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Kyoto Comes to Georgia: How International Environmental Initiatives Foster Sustainable Commerce in Small Town America

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KYOTO COMES TO GEORGIA: HOW INTERNATIONAL ENVIRONMENTAL INITIATIVES FOSTER SUSTAINABLE COMMERCE IN SMALL TOWN AMERICA

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I. INTRODUCTION

Sustainable commerce—products and practices that minimize environmental impacts and optimize commercial value while realizing both public and private environmental benchmarks—predominate industry and government discourse within the international community. In the U.S., sustainable commerce initiatives include a wide spectrum of business and governmental practices adopted over the past ten years. These practices have minimized emission of pollutants (including carbon and other greenhouse gases (GHGs)), prompted the transition to renewable energy by industry and government, and promoted the design of new products that reuse or recycle natural resources while minimizing waste generation.[1] Sustainable commerce initiatives have become integral components of the corporate and governmental programs that will drive U.S. energy, manufacturing, and transportation policy in the coming decades.[2] This move toward sustainable commerce initiatives has already created structural shifts within U.S. industry.[3]

Since the 1970s, new environmental protection programs in the United States have traditionally started with comprehensive congressional legislation providing the U.S. Environmental Protection Agency (EPA) and other federal agencies the authority to design and implement regulatory programs that meet specific legislative objectives.[4] State governments, either by invitation or with more coercive prodding, then take the lead in program design and enforcement.[5] In the case of international environmental concerns, such as the climate and marine drivers of sustainable commerce programs, new environmental initiatives at the state and local government level traditionally begin with U.S. support and ratification of international protocols and accords.[6] For example, the U.S. was a major proponent, and later signatory,

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[1] *See* DANIEL C. ESTY & ANDREW S. WINSTON, GREEN TO GOLD: HOW SMART COMPANIES USE ENVIRONMENTAL STRATEGY TO INNOVATE, CREATE VALUE, AND BUILD COMPETITIVE ADVANTAGE 7–10 (2006).

[2] *Id.* at 10–18.

[3] *Id.*

[4] *See* Clean Water Act, 33 U.S.C. §§ 1251–1387 (2000); Resource Conservation and Recovery Act of 1976, 42 U.S.C. §§ 6901–6992k (2000); Clean Air Act, 42 U.S.C. §§ 7401–7671q (2000). For a history of the development of federal environmental law, see RICHARD J. LAZARUS, THE MAKING OF ENVIRONMENTAL LAW 43–165 (2004).

[5] *See* Peter A. Appel, *Federalism in Environmental Protection*, 23 JUST. SYS. J. 25, 27 (2002).

[6] *See* Cass R. Sunstein, *Of Montreal and Kyoto: A Tale of Two Protocols*, 31 HARV. ENVTL. L. REV. 1, 3–4 (2007).

of the 1989 Montreal Protocol which protected the earth's ozone layer by phasing out production of select halogenated hydrocarbons shown to contribute to ozone depletion.[7] Federal, state, and municipal initiatives followed adoption of the Montreal Protocol such that U.S. consumption of certain ozone-depleting agents covered by the agreement was virtually eliminated within ten years.

By comparison, U.S. sustainable commerce initiatives addressing GHG emission have not followed federal adoption of the 1997 Kyoto Protocol,[8] the major existing international agreement crafted to transition the world's economies from a high-carbon to a low-carbon technology base.[9] The Kyoto Protocol, effective in 2005, was made under the auspices of the 1992 U.N. Framework Convention on Climate Change[10] to reduce fossil fuel and natural resource consumption with the immediate objective of reducing greenhouse gas emissions and their impacts.[11] Over 170 countries and governmental parties have ratified the protocol to date, which required each signatory to monitor and reduce greenhouse gas emissions to protocol-specified levels.[12] To date, however, the U.S. is not a signatory to the agreement and has not adopted federal legislation to implement Kyoto Protocol targets.[13] At the same time, U.S. reaction to Kyoto and its offshoots has not been nugatory; indeed, major U.S. sustainable commerce initiatives have been undertaken, not by the federal government, but by state and local governments or by industrial consortia and organizations.[14]

This Article posits that state and local governments have taken note of the economic development opportunities and competitiveness implications of sustainable commerce initiatives and created initiatives of their own in response to the structural shifts in energy and natural resource use within emissions-intensive industrial, as well as governmental, operations.[15] States

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[7] *Id.* at 9–19.

[8] Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, 37 I.L.M. 22, U.N. Doc FCCC/CP/1997/7/Add.1 [hereinafter Kyoto Protocol].

[9] Sunstein, *supra* note 6, at 23–29.

[10] United Nations Framework Convention on Climate Change, May 9, 1992, S. TREATY DOC. NO. 102-38, 1771 U.N.T.S. 107 [hereinafter UNFCCC].

[11] Kyoto Protocol, *supra* note 8, art. 3.

[12] *See* Kyoto Protocol: Status of Ratification, http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php (follow link under Latest Count) (last visited May 19, 2008).

[13] *Id.*

[14] ESTY & WINSTON, *supra* note 1, at 72.

[15] For information on California's Climate Change Initiatives, see California Climate Change Portal, http://www.climatechange.ca.gov/ (last visited May 19, 2008). For information on New

like California and New Jersey, major cities like Seattle and Albuquerque, small and medium-sized businesses, and even rural governments in north Georgia have formulated sustainable commerce initiatives tailored to control increases in energy and other natural resource costs and to maximize the opportunities for increased state and local revenues and industrial development these structural shifts are expected to achieve.[16] These programs will reduce U.S. reliance on foreign energy sources, create or enhance markets for U.S. goods because they have smaller energy footprints and reduced environmental impacts, and accelerate the conversion of U.S. public and private entities from high-carbon to low-carbon technology and practices.[17]

This Article further posits that in response to adoption of Kyoto Protocol targets by governments and multi-national corporations overseas that comprise significant portions of the global economy as well as global financial markets, businesses and state and local governments in the U.S. are also being driven by necessity to undertake sustainable commerce initiatives.[18] Businesses in the EU and other Kyoto-compliant regions that have implemented sustainable commerce programs now require overseas vendors and suppliers—including those in the U.S.—to implement their own sustainable commerce initiatives as a condition of approved supplier status.[19] New EU environmental regulations developed in part to meet Kyoto-specified emissions targets now prevent many U.S. goods, from electronics to industrial equipment, from being imported into EU countries.[20] State and local governments that are creating economic development proposals to attract overseas business investment to their communities now find sustainable commerce initiatives among the site

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Jersey's Global Warming Initiatives, see State of New Jersey: Global Warming, http://www.state.nj.us/globalwarming/index.shtml (last visited May 19, 2008). For information on Seattle, Washington's Global Warming Initiative, see King County Climate Change, http://dnr.metrokc.gov/dnrp/climate-change/conference-2005.htm (last visited May 19, 2008). For information on Albuquerque, New Mexico's Climate Change Initiatives, see Albuquerque: Stop Global Warming, http://www.cabq.gov/sustainability/green-goals/global-warming/stop-global-warming (last visited May 19, 2008). For information on small and medium-sized business, see ESTY & WINSTON, *supra* note 1, at 72. For information on Catoosa County, Georgia's climate change initiatives, see Randall Franks, *County Set to Cash in Carbon Credits*, CATOOSA COUNTY NEWS, June 19, 2007, *available at* http://news.mywebpal.com/news_tool_v2.cfm?pnpid=724&show=archivedetails&ArchiveID=1282629&om=1.

[16] *See generally* sources cited *supra* note 15.

[17] ESTY & WINSTON, *supra* note 1, at 72.

[18] *See id.* at 72–78.

[19] *Id.*

[20] *Id.* at 1–2 (explaining how EU blocked import of Sony PlayStations because of cadmium content).

selection criteria considered by domestic and foreign firms.[21] U.S. and international financial organizations, including multi-national insurance firms as well as U.S.-based venture capital funds, also include sustainable commerce objectives and targets within their evaluation schemes for areas of the U.S. in which to allocate investment dollars.[22]

This Article examines recent reports in the legal, business, and policy literature highlighting developments within U.S. industry and government in support of these two assertions. Part II reviews the major elements of the Kyoto Protocol and their implementation by business and industry around the world to understand how, absent U.S. implementation of the Kyoto emissions targets, adoption of these elements still drives sustainable commerce initiatives in the U.S. Part III examines how Kyoto Protocol initiatives provide U.S. business and government with policy rationales and guidance for sustainable commerce initiatives. Part IV provides a series of case studies documenting how the Kyoto Protocol, developed and implemented within an international governmental framework, drives the creation and implementation of sustainable commerce initiatives not just in large, industrial areas of the U.S., but also in small rural areas, and how it will continue to do so for decades to come.

II. INTERNATIONAL SUSTAINABLE COMMERCE ACCORDS: MONTREAL PROTOCOL, KYOTO PROTOCOL AND THEIR IMPLEMENTATION TO DATE

Leadership by state and local governments in concert with U.S. industry over key national environmental and natural resource-driven initiatives has been the exception rather than the norm over the past fifty years.[23] As has been well-chronicled in legal academic scholarship, state and local governments, in concert with U.S. corporations and environmental non-governmental organizations, have recently taken the lead to craft both public and private carbon management programs.[24] Traditionally, U.S. environmental protection

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[21] *See* Sustainlane government: Top Five US Cities for Cleantech, http://www.sustainlane.us/articles/cleantech.jsp (last visited May 19, 2008).

[22] ESTY & WINSTON, *supra* note 1, at 90–97.

[23] For a review of the origin and history of U.S. environmental legislation, see LAZARUS, *supra* note 4, at 43–165; see also ZYGMUNT J.B. PLATER ET AL., ENVIRONMENTAL LAW & POLICY: NATURE, LAW, AND SOCIETY 3–41 (3d ed. 2004); US EPA, Laws, Regulations, Guidance and Dockets, http://www.epa.gov/lawsregs/ (last visited May 20, 2008).

[24] *See* Kirsten H. Engel, *Harnessing the Benefits of Dynamic Federalism in Environmental Law*, 56 EMORY L.J. 159, 160 (2006).

and natural resource initiatives start with congressional legislation providing the EPA, the Departments of Commerce, Interior, and Agriculture, as well as other federal agencies with authority to design and implement regulatory programs addressing specific environmental, natural resource, and commerce objectives.[25] Sustainable commerce initiatives in particular, driven in part by international concerns regarding man-made effects on global habitats, ecosystems, and climates, often develop around international agreements and protocols.[26]

A. Montreal Protocol on Substances that Deplete the Ozone Layer

The Montreal Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol), which entered into effect in 1989, is a successful example of such international environmental agreements.[27] The Montreal Protocol was crafted to protect the earth's ozone layer by phasing out production of several groups of halogenated hydrocarbons, including chloroflurocarbons (CFCs), shown to contribute to ozone depletion.[28] Chemists in the 1970s reported CFC molecules could degrade ozone in the earth's upper atmosphere; since stratospheric ozone absorbs ultraviolet radiation reaching the earth's surface, CFC-mediated depletion of the ozone layer was proposed as a threat which would cause increased ultraviolet radiation resulting in a coordinate increased risk of human cancer along with a loss of agricultural production.[29]

In 1976 the U.S. National Academy of Sciences released a report that confirmed the scientific credibility of the ozone depletion hypothesis.[30] Then, in 1985, British government researchers shocked the scientific community with results showing an ozone "hole"—a decline in polar ozone concentrations far larger than previously recognized in the geophysical community.[31] The Montreal Protocol was crafted, under the administrative auspices of the United

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[25] *See supra* notes 4–5.

[26] *See* PLATER ET AL., *supra* note 23, at 1263–70.

[27] Montreal Protocol on Substances that Deplete the Ozone Layer, Sept. 16, 1987, S. TREATY DOC. NO. 100-10, 1522 U.N.T.S. 29.

[28] ESTY & WINSTON, *supra* note 1, at 55–56.

[29] *See id.*

[30] NAT'L RESEARCH COUNCIL, PANEL ON ATMOSPHERIC CHEMISTRY, HALOCARBONS: EFFECTS ON STRATOSPHERIC OZONE (1976).

[31] *See* RICHARD ELLIOT BENEDICK, OZONE DIPLOMACY: NEW DIRECTIONS IN SAFEGUARDING THE PLANET 18–19 (1991); James H. Maxwell & Sanford L. Weiner, *Green Consciousness or Dollar Diplomacy? The British Response to the Threat of Ozone Depletion*, 5 INT'L ENVTL. AFF. 19, 26 (1993).

Nations, by world governments, in concert with various industry sectors and multi-national corporations, to provide timetables for the phasing out and eventual elimination of the harmful substances responsible for ozone depletion.[32] The Multilateral Fund for the Implementation of the Montreal Protocol was established to provide funds for developing countries to phase out the use of ozone-depleting substances[33]—the first financial mechanism created under an international treaty.[34] The Fund, fueled by $2.2 billion in contributions by international governments and parties between 1991–2007, finances conversion of existing manufacturing processes employing ozone-depleting substances.[35] The Montreal Protocol also required that parties base their future decisions regarding the use and production of suspected ozone-depleting chemicals on the current scientific, environmental, technical, and economic information assessable through panels drawn from the worldwide expert communities.[36] Due to its widespread adoption and implementation, the Montreal Protocal has been hailed as an example of exceptional international cooperation; at present, 191 nations—including the U.S.—have become party to the agreement.[37] And since the Montreal Protocol came into effect, the atmospheric concentrations of the most important CFCs and related chlorinated hydrocarbons have either leveled off or decreased.[38]

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[32] For information on the genesis and construction of the Montreal Protocol, see EPA, The 20th Anniversary of the Montreal Protocol On Substances that Deplete the Ozone Layer, http://www.epa.gov/ozone/intpol/ (last visited May 20, 2008).

[33] *See* Sunstein, *supra* note 6, at 17; *see also* Rene Bowser, *History of the Montreal Protocol's Ozone Fund*, 14 INT'L ENV'T REP. 636 (1991).

[34] *See* Multilateral Fund for the Implementation of the Montreal Protocol, About the Multilateral Fund, http://www.multilateralfund.org/about_the_multilateral_fund.htm (last visited May 19, 2008).

[35] *Id.*

[36] *See* Ian H. Rowlands, *The Fourth Meeting of the Parties to the Montreal Protocol: Report and Reflection*, 35 ENV'T 25, 31 (1993), *available at* http://www.ciesin.org/docs/003-077/003-077.html ("As for the future, because the contributions of scientists have been formalized and institutionalized in the documents of the regime, their influence would seem to be assured.").

