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Michael B. Gerrard

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* Michael B. Gerrard is Andrew Sabin Professor of Professional Practice and Director of the Center for Climate Change Law at Columbia Law School. This article is based on Michael B. Gerrard, Keynote Address at the Journal of Environmental and Sustainability Law Symposium: Environmental Justice Issues in Sustainable Development (Mar. 9, 2012).

TABLE OF CONTENTS

The 1990s saw the emergence of the issue of environmental justice – the disproportionate exposure of low-income and minority communities to environmental hazards – into the U.S. political sphere. The 2000s saw the emergence of global climate change as a political concern. Neither has led to significant legislation at the federal level, and thus old laws designed for different purposes are being utilized with decidedly mixed results.

This article addresses the confluence of environmental justice and global climate change. The two interact in complex ways, as do the approaches to dealing with them both.

The magnitude of the climate challenge has the potential to lead to several collisions between efforts to fight climate change and the effort to achieve greater environmental justice. After summarizing the statutory background, this article will discuss 1) environmental justice implications of mitigation, 2) environmental justice implications of adaptation, and 3) a number of difficult choices ahead, some fairly painless, some quite painful. This article aims to identify the relevant issues but not to resolve them; the latter is a monumental task, and many scholars are working on discrete aspects.

I. STATUTORY BACKGROUND

The federal budget is not the only item for which the United States is operating at a deficit. We also have a deficit in environmental statutes. Congress has enacted no major environmental statutes since 1990, the year of the Oil Pollution Act and the Clean Air Act Amendments. Congress has never passed an important statute concerning environmental justice or climate change.[1] While more than two decades have elapsed since

[1] There have been several minor statutes on climate change -- e.g., Global Change Research Act; statute requiring a research program Global Research Act, Pub. L. No. 101-606, 104 Stat. 3096 (1990). The Consolidated Appropriations Act for fiscal year 2008 required a greenhouse gas reporting program. Pub. L. 110-161, 121 Stat. 1844 (2007).

Congress has taken significant action on the environment, scientists have been hard at work identifying a grave global threat, climate change.

To deal with this newly discovered threat, we have a very old legal toolbox. In 2007, in the landmark case of *Massachusetts v. Environmental Protection Agency*, the Supreme Court found that the Clean Air Act of 1970 authorizes EPA to regulate greenhouse gases ("GHGs").[2] Not much was done under this newly-declared authority for the remainder of George W. Bush's presidency. However, when Barack Obama became President in 2009, he supported comprehensive climate legislation and, while waiting for it to be enacted, directed the Environmental Protection Agency ("EPA") to use the Clean Air Act as a backup and as a spur to Congressional action. Such legislation narrowly passed in the House of Representatives in June 2009 but died in the Senate. Thus, this 1970 statute continues its leading role.

Even those who support the use of the Clean Air Act to fight climate change acknowledge that it is a clunky tool not designed for that purpose. It was originally written to deal with local or regional problems such as Los Angeles smog, and in 1990 it was amended to deal with one national problem (acid rain) and one global problem (ozone-depleting substances).[3] The EPA has adopted a series of regulations aimed at GHGs and the U.S. Court of Appeals for the District of Columbia Circuit has upheld them.[4] But, the application of this now forty-three-year-old statute to this new problem remains awkward.

Likewise, the nation's other major environmental statutes were enacted in the 1970s and 1980s to deal with the environmental problems that were known at that time, and were not designed to address anything of the scope of climate change. Important efforts have been made to apply two of these statutes -- the National Environmental Policy Act and the

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[2] Massachusetts v. Envtl. Prot. Agency, 549 U.S. 497, 532 (2007).

[3] *See History of the Clean Air Act*, U.S. EPA, http://epa.gov/oar/caa/caa_history.html (last updated Feb. 17, 2012).

[4] Coal. for Responsible Regulation v. Envtl. Prot. Agency, 684 F.3d 102, 136 (D.C. Cir. 2012).

Endangered Species Act -- to this problem, with some limited success.[5] Other major environmental statutes, such as the Clean Water Act, the Resource Conservation and Recovery Act, and the Comprehensive Environmental Response, Compensation and Liability Act have provided little or no assistance of consequence in dealing with climate change.

In the late 1980s, as the era of major new environmental enactments was drawing to a close, a new issue, environmental justice, was growing in prominence. Environmental justice arose in the context of the siting of polluting facilities, such as landfills and incinerators, in low-income and minority communities. The initial lawsuits were brought mostly under equal protection theories, and foundered when plaintiffs were unable to prove the essential element of discriminatory intent.[6] A second wave of litigation proceeded under EPA's civil rights regulations, but when it was established that these too required proof of intent, these lawsuits went away as well.[7] Discriminatory intent may be proven circumstantially, such as showing that a seemingly neutral law has been applied in a discriminatory fashion or was adopted with a discriminatory intent,[8] but environmental justice plaintiffs have not succeeded in proving such circumstances. Some cases have proceeded under other theories (and, as discussed below, one of them has targeted GHG regulation), but for the most part they are aimed at the disproportionate impact of particular facilities on local communities.

Thus, both environmental law and environmental justice law developed around the central notion that they are aimed at preventing,

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[5] *See* Ctr. for Biological Diversity v. Nat'l. Highway Traffic Safety Admin., 538 F.3d 1172 (9th Cir. 2008); In re Polar Bear Endangered Species Act Listing and §4(d) R. Litig., 818 F. Supp. 2d 214 (D.D.C. 2011).

