5-2008

ELR
NEWS & ANALYSIS

38 ELR 10287

ARTICLES

Environmental Justice and Domestic Climate Change Policy

by Alice Kaswan

Editors' Summary: Legislators and regulators should incorporate environmental justice concerns and opportunities into climate change policies. In this Article, Prof. Alice Kaswan first addresses the environmental justice benefits and risks of cap-and-trade programs. The environmental benefits include enabling higher reduction goals, imposing absolute caps on emissions, and creating technology adoption and innovation incentives. Environmental concerns here center on the programs' morality, their real-world efficacy in reducing emissions and inspiring innovation, the distributional impacts resulting from greenhouse gas co-pollutants, and the lack of public participation. She then describes a number of mechanisms for incorporating environmental justice considerations into cap-and-trade programs in a manner that balances the sometimes conflicting goals of equity and efficiency. She goes on to identify a number of economic risks and opportunities created by climate change policies, including but not limited to cap-and-trade policies. Finally, she addresses the environmental justice risks presented by new technologies like ethanol.

I. Introduction

There is little dispute about the dire consequences of escalating climate change. The Intergovernmental Panel on Climate Change (IPCC), which includes respected scientists from around the globe, predicted a wide range of global impacts in its 2007 report.[1] Emissions reductions are essential. Given the nation's reliance on fossil fuel combustion, however, emissions mitigation could require profound technological and societal changes. Developing mitigation and adaptation strategies will present some of the most significant public policy challenges of our time.

What considerations should be brought to bear in developing the requisite public policies, and more particularly, what role should environmental justice concerns play? At a 2006 conference panel on developing cap-and-trade programs, Dan Skopec, then an undersecretary of the California Environmental Protection Agency, said the following about efforts to incorporate environmental justice considerations into climate change policy:

> [A] lot of people use the issue of global warming to tackle the problems that they've been working on for the last 10, 15, 20, 30 years, and I think that these problems are not necessarily related to global warming. I think that's a folly that we all have to be careful about. The challenge of global warming is so great, it is going to be a major adjustment to our economy. . . . The challenge is so great that it should be the sole focus of this effort. Using the umbrella of global warming to satisfy other agendas is really going to distract from the solution and create inefficiency.[2]

The depth of the problem and the extent of its ramifications lead me to the opposite conclusion. In addition to their environmental consequences, climate change policies addressing transportation, energy production, industry, commercial enterprises, housing, land use, and agriculture will inevitably have significant social and economic repercussions—on the poor, on consumers, and on affected industries. Notwithstanding the critical importance of significant greenhouse gas (GHG) reductions, policies designed in a vacuum, focusing solely on reduc-

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1. *See* IPCC, Climate Change 2007: Impacts, Adaptation, and Vulnerability, Summary for Policymakers (2007), *available at* http://www.ipcc.ch/SPM13apr07.pdf [hereinafter IPCC Impacts Summary for Policymakers]. This document summarized Working Group II's contribution to the IPCC *Fourth Assessment Report*. To view the full report, see IPCC, Working Group II, Climate Change Impacts, Adaptation, and Vulnerability (2007), *available at* http://www.ipcc-wg2.org/; *see also* IPCC, Climate Change 2007: Synthesis Report of the IPCC Fourth Assessment Report, Summary for Policymakers (2007), *available at* http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf.

2. *Global Warming I: Developing Cap-and-Trade Programs to Reduce Greenhouse Gas Emissions*, 16 Envtl. L. News 34, 42 (2007), Panel Presentation by Dan Skopec at California State Bar Environmental Law Section Conference (Mar. 31, 2006).

tions, could create significant and unintentional adverse consequences. Moreover, policies to address climate change have the potential to address long-standing societal problems, like distributional inequities. Constructive GHG policies require a broad vision incorporating environmental, economic, and social considerations.

To date, the national debate on climate change policies has given insufficient attention to their environmental justice implications. This Article addresses that vacuum and provides initial policy recommendations in order to foster a more robust national conversation. Most of this Article addresses the environmental trade offs presented by GHG cap-and-trade policies in light of the complexity and controversy of the issues they raise. Subsequently, the Article notes the economic implications of a number of climate change policies, including cap-and-trade programs, and explores the potential environmental justice issues raised by ethanol.

Part I of this Article provides an introduction to the environmental justice movement and its vision of a just climate change policy. With the exception of California, it also notes the absence of environmental justice considerations in existing climate change policies at the federal and state levels.

Part II addresses the environmental implications of the most politically prominent market-based approach: cap-and-trade programs.[3] I first note some of the potential environmental benefits of a cap-and-trade program, including the potential to set higher reduction goals in light of lower compliance costs, the benefits of establishing a concrete cap, and technology adoption and innovation incentives. Recognizing the long-standing concerns that environmental justice advocates have nonetheless had about cap-and-trade programs, this Article then analyzes the potential environmental justice risks posed by cap-and-trade programs. Like some environmentalists, environmental justice advocates question both the morality and the efficacy of trading programs. In addition, environmental justice advocates have routinely critiqued market-based approaches to environmental protection because trading systems fail to account for the distribution of pollution. Environmental advocates are concerned about a GHG trading system's impacts on the distribution of GHGs' more harmful co-pollutants. The Article explores the controversy over whether carbon trading could create or allow co-pollutant hot spots, notwithstanding existing regulatory measures to control co-pollutants. It also addresses the impact of carbon trading on the equitable distribution of co-pollutant reduction benefits and a trading program's likely impacts on public participation in permitting decisions.