[37] *See* U.N. Environment Programme, Ozone Secretariat, Status of Ratification, http://ozone.unep.org/Ratification_status (last visited May 19, 2008).

[38] R.G. Derwent et al., *The Impact of the Montreal Protocol on Halocarbon Concentrations in Northern Hemisphere Baseline and European Air Masses at Mace Head, Ireland Over a Ten Year Period from 1987–1996*, 32 ATMOSPHERIC ENV'T 3689, 3700–01 (1998).

B. The Kyoto Protocols

In the case of sustainable commerce, parallel international commitments by business and government to shift from high-carbon, resource-intensive economies to low-carbon, resource-neutral economies have been fueled in part by geophysical, geographical, and environmental science discoveries in the twentieth century.[39] That research details mankind's effects on global habitats, ecosystems and climates; the environmental and health effects from mining and other natural resource extractions processes; the long term effects on marine habitats from coastal development and marine pollution; and the unsustainable rate of growth in world energy and food consumption demands.[40] Global warming—a recent warming of the Earth's lower atmosphere—is believed to be the result of an enhanced greenhouse effect due to increased concentrations of greenhouse gases in the atmosphere.[41]

In response to international concerns surrounding the effects of global climate change, the Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) was adopted in 1997 and requires most industrialized signatory nations to comply with reductions in greenhouse gas emissions.[42] The UNFCCC is an international environmental treaty, to which the U.S. is a signatory, and was produced at the United Nations Conference on Environment and Development (known as the Earth Summit) in 1992.[43] The UNFCCC treaty targeted creation of an ongoing process to stabilize greenhouse gas emissions "at a level that would prevent dangerous anthropogenic interference with the climate system" and thereby mitigate climatic and other geophysical impacts of fossil fuel and natural resource consumption.[44] The treaty required stabilization "within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."[45] The UNFCCC set no limits on greenhouse gas emissions for specific nations and did not contain legally binding

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[39] *See generally* sources cited *supra* note 15.

[40] *See generally* sources cited *supra* note 15; *see also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007—SYNTHESIS REPORT 44–54 (2007), *available at* http://www.ipcc.ch/ipccreports/ar4-syr.htm.

[41] *See* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, *supra* note 40, at 36–41.

[42] Kyoto Protocol, *supra* note 8.

[43] UNFCCC, *supra* note 10.

[44] *Id.* art. 2.

[45] *Id.*

enforcement provisions.[46] Instead, the treaty was designed around an ongoing series of update agreements (termed "protocols") by signatory nations to establish enforceable, mandatory emission limits.[47]

The Kyoto Protocol is the principal update, and the most well known, of the UNFCCC agreements. It created mandated emission reduction obligations and strengthened the commitments of the 1992 UNFCCC Convention by setting out a firm schedule for reductions of greenhouse gas (GHG) emissions by developed countries and firm targets to be met within an agreed commitment period (2008–2012).[48] The Kyoto Protocol called for most developed countries to reduce their GHG emissions by an average of 5% from 1990 levels.[49] Specific national targets ranged from those for Iceland and Australia (which enabled them to increase their emissions from 1990 base levels by 10% and 8% respectively) to those for EU Member States which detailed an approximate 8% reduction from 1990 levels.[50]

An innovative aspect of the Kyoto Protocol is the use of flexible market mechanisms by which developed countries can immediately achieve their Kyoto-defined obligations.[51] Within the treaty, Kyoto signatories are permitted to achieve some portion of required emission reductions through the use of contract mechanisms and economic instruments to purchase GHG emission reduction capacity from other locations to offset Kyoto-defined GHG reduction targets.[52] The underlying logic of this treaty element was that marginal abatement costs—the costs of achieving emission reductions—are higher in energy efficient, industrialized economies as compared to similar costs in developing or transition economies with less energy-efficient infrastructure.[53] Since global climates and ecosystems benefit from fossil fuel emission reductions regardless of location, "tradable" emission reductions enable developed countries to rapidly achieve short-term, Kyoto-defined emission reductions at lower cost and thereby increases Kyoto target

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[46] *See* Sunstein, *supra* note 6, at 24.

[47] *Id.* at 24–25.

[48] Kyoto Protocol, *supra* note 8; *see also* Sunstein, *supra* note 6, at 26.

[49] *See* Sunstein, *supra* note 6, at 26.

[50] *Id.* at 26–27.

[51] *See* U.N. Framework Convention on Climate Change, Emissions Trading, http://unfccc.int/kyoto_protocol/mechanisms/emissions_trading/items/2731.php (last visited May 19, 2008).

[52] *Id.*

[53] David Freestone, *The UN Framework Convention on Climate Change, the Kyoto Protocol, and the Kyoto Mechanisms*, *in* LEGAL ASPECTS OF IMPLEMENTING THE KYOTO PROTOCOL MECHANISMS: MAKING KYOTO WORK 3, 11 (David Freestone & Charlotte Streck eds., 2005).

compliance.[54] At the same time, framers of this Kyoto program anticipated such tradable emission markets could also help developed countries introduce low-emission technologies to less developed nations and areas of the world.[55]

The Kyoto Protocol, and its subsequent refinements, specifically detail three elements fostering emissions trading to achieve Kyoto emissions targets.[56] Under Kyoto Article 6, major developed countries can transfer to, and acquire from, other major developed countries emission reduction units (ERUs) achieved by specific projects, additional to those projects already commenced, that reduce global greenhouse gas concentrations or reduce fossil fuel-combustion emissions.[57] In addition to country-to-country ERU transactions, Article 6 also encourages private sector and international organizations (such as the World Bank) to assist financing and organizing these projects.[58] Kyoto Article 12—termed the "Clean Development Mechanism" (CDM)—specified that developed countries can receive credit for financing emission reductions in developing countries.[59] CDM programs encourage investments in low-carbon technologies within developing economies while broadening candidate emission reduction programs available to developed Kyoto signatories.[60] Article 12 CDM programs will beneficially impact the global climate and ecosystems by encouraging low-carbon technology growth in the developing economies—particularly India and China—where much of the future GHG emissions will occur.[61]

Under Kyoto Article 17, assigned amount units (AAUs)—the quantity of GHGs a signatory country can release into the atmosphere—can be traded among specified developed countries.[62] Trading in GHG emission rights under Article 17 forms the basis of global emissions trading systems which enables specified developed countries to comply with their Kyoto emission reduction obligations during the first years of the agreement.[63] Article 17 emissions

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[54] *Id.*

[55] *Id.*

[56] *Id.*

[57] *Id.* at 11–12.

[58] *Id.* at 12.

[59] Kyoto Protocol, *supra* note 8, art. 12; *see also* Freestone, *supra* note 53, at 13.

[60] Freestone, *supra* note 53, at 13.

[61] David Freestone & Charlotte Streck, *The Challenges of Implementing the Kyoto Mechanisms*, 2 ENVT'L LIABILITY 47, 50 (2007).

[62] Kyoto Protocol, *supra* note 8, art. 17; *see generally* Rutger de Witt Wijnen, *Emissions Trading Under Article 17 of the Kyoto Protocol*, *in* LEGAL ASPECTS OF IMPLEMENTING THE KYOTO PROTOCOL MECHANISMS: MAKING KYOTO WORK, *supra* note 53, at 403, 409.

[63] *See* Wijnen, *supra* note 62, at 409.

trading has been one of the best developed elements of the Kyoto Protocol to date.[64] Australia, the UK, and Denmark followed the EU and implemented emission trading systems.[65] In the United States, Northeastern states, as well as California and Pacific coast states, have also adopted this model, even though Kyoto agreement provisions are not binding on the U.S.[66]

Carbon markets created in direct response to the Kyoto Protocol have evolved into numerous successful regional and national emission trading schemes.[67] With the EU Emission Trading Scheme, a main driver of global carbon markets, trade of emission credits for greenhouse gasses is now valued at billions of dollars each year.[68] Kyoto-driven emission trading schemes have further caused multinational industries to internalize and integrate GHG emissions prices into corporate operations at every level.[69] Trading in carbon credits, allowances, and emission rights has become a key element of corporate GHG emissions management for most major industrial facilities since it is the key management mechanism of an international emission protocol applicable to both developed and developing economies.[70] The various flexible mechanisms of the Kyoto Protocol are the best recognized carbon trading mechanisms implemented worldwide and they serve as models for other climate-related markets and initiatives in both developed and developing countries.[71] Such markets hold great promise as tools for sustaining long-term

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[64] *Id.*

[65] *See* SEC'Y OF STATE FOR THE ENVIRON., FOOD AND RURAL AFFAIRS, CLIMATE CHANGE: THE UK PROGRAMME, 2006, Cm. 6764, *available at* http://www.defra.gov.uk/environment/climatechange/uk/ukccp/pdf/ukccp06-all.pdf; Australian Emissions Trading Systems (ETS), http://www.greenhouse.gov.au/emissionstrading/index.html (last visited May 19, 2008); The European Co2 Emission Allowance in Denmark, http://www.ens.dk/sw17278.asp (last visited May 19, 2008).

[66] *See* Regional Greenhouse Gas Initiative, http://www.rggi.org/ (last visited May 21, 2008); *see also* Regional Initiatives: PEW Center on Global Climate Change, http://www.pewclimate.org/what_s_being_done/in_the_states/regional_initiatives.cfm (last visited May 21, 2008).

[67] *See* Chicago Climate Exchange, Key Features, http://www.chicagoclimatex.com/content.jsf?id=25 (last visited May 21, 2008); Peter L. Gray & Geraldine E. Evans, *Carbon Accounting: A Practical Guide for Lawyers*, 22 NAT'L RESOURCES & ENV'T 41 (2008).

[68] *See* European Climate Exchange, About ECX, http://www.europeanclimateexchange.com/default_flash.asp (last visited May 21, 2008).

[69] *See* ESTY & WINSTON, *supra* note 1, at 215 (discussing programs at BP and Shell).

[70] *See* Daniel Bodansky, *International Sectoral Agreements in a Post-2012 Climate Framework* (Pew Ctr. on Global Climate Change, Working Paper, 2007), *available at* http://www.pewclimate.org/docUploads/International%20Sectoral%20Aggreements%20in%20a%20Post-2012%20Climate%20Framework.pdf.

[71] *See* Freestone & Streck, *supra* note 61, at 55.

reduction of GHG emissions. The success of these carbon markets will be judged by how effectively they help developed and developing countries to lower GHG emissions, to decarbonize world economies, and to achieve evolving sustainable commerce objectives and targets.[72]

III. POLICY RATIONALE AND GUIDANCE FOR SUSTAINABLE COMMERCE INITIATIVES BY STATE AND LOCAL GOVERNMENTS

State leadership in U.S. environmental issues has been a common undercurrent in the evolution of environmental common and statutory law over the past two hundred years.[73] In a frequently quoted dissent, Justice Brandeis wrote: "It is one of the happy incidents of the federal system that a single courageous State may, if its citizens choose, serve as a laboratory; and try novel social and economic experiments without risk to the rest of the country."[74] Results from state laboratories that address environmental initiatives have repeatedly generated effective models for later federal legislation governing the United States's national response to specific environmental problems. Water quality regulations by the interstate Delaware River Basin Commission provided an initial template for a model for federal regulations implemented within the Clean Water Act.[75] California state air regulations provided not only substance but also legal framework employed in the construction of the Clean Air Act.[76] Hazardous site remediation programs established by New Jersey were employed by New Jersey congressman Jim Florio as he chaired the House Committee which drafted the bill later enacted as the federal Comprehensive Environmental Response Compensation and Liability Act.[77]

Targeted local and state programs have similarly evolved to address environmental issues which transcend state and national boundaries.[78] Such local and state environmental programs have been created in some

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[72] *Id.*

[73] *See* Alexandra B. Klass, *Common Law and Federalism in the Age of the Regulatory State*, 92 IOWA L. REV. 545, 567 (2007).

[74] New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting).

[75] *See* Robert B. McKinstry, Jr. & Thomas D. Peterson, *The Implications of the New "Old" Federalism in Climate-Change Legislation: How to Function in a Global Marketplace When States Take the Lead*, 20 PAC.-MCGEORGE GLOBAL BUS. & DEV. L.J. 61, 67 (2007).

[76] *Id.*

[77] *Id.*

[78] *See* Engel, *supra* note 24, at 168.

circumstances where the federal government, traditionally having exclusive jurisdiction over this area of law, has not adopted programs to address specific trans-boundary environmental issues.[79] Despite such concerns, many local and state governments are responding to the lack of federal legislation on climate change by establishing their own programs to control emissions of GHGs by both government and industry; these local government responses have been married to an ever-growing number of industrial initiatives recognizing the need to control facility emissions.[80] The legal and policy based literature continues to chronicle the efficacy of state and local governments, in concert with U.S. corporations and environmental non-governmental organizations, in crafting both public and private carbon management programs.[81] It should be noted that states have often pursued an environmental agenda through litigation instead of direct regulation.[82]

Sustainable commerce initiatives by government agencies to date have prioritized cost-effective deployment of existing energy technologies—including wind, solar, and wave power—which can immediately improve U.S. energy efficiency and reduce climate change related emissions in the near-term while new technologies are developed.[83] Governmental policy studies, supported by research within the legal academy, predict the most efficient and powerful way to stimulate private investment in research, development, and deployment of sustainable commerce initiatives is to adopt policies establishing a market value for energy-related emissions over the long-term.[84] Rapid advancement and deployment of breakthrough sustainable commerce initiatives identified by industry and legal researchers to date should include not only policies to promote significant research, development and deployment of hyper-energy efficient end user commercial, industrial, and consumer technologies, but also life cycle assessment driven design and development of all consumer products.[85] Recent government

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[79] *Id.*

[80] *Id.*

[81] Kirsten H. Engel, *Harmonizing Regulatory and Litigation Approaches to Climate Change Mitigation: Incorporating Tradable Emissions Offsets into Common Law Remedies*, 155 U. PA. L. REV. 1563, 1579–93 (2007).

[82] *See* Massachusetts v. EPA, 127 S. Ct. 1438 (2007); *see also* Georgia v. Tenn. Copper Co., 206 U.S. 230 (1907).

[83] *See generally* sources cited *supra* note 15.

