

# From Coase to Collaborative Property Decision-Making: Green Economy Innovation

Elizabeth Burleson\*

*This Article considers the advantages and disadvantages of market-based program design, natural gas regulation, and enhanced international understanding. Transitioning to a green economy involves dedicating efforts towards environmentally sound energy innovation. RGGI, natural gas, and climate change represent sustainability challenges. Optimizing cooperative transboundary green innovation can facilitate inclusive decision making just as public participation by civil society can help economies transition to environmentally sound energy use. Building upon progress made in the human rights and environment fields can advance both and enhance resilience.*

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\* © 2011 Elizabeth Burleson. Professor Elizabeth Burleson has an LL.M. from the London School of Economics and Political Science and a J.D. from the University of Connecticut School of Law. She teaches at Pace Law School and has written reports for the United Nations. She would like to thank David Takacs and the other participants of the Colloquium on Environmental Scholarship at Vermont Law School for their comments on an earlier version of this Article.

## I. INTRODUCTION

The art of decision making is practiced in knowing when to turn back and look for a different route, when to stand still, when to step, and when to jump. Each has its advantages and its risks.

—Edwin Sharp

A just transition to a green economy requires frameworks that are responsive to present and future societal needs in an accountable, effective, transparent, equitable, and inclusive manner. Transitioning to a green economy involves dedicating efforts, both legal and financial, towards designing a technology policy that addresses adaptation and environmentally sound energy innovation. Beyond distributive issues, it is important to incentivize environmentally sound technology research, development, and diffusion. Both public/private sustainable development investment can build on development and climate resilience synergies such as sound subsidization of emerging green energy innovations. Wave, algae, and concentrated solar have yet to become available at the commercial level but, wise investment, siting, and community capacity building can revolutionize energy innovation diffusion. Best practices and environmentally sound technologies can be shared through global database and demonstration initiatives, model research and development (R&D) cooperation agreements, and knowledge-sharing platforms.<sup>1</sup> According to David Driesen, “picking low hanging fruit is a good thing. But if we expect to need to pluck substantially all of the fruit from the tree, we may need to invest some funds early on in ladder construction.”<sup>2</sup> Dynamic federalism and international cooperation can coordinate green economy measures. This process can start by building consensus regarding what constitutes environmentally sound technology.

This Article analyzes the means by which to advance energy technology for climate security. Part II addresses allocation of natural resources in the context of the Regional Greenhouse Gas Initiative (RGGI), considering the advantages and disadvantages of market-based program design. RGGI proceeds are paying for rainwater harvesting,

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1. JOSÉ ANTONIO OCAMPO, DIV. FOR SUSTAINABLE DEV., UN-DESA, THE TRANSITION TO A GREEN ECONOMY: BENEFITS, CHALLENGES AND RISKS FROM A SUSTAINABLE DEVELOPMENT PERSPECTIVE 10 (2011), available at [http://www.uncsd2012.org/rio20/content/documents/Green%20Economy\\_full%20report%20final%20for%20posting%20clean.pdf](http://www.uncsd2012.org/rio20/content/documents/Green%20Economy_full%20report%20final%20for%20posting%20clean.pdf).

2. David M. Driesen, *Linkage and Multilevel Governance*, 19 DUKE J. COMP. & INT'L L. 389, 409 (2009) (“While well-designed trading programs can certainly contribute to protection of the global commons, some programs aimed more squarely at technological advancement through encouragement of deployment of advanced technology”); see also Elizabeth Burleson & Winslow Burleson, *Innovation Cooperation: Energy Biosciences and Law*, 2011 U. ILL. L. REV. 651, 651-94.

storm water retention, and other climate measures. Part II assesses the effectiveness of RGGI allowance allocation and the effectiveness of proceeds allocation in incentivizing environmentally sound technology R & D. Part III offers recommendations for optimizing cooperative transboundary green innovation initiatives. It will analyze the emergence of hydraulic fracturing technological capacity and its regulatory challenges, asking what constitutes maladaptation to climate change. A lifecycle analysis with a human rights frame can help decision-makers weigh complex energy innovation paths. Laying a foundation for further energy lifecycle analysis in the context of climate resilience, Part III also addresses the critical role of enhancing U.S. understanding of international law. This Article concludes that timely energy regulation, taxes, subsidies, and market mechanisms together can contribute to climate stabilization.

## II. PROPERTY IMPLICATIONS OF MARKET-BASED CLIMATE MITIGATION

Determining initial emissions accurately and allocating allowances wisely are core aspects of successful tradable permit programs.<sup>3</sup> Market-based climate mitigation should involve equitable initial allocation, effective market oversight, and funding of efficiency and renewable energy measures.

### A. *RGGI Allowance Allocation: Sectoral Cap and Trade Climate Mitigation*

The Regional Greenhouse Gas Initiative (RGGI) is the first U.S. market-based program that mandates the reduction of carbon dioxide (CO<sub>2</sub>) emissions.<sup>4</sup> RGGI is limited to the electricity sector and CO<sub>2</sub> emissions.<sup>5</sup> Participating states have established a regional CO<sub>2</sub> power

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3. Driesen, *supra* note 2, at 389-412.

4. *Regional Greenhouse Gas Initiative (RGGI)*, PEW CTR. ON GLOBAL CLIMATE CHANGE, [http://www.pewclimate.org/what\\_s\\_being\\_done/in\\_the\\_states/rggi](http://www.pewclimate.org/what_s_being_done/in_the_states/rggi) (last visited Oct. 31, 2011) (“The Regional Greenhouse Gas Initiative (RGGI) . . . was established in December 2005 by the governors of seven Northeastern and Mid-Atlantic states: Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont. . . . Massachusetts and Rhode Island both joined RGGI in early 2007, and Maryland joined in April 2007.”).

5. Timothy P. Duane, *Greening the Grid: Implementing Climate Change Policy Through Energy Efficiency, Renewable Portfolio Standards, and Strategic Transmission System Investments*, 34 VT. L. REV. 711, 731-33 (2010). “The RGGI’s goal is to stabilize CO<sub>2</sub> emissions by 2015 and to reduce CO<sub>2</sub> emissions by ten percent by 2018 compared to the capped level of 188 million short tons of CO<sub>2</sub>.”; *see also* Margaret Rosso Grossman, *Climate Change and the Law*, 58 AM. J. COMP. L. 223, 248 (2010) (“Regional GHG programs are possible, in part, because the U.S. electric power market is managed by regional transmission organizations created to

sector emissions cap and a system by which power plants trade a CO<sub>2</sub> allowance for every ton of CO<sub>2</sub> they emit. The market identifies economic mitigation measures and stabilizes expectations, incentivizing long-term energy innovation. Proceeds of RGGI are funding efficiency and renewable energy throughout the following nine participating states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. Observer states, provinces, and regions include: Pennsylvania, Québec, New Brunswick, and Ontario.

### 1. Institutions and Initiatives

RGGI is a coordinated effort among participating states to reduce greenhouse gas emissions. While the nonprofit RGGI Inc. provides technical and administrative support for the development and implementation of each state's CO<sub>2</sub> Budget Trading Program, it does not regulate or enforce climate mitigation. Sovereign authority remains with each participating state. RGGI Inc. does facilitate tracking and auctioning of allowances as well as reporting of emissions data and state review.<sup>6</sup>

Individual CO<sub>2</sub> Budget Trading Programs in participating states together comprise RGGI. Utilizing the RGGI Model Rule<sup>7</sup> as a best practice standard, each participating state has enacted independent regulations.<sup>8</sup> Regulated power plants can use CO<sub>2</sub> allowances issued by

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implement 1980s and 1990s policies of the Federal Energy Regulatory Commission. Because regions have no regulatory authority, however, regional programs depend on state enactment of applicable statutes or regulations, based on a model rule developed by the regional initiative. Initiatives organized by state executives must be implemented and funded by the legislature or by regulatory agencies.”).

6. *Regional Greenhouse Gas Initiative*, RGGI, INC., <http://www.rggi.org/rggi> (last visited Oct. 31, 2011) (“Development and maintenance of a system to report data from emissions sources subject to RGGI, and to track CO<sub>2</sub> allowances; Implementation of a platform to auction CO<sub>2</sub> allowances; Monitoring the market related to the auction and trading of CO<sub>2</sub> allowances; Providing technical assistance to the participating states in reviewing applications for emissions offset projects; Providing technical assistance to the participating states to evaluate proposed changes to the states’ RGGI programs.”).

7. RGGI, INC., REGIONAL GREENHOUSE GAS INITIATIVE MODEL RULE, 1 (Dec. 31, 2008), available at <http://www.rggi.org/docs/Model%20Rule%20Revised%2012.31.08.pdf>.

8. Pew Ctr. on Global Climate to Change, *supra* note 4 (“Connecticut: Public Act No. 07-242, An Act Concerning Electricity and Energy Efficiency; 22a-174-31, Control of Carbon Dioxide Emissions/Carbon Dioxide Budget Trading Program; Delaware: SB 263, An Act to Amend Title 7 of the Delaware Code Relating to a Regional Greenhouse Gas Initiative and CO<sub>2</sub> Emission Trading Program. Proposed Regulation No. 1147, CO<sub>2</sub> Budget Trading Program; Maine: LD 1851, An Act to Establish the Regional Greenhouse Gas Initiative Act of 2007; Chapter 156, CO<sub>2</sub> Budget Trading Program; Maryland: Subtitle 26.09, Maryland CO<sub>2</sub> Budget Trading Program (draft as of Oct. 2007); Massachusetts: SB 2768, The Green Communities Act

any participating state, enabling the state programs to function as a single market for CO<sub>2</sub> emissions.<sup>9</sup>

Transboundary cooperation through RGGI is facilitated by several other regional activities. In addition to RGGI's cap and trade program for CO<sub>2</sub> emissions from power plants, a parallel Climate Change Action Plan is underway among New England Governors and Eastern Canadian Premiers to mitigate greenhouse gases ten percent below 1990 levels by 2020. Similarly, the Northeast States for Coordinated Air Use Management (NESCAUM) is establishing a Regional Greenhouse Gas Registry (RGGR) to track emissions.<sup>10</sup>

Together, the public and private institutions and cooperative efforts underway can enhance the region's capacity to establish property rights in the form of allowances of CO<sub>2</sub> and facilitate their trade across jurisdictional boundaries. The region is already familiar with such an approach with regard to sulfur dioxide (SO<sub>2</sub>). The Clean Air Act's cap-and-trade system for sulfur dioxide mandated that power generators cap and subsequently reduce their emissions. Electricity plants that reduced emissions beyond their required levels could sell credits to those entities that went over their caps.<sup>11</sup> This cooperative market-based experience with respect to acid rain has facilitated a regional response to climate change.

## 2. RGGI Auction and Distributive Equity

The first RGGI compliance period was three years in length, from January 1, 2009 to December 31, 2011. At the end of the control period, regulated power plants will each produce a CO<sub>2</sub> allowance for every ton of CO<sub>2</sub> emitted during the three-year period.<sup>12</sup> The overall RGGI cap is 188 million short tons of CO<sub>2</sub> every year from 2009 to 2014, and then

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of 2008; 310 CMR 7.70, Massachusetts CO<sub>2</sub> Budget Trading Program; 225 CMR 13.00, DOER CO<sub>2</sub> Budget Trading Program Auction Regulation; New Hampshire: HB 1434, An Act Relative to the Regional Greenhouse Gas Initiative and Authorizing Cap-and-Trade Programs for Controlling Carbon Dioxide Emissions; New Jersey: A4559, The New Jersey Regional Greenhouse Gas Initiative Act; Proposed Regulation, CO<sub>2</sub> Budget Trading Program; New York: Draft Part 242, CO<sub>2</sub> Budget Trading Program; Rhode Island: H5577, An Act Relating to Health and Safety—Implementation of the Regional Greenhouse Gas Initiative Act; Vermont: Title 30, Chapter 5, § 255, Regional Coordination to Reduce Greenhouse Gases; Chapter 22, Vermont CO<sub>2</sub> Budget Trading Program." (internal quotation marks omitted).

9. *Program Design*, RGGI, INC., <http://www.rggi.org/design> (last visited Oct. 31, 2011).

10. *Regional Greenhouse Gas Initiative*, *supra* note 6.

11. *Emissions Exchange Program Aims To Reduce Greenhouse Gases*, PBS (June 7, 2006), [http://www.pbs.org/newshour/bb/environment/jan-june06/globalwarming\\_06-07.html](http://www.pbs.org/newshour/bb/environment/jan-june06/globalwarming_06-07.html).

12. RGGI, INC., FACT SHEET: THE REGIONAL GREENHOUSE GAS INITIATIVE (RGGI) 1 (2011), available at [http://www.rggi.org/docs/RGGI\\_Fact\\_Sheet.pdf](http://www.rggi.org/docs/RGGI_Fact_Sheet.pdf).

after 2014 the cap will be curtailed by 2.5% per year. This should result in an overall ten percent decrease of CO<sub>2</sub> by 2018.<sup>13</sup>

Power plants can buy CO<sub>2</sub> allowances quarterly. RGGI Inc. explains that “auctioning CO<sub>2</sub> allowances ensures that all parties have access to CO<sub>2</sub> allowances under uniform terms. At the same time, auctioning allowances, rather than distributing them for free, realizes the value of the CO<sub>2</sub> allowances for reinvestment in strategic energy programs that save consumers money and create jobs.”<sup>14</sup> Having agreed to auction most CO<sub>2</sub> allowances, RGGI participating states have sought to address distributive equity by reinvesting two-thirds of RGGI auction proceeds towards efficiency and renewable energy within each given state. Doing so gives states the ability to show how establishing market-based climate mitigation measures can not only lower greenhouse gas emissions but also provide green jobs, enhance the stability of the grid, and curb energy bills.<sup>15</sup> The CO<sub>2</sub> emissions cap accounts for between 0.24 to 0.61% of average residential electricity bills, or roughly forty-six cents per month.<sup>16</sup>

Allocating use rights within a closed system provides a means by which to respond to overuse of a natural resource.<sup>17</sup> The European Union’s Emissions Trading Scheme (ETS) has pioneered carbon trading, building upon the successes of acid rain and fishery tradable permit markets.<sup>18</sup>

A carbon cap-and-trade system establishes an overall cap on emissions then allocates tradable permits to emit a given unit of CO<sub>2</sub>. Permit holders who lower their emissions by more than their allowance can sell permits. This allows entities that lower emissions in a cost-effective manner to trade permits with those for whom reducing emissions is more difficult.<sup>19</sup>

There are two phases to an emissions trading program to mitigate greenhouse gases (GHGs). Prior to trading, permits must be initially allocated—only then can trading rules and/or a full market result in permit trading among emissions sources. This analysis will focus on the

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13. *Id.*

14. *Id.*

15. *Id.* (“[P]ower plants may use offsets to meet 3.3 percent of their compliance obligation (limit on use increases to 5-10 percent of compliance obligation under specified conditions).”).

16. *Id.* at 2.

17. Elizabeth Burleson, *Tribal, State, and Federal Cooperation To Achieve Good Governance*, 40 AKRON L. REV. 207, 246 (2007).

18. See Elizabeth Burleson, *Energy Policy, Intellectual Property, and Technology Transfer to Address Climate Change*, 18 TRANSNAT’L L. & CONTEMP. PROBS. 69, 81 (2009) (discussing the use of cap-and-trade systems to prevent acid rain and avert fisheries from collapsing).

19. *Id.*

first phase, considering the decision-making process involved in initial allocation. This stage is often the most contentious aspect of establishing a tradable permit program.<sup>20</sup>

At the theoretical level, initial allocation should not impact cost, yet when implemented, cost is very sensitive to initial allocation. After trading, the allocation should be cost-effective, irrespective of initial allocation. Yet, fairness and cost-effectiveness impact trading behavior, and vice versa. Powerful stakeholders can direct initial allocations to themselves, leaving costs of implementation to minority stakeholders. The public sector can guard against establishing tradable permit systems that are inequitable from the outset.<sup>21</sup>

Broad and inclusive public participation in designing a tradable permit program can balance costs and benefits in an equitable manner. This Part defines and examines a range of initial allocations, using this framework to compare decisions made by existing programs with future possibilities. Stakeholders are more likely to become invested in and abide by tradable permit systems they view as equitable.<sup>22</sup>

Natural resource management offers several means by which to allocate rights. Historically, western states in the United States have used a first-in-time, first-in-right approach to allocating scarce water resources. Tradable fishery programs also took this approach, grandfathering in existing commercial users (at the expense of indigenous communities). Alternatively, permits can be distributed randomly via lotteries—as has been done in the context of hunting. More common, however, are auctions and administrative rules. Thus far, most tradable permit programs have combined historic use with equity when allocating permits. Known as “grandfathering,” this approach favors existing users while generally providing for new users to buy into the system by purchasing permits from existing emitters. It can sometimes simplify implementation when there is an existing command and control standard, yet the transition from technology/rates to units of emissions can be troublesome. Thomas Tietenberg points out that sometimes the cost of

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20. T.H. TIETENBERG, EMISSIONS TRADING: PRINCIPLES AND PRACTICE 127 (2d ed. 2006).

21. Hannah Fairfield, *When Carbon Is Currency*, N.Y. TIMES, May 6, 2007, available at <http://www.nytimes.com/2007/05/06/business/yourmoney/06emit2.html> (“In Europe, power companies received these credits directly and could buy or sell from one another as needed. But most companies passed the cost of the credits on to consumers even though they received them free—giving the companies windfall profits.”). If banking and bubbling are implemented then such an approach should not create hot spots that disproportionately impact minority and indigenous communities.

22. TIETENBERG, *supra* note 20, at 128.

emission trading can be impacted by the initial allocation.<sup>23</sup> Cap and trade cost-effectiveness can depend on initial allocation when revenue decreases welfare costs (e.g., RGGI revenue directed towards insulating low-income housing). Similarly, grandfathering can greatly advantage existing energy sources over new sources. If companies simply raise their emissions to obtain more permits, then initial allocation has skewed the entire objective of mitigating climate change. Finally, transaction costs inhibit optimal market exchanges. For these reasons, initial allocation plays a crucial role in the equity and efficiency of such market mechanisms as tradable permit systems.