[6] *See, e.g.*, Bean v. Sw. Waste Mgmt. Corp., 482 F. Supp. 673 (S.D. Tex. 1979); E.-Bibb Twiggs Neighborhood Ass'n v. Macon Bibb Plan. & Zoning Comm'n, 896 F.2d 1264 (11th Cir. 1989); R.I.S.E., Inc. v. Kay, 768 F. Supp. 1144 (E.D. Va. 1991) aff'd, 977 F.2d 573 (4th Cir. 1992); *See also* THE LAW OF ENVIRONMENTAL JUSTICE 3-23 (Michael B. Gerrard & Shiela R. Foster, eds., 2d ed. 2008).

[7] *See, e.g.*, Chester Residents Concerned for Quality Living v. Seif, 132 F.3d 925 (3d Cir. 1997) vacated, 524 U.S. 974 (1998); Alexander v. Sandoval, 532 U.S. 275 (2001); *see also* Gerrard & Foster, eds., *supra* note 7, at 23.

[8] Vill. Of Arlington Heights v. Metro. Hous. Dev. Corp., 429 U.S. 252, 266 (1977).

reducing, or mitigating the adverse impacts of discrete facilities, and that these impacts can be limited in both space and time. Exceptions to this model situation were certainly recognized and dealt with, but that model has remained the paradigm.

Nothing could be further removed from this paradigm of local and temporary impacts than anthropogenic climate change. It results mostly from the cumulative GHG emissions of millions or billions of pollution sources all over the planet.[9] These emissions spread globally and linger in the atmosphere for decades or centuries.[10] Thus a ton of GHGs emitted over St. Louis in 1950 has about the same impact today as a ton of GHGs emitted over Beijing last month.

The cumulative impacts of these decades of worldwide emissions threaten damage to human and natural systems that is of a scope and magnitude that humanity has never previously confronted (except for the great plagues of the 14th through 17th centuries, the world wars of the 20th century, and the unrealized specter of thermonuclear war).[11]

Preventing the worst effects of climate change will require, among other things, a major reduction in the emission of GHGs or, at a minimum, in the rate at which GHGs emissions are increasing. This, in turn, will require the construction of a large number of new renewable energy facilities (such as wind, solar, and geothermal installations); a massive

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[9] *See* Intergovernmental Panel on Climate Change, 2007: Summary for Policy Makers *in Climate Change 2007: The Physical Science Basis. Contributions of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (Solomon et al. eds 2007) *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf.

[10] *See* U.S. Global Change Research Program, *Global Climate Change Impacts in the U.S.*, 13-16 (2009) http://downloads.globalchange.gov/usimpacts/pdfs/climate-impacts-report.pdf.

[11] For projections about impacts of emissions on humans and the natural system *see generally* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CONTRIBUTION OF WORKING GROUP III TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: MITIGATION OF CLIMATE CHANGE (Bert Metz et. al. eds., 2007) *available at* http://www.ipcc.ch/publications_and_data/ar4/wg3/en/contents.html.

improvement in energy efficiency; and the creation of many reservoirs for the permanent storage of carbon dioxide as part of carbon capture and sequestration systems.[12]

In climate change parlance, efforts to reduce or sequester GHG emissions are termed "mitigation." Efforts to cope with the climate change that will occur are called "adaptation." Massive amounts of both mitigation and adaptation will be required in order to inhibit the effects of climate change.

II. ENVIRONMENTAL JUSTICE IMPLICATIONS OF FAILING TO ACT

It is hardly a secret that climate change is expected to have devastating impacts on the poorest populations. This fact is so in both developed and developing countries.

A. *United States and Other Developed Countries*[13]

The United States is likely to be spared the worst effects of climate change in the next several decades, but that is not to say that there will not be considerable suffering, especially by many low-income and minority communities. The demographics of the principal victims of Hurricane Katrina in 2005 are well known. Hurricane Sandy in 2012 devastated

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[12] *See generally* S. Pacala & R. Socolow, *Stabilization Wedges: Solving the Climate Problem for the Next 50 Years with Current Technologies*, 305 SCI. 968 (2004); INT'L ENERGY AGENCY, TRACKING CLEAN ENERGY PROGRESS (2012), *available at* http://www.iea.org/media/etp/Tracking_Clean_Energy_Progress.pdf.

[13] *See* UNITED STATES GLOBAL CHANGE RESEARCH PROGRAM, GLOBAL CLIMATE CHANGE IMPACTS IN THE UNITED STATES (2009), for one important set of projections about future climate conditions in the U.S., and their human and physical impacts; *see also* Jody Freeman & Andrew Guzman, *Climate Change and U.S. Interests*, 109 COLUM. L. REV. 1531 (2009), for a number of other projections.

several communities of very modest homes in coastal New York and New Jersey, but the homes were not those of the poorest residents. Less well known are New York City's intentional placement of public housing projects on the coastlines of remote areas of the city due to low land values,[14] and the hardship faced by thousands of residents of this public housing who spent extended periods without electricity, water, heat, or elevator service due to the slowness of the restoration of power service.[15] One study prepared shortly after Hurricane Sandy found that most of the extreme weather events of the prior nearly two years—floods, droughts, heat waves, wildfires, tornadoes and severe thunderstorms—typically harmed counties with household incomes below the U.S. median annual household income; only tropical storms and hurricanes affected more well-off areas.[16]

The most life-threatening risk that climate change is likely to pose in the United States this century is protracted heat waves, with temperatures exceeding 100 degrees Fahrenheit for weeks on end.[17] Such a heat wave happened in Europe in 2003 and claimed several thousand lives.[18] The people who are most hurt by such events are those who lack air conditioning, especially the very young and the very old. The availability of air conditioning is, of course, closely correlated with

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[14] Jonathan Mahler, *How the Coastline Became a Place to Put the Poor*, N.Y. TIMES (Dec. 3, 2012), *available at* http://www.nytimes.com/2012/12/04/nyregion/how-new-york-citys-coastline-became-home-to-the-poor.html.

[15] Cara Buckley & Michael Wilson, *In New York's Public Housing, Fear Creeps In With the Dark*, N.Y. TIMES, Nov. 2, 2012, at A1.