[84] *See* Engel, *supra* note 81, at 1579–93.

[85] For details on life cycle analysis and its role in sustainable commerce, see EPA, Product Stewardship, http://www.epa.gov/epr (last visited June 17, 2008).

programs have also focused their attention on the development of available carbon capture and storage technology, an area of development of particular importance for any future programs in clean coal technology development.[86] In industrial and governmental sectors that are insensitive to price signals and that face market barriers to sustainable commerce, policy studies have proposed sector-by-sector specific policies to create incubator markets fostering sustainable commerce initiatives.[87] Recent state and local legislation initiatives have begun to align financial and regulatory public policy with the business interests of energy utilities to aggressively implement energy programs which couple utility sales and revenues with sustainable commerce benchmarks. Such initiatives encourage utilities to pursue a wide spectrum of diversified, cost-effective energy efficient and sustainable energy programs.[88] For example, local and state governments, led by California's consumer appliance standards, have enacted stronger energy efficiency and materials recyclability requirements for equipment, appliances, and building materials along with tax incentive programs which advance low-carbon residential infrastructure.[89]

State and local governments have taken note of the resource costs, as well as the competitiveness implications, of these ongoing structural shifts in state and local sustainable commerce policy.[90] Sustainable commerce initiatives can take one of two forms. The first includes mandatory approaches to reduce fossil fuel emissions from large stationary sources, from transportation, and from energy use in commercial and residential buildings.[91] These reductions and goals tend to be phased in over time with a short- and long-term timeframe.[92] The second form of these initiatives focuses on flexible approaches to establish a price signal for energy emissions and natural resource utilization that may vary by economic sector, and includes market-based incentives, performance standards, cap-and-trade programs, and tax

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[86] For information on U.S. Federal carbon sequestration programs, see National Energy Technology Laboratory, Technologies, Carbon Sequenstration, http://www.netl.doe.gov/technologies/carbon_seq/index.html (last visited May 21, 2008).

[87] U.S. CLIMATE ACTION PARTNERSHIP, A CALL TO ACTION: CONSENSUS PRINCIPLES AND RECOMMENDATIONS 5 (2007) [hereinafter U.S. CLIMATE ACTION PARTNERSHIP], *available at* http://www.us-cap.org/USCAPCallForAction.pdf.

[88] *See* sources cited *supra* note 15.

[89] *See* sources cited *supra* note 15.

[90] *See* sources cited *supra* note 15.

[91] U.S. CLIMATE ACTION PARTNERSHIP, *supra* note 87, at 3.

[92] *Id.*

incentives to engender targeted technology research, development, and deployment programs.[93]

A. Legal and Policy Foundations for Sustainable Commerce Initiatives by Local Governments and Industry

As noted above, the U.S. Constitution creates a system of overlapping responsibilities balanced between the federal government and the individual states allowing states to function as laboratories of experimentation for new policy initiatives.[94] The federal government has the primary responsibility for international and interstate relations, especially where commerce is involved;[95] states enjoy primary authority over local matters such as marriage and child custody.[96] Obviously, these two areas often overlap considerably, and the Constitution prevents many conflicts from occurring by prohibiting some actions by the states[97] and makes general provision for all other conflicts in the Supremacy Clause.[98]

The primary area of overlap between the federal government and the states is in the regulation of commercial activities. As interpreted by the Supreme Court, the states have leeway to govern economic activities unless the federal government takes charge of the area through preemptive legislation.[99] Some areas of commerce are so intertwined with interstate or foreign relations that,

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[93] *Id.*

[94] *See* New State Ice Co. v. Liebmann, 285 U.S. 262, 311 (1932) (Brandeis, J., dissenting). *New State Ice* involved a licensing scheme for ice manufacturers, which the majority held to be unconstitutional. *See id.* at 278–80.

[95] *See* U.S. CONST. art. I, § 8, cl. 3 (granting to Congress authority "[t]o regulate Commerce with foreign Nations, and among the several States . . .").

[96] *See, e.g.*, United States v. Morrison, 529 U.S. 598, 616 (2000); United States v. Lopez, 514 U.S. 549, 564 (1995). The Court has also suggested in *dicta* that land use regulation falls within this area of presumptive state governance. *See* Rapanos v. United States, 547 U.S. 715, 738 (2006) (plurality opinion) ("Regulation of land use, as through the issuance of the development permits sought by petitioners in both of these cases, is a quintessential state and local power."); Solid Waste Agency of N. Cook County v. U.S. Army Corps of Eng'rs, 531 U.S. 159, 174 (2001).

[97] *See, e.g.*, U.S. CONST. art. 1, § 10, cls. 1–3.

[98] U.S. CONST. art. VI, § 2 ("This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding.").

[99] Am. Ins. Ass'n v. Garamendi, 539 U.S. 396, 413 (2003).

by virtue of the so-called Dormant or Negative Commerce Clause, the states are precluded from acting without express congressional consent.[100] By and large, however, the constitutional limitations focus on the exact strategies that states employ to achieve their ends rather than those ends themselves.[101] Provided that a state can prove a nexus between the end to be regulated and the health, welfare, economy, or morals of the state, Supreme Court precedent usually provides the state some means of pursuing that goal absent express or implied federal interference or some other bar.[102] The federalism debate is thus often a political debate rather than an issue for judicial resolution because Congress can often answer the question of which government has authority to regulate a particular activity.

Because of this political reality, the states often have a considerable range of potential actions that they can undertake, especially if they are creative in how they approach a particular problem. As an example of the seemingly disparate outcomes in this area, states generally cannot tax an out-of-state product to raise its price in comparison to locally produced goods; states can, however, subsidize local goods to lower their price in comparison to out-of-state goods.[103] Similarly, although states cannot conduct their own foreign policy, states can respond to overseas influences and realities in concocting

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[100] On the dormant foreign commerce clause, see *id.* ("There is, of course, no question that at some point an exercise of state power that touches on foreign relations must yield to the National Government's policy, given the 'concern for uniformity in this country's dealings with foreign nations' that animated the Constitution's allocation of the foreign relations power to the National Government in the first place." (quoting Banco Nacional de Cuba v. Sabbatino, 376 U.S. 398, 427 (1964)).

[101] *See id.* at 419–20.

[102] *See* United Haulers Ass'n v. Oneida-Herkimer Solid Waste Mgmt. Auth., 127 S. Ct. 1786, 1795 (2007) (upholding ordinance requiring disposal of waste in government-owned facility); Metro. Life Ins. Co. v. Massachusetts, 471 U.S. 724, 756 (1985) (upholding insurance mandated for private employees); *see also* 1 LAURENCE H. TRIBE, AMERICAN CONSTITUTIONAL LAW 1100 (3d ed. 2000) ("State regulations seemingly aimed at furthering pubic health or safety, or at restraining fraudulent or otherwise unfair trade practices, are less likely to be perceived as 'undue burdens on interstate commerce' than are state regulations evidently seeking to maximize the profits of local businesses or the purchasing power of local consumers.").

[103] *See* Dan T. Coenen, *Business Subsidies and the Dormant Commerce Clause*, 107 YALE L.J. 965, 967–68 (1998). To see the narrow distinctions in the Court's Commerce Clause jurisprudence directly affecting waste disposal, *compare United Haulers Ass'n v. Oneida-Herkimer Solid Waste Mgmt. Auth.*, 127 S. Ct. 1786 (2007) (upholding flow control ordinance requiring disposal in publicly owned facility), *with C & A Carbone, Inc. v. Clarkstown*, 511 U.S. 383 (1994) (invalidating as unconstitutional flow control ordinance requiring disposal in privately owned facility).

state policy, which would appear to extend to making determinations about particular products for the state's own use (unless such action is expressly barred by federal action).[104] These observations point out key legal and policy issues which must be addressed by state and local governments as they craft legislative initiatives to address geophysical, ecological, and climatic impacts of high carbon technology and energy systems in the absence of comprehensive and preemptive federal legislation.

Legal and policy analysts have begun to examine the nexus between sustainable commerce initiatives by state and local governments as compared to the proffered environmental benefits in these same areas.[105] Opponents of state and local sustainable commerce initiatives have maintained not only that minimal environmental benefits will be realized by affected citizens who bear all associated economic costs, but also that any environmental benefits achieved by local and state sustainable commerce initiatives are neutered by the absence of parallel programs in growing industrial economies such as China and India.[106] Challengers also argue that a definitive nexus should exist between implementation of specific sustainable commerce initiatives with specific environmental benefits to local and state citizenry.[107]

The effects on the public welfare of state and local sustainable commerce initiatives, however, extend far beyond simple climate- or energy-based metrics.[108] Sustainable commerce initiatives by both government and industry

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[104] This conclusion is drawn from the Court's jurisprudence creating the "market participant exception" to the Dormant Commerce Clause. *See* TRIBE, *supra* note 102, at 1088–95. To be sure, the Court has held that Congress can preempt such state action through express legislation. *See* Crosby v. Nat'l Foreign Trade Council, 530 U.S. 363, 373 n.7 (2000); Wisc. Dep't of Indus., Labor & Human Relations v. Gould, Inc., 475 U.S. 282, 289–90 (1986).

[105] *See* Kirsten Engel, *State and Local Climate Change Initiatives: What Is Motivating State and Local Governments to Address a Global Problem and What Does This Say About Federalism and Environmental Law?*, 38 URB. LAW. 1015, 1028 (2006) ("The activity at the state and local level seems to be driven by the prospect of local economic benefits, political opportunism, and genuine concern that some government response to climate change should be forthcoming in the absence of strong federal leadership.").

[106] *See* Okeson v. City of Seattle, 150 P.3d 556, 564 (Wash. 2007); *see also* MAYOR NICKEL'S GREEN RIBBON COMM'N ON CLIMATE PROTECTION, SEATTLE, A CLIMATE OF CHANGE: MEETING THE KYOTO CHALLENGE 3–4 (2006), *available at* http://www.seattle.gov/climate/PDF/SeattleaClimateReport.pdf.

[107] *See Okeson*, 150 P.3d at 564.

[108] For examples of local economic effects that sustainable commerce initiatives can produce, see NICHOLAS STERN, STERN REVIEW: THE ECONOMICS OF CLIMATE CHANGE 273 (2006) [hereinafter STERN REVIEW].

over the last five years have evolved well beyond global warming concerns.[109] These initiatives are fueled by market-driven forces recognizing that continued economic expansion can only be sustained, in the presence of increasing world population and accelerating natural resource utilization, by a rapid shift towards sustainable governmental and corporate operations which take into account all the environmental, ecosystem, climatic, and natural resource impacts.[110] These global market forces continue to shape numerous aspects of governmental and corporate functions including the availability, access, and pricing of capital to both government and industry and the selection of sites for new business operation and facilities.[111] In addition, industries within numerous business sectors are reporting these same global market forces now influence the conception, design, manufacturing, and distribution of new products and services as well as the development and installation of new, low-carbon technology replacements for energy production, manufacturing, and transportation systems.[112]

Economic development, including job creation initiatives, is a long-standing, judicially recognized rationale for development and implementation of local and state environmental programs.[113] Analysis of the various market-based foundations for sustainable commerce initiatives can prove useful to local and state governmental and industry leaders as they craft needed legal and regulatory infrastructure addressing sustainable commerce objectives and targets; such initiatives directly impact state and local economic growth, natural resources management, workforce development, and industrial infrastructure development.[114] Understanding these local and state impacts provides valuable guidance for government and corporate leaders to craft the most effective means to achieve sustainable commerce goals with an eye towards policy—as well as judicial—scrutiny of the rationale and means chosen.[115]

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[109] *See id.*

[110] *See generally id.* at 269–81.

[111] *Id.*

[112] *Id.*

[113] *See* Kelo v. City of New London, 545 U.S. 469, 484 (2005) ("Promoting economic development is a traditional and long accepted function of government.").

[114] *See generally* sources cited *supra* note 15.

[115] *See generally* sources cited *supra* note 15.

1. Foundation One: Transition to a Low-Emissions Economy Creates New Economic Opportunities Across a Wide Range of American Industries, Services, Geographical Areas, and Sectors of the Workforce

Market estimates portend sales of low-carbon technologies and products will total over $500 billion per year by 2050.[116] Not surprisingly, cities, states, regions, industries, and corporations are actively formulating programs to position themselves to take advantage of these new market opportunities.[117] Some local and state governments view market growth in low-carbon technologies and products as foundations for future business and industrial growth supporting enhanced tax revenues to fund a wide range of initiatives including transportation and utility infrastructure.[118] Local and state governmental agencies also envision sustainable commerce initiatives as a catalyst creating job growth for unskilled and semi-skilled workers for whom job and wage growth has lagged significantly in comparison to the skilled and white collar workforce over the past decade.[119] Skilled workforce development is also anticipated to be enhanced by sustainable commerce initiatives among workers displaced by the loss of U.S. manufacturing jobs to China, India, and other traditionally lower-wage overseas economies.[120] Policy analysts note some carbon-intensive energy and manufacturing industries will be challenged by shifts to a low-carbon economy, but also point out that many other industrial sectors will see global market growth.[121] Significant investments in low-carbon energy, manufacturing, and service technologies continue to create new market opportunities across numerous industry sectors; these market impacts are producing disproportionate opportunities for economic growth in rural areas of the country not dominated by high-technology, heavy manufacturing, chemical and petrochemical, or biotechnology and biomedical industries.[122] Current estimates of the existing market size for renewable energy generation products alone is estimated at $38 billion providing

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[116] *See* STERN REVIEW, *supra* note 108, at 272.

[117] *See generally* Edna Sussman, *Reshaping Municipal and County Laws to Foster Green Building, Energy Efficiency, and Renewable Energy*, 16 N.Y.U. ENVTL. L.J. 1 (2008) (giving an overview of some state and local actions to take advantage of these opportunities).

[118] *See* STERN REVIEW, *supra* note 108, at 272.