Negotiation can be instrumental to the creation of a tradable permit system. Yet, without a ratchet mechanism to bring down emissions, the tendency to over-allocate permits in the first several years of a program can gain political feasibility at the expense of effectiveness at reducing overall emissions.

#### *B. RGGI Stakeholder Participation and Market Oversight*

The RGGI emissions allowance tracking system facilitates the production of independent market monitor reports. Members of civil society with Internet access can “view, customize and download reports of CO2 allowance market activity and RGGI program data.”<sup>24</sup> Public participation can help optimize RGGI, avoiding “leakage” and “hot air.” State agency and civil society monitors can use the RGGI COATS tracking system to identify regulated power plants that may be out of compliance with state CO2 Budget Trading Program regulations.<sup>25</sup> For instance, if a given power plant fails to submit a sufficient number of CO2 allowances to equal its CO2 emissions, it will be evident within the tracking system. Plants have an incentive to provide enough allowances given that they will otherwise have to come up with three times excess emissions.<sup>26</sup>

The Environmental Protection Agency’s Clean Air Markets Division database inventories CO2 emissions data from each regulated power

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23. *Id.* at 140 (“The conventional premise that the initial allocation does not matter in achieving cost-effectiveness assumes the absence of transactions costs. In the presence of transactions costs the post-trade allocation will not only depend on the initial allocation, but it also will not, in general, be cost-effective.”).

24. RGGI, INC., *supra* note 12, at 1.

25. RGGI INC., FACT SHEET: RGGI CO2 ALLOWANCE TRUCKING SYSTEM (RGGI COATS) 2 (2011), *available at* [http://www.rggi.org/docs/RGGI\\_COATS\\_in\\_Brief.pdf](http://www.rggi.org/docs/RGGI_COATS_in_Brief.pdf). “RGGI COATS enables the public to view eight types of program and market data reports.” *Id.* at 1.

26. *Id.*

plant pursuant to each state's CO2 Budget Trading Program regulations<sup>27</sup> and EPA regulations.<sup>28</sup>

Stakeholder participation<sup>29</sup> in RGGI decision-making can encourage efficiency and renewable efforts. For instance, the Pace Energy and Climate Center urges continued commitment to the "15 x 15" targets<sup>30</sup> while the Conservation Law Foundation notes that "[t]he modeling should also recognize the 'positive feedback effect' that the RGGI program is having and can continue to have as revenue from the auction is invested in efficiency which lowers electricity demand and EGU emissions and consequently suppresses demand for RGGI allowances and the price of such allowances."<sup>31</sup> Lower natural gas prices have contributed to a move away from coal and petroleum. Wind and hydro capacity have increased while coal has decreased. While impacted by weather and economy, electricity load also responds to energy efficiency measures. It is not easy to attribute the overall reduction to given contributing factors with precision, but it is worth gaining expertise in modeling the overall energy trends in the region. It is also worth

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27. See *State Statutes & Regulations*, RGGI, INC., <http://www.rggi.org/design/regulations> (last visited Oct. 27, 2011).

28. 40 C.F.R. Pt. 75; see also U.S. ENVIRONMENTAL PROTECTION AGENCY CLEAN AIR MARKETS DIVISION, <http://camddataandmaps.epa.gov/gdm/> (last visited Oct. 31, 2011).

29. See ELINOR OSTROM, *GOVERNING THE COMMONS: THE EVOLUTION OF INSTITUTIONS FOR COLLECTIVE ACTION* (1990) (encouraging resource appropriators to participate in decision-making).

30. E-mail from Jackson Morris, Senior Policy Advisor Pace Energy and Climate Ctr., RE: *Updated RGGI Reference Case 1* (Sept. 20, 2010), available at <http://www.rggi.org/docs/Pace.pdf> ("[M]echanics for a dynamic/self-correcting cap for future years should be explored."); *id.* at 5; see also E-mail from Mirant Corporation, *Comments on Proposed Integrated Planning Model (IPM) Assumptions and Model Inputs 1* (Sept. 22, 2010), available at <http://www.rggi.org/docs/Mirant.pdf>. In relation to process transparency, Mirant asked "[b]ased on the information released to date, it is unclear as to when the base case and sensitivity modeling runs will actually occur." *Id.*

31. Conservation Law Foundation, *COMMENTS OF CONSERVATION LAW FOUNDATION ON DEVELOPMENT OF RGGI REFERENCE CASE FOR ANALYSIS OF ELECTRICITY AND CO2 ALLOWANCE MARKETS 1-2* (Sept. 20, 2010), available at [http://www.rggi.org/docs/Conservation\\_Law\\_Foundation.pdf](http://www.rggi.org/docs/Conservation_Law_Foundation.pdf) ("Efficiency and Load Growth Assumptions . . . should be further refined and harmonized among the states. Certain states relied on the ISO-NE baseline calculated using the amount of Demand Resources that cleared in the first three Forward Capacity Auctions for delivery through 2012. Other states used state-specific methodologies considering current and expected energy efficiency programs."); see also Memorandum from Ross Gould, Air & Energy Program Director, on *Draft RGGI Reference Case Assumptions for the Program Review 1-2* (Sept. 20, 2010), available at [http://www.rggi.org/docs/Environmental\\_Advocates\\_of\\_NY.pdf](http://www.rggi.org/docs/Environmental_Advocates_of_NY.pdf). In relation to coal and nuclear construction under RGGI, "the RGGI states should not have any new coal plant construction because CCS is too expensive and is extremely inefficient in that much of the energy input must be used in the capture and sequestration process. In addition, even with CCS and air quality emissions coal ash is extremely toxic and there are no viable solutions to handling the waste, it is usually retained at the sites." *Id.*

emphasizing the powerful role of effective efficiency programs, given that the least expensive unit of electricity is the one that is never needed. The average transmission and distribution line loss is 7.2%.<sup>32</sup> Customer-sited generation and efficiency can collectively avoid substantial losses when aggregated across the RGGI region—roughly 11.9% of the total decrease in CO<sub>2</sub> emissions.<sup>33</sup>

RGGI auction proceeds have been reinvested in energy efficiency, renewable energy, and direct energy bill assistance.<sup>34</sup> Funding energy innovation and diffusion is an important contribution to addressing climate change.<sup>35</sup>

Efficiency results in reduced emissions via lower energy demand.<sup>36</sup> Similarly, RGGI is facilitating significant green job growth, noting:

Data from the Appollo Alliance shows that every \$1 million invested in building-sector energy retrofits creates about ten direct jobs in construction, as well as additional jobs in the design and manufacture of energy-efficient materials . . . . The same amount invested in renewable energy systems creates about six full-time manufacturing jobs, as well as additional jobs in construction and facility maintenance.<sup>37</sup>

Yet, controversy continues to swirl regarding the effectiveness of markets.<sup>38</sup> David Driesen notes:

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32. NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY, RELATIVE EFFECTS OF VARIOUS FACTORS ON RGGI ELECTRICITY SECTOR CO<sub>2</sub> EMISSIONS: 2009 COMPARED TO 2005, 10 (2010), available at [http://www.rggi.org/docs/Retrospective\\_Analysis\\_Draft\\_White\\_Paper.pdf](http://www.rggi.org/docs/Retrospective_Analysis_Draft_White_Paper.pdf).

33. *Id.*

34. RGGI, INC., FACT SHEET: RGGI CO<sub>2</sub> ALLOWANCE AUCTIONS 1 (2011), available at [http://www.rggi.org/docs/RGGI\\_Auctions\\_in\\_Brief.pdf](http://www.rggi.org/docs/RGGI_Auctions_in_Brief.pdf).

35. See *Program Design*, *supra* note 9.

36. RGGI, INC., FACT SHEET: INVESTING IN THE CLEAN ENERGY ECONOMY 1 (2011), available at [http://www.rggi.org/docs/RGGI\\_Proceeds\\_in\\_Brief.pdf](http://www.rggi.org/docs/RGGI_Proceeds_in_Brief.pdf).

37. *Id.*; see also David M. Driesen, *Capping Carbon*, 40 ENVTL. L. 1, 45 (2010) (“The revenue realized through auctions can help overcome the political inertia that makes caps in a trading program difficult to revise absent adoption of an automatic ratchet. Under RGGI, the states spending auction revenue have devoted the overwhelming majority of these resources to funding energy efficiency measures. The RGGI trading program may well raise the cost per kilowatt hour of electricity, since the program caps the emissions of electric utilities in the region. By financing energy efficiency measures in businesses and households, however, the states can reduce the number of kilowatt hours that people must purchase to meet their needs. This can make it possible to increase the expense of generating electricity while actually reducing the overall costs to energy users, since users face the costs generated by multiplying their cost per kilowatt hour times the number of kilowatt hours used to power their households and businesses. Energy efficiency funding not only generates immediate environmental benefits from avoided greenhouse gas emissions, it also reduces burdens that might otherwise pose an obstacle to further tightening caps in the future.”).

38. See Elizabeth Burleson, *Climate Change Consensus: Emerging International Law*, 34 WM. & MARY ENVTL. L. & POL’Y REV. 543 (2010); see also Lesley K. McAllister, *The*

Auctioning permits, rather than allocating them through administrative decision-making, provides a means of avoiding BAT-like<sup>39</sup> delays in establishing meaningful caps. Many regulators and scholars recognize that auctioning enhances efficiency, avoids windfall profits, and generates revenues that government can spend to further advance environmental or other societal goals, but they have not fully appreciated its importance in avoiding serious administrative difficulties.<sup>40</sup>

Furthermore, Lesley McAllister recommends that if cap and trade programs are to be implemented at all then “caps should be set at levels that ensure that the programs achieve technologically and economically feasible emissions reductions. Given the prevalence of overallocation and its impact on environmental effectiveness, mechanisms need to be incorporated into cap-and-trade programs that are capable of reining in overallocation.”<sup>41</sup> A ratchet can be a useful response to cap inflation that often results from initial allocation. Other helpful mechanisms include automatic and discretionary means such as allowance price floors in addition to auctions to calibrate caps.

RGGI states used available historic emissions data in establishing a cap.<sup>42</sup> Yet, the financial crisis contributed to actual emissions that have

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*Enforcement Challenge of Cap-and-Trade Regulation*, 40 ENVTL. L. 1195, 1230 (2010) (“Government environmental agencies have generally not had sufficient resources to conduct monitoring on a frequent basis, and they came to rely heavily on self-monitoring and reporting of emissions data by pollution sources. . . . [C]itizen enforcement should be enabled through providing ample public access to reported emissions data that would allow citizen groups to also detect violations. Finally, third party verification of emissions data should be considered based on the strong need for accurate data and the chronic enforcement resource limitations that governments experience.”); Vivian E. Thomson & Vicki Arroyo, *Upside-Down Cooperative Federalism: Climate Change Policymaking and the States*, 29 VA. ENVTL. L.J. 1 (2011); Carol M. Rose, *From H2O to CO2: Lessons of Water Rights for Carbon Trading*, 50 ARIZ. L. REV. 91, 109 (2008) (“An important lesson from water rights trades, then, is that greenhouse-gas trades will require a substantial institutional component. When we talk of cap-and-trade programs for greenhouse gases, we may need more than simply a recording system and a market; we will need to have appropriate institutions that can mediate trades both locally (as water districts mediate local trades) and at a longer distance (as California’s major water districts can trade with big cities).”); David Weisbach & Cass R. Sunstein, *Climate Change and Discounting the Future: a Guide for the Perplexed*, 27 YALE L. & POL’Y REV. 433, 436 (2009) (“[E]thicists are concerned about the overall distribution of welfare and resources across generations. They are correct to insist that the consequences of climate change raise important distributional issues and that future generations are at serious risk in a way that might violate the ethical obligations of the current generation.”).

39. BAT stands for “best available technology.”

40. Driesen, *supra* note 37, at 6 (internal citation added).

41. Lesley K. McAllister, *The Overallocation Problem in Cap-and-Trade: Moving Toward Stringency*, 34 COLUM. J. ENVTL. L. 395, 444 (2009). “[A]n allowance price floor could involve buying them back, or reducing the number of allowances allocated in the next compliance period.” *Id.* at 440.

42. Karl S. Coplan, *Public Trust Limits on Greenhouse Gas Trading Schemes: A Sustainable Middle Ground?*, 35 COLUM. J. ENVTL. L. 287, 291 (2010) (“GHG cap-and-trade

been substantially lower than the set cap.<sup>43</sup> Such overallocation of rights to pollute can harm RGGI's reputation, particularly given the banking flexibility mechanism, allowing for entities to forgo current emissions in order to save rights to pollute for the future.<sup>44</sup> Jeanette Soares notes that legislation establishing trading should "specify that if the executive branch agency finds that the first year's cap exceeded actual emissions from covered entities by a certain amount, then it could tighten the cap by a corresponding amount in a subsequent year."<sup>45</sup> At the same time, Alice Kaswan suggests that "states could impose trading restrictions designed to encourage emissions reductions in nonattainment or heavily-polluted areas."<sup>46</sup> Addressing the complexity of pollution abatement, Michael Vandenbergh and Mark Cohen note that certain Coasian assumptions<sup>47</sup> do not sufficiently address climate change.<sup>48</sup> The willingness to bargain is impacted by the global scope of climate change, resulting in transboundary emissions leakage. In other words, it is easier to operate within a jurisdiction that has yet to begin addressing climate change than it is to mitigate greenhouse gasses through trading rights to emit given substances such as carbon. Similarly, the Coasian bargaining

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schemes under consideration have every indication of following the Magnuson-Stevens' Act's failed approach, as the legislation under consideration contemplates initial caps that are based on easing the economic transition from the current fossil-fuel based economy rather than any scientific measure of sustainability.").

43. Similarly, the Soviet Union's historic GHG emissions substantially exceeded the subsequent emissions produced by Russia. Alister Doyle, *G8 Gas Emissions Rise; U.S. Not Worse*, REUTERS, May 31, 2007, [http://www.enn.com/top\\_stories/article/6661](http://www.enn.com/top_stories/article/6661) ("Russia is still 28.7 percent below 1990 levels.").

44. Jeanette M. Soares, *Solving the Super Wicked Problem of Climate Change: How Restraining the Present Could Aid in Establishing an Emissions Cap and Designing Allowance Auctions*, 40 ENVTL. L. REP. NEWS & ANALYSIS 10763, 10763 (2010).

45. *Id.* at 10764 ("Congress could precommit to stringent standards but allow a politically isolated body to decide when the stringent standards need to be employed. Covered entities and investors in new technologies might argue that this approach deprives them of the regulatory certainty they need to conduct business. However, for the most part, the ETS experience and the renewable fuel standard's implementation in the United States demonstrate that this approach can work even if it creates some uncertainty.").

46. Alice Kaswan, *Decentralizing Cap-and-Trade? State Controls Within a Federal Greenhouse Gas Cap-and-Trade Program*, 28 VA. ENVTL. L.J. 343, 386 (2010) ("Smaller, less sophisticated players may not be aware of economically feasible emission reduction strategies, and may not have the resources to devote to strategic planning and investment."). *Id.* at 357.

47. See Ronald Coase, *The Problem of Social Cost*, 3 JOURNAL OF LAW AND ECONOMICS 1, 1-44 (1960). The Coase Theorem suggests that in a world without transaction costs, people would bargain with one another to produce the most efficient distribution of resources, irrespective of the initial allocation. Coase was awarded the Nobel Memorial Prize in Economic Sciences in 1991.

48. Michael P. Vandenbergh & Mark A. Cohen, *Climate Change Governance: Boundaries and Leakage*, 18 N.Y.U. ENVTL. L.J. 221, 224 (2010) (advocating an information-driven approach to GHG mitigation).

of legal entitlements is not easily translated into a global process in which businesses, NGOs, and other members of civil society exert social pressure and influence the informal social license to operate.

### III. RECOMMENDATIONS: A HUMAN RIGHTS FRAME FOR GREEN INNOVATION

#### A. *Equitable and Efficient Market Mechanisms to Address Climate Change*

How to capture market forces without hot air and leakage? The answer has proven elusive. Hot air does not reduce greenhouse gasses. Leakage can concentrate pollution in poor communities domestically and overseas with important human rights implications. When thoughtful policy plays a role in initial values and distribution, markets have an opportunity to reduce emissions without the prescription becoming worse than the disease. Cardiac arrest of the carbon price has proven to be among the worst diseases that decision-makers have yet to resolve. Avoiding market collapse at the end of a trading period has eluded cap-and-trade designers. Isolating key features may allow economists and other researchers to identify what activity leads to sub-optimal behavior and amend trading programs to correct for this behavior without so affecting property rights as to lose the social license to experiment with emission measures in the market context.

A great deal of effort went into the judicial makeup of judges on the International Court of Justice. An analogous formula may be useful in designing an effective cap and trade program. Clearly some dominant players will tend to come out ahead without carefully designed playing field leveling measures. Optimal design involves neutral criteria that prevents market concentration of permits being traded; avoids all emission allowances from being banked for future use; and keeps the impacts of placing a price on carbon from being entirely passed on to ordinary people who are not in an optimal position to alter power plant energy source decisions. The formula is regional, mindful of the need for a long enough term to be effective, yet not designed to concentrate power. The international community and jurisdictions at various scales have analogous experience balancing competing goals in the face of powerful sovereignty and corporate interests.<sup>49</sup> It is neither the first nor the last

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49. As a point of comparison, the Drafters of the United Nations Charter sought to develop an equitable selection process when choosing International Court of Justice judges. See U.N. Charter ch. Xiv, available at <http://www.unhcr.org/refworld/docid/3ae6b3930.html> (last

time that the public sector is tasked with overcoming strong stakeholders to act in the collective best interest. Pondering the politics of private procedures will not in and of itself mitigate climate change. Rather, involving technical, governmental, and a range of civil society representation in an International Panel on Climate Change (IPCC) model of cooperation (albeit not flawless) can result in an outcome document that says “here is what a realistic cap and trade program looks like.” The following are realistic features of cap and trade: (1) substantive measures that reduce emissions in line with the best scientific consensus available, (2) a ratcheting mechanism to provide public sector flexibility that can prevent a complete collapse of the market, as well as ratchet up commitments in a predictable manner, and (3) procedural measures to involve stakeholders in decision-making (with a definition of stakeholders that encompasses the public health and environmental impacts of energy decision-making).

