptive capacity and tacit knowledge in addition to technology access issues.²⁷ The importance of this assertion can be highlighted through two examples in India, light-emitting diode (“LED”) manufacture and Integrated Gasification Combined Cycle (“IGCC”) power plant technology. Without technological capacity, IPR ownership would not have improved India’s ability to manufacture LEDs.²⁸ Similarly, the main barrier to the use of IGCC technology is lack of knowledge about its performance with low quality Indian coal, rather than IPR ownership.²⁹

The present IPR regime has a limited scope for improving transfer of technology to developing countries in this respect. Lynn Mytelka, former director of the United Nations University

Institute for New Technologies, suggests that the possibility for the transfer of technical assistance and capacity building to developing countries in areas capable of meeting local development needs and global environmental concerns should be enhanced through the patent system itself.³⁰

The stage of commercialization of a technology determines the extent to which the developer needs and expects returns.³¹ The level of a country's development is also a determining factor for the IPR impact on technology transfer. In cases of developed and technologically advanced countries, strengthening IPR can increase innovation and technology diffusion. In middle-income countries, a stronger IPR regime may encourage both domestic innovation and technology diffusion through foreign patenting and international trade, both of which can encourage growth. But the beneficial impact of stronger IPR protection on domestic innovation and technology diffusion can offset the growth-enhancing benefits otherwise obtained from imitation.³²

Apart from IPR, a range of other factors, including the level of development, nature of technology, and technical know-how to adapt and develop technologies, affect transfer of technology. These factors also determine the manner in which IPR impacts technology transfer for fighting climate change in developing countries.

ADDRESSING IPR AS A CHALLENGE

It is difficult to determine the precise impact that IPR has on technology transfer, either by way of reduced access or increased prices. To do so would require a detailed product-by-product and country-by-country analysis. There have been many suggestions in the recent past to address IPR as a challenge to efficient transfer of climate change fighting technologies. Suggestions range from compulsory licensing, to joint ownership, to technology acquisition, and knowledge repository funds. Some of these are discussed below as possible mechanisms to mitigate the negative impact of IPR.

COMPULSORY LICENSING

A compulsory license is a statutorily created license that allows certain people to pay a royalty and use an invention without the patentee's permission.³³ Ordinarily, compulsory licensing refers to the government authorizing itself to use otherwise protected intellectual property without having to obtain the permission or authorization of a patent holder in cases of national emergency or for public good.³⁴

An old IPR concept, the term compulsory licensing is not explicitly incorporated into the Trade Related Aspects of Intellectual Property Rights ("TRIPS") regime of the World Trade Organization ("WTO"). However, compulsory licensing can be read into the provision of TRIPS Agreement on "Other Use [of the patented subject matter] Without Authorization of the Right Holder."³⁵ Articles on "Exceptions to Rights of Conferred"³⁶ and "Principles," including reference to measures "needed to prevent

the abuse of intellectual property rights by right holders" and "the resort to practices which unreasonably restrain trade or adversely affect the international transfer of technology"³⁷ also provide reasonable flexibility for countries to use compulsory licensing. Drawing from TRIPS and the Doha Development Declaration, a compulsory license can be granted to meet government requirements, overcome an abuse of patent rights, in a national emergency, for public non-commercial use, and for a technical advance of considerable economic significance over the existing patent.³⁸

Article 31(c) of TRIPS also provides that a country can use such a measure "to remedy a practice determined after judicial or administrative process to be anti-competitive."³⁹ Hence, countries can invoke their competition law where "abuse of dominance" is included as one of the anti-competitive practices and the source of dominance is an IPR.⁴⁰

Similarly, Article 40 of TRIPS, dealing with control of anti-competitive practices in contractual licenses, states that "[n]othing in this Agreement shall prevent Members from specifying in their legislation licensing practices or conditions that may in particular cases constitute an abuse of intellectual property rights having an adverse effect on competition in the relevant market."⁴¹ Hence, refusal to give license can also be included as an anti-competitive practice and may be remedied with compulsory licensing.

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COMPULSORY LICENSING IN PUBLIC HEALTH

Rights of the TRIPS member countries to make use of compulsory licensing in the interest of public health have been explicitly recognized in the Doha Declaration on Public Health. In order to make use of compulsory licensing in the CDM context, climate change mitigation must be treated as a public good. Here, we briefly examine the issues of compulsory licensing in public health and then we will look at clean technology.

The Doha Declaration on the TRIPS Agreement and Public Health clarified the rights of member countries with regard to

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the compulsory licensing system by recognizing that each member has the right to grant compulsory licenses and the freedom to determine the grounds upon which such licenses are granted.⁴² Subsequently, Thailand issued a compulsory license in late 2006 for five years on Efavirenz, a patented AIDS drug from Merck.⁴³ More recently, Brazil issued a compulsory license in May of 2007 for the same product.⁴⁴ However, countries still face difficulties with compulsory licensing for pharmaceuticals. For example, Brazil came under tremendous pressure from the United States—which filed and later withdrew a complaint to the WTO—to repeal a law that allowed the government to issue a compulsory license when patent holders do not manufacture the drug in Brazil. Although Brazil successfully defeated the challenge by the United States, many smaller countries are not able to do so.⁴⁵

Although some steps have been taken in this direction, the declaration and the subsequent TRIPS amendment have left many issues untouched and lack guidelines for eligibility for compulsory licensing.

COMPULSORY LICENSING IN CLEAN TECHNOLOGIES

At the UN Climate Change Conference in Poznan in December 2008, developing countries advocated a paradigm shift in the way climate mitigation technologies are subject to intellectual property rights protection. Many suggested a strategy similar to affordable medicines.⁴⁶ For example, India proposed an approach analogous to pharmaceuticals: creating a mechanism that would ensure that privately owned technologies are available on an affordable basis, including through measures to resolve the barriers posed by intellectual property rights and addressing compulsory licensing of patented technologies.⁴⁷

TRIPS has recognized countries' freedom to determine for themselves what constitutes national emergency for the purposes of compulsory licensing. Although countries have some flexibility to determine when and in which cases to make use of compulsory licensing, confusion and conflict will likely result without guidelines or directives. As mentioned above, to make use of the provisions of compulsory licensing, first and foremost climate change mitigation has to be treated as a public good. Detailed guidelines and specifications to help a country identify a technology that can be eligible for issuing of a compulsory license are needed. Similarly, an eligibility criterion for countries should be created because many developing countries lack domestic capabilities for production and may not be able to use

a technology unless there is an amendment in TRIPS in line with the one made for pharmaceutical products.⁴⁸

Even if compulsory licensing is adopted for climate change technologies, it may not alone solve the problem as incremental costs for adapting and putting the technology to use in local context may also be high.

It is not an easy task to accommodate the interests of the developer of the technology (and indirectly incentives for further research and development) on the one hand and the need to address rapid climate change on the other. This balance has to be met in a manner that is diplomatic and as minimally politically contentious as possible. There have been only few instances of compulsory license issuing, and instances of compulsory licensing by a national authority where the IPR-owner is a foreign national or domiciliary are even less common.⁴⁹ It is a very political issue.⁵⁰

OTHER FLEXIBILITIES IN THE EXISTING REGIMES

In addition to compulsory licensing, other measures beyond the TRIPS regime, such as cooperative research and development and technology acquisition funds, could be used to reduce the high costs resulting from strong IPR protection. Creation of a technology acquisition fund has been proposed within the framework of the UNFCCC.⁵¹ Such a fund could be managed by a multilateral organization or a trust, which serves to acquire or buy out patented technologies that are climate friendly and make

them available to developing countries in need of technology to reduce or mitigate GHG emissions.

Most of the clean technologies are owned by a handful of Organisation for Economic Co-operation and Development ("OECD") countries. The largest environmental corporations in the world are from Germany, France, Japan, the United Kingdom, and the United States, who export equipment, technology, and services worldwide.⁵² These large corporations typically provide integrated products and services and account for about fifty percent of the global market.⁵³ If one considers the market for technology only, their share is likely even higher. Within specific segments of the environmental industry, a few large corporations virtually dominate.⁵⁴ Three countries—Germany, Japan, and the United States—submit about sixty-four percent of the patent applications related to environmental technology in the European Patent Office.⁵⁵ A patent buy-out mechanism is an option that could avoid the need for compulsory licensing, thereby accounting for the patent owners' concerns as well.

The fact that the companies holding [climate-related] technologies are powerful companies from powerful countries makes technology transfer difficult for politically weaker developing countries.

It is likely the “most diplomatic alternative” to compulsory license.⁵⁶

Kevin Outterson, a law professor at Boston University who focuses on achieving equitable access to pharmaceuticals while still encouraging innovation, has outlined a detailed process for a suitable buy-out mechanism.⁵⁷ He suggests that it may be owned or purchased by an intergovernmental organization or a philanthropic foundation and should not be limited to any one technology or region. To make the provision attractive to developers of technology as well, the compensation to be paid in an acquisition could be determined by the net present value of expected future profits.⁵⁸ Such a proposal has also been advocated by Mytelka, suggesting a knowledge fund as the repository of patents dealing with environmentally sound technologies.⁵⁹


In setting up a technology acquisition or repository fund, many details will have to be considered. These may include how to gain the knowledge required to work the acquired patents locally, whether the patents will be in public domain or the purchaser would have exclusive rights, what the grounds and conditions for transfer will be, what modes of acquisition will be used, and how much will be adequate compensation to the patent holder.

Another possible mechanism is mandatory price negotiation. This is very common in many countries, both developed and developing, in pharmaceutical products.⁶⁰ Price regulation can be imposed even as a competition-remedy measure. Since countries are empowered to act under their competition regimes, such a mechanism is legally possible. However, for many developing countries, it would not be easy to enforce when the companies in question are large transnational companies from powerful countries. There are very few cases of a country taking action on a foreign company under competition law, even in

the developed world. In the developing world such an action is almost non-existent.⁶¹

CONCLUSION

Transfer and diffusion of technology from developed to developing countries is happening at a very slow pace. Transfer is even slower in climate-related technologies. The intellectual property rights regime can be an important factor. In the developed world, compulsory licensing has often been used to make technology readily available. Mandatory price negotiations, as well as price regulations, are also used in some measure especially in pharmaceutical products. However, what is legally possible is not always practically feasible. The fact that the companies holding such technologies are powerful companies from powerful countries makes technology transfer difficult for politically weaker developing countries. Thus, the economic and political factors make it difficult to invoke the basic legal instruments to access these technologies.

Given this, it appears that a global technology acquisition fund is the most promising means to spread these technologies. This is, of course, not in lieu of other available instruments, but in addition to them. It would be difficult to create such a mechanism given the present global geo-political context. It is often said that developed country governments cannot control technology transfer, as it is private companies, not governments, that actually own the technologies. However, the governments may be able to pay their companies adequate compensation in order to make the technologies available to developing countries. But merely making the technologies available may not be enough. The use of technologies may be expensive and difficult in developing countries without the necessary capacity. Generous financial assistance would also be required, even for deployment of technologies that are available at concessional rates. 

Endnotes: Clean Technology Transfer and Intellectual Property Rights

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¹² *Id.*

¹³ *Id.*

¹⁴ *Id.* at 68.

¹⁵ *Id.*

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ANALYSIS OF MULTILATERAL AGREEMENTS, PUBLIC-PRIVATE PARTNERSHIPS, AND TAX INCENTIVES DRIVING INTERNATIONAL TRADE IN CLEAN TECHNOLOGY

by Alexander C. Hoover*

International trade in clean technology is still a nascent market and requires encouragement from multilateral agreements, public-private partnerships, and tax incentives. This article will survey various drivers of North-South and North-North cleantech trade including the Clean Development Mechanism, the Private Financing Advisory Network, and tax incentives, and explore potential issues involved in their implementation.


The Clean Development Mechanism (“CDM”) aims to incentivize North-South trade of clean technology. A provision of the Kyoto Protocol, the CDM allows developed countries to gain carbon credits by funding clean technology projects in the developing world.¹ In theory, the CDM lowers the cost of reducing carbon emissions for developed countries,² while stimulating an influx of clean technology into developing countries.³ As of 2008, the CDM’s 3,296 proposed projects represented \$95 billion in potential investments.⁴ However, the money currently invested in approved projects does not exceed \$5 billion.⁵ On average, thirty-six percent of CDM projects require technology transfer.⁶ This percentage increases dramatically when examining different types of projects.⁷ For instance, ninety-two percent of agricultural CDM projects benefit from cleantech trade.⁸ Based on the amount of money spent through CDM and the percentage of projects that encourage clean tech trade, the CDM is responsible for roughly \$1.8 billion of actual clean technology trade.⁹ If the trends continue, the CDM could potentially encourage roughly \$34 billion in cleantech trade.¹⁰

In spite of its potential to encourage cleantech trade, the destination of CDM financing raises questions about the equitable geographic distribution of CDM projects.¹¹ Currently, China, India, Brazil, Mexico, and Malaysia account for eighty percent of the total number of CDM projects.¹² These countries also have some of the lowest rates of clean tech transfer,¹³ which indicates that the CDM is increasingly encouraging projects that draw from the host country’s domestic technology. As countries like China, India, and Brazil internalize clean tech, countries financing CDM projects should invest in countries that have less advanced technology to increase the rate of clean tech trade.

Further encouraging clean tech trade is the Private Financing Advisory Network (“PFAN”), a public-private partnership that finances clean tech projects in countries where clean tech is currently unavailable.¹⁴ PFAN is supported by the Clean Technology Initiative, the United Nations Framework Convention on Climate Change’s (“UNFCCC”) Expert Group on Technology Transfer, government agencies such as the U.S Agency for International Development (“USAID”), and various private companies.¹⁵ PFAN

provides guidance on clean technology projects in the developing world, matches investors, and arranges financing directly from PFAN members.¹⁶ PFAN primarily benefits developers working on mid-size projects who would not otherwise have access to financial advisory services.¹⁷ PFAN’s projects include a twenty-megawatt (“MW”) wind farm in Chile, a 9.3 MW geothermal plant in Georgia, and a bio-ethanol plant in the Philippines.¹⁸ Over the next three years, PFAN will leverage roughly \$500,000 in government funds to generate \$255-550 million in private sector financing for thirty to forty-five clean tech projects.¹⁹ PFAN is still a small initiative compared to the CDM and may not adequately address the need for clean tech trade with the developing world. Although the partnership plans to expand over the next few years,²⁰ PFAN’s members should invest more money so that as the economies of the developing world grow, they can grow with clean tech.

Tax incentives largely drive the North-North clean tech trade. In the United States both federal and state governments offer industry support, tax incentives, loans, and rebates to encourage the use of clean tech.²¹ For instance, the United States provides tax credits to individuals who buy qualified hybrid vehicles,²² which historically have been foreign hybrids.²³ Additionally, the American Recovery and Reinvestment Act provides tax credits to consumers for the first 200,000 plug-in electric vehicles sold by a company.²⁴ The credit may range from \$2,500 to \$7,500 depending on the vehicle’s battery capacity.²⁵ This tax credit could encourage more North-North clean tech trade as Toyota, Mercedes-Benz, and Mitsubishi have announced plans to produce plug-in electric vehicles in 2010.²⁶ A problem with these tax incentives is that they often complement protectionist policies.²⁷ Many countries want to foster domestic growth of clean tech industries by placing tariffs on imported clean tech.²⁸ Protectionism and tax incentives could result in governments encouraging domestic growth in clean tech over international trade because tariffs effectively exclude foreign clean tech from developed markets.²⁹

Although the Clean Development Mechanism, the Private Financing Advisory Network, and tax incentives in developed countries are key components in driving international trade in clean technology, each driver could be improved to better promote clean tech trade. These improvements would include broadening the geographic distribution of CDM projects, increasing funding for public-private partnerships, and eliminating barriers to trade in clean tech. 

Endnotes: Analysis of Multilateral Agreements *continued on page 69*

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EVOLVING U.S. CLEAN TECH: LEGISLATIVE TRENDS

by Ursula Kazarian*

INTRODUCTION

“Clean tech” developments are widely recognized as critical to the fight against climate change. However, putting climate change rhetoric into action has often proven both complex and controversial. One clear global necessity is the transformation of energy production from a hydrocarbon-based paradigm to one comprised of “clean” energy that emits little or no greenhouse gases (“GHGs”). One of the most pressing elements of the realization of this transformation is power production and transmission project funding. The burgeoning field of renewable energy finance is rife with experimental finance options.

Although the recently passed American Recovery and Reinvestment Act (“ARRA”) provides \$4.5 billion to update the U.S. electricity grid and another \$16.8 billion for broad energy efficiency and renewable energy (“RE”) measures,¹ the bulk of the costs of bringing new energy sources online necessitate a more sustainable finance structure. Net metering programs, the voluntary U.S. cap-and-trade market, and, most recently,

feed-in tariffs, have become central to the debate in finding—and funding—a way toward a greener energy infrastructure in the United States. This Article briefly surveys current finance options for RE to supply the main electrical grid and examines current U.S. legislative trends aimed at meeting national goals in an international context to combat climate change through the increased implementation of RE generation and distribution as part of a new national “smart grid.”

The transition to clean energy in the United States has inched its way forward through the incremental establishment of regulations encouraging state-level Renewable Portfolio Standards (“RPS”) and tax incentives for RE production. Particularly in light of the Obama administration’s call for a nationwide renovation of the energy grid, a clearly-defined and uniform finance structure has never been more appropriate or necessary. The market for renewable energy was effectively launched in 1978 by the Public Utility Regulatory Policy Act, which mandated that utilities purchase energy from “qualifying facilities” such as cogeneration plants and small power production plants at “avoided cost” rates that were often above market prices.² Since then, state-level legislative development regarding renewable

energy production has been widely varied, with some states embracing progressive energy programs more than others.³ Perhaps as a consequence of the somewhat scattered and spasmodic policy development across the country, implementation methods are also diverse, not the least of which are the financial mechanisms that fund RE development.

While the Energy Policy Act of 2005 (“EPACT2005”)⁴ extended existing tax incentives⁵ to encourage the integration of RE production within state-level Renewable Portfolio Standards, no federal legislation has yet mandated a specific financial mechanism to implement clean technology in the energy sector,

leaving states to construct their own solutions. However, it is widely anticipated that the Obama administration will continue its stated goals to develop a national “smart grid”—a nationally interconnected network of electricity generation and transmission lines, updated with the latest digital technology for optimal efficiency and cost savings. Such a broad new regulatory plan would necessarily include finance options as a primary consideration, and

the political trend appears to be moving toward cost allocation systems that spread the costs of new electricity generation and distribution to ratepayers. However, the specific cost allocation structure continues to be a topic ripe for discussion.

The GHG emissions reduction rhetoric offered over the last several years by the Bush administration largely relied on “voluntary” market measures that presupposed an inclination of private operations to contribute to the implementation of clean technologies, including RE production. The dearth in domestic implementation mirrored the disinterest in international involvement in forming mandatory regulations. Consequently, the United States currently lags behind the rest of the industrialized world in the development of RE production. The new direction of the Obama administration effectively reverses the position of the federal government both internationally and domestically and gives new hope to the development of national-level legislation to regulate the transition to a clean and modern energy infrastructure.