[119] *Id.*

[120] *Id.*

[121] *Id.*

[122] *See Wood-based Ethanol Plant Slated for Georgia*, RENEWABLE ENERGY WORLD.COM ONLINE, Feb. 8, 2007, http://www.renewableenergyaccess.com/rea/news/story?id=47371.

employment opportunities for over 1.7 million people.[123] Market capitalization of solar power related businesses is now reported to have grown to over $27 billion through the end of 2006.[124] Analysis of ongoing growth in biofuels consumption is estimated to continue at over 15% per year, creating a total market size in excess of $15 billion.[125]

Regional governmental organizations promoting sustainable commerce initiatives are also now a significant market driver for low-carbon energy technology, equipment and construction.[126] Joint government and corporate promotion of new low-carbon industries based on energy security concerns is also expected to strengthen demand for low-carbon technology infrastructure for the next fifty years.[127] One informed estimate of the future market for low-carbon energy technologies, the International Energy Agency's (IEA) Technology Perspective's report, is often cited by government and industry planning groups; IEA studies have evaluated total investments required to support low-carbon power generation technologies following a market scenario where total energy-related greenhouse gas and carbon emissions are reduced to current levels by 2050.[128] IEA's reports estimate cumulative investments in low-carbon technologies by 2050 could total over $13 trillion, accounting for over 60% of all power generation by the middle of the century;[129] other industry scenarios report long-term investment in low-carbon power generation could total even higher levels of investment.[130] Oil industry studies report global markets for emissions reductions could total $1 trillion cumulatively through 2012.[131] Such large financial and infrastructure shifts towards low-carbon technologies are being accompanied by equally significant shifts in U.S. workforce and labor needs.[132] If the number of jobs related to low-carbon technologies rise from the current level of 1.7 million workers in line with these projected investments, over 25 million people could be working in low-carbon related businesses worldwide by the year 2050.[133]

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[123] *See* STERN REVIEW, *supra* note 108, at 270.

[124] *Id.*

[125] *Id. See also* JOEL MAKOWER, STATE OF GREEN BUSINESS 2008, at 6, 16 (2008).

[126] *See, e.g.*, Regional Greenhouse Gas Initiative, About RGGI, http://www.rggi.org/about.htm (last visited May 21, 2008).

[127] *See* STERN REVIEW, *supra* note 108, at 270.

[128] *See id.*

[129] *Id.*

[130] *Id.*

[131] *Id.*

[132] *Id.*

[133] *Id.*

2. Foundation Two: Financial Markets are Creating New Security Instruments Which Provide New Capital Sources

Over the past five years, new financial instruments have been created to provide targeted capital sources to support low-carbon technology implementation.[134] These include not only carbon trading systems, but also sustainable commerce-directed venture capital funds and insurance underwriting programs.[135] Carbon credit transactions already provide new revenue resources for small, rural city and county governments to support improved infrastructure development as well as improved environmental performance.[136] Local and state governments as well as corporations now include in their planning and implementation activities consideration of how their capital and investment sources factor sustainable development commitments into their investment decisions.[137] Local and regional energy utilities include sustainable commerce objectives and targets into their operational planning in order to access long-term financing both to purchase new low-carbon technology as well as to retrofit existing facilities to fulfill future demands for low-carbon energy supplies.[138]

Access to regional, national, and international investment resources will specifically enhance local and state market opportunities for small, start-up low carbon technology enterprises.[139] Specialty venture capital funds now provide new low-carbon energy firms with access to dedicated capital resources in the form of venture capital and long term investment financing.[140] Recent reports on venture financing in the U.S., Europe, and Japan establish that low-carbon, "clean" technology investment has moved beyond niche investment status, becoming the third largest category of U.S. venture capital investment during 2006.[141] Multi-national insurance and re-insurance firms, realizing broad investment opportunities with low-carbon technology implementation, are also supplying capital funding to underwrite technology investments which address increased infrastructure risks caused by extreme climate events; insurance and risk management firms are also creating new

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[134] *See* MAKOWER, *supra* note 125, at 26.
[135] *Id.*; *see also* STERN REVIEW, *supra* note 108, at 271.
[136] *See generally* sources cited *supra* note 15.
[137] *See* JOEL MAKOWER ET AL., CLEAN ENERGY TREND 2008, at 10–11 (2008).
[138] *Id.* at 5–6.
[139] *See* MAKOWER, *supra* note 125, at 26–27.
[140] *See id.* at 26.
[141] *Id.* at 26–28.

climate-driven insurance products available to both industry and government.[142] Carbon trading markets, discussed in detail *infra*, present new financial resources available for local and state low-carbon technology investments totaling over $10 billion per year.[143] Financial industry reports project that carbon markets supporting low-carbon technology implementation could grow over 200% through 2012.[144]

Local and state government sustainable commerce initiatives, targeting future market growth in low-carbon technologies, are attracting investment from clean energy, low-carbon technology markets.[145] States with abundant natural resources as well as strong transportation infrastructures will attract investments dedicated to building new infrastructure elements that support low-carbon technology growth.[146] States with established scientific and technical expertise are attracting significant investment to support basic and applied research for development of new low-carbon technologies.[147] Not surprisingly, local and state sustainable commerce initiatives now include financial resources for start-up firms which commercialize promising new low-carbon technologies. These financial resources target firms at the developmental stage to sustain the commercial potential and employment base of these firms.[148] Sustainable commerce initiatives in California are fueled in part by economic studies projecting that as international initiatives to curb greenhouse gas emissions increase, significant competitive market advantages will be created for California low-carbon technology firms to become globally-dominant industries.[149] Studies estimate the state's initial low-carbon technology investments could increase gross state product by $60 billion and

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[142] *See* Christina Ross et al., *Limiting Liability in the Greenhouse: Insurance Risk-Management Strategies in the Context of Global Climate Change*, 26A STAN. ENVTL. L.J. 251 (2007).

[143] *See* STERN REVIEW, *supra* note 108, at 271.

[144] *Id.*

[145] MAKOWER ET AL., *supra* note 137, at 10–11.

[146] *Id.*

[147] STERN REVIEW, *supra* note 108, at 272.

[148] *See* Steven R. Schiller, Implications of Defining and Achieving California's 80% Greenhouse Gas Reduction Goal, *available at* http://www.climatechange.ca.gov/events/2007_conference/presentations/2007-09-13/2007-09-13_SCHILLER_STEVEN.PDF (last visited June 17, 2008); *see also* Tom Kerr, Effective Strategies for Climate Risk Mitigation, *available at* http://www.climatechange.ca.gov/events/2005-02-23_enbanc_cpuc/presentations/2005-02-23_EN-BANC_PANEL3_KERR_USEPA.PPT (last visited June 17, 2008).

[149] *See* Schiller, *supra* note 148.

create over 20,000 new jobs divided across all work force skill sets by the year 2020.[150]

3. Foundation Three: Sustainable Commerce Continues to Provide Opportunities for Permanent Reductions in Government and Business Costs Through Energy and Natural Resource Savings, Operational Efficiencies, and Process and Product Innovation

Local and state governments, in concert with business and industry groups, are employing sustainable commerce initiatives to isolate operational inefficiencies in energy and natural resource use as well as product manufacturing and distribution.[151] These sustainable commerce initiatives to date include re-examination of tax and other governmental subsidies which introduce inefficiencies in energy generation, product manufacture, and transportation systems. Once these taxes and subsidies are removed, improvements in government and industry operations are expected to create immediate cost-advantages for goods and services within both public and private markets.[152] Multi-national corporations report tens of billions of dollars in annual cost savings from sustainable commerce initiatives.[153] For example, BASF reduced greenhouse emissions by 38% between 1990 and 2002 through a series of process changes and efficiency measures thereby cutting annual operational costs by €500 million at one facility alone.[154] British Petroleum established corporate targets to reduce greenhouse gas emissions by 10% of reported 1990 levels by the year 2010.[155] This target achieved over $650 million in net present value savings to the company through increased operational efficiency and improved energy management.[156] BP reports allocation of over $350 million per year in new investment capital specifically for low-carbon technology implementation from the years 2004–2010.[157]

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[150] *See id.*
[151] STERN REVIEW, *supra* note 108, at 269, 274.
[152] *See generally* sources cited *supra* note 15.
[153] *See* STERN REVIEW, *supra* note 108, at 271.
[154] *See id.* at 273.
[155] *See id.*
[156] *See id.*
[157] *See id.*

4. Foundation Four: Sustainable Commerce Initiatives Provide Regulatory Tools to Enhance Energy Security and Environmental Protection by Reducing Structural Energy and Natural Resource Costs

Energy security—including stable wholesale energy costs and dependable energy supplies—is an important economic resource for local and state economies and their constituent businesses and industries.[158] Energy security is often framed in terms of geopolitical risks of physical interruption of energy supplies; however a broader definition of energy security for local and state economies encompasses secure, reliable, consistent, and competitive energy supplies.[159] It is not a coincidence that California is at the forefront of sustainable commerce initiatives including low-carbon energy production.[160] California sustainable commerce initiatives often cite the severe disruption of the state's economy in the 1990s—created by energy market speculation engineered by out-of-state energy brokers—as a major driver for allocating state financial and programmatic resources towards implementation of low-carbon energy technology systems to power California cities and industries.[161] California, Washington, and other states look forward to meeting a number of long-term energy security objectives by implementing aggressive sustainable commerce initiatives; these energy and security objectives include not only promoting energy and natural resource efficiency, but also reducing peak energy demand, along with lowering economic stress from changes in national and global energy prices.[162]

Established U.S. manufacturing industries, particularly the automotive and petrochemical industries, have struggled to transition their established, high-carbon technology facilities—operating at relatively low energy efficiency—to facilities equipped with energy efficient, low-carbon technology; sustainable commerce initiatives provide local and state governments with means to assist the transition of these industries to lower cost, sustainable energy profiles.[163]

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[158] *See* Barry G. Rabe et al., *State Competition as a Source Driving Climate Change Mitigation*, 14 N.Y.U. ENVTL. L.J. 1, 28–29 (2005).

[159] For complete information on California Sustainable Commerce initiatives, see California Climate Change Portal, http://www.climatechange.ca.gov/ (last visited May 22, 2008).

[160] *Id.*

[161] *See* Tim Duane, Institutions and Climate Change: Lessons from the California Energy Crisis in 2000–2001, Feb. 7, 2002, *available at* http://www.climatechange.ca.gov/events/2002-02-15_PRESENTATIONS/Institutions_Policy.ppt.

[162] *See generally* sources cited *supra* note 15.

[163] *See generally* sources cited *supra* note 15. *See also* Sussman, *supra* note 117.

Sustainable commerce initiatives also provide local and state governments with new opportunities to better address legacy air pollution problems caused by older, high-carbon manufacturing installations coupled with car-dependent transportation systems; sustainable commerce initiatives thus provide local and state government and industries with an effective means of rapidly hedging against economic and social vulnerability to key local industries dependent on single-fuel energy supplies.[164] For example, state governments in countries with large coal reserves, including the United States, Australia, and South Africa, are actively implementing low-carbon technologies to integrate this high-carbon energy source into sustainable commerce energy programs through advanced coal liquefaction technologies which provide interim energy needs while low-carbon technologies are put in place.[165] Policy analysts, however, point with concern to the complete life-cycle of carbon emissions from coal-to-liquid conversion in the manufacture of transport fuels which can be almost double the total carbon emissions from using crude oil alone.[166] Extensive deployment of new carbon capture and storage technology, now undergoing commercial demonstration in various forms around the United States, may thus be needed to reconcile including coal in existing sustainable commerce initiatives with the overall goal to reduce global greenhouse gas emissions.[167]

5. Foundation Five: Sustainable Commerce Initiatives Provide Resources to Address Legacy Waste Management Problems

Local and state governments around the United States continue to seek cost-effective means by which legacy waste management problems can be properly characterized, remediated, and ultimately put into better use.[168] Such sites include not only Brownfield sites but also inactive or abandoned underground storage tanks as well as municipal or commercial waste landfill sites (discussed in greater detail *infra*). Brownfield sites pose a particular

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[164] For complete information on federal government initiatives to address legacy environmental programs through sustainable commerce initiatives, see EPA, Brownfields and Land Revitalization, http://www.epa.gov/brownfields/ (last visited May 22, 2008).

[165] *See* STERN REVIEW, *supra* note 108, at 276.

[166] *Id.*

[167] *Id.*

[168] *See* Amanda Siek, *Smart Cities: A Detailed Look at Land Use Planning Techniques that are Aimed at Promoting Both Energy and Environmental Conservation*, 7 ALB. L. ENVTL. OUTLOOK J. 45, 64–65 (2002).

environmental management problem in need of targeted resources and attention.[169] In local and state government planning, Brownfield land (or simply a Brownfield) is land previously used for local government, industrial, or commercial purposes, that may be contaminated by low concentrations of hazardous substances, but which has the potential to reenter governmental or commercial use once cleaned up; more severely contaminated land with high concentrations of hazardous substances, such as a Superfund hazardous waste site, does not fall under the Brownfield classification.[170] Brownfield sites commonly exist in municipal business or industrial districts as well as previously-active commercial parks; small Brownfield sites have also been identified in older residential neighborhoods where prior commercial uses such as dry cleaning facilities or gas stations discharged subsurface contaminants.[171] Management options in the 1980s and 1990s to remediate Brownfield sites to safe standards often engendered costs greater than what land could be worth after reclamation and redevelopment; such sites therefore often have not been developed in parallel with other redevelopment activities in the immediate area.[172] In the last ten years, sustainable commerce initiatives have aided Brownfield redevelopment as commercially-valuable land grows less available in highly populated areas, and new private and public partnerships enable risk distribution favoring site remediation with more sophisticated and cost-effective methods.[173]

Sustainable commerce initiatives often include targeted funds to partner government agencies with private entities in order to assist developer proposals to remediate and restore Brownfield sites. Local and state governments now regularly cost-share site assessment and evaluation to quantify site cleanup costs; such cost-sharing programs with commercial property development firms can move Brownfield redevelopment efforts forward and regenerate contaminated sites for revenue-producing uses which deploy low-carbon

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[169] Oni N. Harton, Note, *Indiana's Brownfields Initiatives: A Vehicle For Pursuing Environmental Justice or Just Blowing Smoke?* 41 IND. L. REV. 215, 219, 223, 226–27, 240 (2008).

[170] 42 U.S.C. § 9601(39) (2000) (defining term "brownfield"); *see* Siek, *supra* note 168, at 65; *see also* Michael B. Gerrard, *New York State's Brownfields Programs: More and Less than Meets the Eye*, ALB. L. ENVTL. OUTLOOK J., Win. 1999, at 18.

[171] *See* Harton, *supra* note 169, at 217–20.

[172] *See generally* sources cited *supra* note 15.