I urge policymakers to avoid false dichotomies for or against market-based systems, and to instead consider mechanisms for designing cap-and-trade programs that integrate environmental justice concerns. I consider how California's Global Warming Solutions Act (GWSA or AB 32) creates a legal structure that allows a cap-and-trade system, but requires that any such system avoid adverse distributional impacts. I then review several options for integrating environmental justice that could be considered severally or in combination.

Finally, I address the fundamental tensions between environmental justice and economic and administrative efficiency. Markets may lower the cost of achieving environmental ends, but efficiency is not the only relevant parameter for designing environmental policy. Policymakers appear to be focusing too narrowly on the prerequisites for an effective market, rather than considering a broader range of goals, including environmental justice. Achieving a broader range of goals could complicate the market, but lead to a richer and ultimately more effective environmental policy. In considering the environmental challenges ahead, the most efficient system will not necessarily be the most effective.

Having considered environmental issues in Part II, Part III will turn to climate change policies' potential economic implications for disadvantaged communities. On the downside, climate change policies will inevitably impose across-the-board costs that could have regressive impacts on the poor. A just climate change policy would address that impact. Land use policies could also adversely impact poor, inner-city communities unless efforts are made to preserve affordable housing. On the upside, cap-and-trade programs could generate public and private resources that could be directed toward economically disadvantaged communities. In general, the major economic and industrial changes resulting from climate change regulation could be channeled into development opportunities for economically depressed sectors.

Part IV acknowledges the importance of new technologies such as biofuels, but notes the risks that could arise in their development and deployment, with a particular focus on ethanol.

This Article provides an overview of the positive and negative environmental justice implications of a variety of the most significant emerging climate change policies. Whether readers agree or disagree with its specific proposals, it is intended to spark a dialogue about the appropriate role of environmental justice in climate change policies.

II. Environmental Justice and Climate Change

A. Introduction to the Environmental Justice Movement and Its Initial Climate Change Principles

To understand the environmental justice issues presented by climate change policies, it is critical to understand the roots of the environmental justice movement and the nature of its claims. In the 1980s, communities of color became increasingly aware of the inequitable concentration of undesirable land uses in their neighborhoods.[4] Since then, numerous studies have largely confirmed that poor and of color communities are disproportionately exposed to pollution.[5]

3. Academics and scholars have frequently suggested carbon taxes as another market-based approach to climate change. The political climate does not appear to be ripe for such taxes, however. Legislative and administrative proposals have focused much more on cap-and-trade proposals than on tax proposals, and this Article follows suit.

4. *See* Luke W. Cole & Sheila R. Foster, From the Ground Up: Environmental Racism and the Rise of the Environmental Justice Movement 20 (2001).

5. *See* James P. Lester et al., Environmental Injustice in the United States: Myths and Realities (2001) (reviewing studies and conducting additional distributional studies that revealed that race and, to a somewhat lesser extent, class, are correlated with environmental risk). *See generally* Cole & Foster, *supra* note 4, at 54-58 & app. A (describing and listing studies on the inequitable distribution of undesirable land uses); Alice Kaswan, *Distributive Jus-*

Emerging primarily in communities of color, the environmental justice movement built upon the civil rights tradition and its strong focus on grass-roots activism.[6]

The environmental justice movement presents a number of types of claims for justice. Activists seek distributive justice: for example, they oppose facility sitings or permitting actions that would create or increase existing pollution disparities.[7] They also seek participatory justice: they seek an influential role in the decisions that could impact their communities.[8] Environmental justice advocates perceive environmental issues in context: in seeking "social justice," environmental burdens are significant not only in environmental terms, but are considered a product of broader social, economic, and political forces.[9] The movement's environmental policy goals are therefore designed to achieve not only environmental benefits, but community empowerment as well.[10]

In the climate change context, environmental justice groups are beginning to articulate overarching principles. Domestically, the Environmental Justice and Climate Change Initiative developed a list of 10 climate justice principles.[11] Recognizing the particular vulnerability of the poor and people of color, a number of the principles focus on the potential consequences of climate change and the critical importance of reducing GHG emissions.[12] Several other principles focus on the implications of climate change policies, including a call for adaptation assistance for poor communities,[13] as well as compensation for workers and others impacted by the potential economic costs of climate change policies.[14] The environmental justice movement's participatory goals are reflected in the call for community participation.[15] The principles express caution about the emergence of international and national carbon markets.[16] California environmental justice groups have been even more critical of market-based approaches.[17]

In the international arena,[18] the climate justice debate has reflected broader principles in international politics, like human rights[19] and corrective justice.[20] Despite the differ-

tice and the Environment, N.C. L. Rev. 1031, 1069-77 (2003) (discussing studies of the distribution of undesirable land uses).