The transition to clean energy in the United States has inched its way forward through the incremental establishment of regulations.

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MARKET MECHANISMS FOR U.S. CLEAN TECH IMPLEMENTATION

A variety of market mechanisms have been developed over the past few decades to encourage green technology through economic benefit. Compulsory cap-and-trade programs such as the European Emissions Trading Scheme (“EU ETS”) that promote the reduction of GHGs through emissions credits have enjoyed some success among polluting businesses.⁶ However, in the United States, such options have not yet been made mandatory. Despite the popularity of emissions trading worldwide, criticism has been directed at the tendency to “shift” the emissions and reward the heaviest polluters rather than actually reduce total emissions.⁷ Conversely, proponents argue that the overall reductions target can be reduced on a set schedule over a period of years, effectively creating a positive market mechanism while tackling global warming.⁸ In any case, emissions trading will likely continue to be used as a means of reducing GHG emissions in an economically appealing way for emitters.

In addition to emissions trading, which takes a system-wide approach to reducing overall existing emissions, rather than directly mandating the replacement of GHGs with clean energy production, other mechanisms have been developed in an attempt to create a more individual approach to encouraging RE generation. Net metering, which was introduced by EPACT2005 and which requires all public utilities to be offered to consumers upon request, encourages homeowners and small electricity generators by providing retail credits for on-site RE generation.⁹ Thus, net metering has become recognized as a reliable way to reward small-scale RE production. However, the demand for a dramatic increase in RE production encourages the creation and integration of other clean tech policies.

Another financial mechanism, variations of which have been adopted throughout most of the EU and introduced for discussion throughout the world to boost the installation and transmission of RE, has been the feed-in tariff (“FIT”).¹⁰ While there are several structural variations, the German model has been used to construct other FITs throughout Europe. The German model requires utilities to pay a fixed premium price to small renewable energy producers and homeowners for the clean energy they contribute to the grid. The price is sector-specific and based on the cost of production. The FIT policy is credited with the dramatic growth in renewable energy resources in Germany, which is now the world’s largest market for photovoltaic and wind energy. Spain, having adopted a similar FIT policy, has also seen explosive growth in the renewable energy sector. The German model has since been applied in many countries throughout Europe as well as in Canada, so far largely successfully.¹¹ Other adaptations of FIT policy have been adopted in China, Thailand, and parts of India.¹²

Perhaps not surprisingly, the European Commission found in 2005 that FITs were a highly effective finance mechanism to promote new RE production.¹³ Echoing this and referencing the European model, the World Future Council’s (“WFC”) Policy Action Climate Toolkit Project has suggested that feed-in tariffs are the most promising finance mechanism to promote RE generation worldwide.¹⁴ Accordingly, a WFC-funded report supports the idea of a U.S. national feed-in tariff to expedite the transition to a clean energy infrastructure.¹⁵

Despite the success of FITs throughout the world, the United States has not yet adopted a national strategy to finance the shift to a clean energy economy. However, several states have begun to consider FIT policies, in many cases to complement existing RPS requirements that focus on percentage-oriented reduction targets.¹⁶ As is so often the case in the environmental field, California has led the way in the United States for developing feed-in tariff legislation for renewable energy projects. Assembly Bill 1969 of 2006¹⁷ established feed-in tariff systems that offered the same price for all technologies but varied from Germany’s system in that the determining factor is whether the energy is delivered during peak hours, rather than the cost of generation per technology. To date, no other state has passed legislation requiring any form of feed-in tariff; however, the city of Gainesville, Florida

launched a feed-in tariff system similar to that of Germany and Spain in March 2009 and is already reporting economic success through its implementation.¹⁸ Several other states, including Illinois, Minnesota, and Rhode Island, are considering or have introduced similar bills. In 2008, U.S. House Representative Jay Inslee introduced legislation for a national-level FIT that also included the basic uniform minimum standards;¹⁹ although the bill did not pass, it perhaps helped to set the scene for legislation to come. Especially given the new national push to implement green policies, it is quite possible that a federal feed-in tariff bill will pass relatively soon, despite the fact that some political opposition is expected in many states.²⁰

The idea of an electrical “smart grid” focuses on reliability, efficiency, and safety.

THE ROLE OF THE COMING “SMART GRID” TECHNOLOGY IN INCREASING ENERGY EFFICIENCY AND BOOSTING COST SAVINGS

The idea of an electrical “smart grid” focuses on reliability, efficiency, and safety. However, it is generally accepted that a longer-term strategy should include RE as the energy source to power a smart grid. According to a recent report from the Center for American Progress (“CAP”):

Federal incentives for new renewable energy transmission projects should be strengthened—through accelerated depreciation schedules, increasing Private Activity Bond authority for states, or other federal tax incentives—directly

involving taxpayers in the fulfillment of the clean-energy, reliability, and national-security benefits of an updated grid. Smart distribution investments warrant public investment due to their broad public benefits. While in most cases transmission projects will be financed by the private sector, some lines will also need public financing or incentives to ensure they are built.²¹


CAP thus argues that updating the electricity grid is a matter of national security as well as environmentally sound policy, and as such it is reasonable to increase public funding of relevant projects. Policy trends across the states seem to reflect a similar perspective, resulting in a myriad of implementation mechanisms to push forward progressive energy policies. CAP further suggests that it may be procedurally more prudent to spread the costs of a group of new electricity generation projects to all ratepayers, rather than take the more specific but more complicated approach of directing project-specific costs to ratepayers according to load-specific consumption in addition to an assumed taxpayer contribution—in effect creating a uniform FIT.²²

Along the same vein, a federal legislative proposal to build a national smart grid is now being considered. In March 2009, Senate Majority Leader Harry Reid introduced the Clean Renewable Energy and Economic Development Act, which requires the construction of a smart grid based on reliable transmission fed by RE generation through the designation of “renewable energy zones” that will integrate RE into the mainstream electrical transmission grid.²³ The bill also provides that the cost recovery plan will include a federal surcharge²⁴ in addition to cost recovery plans submitted by regional planning entities.²⁵ Given the current state-level push for FITs, it is quite possible that the cost allocation plans submitted by regional planning entities could incorporate such policies, even if no national mandatory standard for FITs is implemented. The bill has been referred to the Committee on Energy and Natural Resources. The timing is well planned. The Obama administration’s recent endorsement for

a national smart grid makes the creation of a national standard to increase the integration of RE production and transmission likely. The Department of Energy has already collected a number of documents and reports concerning the development of a smart grid, and seems poised to implement any relevant legislation that may be passed.²⁶

CONCLUSION

The new direction of the Obama administration gives hope to several concurrent initiatives integrating digital technology, green energy, and economic benefit to RE generators. The need for such progressive policy is increasingly recognized as critical to national security and energy reliability and is more urgent than ever in the larger fight against global climate change. Thus far, the United States has developed RE technology in a patchwork fashion, with some states taking the legislative lead while others are doing little to nothing to integrate RE, despite incremental federal-level encouragement. The passage of the legislation such as that recently introduced in the U.S. Senate to create a national, “green” smart grid will create a uniform national standard for RE generation and distribution as well as the cost recovery mechanisms so critical to implementation.

The timing for such policy harmonization could not be better. The UN Conference on Climate Change meeting in Copenhagen in December 2009, where the follow-up framework to the Kyoto Protocol is expected to be drafted, will address the finance implementation strategy of energy projects among other critical facets of a climate change mitigation strategy. UN climate chief, Yvo de Boer, has cited numerous challenges to financing new RE production, including the current economic crisis.²⁷ Thus, in order to push forward with the fight against global warming and climate change, establishing uniform financial mechanisms to facilitate domestic level realization of the international goals set forth by Kyoto and its successor will remain paramount in the policy formation process at all levels of implementation. 

Endnotes: Evolving U.S. Clean Tech: Legislative Trends

¹ American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115.

² 16 U.S.C. §§ 2601-45 (1978).

³ WILSON RICKERSON ET AL., FEED-IN TARIFFS AND RENEWABLE ENERGY IN THE USA – A POLICY UPDATE 3 (2008) [hereinafter POLICY UPDATE], available at http://onlinepact.org/fileadmin/user_upload/PACT/Misc/Feed-in_Tariffs_and_Renewable_Energy_in_the_USA_-_a_Policy_Update.pdf.

⁴ Energy Policy Act of 2005, Pub. L. 109-58, 119 Stat. 594 [hereinafter EPACT2005], available at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=109_cong_public_laws&docid=f:publ058.109.

⁵ The Energy Policy Act of 1992 provided unfunded authorizations for renewable energy tax credits. CONGRESSIONAL BUDGET OFFICE, THE ENERGY POLICY ACT OF 1992: A BUDGETARY PERSPECTIVE 9-11 (1992), available at <http://www.cbo.gov/ftpdocs/62xx/doc6218/doc03a.pdf>.

⁶ A. DENNY ELLERMAN & PAUL JOSKOW, PEW CTR. ON GLOBAL CLIMATE CHANGE, THE EUROPEAN UNION’S EMISSIONS TRADING SYSTEM IN PERSPECTIVE (2008), available at <http://www.pewclimate.org/docUploads/EU-ETS-In-Perspective-Report.pdf> (discussing the application of the European ETS in the U.S. and globally).

⁷ Larry Lohman, *Carry on Polluting*, NEW SCIENTIST, Dec. 2, 2006, at 18, available at <http://www.thecornerhouse.org.uk/item.shtml?x=546606>.

⁸ ROBERT R. NORDHAUS & KYLE W. DANISH, PEW CTR. ON GLOBAL CLIMATE CHANGE, DESIGNING A MANDATORY GREENHOUSE GAS REDUCTION PROGRAM FOR THE U.S. 23 (2003), available at <http://www.pewclimate.org/docUploads/USGas.pdf>.

⁹ EPACT2005, *supra* note 4, at § 1251.

¹⁰ RENEWABLE ENERGY POLICY NETWORK FOR THE 21ST CENTURY [REN21], GLOBAL STATUS REPORT 23 (2006) [hereinafter REN21], available at http://www.ren21.net/pdf/RE_GSR_2006_Update.pdf (showing a list of all countries enacting feed-in tariff legislation).

¹¹ POLICY UPDATE, *supra* note 3, at 3.

¹² REN 21, *supra* note 10, at 12-13.

¹³ Comm’n of the European Communities, *The Support for Electricity from Renewable Energy Sources: Impact Statement*, CEC Doc. 52005SC1571 (Dec. 7, 2005), available at <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=SEC:2005:1571:FIN:EN:HTML>.

INTELLECTUAL PROPERTY RIGHTS TO ENHANCE INTERNATIONAL CLEAN TECH TRANSFERS

by Anastasia Lewandoski*

The international transfer of clean technology has the ability to promote positive human rights, such as the right to health care and the right to enjoy scientific advancements to one's benefit. Although human rights appear to be inapposite to intellectual property rights, the protection of intellectual property rights will lead to increased clean technology transfer, which will thus increase the quality of life for many. Under the lens of climate change, the access to scientific advancements could protect those at risk to the adverse effects of climate change as technology to protect against droughts, flooding, water temperature changes, habitat deconstruction, and irrigation problems can protect people from famine, dehydration, and forced migration.¹ These rights take the shape of positive human rights, or those that are a guarantee that a government or other provider will supply a citizen with something. In the case of technology transfer, these positive human rights may compete with negative human rights, which require governments to enforce a right, such as the intellectual property right of the technology. Although seemingly at odds with each other, a middle ground can be reached that promotes human rights and intellectual property rights for the benefit of all. While a great deal of countries protect intellectual property to promote the advantages that come with new technology, other countries such as China lack strong protections for intellectual property; this may harm the clean tech trade.² For example, some clean tech producers are reluctant to sell in China because a producer there may simply copy without fear of copy-right penalties.³

While intellectual property may be a young field, the intent to protect intellectual property rights is present in many historic legal documents. The United States Constitution contains language which may be interpreted to protect intellectual property rights.⁴ Intellectual property rights are recognized worldwide by the World Trade Organization ("WTO"),⁵ and scientific productions are protected by the United Nations in its 1948 Declaration of Human Rights.⁶ However, many international documents also adopt positive rights, like the right to health care, food, shelter, and the benefits of scientific advancements.⁷ The United Nations has recognized the conflict between intellectual property rights and the promotion of human rights, particularly in light of the WTO's Agreement on Trade-Related Aspects of Property Rights ("TRIPS").⁸ The UN's response, described as "an antagonistic approach,"⁹ called for "the primacy of human rights obligations over economic policies and agreements."¹⁰

Some argue that for innovation in technology fields to even exist, one must protect the property right first, so that future profits remain as an incentive to innovate. Some economists

point out that this argument is not persuasive because in many fields where there is no intellectual property protection, such as fashion, innovation continues.¹¹ This argument may not hold as true in regards to the high cost of research and development for clean technology, however.¹² Due to the investments necessary for innovation in clean technology, protecting intellectual property rights may be imperative to ensure technological advances continue to be made, even if for some time the technology may not be transferred for others to use. To err on the side of caution, the protection of intellectual property rights should exist in all countries where clean technology is needed most, if even for a limited time under a patent system.

Intellectual property rights and human rights can be reconciled in a system that recognizes patent protection for a limited time. A limited period allowing for intellectual property protection provides incentive to innovate but still allows for the people of the world to enjoy the benefits of these advancements. Although this still prevents some of the poorest people from having access to this technology for some time,¹³ the incentive remains to produce the advancements at all and provides for incentive to make the product available to all in order to enjoy economies of scale. An international patent system may enhance clean tech transfer to less developed countries. Indeed, the World Intellectual Property Organization ("WIPO"), a specialized agency of the UN, is working towards such a system by drafting a substantive patent law treaty.¹⁴ Although WIPO has not yet reached an agreement, the group's existence is nonetheless indicative of a worldwide interest in protecting intellectual property rights. WIPO has worked with the UN's Office of the Commissioner of Human Rights by hosting a panel discussion in 1998,¹⁵ and continued discussions between these two groups may help bring about a solution. As technology transfer in the past by willing companies in foreign direct investment led to more jobs in less developed countries,¹⁶ clean technology transfer can help provide jobs, reduce dependence on carbon fuels, and advance in their own protection from the effects of climate change.¹⁷ In order to guarantee continued progress in the clean technology fields, intellectual property rights should be protected initially for the benefit of all.



Endnotes: Intellectual Property Rights to Enhance International Clean Tech Transfers *continued on page 70*

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A STOP ON THE ROAD TO COPENHAGEN:

IMPLICATIONS OF A U.S. CLIMATE BILL

by Lisa Novins*

INTRODUCTION

As the world prepares for the December 2009 UN Climate Change Conference in Copenhagen, Parties are far from focused on any singular issue that will make or break the negotiations over a successor agreement to the Kyoto Protocol. The U.S. role in international talks has been a topic of discussion for many years and the Obama administration's reengagement on the issue has been an important development both domestically and internationally.¹ The fate of the recently released discussion draft on domestic climate legislation will certainly have an ongoing impact on negotiations taking place in preparation for Copenhagen.² The discussion draft incorporates a number of provisions that may impact U.S. positioning in the coming months. Of particular note are the international clean technology and international adaptation provisions which are important because: (1) they reflect the principle of common but differentiated responsibilities that is essential to the existing international climate framework and (2) they are considered essential to balancing the continuing needs of developed countries with the growth and development of emerging economies.³ Together these two provisions offer a unique preview of the U.S. position on important issues as well as some insight into the U.S. posture on the governance structure of the UN Framework Convention on Climate Change ("UNFCCC"), the Kyoto Protocol, and the international climate discourse generally.

AN EMERGING PARADIGM FOR THE UNITED STATES IN POST-2012 CLIMATE NEGOTIATIONS

On March 31, 2009, U.S. House Energy and Commerce Committee Chairman Henry Waxman and Energy and Environment Subcommittee Chairman Edward Markey released a discussion draft of the American Clean Energy and Security Act, frequently referred to as the U.S. climate bill.⁴ They touted the bill as "clean energy legislation that will create jobs, help end

our dangerous dependence on foreign oil, and combat global warming."⁵ Although the draft legislation may offer less concrete technology investment than previous climate bills or than the Obama administration has advocated,⁶ it is real a starting point for constructive U.S. engagement in both domestic and international climate debates.⁷

In its 648 pages, the proposed bill includes two provisions which can provide insight into the U.S. position on the international deployment of climate mitigation and adaptation technologies during post-Kyoto negotiations.⁸ First, the Exporting Clean

Technology subtitle creates the International Clean Technology Fund ("ICTF") which acknowledges the importance of clean technology export for combating climate change. It provides "assistance to encourage widespread deployment, in developing countries, of technologies that reduce greenhouse gas emissions"⁹ by funding projects that "achieve substantial reductions in greenhouse gas emissions through deployment of low- or zero-carbon technologies."¹⁰

Second, the Adapting to Climate Change subtitle includes an International Climate Change Adaptation Program ("ICCAP"). The ICCAP encourages and facilitates the "deployment of technologies that would help the most vulnerable developing

countries respond to the destabilizing impacts of climate change and encourage the identification and adoption of appropriate renewable and efficient energy technologies that are beneficial in increasing community-level resilience to the impacts of global climate change in those countries."¹¹

The requirements and objectives of the Clean Technology Fund and the Climate Adaptation Program shed some light on the potential U.S. position in the upcoming post-2012 negotiations which will likely include extensive discussion of international

The most vulnerable developing countries will likely be the hardest hit by the impacts of climate change. The instability caused by the disproportionate impacts could potentially be a threat multiplier for global instability.

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adaptation, mitigation, and technology transfer. In this context, it is informative to consider the impacts of the discussion draft's basic framework in terms of the existing UNFCCC governance structure and financial additionality requirements. This, in turn, may provide some insight into the discussion draft's implicit statement on the successes and failures of the expiring Kyoto Protocol.

EXPLORING THE CLIMATE BILL: EXPORTING CLEAN TECHNOLOGY

The text of the discussion draft outlines the ICTF's establishment, governance, country eligibility, funding, and reporting requirements.¹² It would be administered by an interagency group including: the Secretary of State as chairperson, the Secretaries of Energy and the Treasury, the Administrator of the Environmental Protection Agency, and any other agency head or executive branch appointee that the President designates (the "interagency group").¹³ Any project receiving money from the ICTF must serve an identified purpose, be in an eligible country, meet certain criteria, and funds must be distributed through a specific mechanism. Depending on the fund distribution mechanism, the reporting and approval requirements are slightly different in form if not in function.¹⁴

As noted, the Fund's purpose is to encourage widespread deployment of GHG reducing technologies and assist that effort in a way that encourages countries to adopt their own measures to reduce emissions.¹⁵ Any funded project should "achieve substantial reductions in greenhouse gas emissions through the deployment of low- or zero-carbon technologies" and must be included in one of several categories.¹⁶ Those categories include: deploying carbon capture and sequestration technologies, deploying renewable electricity generation technologies, achieving increases in energy efficiency, or reducing transit sector emissions.¹⁷ The interagency group would develop project selection criteria that both achieve these goals and include certain required and preferred components.¹⁸ See Figure 1.