[16] Daniel J. Weiss, et al, *Heavy Weather: How Climate Destruction Harms Middle- and Lower- Income Americans*, CTR. FOR AMERICAN PROGRESS (Nov. 16, 2012), *available at* http://www.americanprogress.org/issues/green/report/2012/11/16/45135/heavy-weather-how-climate-destruction-harms-middle-and-lower-income-americans/.

[17] *See* U.S. Global Change Research Program, *supra* note 11, at 88-94.

[18] Janet Larsen, *Setting the Record Straight: More than 52,000 Europeans Died from Heat in Summer 2003*, EARTH POLICY INSTITUTE (July 28, 2006), http://www.earth-policy.org/index.php?/plan_b_updates/2006/update56.

income, as is access to transportation that enables people to reach cooling centers.[19]

Droughts most affect those who are closest to the soil – the farmers. The U.S. does not now have the same proportion of subsistence farmers it did at the time of the Dust Bowl of the 1930s, an event that, as commemorated in the classic work of fiction *The Grapes of Wrath* by John Steinbeck, inflicted tremendous hardship on many poor communities. However, there are still quite a few farming families that stand to be devastated by drought as well as by extreme precipitation events.

Further, a number of native villages in Alaska are suffering from a loss of the sea ice that protects them from storms, and that also provide access to fishing.[20]

It is also relevant that the principal sources of GHG emissions in the United States, utility and industrial facilities that burn fossil fuels, are also the sources of conventional air pollutants which have a disproportionate impact on low-income and minority communities.[21]

B. *Developing World*

The single greatest adverse impact of climate change on poor populations around the world is likely to be mass migration. It will stem from a variety of climate impacts that will render certain geographic areas

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[19] CALIFORNIA ENVIRONMENTAL HEALTH TRACKING PROGRAM, ASTHO CLIMATE CHANGE POPULATION VULNERABILITY SCREENING TOOL 2, (2012), *available at* http://www.ehib.org/projects/ehss01/Climate%20change%20vulnerability%20report_ASTHO.pdf.

[20] *See* ELIZABETH KOLBERT, FIELD NOTES FROM A CATASTROPHE 7-34 (2006) (chapter on Shishmareef).

[21] Britt Groosman et al., *The Ancillary Benefits From Climate Policy in the United States*, (Middlebury College Economics Discussion Paper No. 0920, 2009), *available at* http://cat2.middlebury.edu/econ/repec/mdl/ancoec/0920.pdf; Diane Bailey et al., *Boosting the Benefits: Improving Air Quality and Health By Reducing Global Warming Pollution in California*, NATURAL RES. DEF. COUNCIL, 10 (June 2008), http://www.nrdc.org/globalwarming/boosting/boosting.pdf.

uninhabitable, either for periods of months or years, or permanently – droughts and desertification, sea level rise (on small islands,[22] coastlines, and deltas), and loss of sea ice and permafrost (in arctic areas). Estimates of the number of people who will be displaced vary quite widely; average estimates range from twenty-three million per year to sixty-two million per year.[23]

In other areas, hurricanes, typhoons, and other extreme precipitation events may cause extreme but short-lived hazards, leading to substantial loss of life. In still other areas, the acidification of the oceans, especially when combined with non-climate factors such as overfishing, will impair fishing.

As with so many kinds of difficulties, these problems will tend to afflict the poorest the most. They tend to live closest to the line of bare subsistence and lack any kind of economic cushion. A large percentage of the poor rely on their own ability to grow food, and agricultural productivity is highly dependent on climate patterns.

III. ENVIRONMENTAL JUSTICE IMPLICATIONS OF MITIGATION

A. *United States and Other Developed Countries*

The environmental justice issues in mitigating climate change – i.e., reducing GHG emissions – are much different in developed countries than in developing countries, so they are treated separately.

In the developed countries, historically high levels of GHG emissions need to be reduced. The developed country with by far the highest GHG emissions is the United States (though China's emissions overtook those

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[22] *See* THREATENED ISLAND NATIONS: LEGAL IMPLICATIONS OF RISING SEAS AND A CHANGING CLIMATE (Michael B Gerrard & Gregory E. Wannier, eds., 2013).

[23] Michelle Leighton, *Population Displacement, Relocation, and Migration*, *in* THE LAW OF ADAPTATION TO CLIMATE CHANGE: U.S. AND INTERNATIONAL ASPECTS 693 (Michael B. Gerrard & Katrina Fischer Kuh eds., 2012) [hereinafter Gerrard & Kuh].

of the U.S. several years ago).[24] Since nearly seventy-nine percent[25] of U.S. GHG emissions come from the combustion of fossil fuels, reduction in the use of such fuels – especially the one with the highest carbon content, coal – is the highest priority.

Policies that would achieve this objective tend to fit within one of three categories: (i) putting a price on GHG mechanisms, most likely either through a cap-and-trade program or a carbon tax; (ii) command and control regulations that would directly regulate the use of carbon-emitting technologies, such as coal-fired power plants; and (iii) development of alternative methods of meeting energy needs, chiefly renewable energy and energy efficiency.

Employment impact -- The impact of GHG reduction measures on employment has become a major political issue in the United States, especially in view of persistently high unemployment rates. During the 2012 election season, the term "job-killing" was appended to "environmental regulations," "cap and trade," "EPA rules," and other such phrases in innumerable debates, speeche and advertisements by various candidates (mostly, but not exclusively, Republicans). The principal claim was that GHG controls would cause mines, factories, and other facilities to shut down, and the jobs would move to countries with less severe GHG rules (particularly, as many of the politicians insisted, China). Think tanks and other groups at the opposite ends of the political spectrum have released dueling studies on the job impacts.[26] Among the principal points of difference in the methodologies underlying these studies were:

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[24] *China overtakes U.S. in greenhouse gas emissions*, N.Y. TIMES (Jun. 20, 2007), *available at* http://www.nytimes.com/2007/06/20/business/worldbusiness/20iht-emit.1.6227564.html?_r=1&.