6. *See* Cole & Foster, *supra* note 4, at 20-21. Other movements contributed to the emergence of the environmental justice movement, including the anti-toxics movement, Native American movements, and the labor movement, *see id.* at 22-28, but the civil rights movement was and has remained a critical driving force. *Id*. at 20.

7. *See* Vicki Been, *What's Fairness Got to Do With It? Environmental Justice and the Siting of Locally Undesirable Land Uses*, 78 Cornell L. Rev. 1001, 1028-55 (describing the distributive conceptions of environmental justice); Kaswan, *supra* note 5, at 1043-44 (describing the environmental justice movement's claim for distributive justice).

8. *See* Kaswan, *supra* note 5, at 1045-47 (describing the environmental justice movement's claim for participatory justice, framed as political justice).

9. *See* Sheila Foster, *Justice From the Ground Up: Distributive Inequities, Grassroots Resistance, and the Transformative Politics of the Environmental Justice Movement*, 86 Cal. L. Rev. 775, 791-92 (1998) (observing that environmental injustice is rooted in a web or economic and social forces); Kaswan, *supra* note 5, at 1047 (describing claim for social justice); Robert R. Kuehn, *A Taxonomy of Environmental Justice*, 30 ELR 10681, 10698-99 (Sept. 2000) (describing movement's pursuit of social justice).

10. *See* Cole & Foster, *supra* note 4, at 13-15 (describing environmental justice movement's goal of transforming and empowering communities).

11. *See* Environmental Justice & Climate Change Initiative, *10 Principles for Just Climate Change Policies in the United States*, http://www.ejcc.org/ejcc10short_usa.pdf (last visited Mar. 27, 2008) (listing 10 principles); Ansje Miller & Cody Sisco, Ten Actions of Climate Justice Policies (2002), *available at* http://www.ejrc.cau.edu/summit2/SummIIClimateJustice%20.pdf (explaining the 10 principles). The Environmental Justice and Climate Change Initiative is an effort by 28 domestic organizations, including environmental justice organizations, religious organizations, Native American organizations, and other nonprofits to advocate for climate change action. *Id.*

12. Principle 1 is "Stop Cooking the Planet"; Principle 5 states that "Global Problems Need Global Solutions," and focuses on the need for global cooperation to solve the climate change challenge; Principle 6 is "The U.S. Must Lead"; Principle 7 states that we should "Stop Exploration for Fossil Fuel"; Principle 9 urges "Caution in the Face of Uncertainty," and argues that uncertainty about the impacts of climate change should not be used as an excuse for inaction; and Principle 10 is "Protect Future Generations."

13. Principle 2, "Protect and Empower Individuals and Communities," states that policies to help communities adapt to the inevitable consequences of climate change should address the underlying inequities that make poor communities particularly vulnerable. *See* Miller & Sisco, *supra* note 11, at 2-4.

14. Principle 3, "Ensure Just Transition for Workers and Communities," recognizes that addressing climate change will have economic consequences, and argues for compensation and other measures to ease the transition for displaced workers and those particularly impacted by the higher energy and food prices that likely lie ahead. *Id*. at 4.

15. Principle 4 states that policy makers must "Require Community Participation," so that people can "have a say in the decisions that affect their lives." *Id*. at 1.

16. Principle 8 states that policymakers should "Monitor Domestic and International Carbon Markets." *Id.* at 2. Principle 8 does not oppose carbon markets, but it highlights the movement's concerns about pollutant hot spots, especially in connection with trades to the developing world, where co-pollutants may not be effectively regulated. *See id.* at 8.

17. *See* The California Environmental Justice Movement's Declaration on Use of Carbon Trading Schemes to Address Climate Change (2008), *available at* http://www.ejmatters.org/declaration [hereinafter California EJ Movement's Declaration].

18. The International Climate Justice Network, comprised of 14 organizations from around the world, developed the Bali Principles of Climate Justice (the Bali Principles) in 2002. *See* Press Release, Climate Justice Principles Released by Coalition (Aug. 28, 2002); Bali Principle of Climate Justice (Aug. 29, 2002), *available at* http://www.indiaresource.org/issues/energycc/2003/baliprinciples.html. A couple of months later, a Climate Justice Summit was held contemporaneously with an annual climate change meeting and resulted in the Delhi Climate Justice Declaration. *See* Delhi Climate Justice Declaration (2002), *available at* http://www.indiaresource.org/issues/energycc/2003/delhicjdeclare.html.