[173] Julianne Kurdila & Elisa Rindfleisch, *Funding Opportunities for Brownfield Redevelopment*, 34 B.C. ENVTL. AFF. L. REV. 479, 479–80 (2007).

energy or manufacturing technology.[174] Case studies of sustainable commerce initiatives to regenerate Brownfield sites highlight the fact that unrecognized site contamination can be encountered—such as underground storage tanks and other buried wastes—which increase cleanup costs and delay site reclamation.[175] To ensure sites are properly evaluated, sustainable commerce-driven partnerships between commercial property developers and government agencies often require that candidate sites be thoroughly investigated prior to approving remedial cleanup funding. As previously discussed, insurance and risk management firms are now active participants in sustainable commerce initiatives; these firms provide insurance products which underwrite risks unique to the acquisition and adaptive reuse of Brownfield sites, and often become commercial partners with property developers and government entities to implement sustainable commerce programs which address legacy environmental problems.[176] Since Brownfield development requires advanced and specialized risk management products as well as appraisal analysis techniques such as contingency valuation, insurance firms provide key technical knowledge to industry and government sustainable commerce partnerships. This is because the highest and best use of Brownfield sites may be affected by the residual post-remediation contamination and stigma and potential for third-party liability.[177]

Many innovative industry and government sustainable commerce initiatives have evolved over the past ten years to facilitate Brownfield remediation through novel partnerships between the public and private sectors.[178] For example, environmental firms have partnered with insurance companies to underwrite Brownfield cleanup by guaranteeing cleanup costs for specific sites so as to limit government and developer exposure to both overall environmental remediation costs as well as contaminant-related litigation.[179] These environmental firms perform extensive investigations of a candidate Brownfield site to ensure guaranteed cleanup cost estimates reflect information

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[174] *Id.*

[175] Richard B. Stewart, *A New Generation of Environmental Regulation?*, 29 CAP. U. L. REV. 21, 69–70 (2001).

[176] *See* Ross et al., *supra* note 142, at 253.

[177] Steven Ferrey, *Converting Brownfield Environmental Negatives into Energy Positives*, 34 B.C. ENVTL. AFF. L. REV. 417, 460–67 (2007).

[178] Miral Alena Sigurani, *Brownfields: Converging Green, Community, and Investment Concerns*, ARIZ. ATT'Y, Dec. 2006, at 38, 44, 45.

[179] *Id.* at 41.

on all contaminants present.[180] In addition, venture capital firms seeking investments in the real estate market have partnered in sustainable commerce initiatives to address Brownfield sites by funding engineering and technology research to address site-specific Brownfield remediation methods as well as funding for specific commercial development of Brownfield properties.[181]

One sustainable commerce initiative targeting Brownfield redevelopment—the Atlantic Station site in downtown Atlanta, Georgia—is recognized as a particular success for industry, government, and insurance company cooperation.[182] Atlantic Station is a large urban renewal project at the northwestern edge of Midtown Atlanta being developed by AIG Global Real Estate in partnership with Jacoby Development.[183] Officially opened in 2005, the 138 acres of mixed-use land development is located on the former Atlantic Steel Mill site which sat unused for decades due to extensive subsurface soil contamination by various hazardous substances including toxic metals.[184] AIG's corporate sibling, AIG Environmental, worked with the local government and developer team to characterize remediation at the site and create cost-effective remediation plans for re-use of the property; complete redevelopment of this site will include 15,000,000 square feet of retail, office, residential and hotel space as well as eleven acres of public parks.[185] Atlantic Station received the EPA's 2004 Phoenix Award as the Best National Brownfield Redevelopment and the 2005 Sierra Club's America's Best New Development Projects listing.[186]

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[180] *Id.*

[181] *See* Julianne Kurdila & Elise Rindfleisch, *Funding Opportunities for Brownfield Redevelopment*, 34 B.C. ENVTL. AFF. L. REV. 479, 497–98 (2007).

[182] Amy Pilat McMorrow, Note & Comment, *CERCLA Liability Redefined: An Analysis of the Small Business Liability Relief and Brownfields Revitalization Act and Its Impact on State Voluntary Cleanup Programs*, 20 GA. ST. U. L. REV. 1087, 1088–89 (2004).

[183] For information on the development of Atlantic Station, see Atlantic Station Redevelopment Overview, http://www.atlanticstation.com/press/presskit/RedevelopmentOverview1206.pdf (last visited May 23, 2008).

[184] *Id.*

[185] *Id.*

[186] *See* Press Release, Corrective Action Success: Atlantic Steel (Oct. 2007), *available at* http://www.epa.gov/correctiveaction/success/atlan11-07.pdf; Press Release, Sierra Club, Building Better (Dec. 1, 2005), *available at* http://www.sierraclub.org/dc/sprawl/bec/building-better.html.

B. Tradable Greenhouse Gas Emission Credits by Government and Industry in the United States

Ringgold, a small town in Catoosa County, North Georgia, provides an insightful and instructive case study of how sustainable commerce initiatives, initially created as part of international regulatory agreements such as the Kyoto Protocol, now impact communities large and small around the United States.[187] As described below, Ringgold and Catoosa County recently implemented sustainable commerce initiatives allowing this sylvan North Georgia community to become an active participant in global market low-carbon economic initiatives.[188]

Part II of this Article detailed Kyoto Protocol objectives that seek commitments from specified developed countries around the world to "individually or jointly, ensure that their [overall] aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases . . . [are reduced] . . . with a view to reducing their overall emissions of such gases . . . below 1990 levels in the commitment period 2008 to 2012."[189] While the U.S. has yet to formally adopt the Kyoto Protocol, a cap and trade system has been implemented that allows individuals and organizations to sell carbon credits in a number of private ordering systems.[190] Cap and trade systems in general enable various parties to generate fungible, tradable carbon credits through either the reduction of their own greenhouse gas emissions or through the creation of "sinks"—specified direct, measurable land use changes which promote carbon sequestration which have been put into place since 1990—of greenhouse gases.[191] Cap and trade programs allow parties to gain credits by either reducing emissions, removing carbon emissions through the creation of these sinks, or both.[192] United States cap-and-trade programs for airborne pollutants began in the 1990s with the adoption of sulfur dioxide emissions trading programs; it was the success of these sulfur dioxide trading programs which encouraged government and corporate leaders to support similar market-based approaches to reduce greenhouse gas emissions, and at the same time, fueled private and public investments in low carbon technologies.[193]

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[187] *See* Franks, *supra* note 15.

[188] *Id.*

[189] Kyoto Protocol, *supra* note 8, art. 3.

[190] *See supra* note 62 and accompanying text.

[191] *See supra* note 62 and accompanying text; *see also* Kyoto Protocol, *supra* note 8, art. 17.

[192] *See* Engel, *supra* note 81, at 1568.

[193] *See* 42 U.S.C. §§ 7651–7651(b) (2000) (creating acid rain trading program). The 1990

State and local governments have been among the most active proponents of tradable carbon credit programs.[194] California's enactment of climate change-directed legislation—including greenhouse gas emission limits—marked a critical milestone in tradable carbon management initiatives. The state, one of the world's largest economies, committed both the private and public sector to identify and manage emissions of carbon dioxide.[195] In concert with the Regional Greenhouse Gas Initiative (RGGI) of nine Northeastern and Mid-Atlantic states, California's sustainable commerce initiative creates a substantial initial incubator market for low-carbon technologies and carbon trading programs within geographical areas representing over 20% of the total U.S. economy.[196]

Two private climate exchanges now allow state and local governments, businesses, and individuals to buy and sell carbon credits recognized under the Kyoto Protocol, as well as industries who have design programs inclusive of Kyoto goals and objectives.[197] The first, the Chicago Climate Exchange (CCX), was founded in 2003 as a voluntary, legally binding U.S. trading system to assist government and business organizations to reduce emissions for six major greenhouse gases (GHGs): carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulfur hexafluoride (SF_6), perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs).[198] CCX provides a fully-integrated greenhouse gas trading market linked with third-party verification of emission reduction or credit purchase and was designed around the U.S. EPA Acid Rain cap and trade system that sought to reduce electric utility emissions linked to acid rain.[199] To participate in the CCX as a greenhouse gas credit-generating project, applicants must sequester, destroy, or reduce GHG emissions from one of a number of candidate activities including methane from agricultural,

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acid rain trading program was based in part on earlier programs designed to phase out the use of CFCs and to eliminate lead additives from gasoline. *See* Thomas W. Merrill, *Innovations in Environmental Policy: Explaining Market Mechanisms*, 2000 U. ILL. L. REV. 275, 283; *see also* Richard G. Newell & Kristian Rogers, *Leaded Gasoline in the United States: The Breakthrough of Permit Trading*, *in* CHOOSING ENVIRONMENTAL POLICY: COMPARING INSTRUMENTS AND OUTCOMES IN THE UNITED STATES AND EUROPE 175 (Winston Harrington et al., eds., 2004).

[194] *See generally* sources cited *supra* note 15.

[195] *See* California Clime Change Portal, *supra* note 15.

[196] *Id.*

[197] *See* sources cited *supra* note 62.

[198] *See* Chicago Climate Exchange, *supra* note 67.

[199] *Id.*

landfill, or coal mine operations, as well as carbon dioxide sequestered through forestry management programs.[200]

The second private exchange, the European Union's Emission Trading System (EU ETS), provides an international trading system for greenhouse gas emissions.[201] The EU ETS includes over 10,500 energy-intensive installations across the EU such as "combustion plants, oil refineries, coke ovens, iron and steel plants, and factories making cement, glass, lime, brick, ceramics, pulp and paper."[202] Much like the CCX, the EU ETS assists EU Member States to achieve cost-effective compliance with their commitments under the Kyoto Protocol. Governments and industries can buy or sell emission allowances so that aggressive greenhouse gas emission targets can be achieved while taking into account the growth, development, and evolution of business activities within both the EU as well as in the global marketplace.[203]

C. Kyoto Comes to Ringgold and Catoosa County, Georgia

Ringgold, the county seat of Catoosa County, lies approximately twenty-five miles from downtown Chattanooga, Tennessee in the rolling hills of northwest Georgia.[204] With an area of 162 square miles, Catoosa ranks as the thirty-sixth most populous county and the seventh smallest county by area among Georgia's 159 counties.[205] As documented in various public records, the path by which Ringgold created sustainable commerce initiatives through the sale of carbon credits began with two main developments. First, in 2004, Catoosa County completed a five-year county landfill closure process which generated ongoing expenses from post-closure monitoring and related

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[200] *See* Chicago Climate Exchange: Key Features, http://www.climatex.com/content.jsf?id=25 (last visited May 28, 2008).

[201] For information on the European Union Emission Trading System (EU ETS), see Europa: Gateway to the European Union, Emission Trading Scheme (EU ETS), http://ec.europa.eu/environment/climat/emission.htm (last visited May 28, 2008).

[202] EUR. COMM'N, EU ACTION AGAINST CLIMATE CHANGE, EU EMISSIONS TRADING: AN OPEN SYSTEM PROMOTING GLOBAL INNOVATION (2007), *available at* http://ec.europa.eu/environment/climat/pdf/bali/eu_action.pdf.

[203] *Id.* at 6.

[204] As of 2006, Catoosa County had a population of 62,016. *See* U.S. Census Bureau, State & County Quickfacts, Catoosa County, Georgia, http://quickfacts.census.gov/qtd/states/13/13047.html (last visited May 28, 2008). For more information and statistics on both Ringgold and Catoosa County, Georgia, see http://www.catoosa.com (last visited May 28, 2008).

[205] *See* http://www.cviog.uga.edu/Projects/gainfo/gastat.htm (navigate to Georgia Counties Ranked by Population and Georgia Counties Ranked by Area) (last visited June 17, 2008).

corrective action requirements.[206] Second, in 2004 the EPA included Ringgold and Catoosa County in the non-attainment area of the Chattanooga metropolitan statistical area (ChattMSA); inclusion in the ChattMSA resulted in both the city and county being classified as non-attainment areas for two priority air pollutants—ozone and particulate matter.[207] The Georgia Department of Natural Resources Environmental Protection Division (EPD) included the city and county as participants in the EPA's Early Action Compact program to aid their management of ozone non-attainment pollution issues.[208]

From a purely public works perspective, Catoosa County's 2004 landfill closure represented an ongoing financial liability for a county actively working to be both a good environmental citizen and a cost-effective provider of services to county residents.[209] Of equal concern was the county's proper response to ongoing state and federal enforcement actions for landfill-related environmental impacts.[210] Catoosa county officials thus began a concerted effort to seek options to mitigate long-term landfill management costs.[211] County officials and commissioners attended a series of regional and national meetings where landfill management program information was made available.[212] The regional meetings included in-state public meetings discussing landfill gas-to-energy projects and U.S. greenhouse gas trading exchanges.[213] The national meetings included the EPA's Landfill Methane Outreach Program (LMOP) conference; the LMOP provides technology information resources to local and state governments to assist in recovery and

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[206] *Landfill Gas Leak Solved?*, CATOOSA COUNTY NEWS, Feb. 18, 2005, *available at* http://www.catt.com/article.php?story=20050218094929322&mode=print.

[207] *See* Letter from Carol A. Couch, Director, Environmental Protection Division to James I. Palmer, Regional Administrator at 2 (Sept. 1, 2004), *available at* http://www.epa.gov/pmdesignations/documents/04Recommendations/4/s/Georgia_J.pdf; *see also* Catoosa County v. EPA, No. 05-1200 (D.C. Cir. filed June 13, 2005) (consolidated with Catawba County v. EPA, No.05-1064, D.C. Cir. filed March 11, 2005) (challenging nonattainment designation).

[208] Approval and Promulgation of Air Quality Implementation Plans; Tennessee and Georgia, 70 FED. REG. 50,199 (Aug. 26, 2005). For more information about the Early Action Compact Program see Amanda L. Maris, *Casenote: Clean Air, Clean Conscience: Evaluating the Early Action Compact Program Under the Shadow of the Clean Air Act in the Five Year Wake of* Whitman v. American Trucking Associations, Inc., 28 N.C. CENT. L.J. 260 (2006).

[209] *See* Randall Franks, *Catoosa Could Be Closer to Setting Up Methane Gas Sale Business*, CATOOSA COUNTY NEWS, Sept. 18, 2007.

[210] United States v. Catoosa County, No. 4:02-cr-00048-HLM (N.D. Ga. filed June 20, 2001).

[211] *See* Franks, *supra* note 209.