Any country eligible to receive assistance from the Fund would first have to be identified as a developing country by the

World Bank.¹⁹ It must then be included on a list of countries established by the President no later than January 1, 2012 based on criteria including that the country "has signed and ratified an international treaty or agreement that requires [it] to undertake nationally appropriate [GHG] mitigation activities [and] . . . has undertaken nationally appropriate mitigation activities that will achieve substantial reductions in [GHG] emissions, relative to business-as-usual levels, in a measurable, reportable, and verifiable manner."²⁰

To achieve these goals, funding would be distributed by any one or a combination of the following three mechanisms:

- Direct assistance;
- Agreements with the World Bank, multilateral development banks ("MDBs"), or international development institutions; and/or
- A UNFCCC fund or agreement negotiated under the Convention.²¹

If distributed directly, the Secretary of State would be authorized to select projects and provide funding for eligible countries in the form of grants, loans, or other aid.²² However, for funding distributed either through a MDB or UNFCCC fund, a mechanism would be established that would apply and enforce the ICTF's requirements including selection criteria.²³ Regardless of who approves and funds the project, rigorous reporting requirements would begin with an initial report no later than March 1, 2012.²⁴ Finally, it appears that the Secretary of State would have the ability to unilaterally suspend funding for any project—funded by a domestic or international fund—through a yet to be determined process.²⁵

EXPLORING THE CLIMATE BILL: INTERNATIONAL CLIMATE CHANGE ADAPTATION

The International Climate Change Adaptation Program is clearly written with a different purpose than the International Clean Technology Fund. Aside from the obvious distinctions between funding clean technology and adaptation programs, the underlying findings and purposes of the sections explicitly touch on different objectives and needs. The Adaptation Program is based on two general findings: (1) that the most vulnerable

Criteria for Project Selection: Clean Technology Fund	
Required Criteria	Preferred Criteria
substantial, measurable, reportable, verifiable reductions in GHG emissions relative to business as usual	maximize GHG emissions per dollar of assistance
no significant adverse effects on human health, safety, or welfare, the environment, or natural resources	promise to achieve large-scale GHG reductions at the sectoral or cross-sectoral level
the project owner/operator has demonstrated capacity to implement and maintain any technologies purchased or installed	have the potential to catalyze a shift within the host country towards widespread deployment of low- or zero-carbon energy technologies
the project will not cause any net loss of U.S. jobs or displacement of U.S. production	
the project meets other requirements of the interagency group	
the project will be co-financed by the host country government, private sector institutions, or a MBD	

Figure 1. Criteria for CTF Project Selection.

developing countries will likely be the hardest hit by the impacts of climate change and (2) instability caused by these disproportionate impacts could potentially be a threat multiplier for global instability.²⁶

More explicitly, the ICCAP finds that the most vulnerable developing countries, with their lack of resource capacity to adapt, may experience extreme increases in poverty and social and economic destabilization.²⁷ Consequently, it is in the national security, economic, and environmental interests of the United States²⁸ to assist these countries in developing resilience to impacts on “water availability, agricultural productivity, flood risk, coastal resources, timing of seasons, biodiversity, economic livelihoods, health and diseases, and human migration.”²⁹ Furthermore, it is a U.S. obligation under the UNFCCC to provide funding that is “predictable, sustainable, and additional to international agreed levels of overseas development assistance” to aid in the cost of adaptation.³⁰

Under the direction of the Administrator of the U.S. Agency for International Development (“USAID”)³¹ the Adaptation Program would have two primary functions. One would be to engage in research and fund aid programs with the goal of carrying out adaptation programs in the most vulnerable developing countries.³² The second would be to mandate community engagement through full disclosure of information, public participation, a locally tailored consultation process, and, to the extent practicable, alignment with the recipient country’s broader development, poverty alleviation, and natural resource management objectives.³³ In executing these functions, the program would establish fairly substantial and immediate reporting requirements.³⁴

Interestingly, these reporting requirements would apply not only to monies directly distributed by USAID but also to assistance through international adaptation funds³⁵ “created pursuant to the [UNFCCC] . . . or an agreement negotiated under the Convention.”³⁶ Any project eligibility requirements would also apply to a hypothetical UNFCCC fund. In order to comply, any fund would be required to:

- Specify the terms and conditions under which the United States is to provide monies to the fund and under which the fund will disburse monies to recipient countries;
- Ensure that U.S. assistance to the fund and the fund’s principal and income are disbursed only for purposes adhering to those specified in the Adaptation Program;
- Require a regular meeting of the fund’s governing body that includes representation from the most vulnerable developing countries and provides full public access;
- Require that local communities and indigenous peoples in areas where activities or programs are planned are engaged through full disclosure of information, public participation, and consultation;
- Spend not more than ten percent of the amounts available to the fund in any single country in any year; and
- Require the international fund to prepare and make public an annual report adhering to specific requirements.³⁷

Examining the ICTF and ICCAP provides insight into pre-Copenhagen U.S. positioning not only by simply highlighting

priorities but also through an evaluation of the implicit criticisms of the existing framework’s governance structure and Party participation. Whether or not a climate agreement moves forward this year, a frequent theme is present throughout both sections of the discussion draft: preparation for participation in a UNFCCC post-2012 climate negotiation and agreement.³⁸

EXISTING INTERNATIONAL FRAMEWORK: UNFCCC & THE KYOTO PROTOCOL

The UNFCCC creates “an institutional framework for the progressive development of the [climate] regime through protocols or amendments.”³⁹ The UNFCCC’s Kyoto Protocol, which sets emission reduction targets for developed country Parties,⁴⁰ expires in 2012. It has faced criticisms of its substance, enforceability, and the impact of its key market and its flexibility mechanisms, which include emissions trading, the Clean Development Mechanism, and Joint Implementation.⁴¹

The UNFCCC “sets an overall framework for intergovernmental efforts to tackle the challenge posed by climate change.”⁴² Its objective is to stabilize GHG “concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”⁴³ In order to achieve this objective, Parties should protect the climate system “on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities.”⁴⁴ The concept of equitable, global protection is reflected in the allocation of Parties’ voting rights. Unlike many other international instruments or funding mechanisms, the UNFCCC gives each Party to the Convention one vote—regardless of population or financial status.⁴⁵

Consistent with the concept of common but differentiated responsibilities, the UNFCCC requires developed country Parties to “provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations.”⁴⁶ This financial additionality requirement should lead to increased support for technology development, transfer, and deployment from developed to developing countries.⁴⁷ In fact, many developing countries expect that developed country Parties will increase their funding because of the “moral and practical claim that [they] bear a much larger share of the responsibility for historical and current greenhouse emissions, and have greater financial and technical resources.”⁴⁸

The Kyoto Protocol also allocates one vote to each Party⁴⁹ and requires “new and additional financial resources to meet the agreed costs incurred by developing country Parties.”⁵⁰ However, Kyoto goes significantly beyond the UNFCCC by creating quantified emissions reductions. It creates mechanisms to achieve these goals, particularly the Clean Development Mechanism (“CDM”), which is informative in this discussion since it represents a significant facet of the existing UNFCCC structure for expansion of clean technologies in developing countries.⁵¹

The CDM allows projects in developing countries to earn emission reductions credits that can then be traded in a carbon market.⁵² It also creates an alternative mechanism for developed countries to meet their obligations without directly reducing their

own emissions, which is arguably more economically efficient. Theoretically, this dual goal helps developed countries meet their GHG emission reduction targets while stimulating sustainable development and emission reductions in developing countries.⁵³ However, the relationship between CDM projects and sustainable development is frequently the subject of debate:⁵⁴ does the CDM help developing countries achieve sustainable development or does it help developed countries create low-cost emission reduction credits?⁵⁵ Criticisms have ranged from the actual impact of offsets to the cost of reductions, and from local environmental integrity and community involvement to the CDM's long term viability as a mechanism to promote sustainable development.⁵⁶ As the prelude to Copenhagen continues, developing countries are calling for more effective technology transfer than the CDM has yet achieved.⁵⁷

Clean technology transfer and climate adaptation are among the most important topics to be discussed in upcoming UNFCCC negotiations.

THE PROPOSED U.S. CLEAN TECHNOLOGY FUND & INTERNATIONAL CLIMATE CHANGE ADAPTATION PLAN: INTERNATIONAL LEGAL IMPLICATIONS

Clearly, the ICTF language was crafted considering the expiration of Kyoto. "Not later than January 1, 2012, and annually thereafter, the President shall determine and publish a list of countries eligible for assistance."⁵⁸ It goes on to require that an eligible country must have "signed and ratified an international treaty or agreement"⁵⁹ and explicitly authorizes distribution of assistance through a fund created pursuant to the UNFCCC or agreement negotiated under the Convention.⁶⁰ The Adaptation Fund was also drafted with the existing international climate structure in mind. It requires that 40–60% of its funding be distributed through an international fund created under the UNFCCC or agreement pursuant to the Convention.⁶¹ Furthermore, it notes that under the United States' UNFCCC obligations, funding for adaptation programs must be predictable, sustainable, and additional to existing overseas development aid.⁶²

THE INTERNATIONAL CLEAN TECHNOLOGY FUND

The ICTF presents several issues when considering how it might fit into a UNFCCC framework. First and foremost, since the UNFCCC, Kyoto Protocol, and CDM all have additionality requirements,⁶³ which is an extremely important point for developing country Parties, it is safe to assume that a similar requirement will be included in any future agreement.⁶⁴ However, the ICTF includes no financial additionality language. This is particularly significant since the ICCAP includes explicit reference to the UNFCCC additionality requirement.⁶⁵ The difference may imply that it was intentionally excluded from the ICTF subtitle. Further, the absence of additionality language leaves some ambiguity as to whether or how it could fulfill any additionality requirements in a future protocol. Although it is clearly

new funding today, it may be difficult to differentiate it from existing overseas development aid, which is ineligible to fulfill the UNFCCC's "new and additional" requirement.⁶⁶

The ICTF could also create potential conflicts in terms of non-financial requirements and governance mechanisms. For example, regardless of how or where monies are distributed, all projects must conform to the Fund's extensive selection criteria and reporting requirements.⁶⁷

Thus, if funds are to be distributed through an agreement to be negotiated under the UNFCCC there would be two options for compliance. First, the agreement would have to incorporate the explicit requirements included in the U.S. legislation. Or second, the agreement would have to incorporate a mechanism by which Parties could specifically approve and enforce unique, individual requirements. On top of the obligation to comply with U.S. requirements, the discussion draft incorporates a component

which may preclude any ICTF-funded project from incorporation into an international fund: it appears to give the U.S. Secretary of State the authority to unilaterally suspend or terminate assistance if a facet of a project does not operate in compliance with its original approval.⁶⁸ Not only does this appear to be an impracticable demand to incorporate, but it also conflicts with the UNFCCC's themes of equity and the concepts of fostering sustainable development as defined by the host-country and encouraging local control of internationally financed projects.

Finally, the ICTF's requirements for identifying eligible countries could decrease the feasibility of distributing funds through an international mechanism. It defines eligible country as a developing country that has already taken measures towards considerable overall improvements and mitigation activities "that will achieve substantial reductions [in GHG emissions]. . . relative to business-as-usual levels."⁶⁹ While this may make environmental sense, it does not reflect the standards under which the UNFCCC, Kyoto Protocol, or CDM programs should operate.⁷⁰ The Convention does not explicitly include guidance regarding the contributions of developing countries to technology development,⁷¹ but the recent Bali Action Plan recognizes the importance of developed countries' role in assisting developing countries with technology finance and "taking into account social and economic conditions [of a developing country] and other relevant factors."⁷² Inflexibly requiring a developing country to "prove itself" before becoming eligible for funding does not reflect a program created on the "basis of equity and in accordance with . . . common but differentiated responsibilities and respective capabilities."⁷³

THE INTERNATIONAL CLIMATE CHANGE ADAPTATION PLAN

The ICCAP is more explicitly written to reflect current UNFCCC and future protocol obligations. It includes specific reference to

THE PROPOSED U.S. CLEAN TECHNOLOGY FUND & CLIMATE CHANGE ADAPTATION PLAN: INTERNATIONAL POLICY IMPLICATIONS

UNFCCC additionality requirements and requires a percentage of assistance to go through a hypothetical UNFCCC or future protocol fund. It does not include, however, specific language explaining how or when its funding should be considered new and additional. The inclusion of language in domestic legislation specifying an intention that overseas development funding is new and additional pursuant to the UNFCCC requirements is by no means required. But given the longstanding confusion regarding how to determine exactly what is new and additional and the requirement that donor countries “clarify how they have determined that [resources are] . . . new and additional,”⁷⁴ it would be good practice for a donor country to be explicit about its intention upon creation of new funding.

The Plan’s requirements also invoke language of sustainable development and community engagement.⁷⁵ Although the goals of adaptation programs and the CDM are certainly not analogous, the language here appears to be aimed at addressing some of the contentious issues identified in CDM implementation—issues that inherently arise when developed countries fulfill international obligations within the boundaries of developing countries. For example, it requires quantifiable performance goals, the creation of specific performance indicators, extensive, country-specific community engagement, and alignment with each country’s development goals.⁷⁶ While these are laudable inclusions, there currently are not mechanisms identified to further develop, define, and implement these goals at an international level.

Much like the ICTF, the ICCAP subtitle would impose its own to be established requirements, enforcement, and reporting mechanisms equally on any project funded through an international fund. The ICCAP even goes a step further by outlining specific requirements for an eligible fund which include reporting, governing body meeting, and eligibility standards. This is a bold prerequisite for a hypothetical funding mechanism and has the potential to create substantial ambiguities and enforcement challenges, as well as conflicts between negotiators, funding partners, and the developing countries where the projects ultimately occur.

Finally, creating a haze over all of its requirements, the ICCAP would have two overarching purposes. In addition to aiding the most vulnerable developing countries in adapting to climate impacts, its second stated purpose is protecting U.S. security interests.⁷⁷ This significantly changes the UNFCCC climate discourse and emphasizes the U.S.-centric focus of the entire legislation.⁷⁸ While national security may have become part of the global climate discourse, it certainly not part of the existing legal framework. Focusing on U.S. security interests will help a bill pass in the U.S. House of Representatives, but focusing on global political stability and its contribution to peace will be more significant at the international level, and these things, arguably, are not too different.

Despite the potential conflicts between the U.S. climate bill and the existing international legal infrastructure and discourse, it is important to acknowledge that the proposed legislation is simply a discussion draft. As the United States re-engages in the international climate debate,⁷⁹ the discussion draft’s value may be its insight into how and why these provisions strengthen and clarify the U.S. position. In order for the 2009 Copenhagen negotiations to be successful in creating a post-2012 agreement many experts agree that “the United States must lead at home.”⁸⁰ To achieve this, comprehensive domestic legislation to reduce emissions is essential, particularly legislation that includes support for developing countries.⁸¹ By discussing this bill in the U.S. Congress, the United States is beginning to indicate the level of support it may be prepared to give developing countries in the global fight against climate change. This bill could be read as a first step towards putting “a concrete and comprehensive offer on the table.”⁸²

In preparation for international negotiations, any domestic legislation must include international technology diffusion and development which are increasingly considered essential to combating climate change.⁸³ This is particularly true where international policy structures do not have full international participation.⁸⁴ Including international technology provisions in domestic legislation may be a signal that the United States is prepared to go forward with negotiations even without full or substantially equal international participation, a longtime roadblock to U.S. involvement.

CONCLUSION

Experts continue to identify countless “essential” points to a successful Copenhagen outcome.⁸⁵ Two recurring themes are “actions by developing countries [and] finance for mitigation and adaptation.”⁸⁶ The international technology provisions of the discussion draft address those two concerns directly and signal a potential shift in the U.S. policy outlook. While domestic legislation outlining technology and adaptation priorities is important, it is equally important not to unilaterally impose U.S. will upon the world. How the proposed provisions will function domestically must be more thoroughly developed. Perhaps more importantly, how these policies will be incorporated into a post-Kyoto agreement must continue to be a vital part of the discourse, since clean technology transfer and climate adaptation are among the most important topics to be discussed in upcoming UNFCCC negotiations.



Endnotes: A Stop on the Road to Copenhagen

¹ Juliet Eilperin, *Top Emissions Negotiator an Expert on Political Climate, Too*, WASH. POST., Apr. 15, 2009, at C01, available at <http://www.washingtonpost.com/wp-dyn/content/article/2009/04/14/AR2009041403444.html>.

² Cheryl Hogue, *A Climate of Change*, CHEM. & ENG’G NEWS, Apr. 6, 2009, <http://pubs.acs.org/cen/government/87/8714gov2.html>.

³ Posting of Michael Wriglesworth to UN Climate Change Conference Blog, <http://en.cop15.dk/blogs/view+blog?blogid=1017> (Apr. 10, 2009, 14:20).

⁴ See Press Release, Committee on Energy and Commerce, Chairmen Waxman, Markey Release Discussion Draft of New Clean Energy Legislation (Mar.

Endnotes: A Stop on the Road to Copenhagen *continued on page 70*

BOOK REVIEW

THE ROLE OF THE ENVIRONMENT IN POVERTY ALLEVIATION

Edited by Paolo Galizzi

Reviewed by Melissa Blue Sky & Megan Chapman*

The nexus between poverty and environmental degradation—or framed more positively, between poverty alleviation and environmental protection—is too often ignored. For some, the two are seen as mutually exclusive and contradictory goals. For others, they are so closely tied as to be taken for granted. *The Role of the Environment in Poverty Alleviation* speaks to both audiences through illustrations of the myriad ways in which environment and development are linked.¹ Tackling such a broad area, the book's editor Paolo Galizzi does an admirable job of organizing the collection of essays thematically and alternating among a variety of viewpoints, from theoretical debates to case studies of natural disasters and cutting edge projects in social entrepreneurship.

This book is the result of a partnership between Fordham University, The Nature Conservancy, and the United Nations Development Programme (“UNDP”), which began a lecture series on People and the Environment in 2005. The collection of essays comes from the first in the lecture series, and draws from a multitude of fields: international environmental law and development policy, natural disaster relief and planning, microfinance and housing strategies, and legal empowerment of the poor. The project—both the lecture and book series—fits the times, as both poverty alleviation and the environment are explicitly listed in the United Nations Millennium Development Goals (“MDGs”), which the United Nations Environment Programme (“UNEP”) and the UNDP have been working together to implement. Although some of the essays are limited in scope to efforts by particular organizations or projects, they provide interesting case studies of successful linking of environment and development.