19. The human rights orientation is reflected in the following Bali Principles: Principle 1 (right to be free from climate change and its impacts); Principle 9 (climate change victims' right to compensation); Principle 11 (right to affordable and sustainable energy); Principle 14 (energy workers' right to safe work environment); Principle 17 (right to socioeconomic models that safeguard rights to food and a clean environment); Principle 18 (communities' rights to own and manage the resources on which they rely); Principle 20 (Indigenous People's right to self-determination); Principle 22 (importance of women's rights); Principle 23 (importance of youth rights); and Principle 27 (right of unborn generations). Bali Principles of Climate Justice, *supra* note 18. The Delhi Declaration similarly emphasizes the human rights implications of climate change policy. *See* Delhi Climate Justice Declaration, *supra* note 18 ("We affirm that climate change is a human rights issue—it affects our livelihoods, our health, our children and our natural resources.").

20. *See* Principle 6 (opposing the role of transnational corporations in promoting unsustainable patterns and influencing national and international policies); Principle 7 (stating that industrialized governments and transnational corporations "owe the rest of the world" an "ecological debt"); Principle 8 (demanding that energy industries be held strictly liable for the impact of GHGs and other pollutants). Bali Principles of Climate Justice, *supra* note 18. *See also* Delhi Climate Justice Declaration, *supra* note 18 (observing that climate change is "caused primarily by industrialized nations and transna-

ence in context, international environmental justice advocates, like their domestic counterparts, focus on participatory rights.[21] In addition, market-based measures, such as international emissions trading, have been met with deep skepticism and concern.[22]

The foregoing indicates how the environmental justice movement's central principles map onto the problem of climate change. However, many of the principles have yet to be translated into concrete climate change proposals.[23]

B. The Role of Environmental Justice in Existing Climate Change Policies

In this part, I provide an overview of the status of environmental justice provisions in existing climate change policies. The survey reveals that most would benefit from more explicit attention to environmental justice, and that California could serve as a model for such efforts.

As of the time of this writing, the primary federal approach to reducing domestic GHG emissions consists of facilitating voluntary industry measures to reduce emissions with the goal of reducing GHG intensity, not actual emissions.[24] Numerous bills to provide actual reduction targets and develop mandatory programs for achieving them were introduced in the 110th Congress.[25] A few of these bills consider the statutes' potential economic consequences through provisions that would compensate low-income utility customers[26] and workers or regions especially affected by regulation.[27] None of the bills explicitly addresses the potential adverse environmental consequences of the GHG reduction programs themselves, or assures environmental justice more broadly.

At the state level,[28] California is a national leader in incorporating environmental justice. AB 32,[29] adopted in 2006, recognizes the importance of developing climate change policies that take a wide variety of factors into consideration, including environmental justice. The California Air Resources Board (CARB), the primary agency responsible for implementing AB 32, is to develop approaches to meet the state's emissions reduction goals

> in a manner that minimizes costs and maximizes benefits for California's economy, improves and modernizes California's energy infrastructure and maintains electric system reliability, maximizes additional environmental and economic co-benefits for California, and complements the state's efforts to improve air quality.[30]

tional corporations" and that "unsustainable consumption exists primarily in the North").

21. Note Bali Principle 3 (affirming indigenous peoples right to represent themselves); Principle 5 (stating that "communities, particularly affected communities [should] play a leading role in national and international processes to address climate change"); and Principle 20 (affirming indigenous peoples and local communities' right "to participate effectively at every level of decision-making"). BALI PRINCIPLES OF CLIMATE JUSTICE, *supra* note 18.

22. Under the Bali Principles, market mechanisms for addressing climate change "should be subject to principles of democratic accountability, ecological sustainability and social justice." BALI PRINCIPLES OF CLIMATE JUSTICE, *supra* note 18 (Principle 13). The Delhi Declaration takes a more skeptical view of international market mechanisms, stating that they are "false solutions and are exacerbating the problem." DELHI CLIMATE JUSTICE DECLARATION, *supra* note 18. It rejects "the market-based principles that guide the current negotiations to solve the climate crisis."

23. *See* Maxine Burkett, *Just Solutions to Climate Change: A Climate Justice Proposal for a Domestic Clean Development Mechanism*, 56 BUFF. L. REV. 3 & 53 (forthcoming 2008) (noting that issues of climate justice have been overlooked in policy and academic circles). In her article, Professor Burkett provides one of the first concrete policy proposals for integrating environmental justice into climate change policy.

24. The Bush Administration seeks to reduce GHG intensity by 18% by the year 2012. U.S. DEP'T OF STATE, USA ENERGY NEEDS, CLEAN DEVELOPMENT AND CLIMATE CHANGE: PARTNERSHIPS IN ACTION 4 (2006), *available at* http://www.state.gov/g/oew.climate. GHG intensity essentially measures energy efficiency: the amount of GHG emissions per unit of economic output.

    Since the U.S. Supreme Court held that U.S. Environmental Protection Agency (EPA) has the authority to address GHGs under the Clean Air Act (CAA), the Agency has initiated additional measures that could, conceivably, move beyond current voluntary initiatives. *See* Massachusetts v. EPA, 127 S. Ct. 1438, 1459-62, 37 ELR 20075 (2007). President George W. Bush directed EPA to develop motor vehicle emissions standards for GHGs. *See* Press Release, White House, President Bush Discusses CAFÉ and Alternative Fuel Standards (May 14, 2007), *available at* http://www.whitehouse.gov/news/releases/2007/05/20070514-4.html. The Administration has the authority to develop stationary source controls and to list CO_2 as a criteria pollutant, but does not appear eager to exercise it.