[212] *Id.*

[213] *Id.*

management of landfill-derived methane.[214] Methane recovery and management programs can be created to reduce potential greenhouse gas release from inactive landfills which otherwise would be released directly into the atmosphere.[215]

During these meetings, county officials envisioned that funding for cost-effective management of the closed Catoosa County landfill could include capturing not only the landfill's leaking methane gas to generate power, but also carbon credits marketable on greenhouse gas exchanges.[216] However, to qualify as an eligible project for carbon credit sales, the landfill closure program needed to meet a series of requirements. First, Catoosa county had to demonstrate that its landfill was not already governed by new source performance standards under the Clean Air Act which already required the county to begin landfill methane collection.[217] Second, Catoosa County had to demonstrate the county's carbon dioxide-equivalent emissions were below standards for crediting greenhouse gas reductions from a specific locale; the county met this standard because the only carbon dioxide emissions, under CCX guidelines, that the county was responsible for were gasoline, diesel, and natural gas usage for operating county vehicles and county buildings.[218] County officials subsequently published public notices of the intent to sell carbon credits generated by its landfill management programs. The county continues active management of responses to inquiries generated by public notices in order to finalize a carbon credit sales program.[219]

In seeking to mitigate ongoing landfill closure costs by the capture and sale of carbon credits within global carbon markets, the landfill administrative program by Catoosa County officials, provides a clear example of how extensively sustainable commerce initiatives are now incorporated into the planning, operations, and management of U.S. state/local government. At least four success factors were critical to the success of Catoosa County's proactive

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[214] *Id.*

[215] *Id.*

[216] Catoosa County Comm'n Minutes, Feb. 20, 2007, *available at* http://www.catoosa.com/minutes/2007Minutes/2-20-07.htm; Catoosa County Comm'n Minutes, June 19, 2007, *available at* http://www.catoosa.com/minutes/2007Minutes/6-19-2007.htm.

[217] *See* Chicago Climate Exchange, Overview and Frequently Asked Questions Landfill Methane Offsets in Chicago Climate Exchange, 2007, http://www.chicagoclimatex.com/docs/offsets/Landfill_Methane_Offsets_faq.pdf.

[218] Chicago Climate Exchange, CCX Landfill Methane Gas Project Guidelines, http://www.chicagoclimatex.com/docs/offsets/Lanfill_Gas_Protocol.pdf (last visited May 1, 2008).

[219] *See* Franks, *supra* note 15.

approach to crafting a landfill administration program. These factors should be of interest to other communities seeking to replicate Catoosa County's successes to date.

1. Centralized Administrative Responsibility Assigned for Sustainable Commerce Initiatives

Responsibility for virtually all aspects of Catoosa County landfill management, including costs associated with landfill closure, was assigned to specific county officials who were empowered to pursue regulatory and technological solutions to the county's environmental issues.

2. Vesting Program Responsibility with a Senior County Administrator

When many local and state governments, as well as business and industry organizations, create sustainable commerce initiatives, junior professionals are often placed in charge of these programs. Younger managers are often considered on the cutting edge of technical expertise on low-carbon technologies or innovative energy and natural resource conservation strategies. While access to those skill sets are important elements in formulating sustainable commerce programs, successful sustainable commerce programs require many of the same elements as other successful governmental or industrial initiatives. These include the need for seasoned managers with not only years of experience to shepherd new programs within existing administrative frameworks, but also credibility to bring together the individuals of differing interests needed to execute multi-disciplinary initiatives. Experienced senior managers can access needed technical information from which to fashion workable sustainable commerce programs targeting specific, identified needs.

3. Educate Stakeholders in Preparation for Program Decisions

Government and industry have many things in common, including the fact that key decisions to commit significant resources to new, multi-year initiatives require one or more levels of administrative review.[220] As with other governmental and industrial programs, educating key stakeholders about

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[220] JOSEPH CASCIO ET AL., ISO 14000 GUIDE: THE NEW INTERNATIONAL ENVIRONMENTAL MANAGEMENT STANDARD 12–30 (1996).

administrative review is critical to program adoption, implementation, and success.[221] Catoosa County's landfill management programs evolved with the participation of both senior county officials and county commissioners in order to evaluate technology issues and options and to develop program options to county stakeholder interests.[222] Education of, and program participation by, representatives of key stakeholders are common elements in successful sustainable commerce programs within governments and businesses, both large and small.[223]

4. Embrace Regulatory Requirements as Opportunities to Improve an Organization's Products and Services by Accessing New Resources

State and federal environmental regulations did not mandate that Catoosa County develop sustainable commerce programs or participate in carbon credits markets.[224] But these governmental regulatory requirements—from managing landfill methane to funding landfill post-closure costs—were a catalyst for county officials to seek new landfill management options beyond simple program compliance and to create "win-win" management options for the future.[225] County officials, concerned by annual ongoing landfill management costs, realized the opportunity afforded by being a smaller county with a landfill not governed by methane abatement mandates, to construct innovative approaches which served both their community and the environment.[226]

One thing should not be overlooked, however. State and federal regulatory requirements not only fueled Catoosa County's search for innovative solutions, but also afforded technical resources for the county to fashion solutions. Unfortunately, too many local governments and businesses fail to fully pursue these resources.[227] The county's landfill regulatory obligations provided opportunities to pursue new landfill management options which in turn opened the doors to technical information on emissions trading exchanges.[228] What

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[221] *Id.*

[222] *See* Franks, *supra* note 15.

[223] *See* Franks, *supra* note 209.

[224] *See id.*

[225] *Id.*

[226] *Id.*

[227] For information on the U.S. EPA Landfill Methane Outreach Program (LMOP), see http://www.epa.gov/lmop/ (last visited May 28, 2008).

[228] *See* Franks, *supra* note 15; Franks, *supra* note 209.

seems to distinguish Catoosa County's success in crafting sustainable commerce initiatives—compared to similarly-situated government and business organizations—has been their proactive approach in responding to regulatory requirements by taking full advantage of the regulatory recourses available.

IV. GLOBAL ENVIRONMENTAL INITIATIVES IMPACTING SUSTAINABLE COMMERCE PROGRAMS BY U.S. BUSINESS AND INDUSTRY

International sustainable commerce agreements that employ tradeable emission markets, such as the Kyoto Protocol, continue to affect governmental and business operations in the United States.[229] However, sustainable commerce initiatives by global business and industry also now impact local and state government as well.[230] This Part details some of the major sustainable commerce initiatives implemented by U.S. business and industry in response to developments in the global marketplace.

A. Sustainable Commerce Investments: International Venture Capital and Intellectual Property Initiatives

As detailed above, adoption of the Kyoto Protocol by industrialized countries, along with the embrace of Kyoto Protocol objectives by international business and industry, now requires U.S. industry and state and local governments to undertake sustainable commerce initiatives in order to successfully compete in the global marketplace.[231] Maintaining sustainable commerce programs across all sectors of the U.S. economy, however, requires significant investment in the development and deployment of new "clean" technologies to enable the shift from a high-carbon to a low-carbon U.S. economy.[232] Sustainable commerce investments in new technologies are thus a leading indicator of progress in moving toward a greener, cleaner, sustainable commerce-based economy.[233] While the United States has long been a leader in energy efficient innovation and in the basic R&D programs which create new technology, investments to underwrite these innovations and new

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[229] *See* sources cited *supra* notes 15, 66, 67.
[230] *See* sources cited *supra* note 125.
[231] *See* sources cited *supra* note 125.
[232] *See* MAKOWER, *supra* note 125, at 26.
[233] *Id.*

technologies are mushrooming at rates faster than any other current investment category.[234]

Governments, corporations, and venture capitalists in 2006 funded over $48 billion in clean technology investments—an increase of 13% over 2005 levels.[235] Much of this rise was attributed to a 12% increase in corporate sustainable commerce investments.[236] However, national and global industry leaders have taken note of the 132% growth in venture capital dedicated to sustainable commerce initiatives from 2005 to 2006.[237] This triple-digit growth in sustainable commerce funding included energy investments—renewable and distributed technologies and technologies which improve energy efficiency—as well as investments in recycled and bio-based materials; also included were funds targeting new technologies for water conservation, purification, and desalination as well as transportation systems including alternative-fuel vehicles.[238] Investments in these technologies originated from a variety of funding sources: government grants, venture capital funds, and corporate and institutional research and development funds.[239]

Among these various funding resources, venture capital is a growing source of sustainable commerce investments.[240] Investments from U.S. venture capital firms during the first nine months of 2007 ($2.6 billion) exceeded the investments for all of 2006 ($1.8 billion) by about 45% with a corresponding increase in the number of individual venture capital investments as well.[241] Solar-related technologies receive the largest portion of current venture investments with increasing amounts also going into new technologies for power generation, pollution- and recycling-related technologies, and wind energy.[242]

U.S. sustainable development research and development programs are funded across a wide range of energy, manufacturing, and transportation industries.[243] However, sustainable commerce initiatives include many new

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[234] *Id.*
[235] *Id.* at 26–27.
[236] *See id.* at 26.
[237] *Id.*
[238] *Id.*
[239] *Id.*
[240] *Id.*
[241] *Id.*
[242] *Id.*
[243] *Id.* at 27.

entrants to an industry dominated by legacy manufacturing and energy firms.[244] Firms growing their market share of sustainable commerce goods and services include electronics companies such as Sharp—one of the world's largest makers of solar panels—as well as information-technology companies.[245] In addition, chemical companies are active participants in the expanding base of sustainable commerce products; Dupont makes a significant percentage of the materials typically found in commercial solar cells.[246]

The number of patents for sustainable commerce technologies has similarly grown as investments in these technologies have increased.[247] Within the global marketplace, the United States accounts for almost half of all sustainable commerce-related patents issued in the year 2006.[248] Indeed, the U.S. Patent and Trademark Office issued over 4,000 patents on sustainable commerce technology for 2006, slightly more than half of which were for energy technologies.[249] The remaining patents focused on sustainable technologies and products as well as air, water, and waste technologies.[250] Sustainable commerce-related patents have grown at an annual average rate of 5% since 1995—over twice the rate for U.S. patents overall.[251]

These venture capital investments in sustainable commerce technology, driven by governmental and industrial programs to address Kyoto Protocol and other global environmental metrics, would traditionally be expected to preferentially benefit firms concentrated in U.S. technology centers.[252] As described above however, sustainable commerce investments are being distributed within small towns and communities around the United States.[253]

> In another small town—Elkin, North Carolina—textile mill workers are turning out fibers for carpeting from Atlanta-based Interface Engineering [sic], one of the world's largest suppliers of commercial flooring materials. The Terratex brand fabric is

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[244] *Id.*

[245] *Id.* IBM, Cisco, and Intel are producing chips and software to make appliances and the U.S. energy grids more efficient.

[246] *Id.*

[247] *Id.* at 28.

[248] *Id.*

[249] *Id.*

[250] *Id.*

[251] *Id.*

[252] *See* sources cited *supra* note 15.

[253] JOEL MAKOWER & RON PERNICK, CLEAN TECH: PROFITS AND POTENTIAL 1–4 (2001), *available at* http://www.cleanedge.com/reports/ (free registration required).

> a combination of 100% recycled polyester and so-called bio-based fibers, derived from corn, rice, and beet plants. Some of the carpet fibers are not only recyclable but also fully compostable and biodegradable.[254]

The advent of smaller-scale community wind projects now enable rural farmers across the mid-west to achieve energy independence while generating excess power for sale to local power grids.[255] In the small south Georgia community of Soperton, Range Fuels Inc. is constructing a $225 million factory to convert wood waste into ethanol to fuel cars and trucks.[256] Range fuels plans for its Georgia facility to produce up to twenty million gallons of cellulosic ethanol a year when completed by the end of 2008. At full production, Range Fuels's facility in Georgia would be among the first commercially-viable cellulosic ethanol manufacturing sites in the U.S.[257]

B. International Standards for U.S. Sustainable Commerce Initiatives: ISO14001 Environmental Management Systems (EMS) Standards

Sustainable commerce initiatives within the semiconductor industry have achieved demonstrable success in reducing overall pollutant emissions and natural resource consumption on a facility-specific basis.[258] Environmental studies of large semiconductor manufacturers in Silicon Valley and Santa Clara County, California report a 74% decrease, on a per facility basis, in the amount of toxic chemicals released into the county's air or managed through

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[254] RON PERNICK & CLINT WILDER, THE CLEAN TECH REVOLUTION: THE NEXT BIG GROWTH AND INVESTMENT OPPORTUNITY 1 (2007). The reference to "Interface Engineering" should be to the carpet manufacturer Interface, Inc. *See* http://www.interfaceinc.com (last visited May 21, 2008). Interface Engineering is a consulting firm originally founded in Washington state that specializes in eco-friendly buildings. *See* http://www.ieice.com (last visited May 21, 2008).

[255] SASHA KEMMET, USING FINANCIAL INCENTIVES TO ENCOURAGE WIND POWER PROJECT DEVELOPMENT 13 (2006), *available at* http://www.wise-intern.org/journal/2006/Kemmet-IEEE.pdf.

[256] For information on Range Fuels's biofuel operations, see Daniel Cusick, *Will Sleepy Ga. Town Lead Cellulosic Revolution?*, GREENWIRE, Aug. 23, 2007, *available at* http://www.rangefuels.com/files/ETHANOL-Will-sleepy-Ga-town-lead-cellulosic-revolution_2007-08-24.pdf.