Public private partnerships can use GHG disclosure information to enhance social norm-driven market pressure.<sup>50</sup> Beyond polluter/neighbor negotiating, public/private bargaining occurs with regard to the scope and scale of rights and regulation.<sup>51</sup> Clear rights, access to sufficient information, and social sticks and carrots together impact GHG mitigation efforts.<sup>52</sup> Access to emissions data and civil society involvement in climate change decision-making can facilitate social license pressure.<sup>53</sup>

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visited Nov. 12, 2011), *also available by chapter at* <http://www.un.org/en/documents/charter/> (last visited Nov. 12, 2011).

50. Vandenbergh & Cohen, *supra* note 48, at 224.

51. *Id.* at 240.

52. *Id.*; see also Joseph A. Siegel, *Collaborative Decision Making on Climate Change in the Federal Government*, 27 PACE ENVTL. L. REV. 257, 265 (2009) (“[T]here is a major task at hand to build capacity on climate change science, law and policy, education, and technology. There is also a great need to build capacity on collaborative decision-making and public involvement on climate change. This can be accomplished, in part, by increasing the numbers of climate change stakeholder representatives and neutrals who are skilled in the process of collaborative decision-making. . . . Among the factors that call for collaborative decision making are: (1) the need for adaptive management in the face of uncertainty; (2) the benefits of drawing upon the significant expertise gained by many state and local governments during the years of federal government inaction; (3) the expectation that a climate bill will necessitate intensive rulemaking; (4) the federal government’s unique role in responding to natural disasters; (5) the international trans-boundary nature of impacts and solutions; and (6) the anticipated stress on infrastructure and resources due to climate change.”).

53. Vandenbergh & Cohen, *supra* note 48, at 221-22; see also Soares, *supra* note 44, at 10763 (“Accurate information on current and historical greenhouse gas emissions is critical to establishing the emissions cap and ensuring that emission reductions relative to a baseline occur. When the European Union Emissions Trading Scheme (EU ETS) began, member states did not have historical emissions data for specific facilities and, in some cases, did not have national laws and regulations in place that required reporting of emissions. Member states had to use aggregate level and voluntarily reported emissions data as well as projections of future emissions to

RGGI Stakeholder Participation can enhance market oversight and avert externalities that impact the efficacy of market-based climate mitigation.

Internalizing the social cost of high CO<sub>2</sub> use by trading credits can compel CO<sub>2</sub> reduction and prevent further destabilization of the climate. In transitioning to sound energy-water-climate policies, it is important to recognize where the obstacles are scientific, where there are political eddies, and what role the legal system has and can play in addressing climate change. Like many other international cooperative initiatives, climate consensus is a deliberative process that is not accomplished overnight. One way to increase the visibility of adaptation efforts is to highlight the synergies between mitigation and adaptation. Energy efficiency, adaptive water management, and green buildings are but a few examples of win-win endeavors that both mitigate and enhance climate adaptation. Addressing climate change can occur through the simultaneous development of an array of decarbonization strategies to facilitate consensus for timely action.<sup>54</sup> When dealing with interacting and compounding uncertainties it behooves decision-makers to be adaptive, systematically learning from measures taken. Adaptive management is as applicable to transitioning to a sound energy policy as it is to water policy.

Greater awareness-raising can strengthen broad civil society support for the projects that RGGI has funded. Among the many projects, it is worth highlighting the RGGI funding for methane landfill capture.

While capturing natural gas from landfills and other sources qualifies as low-lying fruit, if done through offsets then measures are needed to prevent destabilizing the market trading of emissions. Offsets provide a safety valve within cap and trade programs but can lead to leakage on a scale that can defeat the point of trading. RGGI offsets include end-use natural gas efficiency measures, capture of landfill methane from farming operations, or leaking natural gas infrastructure.<sup>55</sup>

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establish their emission caps for Phase I of the EU ETS, which ran from 2005 to 2007. As a result, the cap exceeded actual emissions in Phase I by more than 3%.”); Christie J. Kneteman, *Building an Effective North American Emissions Trading System: Key Considerations and Canada’s Role*, 20 J. ENVTL. L. & PRAC. 127, 127 (2010) (explaining that core attributes of an effective tradable market include “a sufficiently tight emissions cap; an ability to enforce compliance with the cap and trading rules; breadth; flexibility; regulatory certainty over time; transparency; and market liquidity”).

54. See Steven Ferrey, *The Failure of International Global Warming Regulation To Promote Needed Renewable Energy*, 37 B.C. ENVTL. AFF. L. REV. 67, 72 (2010) (“According to Hansen, there is no ice left on the planet when GHG concentrations reach 450 ppm. Since the beginning of the Industrial Revolution, CO<sub>2</sub> has increased about a third to 382 ppm.”).

55. Q&A: *Regional Greenhouse Gas Initiative*, PEW CTR. ON GLOBAL CLIMATE CHANGE, <http://www.pewclimate.org/rggi/qanda> (last visited Oct. 27, 2011) (“RGGI initially allows offset

This brings together the two controversial energy issues, namely, cap-and-trade and natural gas extraction in the Northeast.

*B. Does Natural Gas Have a Role in Transitioning to a Sound Energy-Climate Policy?*

Technological innovation is driving natural gas infrastructure expansion.<sup>56</sup> Gas pipelines lace across continents and liquefied natural gas vessels chug across seas. A global market for natural gas is nowhere near as developed as that for oil but is on the verge of coalescing. Yet North Americans still price natural gas to coal, while Asians price gas to oil. As a result, natural gas is less expensive in North America given the lower price of coal vis-à-vis oil.<sup>57</sup> Natural gas has come a long way from being seen as a marginal fuel suitable to isolated markets. By the mid-1930s technological innovation had enabled long distance transport of natural gas via pipelines.<sup>58</sup> Use of natural gas in electricity production can enhance flexibility. For instance, wind-gas co-generation increases the reliability of mixing renewable energy into the grid.<sup>59</sup> While natural gas can help leverage the transition to a lower carbon economy, robust environmental and public health measures should predate a significant increase in natural gas production.

Coal contributes roughly half and natural gas roughly twenty percent of U.S. electricity use.<sup>60</sup> While gas emits about half as much carbon dioxide as coal per unit of energy produced, natural gas is predominantly methane, a potent greenhouse gas in its own right. Putting a price on greenhouse gases has proven to be a political challenge.

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projects anywhere in the United States. If average allowance prices rise above \$7 per ton, sources will be allowed to cover up to 5% of their emissions using offsets. If allowance prices rise above \$10 per ton, RGGI will allow sources to cover up to 10% of their emissions with offsets, and will allow offset projects outside the U.S. as well as allowances from the EU Emissions Trading Scheme and the Kyoto Protocol's Clean Development Mechanism.”)

56. See, e.g., Michael Fitzpatrick, *Japan to Drill for Controversial 'Fire Ice,'* THE GUARDIAN, Sept. 27, 2010, at 1, available at <http://www.guardian.co.uk/business/2010/sep/27/energy-industry-energy> (“Japan seeks to improve energy security by drilling for frozen methane but environmentalists fear a leak of the greenhouse gas, which is 21 times as damaging as carbon dioxide”).

57. John Deutch, *The Natural Gas Revolution*, WALL ST. J., July 16, 2010, at A17.

58. *Id.* (“Advances in welding, metallurgy, and compression technologies in the late 1920s and early 1930s made it possible to transmit natural gas over long distance pipelines. . . . Before 1950, the development natural gas markets continued to be restricted to the United States and 90 percent of consumption was in the United States.”).

59. See Elizabeth Burleson, *Wind Power, National Security, and Sound Energy Policy*, 17 PENN ST. ENVTL. L. REV. 137, 139-40 (2009).

60. Clifford Krauss, *Natural Gas Hits a Roadblock in New Energy Bill*, N.Y. TIMES, Sept. 6, 2009, at 1, available at <http://www.nytimes.com/2009/09/07/business/07gas.html?>

If carbon dioxide becomes expensive to emit, then natural gas may become an important transition fuel in the effort to move from coal and oil to renewable energy.<sup>61</sup>

Global energy demand skyrockets as scientific understanding for the need to transition to a low greenhouse gas economy develops. The international community need not wait until that crystallization matures into diamond strength before responding effectively to the climate stabilization challenge. Collaborative decision-making can help optimize energy usage. Natural gas is likely to play an important role in this process, for better or for worse. For better, it can help communities transition from fossil fuels to renewable energy in a cost-effective manner as long as health and environmental effects are not shunted to the margins of energy decision-making.<sup>62</sup> Averting the well-trodden path of kicking environmental externalities off of the mountainous pass to fall on the heads of people unfortunate enough to still be at an earlier stage of the climb requires fine tuning energy solutions to the myriad of geopolitical factors that come into play at varying scales.<sup>63</sup> As jurisdictions ramp up natural gas infrastructure, it remains to be seen whether supply will outstrip demand, whether domestic or imported natural gas will prevail, or whether energy needs will match the frenzied rush to bring natural gas into production.<sup>64</sup> As conventional sources of natural gas decline, Alaska's North Slope tantalizes energy companies with one of the largest United States' deposits of recoverable natural gas.<sup>65</sup> In

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61. The Economist, *The Economics of Natural Gas: Drowning in It*, Aug. 13, 2009, at 1, available at <http://www.economist.com/node/1422281>. The Potential Gas Committee has "revised its estimates of America's gas reserves, raising them 39% above its assessment in 2006. The biggest part of that boost comes from higher estimates of gas in shale formations, which were formerly difficult and expensive to reach. Advances in horizontal drilling and the hydraulic fracturing of rock have made it possible to get previously inaccessible gas out. Shale gas, according to the committee, accounts for two-thirds of America's technically recoverable reserves." *Id.*

62. See, e.g., Ben Casselman, *Tainted Water Spurns Evacuation*, WALL ST. J., Apr. 21, 2010, at A1 (discussing natural gas that seeped into water near a Louisiana drilling site forcing evacuations).

63. See, e.g., Ben Casselman, *Expansion of Pipeline Stirs Concerns over Safety: Natural-Gas Grid Increasingly Reaches into Sensitive Areas*, WALL ST. J., Aug. 4, 2008, at A4 ("America's natural-gas boom is driving the construction of thousands of miles of new pipelines, many of them crisscrossing heavily populated or environmentally sensitive areas.").

64. See, e.g., Russell Gold, *Bad Call: The Conventional Wisdom Said that the US Would Soon Become a Big Importer of Natural Gas: The Conventional Wisdom Blew It*, WALL ST. J., Feb. 8, 2009, at R6 ("LNG will arrive at a time when big users, such as the petrochemical and fertilizer industry, are cutting demand, and as even more domestic supply comes from the giant new unconventional wells.").

65. Juliet Eilperin, *Study Points to Major Source of Natural Gas in Alaska*, WASH. POST, Nov. 12, 2008 at A6, available at <http://www.washingtonpost.com/wp-dyn/content/article/2008/11/11/AR2008111103047.html> ("ConocoPhillips received \$11.6 million in funding from the

Canada, the Economist notes: “Long a bucolic place of fertile farms, the Peace valley has become the centre of the hottest natural-gas boom in North America. New drilling technology has unlocked two vast pockets of shale gas with recoverable reserves of about 70 trillion cubic feet (2 trillion cubic metres).”<sup>66</sup> Yet, bomb attacks have been made on natural-gas pipelines in the Dawson Creek region.<sup>67</sup> At the same time, throughout communities that lie above the Marcellus shale formation there are simultaneous races (1) to identify mineral rights holders and (2) to place an environmental/public health safety net regulatory system under the energy revolution.<sup>68</sup> According to Riverkeeper, “[T]here have

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Energy Department to test its gas hydrate production technology on the North Slope, and company spokesman Charlie Rowton said yesterday that “both globally and for the domestic market, methane hydrates represent a potentially huge new source of natural gas.”); *see also* Jon Hurdle, *U.S. States Strive To Regulate Shale Gas Industry*, REUTERS, Dec. 31, 2009, at 1, available at <http://www.reuters.com/article/2009/12/30/us-energy-fracking-regulation-idUSTRE5Bt3un20091230> (“In September, the DEP fined Cabot Oil & Gas Corp. \$56,500 for three spills of a drilling lubricant and banned it from hydraulic fracturing until it bolstered safeguards.”).

66. The Economist, *Energy v. Environment in Canada: Bombs in the Bush*, Aug. 13, 2009, at 1, available at <http://www.economist.com/node/14229025> (discussing how a stampede of energy companies has snapped up exploration rights, drilling more than 700 wells last year alone, and building pipelines); *see also* Phred Dvorak & Edward Welsch, *Canada Approves Arctic Pipeline*, WALL ST. J. Dec. 17, 2010, at B7 (“Canada’s National Energy Board approved plans Thursday to build a 740-mile pipeline to ship natural gas south from the Arctic. The decision, which followed a six-year review, removes a major obstacle to the 16.2-billion-Canadian-dollar (U.S. \$16.1 billion) Mackenzie Gas Project, which proposes to bring gas from Canadian fields in the Northwest Territories bordering the Arctic Ocean to other pipelines and refineries that serve the North American market. . . . ‘It’s not the natural-gas price now—it’s what it is when these wells come into service’ in 2018, said Bob Reid, president of the Aboriginal Pipeline Group, which has a one-third stake in the pipeline. The group represents the interests of three native groups whose land the pipeline will pass over. ‘I’m confident we will make a decision to construct,’ Mr. Reid said. Two other natural-gas pipeline projects are competing to bring another source of natural gas south from Alaska’s North Shore. TransCanada Corp. and Exxon Mobil are asking natural-gas producers to support their plan to ship up to 4.5 billion cubic feet of gas a day over the rival Denali pipeline project, supported by BP PLC and ConocoPhillips.”).

67. *See* The Economist, *supra* note 66, at 1; *see also* Emeka Duruigbo, *The Global Energy Challenge and Nigeria’s Emergence as a Major Gas Power: Promise, Peril, or Paradox of Plenty?*, 21 GEO. INT’L ENVTL. L. REV. 395, 451 (2009) (“Notwithstanding the most recent setback, the national legislature should proceed with proposed legislation introduced in 2008 permitting the Minister of Petroleum to shut down facilities that continue to flare gas.”); *see also* Michael B. Bixby, *The Lion Awakens: The Foreign Corrupt Practices Act—1977 to 2010*, 12 SAN DIEGO INT’L L.J. 89, 108 (2010) (“In February 2009, Halliburton and its KBR subsidiary agreed to pay \$579 million in disgorgement and penalties to settle charges that one of its former units bribed Nigerian officials during the construction of a gas plant.”).

68. *See, e.g.*, Adam Nossiter, *Gas Rush Is On, and Louisianians Cash In*, N.Y. TIMES, July 29, 2008, at 1, available at <http://www.nytimes.com/2008/07/29/us/29boom.html?partner=rssnyt&emc=rss> (“[O]il company ‘landmen’ . . . frantically search the record books for the owners of the mineral rights to land that has become like gold.”); *see also* Siobhan Hughes, *EPA Seeks Gas-Drilling Facts*, WALL ST. J., Sept. 10, 2010, at B2 (“The Environmental Protection Agency on Thursday asked nine big natural-gas companies and contractors to disclose the chemicals used in a controversial technique for accessing the fuel from vast underground gas fields.”); Associated

been four cases of well blowouts and operator errors, three cases of water contamination and illegal discharges, six cases of surface water spills and fifteen cases of stray gas migration involving the Marcellus shale.<sup>69</sup> Concerns over the composition of fracking fluids continues to mount.<sup>70</sup> Recent disclosure of the widespread use of diesel has met stiff resistance from citizens concerned about water safety.<sup>71</sup> While diesel may help spread other chemicals in fracking fluids, it contains such known carcinogens as benzene.<sup>72</sup> Robert Beck suggests:

[I]f there is a real conflict between life-sustenance uses of water and energy production, life sustenance must prevail. Use of potable water should be prohibited if non-potable water is adequate and available. Recycling should be required whenever recycling is feasible. If facilities are not bound to a particular location, they should be required to locate where there is more, rather than less, water available; and, in planning for energies of the future, energy forms that will consume less water, if otherwise feasible, must be favored over those that will consume significantly more water.<sup>73</sup>

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Press, *Deaths, Injuries in Connecticut Power Plant Blast*, NPR, Feb. 7, 2010, at 1, available at <http://npr.org/templates/story/story.php?storyID=123467361> (“An explosion that sounded like a sonic boom blew out walls of an unfinished power plant and set off a fire during a test of natural gas lines Sunday.”); Benjamin Sovacool, *THE DIRTY ENERGY DILEMMA* 63-66 (2008); Robert D. McFadden, *5 Dead, Dozens Hurt in Connecticut Power Plant Blast*, N.Y. TIMES, Feb. 7, 2010, at 2, available at <http://www.nytimes.com/2010/02/08/nyregion/08explode.html> (“The hope was that by increasing generation, we could bring electric rates under control.”).

69. See Edith Honan, *Gulf Oil Spill Energizes Foes of NY Shale Drilling*, REUTERS, Sept. 14, 2010, at 1, available at <http://planetark.org/enviro-news/item/59512>.

70. Hannah Wiseman, *Untested Waters: The Rise of Hydraulic Fracturing in Oil and Gas Production and the Need To Revisit Regulation*, 20 *FORDHAM ENVTL. L. REV.* 115, 117 (2009) (“Congress’ exemption of fracing from the Safe Drinking Water Act involved two types of regulatory failure.”).

71. Nicholas A. Robinson, *“Minimum Standards:” the UN Declaration on the Rights of Indigenous Peoples*, 28 *PACE ENVTL. L. REV.* 346, 354-55 (2010) (“New York should work with the Indigenous Peoples to provide stewardship of the aquifers and ground water, over which Indigenous Rights remain.”).