25. *See* Alice Kaswan, *The Domestic Response to Global Climate Change: What Role for Federal, State, and Litigation Initiatives?*, 42 U.S.F. L. REV. 39, 74-76 (2007) (providing brief description of bills introduced as of July 2007). In addition, in October 2007, Sens. Joseph I. Lieberman (I-Conn.) and John W. Warner (R-Va.) introduced America's Climate Security Act of 2007. S. 2191, 110th Cong. (2007), *available at* http://usclimatenetwork.org/federal/lieberman-warner-bill/ACSA.pdf.

26. *See* America's Climate Security Act of 2007, S. 2191, 110th Cong., §3503(b)(2) (Lieberman-Warner bill provision allocating allowances to utilities to mitigate economic impacts on low- and middle-income consumers), §3403(b) (allocating allowances to states based upon the state's expenditures under the federal Low-Income Home Energy Assistance Act), §3403(c)(1)(A) (allocating allowances to states to mitigate impacts on low-income energy consumers); Low Carbon Economy Act of 2007, S. 1766, 110th Cong. §403 (Bingaman-Specter bill provision designating certain auction proceeds for low-income and rural assistance programs); Global Warming Reduction Act of 2007, S. 485, 110th Cong. §702(a)(B) (Kerry-Snowe bill provision establishing a goal of mitigating energy cost increases to consumers, "particularly low-income consumers"). The McCain-Lieberman bill would require the U.S. Department of Commerce to research the impacts of climate change (not climate change policy) on low-income populations, but does not specify actions to be taken in light of such findings. S. 280, 110th Cong. §402.

27. *See* S. 2191 §§4601-4605 (Lieberman-Warner bill provision establishing a fund for worker training and assistance); S. 485 §702(C) (Kerry-Snowe bill provision establishing a goal of providing transition assistance to "employees and regions affected by a transition away from the use of high carbon-emitting energy sources"); Global Warming Pollution Reduction Act, S. 309, 110th Cong. §706(b) (Sanders-Boxer bill provision allowing allowances to be allocated to "communities, individuals and companies that have experienced disproportionate adverse impacts as a result of . . . the transition to a lower carbon-emitting economy . . . .").

28. EPA and the Pew Center on Global Climate Change websites provide comprehensive information on state climate change policies. *See* U.S. EPA, *State and Regional Climate Action Table*, http://www.epa.gov/climatechange/wycd/stateandlocalgov/state_actions list.html (EPA website listing state climate change policies); Pew Ctr. on Global Climate Change, *What's Being Done . . . in the States*, http://www.pewclimate.org/what_s_being_done/in_the_states.

29. CAL. HEALTH & SAFETY CODE §§38500-99, *available at* http://www.climatechange.ca.gov/documents/ab_32_bill_20060927_chaptered.pdf. AB 32 requires the state to reduce to its 1990 levels of emissions by 2020. *Id.* §38550. That goal is expected to lead to a 25% reduction below 2006 levels. *See* Media Release, California Climate Action Team, State Takes Early Action to Reduce Greenhouse Gases (Mar. 12, 2007), *available at* http://www.calepa.ca.gov/PressRoom/Releases/2007/PR4-031207.pdf.

30. CAL. HEALTH & SAFETY CODE §38501(h). AB 32 also states that in developing implementing regulations, CARB should "[c]onsider overall societal benefits, including reductions in other air pollutants, diversification of energy sources, and other benefits to the economy, environment, and public health." *Id.* §38562(b)(6). To the extent a

Procedurally, the law instructs CARB to develop its policies in consultation with many relevant stakeholders, including "the environmental justice community, industry sectors, business groups, academic institutions, [and] environmental organizations."[31] The law also mandated the creation of an Environmental Justice Advisory Committee and required that it be "comprised of representatives from communities in the state with the most significant exposure to air pollution, including, but not limited to, communities with minority populations or low-income populations . . . ."[32] To develop its scoping plan for regulations, AB 32 also requires CARB to hold public workshops "in regions of the state that have the most significant exposure to air pollutants, including, but not limited to, communities with minority populations [and] communities with low-income populations . . . ."[33]

Substantively, several AB 32 provisions require CARB to consider impacts on low-income minority populations and to ensure that climate change policies do not undermine the achievement of other environmental goals.[34] These provisions are described in more detail below, where I detail AB 32's requirements for integrating environmental justice into a market system as a prelude to exploring actual mechanisms for doing so.

AB 32 also provides a model for how climate change regulation could provide economic benefits to disadvantaged communities, fueled by investments in new technology and its implementation. The relevant provision[35] is discussed below, where I discuss the economic opportunities presented by climate change regulation.[36] At least on paper, California is thus a national leader in recognizing the interrelationships between climate change policy and broader economic and environmental issues.