[257] *Id.*

[258] For a complete profile and history of environmental performance in Silicon Valley, see California Dep't of Toxic Substance Control, Preventing Pollution, http://www.dtsc.ca.gov/PollutionPrevention/index.cfm (last visited May 29, 2008).

treatment and disposal over a four year reporting period.[259] Such improvements in environmental performance are striking given that Silicon Valley's industrial corridor has experienced one of the largest growth rates among U.S. industrial centers.[260] Silicon Valley's semiconductor industry began with the first Fairchild semiconductor manufacturing facility in 1972, and, by the 1990s, comprised over 200 semiconductor manufacturing and support facilities and employed hundreds of thousands of workers.[261] It should be noted that while per-facility environmental and energy impacts among Silicon Valley firms decreased over the thirty years since the birth of the industry, the total environmental impact of the Silicon Valley industry corridor as a whole has continued to increase.[262]

Local and state governments, U.S. industry groups, and economic policy analysts all expect that sustainable commerce initiatives, including the development of low-carbon energy resources, will generate enormous economic growth in the U.S. economy.[263] As described above, corporations which have already implemented low-carbon based technologies and other sustainable commerce programs realize near-term improvements in profitability from decreased operational costs and increased product development.[264] As in the case of the Silicon Valley industrial corridor outlined above, sustainable commerce-fueled industrial growth could result in significant per-facility decreases in environmental impacts while simultaneously causing overall net increases in greenhouse gas emissions and natural resource usage.[265] State and local governments will therefore need regulatory tools which link sustainable commerce goals and objectives with business and industry development to ensure that public and private environmental benchmarks are not undermined by enhanced economic growth precipitated by anticipated double-digit growth in U.S. "green" industries.[266]

Historically, managing environmental issues was not an integral component of corporate strategic decisionmaking processes comparable to the planning efforts addressing manpower needs, new product development, and global

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[259] *Id.*
[260] *Id.*
[261] *Id.*
[262] *Id.*
[263] *See* sources cited *supra* notes 122–25 and accompanying text.
[264] *See* ESTY & WINSTON, *supra* note 1, at 72.
[265] *See* sources cited *supra* notes 258–62 and accompanying text.
[266] *See* sources cited *supra* note 15.

marketing initiatives.[267] But with sustainable commerce initiatives now governing corporate access to global capital and markets, businesses now fully integrate sustainable commerce elements—including evaluation of environmental impacts and natural resource consumption—into all business operation planning processes.[268] To integrate sustainable commerce initiatives along with ongoing business development and environmental management planning programs, global corporations are implementing EMSs designed around private international environmental standards with independent, third-party verification and reporting.[269] EMSs include all organizational management programs for developing, implementing, achieving, reviewing, and maintaining environmental policies and objectives.[270] Program elements vary with a particular business organization's size, products, services, customer base, and scope of operations.[271] Business organizations can implement selected EMS components into existing corporate management systems with a principal focus on environmental regulatory compliance. Other firms can establish formal, stand-alone EMS programs to provide third-party verification to major customers, stakeholders, or governmental organizations. These programs would confirm that specific, sustainable commerce initiatives have been implemented and measurable improvements in sustainable commerce objectives and targets are being achieved.[272]

The ISO 14000 standard series is the most widely-accepted standard for voluntary sustainable commerce and environmental management programs by which private and public organizations can document the achievements of internal, external, and regulatory sustainable commerce metrics.[273] ISO 14000-series EMS standards are not constructed to replace governmental

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[267] *See* ANDREW J. HOFFMAN, FROM HERESY TO DOGMA: AN INSTITUTIONAL HISTORY OF CORPORATE ENVIRONMENTALISM 80–81 (1997).

[268] *Id.* at 137–38.

[269] For a review of Environmental Management Systems in the United States, see EPA, Voluntary Environmental Management Systems/ISO 14001, FAQs, http://www.epa.gov/owowm.html/iso14001/isofaq.htm (last visited June 19, 2008).

[270] *Id.*

[271] *Id.*

[272] *See* ANDREW J. HOFFMAN, COMPETITIVE ENVIRONMENTAL STRATEGY: A GUIDE TO THE CHANGING BUSINESS LANDSCAPE 97–102 (2000) (describing voluntary industry environmental initiatives).

[273] For a complete discussion of the ISO14000-series of standards, see International Organization for Standardization (ISO), ISO 14000 essentials, http://www.iso.org/iso/iso_catalogue/management_standards/iso_9000_iso_14000/iso_14000_essentials.htm (last visited May 29, 2008).

environmental requirements. Instead, ISO 14000 was designed to complement environmental, command-and-control regulatory systems by integrating national environmental requirements into an organization's ongoing operational and business planning activities, thereby providing internal and external verification that sustainable commerce metrics have been met.[274] ISO 14000-series EMS programs which address regulatory obligations for facilities allow corporate managers greater flexibility in choosing how to meet location- and industry-specific regulatory requirements as products, processes, and customers change.[275]

The ISO 14001 standard series includes multiple individual standards addressing various elements or components of corporate EMS programs.[276] ISO 14001–ISO 14005 standards provide guidelines for using and implementing an environmental management system.[277] ISO 14031 provides guidance for reporting environmental performance of an organization's activities, products, and services.[278] ISO 14040–14049 detail systematic methods to characterize how a product impacts the environment throughout its entire life cycle—from conception to disposal.[279] Unlike command-and-control regulatory programs, EMSs challenge business and public organizations to employ innovative means for achieving specific environmental benchmarks set by internal as well as external stakeholders—just as organizations seek innovative means to achieve other organizational product, process, and operational benchmarks.[280] External corporate stakeholders around the world obligate vendors and suppliers to provide third-party verification that specific sustainable commerce goals and objectives have been met as an element of continued approved vendor status.[281]

Thus, much in the same way the Kyoto Protocol fostered creation of global greenhouse gas management programs and tradable emissions markets, the ISO 14000 EMS standard series is fostering sustainable commerce initiatives

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[274] *Id.*

[275] *Id.*

[276] *Id.*

[277] *Id.*

[278] ISO 14031, ISO14031: The EMS Group, http://www.ems-14000.com/ems-iso14031.htm (last visited June 18, 2008).

[279] ISO 14041, ISO14041: The EMS Group, http://www.ems-14000.com/ems-iso14041.htm.

[280] *See* sources cited *supra* note 15.

[281] For information on sustainable commerce vendor certification programs, see EPA, Environmentally Preferable Purchasing, http://www.epa.gov/epp/index.htm (last visited on May 29, 2008); see also California Climate Change Center, http://calclimate.berkeley.edu/policy.html (last visited May 29, 2008).

within global business organizations with third-party verified metrics.[282] Key business stakeholders within local, state, national, and international markets—government agencies, financial institutions, risk management organizations, and candidate customers—can in turn employ these metrics as components of their own sustainable commerce programs.[283] With third-party verification, state and local governments can employ ISO 14000 EMS standards to craft sustainable commerce initiatives within growing economies to ensure concentrated industrial corridors, such as Silicon Valley, meet Kyoto Protocol-inspired emission goals while providing needed regulatory flexibility. Local and state governments experiencing low-carbon-fueled industrial growth could create sustainable commerce initiatives and ISO 14000-driven EMS policy elements, which a growing, concentrated industry could then build into their own individual corporate sustainable commerce programs. Local and state governments, along with internal and external stakeholders, could thereafter receive and review internal as well as third-party verification audits of ISO 14000 EMS-driven sustainable commerce programs on a regular basis. Then, as manufacturing, transportation, and workforce elements of business and industry increase during green economy-driven periods of economic expansion, local and state governments could proactively partner with those firms to adjust sustainable commerce objectives targets such that overall industrial growth maintained sustainable commerce metrics.

C. Green Building Requirements: Leadership in Energy and Environmental Design (LEED) Building Certification

The United States Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED®) rating system has developed into the established standard employed by commercial real estate organizations to develop facilities in conformance with public and private sustainable commerce initiatives.[284] The USGBC developed the LEED rating system to represent "a voluntary, consensus-based national standard for developing high-

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[282] *See* Richard Peglau & Martin Baxter, *A Decade of ISO 14001*, ISO MGMT. SYSTEMS, May–June 2007, at 13, *available at* http://www.iso.org/iso/14001_decade_ims3_07.pdf.

[283] *Id.*

[284] GEORGIA TECH RESEARCH INST., GREENING GEORGIA FACILITIES: AN ANALYSIS OF LEED REQUIREMENT IMPACTS 1–10 (2005). For a complete summary of the LEED certification programs, see U.S. Green Building Council, LEED, http://www.usgbc.org/DisplayPage.aspx?CategoryID=19 (last visited May 29, 2008).

performance, sustainable buildings."[285] Under the LEED standard, facility development organizations identify user-specific sustainable design elements to be incorporated into new construction projects; building projects that meet LEED-denominated qualifications, as verified by third-party organizations, can be formally recognized with certification levels of LEED Certified, Silver, Gold, or Platinum.[286] The LEED certification rating system includes seven required building elements and sixty-nine elective points grouped into one of six categories.[287] During the development phase of a project targeting a specific level of LEED certification, facility development professionals first evaluate which LEED point elements can be achieved given a particular facility's scope, intended use, and projected tenants.[288] Second, facility developers evaluate the cost-benefit potential for each achievable LEED point element proposed as part of a total facility design.[289] Design factors driving the feasibility and cost of achieving different levels of LEED certification can include building size, intended uses by occupants of a LEED-certified building, and local facility design standards—including local facility codes.[290] Studies of successful LEED-certified facility construction projects consistently report that the most economical approaches to meeting specified LEED criteria incorporate systematic efforts; beginning with the conception of a candidate facility, to consider facility sustainability goals and objectives at each stage of facility development, from initial design through building occupancy.[291]

Requirements necessary to meet the highest levels of LEED certification (LEED Gold and Platinum certification) are designed to ensure commercial facility development organizations allocate significant facility development resources towards creating highly efficient, sustainable commercial buildings.[292] Gold- and Platinum-certified LEED facilities meet specific sustainable commerce metrics. They also demonstrate elements which contribute to the transformation of commercial real estate markets by

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[285] U.S. Green Building Council, http://www.usgbc.org (last visited June 18, 2008) (describing LEED program).

[286] LISA FAY MATTHIESSEN & PETER MORRIS, COSTING GREEN: A COMPREHENSIVE COST DATABASE AND BUDGETING METHODOLOGY 4 (2004), *available at* http://www.usgbc.org/Docs/Resources/Cost_of_Green_Full.pdf.

[287] *Id.* at 6.

[288] *Id.*

[289] *Id.*

[290] *Id.* at 4.

[291] *Id.* at 26–27.

[292] *Id.*

promoting the industry's adoption of sustainable commerce initiatives as part of future commercial facility development programs.[293] LEED certification has become the accepted standard for measuring U.S. commercial green design within the real estate development industry in part because it adopted industry-recognized standards to evaluate commercial building sustainability measured by industry-recognized metrics.[294] It should be noted that industry participation in the creation and adoption of LEED certification now goes beyond commercial construction, architecture, and real estate management firms.[295] Virtually all stakeholders in commercial facility development, including the banking and financial industry, building materials manufacturers, and the insurance industry, now actively participate in promoting and developing LEED-certified facility construction projects around the United States.[296]

As U.S. construction markets continue cycles of growth and decline, LEED-certified facility construction along with generic "green" building programs continue to grow, fueled in part by regular announcements of new LEED-certified commercial buildings being occupied, as well as financial institution commitments of dedicated investment capital for LEED-certified facility development.[297] Over the last two years, well-known LEED Platinum- and Gold-certified buildings have opened including the Clinton Presidential Library, the New York Times Tower, and the U.S. Federal Building in San Francisco.[298] California-based New Resource Bank has announced programs to encourage developers and investors to undertake green building projects by offering targeted financial incentives including higher loan-to-value and lower interest rates.[299] Construction of LEED-certified facility projects have become so much the norm in New York City that the *Financial Times* reports every one of the more than fifty commercial building projects valued above $25 million currently under development in lower Manhattan is being constructed employing LEED and other industry-recognized sustainable commerce building standards.[300] More than half of corporate respondents to recent

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[293] *Id.* at 4.
[294] *See* MAKOWER, *supra* note 125, at 11.
[295] *Id.* at 10.
[296] *Id.* at 11.
[297] *Id.* at 10.
[298] *Id.*
[299] *Id.* at 11.
[300] *Id.* at 10.

facility development surveys report they own, manage, or lease one or more "green" properties.[301]

Construction of LEED-certified facilities, as well as facilities incorporating "green" building elements, is now part of the landscape of small town America.[302] For example, Charlotte, North Carolina–based Wachovia Bank has announced plans to build at least 300 LEED–certified green financial centers by 2010, just two years from the present, many of which will be located in small, rural communities in the southeastern and southwestern United States.[303] The small community of Greensburg, Kansas, with a population of under 2,000, was devastated by a massive tornado on May 4, 2007 that destroyed over 95% of the city and killed eleven people. Greensburg has focused its economic recovery on rebuilding as a model "green" community by adopting resolutions to certify all city-owned buildings LEED Platinum, making it the first city to adopt such a resolution.[304] Tempe, Arizona-based facility contractor Adolfson and Peterson is currently renovating an abandoned commercial building in the small community of Buckeye, Arizona for use as professional offices.[305] In most states, LEED-certified buildings can be found in small rural communities as well as small, bedroom suburbs at the edge of large metropolitan areas.[306] State and local sustainable commerce initiatives are thus not only a part of the metropolitan landscape.

While development of LEED-certified facilities continues to outpace other commercial construction, recent studies highlight that upfront "price premiums" for green buildings account for no more than 1%–2% of total project costs. These same studies report LEED-certified facilities and buildings conforming to other green standards provide numerous competitive advantages to commercial facility development groups during tough real estate

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[301] *Id.*

[302] *Id.*

[303] *Id.* at 11.

[304] For information on the tornado destruction to Greensburg, Kansas, see *Greensburg Focuses on Rebuilding*, CNN, May 7, 2007, http://www.cnn.com/2007/WEATHER/05/07/severe.weather/index.html. For information on the adoption of LEED certification during reconstruction of Greensburg, see Press Release, U.S. Green Building Council (Jan. 2, 2008), *available at* http://www.a-p.com/news/press-releases/?nid=64.

[305] For information on the Buckeye, Arizona office project, see http://www.a-p.com/news/?nid=64 (last visited May 29, 2008).

[306] For a list of urban and rural LEED building projects, see U.S. Green Building Council, Project Profiles, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1721 (last visited May 29, 2008).

markets, including enhanced rental premiums and increased market valuations.[307] LEED-certified facility projects attract preferential financing in part because sustainable building projects are perceived as creating added value to real estate assets particularly from goodwill by current and future tenants. Commercial building market surveys report ongoing U.S. LEED-certified and other green building markets will continue rapid expansion through 2011, more than doubling in size to $4.7 billion in the next four years; these studies also report market growth for green building materials will continue growing at 15%–23% per year over the next five years.[308] LEED and other green building programs thus continue to benefit from a combination of mandated efficiency codes, increased awareness of the environmental impact of a building's energy use, and improved technology that is steadily lowering the cost of resource-efficient, high-performance buildings.[309]

D. Energy Efficiency in Construction: International Energy Conservation Code

To the surprise of many, residential and commercial buildings, and the energy these structures consume, have been identified as the single largest generator of U.S. greenhouse gases.[310] Beginning in the 1990s, governments and industries across the nation adopted programs to encourage the design and construction of residential and commercial buildings which met detailed sustainable commerce metrics verified by third-party organizations.[311] Adoption of these programs was fueled in part by energy security concerns as discussed above.[312] These programs were also put in place to satisfy growing demands in the global marketplace that products exported by U.S. corporations be produced at facilities employing specific sustainable commerce initiatives.[313] Policy research on the success of various governmental and industrial sustainable commerce initiatives has called attention to the fact that

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[307] *See* GREG KATS, THE COSTS AND FINANCIAL BENEFITS OF GREEN BUILDINGS: A REPORT TO CALIFORNIA'S SUSTAINABLE BUILDING TASK FORCE 14 (2003); MAKOWER, *supra* note 125, at 10.