72. Tom Zeller Jr., *Gas Drilling Technique Is Labeled Violation*, N.Y. TIMES, Jan. 31, 2011, at 1, available at <http://www.nytimes.com/2011/02/01/business/energy-environment/01gas.html> (“[H]ydraulic fracturing, or fracking, which involves the high-pressure injection of a mixture of water, sand and chemical additives—including diesel fuel—into rock formations deep underground. The process, which has opened up vast new deposits of natural gas to drilling, creates and props open fissures in the rock to ease the release of oil and gas. But concerns have been growing over the potential for fracking chemicals—particularly those found in diesel fuel—to contaminate underground sources of drinking water. ‘We learned that no oil and gas service companies have sought—and no state and federal regulators have issued—permits for diesel fuel use in hydraulic fracturing,’ said Representative Henry A. Waxman of California.”).

73. Robert E. Beck, *Current Water Issues in Oil and Gas Development and Production: Will Water Control What Energy We Have?*, 49 *WASHBURN L.J.* 423, 453 (2010).

Optimizing “closed-loop systems” can reduce fracturing fluid impacts on surrounding environment and public health.<sup>74</sup> Extracting eighteen billion cubic feet of natural gas a day requires a vast amount of water.<sup>75</sup> While groundwater contamination has caught the headlines, the United States Environmental Protection Agency’s (EPA) hydraulic-fracturing study technical lead, Robert Puls, notes that the EPA is also looking into where the fracking water will come from and what competing uses will be impacted.<sup>76</sup> This author witnessed first-hand the very real anger and polarization that has overcome the Mid-Atlantic region and New York while delivering an earlier version of this Article at the Cornell Hydraulic Fracturing Conference of 2011.<sup>77</sup> Scientists tasked with sharing a panel struggled to remain on speaking terms with one another. Members of civil society were barely civil. Many residents are anything but enthusiastic about finding themselves in the midst of such a revolution and are exploring the entire spectrum of responses ranging from litigation to collaborative decision-making within the legislative and administrative contexts, to coordinated Gandhian civil disobedience.<sup>78</sup>

Al Gore, James Hansen, Gus Speth, and others have reached the conclusion that the time has come for orderly civil resistance to locking in climate disrupting large energy infrastructure—be it new coal, nuclear, or Keystone pipeline construction. German civil sentiment has led to a substantial change in national policy, as has civil resistance to

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74. Edith Honan, *Water Waste a Kink in New York Shale Gas Future*, REUTERS, Feb. 22, 2010, available at <http://planetark.org/enviro-news/item/56822>.

75. *Id.* Siobhan Hughes, *Drilling Focus Widens—EPA to Look at Impact of Heavy Water Use to Extract Gas*, WALL ST. J., Sept. 14, 2010, at B8 (“Congress has ordered the EPA to study the impact of fracturing, but the industry has pressed the agency to keep its focus on whether the process puts drinking water at risk.”).

76. *Id.*; see also Ryan Tracy, *Energy Companies Faulted on Fracturing*, WALL ST. J., Jan. 31, 2011, at B3 (“Data submitted to Congress by 12 oil and gas companies indicates they pumped hydraulic-fracturing fluids containing diesel fuel into wells in 19 states without proper permits, three House Democrats wrote in a letter released Monday. The letter from Reps. Henry Waxman (D., Calif.), Edward Markey (D., Mass.) and Diana Degette (D., Colo.) calls on Environmental Protection Agency administrator Lisa Jackson to investigate whether the companies violated the Safe Drinking Water act.”).

77. ELIZABETH BURLESON, *HYDRAULIC FRACTURING: WATER AND ENERGY PRODUCTION AT CORNELL UNIVERSITY* (2011).

78. See, e.g., *Coastal Oil & Gas Corp. v. Garza Energy Trust*, 268 S.W.3d 1 (Tex. 2008); see also Alexandra B. Klass & Elizabeth J. Wilson, *Climate Change, Carbon Sequestration, and Property Rights*, 2010 U. ILL. L. REV. 363 (2010); Peter Lattman, *KKR to Invest \$400 Million To Develop Shale Gas in Texas*, WALL ST. J., June 14, 2010, at C3 (“In recent months both private-equity firms and foreign investors have invested billions of dollars in shale-gas production across the U.S.”); Jacqueline Lang Weaver, *The Traditional Petroleum-Based Economy: An “Eventful” Future*, 36 CUMB. L. REV. 505, 525 (2006) (“increased reliance on natural gas imports, particularly for power generation, raises the same national security concerns as increased reliance on imported oil.”).

democratize the Middle East. Is freedom really just another word for nothing left to lose? As ordinary people take to the streets, tired of becoming cannon fodder for energy conflicts when viable alternative power exists, the environmental law professor listserv debates the role of scholar-practitioner-mentors in university presence in protests resulting in student and professor Thoreau protest arrests.<sup>79</sup> Students were instrumental in African-American efforts to codify civil rights in the United States and similar human rights struggles around the globe. Ken Saro-Wiwa bridged human rights and environmental rights in a profound yet deadly reminder that social change does not come without cost.<sup>80</sup> Everyone takes individual calculated risks in life. It is important to remain mindful that there are risks and fully calculate the ramifications.<sup>81</sup>

Be it as elementary as sabotaging the flaring of Nigerian natural gas by village youth or well financed hacking schemes, more and more individuals are giving up on the capacity of deliberative analysis. It is far better to have a negotiating table upon which to sort out differences than to whack moles with neither strategy nor a deep understanding of the given conflict. Cyber threats to the electric grid appear to be larger than either the public or private sectors are willing to acknowledge. Winona LaDuke notes, “we need to recover democracy, and one key element is democratizing power production.”<sup>82</sup> Distributed power can enhance such a process. Its ability to do so would be greatly enhanced by breakthrough energy storage innovation. Already, the distributed power movement has reached retirement communities and universities in a piecemeal manner. If New York is committed to closing its Indian Point Nuclear Power Plant, the crucial collective concern will be how to transition responsibly to an energy load that can match that of Indian Point. These policy debates require an in-depth analysis and public awareness. They are complex, contentious, and not easily compared. Yet, it is fair to say that diversified

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79. Thoreau went to jail for not paying taxes that supported slavery and the Mexican War.

80. See *Background Information on Ken Saro-Wiwa*, THE GOLDMAN ENVIRONMENTAL PRIZE, <http://www.goldmanprize.org/node/160> (last visited Nov. 8, 2011); see also ANDREW REVKIN, *THE BURNING SEASON: THE MURDER OF CHICO MENDES AND THE FIGHT FOR THE AMAZON RAIN FOREST* (1990); MARC S. MILLER ET AL., *STATE OF THE PEOPLES: A GLOBAL HUMAN RIGHTS REPORT ON SOCIETIES IN DANGER* (Cultural Survival ed., 1993).

81. This Author's experiences: in Chiapas, at the height of the region's conflict in 1994; in Guatemala, during its civil war; and elsewhere, where machine guns were too numerous to count (including recent climate negotiations), have yet to alter a strong sense that the means are the ends. For this Author, living deliberately involves retaining hope and seeking wisdom. It also means responding with grace under pressure. In addition to courage, striving for justice, moderation, and truth frame a vision for a life truly lived.

82. Winona LaDuke, *Local Energy, Local Power*, YES! MAGAZINE, Winter 2007, at 26, available at <http://www.yesmagazine.org/article.asp?ID=1553>.

energy economies are sensible, never more so than as scientific studies mount, pointing to the need to address climate destabilization through greenhouse gas mitigation. Transitioning to a sound energy policy requires careful and comprehensive life cycle analysis. Such life cycle analysis involves factoring in public health, reliability, and cradle-to-grave metrics across energy sources. It is important to move beyond a market kilowatt per hour short hand that neither accounts for high fossil fuel subsidies nor human rights and environmental externalities. In the context of natural gas, it is not at all clear that it constitutes an advisable transition fuel to address climate change. It may well be a maladaptation that neither exemplifies green innovation nor reduces human exposure energy risks. Jurisdictions at all levels should form effective partnerships with civil society and given corporate sectors to pool energy information with which to assess life cycle energy analysis. The Aarhus Convention provides a best practice legal model with which to facilitate access to energy information and decision-making.<sup>83</sup> Access to information, public participation, and access to justice can empower civil society to sustain environmentally sound development through inclusive decision-making.

Human rights and environmental institutions have the capacity to bring people together to address governance gaps. Transparent, legitimate, and accountable governments are the most likely to achieve good governance and cooperate with one another in decision-making forums. This cooperation involves time and trust. Governments and civil society must remain committed to justice, respecting varying cultural approaches to conflict resolution such as mediation. In transitioning to a green economy, it is worth remembering that how one makes a decision affects the substantive provision enacted. Inclusive stakeholder participation brings new perspectives to problem solving as well as trust and support for implementation. In this manner, environmental justice can be integrated into effective, equitable environmental protection.

El-Gamal and Jaffe note that “as natural gas becomes an important primary source of energy, its importance in fueling or stifling global

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83. Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (June 25, 1998), 38 I.L.M. 517 (1999), available at <http://www.unece.org/env/pp/documents/cep43e.pdf> (providing text of the “Aarhus Convention”). This convention was negotiated among the member states of the United Nations Economic Commission for Europe. On June 25, 1998, the convention was adopted at a pan-European meeting of environment ministers in Aarhus, Denmark. All of the member states of the European Union and the EU itself were signatories. See also Elizabeth Burleson, *Emerging Law Addressing Climate Change and Water*, 5 ENVTL. & ENERGY L. & POL’Y J. 489 (2010).

economic growth increasingly mimics that of oil.”<sup>84</sup> Further, the liquefied natural gas (LNG) market expansion will likely minimize regional monopolies making them as “fungible and transportable as oil.”<sup>85</sup> Qatar and Iran share a vast natural gas field. The former has invested in an LNG export market to North America while Iran has focused upon pipelines to Europe and Asia.<sup>86</sup> At present, Qatar and Russia dominate natural gas exports and Russia is not enthusiastic about Iranian pipeline infrastructure through former Soviet states.<sup>87</sup> El-Gamal and Jaffe explain:

After the discontinuance of Russian gas supplies to the Ukraine in the winter of 2005-06 and again in 2008-09 consumer countries have begun to question the premise that natural gas imports will prove inherently more secure than oil. Moreover, the Russian-Ukraine disputes have prompted many consuming countries in Europe to seek diversification as means of mitigating the potential risks of being heavily reliant on any single supplier.<sup>88</sup>

As the international community reaches out for a shared vision for long-term cooperative action, areas of agreement are emerging on climate mitigation, adaptation, technology transfer, funding, and forestry. Remarkable diplomatic coordination is underway. Yet, it falls short of what is needed to address climate destabilization. Collaborative decision-making can effectively engage global, regional, national, and local public and civil society participation.<sup>89</sup> While developed countries are responsible for the preponderance of current greenhouse gas concentrations in the atmosphere, the involvement of major emitting

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84. Mahmoud A. El-Gamal & Amy Myers Jaffe, OIL, DOLLARS, DEBT, AND CRISIS 62 (2010) (“Russia’s share of gas reserves is approximately 30 percent, which is the difference between the Middle East’s share in global oil reserves, approximately 65 percent, and its share in gas reserves, which is approximately 35 percent.”).

85. *Id.* at 63.

86. *Id.* at 64.

87. *Id.* (“[A]ccusations of Qatari over-extraction from the North Field are very reminiscent of Iraq’s accusations toward Kuwait circa 1990. . . . Iran has also been involved in disputes with Kuwait and Audi Arabia over border demarcation in the northern-Gulf continental shelf, which contains the prolific Dorra gas field.”).

88. *Id.*; see also CATHERINE GAUTIER, OIL, WATER, AND CLIMATE: AN INTRODUCTION 144 (2008). See generally SANAM S. HAGHIGHI, ENERGY SECURITY: THE EXTERNAL LEGAL RELATIONS OF THE EUROPEAN UNION WITH MAJOR OIL AND GAS SUPPLYING COUNTRIES (2007).

89. See, e.g., United Nations Framework Convention on Climate Change (AWG-LOA) OUTCOME OF THE WORK OF THE AD HOC WORKING GROUP ON LONG-TERM COOPERATIVE ACTION UNDER THE CONVENTION, “Takes Note of Relevant provisions of the United Nations Declaration on the Rights of Indigenous Peoples,” ¶ 87 (Mar. 15, 2011), available at [http://unfccc.int/files/meetings/cop\\_16/application/pdf/cop16\\_lca.pdf](http://unfccc.int/files/meetings/cop_16/application/pdf/cop16_lca.pdf); see also Anna Spain, *Who’s Going to Copenhagen?: The Rise of Civil Society in International Treaty-Making*, 13 ASIL INSIGHT No. 25 (2009), available at <http://www.asil.org/insights091211.cfm>.

developing country mitigation is imperative to avert catastrophic climate change. Greater monitoring and reporting of such greenhouse gas emissions as carbon and methane benefit from funding environmentally sound technology transfer and capacity building.

Within the framework of the nascent global natural gas sector, international public and private law and policy are converging in unpredictable ways. Natural gas looms large in the climate mitigation debate as natural and anthropocentric methane abatement challenges abound. At the same time, policy-makers are turning to natural gas as a transition fuel to soften volatile fossil fuel markets, as well as transition to sustainable development. Natural gas frustrates those seeking to quantify economy-wide emission reductions vis-à-vis natural sinks that absorb greenhouse gasses. Beyond the understanding that vast thawing of Siberian, Canadian, and U.S. arctic permafrost will be a climate game changer in terms of methane emissions, the international community remains technologically challenged with regard to measuring, let alone reporting and verifying, greenhouse gas levels. Technology transfer of environmentally sound monitoring equipment can facilitate a country's willingness to commit to legal obligations to monitor, report, and verify climate mitigation measures. At the same time, innovative extraction of oil and gas continues to eclipse environmentally sound technology transfer. Setting aside hair-splitting debates on what constitutes clean technology, one can safely identify outliers that do not constitute environmentally sound outcomes. The BP oil spill may come to mind. The international community is witnessing an energy revolution that has taken on a manic degree of intensity at a time that such a drive can, and should, be similarly directed towards addressing climate destabilization in a humanitarian manner.

One way to bring these forces together is through environmentally sound technology transfer. The international community can deeply commit to the new Technology Mechanism, including a Technology Executive Committee (TEC) and a Climate Technology Centre and Network (CTCN). The TEC can consider and recommend actions to promote environmentally sound technology transfer; provide guidance on policy and program priorities; facilitate collaboration between governments, the private sector, NGOs, and academic and research communities; recommend actions to address barriers to technology transfer; and catalyze development and use of technology road maps or action plans. The CTCN can facilitate existing networks, organizations, and initiatives in order to provide assistance to developing countries on technology needs identification, technology implementation, and

deployment of existing technologies. The international community is reaching common ground to strengthen capacity-building support via networks for sharing communication, education, information, public awareness, training, and stakeholder participation.

While neither sufficient nor binding, the Cancún Agreements have put the climate negotiations back on track in a party-driven, transparent, and inclusive manner. A post-2012 framework should (1) anchor mitigation proposals and (2) coordinate funding for mitigation, adaptation, and technology transfer.<sup>90</sup> Agreement at the international scale is only as effective as implementation at the regional, national, local and individual levels. Natural gas may emit less carbon than coal or oil but is not an all-encompassing solution to peak oil, national security, or sustainable development. Cradle to grave assessments should be conducted when assessing an environmentally sound, diversified energy mix. Technological innovation should be harnessed to optimize environmentally sound energy development. Satellite and low flying helicopter monitoring can facilitate international pressure to end flaring and natural gas pipeline leakage.<sup>91</sup> Best practices can be shared and capacities to abate natural gas emissions can be shared and improved upon. Corporate responsibility is taken seriously when civil society has access to information with which to be collaborative decision-makers. A social license to operate an activity as strategic and volatile as natural gas extraction can best be accomplished in combination with a robust environmental and public health framework that balances energy and equity at local, regional, and international levels. Energy demand has never been greater and natural gas is highly likely to fill the energy supply-demand gap. This can best be accomplished via comprehensive energy policy development that embraces sustainable development generally and energy and human security in particular.

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90. See Christiana Figueres, Executive Secretary, United Nations Framework Convention on Climate Change, Statements at the Sixteenth Session of the Conference of the Parties and the Sixth Session of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol Cancun (Dec. 7, 2010), (transcript available at [http://unfccc.int/files/press/statements/application/pdf/101207\\_cop16\\_hls\\_cfg.pdf](http://unfccc.int/files/press/statements/application/pdf/101207_cop16_hls_cfg.pdf)). Efforts to anchor text in an outcome document will continue as the international community works towards draft treaty language that can become a broadly agreed upon ratified instrument.

91. See Andrew C. Revkin & Clifford Krauss, *Curbing Emissions by Sealing Gas Leaks*, N.Y. TIMES, Oct. 14, 2009, at 1, available at <http://www.nytimes.com/2009/10/15/business/energy-environment/15degrees.html> (“Gazprom, the Russian Defense Ministry and an Israeli aerospace company began discussing the potential use of miniature remotely piloted helicopters to monitor pipelines for leaks.”).

### C. *Global Green Economy Cooperation*

The energy-water-climate nexus has historically been, and will continue to be, central to individual, regional, and international security. Human rights and environmental law come together when addressing water availability, energy use, and climate resilience.

The “world’s population surpassed 6 billion in 1999 . . . . By comparison, the number of people didn’t reach 1 billion until 1800 . . . . It didn’t reach 2 billion until 130 years later.”<sup>92</sup> Global population has just reached seven billion, escalating competition for resources.<sup>93</sup> Expanding environmentally sound energy solutions can help minimize conflict as demand rises with population rates and supply becomes less predictable due to climate destabilization.

Since the international community committed to assisting least-developed countries and small island nations adaptation in Agenda 21, efforts have waxed and waned substantively and procedurally. Few would argue against the useful role that drip irrigation could effectively reduce saltwater intrusion of fresh water aquifers. More controversial is the means by which building codes can provide for such sensible adaptation measures with minimal impact on existing property rights. Green economy decision-makers at all scales can be guided in their evaluations by considering international water law factors, including the natural condition, socio-economic needs, demographics, effects of utilizing a resource, existing and potential use, conservation, and availability of comparable alternatives. Energy efficiency, adaptive water management, and green building are but a few examples of win-win endeavors that support the greening of economies.