III. Cap-and-Trade Programs

A. Cap-and-Trade Program Basics

The first key area for considering the role of environmental justice is in the design and operation of a cap-and-trade program for GHGs. Cap-and-trade programs have figured prominently in proposals for addressing climate change. Most of the federal climate change bills introduced in the 110th Congress contemplate a cap-and-trade program.[37] The most developed state initiative for GHG reductions, the Regional Greenhouse Gas Initiative, is a cap-and-trade program for electric utilities in the Northeast.[38] Although California's climate change legislation did not mandate a cap-and-trade program, it permitted the implementing agency to adopt one, and the governor has strongly promoted that option.[39]

Given the prominence of cap-and-trade programs, I will describe several key design features in this part and explore their environmental justice implications in subsequent parts. Under a cap-and-trade program, the relevant government entity would set a cap on the total emissions of carbon dioxide (CO_2) or GHGs. The cap would be translated into a set number of pollution allowances which the regulatory entity would distribute to polluting facilities.

The method of allowance distribution is a key variable in cap-and-trade program design. The implementing agencies could give the allowances for free. Since the cap would be below the existing overall emissions level, facilities would not receive enough allowances to cover their existing emissions. Facilities would have three mechanisms for aligning their emissions with their allowances: (1) reduce emissions to match the number of allowances; (2) reduce emissions by more than is necessary to match the number of allowances and sell the excess; or (3) buy allowances until they equal the actual emissions level. Options (2) and (3) embody the trade aspect of a cap-and-trade program: rather than all facilities having to reduce by the same percentage, facilities can trade allowances so that those who reduce more enable others to reduce less or not at all.

Another option for allocating allowances is to auction some or all of the allowances; in other words, a regulatory agency would sell pollution rights.[40] A pure auction would result in less trading than a free distribution of allowances based on past emissions, since facilities would presumably purchase the number of allowances they need to cover their expected emissions. In a pure auction system, trading would likely occur, if at all, only to address unanticipated differences between the amount purchased and the amount ultimately needed. Those who could reduce emissions for less

market-based system is adopted, the statute specifies that CARB should "[m]aximize additional environmental and economic benefits for California . . . ." *Id.* §38570(b)(3).

31. *Id.* §38501(f).

32. *Id.* §38591(a).

33. *Id.* §38561(g).

34. *Id.* §38562(b)(2) (prohibiting disproportionate impacts on low-income communities); *id.* §38570(b)(1) (requiring that CARB consider whether market-based systems will lead to direct, indirect, and cumulative impacts, especially on heavily polluted communities); *id.* §38562(4) (stating that the law should complement the state's efforts to meet clean air goals); *id*. §38570(b)(2) (stating that CARB should ensure that market-based systems do not increase co-pollutants).

35. *Id*. §38565.

36. *See infra* Part III(B).

37. *See* Kaswan, *supra* note 25, at 76 (describing cap-and-trade programs in federal bills introduced as of summer 2007). The recent Lieberman-Warner bill also relies on cap a cap-and-trade mechanism. S. 2191 §§1101-4901 (proposing a cap-and-trade system). *See also* Pew Ctr. on Global Climate Change, *Economy-Wide Cap-and-Trade Proposals in the 110th Congress*, http://www.pewclimate.Org/docUploads/110th%20Congress%20Economy-wide%20Cap Trade%20Proposals%2010-18-2007.pdf (chart comparing key features of recent legislative proposals).

38. *See* Regional Greenhouse Gas Initiative (RGGI), Memorandum of Understanding (2005), *available at* http://www.rggi.org/docs/mou_final_12_20_05.pdf. In November 2007, several midwestern states entered a Midwestern Greenhouse Gas Accord in which they agreed to establish a regional GHG cap-and-trade program. Midwestern Greenhouse Gas Accord (Nov. 15, 2007), *available at* http://www.wisgov.state.wi.us/docview.asp?docid=12497.

39. Cal. Health & Safety Code §38570(a) (stating that the regulatory agency "may" adopt market mechanisms). Two months after approving AB 32, Gov. Arnold Schwarzenegger (R-Cal.) promulgated an executive order promoting a "comprehensive market-based compliance program," and created an advisory committee to provide initial recommendations on its structure. Exec. Order No. S-20-06 (Cal. 2006), *available at* http://gov.ca.gov/index.php?/executive-order/4484/. A market-based system is also likely because California has joined a regional initiative designed to integrate trading programs throughout the western states. *See* Western Regional Climate Change Initiative (Feb. 26, 2007), http://www.westernclimate initiative.org/ewebeditpro/items/O104F12775.pdf.

40. *See generally* U.S. EPA, Tools of the Trade: A Guide to Designing and Operating a Cap-and-Trade Program for Pollution Control 3-14 (2003) (describing auctions).

cost than the allowance price would presumably buy fewer allowances, while those whose costs of control exceed the allowance price would presumably buy more. Although this system leads to less trading than distributing allowances for free, it provides companies with the same flexibility as a more trade-centered program, since facilities can choose how much to reduce emissions (if at all) depending upon their own marginal costs of control. As a consequence, it would also result in differing levels of control at different facilities.