[25] U.S. EPA, REPORT NO. 430-R-12-001 INVENTORY OF U.S. GREENHOUSE GAS EMISSIONS AND SINKS: 1990-2010, ES-4, 2-3 (2012), http://www.epa.gov/climatechange/Downloads/ghgemissions/US-GHG-Inventory-2012-Main-Text.pdf (note: 5387 is 78.9% of 6821).

[26] MONTANA POLICY INSTITUTE, THE MONTANA ECONOMY: HOW WILL CLIMATE CHANGE LEGISLATION IMPACT ECONOMIC AND JOB GROWTH? 1, 3 (2010), http://dev.montanapolicy.org/files/pdf/Cap_and_Trade_Policy_Note_0710.pdf (reporting on study finding negative job impact from cap-and-trade legislation), *with* TREVOR

1. Whether it was assumed that revenues from a charge on carbon would be lost to the economy, or would be reinvested in ways that would create jobs;
2. Whether it was assumed that, with a decline in use of fossil fuels, there would be a corresponding growth in the use of renewable energy, and the jobs that creates;
3. Whether it was assumed the workers displaced by a move away from fossil fuels would be provided with assistance in training and relocation;
4. Varying assumptions about the effect that higher energy prices would have on domestic industrial production;
5. The assumed multiplier effect that job losses would have on other sectors of the economy, when newly unemployed workers are no longer able to buy goods and services, or to afford to stay in their homes.

Likewise, there have been dueling studies on the job impact of cap-and-trade and carbon tax.[27]

Energy price impact -- A threshold issue in the debate about the job impact of a carbon price is the effect it has on energy prices for consumers and businesses. This effect, in turn, is largely a function of program design. Various price caps and floors, offset mechanisms, points of regulation, and other factors yield a wide range of energy price impacts.[28]

Here, an internal contradiction arises. A significant price signal would be needed in order to achieve a major decline in GHG emissions. However, Americans are accustomed to low energy prices. Gasoline prices and electricity prices in the U.S. are very low compared to those in

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HOUSER ET AL., PETERSON INSTITUTE FOR INT'L ECON., ASSESSING THE AMERICAN POWER ACT 2 (2010), http://www.iie.com/publications/pb/pb10-12.pdf.

[27] *See, e.g.*, MONTANA POLICY INSTITUTE, *supra* note 27; *see also* HOUSER ET AL., *supra* note 27, at 2.

[28] Gilbert Metcalf & David Weisbach, *The Design of a Carbon Tax*, 33 HARV. ENVTL. L. REV. 499, 501-02 (2009).

most other advanced countries.[29] Increases in either can cause major problems for elected officials. For example, in the third debate between President Obama and Governor Romney, the effect of federal actions on gasoline prices was discussed at length. (Most energy experts agree that there is little that a U.S. president can do to strongly influence gasoline prices, since those prices are mostly determined by the price of crude oil, a commodity with a global price; variations in U.S. oil production have little impact on that price.)

If energy prices did rise significantly, there would be a disproportionate impact on lower income families. Those at the very bottom of the income ladder are not much affected by gasoline prices because they do not have cars, nor do they have jobs that require them to drive every day; but the working poor, up through the median of the middle class, would be much affected. Several government programs provide assistance to low-income consumers to purchase energy, especially fuel oil for heating (though such programs have been a target of recent budget-cutting efforts). Such assistance could also be provided to help offset the disproportionate impact of a carbon tax.[30]

Cap-and-trade equity impacts – An entirely separate set of issues has arisen with respect to the environmental justice implications of cap-and-trade programs.[31] This became a hot issue in California with the proposed adoption of a cap-and-trade program as part of the

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[29] *See* Bonnie Kavoussi, *Gas Prices in U.S. Are Among Lowest in World, Report Finds*, THE HUFFINGTON POST (May 15, 2012), http://www.huffingtonpost.com/2012/05/15/united-states-low-gas-prices_n_1518169.html (gasoline prices); *see also Electricity Prices in America are Low*, THINKPROGRESS (Apr. 28, 2011), http://thinkprogress.org/climate/2011/04/28/207971/electricity-prices-in-america-are-low/?mobile=nc (electricity prices).

[30] Terry Dinan, *Offsetting a Carbon Tax's Costs in Low-Income Households* 1 (Cong. Budget Office, Working Paper No. 2012-16, 2012), *available at* http://www.cbo.gov/sites/default/files/cbofiles/attachments/11-13LowIncomeOptions.pdf.

[31] *See* Alice Kaswan, *Environmental Justice and Domestic Climate Change*, 38 ENVTL. L. REP. NEWS & ANALYSIS 10287, 10288 (2008).

implementation of the California Global Warming Solutions Act of 2006, A.B. 32. The controversy had its origins in a much earlier program called the Regional Clean Air Incentives Market ("RECLAIM") program, in which cap-and-trade was used to lower emissions of certain non-GHG air pollutants in southern California.[32] An unintended consequence of that program was certain emission sources in low-income and minority communities were able to continue their emissions through purchases of emissions allowances. This aspect was later corrected. Nonetheless, this experience left many environmental justice advocates in California with the concern other cap-and-trade programs would likewise lead to the continuation or expansion of polluting facilities in their communities.