Communities can build networks with which to diffuse rainwater harvesting, drip irrigation, and a wide array of environmentally sound, climate friendly technologies. These efforts can build upon integrated best practices<sup>94</sup> consistent with the United Nations Framework Convention on Climate Change (UNFCCC),<sup>95</sup> United Nations

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92. *World Population Expected To Hit Seven Billion by 2012*, DAILY MAIL REPORT, June 20, 2008 (“There are 6.7 billion people in the world today. The United States ranks third . . . behind China and India.”).

93. *United Nations Marks World Population Milestone: 7 Billion People*, WASH. POST, Oct. 31, 2011, at 1, available at [http://www.washingtonpost.com/world/asia-pacific/nations-worldwide-honor-various-7-billionth-babies-symbolizing-global-population-milestone2011/10/31/gIQAe6rBYM\\_story.html](http://www.washingtonpost.com/world/asia-pacific/nations-worldwide-honor-various-7-billionth-babies-symbolizing-global-population-milestone2011/10/31/gIQAe6rBYM_story.html).

94. United Nations Framework Convention on Climate Change, UN Doc. A/AC.237/18 (May 15, 1992), reprinted in 31 I.L.M. 849, available at <http://unfccc.int/resource/docs/a/18p2a01.pdf>.

95. *Id.* ch. III, para. 129(f).

Convention to Combat Desertification, the Convention on Biological Diversity, and the United Nations Declaration on the Rights of Indigenous Peoples.<sup>96</sup> Periodic reviews<sup>97</sup> of national adaptation plans should assess and update measures for “climate refugees,”<sup>98</sup> increasing resilience through economic diversification and transfer of adaptation and mitigation technologies.<sup>99</sup>

Robust habitat protection/restoration and emergency response systems are resilience enhancers.<sup>100</sup> Security driver areas for greater cooperation include per capita resource use intensity, disease resistance to climate-induced pathogens, and population, and urbanization coordination.

There is substantial room for integration among climate and development strategies in the developing world on water and food security, literacy, employment, and poverty reduction. For instance, increasing the availability of solar cookers around the world can help reduce black carbon emissions in the atmosphere, indoor air pollution, and deforestation.<sup>101</sup> Scaling up the use of solar cookers addresses mitigation, adaptation, and public health simultaneously. Solar cooker diffusion can build trust, establish climate networks around the world, and provide tangible success stories with which to establish accessible technology clearing house programs. Scalable, sustainable energy innovations such as solar cookers can play a crucial role in reducing health risks and increasing energy availability.

Green economy capacity building can come in the form of building training with disaster resilience in mind.<sup>102</sup> Post disaster rebuilding should involve local communities and materials. Given the reality that poor people in developing countries construct their own homes, the international community can facilitate capacity building in the form of model homes that can be copied by people building their own homes, emphasizing resilience to disasters that may impact a given region. This effort can combine local traditional knowledge with structural

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96. *Id.* ch. II, para. 22(i).

97. *Id.* ch. I, para. 26.

98. Elizabeth Burleson, *Climate Change Displacement to Refuge*, 25 J. ENVTL. L. & LITIG. 19 (2010).

99. United Nations Framework Convention on Climate Change, *supra* note 94, ch. I, para. 25(c)-(e).

100. See Elizabeth Burleson, *Multilateral Climate Change Mitigation*, 41 U.S.F. L. REV. 373 (2007).

101. See generally Burleson & Burleson, *supra* note 2.

102. See generally DANIEL FARBER, JIM CHEN, ROBERT R.M. VERCHICK & LISA GROW SUN, *DISASTER LAW AND POLICY* (2d ed. 2006).

engineering developments to achieve safe, affordable, sustainable living spaces throughout the world.

Building codes seek to preserve health, safety, and welfare while enabling private development of land. Governance has expanded to encompass water management, construction materials, indoor air quality, and efficiency.<sup>103</sup> In the United States, the private, voluntary LEED program<sup>104</sup> awards points for a myriad of environmental measures, such as sustainable construction materials, while the public Energy Star program<sup>105</sup> provides a labeling system with which people can integrate energy use into their purchasing decisions. In addition to subsidies, loans and fast track permitting, communities have used such programs as a basis upon which to incentivize green building.<sup>106</sup> Making available clearinghouses of best practices would facilitate increased efficiency.<sup>107</sup> Solutions can vary from region to region. Communities can build sustainable quality homes that save water, minimize storm water runoff, reduce energy bills, and help people become resilient to climate extremes while contributing to climate adaptation and mitigation.

#### *D. What Is Environmentally Sound Technology: Life Cycle Analysis*

Ramping up interdisciplinary innovation exchanges can build upon UNFCCC innovation centers initiatives through in person, online, and hard copy pooling of established best practices as well as cutting edge experiments. This author recommends a full scale World's Fair For Renewable Energy. Environmentally sound demonstration projects can build on the creativity of the MIT Media Lab, combined with the ecological integrity of Maine's Common Ground Fair. Universities can engage in bringing demonstrations on the road to share tangible climate solutions with a wide range of community participants.

Clearly some technologies are better suited to informal individual and small group breakthroughs while others would benefit most from

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103. For a discussion of tribal governance in the area of land use see Nicholas A. Fromherz & Joseph W. Mead, *Equal Standing with States: Tribal Sovereignty and Standing After Massachusetts v. EPA*, 29 STAN. ENVTL. L.J. 131 (2010).

104. U.S. Green Building Council, LEED Rating Systems, <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222> (last visited Oct. 28, 2011); see also Charles J. Kibert & Kevin Grosskopf, *Envisioning Next-Generation Green Buildings*, 23 J. LAND USE & ENVTL. L. 145, 148 (2007).

105. See ENERGY STAR PROGRAM, <http://www.energystar.gov> (last visited Oct. 28, 2011).

106. See 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).

107. See Stephen R. Miller, *Commercial Green Leasing in the Era of Climate Change: Practical Solutions for Balancing Risks, Burdens, and Incentives*, 40 ENVTL. L. REP. NEWS & ANALYSIS 10487, 10495 (2010).

large-scale public research coordination. Hydrokinetic energy, for instance, should not be dismissed without substantial efforts to coordinate shared use of coastal regions suitable to wave energy projects.

RGGI funding, as well as Renewable Portfolio Standard proceeds, can be directed towards large scale renewable infrastructure as well as Civilian Conservation Corps plus youth innovation initiatives. These can be in the form of grants that are not onerous to apply for, and which are broad enough to facilitate both well-off communities as well as urban and rural communities struggling to meet basic energy and shelter needs.

Depression era poor urban youth built lasting monuments to national spirit throughout the national parks of the United States. Their modern contemporaries compete in Olympiad of the mind, extra-curricular and occasional solar races, if the opportunity arises. More often they live in virtual worlds for lack of safe places to congregate. Sustaining an environmental conscience is not easily done by spending little time in natural places. Class, gender, ethnicity, and a range of other factors influence exposure rates to environmental externalities and understanding of how to integrate human rights and environmental stewardship. Creativity expands with practice and can be synergistic. MIT students immerse themselves in collaborative cutting edge endeavors, the likes of which are sometimes as suited to Steve Jobs' garage as to large institutions.

Of course there are intellectual property obstacles. They are real and complex. The Soviet experiment with socialism tragically demonstrated that folks do not tend to be inwardly driven to work without recognition or remuneration. Centuries of repressive governments have exacted human capital towards national objectives. This is not the goal of this Article. Many of the world's leading trade, intellectual property, climate, and innovation experts have been finding common ground in the UNFCCC (Conference of the Parties) gatherings, and side events. These science and technology conferences have led to partnerships among BINGOS, ENGOS, and RINGOS.<sup>108</sup> In this manner, business, research, and nongovernmental human rights/environmental groups have worked with country delegations to draft consensus language on environmentally sound technology innovation and transfer. This process has involved defining international legal terms and integrating treaty party reports. Nonstate actor discussions have led to useful expert guidance—the jury

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108. BINGOs are business and industry nongovernmental organizations (NGO), ENGOS are environmental NGOs, and RINGOs are research and independent NGOs.

is still out on whether they will lead to industry capture and intellectual property rules at the international level that preclude climate tech transfer.

Not many individuals are able to become experts across international economic, public, environmental, and human rights and law of armed conflict legal regimes. Each has an influence on climate decision-making. International legal texts often combine roughly three of the above categories. Seldom does the literature discuss the manner in which “military intelligence” and funding could provide environmentally sound technology R&D leadership. At the Bali Climate Conference, Papua New Guinea challenged the United States to lead or “get out of the way.”<sup>109</sup> An important question today is whether those stakeholders with the most to lose in mitigating climate change can be convinced to step aside or become the alternative energy leaders. The U.S. military is clearly stepping up to the plate.<sup>110</sup> Can big energy begin to play a similarly important role mitigating greenhouse gas emissions? What would this look like? BP may not have taken us beyond petroleum yet but the largest energy companies are involved in a range of nonfossil fuel diversification energy projects. Scaling this R&D up by several orders of magnitude could have a profound impact on the rate at which climate targets could be reached, both domestically and globally. The Defense Advanced Research Projects Agency (DARPA) has innovation capacity beyond pure capitalism, with its intellectual property/public domain obstacles. The U.S. military should design, develop, and broadly diffuse climate-friendly and environmentally sound technologies that can be improved upon within the public domain. Redirecting military and big energy funding towards green innovation can build upon the best practice model of the national public sector energy labs.

In order to sustain military and energy security, it makes sense for military and energy sectors to work on ramping up energy storage, renewable energy, and efficiency measures. This author suggests the United States Coast Guard play a lead role in tackling wave energy—on par with the Army Corps of Engineers control of much of the U.S. hydro infrastructure. By working with the Corps and other public/private partnerships, the Coast Guard can coordinate wave energy viability and strategic implementation.

Optimal design features will not inevitably lead to widespread adoption. Even good innovations often need help to come into widespread use. A global perspective and perseverance can be instrumental in

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109. See Catherine Brahic, *Tears and Cheers Seal “Unthinkable” Climate Deal*, NEW SCIENTIST (Dec. 15, 2007), <http://www.newscientist.com/blog/environment/labels/bali.html>.

110. Burlison & Burlison, *supra* note 2, at 661.

enabling environmentally sound innovation. Free trade agreements for such climate friendly goods can also help.<sup>111</sup>

In the context of environmentally sound technology creation, global businesses would like a single standard. Generally, they do not prefer selling different products in the United States than they sell elsewhere. If U.S. standards are lower, then it is a rush to the lowest common denominator to sell the product with the cheapest price tag at the outset rather than the most energy efficient product across its life cycle. The upscale green market remains small. Noble individuals are willing to buy, but many remain priced out of the decision-making process regarding green choices. Lack of demand-pull impacts the green technology markets in much of the developing world.

We need to incentivize the supply and demand of environmentally sound technology. Just as a reward for a clock that could keep accurate time at sea incentivized John Harrison to build such a device,<sup>112</sup> accelerating innovation should become a national and international priority. Whether one uses the U.S. Council on Foreign Relations term Innovation Hubs or the UNFCCC term Climate Technology Centers, policy frameworks that can catalyze innovation require a well-designed public sector role. For instance, it takes government action to implement patent extension in exchange for open licenses. Funding can occur through both private and public sector cooperation. It is important to provide the right conditions for innovation to not only hatch but also thrive. This requires suitable macro systems, rather than a single pilot program in order to incentivize ongoing dynamic systems.

This author suggests that innovation centers collaborate on substantive life cycle costing analyses that can be both comprehensive and allow for breakout assessments given local metrics. Not every energy source needs to become a free-standing category. Whale oil once sustained many civilizations. The whaling debate is still alive and well, but perhaps whale oil can be combined with biomass analysis for the purposes of energy source comparisons. These decisions are not without value judgments and there is a danger in reducing lifecycle analysis to charts or kilowatt cost comparisons. Measuring black lung disease for West Virginian coal miners versus Fukushima nuclear fallout for Tokyo children clearly involves apples and oranges. Eliminating age and

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111. See Interview with Marie-Claire Cordonier Segger, Dir. of the Ctr. for Int'l Sustainable Dev. Law, at Cancún climate negotiations, *available at* <http://www.youtube.com/watch?v=dy2T3mOZp-g> (last visited Nov. 12, 2011).

112. See DAVA SOBEL, *LONGITUDE: THE TRUE STORY OF A LONE GENIUS WHO SOLVED THE GREATEST SCIENTIFIC PROBLEM OF HIS TIME* (2005).

earning power as metrics can simplify the analysis, as can using average hospital costs to treat cancer and lung conditions. These are fraught with subsidiary issues that reduce the fungibility of the numbers, yet they would provide a much more comprehensive picture than the current default to kilowatt-hours. This is an important analysis to conduct and may be a precursor for some to engage in climate negotiations. Just as transboundary water management benefits from coming to the negotiation table with a firm understanding of basic data on regional natural conditions, adaptive energy management can green economies by first deeply understanding positive and negative externalities associated with given energy sources. In this way, climate consensus building can regain momentum.

This Article responds to an under-theorized area of incentivizing environmentally sound innovation to address climate change. Joint R & D endeavors can seek to match innovators with end users and/or funders. Centers can come in the form of international sector specific nodes that gather experts and resources. They can offer country-specific best practice demonstrations as well as foster opportunities to improve upon initial innovations. They can commit to focusing upon innovations that meet hitherto ignored needs. These can be as simple as the design exhibits IBM pioneered in its office space in Manhattan, or as extensive as the Barefoot College's efforts to expand basic solar panel use across Africa via training for women to become engineers.<sup>113</sup>

Decentralized processes that are free from micro management can learn by doing and adapt technology to local conditions. Building on existing institutional support and environmentally sound technology, innovation centers can become incubators and organizers of field trials. Locating recycling centers and innovation hubs near one another and near university resources can intensify innovation processes. This bottom-up enabling environment can involve a mix of bilateral funding and host institution funding put towards subsidization and contests for new breakthrough technologies.

Intellectual property issues vary by technology. Generally, it is fair to say that there is middle ground between granting overly strict intellectual property rights for climate technologies and waiting thirty years for intellectual property rights to expire and technological knowhow to enter the public domain. This author has written elsewhere

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113. See generally BAREFOOT COLLEGE, <http://www.barefootcollege.org/> (last visited Aug. 20, 2011).

of the myriad of opportunities for patent prizes, pooling, and other innovation incentivizing measures.<sup>114</sup>

Given the need for a new pace and scale of innovation, the public sector should implement such policy interventions as subsidies for renewables combined with hands on demonstrations that incentivize further innovation. Accelerated innovation initiatives can come in the form of both networks of innovation hubs and freestanding centers. They can build on existing institutions or galvanize new energy. Public versus private debates are not necessary given the synergies that can result from public-private partnerships, given long-term reliable financing. Innovation incentivizing initiatives should incorporate independent evaluation that can facilitate adaptive management. Linking local, national, regional, and global environmentally sound technology centers can diffuse best practices.

The following chart seeks to flesh out what constitutes environmentally sound technology from a life cycle analysis frame. Energy sources ranging from fossil fuels to hydrokinetic energy can be found along the following horizontal axis. Along the vertical axis, factors include water intensity, human security issues, and innovation/diffusion/scalability indicators. In this manner the Author seeks to establish a framework that can aid policy-makers in reaching environmentally sound and water conscious energy decisions. The new UNFCCC Technology Mechanism could post online the following template and survey UNFCCC state and nonstate participants based upon the following metrics.<sup>115</sup> The IPCC has published a full report upon which to begin to provide decision-makers with a comparative lifecycle analysis.<sup>116</sup> The International Renewable Energy Agency (IRENA) and the new UNFCCC Technology Mechanism are well positioned to provide leadership to develop and diffuse general and regionally specific lifecycle analysis (1) using some of the following energy sources along a horizontal axis: coal, oil, gas, nuclear, wind, solar, geothermal, hydro, wave, and biofuels and (2) using the following criteria in a vertical column: adaptation, cost, safety, availability, scalability, security issues, sustainability index, water, and climate. This empirical multi-factor

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114. See Burlison & Burlison, *supra* note 2, at 661.

115. This is one of many possible approaches to broaden general understanding of renewable energy material that can be found in longer analyses. See, e.g., K.K. DUUVIER, THE RENEWABLE ENERGY READER (2011); CATHERINE GAUTIER, OIL WATER, AND CLIMATE: AN INTRODUCTION (2008).

116. IPCC WORKING GROUP III-MITIGATION OF CLIMATE CHANGE, SPECIAL REPORT ON RENEWABLE ENERGY SOURCES AND CLIMATE CHANGE MITIGATION (2011), available at <http://srren.ipcc-wg3.de/>.

evaluation provides a preliminary framework with which to compare and contrast energy sources. Others may choose to give weights to the different factors based upon differing value judgments. This approach may prove useful in extending a labeling or cradle to grave certification program beyond hazardous chemicals to energy sources with varying social impacts. Mountain top removal, an energy extraction process that destroys ecosystems by design, has different impacts than other forms of coal extraction. Such distinctions should be addressed in developing a full life cycle analysis with which to base a labeling program for energy use. Doing so can send a message to entire supply chains. In the United States, the EPA is well-suited, albeit under-funded, to help design a robust sustainability index of this kind.

*E. Understanding and Contributing to Emerging International Law*

Emphasizing synergies between the international human rights and international environmental legal regimes can help broaden the level of cooperation for sustainable development generally and in community based green economy initiatives in particular. Analyzing inter-temporal negative externalities can lead to broad understanding of the cross-cutting public health and security issues that are intricately intertwined with energy generation. These are called health and welfare in the United States and international peace and security at the international level.

Increasing the breadth/depth of understanding of international law generally, and of international organizations in particular, can help resolve the much needed integration of human rights and environmental protections.<sup>117</sup> Often these two are on the flip sides of the same coin.

This Part discusses several of the areas of international law that can be better integrated into U.S. legal education.