Fittingly, the first section of the book, entitled *Poverty Reduction and the Environment are not Opposing Goals*, contains a sound critique of one prevailing view that incorporating environmental protection into development will slow growth and perpetuate poverty in developing countries. The late environmental economist, David Pearce, looks at the Environmental Kuznets Curve (“EKC”) hypothesis, which asserts that countries cannot protect their environment without sacrificing economic

growth. Pearce contends that in concluding environmental protection is a “luxury good,” EKC ignores negative impacts on human health caused by environmental degradation, which in turn decrease long-range growth. Moreover, EKC does not acknowledge that some damage to the environment may be irreparable or that alternative models incorporating environmental objectives into plans for development exist.

For Pearce, wealth includes human, social, and environmental capital, and using this measure, he suggests that while per capita incomes are increasing in some developing countries, per capita wealth in these countries is decreasing. This growth in income paired with loss of wealth may be an indicator of unsustainable development, due in part to resource exploitation and environmental contamination. Because the rural poor are disproportionately dependent on the ecosystem for their livelihoods, they are likely to be driven into even deeper poverty as a result of environmental degradation. To link environmental management with development gains, Pearce argues, environmental policy and investment in environmental assets such as water and sanitation, wetlands, and fisheries must incorporate the goals of long-term local management of the natural environment.


While the first section broadly addresses why poverty reduction and the environment are not opposing goals, the subsequent essays are organized around somewhat narrower themes: natural disasters, information and education, and legal empowerment. Of these, the first ties most closely to the book's overall thesis: that poverty alleviation and environmental goals are inter-related and must be tackled together. Most interesting is the brief study of the impact of the December 2004 tsunami in Southeast Asia. After illustrating how the tsunami's effect was felt disproportionately by the poorest populations, author Annie Maxwell identifies the disaster's environmental causes and consequences. Where coral reefs, natural dunes, and mangroves were intact, they served as natural buffers and communities suffered less.

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For example, in Sri Lanka, an intact coral reef made the difference between the tsunami coming inland 1.5 kilometers versus fifty meters, and killing 1,700 people versus no one. On the other end of the spectrum, Maxwell argues, the recognition that environmental impact should be part of disaster relief planning came too late. For example, in the Aceh region of Indonesia, over 120,000 homes were destroyed and needed to be rebuilt. This tremendous demand for an immediate supply of lumber led to illegal logging of one of the area's few remaining rain forests. Similarly, poor coordination between relief groups led to a huge surplus of small fishing boats to replace those destroyed in Sri Lanka—without enough larger multi-daytrip fishing boats—leading rapidly to overfishing of shallow waters.

As with many interdisciplinary topics, the breadth of the issues and the overlapping cycles of cause and effect could overwhelm the reader if not for a few refreshingly pragmatic essays and inspiring case studies. One that stands out is an essay by three professionals involved in the World Conservation Union on knowledge necessary to meet poverty alleviation. It focuses on

the process of “knowledge to action,” or methods that can help to translate knowledge generated by academics and researchers into useful information for those who can put it into action in developing countries, and promote information exchange between practitioners.

Another essay offers a much-needed glimmer of hope: a case study of social entrepreneurship by International Development Enterprises India (“IDEI”). IDEI adapted the drip irrigation system used on large commercial farms to be suitable to the small farms common among subsistence farmers in India. The modified product prioritizes affordability such that a poor, risk-averse farmer may see net benefits of his investment within one growing season, and serves both poverty alleviation—increasing crop yields and thus profits—and environmental benefits—by reducing water consumption. While poverty and environmental degradation are often two components in a vicious cycle, the IDEI case study and others offered in this book remind us that creative approaches to development and environmental protection can and should yield positive outcomes on both fronts. 

Endnotes: Book Review

¹ THE ROLE OF THE ENVIRONMENT IN POVERTY ALLEVIATION (Paolo Galizzi & Alena Herklotz eds., 2008).

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ENDNOTES: AQUAPONICS & LANDFILL METHANE USE *continued from page 11*

¹ See generally Aquaponics.com, Information—Aquaponics Overview, <http://www.aquaponics.com/InfoAquaponics.htm> (last visited Mar. 25, 2009) [hereinafter Overview] (noting that aquaponics is in its commercial infancy despite the existence of fish farming and soilless plant culture in combination for thousands of years).

² See PracticalEnvironmental.com, What the Heck is Aquaponics?, <http://www.practicalenvironmentalist.com/gardening/what-the-heck-is-aquaponics.htm> (last visited Apr. 3, 2009).

³ See DEPARTMENT OF ENERGY, LANDFILL GAS TO ENERGY FOR FEDERAL FACILITIES: FACT SHEET, available at <http://www.epa.gov/lmop/res/pdf/bio-alt.pdf> (last visited Mar. 25, 2009) (placing the birth of landfill gas capture for energy use in the late 1970s).

⁴ See generally Overview, *supra* note 1 (describing how the problem of removing nutrient rich water from an aquaculture system satisfies the need for nutrient rich water in a hydroponic system); Energy Information Administration, Landfill Gas, <http://www.eia.doe.gov/cneaf/solar.renewables/page/landfillgas/landfillgas.html> (last visited Apr. 3, 2009) (providing official energy statistics compiled by the U.S. Government and stating that the landfill methane that is captured and burned for fuel is prevented from leaching into the atmosphere).

⁵ E.g., Eco-sphere.com, The Inside Story, <http://www.eco-sphere.com/aboutecosphere.htm> (last visited Mar. 25, 2009) (advertising a closed, interdependent ecological system as an educational tool for young people; the system was first developed by NASA scientists as they attempted to create self-contained communities for astronauts).

⁶ STEVE DIVER, NATIONAL SUSTAINABLE AGRICULTURE INFORMATION SERVICE, AQUAPONICS: INTEGRATION OF HYDROPONICS WITH AQUACULTURE 1-2 (2000), available at <http://www.attra.org/attra-pub/PDF/aquaponic.pdf> (enumerating the benefits of aquaculture's use of wastes to fertilize plants situated above fish tanks).

⁷ See *id.* at 1 (pointing out that “[g]reenhouse growers view aquaponics as a way to introduce organic hydroponic produce into the marketplace, since the only fertility input is fish feed and all of the nutrients pass through a biological process”).

⁸ See What the Heck is Aquaponics?, *supra* note 2 (distinguishing deep water aquaponics from reciprocating aquaponics by describing the differing plant placement and comparing aquaponics to conventional agriculture and concluding that “. . . aquaponics is a huge water saver.”).

⁹ E.g., Overview, *supra* note 1 (proffering that a miniature ecosystem is created that benefits both the fish and the plants).

¹⁰ CENTER FOR INNOVATIVE FOOD TECHNOLOGY, ALTERNATIVE AG VENTURES – AQUAPONICS 1, available at <http://www.eisc.org/attach/aquaponics.pdf> (articulating that farmers can profit from their hydroponic vegetables grown on less than one acre of land).

¹¹ See Rosamond L. Naylor et al., *Effect of Aquaculture on World Fish Supplies*, 405 NATURE 1017, 1018 (2000) [hereinafter *Effect of Aquaculture*] (presenting the pros and cons of fish farming and noting that tilapia can displace the catches of some wild species such as cod, hake, haddock, and pollock).

¹² Overview, *supra* note 1.

¹³ See UN Framework Convention on Climate Change, GHG Data from UNFCCC, http://unfccc.int/ghg_data/ghg_data_unfccc/items/4146.php (last visited Apr. 3, 2009).

¹⁴ Environmental Protection Agency, Landfill Methane Outreach Program, <http://www.epa.gov/lmop/overview.htm> (last visited Apr. 3, 2009) [hereinafter LMOP] (asserting that there are over 500 landfills that are good candidates for methane capture and energy use).

¹⁵ See ScienceDaily.com, *Greenhouse Gases, Carbon Dioxide and Methane, Rise Sharply In 2007* (Apr. 24, 2008), available at <http://www.sciencedaily.com/releases/2008/04/080423181652.htm>.

¹⁶ See, e.g., GHGonline.org, Sources of Methane – Landfill, <http://www.ghgonline.org/methanelandfill.htm> (last visited Apr. 3, 2009) (observing that up to fifty percent of landfill methane emissions can be reduced through methane recovery systems, including methane capture for energy production).

¹⁷ See LMOP, *supra* note 14 (clarifying that a small amount of non-methane organic compounds are released in the decomposition process).

¹⁸ *Id.*

¹⁹ E.g., Chicago Climate Exchange, Landfill Methane Emissions Offsets, <http://www.chicagoclimatex.com/content.jsf?id=222> (last visited Apr. 3, 2009) (recognizing the offset potential of “[m]ethane collection projects that include electricity generation,” which may qualify “based on displaced emissions”).

²⁰ See, e.g., DIVER, *supra* note 6, at 1 (lauding the benefits of aquaculture in large part because of the symbiotic use of fish effluent and the bio-filtration that the plant roots perform).

²¹ See *Effect of Aquaculture*, *supra* note 11, at 1019 (warning that tilapia fish feeds often exceed the percentage requirement for the level of fish meal used and that fish meal is produced from wild caught fish).

²² See LMOP, *supra* note 14.

ENDNOTES: BORDER ADJUSTMENT MEASURES IN PROPOSED U.S. CLIMATE CHANGE LEGISLATION *continued from page 19*

¹⁰ The Boxer Amendment died in a 48-36 vote against cloture on June 2, 2008. No further action has been reported on the Boxer Amendment to date. An article published one day before the cloture vote on the Boxer Amendment stated that “several senators are questioning why they are being asked to vote on a lengthy substitute version of the bill that Boxer and her allies just introduced a week and a half ago.” Juliet Eilperin and Steven Mufson, *Climate Bill Underlines Obstacles to Capping Greenhouse Gases*, WASHINGTON POST, June 1, 2008, at A12, available at <http://www.washingtonpost.com/wp-dyn/content/article/2008/05/31/AR2008053102471.html>.

¹¹ See Boxer Amendment to S.3036, 110th Cong. Title XIII, Subtitle A and American Clean Energy and Security Act of 2009, Discussion Draft, 111th Cong. Title IV, Subtitle A, Part 2. It should be noted that the Waxman-Markey bill utilizes the border adjustment measure as a “backstop” to a more comprehensive free allowance mechanism for trade-sensitive, energy-intensive industries. In other words, under this bill, free allowances would first be provided to such industries to ensure their global competitiveness. Should these allowances not meet this stated goal, border adjustment measures would then be used.

¹² See, PEW CENTER ON GLOBAL CLIMATE CHANGE, RESPONSE OF THE PEW CENTER ON GLOBAL CLIMATE CHANGE TO THE COMMITTEE ON ENERGY AND COMMERCE AND ITS SUBCOMMITTEE ON ENERGY AND AIR QUALITY, U.S. HOUSE OF REPRESENTATIVES, ON THE CLIMATE CHANGE LEGISLATION DESIGN WHITE PAPER: COMPETITIVENESS CONCERNS/ENGAGING DEVELOPING COUNTRIES 2 (2008), available at <http://www.pewclimate.org/docUploads/Pew%20Center%20on%20Competitiveness-Developing%20Countries-FINAL.pdf>.

¹³ NIGEL PURVIS, RES. FOR THE FUTURE, MIND THE GAP: THE CASE FOR CLIMATE

AND COMPETITIVENESS PROTECTION AUTHORITY 2 (2008), available at <http://www.rff.org/RFF/Documents/RFF-IB-08-03.pdf>.

¹⁴ See ELLIOT DIRINGER, PEW CTR. ON GLOBAL CLIMATE CHANGE, THE U.S. ELECTION AND PROSPECTS FOR A NEW CLIMATE AGREEMENT 4 (2008), available at <http://www.boell.de/climate-transatlantic/index-117.html>. (“There is now an emerging consensus in Washington that the United States should proceed with mandatory action at home, with or without developing country commitments, provided the legislation includes trade provisions to protect U.S. industry from competitive harm by imposing like costs on energy-intensive imports from countries like China.”).

¹⁵ STAFF OF H.R. COMMITTEE ON ENERGY AND COMMERCE, 110TH CONG., CLIMATE CHANGE LEGISLATION DESIGN WHITE PAPER: COMPETITIVENESS CONCERNS/ENGAGING DEVELOPING COUNTRIES 1 (Comm. Print 2008) (“If the U.S. were to cap its own GHG emissions without corresponding action by developing nations that compete in global trade markets, the cost of producing some American products would increase relative to those manufactured in countries without emissions limits. As a result, U.S. industry might relocate to (or expand operations in) countries that do not limit the emissions of their industries, causing both the environment and the U.S. economy to suffer.”).

¹⁶ *Id.* at 2, 8.

¹⁷ *Id.* at 12.

¹⁸ *Issues in Designing a Cap-and-Trade Program for Carbon Dioxide Emissions, Before the H. Comm. on Ways and Means*, 110th Cong. 16 (2008) (statement of Peter R. Orzag, Director, Congressional Budget Office), available at <http://waysandmeans.house.gov/media/pdf/110/orzag.pdf>.

¹⁹ *Id.*

²⁰ See Joost Pauwelyn, *U.S. Federal Climate Policy and Competitiveness Concerns: The Limits and Options of International Trade Law 4* (Nicholas Inst., Working Paper no. 07-02, 2007), available at <http://www.nicholas.duke.edu/institute/internationaltradelaw.pdf>.

²¹ A “covered good” is defined as:

[A] good that (as identified by the EPA Administrator by rule (A) is a primary product or manufactured item for consumption; (B) generates, in the course of the manufacture of the good, a substantial quantity of direct greenhouse gas emissions and indirect greenhouse gas emissions; and (C) is closely related to a good the cost of production of which in the United States is affected by a requirement of [the Boxer Amendment].

Boxer Amendment to S.3036, 110th Cong. § 1311(7). In § 1311(16), “primary product” is defined as:

(A) iron, steel, steel mill products (including pipe and tube), aluminum, cement, glass (including flat, container, and specialty glass, and fiberglass), pulp, paper, chemicals, or industrial ceramics; or (B) any other manufactured product that—(i) is sold in bulk for purposes of further manufacture or inclusion in a finished product; and (ii) generates, in the course of the manufacture of the product, direct greenhouse gas emissions or indirect greenhouse gas emissions that are comparable (on an emissions-per-output basis) to emissions generated in the manufacture of products by covered entities in the industrial sector.

Id. § 1311(16).

²² “Comparable action” is defined in the Boxer Amendment as “greenhouse gas regulatory programs, requirements and other measures adopted by a foreign country that, in combination, are comparable in effect to actions carried out by the United States through federal, state and local measures to limit greenhouse gas emissions, as determined by the Commission.” The determination of whether a country has taken comparable action will be based on the following requirements, in compliance with applicable international agreements:

(i) A foreign country is deemed to have taken comparable action if the Commission determines that (I) the percentage change in greenhouse gas emissions in the foreign country during the relevant period is equal to, or better than, (II) the percentage change in greenhouse gas emissions in the United States during the same period.

The Commission will develop rules for taking into account net transfers to and from the United States and other foreign countries of greenhouse gas allowances and other emission credits.

(ii) If a foreign country is not deemed to have taken comparable action under clause (i), the Commission will take into consideration, the extent to which all of the following actions that have the effect of limiting greenhouse gas emissions in the foreign country have been taken during the relevant period, and that these actions have been fully implemented, verified and enforced: (I) the deployment and use of state of the art technologies in industrial processes, equipment manufacturing facilities, power generation and other energy facilities, consumer goods (such as automobiles and appliances) and implementation of other techniques or actions that have the effect of limiting greenhouse gas emissions in the foreign country during the relevant period; and (II) any regulatory programs, requirements, and other measures that the foreign country has implemented to limit greenhouse gas emissions during the relevant period.

Id. § 1311(4).

²³ *Id.* § 1314.

²⁴ Exemptions include foreign countries (i) that have been classified as a least-developed developing country by the United Nations, or (ii) whose share of total global greenhouse gas emissions is below the *de minimis* percentage defined in the Boxer Amendment as “0.5% of total global greenhouse gas emissions for the most recent calendar year for which relevant data is available, taking into consideration the annual average deforestation rate during a representative period for a developing foreign country.” *Id.* § 1316(b)(2).

²⁵ *Id.* § 1316(b)(2).

²⁶ *Id.* § 1316(b)(3).

²⁷ Boxer Amendment to S.3036, 110th Cong. § 1314.

²⁸ *Id.* §§ 1314(d)(1)-(2).

²⁹ *Id.* § 1316(a)(3).

³⁰ The “general formula” is defined as:

[T]he international reserve allowance requirement, as described in paragraph (1), for a compliance year is equal to the product obtained

by multiplying (A) the national greenhouse gas intensity rate for each category of covered goods of each covered foreign country for the compliance year, as determined by the Administrator under paragraph (3); by (B) the allowance adjustment factor for the industry sector in the foreign country that manufactured the covered goods entered into the United States, as determined by the Administrator under paragraph (4); by (C) the economic adjustment ratio for the foreign country, as determined by the Commission under paragraph (5).

Id. § 1316(d)(2).

The “national greenhouse gas intensity rate” is calculated by the Administrator:

[F]or a particular foreign country under subparagraph (2)(A), on a per unit basis, in an amount equal to the quotient obtained by dividing (A) the total amount of direct greenhouse gas emissions and indirect greenhouse gas emissions that are attributable to a category of covered goods of a covered foreign country during the most calendar year (as adjusted to exclude those emissions that would not be subject to the allowance submission requirements of section 202 for the category of covered goods if manufactured in the United States); by (B) total number of units of the particular covered good that are produced in the covered foreign country during the same calendar year.

Id.

The “allowance adjustment factor” is calculated by the Administrator:

[F]or a particular foreign country under subparagraph (2)(B) in an amount that is equal to 1 minus the ratio that (i) the number of allowances, as determined by the Administrator under subparagraph (4)(B), that an entire industry sector in the foreign country would have received at no cost if such allowances were allocated in the same manner that allowances are allocated at no cost under Titles V through XI to the same industry sector in the United States; bears to (ii) the total amount of direct greenhouse gas emissions and indirect greenhouse gas emissions that are attributable to a category of covered goods of a covered foreign country during a particular compliance year.

Id.

“Allowances allocated at no cost” are calculated by the Administrator:

[I]n an amount equal to the product obtained by multiplying—(i) the baseline emissions level that the Commission has attributed to a category of covered goods of a foreign country; by (ii) the ratio that—(I) the quantity of allowances that are allocated at no cost under Titles V through XI to entities within the industry sector that manufactures the covered goods for the compliance year during which the covered goods were entered into the United States; bears to (II) the total amount of direct greenhouse gas emissions and indirect greenhouse gas emissions of that sector during the same compliance year.

Finally:

[T]he Administrator shall apply an economic adjustment ratio of 1 for a particular foreign country under subparagraph (2)(C) unless the Commission makes an affirmative decision to lower the ratio in order to take into account all of the following actions that the foreign country has taken during the relevant period, and that these actions have been fully implemented, verified, and enforced—(A) the deployment and use of state of the art technologies in industrial processes, equipment manufacturing facilities, power generation and other energy facilities, consumer goods (such as automobiles and appliances) and implementation of other techniques or actions that have the effect of limiting greenhouse gas emissions in the foreign country during the relevant period; and (B) any regulatory programs, requirements, and other measures that the foreign country has implemented to limit greenhouse gas emissions during the relevant period.