GHG emissions from utility and industrial sources do not themselves tend to have localized impacts; their impacts are primarily their contribution to global conditions. However, these sources typically emit a number of non-GHG pollutants that may have local health impacts.[33] Some environmental justice advocates have attacked cap-and-trade as a policy tool because it does not address these "co-pollutants." In theory, the Clean Air Act's other regulatory programs should address any adverse health effects of these co-pollutants. The National Ambient Air Quality Standards ("NAAQS") are required to be set at a level that is protective of human health, and the state implementation plans each state adopts under the Clean Air Act are designed to achieve and maintain air quality levels that meet the NAAQS. However, some environmental justice advocates argue that the NAAQS do not sufficiently account for especially vulnerable populations (a claim that EPA vigorously disputes), and that there is a lack of vigorous enforcement of the emissions limitations in their communities.

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[32] Lesley K. McAllister, *Beyond Playing "Banker": The Role of the Regulatory Agency in Emissions Trading*, 59 ADMIN. L. REV. 269, 290 (2007).

[33] *See* James K. Boyce & Manuel Pastor, *Cooling the Planet, Clearing the Air: Climate Policy, Carbon Pricing, and Co-Benefits*, ECONOMICS FOR EQUITY AND THE ENV'T NETWORK (2012) *available at* http://www.peri.umass.edu/fileadmin/pdf/published_study/Cooling_the_Planet_Sept2012-1.pdf.

Some of these advocates also argue that if a cap-and-trade program is to be instituted, some of the revenues it generates should be devoted to addressing the environmental health problems in their communities.

These concerns led to an important lawsuit styled as *Association of Irritated Residents v. California Air Resources Board.*[34] The suit was filed in June 2009 alleging there were alternatives to cap-and-trade that would better curb emissions in low-income and minority communities, and that these alternatives had been insufficiently studied under the California Environmental Quality Act.[35] In May 2011, the trial court initially enjoined the adoption of the program.[36] The Air Resources Board modified its environmental impact report, and in June 2012 the Court of Appeals ruled compliance had been achieved, and the program could go forward.[37] In the same month, however, these groups filed a complaint with the EPA alleging the cap-and-trade program violates the Civil Rights Act of 1964 by allowing emitters to purchase offsets that let them avoid reducing their emissions.[38]

Many advocates of climate controls were extremely unhappy that California – the leading jurisdiction in the U.S., and arguably in the world, in fighting climate change – was being impeded by attacks from the left. This incident has led to some tensions between the environmental and the environmental justice communities.[39]

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[34] 206 Cal.App.4th 1487, 143 Cal.Rptr.3d 65 (2012).

[35] *Id.*

[36] Ass'n. of Irritated Residents v. Cal. Air Res. Bd., No. CPF-09-509562 (San Francisco County Superior Court Mar. 8, 2011) (order enjoining further rulemaking) *available at* http://cdn.law.ucla.edu/SiteCollectionDocuments/Environmental%20Law/Court%27s%20Final%20Order%203%2017%2011.pdf.

[37] *Irritated Residents*, 206 Cal.App.4th at 1506.

[38] Peter Fimrite, *EPA complaint says cap and trade racially biased*, SAN FRANCISCO CHRONICLE, June 12, 2012, http://www.sfgate.com/bayarea/article/EPA-complaint-says-cap-and-trade-racially-biased-3626368.php.

[39] "Climate-Change Law: Why CA Environmentalists Are Fighting Each Other," NEW AMERICA MEDIA (Mar. 14, 2011), http://newamericamedia.org/2011/03/cap-and-trade-story-here.php.

Facility siting – As noted above, a large number of renewable energy facilities will need to be built in order to effect a transition to a low-carbon economy. Many disputes have arisen about the siting of these new facilities. For the most part, they have not involved low-income or minority communities; most of the disputes have concerned proposed wind farms, and few of the opponents of these projects have been from such communities. Indeed, some Indian tribes have seen substantial economic opportunities in hosting wind farms.[40] One notable exception is that among the numerous challenges that have been brought against the proposed Cape Wind project in Nantucket Sound, one was brought by the Wampanoag Tribe of Gay Head on the grounds the project would interfere with culturally significant views. As of this writing, the tribe's suit is still pending.[41]

B. *Developing Countries*

Coal use in the United States and Europe has been falling.[42] Meanwhile, coal use in China has been soaring at an astonishing rate, and coal use in India and some of the other rapidly developing countries has also been increasing.[43] China has shifted from a coal-exporting to a coal-importing nation, and in 2010 purchased about fifty percent of the world's coal production, acquiring coal from Australia, Indonesia, South Africa, Colombia, the United States, and other nations.[44] No serious progress can be made in reducing GHG emissions unless this growth of coal use in the

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[40] Patrick M. Garry et al., *Wind Energy in Indian Country: A Study of the Challenges and Opportunities Facing South Dakota Tribes*, 54 S.D. L. Rev. 448 (2009).

[41] *Indian Tribe Says Cape Wind Project Flouts Conservation Law*, LAW 360, (Oct. 30, 2012) http://www.law360.com/energy/articles/390501/indian-tribe-says-cape-wind-project-flouts-conservation-law.

[42] *See* MEDIUM-TERM COAL MARKET REPORT-2012, INTERNATIONAL ENERGY AGENCY (2012).

[43] Eric de Place, *Coal Trends in Asia*, SIGHTLINE DAILY (Apr. 23, 2012), http://daily.sightline.org/2012/04/23/coal-trends-in-asia/.

[44] Kevin Jianjun Tu, et al., *Understanding China's Rising Coal Imports* CARNEGIE ENDOWMENT FOR INT'L PEACE (Feb. 16, 2012), at 3-4, *available at* http://www.carnegieendowment.org/files/china_coal.pdf.

developing world is halted and reversed. Doing so, of course, would directly collide with the aspirations of those nations to expand their economies and lift hundreds of millions of people out of desperate poverty. Thus, it is far from certain that environmental protection will prevail over economic development. But whatever progress is made will almost certainly involve major improvements in energy efficiency and massive programs to build renewable energy facilities.