Another key issue in designing a cap-and-trade program is the sectoral and geographic scope of a program. Cap-and-trade programs could focus on particular sectors, like electric utilities,[41] or could embrace a wide range of sectors, including utilities, industry, commercial enterprises, and even mobile sources.[42] The geographic scope of a trading program could also vary widely. Programs can be designed to operate at different levels, including at the municipal,[43] state,[44] regional,[45] national,[46] or international level.[47] Even if a program is designed at one level (say, state), program designers must decide whether to link the program to others and allow trades outside the program's geographic boundaries. Thus, California, in designing a cap-and-trade program, will have to address whether and to what extent to allow trades for credits outside of California.[48] The larger the sectoral and geographic scope of the program, the larger the variation in the costs for reducing GHGs, the more that expensive sources will purchase allowances from cheaper sources, and the lower the overall costs of pollution control. Fewer actual reductions would occur in sectors or regions experiencing higher costs of control. Sectoral and geographic flexibility could thus have distributional consequences.

Offsets present another significant design issue: the extent to which facilities can buy credits for reductions made outside of the regulated sector. If the cap-and-trade system allowed facilities in a regulated sector (say, utilities) to purchase offsets, then a utility could not only trade allowances with other utilities, but purchase emission reduction credits from an unregulated entity that nonetheless reduced emissions (say, an unregulated cement plant) or an entity that sequestered carbon (say, a timber company that planted trees). Like expanding sectoral and geographic scope, allowing an entity to purchase offsets rather than reduce its own emissions has distributional consequences.

The discussion so far has addressed spatial trading. Intertemporal trading, otherwise known as emissions banking, could also have potential environmental justice impacts. If allowances can be banked, then companies could reduce their emissions below the required level and bank the extra credits for use in the future. Companies bank emissions to facilitate future increases in production, to ease the achievement of more stringent future targets,[49] and to provide a cushion against potentially unstable future allowance prices.[50] Allowing banking does, however, create the possibility of higher emissions at a source in the future as a consequence of lower emissions in the present.

The decision about whether, to what extent, and how to adopt a cap-and-trade program rather than a more traditional regulatory program for controlling GHG emissions turns on a multiplicity of factors, not just the implications for environmental justice. Scholars have debated the systems' relative morality,[51] economic efficiency,[52] administrative efficiency,[53] efficacy at creating incentives for additional pollution reduction,[54] efficacy at creating incentives for the development of innovative pollution control technology,[55] im-

41. For example, the RGGI program addresses only the electric utility sector. *See* RGGI Memorandum of Understanding, *supra* note 38, §1.

42. Los Angeles adopted a cap-and-trade program for addressing local air pollutants, known as the Regional Clean Air Incentives Market (RECLAIM), which included a wide range of sectors, including utilities as well as many additional air pollution sources. *See* Lesley K. McAllister, *Beyond Playing "Banker": The Role of the Regulatory Agency in Emissions Trading*, 59 ADMIN. L. REV. 269, 288 (2007).

43. Los Angeles' RECLAIM program created a local cap-and-trade program for certain criteria air pollutants. *See id.* at 287-88.

44. As noted above, California is considering a state-centered cap-and-trade program as one of its policy options. *See supra* note 39 and accompanying text.

45. The RGGI program is an example of a regional trading program. *See supra* note 40 and accompanying text.

46. Many of the federal bills propose a national cap-and-trade program. *See* Kaswan, *supra* note 25, at 76.

47. The Kyoto Protocol to the United Nations Framework Convention on Climate Change, the primary international treating addressing climate change, creates an international trading system. *See* Kyoto Protocol, arts. 6, 12, and 17.

48. Some degree of trading outside of the state is likely, since California has signed the Western States Climate Change Initiative, in which several western states agreed to establish a regional emissions goal and a regional trading system to accomplish that goal. *See* Western Regional Climate Change Initiative, *supra* note 39.

49. *See* A. DENNY ELLERMAN ET AL., EMISSIONS TRADING IN THE U.S.: EXPERIENCE, LESSONS, AND CONSIDERATIONS FOR GREENHOUSE GASES 14 (2003), *available at* http://www.pewclimate.org/global-warming-in-depth/all_reports/emissions_trading/ (noting that many firms reduced emissions and banked allowances in Phase I of the Acid Rain Program to provide an advantage in meeting the more stringent requirements to be imposed in Phase II of the program) [hereinafter ELLERMAN ET AL.; Byron Swift, *How Environmental Laws Work: An Analysis of the Utility Sector's Response to Regulation of Nitrogen Oxides and Sulfur Dioxide Under the Clean Air Act*, 14 TUL. ENVTL. L.J. 309, 325-26 (2001) (describing incentives to bank in Phase I to generate allowances that would increase in value during Phase II).

50. *See* ELLERMAN ET AL., *supra* note 49, at 37.