Boxer Amendment to S.3036, 110th Cong. § 1316(d)(2).

³¹ *Id.* § 1316(d)(1)(B).

³² Under this methodology, each importer would (i) determine for each covered foreign country the number of allowances that apply to the category of covered goods manufactured and processed entirely in that covered foreign country for that compliance year; and (ii) of the allowance requirements identified for particular covered foreign countries, apply the requirement that imposes the highest number of allowances for the category of covered goods. The Administrator may allow importers to apply an alternate method for establishing this requirement, but only if the importer demonstrates in an administrative hearing by a preponderance of evidence that the alternate method will establish

an international reserve allowance requirement that is more representative than the applicable requirement. *Id.* § 1316(d)(8).

³³ Such programs represent a “comparable action” if the Administrator certifies that the program (i) places a quantitative limitation on the total quantity of greenhouse gas emissions of the covered foreign country in terms of tons emitted per year and achieves that limitation through an allowance trading system; (ii) satisfies criteria established by the Administrator for requirements relating to the enforceability of the cap and trade program, including requirements for monitoring, reporting, verification procedures, and allowance tracking; and (iii) is a comparable action. *Id.* § 1316(e)(1).

³⁴ *Id.* § 1316(e)(2).

³⁵ *Id.* § 1316(e)(2)(A).

³⁶ American Clean Energy and Security Act of 2009, Discussion Draft, 111th Cong. § 414(b) [hereinafter American Clean Energy and Security Act of 2009]. Furthermore, a country will be determined to have:

[C]ommensurate greenhouse gas regulation if (1) the country’s annual greenhouse gas intensity or energy intensity (as described in section 403(b)) for a sector or sub-sector is equal to or less than the greenhouse gas intensity or energy intensity for such sector or sub-sector in the United States in the most recent calendar year for which reliable data are available; or (2) the country has implemented policies, including sectoral caps, export tariffs, or production fees, that individually or collectively place a price on greenhouse gas emissions from a sector or sub-sector that is at least 60 percent of the cost of complying with title VII of the Clean Air Act in the United States for such sector or sub-sector, averaged over a two-year period.

American Clean Energy and Security Act of 2009, § 405(b)(2).

³⁷ *Id.* § 414(a).

³⁸ *Id.* § 416(a).

³⁹ *Id.* § 415.

⁴⁰ *Id.* § 416(a)(1)(C).

⁴¹ *Id.* § 416(a)(2).

⁴² American Clean Energy and Security Act of 2009, *supra* note 36, § 411(1). This section specifies “iron, steel, steel mill products (including pipe and tube), aluminum, cement, glass (including flat, container, and specialty glass and fiberglass), pulp, paper, chemicals, and industrial ceramics” as “primary products.” It also provides a “catch-all” sub-provision covering

[A]ny other manufactured product that (i) is sold in bulk for purposes of further manufacture or inclusion in a finished product; and (ii) generates, in the course of the manufacture of the product, direct greenhouse gas emissions or indirect greenhouse gas emissions that are comparable (on an emissions-per-output basis) to emissions generated in the manufacture of products [that were specifically listed earlier].

Id.

⁴³ *Id.* § 402(b)(1). Carbon leakage is defined as “any substantial increase (as determined by the Administrator) in [GHG] emissions by manufacturing entities located in countries without commensurate [GHG] regulation, provided that such increase is caused by an incremental cost of production increase in the United States resulting from the implementation of title VII of the Clean Air Act.”

⁴⁴ *Id.* § 403(a).

⁴⁵ *Id.* § 403(b).

⁴⁶ *Id.* § 403(c). The direct compliance factor is equal to the “product of (i) the output of the covered entity; and (ii) 85 percent of the average [GHG] emissions (expressed in tons of carbon dioxide equivalent) per unit of output for all covered entities in the sector or sub-sector, as determined by the Administrator based on reports provided under subparagraph (C).” The “indirect carbon factor for an entity for a calendar year is the product obtained by multiplying the output of the covered entity by both the emissions intensity factor determined pursuant to clause (i) and the electricity efficiency factor determined pursuant to clause (ii) for the year concerned.” The “emissions intensity factor” in a regulated electricity market is “the average [GHG] emissions (expressed in tons of carbon dioxide equivalents) per kilowatt hour of the electricity purchased by the covered entity, as determined by the Administrator based on reports provided under subparagraph (D).” “In a wholesale competitive electricity market, the emissions intensity factor is the average [GHG] emissions (expressed in tons of carbon dioxide equivalents) per kilowatt hour of the marginal source of supply of electricity purchased by the covered entity, as determined by the Administrator based on reports provided under subparagraph (D).” “The electricity efficiency factor is 85 percent of the average amount of electricity (in kilowatt

hours) used per unit of output for all covered entities in the relevant sector or sub-sector, as determined by the Administrator based on reports provided under subparagraph (C).”

⁴⁷ American Clean Energy and Security Act of 2009, *supra* note 36, § 405(b).

⁴⁸ *See id.* Titles I and IV.

⁴⁹ Also known as H.R. 1862, the bill was introduced on April 1, 2009 and was referred to the Committees on Ways and Means and Energy and Commerce. H.R. 1862, 111th Cong. (1st Sess. 2009).

⁵⁰ *Id.* § 2.

⁵¹ *Id.*

⁵² *Id.*

⁵³ *Id.*

⁵⁴ S.3036, 110th Cong. § 6006 (2008). An important difference between the Boxer Amendment and S.3036 is that the requirement for U.S. importers to submit emissions allowances for the covered goods imported would have gone into effect from January 1, 2020 under S.3036, meaning that there would have been an eight-year delay between requiring emissions allowances from domestic manufacturers (which would commence in 2012) and from importers. In contrast, the Boxer Amendment incorporates only a two-year delay between domestic and international requirements, requiring importers to purchase and produce emissions allowances beginning from January 1, 2014. A further difference concerns how key terms in the border adjustment measures are defined, thus having an impact on how these measures will be implemented and enforced. Baseline emissions level used to calculate emissions attributable to covered goods, and to determine whether comparable actions have been taken, would be calculated as of 2005 levels in the Boxer Amendment, but as of the period from January 1, 2012 to December 31, 2014 under S.3036. While the Boxer Amendment specifically addresses the calculation of allowances for goods from multiple covered countries, S.3036 does not. Further, under the Boxer Amendment, the definitions of comparable action and the formulas to be used by the EPA are far more developed and fully conceptualized than in S.3036. For example, in contrast to the methodology described above in the section on the Boxer Amendment, the methodology for calculating the international allowance requirements under S.3036 only covers the initial compliance year, and is defined as “for each category of covered goods of each covered foreign country” it is “equal to the quotient obtained by dividing (i) the excess, if any, of the total emissions from the covered foreign country that are attributable to the category of covered goods produced during the most recent year for which data are available, over the baseline emission level of the covered foreign country for that category; and (ii) the total quantity of the covered good produced in the covered foreign country during the most recent calendar year.” *Id.* § 6006(d)(2)(A). The legislation is designed so that the allowance requirements would be adjusted later:

(i) in accordance with the ratio that (I) the quantity of allowances that were allocated at no cost to entities within the industry sector manufacturing the covered goods for the compliance year during which the covered goods were imported into the United States, bears to (II) the greenhouse gas emissions of that industry sectors; and (ii) to take into account the level of economic development of the covered foreign country in which the covered goods were produced.

Id. § 6006(d)(2)(B). While the Boxer Amendment’s methodology is more detailed and complex, its basic principles are roughly the same as in S.3036.

⁵⁵ H.R.6186 was introduced in the House of Representatives on June 4, 2008, and referred to the House Subcommittee on Energy and the Environment on June 12, 2008. No further action has been taken on this bill. H.R. 6186, 110th Cong. (2d Sess. 2008).

⁵⁶ H.R.6316 was introduced into the House of Representatives on June 19, 2008 and referred to the House Subcommittee on Conservation, Credit, Energy and Research on November 19, 2008. No further action has been taken on this bill. H.R. 6316, 110th Cong. (2d Sess. 2008).

⁵⁷ However, there are some significant differences between the Boxer Amendment and H.R.6316 that are worth noting. Perhaps the most significant difference between the two is that, unlike the Boxer Amendment, which requires imports from any foreign country not on the exempted list to submit emissions allowances, H.R.6316 applies only to countries that are members, or observant governments of, the WTO, defined in the bill as “WTO participants.” Imports from countries that are not WTO participants are not regulated under this legislation, and therefore efforts to limit GHG emissions and spread the cost of regulation among nations do not extend to countries outside of the WTO. Another significant difference is H.R.6316’s inclusion of provisions for negotiating agreements with WTO participants who are developing countries to secure comparable action on GHG emissions, including offering countries will-

ing to negotiate such agreements preferential access to the domestic U.S. carbon market. H.R.6316 § 115(b)(1). The preferential agreements could include incentives such as the ability of the WTO participant to choose its base year or its maximum GHG emissions limits for its system, rather than requiring it to match the U.S. limitations in order to access the U.S. carbon market. *Id.* The negotiated agreements would only be available on a “first-come, first-served” basis, and would not be negotiated in a way that would breach this emissions budget. *Id.* Finally, the requirement for importers to provide emissions allowances on imports from covered countries would begin from January 1, 2015 under H.R.6316, rather than on January 1, 2014 under the Boxer Amendment. Therefore, H.R.6316 allows for a three-year implementation gap before implementing the border adjustment measure, rather than a two-year gap indicated under the Boxer Amendment. H.R.6316, § 111(d)(1).

⁵⁸ The GATT is incorporated into the set of agreements known collectively as the Marrakesh Agreement Establishing the World Trade Organization, which entered into effect on January 1, 2005.

⁵⁹ For instance, one line of cases suggests that the definition of “like” is broader under Article III.4 than it is under Article III.2. *See* World Trade Organization, Appellate Body Report, *European Communities – Measures Affecting Asbestos and Asbestos-Containing Products (“EC – Asbestos”)*, ¶¶ 87-154, WT/DS135/AB/R (March 12, 2001).

⁶⁰ The Mercado Común del Sur (“MERCUSOR”), is a regional trade agreement in South America.

⁶¹ World Trade Organization, Appellate Body Report, *Brazil – Measures Affecting Imports of Retreaded Tyres (“Brazil – Tyres”)*, ¶ 232, WT/DS332/AB/R (Dec. 3, 2007).

⁶² World Trade Organization, Appellate Body Report, *United States – Import Prohibition of Certain Shrimp and Shrimp Products (“U.S. – Shrimp”)*, ¶¶ 122-24, WT/DS58/AB/R (Oct. 22, 2001).

⁶³ Agreement on Technical Barriers to Trade, Dec. 15, 1993, Marrakesh Agreement Establishing the World Trade Organization, Annex 1A, Legal Instruments—Results of the Uruguay Round, 33 I.L.M. (1994) [hereinafter TBT Agreement].

⁶⁴ *See e.g.*, Statement of Joost Pauwelyn, “Testimony Before the Subcommittee on Trade of the House Committee on Ways and Means,” March 24, 2009. On page 13 of his written statement, Professor Pauwelyn refers to “a carbon assessment on a product-specific basis by, for example, allowing an importer to demonstrate the actual carbon-footprint of a specific batch of imports.” (Emphasis in the original.)

⁶⁵ TBT Agreement, *supra* note 63, art. 2.1.

⁶⁶ *Id.* art. 2.2.

⁶⁷ *Id.* art. 2.4.

⁶⁸ *Id.* art. 12.

⁶⁹ The Emission Migration Prevention with Long-term Output Yields Act (“H.R. 1759”), introduced by Representatives Jay Inslee and Mike Doyle on March 26, 2009, provides an example of the adoption of technical standards in legislation designed to address GHG emissions. H.R. 1759, 111th Cong. (2009). Although this legislation does not apply to imported goods, it does apply to domestic industries in a way intended to defend against carbon leakage. Under the proposal, emission allowances would be distributed to industries vulnerable to external competition as a result of the imposition of a cap-and-trade program. The allowances would be subject to a declining cap, which

would force industries either to adopt clean technologies and become more efficient, or, alternatively, to move operations offshore to avoid U.S. restrictions. Given that the adoption of such technical standards to determine distribution of emissions allowances could force less efficient manufacturers to relocate operations offshore, rather than adopt expensive, cleaner technologies, it is possible that eventually, only the most efficient operators would remain in the United States. The most efficient operators then would have to both increase expenses to maintain efficiency and defend against competition from manufacturers who have moved offshore and are able to produce at lower cost. In short, technical standards, when not carefully applied, can have unintended consequences, and when applied to imported goods they can trigger a TBT Agreement challenge.

⁷⁰ Agreement on Subsidies and Countervailing Measures, Dec. 15, 1993, Marrakesh Agreement Establishing the World Trade Organization, Legal Instruments—Results of the Uruguay Round, 33 I.L.M. (1994) [hereinafter SCM Agreement].

⁷¹ The SCM Agreement permits WTO Members to take action against foreign governments’ subsidies in two distinct ways. The first method is through direct challenges that WTO Members may pursue before WTO dispute settlement panels pursuant to Part III of the SCM Agreement, which may, if successful, result in a WTO ruling requiring that the subsidizing WTO Member terminate the subsidy program. *Id.* pt. III. The second method, authorized in Part V of the SCM Agreement, is through the imposition of countervailing duties (“CVDs”) on imported products benefiting from alleged subsidies. *Id.* pt. V.

⁷² Such a theory of subsidization would posit that the system norm is the government sale of emissions allowances to manufacturing industries. Thus, the provision of allowances to some industries or entities would arguably constitute a government decision to forego government revenue otherwise due. *Id.* art. 1.1(a)(ii).

⁷³ This observation applies to challenges brought pursuant to Part III of the SCM Agreement, for non-export contingent, actionable subsidies. *Id.* art. 5.

⁷⁴ The Article 8.2(c) exception covered “assistance to promote adaptation of existing facilities to new environmental requirements imposed by law and/or regulations which result in greater constraints and financial burden on firms,” subject to certain specified limitations. *Id.* art. 8.2(c). It seems this exception might have covered a range of emerging clean energy technologies useful in mitigating climate change.

⁷⁵ *See id.* at Art. 31, concerning period of applicability of SCM Agreement Article 8.

⁷⁶ Pascal Lamy, WTO Director-General, Speech before a European Parliament panel (May 29, 2008), available at http://www.wto.org/english/news_e/spl_e/spl91_e.htm.

⁷⁷ While the levy of an internal consumption tax is also a possibility, it is likely that a requirement to submit allowances would optically appear more permissible under the WTO.

⁷⁸ So, for example, all suppliers of corrosion-resistant or stainless steel sheet to a U.S. manufacturer of kitchen appliances would be required to submit emissions allowances for the steel products supplied to the manufacturer. However, the suppliers would be able to obtain allowance refunds if they can certify that the same amount of allowances were submitted at the point of production. Alternatively, a prospective system utilizing a certification process may also be considered.

ENDNOTES: AVOIDING DERAILMENT OF WIND POWER DEVELOPMENT *continued from page 20*

¹ John A. McKinsey, *Regulating Avian Impacts Under the Migratory Bird Treaty Act and Other Laws: the Wind Industry Collides With One of Its Own, the Environmental Protection Movement*, 28 Energy L. J. 71, 71 (2007).

² *See* Press Release, BirdLife International, Position Statement on Wind Farms and Birds (Dec. 9, 2005), available at http://www.ornithologiki.gr/gr/politiki/wind_birdlife.php.

³ *See* *Gone With the Wind: Impacts of Wind Turbines on Birds and Bats: Hearing Before the H. Subcomm. On Fisheries, Wildlife, and Oceans*, 110th Cong. (May 1, 2007) (testimony of Mike Daulton, National Audubon Society Director of Conservation Policy) [hereinafter Daulton], available at http://resourcescommittee.house.gov/images/Documents/20070501b/testimony_daulton.pdf (noting concern about the potential cumulative effects of poorly sited wind farms on bird populations).

⁴ *See* American Bird Conservancy, American Bird Conservancy’s Wind Energy Policy, http://www.abcbirds.org/abcprograms/policy/wind/wind_policy.html

(last visited April 5, 2009) (describing avian mortality caused by collision with the wind turbine structure or electrocution on power lines).

⁵ Daulton, *supra* note 3.

⁶ *See* Press Release, Center for Biological Diversity, Lawsuit Seeks Redress for Massive Illegal Bird Kills as Altamont Pass, CA, Wind Farms (Jan. 12, 2004) available at http://www.biologicaldiversity.org/news/press_releases/bird-kills1-12-04.htm.

⁷ *See* Daulton, *supra* note 3 (asserting that the FWS “has not prosecuted a single case citing a violation of wildlife laws against a developer”).

⁸ *See* McKinsey, *supra* note 1, at 75-79.

⁹ *See id.* at 88-89.

¹⁰ *Id.* at 77.

¹¹ *Cf.* American Bird Conservancy, *supra* note 4 (detailing how global warming will cause “changes in the ranges of birds, disruption of migration timing

and synchrony with food resources”); Daulton, *supra* note 3 (calling global warming a “severe threat” to birds).

¹² Joris Everaert & Eckhart Kuijken, Industrial Wind Action Group, Wind Turbines and Birds in Flanders: Preliminary Summary of the Mortality Research Results (June 19, 2007), <http://www.windaction.org/documents/11725>.

¹³ Center for Biological Diversity, *supra* note 6.

¹⁴ Jennifer Bogo, *How the Deadliest Wind Farm Can Save the Birds: Green Machines*, POPULAR MECHANICS (Sept. 14, 2007), available at <http://www.popularmechanics.com/science/earth/4222351.html>.

¹⁵ 1979 Bern Convention on the Conservation of European Wildlife and Natural Habitats, 1992 Europ. T.S. No. 104, Recommendation No. 109 (2004), available at http://www.coe.int/t/dg4/cultureheritage/conventions/bern/Recommendations/Rec109_2004_en.pdf.

¹⁶ Press Release, Royal Society for the Protection of Birds, Save the Lewis Peatlands (Apr. 22, 2008), available at <http://www.rspb.org.uk/supporting/>

<http://www.independent.co.uk/environment/climate-change/biggest-onshore-wind-farm-plan-rejected-813320.html>.

¹⁷ Press Release, BirdLife International, Wind Farm “Whether Map” (Feb. 20, 2008) available at http://www.birdlife.org/news/news/2008/02/rspb_wind-farms.html.

¹⁸ U.S. DEP’T OF INT., WIND TURBINE GUIDELINES ADVISORY COMM. CHARTER (2007) available at http://www.fws.gov/habitatconservation/windpower/Committee_Charter.pdf.

¹⁹ U.S. FWS, WIND TURBINE GUIDELINES ADVISORY COMM., PRE-DECISIONAL SECOND RELEASE DRAFT OF THE “ONE-TEXT” FROM THE WIND TURBINE COMM.’S SYNTHESIS WORKGROUP, 13-14 (2009), available at http://www.fws.gov/habitatconservation/windpower/Second_Release_Draft_One_Text_FAC_Briefing_3_13_09.pdf.