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117. See generally SIMON CHESTERMAN, THOMAS FRANCK & DAVID MALONE, LAW AND PRACTICE OF THE UNITED NATIONS: DOCUMENTS AND COMMENTARY (2008); JOSÉ ALVAREZ, INTERNATIONAL ORGANIZATIONS AS LAW-MAKERS, VOLUME 13 (2006); UNITED NATIONS UNIVERSITY, THE ROLE OF THE UNITED NATIONS IN THE TWENTY-FIRST CENTURY: REPORT OF THE INAUGURAL SYMPOSIUM HELD AT UNU HEADQUARTERS, TOKYO, JAPAN, 18 FEBRUARY 1993 (1993); FREDERICO MAYOR, MEMORY OF THE FUTURE (1995); LEYLA ALYANAK ET AL., IMPLEMENTING AGENDA 21: NGO EXPERIENCES FROM AROUND THE WORLD (1997); NILS JANSEN, THE MAKING OF LEGAL AUTHORITY: NON-LEGISLATIVE CODIFICATIONS IN HISTORICAL AND COMPARATIVE PERSPECTIVE (2010); DIMITRIS BOURANTONIS & JARROD WIENER, THE UNITED NATIONS IN THE NEW WORLD ORDER: THE WORLD ORGANIZATION AT FIFTY (1996); EVAN LUARD, THE UNITED NATIONS: HOW IT WORKS AND WHAT IT DOES (1979); ANDREAS RASCHE ET AL., THE UNITED NATIONS GLOBAL COMPACT: ACHIEVEMENTS, TRENDS, AND CHALLENGES (2010); IAN HURD, INTERNATIONAL ORGANIZATIONS: POLITICS, LAW, PRACTICE (2011); THOMAS G. WEISS ET AL., THE OXFORD HANDBOOK ON THE UNITED NATIONS (2007).

International curricula can begin with the U.N. Charter as a constitution and basis upon which to achieve widespread cooperation in international decision-making.<sup>118</sup> It can analyze the U.N. structure, treaty facilitation role, and interdependence of inter-governmental organizations, states, and nonstate actors on such emerging collective action security problems as climate, energy, water, and good governance.<sup>119</sup> A focus can be placed on the creation of the United Nations as well as an overview of U.N. organs, agencies, funds and partners in sustaining international peace and security. Armed conflict and expanding challenges to collective security continue to arise in the traditional context of threats to the peace. At the same time, evolving international law continues to integrate nonstate actors into peace building and conflict prevention. Climate change poses nonarmed conflict threats on a global scale. Curricula can facilitate exploration of the means by which such threats can be addressed in a security context through cooperation with regional organizations, international institutions, and civil society. Using this thematic approach, curricula can offer a U.N. base upon which to build an understanding of international law generally. It can provide a base for further analysis of international human rights and sustainable development. Energy is a useful thread with which to analyze the accretion of International Court of Justice litigation and Security Council resolutions. For instance, the North Sea Oil cases<sup>120</sup> are both procedurally and substantively instrumental, as are U.N. responses to such energy induced armed conflicts as the conflict in Iraq.<sup>121</sup> Providing an overview of U.N. law through the context of energy security offers a framework with which to analyze the integrated cooperative decision making underway at the international level.

International curricula can provide an overview of the evolution of international environmental law and global struggle to achieve sustainable development as energy, climate, and water security pressures mount. It can focus on the International Court of Justice's decision on the Gabčíkovo-Nagymaros Project, exemplifying substantive

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118. See U.N. Charter, available at <http://www.un.org/en/documents/charter>.

119. See generally DAVID LEARY ET AL., THE FUTURE OF INTERNATIONAL ENVIRONMENTAL LAW (2010); PATRICIA BIRNIE, ALAN BOYLE & CATHERINE REDGWELL, INTERNATIONAL LAW AND THE ENVIRONMENT (2009).

120. North Sea Continental Shelf (Ger./Den.; Ger./Neth.) 1969 I.C.J. 3 (1969).

121. See S.C. Res. 1483, U.N. Doc. 5/RES/1483 (May 22, 2003). The Security Council recognized the conditional nature of Coalition Provisional Authority's use Iraqi oil revenue. Use must benefit the Iraqi people and be made in a transparent manner and with meaningful Iraqi input. *Id.*

international water law that encompassed International Law Commission treaty language.<sup>122</sup> Through case and treaty materials, it can demonstrate the interdependency that has developed among various international bodies, both within and beyond the United Nations. Such curricula can also analyze the *WHO Advisory Opinion* as a landmark decision in delineating spheres of influence among international bodies.<sup>123</sup> International institutions ranging from transboundary water organizations to global climate coordination institutions have evolved in a piecemeal fashion over the past century.<sup>124</sup> If climate disruptions will be increasingly water related, then climate coordination involving transboundary water cooperation will be an important means of adaptation and conflict prevention. The international community has identified equitable, efficient energy use as a strategic climate mitigation measure. Addressing this complex collective action problem that spans many disciplines and geopolitical jurisdictions can be facilitated by a strong foundation in international decision-making. Given the framework of the climate, water, and energy nexus curricula can provide an overview of the consensus building process that has resulted in treaty regimes and international institutions emerging from Stockholm and Rio forums. It can look at ways in which to better coordinate decision making across disparate regimes ranging from trade to climate, bringing together Rio treaty bodies with UNEP, UNESCO, WHO and other U.N. bodies as well as the IUCN and such international organizations as the WTO.<sup>125</sup> Transfer of environmentally sound technologies as a legal obligation under TRIPS<sup>126</sup> and GATT article XX<sup>127</sup> provide some legal guidance. Yet, consensus remains elusive regarding the scope of the Agenda 21 term “environmentally sound” and the manner in which specialized international law emerging from fragmented regimes can

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122. Gabčíkovo-Nagymaros Project (Hung. v. Slov.), 1997 I.C.J. No. 92 (1997).

123. Request for advisory opinion made by the World Health Organization, THE HAGUE: INTERNATIONAL COURT OF JUSTICE (Sept. 3, 1993), <http://www.icj-cij.org/docket/files/93/10309.pdf>.

124. See Legality of the Threat or Use of Nuclear Weapons, 1996 I.C.J. 226 (Advisory Opinion of 8 July 1996), *reprinted in* 35 I.L.M. 809 (1996).

125. UNEP (United Nations Environmental Programme), UNESCO (United Nations Educational, Scientific and Cultural Organization), WHO (World Health Organization), and WTO (World Trade Organization).

126. Agreement on Trade Related Aspects of Intellectual Property Rights, Apr. 15, 1994, *available at* [http://www.wto.org/english/docs\\_e/legal\\_e/27-trips\\_01\\_e.htm](http://www.wto.org/english/docs_e/legal_e/27-trips_01_e.htm) (last visited Oct. 27, 2011).

127. General Agreement on Tariffs and Trade, Oct. 30, 1947, 61 Stat. A-11, 55 U.N.T.S. 194.

increase rather than decrease international cooperation.<sup>128</sup> The international climate negotiations provide both a substantive and procedural case study with which to analyze the cooperative decision-making role of the United Nations, major groups and other nonstate actors.<sup>129</sup>

International curricula can evaluate such principles as sustainable development arising from the Our Common Future<sup>130</sup> report and how Indigenous Peoples, national minorities, youth, women, business, farmers, local authorities, NGOs, academia, and other nonstate actors can find shared vision on the precautionary principle and subsidiarity generally and climate mitigation, adaptation, technology transfer, and funding in particular. Energy innovation and diffusion of environmentally sound technologies can address climate, public health, and air pollution.<sup>131</sup> Curricula can analyze the nascent efforts between WIPO,<sup>132</sup> UNFCCC, core U.N. bodies, and NGOs to bridge intellectual property and international environmental laws, policies, and practice.<sup>133</sup> By focusing on sustainable development, curricula can offer both a free standing unit as well as a foundation for the evolution of addressing human rights and the environment in a mutually reinforcing manner. The climate refugee dilemma provides a framework with which to bring

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128. See generally THOMAS COTTIER, OLGA NARTOVA & SADEQ Z. BIGDELI, INTERNATIONAL TRADE REGULATION AND THE MITIGATION OF CLIMATE CHANGE: WORLD TRADE FORUM (2009); RICHARD L. REVESZ ET AL., ENVIRONMENTAL LAW, THE ECONOMY, AND SUSTAINABLE DEVELOPMENT (2000); CARLO CARRARO ET AL., NEW DIRECTIONS IN THE ECONOMIC THEORY OF THE ENVIRONMENT (2009); JIM MACNEILL, PIETER WINSEMIUS & TAIZO YAKUSHIJI, BEYOND INTERDEPENDENCE: THE MESHING OF THE WORLD'S ECONOMY AND THE EARTH'S ECOLOGY (1991); HANS JOACHIM SCHELLNHUBER ET AL., GLOBAL SUSTAINABILITY: A NOBLE CAUSE (2010); SCOTT BARRETT, WHY COOPERATE?: THE INCENTIVE TO SUPPLY GLOBAL PUBLIC GOODS (2007); DOUGLAS G. BAIRD, ROBERT H. GERTNER & RANDAL C. PICKER, GAME THEORY AND THE LAW (1998).

129. Elizabeth Burlison & Diana Pei Wu, *Non-State Actor Access and Influence in International Legal and Policy Negotiations*, 21 FORDHAM ENVTL. L. REV. 193, 201 (2010).

130. See WORLD COMMISSION AND DEVELOPMENT, OUR COMMON FUTURE: THE WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT (1987).

131. For recent developments in Intellectual Property discussions, see generally TZEN WONG & GRAHAM DUTFIELD, INTELLECTUAL PROPERTY AND HUMAN DEVELOPMENT: CURRENT TRENDS AND FUTURE SCENARIOS (2011).

132. See generally WIPO, <http://www.wipo.int/portal/index.html.en> (last visited Oct. 28, 2011).

133. See generally MICHAEL GOLLIN, DRIVING INNOVATION: INTELLECTUAL PROPERTY STRATEGIES FOR A DYNAMIC WORLD (2008); STEWART BRAND, THE MEDIA LAB: INVENTING THE FUTURE AT M.I.T. (1988); CHRISTOPHER ARUP, INNOVATION, POLICY AND LAW (2009); DAVID VAVER ET AL., INTELLECTUAL PROPERTY AND THE NEW MILLENNIUM: ESSAYS IN HONOUR OF WILLIAM R. CORNISH (2004); JAN FAGERBERG ET AL., THE OXFORD HANDBOOK OF INNOVATION (2006); CHRISTOPHER ARUP ET AL., INTELLECTUAL PROPERTY POLICY REFORM: FOSTERING INNOVATION AND DEVELOPMENT (2009); WILLEM GROSHEIDE ET AL., INTELLECTUAL PROPERTY AND HUMAN RIGHTS: A PARADOX (2010).

together key rights-based aspects of international law with such thematic issues as water and food security.<sup>134</sup> U.N. Water has become a model for addressing fragmentation and building on shared mandates to address cross cutting issues.<sup>135</sup> Curricula can assess new challenges in polar regions relating to ocean stewardship, natural resource management, and human rights.<sup>136</sup> There is a clear nexus between armed conflict and natural resource exploitation—one that can be addressed through sharing best practices for natural resource management that remains mindful of equity.<sup>137</sup> National resource sovereignty and sustainable development compromises have led to functional rather than strictly territorial approaches to shared environmental concerns, ranging from climate change to biological diversity. Much progress remains to be made, as existing international bodies remain under-resourced to address the ever-increasing rate of environmental degradation.

Curricula can further consider the Millennium Development Goals,<sup>138</sup> the Commission on Sustainable Development, the United Nations Development Programme, U.N. Water, and efforts to bridge human rights international bodies with environmental entities.

International curricula can analyze the groundbreaking work of the Aarhus Convention in the context of a human right to a clean environment. Collaborative decision-making and climate justice discussions depend upon rule of law and strong civil and political rights.<sup>139</sup> These, in turn, can become meaningless in the absence of economic, social, and cultural rights. Curricula can consider the evolution of U.N. human rights developments and case law, as well as such regional organizational regimes as the ECHR.<sup>140</sup> It can culminate in

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134. Burleson, *supra* note 98, at 19.

135. See generally UN Water, <http://www.unwater.org/> (last visited Oct. 28, 2011).

136. Elizabeth Burleson, *The Polar Regions and Environmental Law*, in ROUTLEDGE HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW (Shawkat Alam et al. eds., forthcoming 2012).

137. Elizabeth Burleson, *Middle Eastern and North African Hydropolitics: From Eddies of Indecision to Emerging International Law* 18 GEO. INT'L ENVTL. L. REV. 385 (2006); see also Elizabeth Burleson, *Equitable and Reasonable Use of Water in the Euphrates-Tigris River Basin*, 35 ENVTL. L. REP. 10041 (2005).

138. See UN, <http://www.un.org/millenniumgoals/> (last visited Oct. 28, 2011); see also Burleson, *supra* note 38.

139. See generally SHAWKAT ALAM ET AL., GLOBALISATION AND THE QUEST FOR SOCIAL AND ENVIRONMENTAL JUSTICE: THE RELEVANCE OF INTERNATIONAL LAW IN AN EVOLVING WORLD ORDER (2011).

140. Convention for the Protection of Human Rights and Fundamental Freedoms, Nov. 4, 1950, 213 U.N.T.S. 222 (1950). It is important to note that the European Convention for the Protection of Human Rights and Fundamental Freedoms significantly predates European Community and European Union legislation. The former was signed in 1953 by European countries in an effort to prevent atrocities like the Holocaust. In contrast to this human rights

an analysis of coordination among human rights and nonhuman rights international legal frameworks. Curricula can focus on U.N. organ and subsidiary organ analysis, looking at the ways in which “We the Peoples of the United Nations” has slowly taken on meaning as civil society has gained access to decision-making forums and brought human rights cases before international tribunals.<sup>141</sup>

The Universal Declaration of Human Rights (UDHR) provides a launching point with which to address the array of treaty regimes on human rights and minority rights for such groups as Indigenous Peoples, national minorities, women, children, and disability communities. The UDHR forms the foundation of the two oldest human rights instruments (ICCPR and ICESCR).<sup>142</sup> Building upon this international bill of rights framework, curricula can provide an overview on the U.N. High Commissioner for Human Rights (OHCHR), U.N. Human Rights Council, special rapporteurs, international courts and tribunals, as well as forums such as the World Conference on Human Rights (1993 Vienna). In the alphabet soup of international human rights bodies, the OHCHR supports a wide variety of human rights monitoring mechanisms (U.N. Charter-based bodies and bodies created under such international human rights treaties as the Committee on the Rights of the Child (CRC)<sup>143</sup> and Committee on the Rights of Persons with Disabilities (CRPD)).<sup>144</sup> Recently, cooperative efforts have focused on building enabling environments for sustainable development and addressing the global food security crisis fueled by speculation, biofuels, climate instability, and other factors. The Committee on Economic, Social and Cultural Rights (CESCR) is the body of independent experts that monitors implementation of the International Covenant on Economic, Social and

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initiative, European Union institutions have concentrated on the economic incentives of cooperation; *see also* SVITLANA KRAVCHENKO & JOHN BONINE, HUMAN RIGHTS AND THE ENVIRONMENT: CASES, LAW, AND POLICY (2008).

141. *See generally* DAVID MATHEWS, POLITICS FOR PEOPLE: FINDING A RESPONSIBLE PUBLIC VOICE (1998); JAMES S. FISHKIN, WHEN THE PEOPLE SPEAK: DELIBERATIVE DEMOCRACY & PUBLIC CONSULTATION (2009).

142. *See United Nations' Documentation: Research Guide*, UN, <http://www.un.org/Depts/dhl/resguide/spechr.htm> (last visited Oct. 28, 2011).

143. *See Committee on the Rights of the Child*, OFFICE OF THE UNITED NATIONS HIGH COMMISSIONER FOR HUMAN RIGHTS, <http://www2.ohchr.org/english/bodies/crc/> (last visited Nov. 8, 2011).

144. *See Committee on the Rights of Persons with Disabilities*, OFFICE OF THE UNITED NATIONS HIGH COMMISSIONER FOR HUMAN RIGHTS, <http://www.ohchr.org/en/hrbodies/crpd/pages/crpdindex.aspx> (last visited Nov. 8, 2011).

Cultural Rights by its states' parties.<sup>145</sup> Food, water, energy, and climate concerns are squarely on the agenda. This work is facilitated by the equally important protection of civil and political rights with which to voice civil society concerns. The Human Rights Committee is the body of independent experts that monitors implementation of the International Covenant on Civil and Political Rights by its state parties.<sup>146</sup>

Good governance involves the promotion of the rule of law and equal justice under the law. Curricula can provide an overview of the interrelated U.N. work on human rights and good governance. Political, social, and economic priorities of a state should be based on a broad consensus within its civil society, and governing processes should seek to respond effectively to socioeconomic concerns.<sup>147</sup> Beyond free and fair elections, governing inclusively and humanely is core to good governance. Constitutionally guaranteed rights can avert the abuse of power, loss of liberty, and targeting of minorities. The United Nations seeks to maintain international peace and security; develop friendly relations among nations; cooperate in solving international economic, social, cultural and humanitarian problems; and promote respect for human rights and fundamental freedoms. The United Nations High Commissioner for Human Rights works to strengthen and coordinate United Nations human rights work.<sup>148</sup> This increasingly involves cross-cutting human rights, humanitarian work, disaster response, and conflict prevention. The Office of the United Nations High Commissioner for Refugees works in 123 countries seeking to assist more than forty-three million uprooted people worldwide. The international community relies upon the United Nations to respond to natural and man-made disasters. Over a longer time frame, conflict prevention strategies address the root causes of war, strengthening security, economic growth, good governance, and respect for human rights.<sup>149</sup>

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145. See *Committee on Economic, Social and Cultural Rights*, OFFICE OF THE UNITED NATIONS HIGH COMMISSIONER FOR HUMAN RIGHTS, <http://www2.ohchr.org/english/bodies/cescr/> (last visited Nov. 8, 2011).

146. See *Monitoring Civil and Political Rights*, OFFICE OF THE UNITED NATIONS HIGH COMMISSIONER FOR HUMAN RIGHTS, <http://www2.ohchr.org/english/bodies/hrc/> (last visited Nov. 8, 2011).