[308] *See* KATS, *supra* note 307.

[309] MAKOWER, *supra* note 125, at 11.

[310] COMM'N FOR ENVTL. COOPERATION, GREEN BUILDING IN NORTH AMERICA: OPPORTUNITIES AND CHALLENGES 22–23 (2008).

[311] *Id.* at 18.

[312] *See* sources cited *supra* note 15.

[313] COMM'N FOR ENVTL. COOPERATION, *supra* note 310, at 50–51.

real estate development firms, working with local governments and financial organizations, have made significant progress in the development and adoption of facility codes and standards which generate tangible improvements in sustainable commerce objectives measured against established benchmarks.[314]

For example, the International Energy Conservation Code (IECC), commonly referred to as the Energy Code, has been adopted by state and local governments across the United States to encourage the adoption of proven energy conservation measures in new facilities.[315] The Energy Code was designed to minimally restrict the use of new materials, products, or methods of construction in meeting energy conservation goals, while providing metrics against which stakeholder organizations—including development agencies and financial institutions—could evaluate a building project's design elements against stated energy conservation objectives and targets.[316]

The Energy Code focuses on three major elements in new construction projects including the building envelope (components of building's exterior skin—walls, windows, roof), heating and cooling system efficiency, and electrical lighting loads.[317] Buildings undergoing renovations—where Energy Code compliance can have the greatest short-term impact on decreasing total facility energy demand—must also meet Code requirements to increase local inventories of buildings which include sustainable commerce targets and to ensure the greatest immediate reduction in local energy consumption.[318] Energy Code requirements for commercial buildings traditionally apply to all new construction and alterations to a wide variety of structures: offices, stores, commercial warehouses, schools, churches, libraries, hotels, apartment buildings, and condominiums with four or more habitable stories.[319] Facilities often exempted from various state and local Energy Code requirements include existing buildings (absent alterations or additions), buildings with very low energy consumption or buildings designated under local historic ordinances.[320]

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[314] For a complete review of the LEED certification process, see U.S. Green Building Council, Project Certification, http://www.usgbc.org/DisplayPage.aspx?CMSPageID=64 (last visited May 29, 2008).

[315] *See* 2006 INTERNATIONAL ENERGY CONSERVATION CODE (2006). For a complete review of IECC and other Federally-approved energy codes, see U.S. Dep't of Energy, Building Energy Codes Program, http://www.energycodes.gov (last visited May 29, 2008).

[316] *See* KIRKSEY ARCHITECTURE, ENERGY CODE LEEDS TO GREEN 1–12 (2003), *available at* http://www.kirksey.com/newsPDF/energy-code-LEEDs-to-green.pdf.

[317] *Id.* at 7.

[318] *Id.*

[319] *Id.*; *see also* MAKOWER, *supra* note 125, at 26 (2008).

[320] KIRKSEY ARCHITECTURE, *supra* note 316, at 8.

Facility construction firms can usually evidence Energy Code compliance in one of three ways. The prescriptive approach requires that developers demonstrate conformance with defined building construction specifications and materials; by comparison, the component performance approach allows facility architects and developers to deviate from identified building construction specifications if their plans still cumulatively meet overall Energy Code requirements.[321] Lastly, the system analysis approach requires an architect or qualified professional engineer to detail the energy consumption of each building component and to verify the overall annual energy usage for a new or renovated facility.[322]

One of the greatest impacts of Energy Code adoption identified to date is the virtual elimination of incandescent fixtures in commercial spaces since the energy requirements of these fixtures regularly exceeds maximum Code-allowable energy consumption per square foot of space.[323] In response, U.S. lighting manufacturers have created new energy-efficient lighting products for Energy Code buildings, thus demonstrating the technology-forcing attributes of joint government and industry development and the adoption of sustainable commerce initiatives.[324] Energy Code implementation has also served to engender partnerships between organizations of design professionals and building product manufacturers to advance Energy Code-compliant product development.[325] Energy Code adoption has been credited with introducing responsibility and accountability for energy efficient construction to a greater number of commercial development stakeholders.[326] It should be noted that Energy Code adoption has been credited with facilitating recent federal legislation mandating the phase-out of many incandescent light fixtures by the year 2012.[327] Recent studies also point to the raw total value of energy conserved as part of Energy Code adoption; studies by the Alliance to Save

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[321] *Id.*

[322] *Id.*

[323] *Id.* at 9.

[324] *Id.*

[325] *Id.* at 10.

[326] *See id.*

[327] Nicholas Paul Lutsey, Prioritizing Climate Change Mitigation Alternatives: Comparing Transportation Technologies to Options in Other Sectors, at 91 (2008) (unpublished Ph.D dissertation, Univ. Cal. Davis) (available at http://pubs.its.ucdavis.edu/download_pdf.php?id=1175).

Energy report that since 1991, national model Energy Codes have resulted in cumulative energy savings exceeding $7 billion.[328]

E. Extended Product Responsibility and Life Cycle Analysis of Products

Extended Product Responsibility (EPR) is a key element of sustainable commerce programs by multi-national firms. EPR focuses attention on the environmental impacts of product systems over their entire life instead of limiting attention to the moment when the products are manufactured.[329] Fueled by EU Life Cycle Assessment regulations, EPR programs require product providers to identify and minimize product-associated environmental impacts within each stage of a product's life cycle-through changes in product design and construction as well as product management after the useful life of the product.[330] Underlying EPR programs is the concept that each participant involved in producing and providing a product affects that product's environmental impacts, including production impacts derived from a manufacturer's selection of input material and production processes, as well as downstream impacts from product transportation, sale, use and disposal.[331] Sustainable commerce initiatives which incorporate EPR programs thus obligate product manufacturers and retailers to consider options to reclaim products at the end of their useful consumer life, in order to recapture the natural resources consumed to produce those items and to diminish environmental impacts of future generations of goods and services.[332]

European corporations began integrating EPR principles into various levels of their organizational structures in the 1980s.[333] The UK-based home improvement retailer B&Q provides a case study of how extensively European

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[328] JOE LOPER ET AL., BUILDING ON SUCCESS: POLICIES TO REDUCE ENERGY WASTE IN BUILDINGS 14 (2005).

[329] For information on U.S. Government EPR programs, see EPA, Product Stewardship, http://www.epa.gov/epr/ (last visited June 19, 2008).

[330] *Id.*

[331] *See generally* GARY A. DAVIS & CATHERINE A. WILT, U. OF TENN. CTR. FOR CLEAN PRODS. AND CLEAN TECHS., EXTENDED PRODUCT RESPONSE RESPONSIBILITY: A NEW PRINCIPLE FOR PRODUCT-ORIENTED POLLUTION PREVENTION 1-1 (1997) ("Extended Product Responsibility is the principle that the actors along the product chain share responsibility for the life-cycle environmental impacts of the whole product system, including upstream impacts inherent in the selection of materials for the products, impacts from the manufacturer's production process itself, and downstream impacts from the use and disposal of the products.").

[332] *Id.* at 1–3.

[333] *Id.* at 1–3 to 1–4.

firms have embraced and adopted EPR programs.[334] B&Q has integrated an aggressive sustainable commerce program into the design and operation of individual stores, the selection of products and product suppliers, and the different levels of corporate operations.[335] B&Q clearly states to customers, and suppliers alike, their company seeks "to understand, manage, and reduce the impact our products have on the environment."[336] Consequently, B&Q has a duty to ensure that the environmental impact of each product is as low as possible, whether it is made from natural resources (like wood) or based upon synthetic ingredients.[337] To achieve this corporate-wide objective, B&Q focuses significant resources on monitoring supplier sustainable commerce performance in order to ensure it meets its own corporate sustainable commerce objectives and targets—resources which include hands on evaluation of the environmental impacts of supplier operations and products.[338] B&Q "define[s] standards for the environmental performance of . . . product suppliers and regularly assesses each supplier's performance against these standards" in order to ensure they "address the environmental issues associated with the life-cycles of the products they supply."[339] It also works with suppliers "to reduce their impact on the environment and manage the challenges of sustainable environmental development" by establishing "clear visibility through all our supply chains, so that [they] know who is making every product [they] sell and can identify the critical environmental issues associated with its lifecycle."[340] The company has implemented product-disposal programs including working "with suppliers to design products that can be recycled."[341] B&Q's product packaging initiatives also "[d]evelop

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[334] For a summary of the corporate sustainable commerce initiatives by B&Q, see B&Q, Social Responsibility, http://www.diy.com/diy/jsp/bq/templates/content_lookup.jsp?content=/aboutbandq/social_responsibility_2007&menu=default (last visited May 29, 2008).

[335] *Id.*

[336] *See* B&Q, Social Responsibility, Environment, http://www.diy.com/diy/jsp/bq/templates/context_lookup.jsp?content=/aboutbandq/social_responsibility_2007/environmental_main.jsp&menu=aboutbandq (last visited May 29, 2008).

[337] *Id.*

[338] *Id.*

[339] B&Q, Social Responsibility: Supplier Environmental Performance, http://www.diy.com/diy/jsp/bq/templates/content_lookup.jsp?content=/aboutbandq/social_responsibility_2007/supplier_environmental_performance.jsp&menu=aboutbandq (last visited May 29, 2008).

[340] *Id.*

[341] B&Q, Social Responsibility: Product Disposal, http://www.diy.com/diy/jsp/bq/templates/content_lookup.jsp?content=/aboutbandq/social_responsibility_2007/product_disposal;jsp&menu=aboutbanq (last visited May 29, 2008).

guidelines, based on [their] experience, to help product suppliers meet [their] policy requirements" by working "to minimise . . . packaging to that required to be fit for purpose."[342]

As a major EU home improvement retailer, B&Q is a significant retailer of consumer goods from small and large U.S. businesses operating from locations in major U.S. metropolitan areas, as well as small rural communities.[343] To maintain their status as B&Q-approved vendors, U.S. suppliers must address vendor obligations. One such candidate B&Q vendor was the Murray Corporation which manufactured bicycles and power lawn equipment from its sprawling manufacturing facility southwest of Nashville, Tennessee, in the small town of Lawrenceburg. Murray created a corporate environmental management system that set internal, self-imposed timelines to identify and minimize toxic chemical usage and waste generation. This EMS was developed, in part, to codify Murray's environmental performance and to satisfy B&Q supplier sustainable commerce requirements, which included aggressive benchmarks to minimize supplier environmental impacts. The Murray EMS coordinated new product design functions with input from environmental and facility management staff; toxic chemical-intensive finishes and lubricants, as well as energy-intensive manufacturing processes, could thus be identified while a new product was still on the drawing board. Internal timelines were established by Murray's EMS to minimize toxic chemical usage as well as natural resource consumption. With a functioning environmental management system in place, Murray was subsequently able to provide tangible evidence to both B&Q and other potential overseas customers that its products and operations not only included sustainable commerce initiatives, but also met its customers' sustainable commerce objectives and targets.[344]

U.S. corporations are now designing corporate sustainable commerce initiatives with extended product responsibility elements that embrace environmental impact metrics as a tool to evaluate and select vendors and suppliers—similar to the metrics required of U.S. corporations beginning in the

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[342] B&Q, Social Responsibility: Packaging, http://www.diy.cov/diy/jsp/bq/templates/context_lookup.jsp?content=/aboutbandq/social_responsibility_2007/packaging.jsp&menu=aboutbandq (last visited May 29, 2008).

[343] For a list of B&Q suppliers in the United States, see http://www.kellysearch.com/US-product-9596.html (last visited May 29, 2008).

[344] *See* Peter A. Appel & T. Rick Irvin, *Intellectual Property and Corporate Legal Structures to Promote the U.S. Environmental Management Systems Industry*, 35 B.C. ENVTL. AFF. L. REV. 397, 407–08 (2008) (discussing development of Murray Corporation environmental management systems).

1990s by many of their European customers and competitors. Numerous well-known corporations—including Dell, L'Oréal, PepsiCo, Wal-Mart, Procter & Gamble, and Hewlett-Packard—have implemented sustainable commerce programs that monitor key environmental and operational information as part of vendor-approval programs.[345] Vendor environmental metrics established by U.S. purchasing organizations with extended product responsibility elements often measure not only the environmental impacts of candidate product suppliers but also evaluate the goals and objectives of vendor sustainable commerce programs. Purchasing organizations can then compare suppliers with their peer competitors and identify avenues to minimize the environmental impacts over a product's life cycle by identifying the impacts of each vendor from which they purchase goods and services. Global sustainable commerce agreements, such as the Kyoto Protocol, thus continue to interconnect U.S. manufacturers with their vendors, retailers, and customers to minimize environmental impacts in the absence of U.S. adoption of the Protocol or enactment of new federal sustainable commerce legislation.

V. CONCLUSION

The case studies detailed in this Article provide evidence that international regulatory agreements, in the absence of pre-emptive federal legislation, now substantively shape both government and industry operations as sustainable commerce principles become vital elements of the U.S. economy at all levels. This Article further provides evidence that state and local governments—partnered with private industry in public and private agreements—will continue to be the incubators by which sustainable commerce principles fuel the next generation of U.S. economic growth, in the same way semiconductor technology and biotechnology fueled a generation of growth within the U.S. economy in the 1980s and 1990s. As sustainable commerce principles impact the creation, design, development, manufacture, transportation, sale, and disposal of a greater percentage of U.S. consumer and industrial goods, the case studies outlined here portend that international public and private agreements will increasingly foster new sustainable commerce programs within government and business in the years to come.

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[345] Fiona Harvey, *Suppliers Pushed on their Green Credentials*, FINANCIAL TIMES, Jan. 20, 2008.