²⁰ *Id.* at 3.

ENDNOTES: THE CLEAN TECHNOLOGY FUND AND COAL *continued from page 24*

¹⁷ WORLD BANK, CLEAN TECHNOLOGY FUND: INVESTMENT CRITERIA FOR PUBLIC SECTOR OPERATIONS 6 (2009) [hereinafter PUBLIC SECTOR CRITERIA], available at <http://siteresources.worldbank.org/INTCC/Resources/CTFInvestmentCriteria-revisedcleanJan16.pdf> (requiring proposals for investments to include an analysis of “the expected reduction in the cost of the technology due to technological progress and scale effect at a global level, and/or through organizational learning and scale effects at the country level”).

¹⁸ WORLD BANK, INVESTMENT CRITERIA, *supra* note 10, at 5.

¹⁹ See generally *Hearing*, *supra* note 16.

²⁰ *Id.*

²¹ WORLD BANK, INVESTMENT CRITERIA, *supra* note 10, at 5.

²² *Id.*

²³ See WORLD BANK, INT’L FIN. CORP., ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES FOR THERMAL POWER GENERATION 8 (2008) (working draft) [hereinafter GUIDELINES], available at [http://nonroad.net/download/news/publications/Publications/WBG_EHS_Guidelines_-_Thermal_Power_Plants_\(Draft\)_2008.pdf](http://nonroad.net/download/news/publications/Publications/WBG_EHS_Guidelines_-_Thermal_Power_Plants_(Draft)_2008.pdf) (according to the International Finance Corporation, supercritical plants can achieve emission factors as low as .756 t CO₂/MWh).

²⁴ WORLD BANK, INVESTMENT CRITERIA, *supra* note 10, at 6.

²⁵ ANANTH P. CHIKKATUR & AMBUJ D. SAGAR, POSITIONING THE INDIAN COAL-POWER SECTOR FOR CARBON MITIGATION: KEY POLICY OPTIONS 23 (2009), available at <http://mail.google.com/mail/?ui=2&view=bsp&ver=1qygcgcurkovy> (explaining that post-combustion capture of these pollutants can lead to increases of 24 to 40 percent in auxiliary power consumption, thus reducing efficiency).

²⁶ WORLD BANK, INVESTMENT CRITERIA, *supra* note 10, at 7.

²⁷ *Id.*

²⁸ *Id.*

²⁹ U.S. 10-Year Energy Research and Development Outlook: Hearing Before the Subcomm. on Energy and Water Development of the H. Comm. on Appropriations, 110th Cong. 6 (2007) (testimony of David G. Hawkins), available at http://docs.nrdc.org/globalWarming/files/glo_07022801A.pdf.

³⁰ MCKINSEY & CO., CARBON CAPTURE & STORAGE: ASSESSING THE ECONOMICS 13 (2008), available at www.mckinsey.com/client-service/ccsi/pdf/CCS_Assessing_the_Economics.pdf.

³¹ *Trouble in Store*, ECONOMIST, Mar. 7, 2009, at 12, available at http://www.economist.com/displaystory.cfm?STORY_ID=13226661.

³² *Id.*

³³ The United States’ experience with “new source review” under the Clean Air Act is instructive in this regard. First, utilities successfully lobbied to ensure that some existing facilities would not be required to immediately comply with new Clean Air Act regulations. Instead, costly upgrades would only be required as plants were upgraded or expanded. Then, many of the country’s largest utilities simply flouted its requirements for as long as twenty years. When Clinton Administration regulators finally uncovered these violations and initiated enforcement actions, many utilities agreed to negotiate the terms of their compliance. But when the Bush Administration came to power, the

utilities persuaded sympathetic regulators and enforcement officials to drop these investigations and to rewrite the regulations in accordance with industry preferences. See generally, Bruce Barcott, *Changing All the Rules*, N.Y. TIMES MAGAZINE, Apr. 4, 2004, available at <http://www.nytimes.com/2004/04/04/magazine/04BUSINESS.html?ei=5070&en=c3d3462c0c63eb2f&ex=1222920000&pagewanted=all&position=>; Nicholas H. Rabinowitsh, Note, *Bringing New Source Review Back: The Supreme Court’s Surprise (and Disguised) Attack on Grandfathering Old Coal Plants in Environmental Defense v. Duke Energy Corp.*, 31 SPG ENVIRONS ENVT. L. & POL’Y J. 251 (2008).

³⁴ MCKINSEY & CO., *supra* note 30, at 16-17.

³⁵ Point Carbon, EUA OTC assessment (EUR/t), <http://www.pointcarbon.com/> (last visited Apr. 22, 2009).

³⁶ See generally Kyoto Protocol Clean Development Mechanism Executive Board, *Further Guidance Relating to the Clean Development Mechanism*, U.N. Doc. FCCC/KP/AWG/2008/MISC.7/Add.1, available at http://unfccc.int/files/meetings/cop_14/application/pdf/cmp_cdm.pdf (advance unedited version).

³⁷ MCKINSEY & CO., *supra* note 30, at 6-7.

³⁸ JAMES KATZER ET AL., THE FUTURE OF COAL: OPTIONS FOR A CARBON-CONSTRAINED WORLD xiv (2007), available at http://web.mit.edu/coal/The_Future_of_Coal.pdf.

³⁹ See Press Release, World Bank, Donors Pledge Over \$6.1 Billion to Climate Investment Funds (Sept. 26, 2008), available at <http://web.worldbank.org/WBSITE/EXTERNAL/NEWS/0,,contentMDK:21916602~pagePK:34370~piPK:34424~theSitePK:4607,00.html>.

⁴⁰ See generally, World Bank, Climate Change – CTF Investment Plans, <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/ENVIRONMENT/EXTCC/0,,contentMDK:22092311~menuPK:5927555~pagePK:210058~piPK:210062~theSitePK:407864,00.html> (last visited Apr. 22, 2009); Lisa Friedman, *World Bank: Money begins to move from controversy-ridden fund to renewable energy projects*, E&E REPORTER, Apr. 20, 2009.

⁴¹ WORLD BANK, THE CLEAN TECHNOLOGY FUND 15-16 (2008), available at http://siteresources.worldbank.org/INTCC/Resources/Clean_Technology_Fund_paper_June_9_final.pdf.

⁴² Bali Action Plan, *supra* note 2, at 1(b)(ii).

⁴³ The International Finance Corporations’ Performance Standards, for example, have gained currency as best practice standards for the management of environmental and social issues within the world of private-sector project finance.

⁴⁴ Jeffrey Logan & Martin Weiss, The World Bank’s Clean Technology Fund (CTF) 5 (Congressional Research Service Report for Congress No. RS22989, 2008).

⁴⁵ UNFCCC, Matters relating to Article 3, paragraph 14, of the Kyoto Protocol, Decision -/CMP.1, ¶ 5(d), U.N. Doc. FCCC/SBI/2008/L.27, available at http://unfccc.int/files/meetings/cop_11/application/pdf/cmp1_04_matters_relat_to_art3_14.pdf.

⁴⁶ Lisa Friedman, *World Bank: Congress scraps support for clean technology program that funds coal*, E&E REPORTER, Feb. 25, 2009.

- ¹ See Martin LaMonica, *Obama Signs Stimulus Plan, Touts Clean Energy*, CNET, Feb. 17, 2009, http://news.cnet.com/8301-11128_3-10165605-54.html (explaining that President Obama hopes the investment of the U.S. government in clean technology will help to fuel innovation in the field and make the economy stronger).
- ² See Bill Moore & Rolf Wüstenhagen, *Innovative and Sustainable Energy Technologies: The Role of Venture Capital*, 13 BUS. STRAT. & ENV'T. 235, 240 (2004) (“Historically, venture capital and all forms of new venture financing have played a critical role in new business formation and technological transformation.”).
- ³ See GLOBAL INSIGHT, *VENTURE IMPACT: THE ECONOMIC IMPORTANCE OF VENTURE CAPITAL BACKED COMPANIES TO THE U.S. ECONOMY* 5 (3d ed. 2007) (noting that, in 2005, venture capital created ten million jobs and 2.1 trillion in revenue).
- ⁴ *Id.* at 10-11.
- ⁵ *Id.* at 10.
- ⁶ *Id.* at 8-9.
- ⁷ *Id.* at 8.
- ⁸ GLOBAL INSIGHT, *supra* note 3, at 10 (advancing that technologies backed by venture capital have the potential to “cannibalize” the products of larger companies that are already on the market). Furthermore, companies tend to cut spending on research and development, which means that viable employee ideas may be turned down by the company. *Id.* at 10.
- ⁹ See Andrzej Zwanecki, *Venture Capitalists Boost Clean-Energy Technology*, AMERICA.GOV, Mar. 5, 2008, available at <http://www.america.gov/st/env-english/2008/March/20080305112303saikceinawz0.5196497.html> (claiming investors have “flocked” to the clean-technology sector recently).
- ¹⁰ See *id.* (“U.S. venture capitalists are bullish about clean-tech prospects because they say the development of renewable energy, green buildings and other energy-efficient technologies is driven by long-term trends—such as rising energy consumption and prices and concern about climate change and future supplies of petroleum and natural gas.”).
- ¹¹ See Anupreeta Das, *Cleantech Funding Rising, May Overvalue Sector: VCs*, REUTERS, Jan. 8, 2008, <http://www.reuters.com/article/environmentNews/idUSN0842895820080109> (observing that clean technology investments increased by 341% between 2000 and 2007).
- ¹² Zwanecki, *supra* note 9.
- ¹³ Press Release, PriceWaterhouseCoopers, *Venture Investment in Clean Technology Accelerates Significantly in 2008, Despite Economic Uncertainty* (Jan. 24, 2009), available at <http://www.pwc.com/extweb/ncpressrelease.nsf/docid/488E9029CC2802708525754A005BF36>.
- ¹⁴ See Kate Galbraith, *Clean Technology Venture Funding Fell 48% in First Quarter*, N.Y. TIMES, Apr. 1, 2009, <http://greeninc.blogs.nytimes.com/2009/04/01/cleantech-venture-funding-plunges/> (stating that the venture capital investments into clean technology fell in the last quarter of 2008 and the first quarter of 2009).
- ¹⁵ *Id.*
- ¹⁶ See Moore & Wüstenhagen, *supra* note 2, at 243 (giving examples of ways in which the government can make investments into sustainable energy venture

- more attractive, including research and development subsidies and taxes on fossil fuels); see also Zwanecki, *supra* note 9 (suggesting that shifts in governmental policy is contributing to the growth of interest in clean technology).
- ¹⁷ American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (2009); PRICEWATERHOUSECOOPERS, *CLEANTECH NATION: CLEANTECH PLAYING A CENTRAL ROLE IN THE NATIONAL RECOVERY AGENDA* 1 (2009), available at http://www.pwc.com/images/us/eng/about/pov/PwC_PointofView_Cleantech.pdf (last visited Apr. 11, 2009).
- ¹⁸ See *id.* at 1.
- ¹⁹ See LATHAM & WATKINS, *CLIENT ALERT: AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009—IMPLICATIONS FOR CLEANTECH COMPANIES AND INVESTMENT* 1 (2009), available at http://www.lw.com/upload/pubContent/_pdf/pub2518_1.pdf (determining that the industry incentives will promote public and private investment in clean technology).
- ²⁰ *Id.*
- ²¹ See PRICEWATERHOUSECOOPERS, *CLEANTECH NATION*, *supra* note 17, at 2 (suggesting that investors in companies that are becoming a part of the new energy infrastructure created by the stimulus stand to benefit).
- ²² LATHAM & WATKINS, *supra* note 19, at 1.
- ²³ See John M. Broder, *Energy Department Issues First Renewable-Energy Loan Guarantee*, N.Y. TIMES (Mar. 20, 2009), available at <http://greeninc.blogs.nytimes.com/2009/03/20/energy-department-issues-first-renewable-energy-loan-guarantee/?ref=business> (explaining that the loan program of the DOE has been “hindered by bureaucratic inertia and lengthy reviews of hundreds of applications for more than \$40 billion in loan guarantees”).
- ²⁴ MAYER BROWN, *CLIENT ALERT: DEPARTMENT OF ENERGY LOAN GUARANTEE PROGRAM SIGNIFICANTLY EXPANDED BY AMERICAN RECOVERY AND REINVESTMENT ACT OF 2009* 1 (2009), available at <http://www.mayerbrown.com/publications/article.asp?id=6333&nid=6>; see Department of Energy, *Overview of the American Recovery and Reinvestment Act of 2009*, <http://www.energy.gov/recovery> (last visited Apr. 7, 2009) (giving a breakdown of the authorized funds allotted to the Department of Energy in the Resource and Recovery Act).
- ²⁵ See PRICEWATERHOUSECOOPERS, *CLEANTECH NATION*, *supra* note 17, at 3.
- ²⁶ Keith Bradsher, *China Vies to Be World’s Leader in Electric Cars*, N.Y. TIMES, Apr. 1, 2009, http://www.nytimes.com/2009/04/02/business/global/02electric.html?_r=3&bl&ex=1238904000&en=e70ffe2956e3a3c3&ei=5087%0A.
- ²⁷ See Claire Cain Miller, *An All-Electric Sedan, Awaiting Federal Aid*, N.Y. TIMES, Mar. 26, 2009, <http://www.nytimes.com/2009/03/27/technology/start-ups/27tesla.html?ref=start-ups> (advancing that Tesla Motors has been stalled by the credit crisis and is depending on a government loan to begin production on the vehicle).
- ²⁸ *Id.*
- ²⁹ See *id.* (reporting that the DOE awarded a \$535 million loan guarantee to Solyndra, Inc. for the expansion of production of photovoltaic systems).
- ³⁰ See Galbraith, *supra* note 14 (“The stimulus package, and the president’s emphasis on renewable energy, may also breathe new life into Silicon Valley, Boston and other clean-tech hubs.”).

- ¹⁸ See Evan N. Turgeon, *Federal Forests, Biomass, & Ethanol: Energy Security Sabotaged*, 39 ENVTL. L. REP. NEWS & ANALYSIS 10140, 10148 (2009) (noting that “harvesting and transporting biomass is the greatest cost constraint to its use”).
- ¹⁹ See, e.g., RAVINDRANATH & HALL, *supra* note 16, at 19-30 (examining the many domestic and industrial uses of biomass in India).
- ²⁰ See Mario Giampietro et al., *Feasibility of Large-Scale Biofuel Production*, 47 BIOSCIENCE 587 (1997) (finding that water requirements will severely limit the expansion of biofuels production); but see Göran Berndes et al., *The feasibility of large-scale lignocellulose-based bioenergy production*, 20 BIOMASS & BIOENERGY 371 (2001) (contradicting Giampietro et al., finding that water requirements are not a severe limitation on biofuels production).
- ²¹ The renminbi is the currency of the People’s Republic of China.
- ²² Fredrich Kahrl & David Roland-Holst, *China’s Carbon Challenge: Insights from the Electric Power Sector* 22 (Ctr. for Energy, Res. & Econ. Sustain-

- ability, Research Paper No. 110106, 2006), available at http://are.berkeley.edu/~dwrh/CERES_Web/Docs/CCC_110106.pdf.
- ²³ The Renewable Energy Law (promulgated by the Standing Comm. Nat’l People’s Cong., Feb. 28, 2005, effective Jan. 1, 2006), arts. 1, 5, 19 (P.R.C.), available at http://www.renewableenergyaccess.com/assets/download/China_RE_Law_05.doc.
- ²⁴ Craig Hart, *China Biomass Combined Heat & Power Multi-Stakeholder Negotiation*, Energy + Environment OpenCourseWare, <http://eeocw.org/environmental-negotiation/china-biomass-combined-heat-and-power-multi>.
- ²⁵ Zijun Li, *China’s Renewable Energy Law Takes Effect; Pricing and Fee-Sharing Rules Issued*, Worldwatch Institute (Jan. 18, 2006), <http://www.worldwatch.org/node/3874>.
- ²⁶ The Renewable Energy Law (promulgated by the Standing Comm. Nat’l People’s Cong., Feb. 28, 2005, effective Jan. 1, 2006), arts. 14-15 (P.R.C.), available at http://www.renewableenergyaccess.com/assets/download/China_RE_Law_05.doc.

²⁷ See CRED, *supra* note 12.
²⁸ *Id.*
²⁹ *Id.*
³⁰ *Id.*
³¹ *Id.*
³² See CRED, *supra* note 12.
³³ *Id.*
³⁴ Ministry of New and Renewable Energy, History MNRC, <http://mnes.nic.in/history.htm> (last visited Apr. 22, 2009).
³⁵ See Shoumyo Majumdar, Renewable Energy and Energy Efficiency P'ship, The Current Scenario of Developments In Renewable Energy In India (2008), available at http://www.reeep.org/file_upload/5272_tmpphpJPhOrP.pdf; see also The Energy Conservation Act, 2001, No. 52, Acts of Parliament, 2001, available at http://powermin.nic.in/acts_notification/energy_conservation_act/index.htm.
³⁶ The Electricity Act of 2003, 2003, No. 36, Acts of Parliament, 2003, available at http://aptel.gov.in/pdf/The%20Electricity%20Act_2003.pdf.
³⁷ See e.g. MAHESH C. VIPRADAS, RENEWABLE ENERGY AND ENERGY EFFICIENCY P'SHIP, CASE STUDY: DEVELOPMENT OF REGULATORY FRAMEWORK FOR RENEWABLE POWER IN INDIA, available at http://www.aeinetnetwork.org/reeep/doc/re_regulation.pdf; See generally Global Wind Energy Council, <http://www.gwec.net/index.php?id=124> (last visited Apr. 18, 2009).
³⁸ National Electricity Policy, 2005, No. 23/40/2004 (India), available at <http://www.mperc.org/National%20Electricity%20Policy.pdf>; Tariff Policy,

2006, No. 23/2/2005 (India), available at <http://www.karmayog.org/redirect/stred.asp?docId=2176>; Rural Electrification Policy, 2006, No. 44/26/05-RE (India), available at http://powermin.nic.in/whats_new/pdf/RE%20Policy.pdf; GOVERNMENT OF INDIA, PLANNING COMMISSION, DRAFT REPORT OF THE EXPERT COMMITTEE ON INTEGRATED ENERGY POLICY (2005), available at <http://planning-commission.nic.in/reports/genrep/intengpol.pdf>.
³⁹ The Electricity Act of 2003, 2003, No. 36, Acts of Parliament, 2003, available at http://aptel.gov.in/pdf/The%20Electricity%20Act_2003.pdf.
⁴⁰ Government of India Ministry of New and Renewable Energy, Biomass Power/Cogeneration Programme, <http://mnes.nic.in/prog-biomasspower.htm> (last visited Apr. 18, 2009).
⁴¹ Food & Agric. Org. of the UN [FAO], Econ. and Soc. Div., Major Food and Agricultural Commodities and Producers: Countries by Commodity, <http://www.fao.org/es/ess/top/commodity.html?jsessionid=DFB41A33961E22240EFD874557E18A73?lang=en&item=156&year=2005> (last visited Apr. 22, 2009).
⁴² Government of India, Dept. of Agric. & Cooperation, Three Largest Producing States of Important Crops During 1999–2000, <http://indiabudget.nic.in/es2001-02/chapt2002/tab115.pdf>.
⁴³ SATISH KANSAL, FAO, COMMODITIES & TRADE DIV., FACTORS DETERMINING INDIAN SUGAR PRODUCTION AND ITS COMPARATIVE ADVANTAGE, <http://www.fao.org/DOCREP/005/X0513E/x0513e16.htm>.
⁴⁴ Interview with Mr. Lohia, Dwarikesh Sugar Mills, Ltd., in Bijnaur, Uttar Pradesh, India (Feb. 23, 2009).