Coal use imposes very large externalities in addition to its contribution to climate change. Particulate matter, sulfur dioxide, and other byproducts of coal combustion contribute to very high levels of air pollution in many cities in China and other countries.[45] The mining of coal involves a large number of accidents and illnesses.[46]

China has been making tremendous strides in expanding its use of renewable energy and the energy efficiency of its economy. However, this is in addition to rather than instead of its ever-increasing use of coal. China truly has an "all of the above" approach to energy, and this has been one of the keys to its astonishing economic growth.

Many other countries not nearly as far up the development curve as China do not have nearly as much choice in their energy sources. According to one study, "approximately 1.4 billion people still lived without electricity in 2009, a further one billion had access only to intermittent or unreliable electricity networks, and an additional 2.7 billion people depended entirely on wood, charcoal, dung, and solid fuels for their domestic energy needs."[47] Fossil fuels continue to be generally the lowest-cost form of energy, though the price of solar photovoltaic cells is dropping very rapidly, and for some applications (especially involving distributed as opposed to central-station generation) renewables cost less,

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[45] *Country Analysis Brief: China*, U.S. ENERGY INFO. ADMIN., (Feb. 12, 2013) http://www.eia.gov/countries/country-data.cfm?fips=CH.

[46] *See Mining Industry Accident, Injuries, Employment and Production Statistics and Reports*, U.S. DEPT. OF LABOR, MINING SAFETY AND HEALTH ADMIN. http://www.msha.gov/ACCINJ/accinj.htm (last visited Apr. 4, 2013).

[47] Benjamin K. Sovacool et al., *What moves and works: Broadening the consideration of energy poverty*, 42 ENERGY POL'Y 715 (2012).

especially when their low (or zero) cost of fuel is considered. Otherwise, however, fossil fuel use will continue to expand. This is a negative development for climate change, but it is difficult to argue this large number of people should not be able to climb up from the very lowest to the second-lowest rung.

To give a sense of the disparities, in 2010 per capita energy use (in kg of oil equivalent) in the United States was 7,164, in the United Kingdom was 3,254, in China was 1,807, in India was 566, and in Senegal was 272.[48]

One important climate mitigation measure that would also yield major health benefits in the poorest countries is the control of cook stoves used in household cooking. These stoves are major sources of "black carbon," a type of pollution (not GHGs) that contributes to climate change.[49] These stoves are also a major source of indoor air pollution and have been blamed for nearly two million deaths annually.[50] Replacing these devices with cleaner-burning stoves could yield tremendous benefits both for climate change and public health.[51]

Another aspect of GHG mitigation that has important environmental justice implications in developing countries is the reduction of emissions from forest destruction and degradation ("REDD"). The loss of forest is the second largest source of anthropogenic GHG emissions, after fossil fuel combustion.[52] Much activity under the United Nations

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[48] *Energy Use (kg of oil equivalent per capita)*, THE WORLD BANK, http://data.worldbank.org/indicator/EG.USE.PCAP.KG.OE (last visited Feb. 14, 2013).

[49] U.S. EPA, REPORT TO CONGRESS ON BLACK CARBON: EXECUTIVE SUMMARY, EPA-450/S-12-001 (Mar. 2012), *available at* http://www.epa.gov/blackcarbon/2012report/ReportHighlightsExecSummary.pdf.

[50] *Cookstove Research*, U.S. EPA (Jan 28, 2013) http://www.epa.gov/airscience/air-cookstoveresearch.htm.

[51] William J. Martin II, *A Major Environmental Cause of Death*, 334 SCIENCE 180 (Oct. 14, 2011); *Household Cookstoves, Environment, Health, and Climate Change: A New Look at an Old Problem*, THE WORLD BANK (2011).

[52] Toni Johnson, *Deforestation and Greenhouse Gas Emissions*, COUNCIL ON FOREIGN RELATIONS (Dec. 21, 2009), http://www.cfr.org/natural-resources-management/deforestation-greenhouse-gas-emissions/p14919.

Framework Convention on Climate Change is aimed REDD. Not all forest destruction is carried out by governments or large corporations; indigenous populations that rely on forests for their livelihoods contributed to some of the destruction (though typically on a much smaller scale). These populations may be affected by REDD controls. On the other hand, REDD controls also address sources of forest destruction that are far larger than indigenous activities – the clearing of forestlands for agriculture, mining and biofuels.

This brings up another environmental justice implication of GHG mitigation. The diversion of cropland from food crops to biofuels, and the use of food crops, such as corn, for biofuel, has the effect of increasing food prices, though the magnitude of this impact is contested.[53] Higher food prices can have devastating impacts on poor populations.

IV. ENVIRONMENTAL JUSTICE IMPLICATIONS OF ADAPTATION TO CLIMATE CHANGE

"Adaptation" is the term used to describe efforts to moderate, cope with, and prepare for the current and anticipated impacts of climate change on human and natural systems.[54]

Throughout the world, one of the principal environmental justice implications of adaptation will relate to the retreat from highly vulnerable areas such as coastlines. When an area is devastated by an extreme weather event, decisions must be made about whether to rebuild there. In the United States, at least, little thought is given to any alternative other than rebuilding in place. However, there is growing realization that this is putting people back in harm's way, and it requires large public and private investments that may be suddenly lost at any time should the extreme

[53] THE STATE OF FOOD INSECURITY IN THE WORLD: HOW DOES INTERNATIONAL PRICE VOLATILITY AFFECT DOMESTIC ECONOMIES AND FOOD SECURITY? FOOD AND AGRICULTURAL ORGANIZATION OF THE UNITED NATIONS (2011).