147. See generally HANS KÜNG, *GLOBAL RESPONSIBILITY: IN SEARCH OF A NEW WORLD ETHIC* (2004); HANS KÜNG, *A GLOBAL ETHIC FOR GLOBAL POLITICS AND ECONOMICS* (1998); DANIEL TAYLOR-IDE & CARL E. TAYLOR, *JUST AND LASTING CHANGE: WHEN COMMUNITIES OWN THEIR FUTURES* (2002); ALBERT EINSTEIN, *EINSTEIN ON HUMANISM* (1998).

148. See *Navanethem Pillay*, OFFICE OF THE UNITED NATIONS HIGH COMMISSIONER FOR HUMAN RIGHTS, <http://www.ohchr.org/en/aboutus/pages/highcommissioner.aspx> (last visited Nov. 8, 2011).

149. See generally JOHN PAUL LEDERACH, *THE MORAL IMAGINATION: THE ART AND SOUL OF BUILDING PEACE* (2010); CHERYL H. KEEN, JAMES P. KEEN, SHARON DALOZ PARKS & LAURENT

Initially, the U.N. system was designed to maintain international peace and security. Critiques centered around the legality of the use of force by states and the Chapter VII system permitting economic sanctions and use of force in such contexts as the Gulf War. This expanded to new uses of Chapter VII, criminal trials, humanitarian intervention, peacekeeping, and terrorism. Changes since the creation of the United Nations have included expansion of the U.N. use of force in noninternational conflicts, as well as the international community's response to international terrorism within a system based on sovereign equality of nation states.

U.N. sanctions and humanitarian interventions have had human rights impacts. Beyond existing within a society of states defined by sovereignty, the United Nations has evolved along with an emerging global culture that has progressed from the nation-state model, and has profoundly impacted the expansion of global norms and laws. The United Nations has been one of the forces that have helped shape international law and politics. It hosts treaty-making forums and coordinates human rights observers, election monitors, and peacekeepers. It collects data and publicizes information about given problems and country policies, as well as encouraging compliance with international treaties. It has facilitated trust and cooperation among governments and nonstate actors. Building upon U.N. cooperation with the International Committee of the Red Cross and the U.N. Charter Article 71 provisions for NGO involvement, collective action collaborative decision-making among the United Nations, states, and civil society NGOs have strengthened respective weaknesses with regard to good governance, legitimacy, and effectiveness. This collaborative approach continues to evolve as new challenges threaten international peace and human security.

Public international law provides an overview of the structure and workings of the international legal system and some of the principal topics and problems in the field. It involves the nature of international law, sources of international law, law relating to the use of force, jurisdiction, state responsibility, sovereign immunity, the environment, and human rights.

International human rights law examines the role of international judicial institutions, regional human rights courts, nations, and civil society in developing and protecting international human rights. Standing, proper forum, and access to information all arise in distinct

courts, many of which have begun citing to one another—not as binding precedent—but as persuasive authority for principles and examples of ways to integrate human rights and environmental stewardship. Within the legal field alone there are a myriad of jurisdictions taking up aspects of the “energy, climate, water, good governance” nexus. Statutory interpretation—be it of a human rights treaty or a domestic environmental instrument—can lead to overlapping concentric circles of impacts. Each case drops a pebble in the ocean of law, with reverberating implications for the analysis conducted by other jurisdictions.

International environmental law and policy scholars analyze the structure and basic principles of international environmental law and policy.<sup>150</sup> Curricula can consider the challenge of addressing global environmental problems, the regulatory limitations of law, and the basic structure and principles of international environmental law. It can assess the treaties related to climate change, biodiversity and wildlife protection, and the intersection of international trade and the environment.

Energy law can consider the many energy conflicts that arise from public resources, impacts of extraction on public lands for individuals and disadvantaged communities—be it Papua New Guinea mining without clear land title, or hydraulic fracturing without lengthy scientific documentation of groundwater effects. Sectoral cap-and-trade initiatives like RGGI can provide a useful model while achieving significant greenhouse gas emission mitigation. The property law inquiry into how members of a society allocate entitlements to control scarce resources such as water, land, and innovative ideas become central to energy and environmental analysis. Limitations on the rights of landowners to exclude others, estates in land, co-ownership, nuisance, easements, covenants, eminent domain, zoning, and other tools of public land-use regulation cut both ways depending upon the natural resource debate and jurisdiction. In the energy context, law offers the opportunity to address the increase in energy demand within a carbon-constrained world. Joining forces with other disciplines, the legal community can help flesh out meaningful life cycle analysis—life costing metrics, or any other rubric that manages to provide value when comparing the use of coal, oil, gas, nuclear, wind, solar, hydro, wave, and biofuels. Interdisciplinary cooperation can also help come to terms with obstacles that have slowed progress on energy storage. Distributed power, efficiency, and other

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150. *See generally* DANIEL BODANSKY ET AL., THE OXFORD HANDBOOK OF INTERNATIONAL ENVIRONMENTAL LAW (2008).

ancillary concerns all benefit from layering scientific, engineering, economic, legal, and other expertise to find solutions to electricity generation generally, cogeneration, transmission line expansion, human exposure, and environmental factors. In this way, a sound energy policy that meets society's energy needs can fold into green economy and sustainable development advances.

The International Law Commission has taken up the task of trying to address the fragmentation of international law. Past framing decisions have left silos of highly knowledgeable experts in a given specialty who are not well positioned to bridge cross-cutting issues. Diversification and expansion of international law has led to the fragmentation of international law. The Rio+20 Conference hopes to take up enhancing the role of UNEP as well as corporate responsibility in greening the economy.<sup>151</sup>

Greening the economy should involve expanding the figurative pie without negatively impacting ecosystem services. To date, there has been profound resistance to globalization, marked by WTO riots and the targeting of the World Trade Towers in New York City. Sustainable development involves integrating environmental and human needs, engaging civil society rather than repressing people militarily or economically.<sup>152</sup> Traditionally, nation-states were subjects at international law. The international human rights legal regime in particular has recognized broad individual rights. Ordinary people are no longer seen as objects at international law, whose rights may or may not be advanced by given nation-states. Instead, individual people are subjects at international law, with capacity to bring legal suits to protect individual rights as well as rights to participate in international decision-making. This has yet to occur in the context of global referendums—taking given legal decisions directly to the people via the ballot. Increasingly, it has involved public comment periods, opportunities to testify, and stakeholder engagement with public officials making complex decisions. In energy siting processes, rural water cooperatives have been able to

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151. For a discussion of enhancing UNEP, see generally BHARAT H. DESAI, *MULTILATERAL ENVIRONMENTAL AGREEMENTS: LEGAL STATUS OF THE SECRETARIATS* (2010). For an overview of Rio+20, see generally José Antonio Ocampo et al., *The Transition to a Green Economy: Benefits, Challenges and Risks from a Sustainable Development Perspective*, UNITED NATIONS CONFERENCE ON SUSTAINABLE DEVELOPMENT, [http://www.uncsd2012.org/rio20/content/documents/Green%20Economy\\_full%20report%20final%20for%20posting%20clean.pdf](http://www.uncsd2012.org/rio20/content/documents/Green%20Economy_full%20report%20final%20for%20posting%20clean.pdf) (last visited Nov. 8, 2011).

152. See generally JONAS EBBESSON ET AL., *ENVIRONMENTAL LAW AND JUSTICE IN CONTEXT* (2009); MICHAEL B. GERRARD & SHEILA R. FOSTER, *THE LAW OF ENVIRONMENTAL JUSTICE: THEORIES AND PROCEDURES TO ADDRESS DISPROPORTIONATE RISKS* (2008); M. SCOTT PECK, *THE DIFFERENT DRUM: COMMUNITY MAKING AND PEACE* (1998).

impact siting by denying water permits.<sup>153</sup> Ordinary residents had a vote in decisions of national impact due to their collective usufructuary rights to water. Water permitting decisions elsewhere are determined by state officials who take the pulse of given communities regarding such siting issues as hydraulic fracturing for natural gas. In the context of RGGI, state officials have the capacity to ratchet emissions allowances up and down. As a result, RGGI has not taken the invisible hand approach, nor did Adam Smith in *The Wealth of Nations*.<sup>154</sup> Public measures to shift demand or supply alter economic incentives. Sharp shifts can lead to nonstate actor use of monkey wrench sabotage measures. Rule of law is a fragile cooperative arrangement among ordinary people and a small collection of public sector officials. Viable public participation helps sustain buy-in from nonstate actors.<sup>155</sup>

Efficient referendum-like decision-making can come in a variety of forms. This author recommends placing a climate box on IRS 1040 forms directly under front-page contact information that allows people to check a box and an amount of their taxes to be directed towards one of several climate mitigation and adaptation measures. This could be as simple as a box stating environmentally sound technology.

We have come a long way since Rousseau's first sketches of a civil state, yet we still struggle to retain a public domain. This has played out in Wi-Fi and water rights contexts, to mention just a few. We are more dependent on electricity than ever as the security of the grid is challenged by intentional and unintentional threats. As we grow ever more energy dependent, we become more vulnerable.

Aristotle identified the following three realms: (1) recklessness, (2) courage, and (3) cowardice.<sup>156</sup> The United States is overdue for an informed national discussion regarding climate courage as the middle way. Similarly, on the spectrum of hoarding, generosity, and spendthrift behavior, optimal climate mitigation and adaptation measures require generosity to respond to the anticipated risk of climate disruption.

Governments are neither divine nor half-witted. Thoreau noted the physical strength of the state, lamenting its lack of moral strength. In the

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153. The author of this piece personally observed the Clay County Water District decision to turn down Hyperion's water permit request at meeting regarding siting a large new oil refinery.

154. ADAM SMITH, *WEALTH OF NATIONS* (1776).

155. See generally CHRISTOPHER W. MORRIS et al., *AMARTYA SEN: CONTEMPORARY PHILOSOPHY IN FOCUS* (2010); AMARTYA SEN ET AL., *AGAINST INJUSTICE: THE NEW ECONOMICS OF AMARTYA SEN* (2009); AMARTYA SEN, *THE IDEA OF JUSTICE* (2011); AMARTYA SEN, *DEVELOPMENT AS FREEDOM* (2000); AMARTYA SEN, *ON ETHICS & ECONOMICS* (1991).

156. ARISTOTLE, *NICHOMACHEAN ETHICS* (Sarah Broadie & Christopher Rowe eds., trans. 2002).

environmental context, seeing the state as merely inhibiting individual liberty precludes recognition of the public sector as having the capacity to be a steward of the public trust or safety valve for a carbon market. It limits the notion that the public sector can direct financial resources towards environmentally sound technologies and away from climate disrupting ones.

Collective action problems of environmental protection indeed impact individual liberty vis-à-vis personal property. Water law in particular illustrates the careful public oversight of private use of water that remains in the public domain.

In the Second Treatise of Government,<sup>157</sup> Locke's social contract relies on fair elections that select representatives with the integrity to act in the public interest. Locke defends the purpose of government as protecting private property, in contrast to Plato's notion that private property is questionable. Thoreau brought to this debate the perspective that we are richer in proportion to what we can do without. Reducing greenhouse gas emissions will likely require a paradigm shift back to lower resource consumption. If taken seriously and implemented in a timely manner, then efficiency measures can look like an even more powerful laptop that uses less power rather than a move to a cabin on Walden Pond. For some it could mean both. The point is that the public sector can facilitate green economy measures such as energy star labeling that does not result in painful shifts in demand or supply.

Over a century after Thoreau wrote, most people in the world still lead lives of quiet desperation. The West set out on a civil and political liberty path to alleviating such desperation—creating civil society space with which nonstate actors can make meaningful and influential contributions to society while advancing human security. The East set out on an economic, social, and cultural path to alleviating such desperation—creating a framework for public sector distribution of employment, housing, and cultural benefits. Both the East and West have resorted to describing these rights as aspirational and derogable when implementation of universal basic human rights proved challenging.

Individuals have made significant contributions with the expanded fabric of civil society.<sup>158</sup> It is indeed a safety net, but not one that is

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157. JOHN LOCKE, THE SECOND TREATISE OF CIVIL GOVERNMENT (1690).

158. See generally JEROME BRUNER, THE CULTURE OF EDUCATION (1996); ROGER-POL DROIT, PHILOSOPHY AND DEMOCRACY IN THE WORLD: A UNESCO SURVEY, (1995); SAMANTHA BESSON ET AL., THE PHILOSOPHY OF INTERNATIONAL LAW (2010); JOHN RAWLS, JUSTICE AS FAIRNESS: A RESTATEMENT (2001); JOHN RAWLS, A THEORY OF JUSTICE (2005); JOHN RAWLS, LECTURES ON THE HISTORY OF POLITICAL PHILOSOPHY (2008).

watertight. Coordinated climate change mitigation/adaptation remains one of the timeliest issues of our era. The United States obstructionist behavior in international climate negotiations demonstrates the need for an informed citizenry able to participate in decision-making. Efforts to muddy the waters are looked upon with deep disappointment and outright resentment by the international community.

Emerson's friendly state that is not sacred but performs its services well is still within political reach. Thoreau's public lecture at the Concord Lyceum and essay on civil disobedience<sup>159</sup> reverberated as far as Gandhi's and Martin Luther King's struggles for human rights and civil liberties. Knowing when (or whether) justice requires/justifies civil disobedience may never be widely agreed upon. Peaceful protest is very difficult to sustain, particularly when hired thugs and those that believe that "government is best that governs not at all" disrupt peaceful gatherings. Where does this leave tools such as cap and trade and other market based mechanisms? This Article has analyzed the importance of initial allocation of permits, the need for subsidizing environmentally sound technologies and taxing climate disrupting ones, and the value in water regulation predating natural gas extraction. Lifecycle analysis across energy sources can help public-private partnerships maximize welfare.

Neither end of the capitalism—communism spectrum has shown to provide adequately for human security and environmental integrity. The United States went through the darkest period of its history to transition to an economy free of its dependency on slavery. Are economic systems that lock in climate disrupting technology similar? Are such analogies needed? Can smart individuals and groups come together to green the economy in win-win ways? This Article has chosen a few examples. It has analyzed RGGI pricing of carbon. It has also analyzed a second greenhouse gas, methane, which happens to be a useful energy source in its own right when natural gas can be captured and transported. Large-scale energy infrastructure decision-making can have a substantial impact on meeting climate mitigation targets. This Article suggests that existing regulatory tools, carefully designed tax/subsidy measures, and market mechanisms that place a price on greenhouse gases such as carbon should be implemented by the United States and other jurisdictions at all scales in a cooperative coordinated manner.

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159. HENRY DAVID THOREAU, CIVIL DISOBEDIENCE (1849), available at <http://thoreau.eserver.org/civil.html>.

These are but a few examples of the manner in which the public sector can facilitate green economy best practices, integrating human rights and environmental protection into genuine sustainable development. This is not easily done. Cap-and-trade can result in pollution hot spots that have environmental justice implications. Cancer alleys are disproportionately aligned with poor communities lacking the capacity to lobby effectively for a re-siting of toxic activities. Environmental statutes such as the U.S. Clean Air Act struggle with utilitarian notions of the greatest good for the greatest number, allowing for increased concentrations of air pollution in less populated locations. The Clean Air Act also has higher standards for new source review than existing infrastructure. While this arguably promotes cost effective transition to lower pollution, it does not address pollution hot spots.

Advocates for a robust climate response, this author included, continue to struggle with the immense task of structure, framing, and narrative arc. Bringing up existing criticism such as the IPCC rate of Himalayan glacial melt runs the risk of distracting from the larger need to coordinate climate mitigation and adaptation measures. It is worth taking the time to address invalid points by showing that they are circular. For instance, when the United States dismisses international law as not substantial, it is worth noting this is a circular argument. The United States has been the root cause of this lack of robustness as a result of decades of obstructionist behavior in international treaty forums seeking to codify international law. The Law of the Sea as well as international environmental and human rights instruments are worthy of United States participation. They recognize legal rights—both sovereign and individual—creating a clear framework with which to engage in international public and private endeavors. The United States has seen the benefit of joining terrorism conventions and could equally benefit from participation in broader international law and policy. Doing so does not need to concentrate power in an overly centralized world government. Treaty law provides the opportunity for nation-states to enter into social contracts at the international level. Absence of such agreement can erode security as the world becomes ever more international in most fields. Recent debates have involved transboundary coordination over vaccines, intellectual property protections, and climate mitigation. Collective action problems abound and can best be addressed by agreeing upon broad framework conventions followed by amendment discussions to agree upon protocols for more substantive measures in sub-areas. In this way, state sovereignty and international security can be coordinated

before conflicts explode into situations ill-suited to civil statutory responses.

Refraining from engaging in international decision-making leaves the United States without a seat at the negotiating table and without a legal stake in how energy is extracted in the Arctic.<sup>160</sup> Nonstate actors are recognized at international law and environmental integrity is balanced with development objectives. On the whole, the United States should recognize the field of international law as instrumental to international peace and security and engage in such consensus building initiatives as the Law of the Sea proceedings. Doing so would enhance U.S. capacity to work on offshore energy innovations, replete with equitable and ecological siting considerations and multilateral and resource coordination. The fair criticism that joining the Law of the Sea would transfer wealth to developing countries as royalties for seabed use has been addressed. Relying on customary international law is unwieldy, given the need for specific measures to protect human and environmental integrity in the Arctic. These are just a few but compelling reasons for the United States to engage genuinely in multilateral international decision-making.

Given the climate timeframe with which decision-makers have to work, it is worth focusing upon building a coordinated climate response. Clearly, coal causes black lung disease and is inexpensive, while wave energy could be cleaner but is initially more expensive. Robust state renewable portfolio standard laws can facilitate innovation that is supported within a legal and financial framework, offering flexible ways to transition to sound energy sources. Large energy companies have little to gain initially in this development. Taxing the most climate-disrupting activities while subsidizing a range of renewable, storage, and efficiency measures can occur at the same time as sectoral cap-and-trade programs that put a price on carbon. False dichotomies slow down the consensus building process. Environmentally sound technology transfer does not need to be held as a bargaining chip to exact measurable, reportable, and verifiable (MRV) mitigation measures by BRIC countries.<sup>161</sup> Environmentally sound technology cooperation can rebuild the trust needed with which to reach breakthrough solutions on MRV. This does not minimize the MRV dilemma. It takes an engagement approach to international cooperation while diffusing viable climate friendly technologies in a timely manner.