ENDNOTES: THE AMERICAN RECOVERY AND REINVESTMENT ACT *continued from page 32*

¹ See Nathaniel Gronewold, *Stimulus Seen Sowing Seeds for Renewable Energy's Revival*, N.Y. TIMES, Mar. 20, 2009, <http://www.nytimes.com/gwire/2009/03/20/20greenwire-stimulus-seen-sowing-seeds-for-industrys-rev-10227.html>; see also Mitchell Zuklie, *The Clean Energy Investment Climate*, in BUSINESS 2009: STRATEGIES FOR FIN., CARBON TRADING, IT, AND CARBON NEUTRAL POLICIES 27, 38 (PLI Corp. Law & Practice, Course Handbook Series No. 1718, 2009) (noting that “[m]any project financing lenders have effectively shut down on closing new deals through the end of the year.”).
² See Gronewold, *supra* note 1 (reporting that approximately twenty-five of the largest financial firms “were active in tax equity financing for alternatives in 2007” and today there are only six bank investors remaining active in the sector); see also Kate Galbraith, *Dark Days for Green Energy*, N.Y. TIMES, Feb. 4, 2009, <http://www.nytimes.com/2009/02/04/business/04windsolar.html> (reporting that since the crisis but before the Obama economic stimulus package, installation of wind and solar power plummeted).
³ See Zuklie, *supra* note 1, at 40 (finding that these technologies are less capital-intensive “since they are targeted at making more efficient use of the existing power generation and supply grid, rather than on new energy generation technologies”).
⁴ See Press Summary, Committee on Appropriations: 111th Congress, American Recovery & Reinvestment, available at <http://appropriations.house.gov/pdf/PressSummary02-13-09.pdf> (outlining the specific provisions of the American Recovery and Reinvestment Act); see also Kate Galbraith, *Obama Signs Stimulus Packed With Clean Energy Provisions*, N.Y. TIMES, Feb. 17, 2009, <http://greeninc.blogs.nytimes.com/2009/02/17/obama-signs-stimulus-packed-with-clean-energy-provisions/>; American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115.
⁵ I.R.C. § 48 (2008).
⁶ I.R.C. § 45 (2008).
⁷ American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, §§ 1104, 1603, 123 Stat. 115; see also Database of State Incentives for Renewables & Efficiency, Business Energy Investment Tax Credit (ITC), http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=US02F&State=federal¤tpageid=1&ee=1&re=1 (last visited Apr. 13, 2009) [hereinafter DSIRE, ITC].
⁸ Database of State Incentives for Renewables & Efficiency, Renewable Electricity Production Tax Credit, http://www.dsireusa.org/library/includes/incentive2.cfm?Incentive_Code=US13F&State=federal¤tpageid=1&ee=1&re=1 (last visited Apr. 13, 2009) [hereinafter DSIRE, PTC] (noting that under the PTC, the qualified energy resources receiving the highest credit amount are wind, geothermal, and closed-loop biomass).

⁹ See generally Gronewold, *supra* note 1.
¹⁰ See generally DSIRE, ITC, *supra* note 7; see also DSIRE, PTC, *supra* note 8.
¹¹ See DSIRE, ITC, *supra* note 7; DSIRE, PTC, *supra* note 8.
¹² Gronewold, *supra* note 1.
¹³ See Martin LaMonica, *Utility PG&E Placing Bets in Solar Tech Race*, CNET NEWS, Mar. 18, 2009, http://news.cnet.com/8301-11128_3-10198984-54.html (recognizing that Pacific Gas & Electric’s decision is also the result of the California renewable portfolio standard mandate that utilities generate 20 percent of electricity from renewable sources by 2010); see also Jeff Postelwait, *A U.S. Federal Renewable Portfolio Standard: Potentials & Pitfalls*, RENEWABLEENERGYWORLD.COM, Mar. 27, 2009, <http://www.renewableenergy-world.com/rea/news/article/2009/03/a-federal-renewable-portfolio-standard-potentials-and-pitfalls> (highlighting recent pushes for a federal RPS; uniform utility regulation through an RPS system combined with other incentives could induce more business to follow in Pacific Gas & Electric’s footsteps).
¹⁴ Martin LaMonica, *Green-tech Pros Gird for Stimulus Jolt*, CNET NEWS, Mar. 26, 2009, http://news.cnet.com/8301-11128_3-10204816-54.html.
¹⁵ See U.S. Dep’t of Energy – Loan Guarantee Program, <http://www.lgprogram.energy.gov> (last visited Apr. 18, 2009); see also Keith Johnson, *Obama: Gov’t Support the Key to Clean Tech*, WALL ST. J., Mar. 23, 2009, <http://blogs.wsj.com/environmentalcapital/2009/03/23/obama-government-support-the-key-to-clean-tech/> (noting that there is also \$20 billion available for clean energy grants).
¹⁶ See generally Energy Policy Act of 2005, Pub. L. No. 109-58, 119 Stat. 594.
¹⁷ See John M. Broder, *Energy Department Issues First Renewable-Energy Loan Guarantee*, N.Y. TIMES, Mar. 20, 2009, <http://greeninc.blogs.nytimes.com/2009/03/20/energy-department-issues-first-renewable-energy-loan-guarantee/>.
¹⁸ See LaMonica, *supra* note 14.
¹⁹ See Claire Cain Miller, *An All-Electric Sedan, Awaiting Federal Aid*, N.Y. TIMES, Mar. 26, 2009, <http://www.nytimes.com/2009/03/27/technology/startups/27tesla.html> (noting that, because of the credit crisis, survival of these kinds of projects depend on federal loans).
²⁰ Stephanie Condon, *Energy Dept. Aims to Give Out Stimulus Loans by Summer*, CNET NEWS, Feb. 19, 2009, http://news.cnet.com/8301-13578_3-10167814-38.html.
²¹ Elizabeth Burleson, *Multilateral Climate Change Mitigation*, 41 U.S.F. L. REV. 373, 403 (2007).

²⁰ See Mostafa K. Tolba et al. *Global Environmental Diplomacy: Negotiating Environmental Agreements for the World*, in THE MONTREAL PROTOCOL: CELEBRATING 20 YEARS OF ENVIRONMENTAL PROGRESS, *supra* note 1, at 38.

²¹ See Montreal Protocol, *supra* note 8, art. 10. The mechanism also includes other forms of multilateral, bilateral, and regional co-operative efforts in compliance with the policies and guidelines of the fund. See Montreal Protocol, *supra* note 8, art. 10, para. 2; see also United Nations Environment Programme, Division of Technology, Industry and Economics, Chemicals Branch, Some Relevant Aspects of the Montreal Protocol on Substances that Deplete the Ozone Layer, <http://www.chem.unep.ch/pops/indxhtmls/manwg2.html> (last visited Apr. 19, 2009) [hereinafter Relevant Aspects].

²² See Montreal Protocol, *supra* note 8, art. 10, para. 1. Incremental costs include such items as the supply of substitute chemicals, conversion of existing production facilities and plants, capital costs of equipment, training, premature retirement of equipment, technical assistance, research, and development. See Fourth Report, *supra* note 14, at Annex VIII; see also Relevant Aspects, *supra* note 21.

²³ See Montreal Protocol, *supra* note 8, art. 10, paras. 6-7.

²⁴ See Secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol, About The Multilateral Fund-Overview, http://www.multilateralfund.org/about_the_multilateral_fund.htm (last visited Apr. 18, 2009) [hereinafter Multilateral Fund Overview]; see also Fourth Report, *supra* note 14, at Annex IX. The day-to-day operations of the fund are managed by a secretariat with a small staff located in Montreal, Canada. See Multilateral Fund Overview, *supra*.

²⁵ See Press Release, Secretariat of the Multilateral Fund for the Implementation of the Montreal Protocol, 56th Meeting Approves 116 Projects and Activities for 65 Countries (Dec. 1, 2008), <http://www.multilateralfund.org/news/1228514896375.htm>. Projects receiving approval included renewal of institutional strengthening projects in twenty-five countries, projects for the removal of CFCs from the manufacturing process for metered dose inhalers in five nations, and approval of a bilateral proposal for an international methyl bromide compliance workshop for Article 5 countries. *Id.*

²⁶ See Ralph Luken & Thomas Graf, *The Montreal Protocol's Multilateral Fund and Sustainable Development*, in THE MONTREAL PROTOCOL: CELEBRATING 20 YEARS OF ENVIRONMENTAL PROGRESS, *supra* note 1, at 71. Central to all Multilateral Fund projects are training programs to enable managers and technicians to obtain the data and skills necessary to adapt to the new technology. See *id.* at 72.

²⁷ Donald Kaniaru et al., *Appendix 1, Frequently Asked Questions: Strengthening the Montreal Protocol by Accelerating the Phase-Out of HCFCs at the 20th Anniversary Meeting of the Parties*, in THE MONTREAL PROTOCOL: CELEBRATING 20 YEARS OF ENVIRONMENTAL PROGRESS, *supra* note 1, at 261. Stated another way, it has been estimated that the phase-out of ODSs under the Montreal Protocol has resulted in the equivalent of a reduction of 11 Gt. of CO₂-eq. per year—delaying climate change by up to 12 years. Guus J.M. Velders et al., *The Importance of the Montreal Protocol in Protecting Climate*, 104(12) PROC. NATL. ACAD. SCI. USA 4814, 4817 (2007), available at <http://www.pnas.org/content/104/12/4814.full.pdf>.

²⁸ Fifth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Bangkok, Thailand, Nov. 17–19, 1993, *Report of the Fifth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision V/8, UNEP/OzL.Pro.5/12 (Nov. 19, 1993), available at http://www.unep.org/OZONE/Meeting_Documents/mop/05mop/MOP_5.asp.

²⁹ Sixth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Nairobi, Kenya, Oct. 6–7, 1994, *Report of the Sixth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision VI/13, UNEP/OzL.Pro.6/7 (Oct. 10, 1994) [hereinafter Sixth Report], available at http://www.unep.org/ozone/Meeting_Documents/mop/06mop/MOP_6.asp.

³⁰ *Id.*

³¹ Tenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Cairo, Egypt, Nov. 23–24, 1998, *Report of the Tenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Annex 5 (Declaration on Hydrochlorofluorocarbons, Hydrofluorocarbons, and Perfluorocarbons), UNEP/OzL.Pro.10/9 (Dec. 3, 1998) [hereinafter Tenth Report], available at <http://www.unep.ch/ozone/pdf/10mop-rpt.pdf>.

³² *Id.*

³³ IPCC/TEAP Special Report, *supra* note 2, Summary for Policymakers at 3-4.

³⁴ Nineteenth Report, *supra* note 7, at 33-34, 38-39, and 44-45 (Decisions XIX/6, XIX/12, and XIX/20).

³⁵ See Mark W. Roberts, ENVIRONMENTAL INVESTIGATION AGENCY, A CLIMATE BRIEFING 5 (2008), available at <http://www.eia-global.org/PDF/report--Climate--Jan09.pdf>.

³⁶ G8 Summit, Heiligendamm, Ger., June 6–8, 2007, *Declaration on Growth and Responsibility in the World Economy* para. 59, available at http://www.g-8.de/Content/EN/Artikel/_g8-summit/2007-06-07-summit-documents.html (select hyperlink to article).

³⁷ G8 Summit, Hokkaido, Japan, July 7–9, 2008, *Declaration of Leaders Meeting of Major Economies on Energy Security and Climate Change* paras. 3, 10, available at http://www.mofa.go.jp/policy/economy/summit/2008/doc/doc080709_10_en.html.

³⁸ See Twentieth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Doha, Qatar, Nov. 16–20, 2008, *Report of the Twentieth Meeting of the Conference of the Parties to the Vienna Convention for the Protection of the Ozone Layer and the Twentieth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer* 38-41, UNEP/OzL.Pro.20/9 (Nov. 27, 2008) [hereinafter Twentieth Report], available at http://ozone.unep.org/Meeting_Documents/mop/20mop/MOP-20-9E.pdf.

³⁹ U.N. Conference on Environment and Development, Rio de Janeiro, Brazil, June 3–14, 1992, Agenda 21, section 9.24(e), available at <http://www.un.org/esa/sustdev/documents/agenda21/english/agenda21chapter9.htm>.

⁴⁰ See, e.g., Velders, *supra* note 27. An example of the high-GWP HFCs to be replaced is HFC-134a which is commonly used in vehicle air conditioners and has a GWP of 1300.

⁴¹ See European Fluorocarbons Technical Committee, Fluorocarbons and Sulphur Hexafluoride, <http://www.fluorocarbons.org/en/homepage.html> (last visited Apr. 18, 2009).

⁴² The production of HCFC-22 has increased by hundreds of thousands of tons per year in the last decade, primarily for use in small air conditioners and refrigerators. See IPCC/TEAP Special Report, *supra* note 2, at 11. A by-product of the production of HCFC-22, also a refrigerant, is HFC-23, a “super” GHG which has a GWP reported by the UNFCCC to be 11,700 times greater than CO₂. See *id.*, at 30.

⁴³ Twentieth Report, *supra* note 38, at 40-41 (creating a “[w]orkshop for a dialog[on] high-global warming potential alternatives for ozone depleting substances”).

⁴⁴ See UNEP Provisional Agenda, Open-ended Working Group of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Twenty-ninth meeting, Geneva, (July 15-18, 2009), UNEP/OzL.Pro.WG.1/29/1 [hereinafter Provisional Agenda], available at http://ozone.unep.org/Meeting_Documents/oewg/29oewg/OEWG-29-1E.pdf.

⁴⁵ See Provisional Agenda, *supra* note 44.

⁴⁶ See Proposed Adjustments to the Montreal Protocol, UNEP/OzL.Pro. WG.1/28/3/Add.1, available at http://www.unon.org/confss/doc/unep/ozone/ozl.pro.wg/Pro_WG_1_28/OzL-WG1-28-3-Add1/K0840783_E.doc. *citing* TEAP, *Response to Decision XVIII/12, Report of the Task Force on HCFC Issues (with Particular Focus on the Impact of the Clean Development Mechanism) and Emissions Reductions Benefits Arising from Earlier HCFC Phase-Out and Other Practical Measures* (August 2007) at 12, available at http://ozone.unep.org/Assessment_Panels/TEAP/Reports/TEAP_Reports/TEAP-TaskForce-HCFC-Aug2007.pdf; see also IPCC/TEAP Special Report, *supra* note 2, at 53 (“With a typical 20-year lifespan, refrigerator end-of-life retirement and disposal occurs at a frequency of about 5% of the installed base each year. This means approximately 75 million refrigerators containing 100 [grams] per unit, or a total of 7500 tonnes of refrigerant, are disposed of annually.”).

⁴⁷ See Montreal Protocol, *supra* note 8, art. 1, para. 6.

⁴⁸ See generally IPCC/TEAP Special Report, *supra* note 2.

⁴⁹ See *supra* note 6 and accompanying text.

⁵⁰ See UNITED NATIONS ENVIRONMENT PROGRAMME, TECHNOLOGY AND ECONOMIC ASSESSMENT PANEL, RESPONSE TO DECISION XVIII/12, REPORT OF THE TASK FORCE ON HCFC ISSUES (WITH PARTICULAR FOCUS ON THE IMPACT OF CLEAN DEVELOPMENT MECHANISM) AND EMISSIONS REDUCTIONS BENEFITS ARISING FROM EARLIER HCFC PHASE-OUT AND OTHER PRACTICAL MEASURES 27 (2007), available at http://ozone.unep.org/teap/Reports/TEAP_Reports/TEAP-TaskForce-HCFC-Aug2007.pdf.

⁵¹ IPCC/TEAP Special Report, *supra* note 2, at 9.

⁵² Article 5 countries are expected to completely phase-out the production and consumption of CFCs, halons, and carbon tetrachloride by 2010. See Backgrounder, UNEP Basic Facts and Data on the Science and Politics of Ozone Protection (Aug. 2003), available at <http://www.unep.org/ozone/pdf/Press-Backgrounder.pdf>.

⁵³ For examples of decisions relating to Banks destruction, see Fourth Report, *supra* note 14, Decision IV/11, para. 7, Decision IV/12, para. 2, and Decision IV/24, para. 4; Seventh Report, *supra* note 13, Decision VII/31; Seventeenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer, Dakar, Sen., Dec. 12-16, 2005, *Report Seventeenth Meeting of the Parties to the Montreal Protocol on Substances that Deplete the Ozone Layer*, Decision XVII/17 and Decision XVII/18, para. 1, UNEP/OzL.Pro.17/11 (Jan. 25, 2006), available at http://ozone.unep.org/Meeting_Documents/mop/17mop/17mop-11.e.pdf; and Twentieth Report, *supra* note 38, Decision XX/7.
⁵⁴ Twentieth Report, *supra* note 38, Decision XX/7 (“Environmentally sound management of banks of ozone-depleting substances.”).

⁵⁵ *Id.*

⁵⁶ *Id.* para. 7.

⁵⁷ *Id.* para. 9.

⁵⁸ ICF INTERNATIONAL, DESTRUCTION OF OZONE-DEPLETING SUBSTANCES IN THE UNITED STATES 5 (2008) [hereinafter ICF INTERNATIONAL DESTRUCTION], available at <http://www.epa.gov/ozone/title6/downloads/ODSDestruction.pdf> (draft report prepared for the U.S. Environmental Protection Agency’s Stratospheric Protection Division).

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⁶⁶ GEF projects in climate change help developing countries and economies in transition to contribute to the overall objective of the UNFCCC. The projects support measures that minimize climate change damage by reducing the risk, or the adverse effects, of climate change. See, e.g., Global Environmental Facility, About the GEF, http://www.gefweb.org/interior_right.aspx?id=50 (last visited Apr. 18, 2009).

⁶⁷ CHICAGO CLIMATE EXCHANGE, CCX OZONE DEPLETING SUBSTANCES DESTRUCTION OFFSETS 1 (2008) [hereinafter CCX Offsets], available at http://www.theccx.com/docs/offsets/Ozone_Depleting_Substance_Protocol.pdf.

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⁸⁵ A parallel amendment to the Vienna Convention would be required.