[54] Michael B. Gerrard, *Chapter 1: Introduction and Overview in* Gerrard & Kuh, *supra* note 24, at 3.

weather event recur. What were once one-hundred-year storms may be becoming twenty-year storms, or worse. The one-in-twenty chance that a large investment may be lost in any given year may be too big a gamble. The insurance industry is on the front line of many of these losses and is actively debating how to handle this predicament.

So far there have been only a few instances in which society has made a conscious decision to retreat from the coasts out of concern for a recurrence of a natural disaster. One example is when the government of Chile imposed restrictions on reconstruction along parts of its coastline after a devastating earthquake and tsunami in 2010.

Who will be affected by such decisions varies widely with the location. Some coasts are dotted with the vacation homes of the wealthy (e.g. the Hamptons, Cape Cod, parts of Florida). At the other end of the income spectrum are low-lying areas that are highly vulnerable, such as the Lower Ninth Ward of New Orleans, parts of which were virtually leveled by Hurricane Katrina and could be again.

In some of the world's poorest regions, very large numbers of people live in places that are one large storm away from catastrophe. Bangladesh is the most prominent example. The deltas of the Nile River and the Mekong River are others. If those societies had the resources and the land to do so, they might rationally decide to relocate many people. Where one or both are lacking, this relocation does not occur. However, one can imagine a day when the hazards are so great that relocation will be forced. In such an event, the poorest will tend to suffer the most.

Short of immediately life-threatening flooding, as noted above there are likely to be large migrations due to drought and other phenomena that make it impossible to produce food. Here again, most relocation is likely to take place in reaction to, rather than in anticipation of, such occurrences; but when it is anticipatory, it can be classified as adaptation. With a warming planet, the zones where certain agricultural activity can take place will migrate northward, and the populations that depend on them may have no choice but to follow.

V. COMPENSATION

One way to address environmental injustice would be to compensate people for their losses.[55] There is little prospect this will occur in the context of climate change.

In the United States, four separate lawsuits have been filed seeking common law remedies against GHG emitters. All of them were based on the theory of the federal common law of nuisance. One of them (which sought injunctive relief against several large electric utility companies) led to a decision by the United States Supreme Court which held that in enacting the Clean Air Act, Congress assigned EPA the task of regulating GHGs, and this displaced the federal common law of nuisance as to climate change.[56] Two others sought money damages, one on behalf of the residents of an Alaskan village,[57] and the other on behalf of property owners in Mississippi who suffered losses as a result of Hurricane Katrina.[58] Both of those cases were dismissed due to displacement and also to a variety of other grounds. The fourth was dismissed by the district court on the grounds that it raised a nonjusticiable political question; the appeal was withdrawn.[59]

The last of these cases to be filed, *Native Village of Kivalina*, was brought in 2008. The fact that no such suits have been brought since is a strong indication that the plaintiffs' bar does not regard their prospects as bright.[60]

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[55] Some of the issues in whether compensation should be provided to victims of climate change are discussed in Daniel A. Faber, *Climate Justice*, 110 MICH. L. REV. 985, 990-96 (2012) and the sources cited therein.

[56] Am. Elec. Power Co., Inc., v. Connecticut, 131 S.Ct. 2527, 2536-2537 (2011).

[57] Native Vill. of Kivalina v. ExxonMobil Corp., 696 F.3d 849, 853 (9th Cir. 2012).

[58] Comer v. Murphy Oil USA, Inc., 839 F. Supp. 2d 849, 852 (S.D. Miss. 2012).

[59] California v. Gen. Motors Corp., No. C06-05755 MJJ, 2007 U.S. Dist. LEXIS 68547, at 48 (N.D. Cal. 2007).

[60] In 2011 and 2012, an organization called Our Children's Trust brought or organized numerous lawsuits alleging that the public trust doctrine extends to the atmosphere, and that excessive GHG emissions violate that public trust. These suits all sought injunctive

No similar lawsuits have been filed in any other country.[61] Extensive scholarly effort has gone toward finding causes of action; these have identified a number of theories under international human rights principles for seeking nonbinding declarations, but none that would yield money damages.[62] The quest for legal remedies continues.

At the fifteenth Conference of the Parties ("COP") to the United Nations Framework Convention on Climate Change in Copenhagen in 2009, an informal decision was made that the developed countries would, beginning in 2020, collectively provide $100 billion/year for climate mitigation and adaptation measures in the developing world. This decision was formalized at the sixteenth COP in Cancun, Mexico in 2010, and some of the mechanisms for administering these funds were adopted at the seventeenth COP in Durban, South Africa, in 2011 and the eighteenth COP in Doha, Qatar in 2012. However, no decisions have been made about which countries will contribute what toward this fund, nor about just how it would be allocated to recipients. Moreover, it does not appear that this money would go toward any kind of compensation, as opposed to projects for mitigation and adaptation.[63]

VI. DIFFICULT CHOICES AHEAD

The gravity of recent climate change predictions[64] dictates severe measures to reduce the amount of warming that occurs, and to cope with

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relief rather than money damages. Most of them have been dismissed. *See* Michael B. Gerrard & J. Cullen Howe, *Climate Change Litigation in the U.S.* 13 (2012), *available at* www.climatecasechart.com.

[61] *See generally* CLIMATE CHANGE LIABILITY: TRANSNATIONAL LAW AND PRACTICE (Richard Lord et al. eds., 2011).

[62] ADJUDICATING CLIMATE CHANGE: STATE, NATIONAL, AND INTERNATIONAL APPROACHES (William C.G. Burns & Hari M. Osofsky, eds., 2009); Maxine Burkett, *Legal Rights and Remedies*, *in* Gerrard and Kuh, *supra* note 24, at ch. 24.

[63] *See* Deepa Badrinarayana, *Financing of Adaptation Measures*, *in* Gerrard & Kuh, *supra* note 24, at ch. 18.