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160. *See generally* TED L. McDORMAN, SALT WATER NEIGHBORS: INTERNATIONAL OCEAN LAW RELATIONS BETWEEN THE UNITED STATES AND CANADA (2009).

161. BRIC countries include: Brazil, Russia, India and China.

International decision-making has evolved remarkably over the past century and its contours need to become better understood by the public and private sectors within the United States. This can best be accomplished through a strong commitment to international law generally and the areas of international law, policy, and dialogue that are having international peace and security impacts that are reverberating around the globe. It is human nature to have the strongest instincts towards self-preservation. Perhaps the human psyche has yet to integrate the speed with which remote events can threaten citizens of wealthy influential nations. Certainly governance group think has yet to integrate the rate at which climate mitigation, adaptation, funding, and technology transfer can be a game changer with regard to resilience. We can all be cynical about the barriers to cooperation, yet nothing is to be gained from such cynicism, and overcoming apathy is our best tool towards crafting a collective security framework, capable of responding to modern security priorities.

This Article argues that the United Nations is well positioned to facilitate climate cooperation. Local, state, and regional mutually reinforcing climate efforts are also helpful but do not fill the international collective action governance gap. The United Nations is as effective as its member states collectively allow it to be. This is by design to preclude global dominance by a centralized international organization. As a result, the United States and other influential countries can, through their failure to engage and efforts to undermine treaty drafting, effectively create gridlock at the international level. Designing the United Nations after the League of Nations was as deliberate an endeavor as designing the United States Constitution. They are not identical but both the United States Constitution and the United Nations Charter establish a sovereignty balance and various forums within which to resolve new and timeless issues. Climate change presents a new challenge, the resolution of which must fit within the existing needs to balance state sovereignty and individual human rights. Environmental law generally, and climate in particular, are not in the plain language of most domestic or international legal instruments. Strengthening the United Nations and international cooperation should involve effective climate security responses across the entities whose mandates touch upon climate ramifications. That is to say, UNICEF is coordinating with UNEP, UNDP, WHO, UN-Habitat, UNESCO, UN-Water, FAO, OHCHR, UNFPA, CSD, ILC, and ILO. These in turn work with WRI, Amnesty International, Human Rights Watch, IUCN, ILA, ASIL, CIEL, OECD, and the World Bank. This is clearly not a comprehensive list and yet is

already daunting to those not familiar with the acronym alphabet soup of international institutions. This complexity is surmountable from both sides.

The United Nations has demonstrated its capacity to be a negotiating table that can slow down conflicts before hostilities escalate. A better-resourced and differently structured organization would have been able to respond to any number of armed conflicts in a distinct manner. This Article focuses on the sustained work of the United Nations on international transboundary issues that can spark conflicts but are not generally viewed as falling within the purview of the laws of armed conflict. These include the treaty bodies as well as the core organs, funds, and agencies tasked with specific mandates.

Lack of a standing army does not a failure make. Enforcement is delegated to sovereign states by design, and it is up to the states that make up the membership of the United Nations to meet their legal obligations. Just as it is up to corporations engaged in economic activity in the United States to meet their legal obligations to abide by environmental regulations promulgated by the United States. Lack of enforcement and oversight do not make the underlying laws disappear, but they do severely undermine their effectiveness. The remedy lies in state and corporate responsibility supported by informed civil society participation in monitoring and amending flexible human rights and environmental protections. Civil society can bring suits to courts at all scales and help (albeit in a slow and expensive manner) flesh out a body of human rights and environmental case law.

International law does not always look like the law of the United States, but often is complementary. When it is not, the United States has the sovereign right to stay outside of a treaty regime. Doing so should be based upon principled arguments of substantive and procedural international law, not a lack of capacity at the federal level to ratify international instruments nor a sweeping isolationist position that all international law should be ignored.

This Article seeks to argue that a better understanding of international law and the process by which it is created would facilitate efforts to regain economic stability, protect human rights, and achieve sustainable development. It is worth acknowledging the current logjam and finding ways to be more diplomatic. This does not require sweeping important issues under the rug. In the ongoing U.N. procedures that slowly lead to international agreements, there are fluid and ongoing opportunities to engage and find middle ground in substantive multilateral forums. Currently, states are not acting in their own state's

interests. There are weaknesses in the international legal regime. The United States is firmly committed to the creation and continuation of weak international institutions. As states hold onto perceived autonomy, they risk losing international peace and security. As an institution in progress, the United Nations juggles state needs for autonomy and international bodies that can support global human rights and environmental coordination.

As a collection of nation-states, Europe is inherently more international and has developed an integrated dialogue with which to sort out complex transboundary concerns. This is not a perfect model but has led to a greater willingness to engage in international agreements and work in a more cooperative, long-range manner. This has not always been the case and it is perhaps because of, rather than despite, World Wars I and II that Europeans have found less hostile means by which to address transboundary conflicts. In recent years, people in the United States have not understood international law to the same degree. This too appears to be by design. Yet, this author argues that it is to the detriment of the United States, and that greater international understanding by the United States could facilitate greater international peace and security. Students in both law and in other fields are pressed to find employment of any kind and this author is not saying "Let them eat cake." Most aspects of the law have taken on international dimensions and many individuals have found employment opportunities because of, rather than despite, their international experience. When tuition is \$40,000 a year, legal education is a high stakes endeavor. The policy dynamic has shifted. International governance and structures have gained in prominence and U.S. hegemony has lessened, perhaps cyclically, perhaps for good. It behooves students to gain an understanding of international law, and it benefits the United States to enhance its international capacity. Regional and international courts are influencing many legal activities. It is not easy to remain abreast of private and public international legal dimensions, especially as these fields do not always have open avenues of communication. It is a rewarding endeavor, however. Major private law firms increasingly need to navigate EU law. They are conducting pitched battles with the EU, WTO, as well as many other legal systems beyond the United States. This Article has chosen energy law as a case in point precisely because it cuts across domestic-international and public-private sectors with broad ramifications.

International organization law is not well understood in the United States, to the detriment of entities trying to contend with international businesses. It is no longer the case that legal practitioners in the United

States do not need international law. There are massive international legal systems doing things that the United States does not understand and will need. Whether it is climate coordination, the energy rush to the Arctic, or the internationalization of the natural gas market—if the United States values remaining a key player in rapidly changing legal dynamics, it should consider supporting increased international legal understanding analogous to its efforts to sustain its innovation edge in science. Some business sectors have responded sooner than states.

In the climate context it is not clear which scale of governance will break the logjam. International climate coordination requires U.S. action, and vice-versa, a true collective action dilemma.

Real politic may have been advocated by Machiavelli<sup>162</sup> but has important shortcomings, the primary of which is that precedent is set when United States obstructs international cooperation. This U.S. precedent is then used as legal justification for uncooperative activities by other nation-states. Thus, the power of the results approach is not more effective than engaging and optimizing the international legal system.

Repeated calls by the United States and its conservative media, that international law does not have enough legal teeth, while pulling out the teeth one by one, will eventually result in a self-fulfilling process by which international law will lack political weight. That day has not arrived and need not arrive if the legal community takes seriously the understanding and development of international law. U.S. scholars can begin joining the robust international discussion identifying and analyzing instruments that may be able to address climate stabilization.

A scholarly article must come across as plausible. Has this led to the making of finer and finer legal points in an ever-narrowing process less likely to make an impact? Is making an impact an acceptable goal? Can one be scholarly, analytical, and frame the argument that resonates? Coining cool buzzwords resonates, particularly when they can make complex legal principles more accessible without oversimplification. Tipping points come to mind, and in this context, this author is reminded that rocking the boat from inside will have the likely result of getting everyone wet. Criticizing maladaptation and “solutions” that are worse than the problems they seek to solve adds value. Building on international climate consensus also has value. U.S. and international law have a great deal to offer one another. The Social Science Research

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162. NICCOLO MACHIAVELLI, *THE PRINCE* (N.H. Thomson trans., P.F. Collier & Son 1910) (1515).

Network (SSRN) database of working papers has been a game changer for transparency of legal analysis for anyone able to navigate the Internet rather than anyone with an expensive legal database account. Yet, citations remain the currency of reputation and this appears to have resulted in a U.S.-centric dialogue.

There is still a great deal to be said in the context of U.S. leadership in bridging and integrating environmentally sound technology in particular and climate strategies in general. The private sector has begun to integrate climate decision-making into corporate strategies or are at least poised to do so with the right regulatory framework in order to avoid becoming an industry outlier.

International institutions are effective and could become more so with increased U.S. engagement. This is in the best interest of the United States, as other “fish” are becoming as big as we are. It remains to be seen whether our pond is shrinking or whether the various sovereigns (ponds) around the globe will breach political dams and allow waters to flow together while retaining important areas of autonomy. Engaging in forums discussing the development of shared goals and guidelines can help resolve international collective action problems. It would be easy to cover U.N. developments during prime time news, as the BBC frequently does, and air U.N. proceedings on C-Span. Covering important transboundary debates more fully by mainstream media would help increase understanding of international law and policy developments.

The U.S. legitimacy in remaining deeply critical of the United Nations rests upon a willingness to cooperate with the international community to enhance the effectiveness of international institutions through broad multilateral initiatives.

Consider a hiking analogy. Switchbacks are common while hiking. It may feel as though one is going down a mountain to reach the top. It is not always the case that the most effective way to get from point A to point B is a straight line. Yet, spiraling down as a result of a concerted effort to keep the international community from reaching any pinnacle of international cooperation requires a reevaluation of the vision, whether it is a shared vision, and how to chart a path back up the mountain.

Reframing arguments to reach as many audiences as possible can be valuable. Adding environmental rhetoric every time a previous principle loses broad support becomes disheartening. This author would like to support a collective effort to focus on legal definitions with policy objectives that can resolve collective problems, starting with climate instability.

This Article has charted a stretch of terrain, sought to engage those with differing perspectives. It has explained how three legal frameworks (1) at the regional level, using RGGI as an example; (2) at the sectoral level, using natural gas as an example; and (3) at the international level, using the climate negotiations as an example, can help rectify unsustainable development. Greening the economy can, and should, look to such low-lying fruit as ending natural gas flaring while building innovation centers that can roll out breakthrough environmentally sound technologies. This is best achieved through international cooperation that supports sectoral transition to environmentally sound, climate friendly measures.

The United States can show its good faith efforts to engage in this process by refraining from opening a draft text back up for negotiation at the eleventh hour after all the countries have agreed not to introduce new language to an outcome document. Similarly, the United States can stop insisting on making other countries water-down text, then refrain from signing what otherwise would have been a more effective multilateral provision.

Understanding the evolutionary arc of international law can help people understand its importance and at times consensual, aspirational nature. If more people in the United States respected and knew how to navigate international law, then we might be closer to agreeing upon a climate response.

The sources of international law include: treaties, customs, *Jus Cogens*, and the writings of highly qualified scholars.<sup>163</sup> Treaties are like contracts; customs develop from the accretion of state practice with the understanding of being legally bound, and *Jus Cogens* are universal prohibitions against such institutions as slavery. International expertise through the writings of highly qualified individuals provide analysis on the development of international law and how it can relate to new concerns such as climate change. Judicial bodies have provided a growing body of human rights law that is now merging with environmental jurisprudence. Courts have cited to one another, not as binding precedent but as persuasive authority.

Some individuals in the United States might respect international law more if it is seen in a comparable evolutionary stage to the real law developed in the United States at earlier stages of the country's history. Yet, even the newest trade and terrorism-related international law has

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163. International Court of Justice, Article 38 (1945), *available at* <http://www.icj-cij.org/documents/index.php?p1=4&p2=2&p3=0> (last visited Oct. 28, 2011).

been respected over environmental and human rights provisions. International law may be at a different stage of development and have different structures but it is worth understanding. Universities have the creative challenge both to transmit doctrinal material and foster critical and innovative analysis. Enhancing the latter involves offering an international curricula that matches the degree to which the world has become globalized. Graduates will encounter international dimensions of their legal work whether they choose to practice overseas or in the heartland. International institutions are not well understood by individuals in the United States in large part because they are seldom encountered in the curriculum. Similarly, the precautionary principle and other basic normative principles of international law as basic as a threat to international peace and security do not register as terms to many Americans. They are not used in domestic policy discussions and this leads to a disconnect between international and U.S. discourse on issues that are both national and international in scope. The Rio+20 gathering may be able to bridge the gap, bringing U.S. environmental nonprofits into a broader discussion on greening the economy through sound energy use. To date, greening the economy has yet to encompass the broader sustainable development components: intergenerational equity, developing world, and sustainability itself. This brings up the important point that decision-makers at all levels have become accustomed to using legal terms lacking robust definitions.

In the context of codifying *lex specialis*,<sup>164</sup> international law has become fragmented. This occurs in domestic contexts as well. It is worth acknowledging that (1) international environmental law does not look like U.S. law; (2) that it was codified differently; and (3) that states have carved out a greater ability to opt out of international legal provisions. Even in the trade context, things fall apart. We still await cooperation over agricultural subsidy rules. This is not so very different than domestic negotiations that break down and take years to codify important areas of the law. Similarly, Europe's Aarhus Convention builds upon U.S. National Environmental Policy Act (NEPA)<sup>165</sup> provisions for standing and can be built upon in turn by the United States should Americans gain the capacity to strengthen human rights to a clean environment. Citizen suits, due process, and Roosevelt human rights discourse flow from a strong U.S. tradition of nonstate actor participation in balancing state and corporate interests within a robust market economy.

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164. *Lex specialis* is a Latin phrase meaning "law governing a specific subject matter."

165. 42 U.S.C. § 4332(2)(c) (1970).

## IV. CONCLUSION

Infusing international law throughout the curricula can facilitate an informed public discourse regarding how to work across jurisdictional borders. The United States, in particular, can benefit from expanding course offerings on public international organizations and legal instruments. State prohibitions on referencing any international jurisprudence<sup>166</sup> are not a helpful development, as economies become ever more integrated and local, regional, and international law morph into complex litigation. Practice-ready attorneys include more than a handful of law graduates with a deep understanding of the layers of legal ramifications, global as well as multistate, that are already facing public and private enterprise.

Greening the economy needs to be more than skin deep—it needs to infuse sustainability into the ethos. This is best done by understanding the pallet range and fostering the creativity with which to mix hues and design more than shadows. Robust energy innovation measures need traditional regulations to protect drinking water from carcinogenic chemicals (e.g., diesel in hydraulic fracturing solution) as well as transformational efforts. These have included such labeling programs as the energy star system—a concept with the capacity for much broader and more insightful information sharing. Incorporating life cycle costing into the product description of products need not be limited to allergy alerts, annual energy consumption of appliances, and organic production of produce.

This analysis has addressed water, energy, climate, sustainable development, and good governance. Comparative environmental law provides concrete models with which to assess natural resource management and public participation in environmental decision-making. This author has focused on applying economic tools such as tradable permits to transboundary externalities, including climate change, with particular attention paid to equity issues involved in initially allocating such permits. It has addressed the ways in which institutions facilitate emerging transboundary law and policy as well as procedural good governance measures that effectively integrate public participation in decision-making.

Developing a normative framework with regard to crucial interrelationships between human rights and environmental law, this

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166. See, e.g., Jacob A. Kramer, *Controversy Erupts over Foreign Laws and International Law in U.S. Courts*, INST. FOR U.S. LAW, Feb. 1, 2011, available at <http://www.iuslaw.org/news2111.php>.

Article has focused on energy use and climate resilience. A transparent, international forum facilitates inclusive decision-making. This is important because the means often are the ends. How one makes a decision affects the substantive provision enacted.

This Article has demonstrated that while Coasian bargaining is not concerned with initial allocation, initial allocation can matter a great deal. When permits are auctioned, entities with more money can have a higher ability to pollute. The Coasian problem can be resolved through collaborative decision-making. In a cap-and-trade context, if an entity values pollution, then the entity will buy more permits to pollute. Technological innovation becomes a game changer. This analysis has sought to solve the collective action problem of setting up a process and instituting framework to address climate change. It highlights problems with Coasian trading, using RGGI to illustrate when allocation becomes instrumental and how providing mechanisms for stakeholder participation can lead to effective collaborative climate decision-making.

More broadly, initial allocation and participation equally enhance market-based approaches to solving collective action problems at the broadest level. RGGI can employ adaptive management to address unforeseen issues.

Weaving together crosscutting issues provides a tapestry with which to better understand an array of independent in-depth analyses. Seeing, stating, and synthesizing the ramifications of not only studies but interdisciplinary and transboundary challenges can build the firm foundation needed to move beyond coining new environmental terminology to achieving substantive progress. It is not clear whether scarce resources are better directed towards solar over wave energy.<sup>167</sup> Current kilowatt calculations are argued as determinative, yet long-range investment has atrophied as a national and international practice.

The process of collaborative decision-making has the advantage of bringing a very wide array of perspectives into the fray. On the other hand, distilling wisdom and viable options can be elusive. The international community has witnessed this in an emotionally wrenching manner over the past several years.

A command of public and private international law, effective oration and written communication, engaged scholarship, technical understanding, stamina, hope, and collaborative capacity building can collectively facilitate green economy design that builds on decades of

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167. Ramping up wave energy generation in such developing countries as India is only as feasible as beginning the legal analysis of regulatory obstacles along with the options to direct renewable portfolio standard funding towards such energy research.

sustainable development efforts. Genuine public private partnerships can and do bring tangible environmentally sound energy innovations such as solar and wind generation into the mainstream. Knowing what can work and implementing legal measures that create the right conditions to ramp up renewable energy are not the same thing.

Regional RGGI development, sectoral natural gas development, and international climate negotiations development provide three sustainability challenges. Greening the economy can and should look to such low lying fruit as ending natural gas flaring while building innovation centers that can roll out breakthrough environmentally sound technologies. This is best achieved through international cooperation that supports sectoral transition to environmentally sound, climate friendly measures. Optimizing cooperative transboundary green innovation can facilitate inclusive decision-making just as public participation by civil society can help economies transition to environmentally sound energy use. Bridging progress made in the human rights and environment fields can advance both and enhance the resilience of the international community.