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¹² See Patrick Avato & Jonathon Coony, *Accelerating Clean Technology Research, Development, and Deployment*, 18 (World Bank Working Paper No. 138, 2008), available at http://www.esmap.org/filez/pubs/78200895253_accelerating_clean_energy.pdf (last visited Apr. 11, 2009) (noting that energy research and development requires significant initial capital investment).

¹³ Jeffrey Sachs, *Keys to Climate Protection*, SCIENTIFIC AMERICAN (Apr. 2008), available at <http://www.sciam.com/article.cfm?id=technological-keys-to-climate-protection-extended> (acknowledging that patent protection may be a double-edged sword).

¹⁴ COMMISSION ON INTELLECTUAL PROPERTY RIGHTS, INTEGRATING INTELLECTUAL PROPERTY RIGHTS AND DEVELOPMENT POLICY 125 (2002), available at http://www.iprcommission.org/papers/pdfs/final_report/CIPRfullfinal.pdf (noting that some hope to one day have an international patent system with a single application process).

¹⁵ World Intellectual Property Organization, Human Rights and Intellectual Property: An Overview, <http://www.wipo.int/tk/en/hr/> (last visited Apr. 11, 2009).

¹⁶ See, e.g., T.K. Jayaraman & Baljeet Singh, *Foreign Direct Investment and Employment Creation in Pacific Countries: An Empirical Study of Fiji*, 5 (May 2007), available at <http://www.unescap.org/tid/artnet/pub/wp3507.pdf>.

¹⁷ INTERNATIONAL COUNCIL ON HUMAN RIGHTS POLICY, *supra* note 1, at 76.

ENDNOTES: A STOP ON THE ROAD TO COPENHAGEN *continued from page 56*

31, 2009), <http://energycommerce.house.gov/> (select Newsroom hyperlink, select New Clean Energy Legislation); see also Darren Samuelsohn & Ben Gelman, *House Democrats release draft energy, climate bill*, N.Y. TIMES, Mar. 31, 2009, <http://www.nytimes.com/gwire/2009/03/31/31greenwire-house-democrats-release-draft-energy-emissions-10364.html>.

⁵ See Press Release, Energy and Commerce, *supra* note 4.

⁶ See Posting of Jesse Jenkins to Breakthrough Blog, http://thebreakthrough.org/blog/2009/04/new_climate_bill_proof_of_misp.shtml (Apr. 1, 2009, 9:55 PM) ("The draft Markey-Waxman climate bill is proof that the green groups leading the climate charge won't fight for investments in clean energy technologies and a new energy economy. Instead, they'll throw these critical investments overboard to preserve precious regulations and an increasingly compromised "cap" on carbon.").

⁷ See Press Release, Union of Concerned Scientists, Waxman-Markey Draft Sets Stage for Climate Legislation (Mar. 31, 2009), http://www.ucsusa.org/news/press_release/waxman-markey-draft-sets-pace-0214.html.

⁸ See American Clean Energy and Security Act of 2009, discussion draft, 111th Cong., §§ 451-56, 491-96 [hereinafter Climate Bill], available at http://energycommerce.house.gov/Press_111/20090331/acesa_discussiondraft.pdf (establishing an International Clean Technology Fund and International Climate Change Adaptation Program); see also Posting of Melanie Nakagawa to NRDC Switchboard, http://switchboard.nrdc.org/blogs/mnakagawa/waxman_markey_bill_shows_stron.html (Apr. 3, 2009).

⁹ Climate Bill, *supra* note 8, § 451.

¹⁰ *Id.* at § 455.

¹¹ *Id.* at § 455. See also Nakagawa, *supra* note 8 (outlining the some of the benefits of the exporting clean technology provisions as providing "assistance to encourage widespread deployment of clean technologies to developing countries . . . specif[ying] that only developing countries that have ratified an international treaty and undertaken . . . mitigation activities . . . are eligible . . . establish[ing] an International Clean Technology Fund . . . [and identify] criteria for project selection.").

¹² Climate Bill, *supra* note 8, §§ 451-60.

¹³ *Id.* at § 453.

¹⁴ See discussion *infra*, n.24, n.70 and accompanying text.

¹⁵ Climate Bill, *supra* note 8, § 451.

¹⁶ *Id.* at § 455.

¹⁷ *Id.* at § 455.

¹⁸ Climate Bill, *supra* note 8, § 455; see also Figure 1.

¹⁹ Climate Bill, *supra* note 8, § 454.

²⁰ *Id.*

²¹ *Id.* at § 455.

²² *Id.*

²³ *Id.* at § 454.

²⁴ *Id.* at § 456.

²⁵ Climate Bill, *supra* note 8, § 455.

²⁶ *Id.* at § 491 ("[G]lobal climate change is a potentially significant threat multiplier for instability around the world . . . increasing hunger and poverty and causing increased pressure on developing countries.").

²⁷ *Id.*

²⁸ *Id.* ("[T]he consequences of global climate change . . . are likely to pose a long-term threat to the national security, foreign policy, and economic interests of the United States.").

²⁹ *Id.*

³⁰ *Id.* ("[U]nder the [UNFCCC] and under the Bali Action Plan, developed country parties, include in the United States, committed to provide 'new and additional financial resources' to assist developing countries in meeting the costs of adaptation.").

³¹ Climate Bill, *supra* note 8, § 492.

³² *Id.* at § 494.

³³ *Id.*

³⁴ *Id.* (establishing reporting requirements that begin no later than 180 days after enactment).

³⁵ *Id.* at § 495.

³⁶ *Id.*

³⁷ Climate Bill, *supra* note 8, § 495.

³⁸ Throughout the Fund and Adaptation Program text of the bill, there is frequent reference to the World Bank and to existing or hypothetical future international funds. For example, developing country is defined as "a country eligible to receive financial assistance from the" World Bank. Climate Bill, *supra* note 8, § 452. Distribution of assistance is authorized through agreements with the World Bank, "other multilateral development banks, or international development institutions." *Id.* at § 455. Furthermore, the criteria for Fund project selection require that any approved project be "co-financed by the host

country government, private sector institutions, or a multinational development bank.” *Id.* And explicitly, the Adaption Program language references the financial additionality requirement under the UNFCCC which has been controversial in its enforceability particularly in light of recent developments with emerging international funding mechanisms such as the World Bank’s Climate Investment Funds. *See generally*, Addie Haughey, *The World Bank Clean Technology Fund: Friend or FOE to the UNFCCC?*, SUSTAINABLE DEV. L. & POL’Y, Winter 2009, at 57.

³⁹ DAVID HUNTER ET AL., INTERNATIONAL ENVIRONMENTAL LAW AND POLICY 670 (2007).

⁴⁰ See Christopher Carr & Flavia Rosembuj, *Hot Markets: The Future of the American Legal Practice in the Regulation and Business of Greenhouse Gases*, 16 N.Y.U. ENVTL. L.J. 44, 45 (2008).

⁴¹ *See id.*; *see also* DAVID HUNTER ET AL., *supra* note 39, at 691 (explaining the four key flexibility mechanism – including the Article 4 “Bubbles” and noting that there has been considerable “debate over the technical rules to ensure the flexibility mechanism are in fact leading to additional reductions”); and Commentary, *Kyoto out of kilter*, CHRISTIAN SCI. MONITOR, at 8, Dec. 6, 2005, available at <http://www.csmonitor.com/2005/1206/p08s02-comv.html?s=wdep>.

⁴² UN Framework Convention on Climate Change [UNFCCC] Website, Essential Background, http://unfccc.int/essential_background/convention/items/2627.php (last visited Apr. 22, 2009).

⁴³ UNFCCC, art. 2, May 9, 1992, 1771 U.N.T.S. 165.

⁴⁴ *Id.* art. 3.

⁴⁵ *See id.* art. 18; *see also* Haughey, *supra* note 38, at n.57, n.58 and accompanying discussion.

⁴⁶ *See* UNFCCC, *supra* note 43, art. 4, para. 3.

⁴⁷ TARYN FRANSEN ET AL., WORLD RESOURCES INSTITUTE, MEASURING THE WAY TO A NEW GLOBAL CLIMATE AGREEMENT 5 (2008), available at http://pdf.wri.org/measuring_the_way_to_a_new_global_climate_agreement.pdf.

⁴⁸ *See* Manish Bapna & Heather McGray, Financing Adaptation: Opportunities for Innovation and Experimentation (forthcoming in 2009 in Brookings Institution, Climate Change and Global Poverty: A Billion Lives in the Balance?), available at http://pdf.wri.org/financing_adaptation.pdf; *see also* UNFCCC, *supra* note 43, art. 4 (requiring all Parties to develop, update, and publish national inventories of anthropogenic emissions of GHG, cooperate in preparing for adaptation, promote scientific and technological research, promote exchange of said scientific and technological research, among numerous other commitments).

⁴⁹ Kyoto Protocol to the UNFCCC, Dec. 10, 1997, 37 I.L.M. 22, art. 11 [hereinafter Kyoto Protocol].

⁵⁰ *Id.*

⁵¹ *See* Morton Anderson, Saving up for the “Copenhagen Protocol,” COP15 United Nations Climate Change Conference Copenhagen (Apr. 9, 2009), <http://en.cop15.dk/news/view+news?newsid=1065>.

⁵² *See* UN ENV’T PROGRAM, LEGAL ISSUES GUIDEBOOK TO THE CLEAN DEVELOPMENT MECHANISM 6 (2004); *see also* UNFCCC, Conference of the Parties, *Report of the Conferences of the Parties on its Seventh Session*, Decision 17/CP.7, UN Doc. FCCC/CP/2001/13/Add.2 (Jan. 21, 2002) [hereinafter *Seventh Session Report*] (establishing that public funding for CDM projects must also be additional and should not result in the diversion of overseas development aid).

⁵³ UNFCCC Website, About CDM, <http://cdm.unfccc.int/about/index.html> (last visited Apr. 20, 2009).

⁵⁴ *See generally* Karen Holm Olsen, *The clean development mechanism’s contribution to sustainable development: a review of the literature*, CLIMATIC CHANGE, Sept. 2007, at 59; *see also* Hunter et al., *supra* note 39, at 694.

⁵⁵ *See generally* Joyceline A. Goco, Head IACC Secretariat, Presentation at the First National Workshop on Capacity Development for the Clean Development Mechanism in the Philippines, The UNFCCC, the Kyoto Protocol, and an Introduction to CDM, available at <http://www.cd4cdm.org/Asia/Philippines/First%20National%20Workshop/unfcccintrotocdm.ppt>; and U.S. Gov. ACCOUNTABILITY OFFICE, REPORT TO CONGRESSIONAL REQUESTERS NO. GAO 09-151, INTERNATIONAL CLIMATE CHANGE PROGRAMS: LESSONS LEARNED FROM THE EUROPEAN UNION’S EMISSIONS TRADING SCHEME AND THE KYOTO PROTOCOL’S CLEAN DEVELOPMENT MECHANISM (2008), available at <http://www.gao.gov/new.items/d09151.pdf>.

⁵⁶ *See* Karen Holm Olsen, The Clean Development Mechanism’s Contribution to Sustainable Development http://www.cd4cdm.org/Publications/CDM&SustainDevelop_literature.pdf (last visited Apr. 20, 2009); Int’l Rivers, Bad Day in Congress for the CDM (Mar. 6, 2009), <http://internationalrivers.org/en/blog/patrick-mccully/bad-day-congress-cdm>; and INT’L RIVERS & CDM WATCH, THE GOOD, THE BAD, AND THE DAMMED UGLY (2003), available at <http://internationalrivers.org/files/gbduimcdmwatch.pdf>.

⁵⁷ *See* FRANSEN ET AL., *supra* note 47, at 5-6 (noting that one aspect of that call includes redeveloping a governance structure that mandates that “any funding not under the authority and guidance of the UNFCCC shall not be regarded as the fulfillment of [financial] commitments by developed countries”); and Proposal by the G77 & China

For A Technology Mechanism under the UNFCCC, http://unfccc.int/files/meetings/ad_hoc_working_groups/lca/application/pdf/technology_proposal_g77_8.pdf (last visited Apr. 22, 2009).

⁵⁸ Climate Bill, *supra* note 8, § 454.

⁵⁹ *Id.*

⁶⁰ *Id.*

⁶¹ *Id.* at § 495.

⁶² *Id.*

⁶³ *See Seventh Session Report*, *supra* note 52; Kyoto Protocol, *supra* note 49 and UNFCCC, *supra* note 43, art. 3.

⁶⁴ In fact, after the CDM was created, it began requiring that public CDM funding should not result in a diversion of ODA. *See Seventh Session Report*, *supra* note 52.

⁶⁵ *See* Climate Bill, *supra* note 8, § 491.

⁶⁶ *See* UNFCCC, Conference of the Parties, *Report of the Conferences of the Parties on its Fifth Session, Review of the Implementation of Commitments and of Other Provisions of the Convention*, UN Doc. FCCC/CP/1999/7 (Feb. 16, 2000), available at <http://unfccc.int/resource/docs/cop5/07.pdf> (establishing that public funding for CDM projects must also be additional and should not result in the diversion of overseas development aid).

⁶⁷ *See* Climate Bill, *supra* note 8, § 495.

⁶⁸ *Id.* at § 455.

⁶⁹ *Id.* at § 454.

⁷⁰ Live from the Wall Street Green Trading Summit, Red, Green, and Blue (Apr. 1, 2009), <http://redgreenandblue.org/2009/04/01/live-from-the-wall-street-green-trading-summit/> [hereinafter Live from Wall Street]. This is particularly troubling in the sense of offsets. HEATHER MCGRAY ET AL., THE WORLD RESOURCES INSTITUTE, WEATHERING THE STORM: OPTIONS FOR FRAMING AND ADAPTING DEVELOPMENT 27 (2007) [hereinafter WEATHERING THE STORM], available at http://pdf.wri.org/weathering_the_storm.pdf.

⁷¹ *See* WEATHERING THE STORM, *supra* note 70, at 33.

⁷² UNFCCC, Provisional Agenda of the Ad Hoc Working Group on Long-Term Cooperative Action Under the Convention, Fulfillment of the Bali Action Plan and components of the agreed outcome, Fifth Session, Note by the Chair, Part II, Bonn, F.R.G., Mar. 29-Apr. 8, 2009, UN Doc. FCCC/AWGLCA/2009/4 (Mar. 18, 2009) 3, 17-22, available at <http://unfccc.int/resource/docs/2009/awglca5/eng/04p02.pdf>.

⁷³ UNFCCC, *supra* note 43, art. 3.

⁷⁴ *See* Haughey, *supra* note 38, at n.49.

⁷⁵ *See* Climate Bill, *supra* note 8, § 494.

⁷⁶ *Id.* at § 496.

⁷⁷ *See* discussion *supra*, n.27, n.28 and accompanying text.

⁷⁸ *See* Live from Wall Street, *supra* note 70.

⁷⁹ *See* Eilperin, *supra* note 1.

⁸⁰ *Roadmap from Poznan to Copenhagen – Preconditions for Success: Hearing before the H. Select Comm. on Energy Independence and Global Warming*, 111th Cong. 2 (2009) (statement of Elliot Diringer, Vice President, International Strategies, Pew Center on Global Climate Change) available at <http://globalwarming.house.gov/tools/3q08materials/files/0099.pdf>.

⁸¹ *Id.* at 5.

⁸² *Id.* at 7.

⁸³ LEON CLARKE ET AL., TECHNOLOGY AND INTERNATIONAL CLIMATE POLICY I (The Harvard Project on Int’l Agreements, Discussion Paper 08-21, 2008) available at <http://belfercenter.ksg.harvard.edu/files/ClarkeWeb2.pdf> (last visited Apr. 10, 2009).

⁸⁴ *Id.* at 1-2.

⁸⁵ *See, e.g.*, James Russell & Janet Sawin, *Help Wanted: International Climate Change Mitigation Seeks Leader*, E2 – EYE TO EARTH, Sept. 25, 2007, <http://www.worldwatch.org/node/5369> (indicating that China’s participation is essential); Videotape Transcript: UNFCCC chief de Boer discusses U.S. role in Copenhagen talks (OnPoint, Mar. 5, 2009), <http://www.eenews.net/tv/transcript/958> (identifying four political essentials for moving forward at Copenhagen: clarity on how much industrialized countries willing to reduce

their emissions, clarity on how much major developing countries like China and India are willing to limit their emissions growth of their emissions; clarity on finance will be essential to help engage developing countries in reducing emissions and adapting to impacts of climate change; and decisions on how money will be managed).

⁸⁶ See *Roadmap from Poznan to Copenhagen – Preconditions for Success: Hearing before the H. Select Comm. on Energy Independence and Global Warming*, 111th Cong. 4 (2009) (written statement of Ambassador John Brunton, Ambassador to the Delegation of the European Commission to the USA)

available at <http://globalwarming.house.gov/tools/3q08materials/files/0100.pdf>; see also Conference of European Churches, CSC Briefing on the Commission Proposal for Post-Kyoto Negotiations (2009), <http://www.ccc-kek.org/pdf/EuropeUpdate23PostKyoto.pdf>; ANDREW KEELER & ALEXANDER THOMPSON, INDUSTRIALIZED COUNTRY MITIGATION POLICY AND RESOURCE TRANSFERS TO DEVELOPING COUNTRIES: IMPROVING AND EXPANDING GREENHOUSE GAS OFFSETS 11, 16 (The Harvard Project on Int'l Agreements, Discussion Paper 08-05, 2008), available at <http://belfercenter.ksg.harvard.edu/files/KeelerWeb4.pdf>.

UPDATE

The following language should be added to the article by Jacqueline Peel and Lee Godden in SDLP's 2009 Climate Law Reporter. This is an update to the *Walker* case which was discussed in detail in that article. See Jacqueline Peel & Lee Godden, *Planning for Adaptation to Climate Change: Landmark Cases from Australia*, SUSTAINABLE DEV. L. & POL'Y, Winter 2009, at 37, 39.

The New South Wales Court of Appeal,¹ later overturned the decision of Justice Biscoe on a technicality, finding that whilst the 'public interest' was an implied mandatory consideration, the ESD principles were not. The Court held that, although the Minister did not consider ESD principles, that oversight only had relevance for the inadequacy of a 'public interest' consideration, which was a merits-based matter. The merits approach was to be contrasted to an overarching failure to consider the public interest at all, which would be susceptible to judicial review.²

Nonetheless, the majority of the Court stressed, 'the principles of ESD are likely to come to be seen as so plainly an element of the public interest, in relation to most if not all decisions, that failure to consider them will become strong evidence of failure to consider the public interest and/or to act bona fide in the exercise of powers granted to the Minister, and thus become capable of avoiding decisions.'³ Thus while the majority judgment set a steep threshold test for declaring decision-making invalid, it does not preclude ESD principles as a relevant consideration in determining the public interest in climate change contexts.

Endnotes:

¹ Minister for Planning v. Walker (2008) 161 LGERA 423; [2008] NSWCA 224.

² *Id.* at 40, 41, 44.

³ *Id.* at 56.

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