[64] WORLD BANK, TURN DOWN THE HEAT: WHY A 4°C WARMER WORLD MUST BE AVOIDED (2012), *available at*

the warming that cannot be avoided. Several of these measures will intensify the environmental justice issues discussed above.

One of these measures is relatively painless, and has clear environmental justice benefits: a major improvement in energy efficiency. Numerous studies confirm there is tremendous potential to reduce GHG emissions through energy efficiency, and that many measures save rather than cost money.[65] Retrofitting of existing buildings through such measures as weatherization is both very effective and quite labor intensive, yielding considerable energy efficiency benefits. Unfortunately, most other needed measures are not nearly so painless.

A. *Carbon Price*

Most economists agree placing a price on carbon should be the centerpiece of a global effort to reduce GHG emissions. As noted above, this has the potential to impose special burdens on those with low incomes. Thus, various kinds of subsidies will be needed to ease these burdens.

B. *Renewables Siting*

As shown above, a very large number of new renewable energy facilities will be needed, and some of them may have negative impacts on low-income communities (though almost certainly these impacts will be lower than those of fossil fuel facilities). Procedures may have to be adopted to expedite the approval of these facilities. Furthermore, care will need to be taken to ensure that these procedures do not disproportionately burden low-income communities.

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http://climatechange.worldbank.org/sites/default/files/Turn_Down_the_heat_Why_a_4_degree_centrigrade_warmer_world_must_be_avoided.pdf.

[65] *See generally*, John C. Dernbach & Marianne Tyrrell, *Federal Energy Efficiency and Conservation Laws*, *in* THE LAW OF CLEAN ENERGY: EFFICIENCY AND RENEWABLES (Michael B. Gerrard, ed.) (2011).

C. *Risk Tradeoffs*

No energy source (except, for the most part, energy efficiency) is without risk. Blocking certain energy sources because they entail some risks may lead to the perpetuation or expansion of other energy sources with even greater risks. Thus, in examining the advisability of certain sources, it is necessary to evaluate not only their positive and negative impacts, but also the impacts of their alternatives.

One salient example concerns the tremendous growth of hydraulic fracturing as a means of extracting natural gas. This has led to a major increase in the supply and reduction in the price of natural gas. This in turn is displacing other forms of energy, most notably coal, renewables and nuclear power. There is currently a major controversy about the environmental impacts of hydrofracking, especially with respect to its life cycle air pollution impacts and its potential to contaminate surface waters and groundwater. Many have advocated a complete ban on the practice. In my view that is premature; many studies are now underway that attempt to resolve the open technical issues, and it may well be found that a strict regulatory regime would adequately reduce the risks, while allowing the benefits to be realized.

Another example, which is not currently arising in the United States but may one day, concerns carbon capture and sequestration ("CCS"). This is a technology under which the GHG emissions from major stationary sources (especially coal-fired power plants) are captured before they leave the smokestack, and the gas is instead stored permanently in underground repositories. This technology is the primary mechanism that has been identified for continuing to burn coal for electricity without negative climate impacts. Efforts to develop CCS technology in the United States are currently moving very slowly because of the lack of a comprehensive regulatory scheme for GHGs. But if and when CCS advances in the U.S., siting controversies will undoubtedly emerge, because the underground reservoirs needed for large-scale adoption of CCS will involve very large acreage. Not everyone will want to live on top of such a reservoir. Such controversy has already erupted in parts of

Europe.[66] (In China, where CCS technology is being rapidly developed, there are different traditions of local participation). Here, too, risk tradeoffs will have to be assessed, rather than moving to veto a technology because it poses some risks. Since many Indian tribal reservations encompass large areas of land, and quite a few coal-fired power plants are located on or near such reservations, policy makers may well seek to locate some CCS reservoirs under tribal land.

D. *Industrial Disruption*

Under any scenario, stringent GHG controls would be bad news for some industries. The mining and combustion of coal are at the top of any list. There seems to be no way around the reality that some jobs will be lost. In order to minimize the hardship this will cause to workers, retaining and relocation programs will be needed on a large scale.

E. *Migration*

Finally, and most painfully, extremely large numbers of people may need to relocate in the coming decades. Most of this will likely be in reaction to imminent disasters (or disasters that have already struck but that have left survivors); some may be in anticipation of not-so-imminent disasters. All of these people will have to go somewhere, and often there is no neighboring land that is physically suitable, and even if there is, accommodating such a large number of people may be politically impossible, leading to global security issues.

Thus the countries of the world with large areas of sparsely populated land will, during some decade, have to begin considering the

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[66] *See* Richard Van Noorden, *Carbon sequestration: Buried trouble*, NATURE (Feb. 17, 2010), http://www.nature.com/news/2010/100217/full/463871a.html; *See also Dutch gas protests 'unlikely to derail UK carbon capture plans,'* BUSINESSGREEN (Aug. 9, 2011) http://www.businessgreen.com/bg/news/2100206/dutch-gas-protests-unlikely-derail-uk-carbon-capture-plans.

prospect of taking in large numbers of climate-displaced people.[67] As a country that also has large historic GHG emissions and high per capita GHG emissions, the United States would be on the top of any list; Canada, Australia and Russia would also appear. China now has very large and growing GHG emissions, and some relatively unpopulated regions, but unlike these other countries it will also face massive relocation of its own because of its large and vulnerable coastlines, so China's contribution to solving this problem may be to take care of its own internally displaced persons. No country has announced it is willing to take in many persons displaced by climate change, and there is currently no legal obligation to do so. In no country would it be politically palatable under current circumstances. But these circumstances may change in the decades to come, and the time will arrive when it is no longer possible to avoid the issue

[67] For discussions of the legal issues involved, *see* THREATENED ISLAND NATIONS, *supra* note 23; JANE MCADAM, CLIMATE CHANGE, FORCED MIGRATION, AND INTERNATIONAL LAW (2012).