51. *See* Richard T. Drury et al., *Pollution Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 DUKE ENVTL. L. & POL'Y F. 231 (1999) (critiquing Los Angeles' cap-and-trade programs based upon environmental justice concerns), at 269-71 (suggesting that a cap-and-trade program turns an ethical wrong—polluting—into a right); Burkett, *supra* note 23, at 48 (suggesting that cap-and-trade programs allow companies to profit from complying with a preexisting ethical duty not to pollute).

52. For arguments that cap-and-trade programs are economically efficient, see, e.g., Daniel J. Dudek & John Palmisano, *Emissions Trading: Why Is This Thoroughbred Hobbled?*, 13 COLUM. J. ENVTL. L. 217, 223, 231-34 (1988); Swift, *supra* note 49, at 381-82 (describing economic efficiency generated by the acid rain trading program).

53. *Compare* Bruce A. Ackerman & Richard B. Stewart, *Reforming Environmental Law*, 37 STAN. L. REV. 1333, 1342-43 (1985) (describing greater administrative efficiency of market-based systems over cap-and-trade) and Swift, *supra* note 49, at 400-02 (describing relative administrative efficiency of pure cap-and-trade program), *with* McAllister, *supra* note 42, at 287-312 (describing high administrative costs associated with Los Angeles' air pollutant trading program).

54. *See* EPA, *supra* note 40, at 1-2 to 1-3.

55. *Compare* Ackerman & Stewart, *supra* 53, at 1349-50 (discussing incentive effect created by decreasing caps and increasing allowance prices), Dudek & Palmisano, *supra* note 52, at 234-36 (discussing how trading system creates incentives to develop more cost-effective pollution control mechanisms), Swift, *supra* note 49, at 391-95, EPA, *supra* note 40, at 1-4 (describing incentives for innovations in pollution abatement), *with* David M. Dreisen, *Is Emissions Trading*

portance in attracting political support for regulation,[56] and, last but not least, each system's impact on the distribution of pollution.[57] The primary focus of this Article, however, is on the consequences of cap-and-trade programs for environmental justice. I will discuss the issues identified above as they intersect with that central theme.

B. The Environmental Justice Benefits of Cap-and-Trade Programs

Notwithstanding the environmental justice community's long-standing concern about market-based systems, they offer several potential benefits. The first is the capacity to facilitate greater GHG emission reduction goals. The environmental justice community supports stringent environmental goals. It is not only concerned about distributional equity; achieving large aggregate reductions will be particularly important for disadvantaged communities.[58] Given their lack of health insurance, disadvantaged communities are likely to suffer greater health consequences from increased incidences of disease and pollution. They are also likely to live in more environmentally vulnerable areas, as Hurricane Katrina so vividly demonstrated. Residents of disadvantaged communities will, by definition, have fewer resources to move and adapt to climate change.[59]

A cap-and-trade program could (at least in theory) lead Congress or implementing agencies to set higher environmental goals than they would set under conventional regulation.[60] Since cap-and-trade programs are presumably economically efficient, more stringent environmental goals might be more economically and politically acceptable than under a higher cost regulatory approach.[61] In addition, the presence of a cap-and-trade program could make the prospect of regulation more politically viable.[62] To the extent that a lower cost control system would facilitate adoption of legislation and greater emissions reductions goals, the system would serve environmental justice goals.

Another purported benefit of cap-and-trade is its capacity to create an incentive for technological innovations to reduce GHGs and an incentive for facilities to adopt the most effective and efficient mechanisms for doing so.[63] Reducing emissions sufficiently to stabilize the environment will likely require substantial technological innovation. If the price of carbon is high enough, then, at least in theory, facilities will adopt lower emission practices and technologies. Facilities that can install low-cost mechanisms will do so to free up allowances for sale.[64] Facilities with higher reduction costs that might initially purchase allowances rather than reduce emissions will have an on-going incentive to reduce emissions to avoid the cost of purchasing allowances. If the price of carbon is high and consistent enough to promise a successful future market, it could also prompt investors to support technology research and development.[65] Traditional regulation, in comparison, generally requires facilities to achieve a particular level of performance based upon existing technology, and does not create a strong incentive for facilities to reduce emissions below the required level.[66] As discussed further below, however, the extent to which cap-and-trade programs have provided such incentives in actual practice, and whether the incentives to adopt pollution control technologies are greater under cap-and-trade versus traditional programs, are highly contested questions that likely turn on each system's respective stringency.[67]

In addition, the first step in a cap-and-trade program—setting a cap—provides a more definitive control on pollution than most existing regulatory programs. Standard pollution controls generally impose limits on pollution rates, not absolute caps on emissions. Therefore, economic growth and new sources could lead to increases in production that lead to increases in emissions, so long as the appli-

an Economic Incentive Program?: Replacing the Command-and-Control/Economic Incentive Dichotomy, 55 WASH. & LEE L. REV. 289 (1998) (arguing that cap-and-trade programs have the potential to be less effective at encouraging technological innovation than traditional regulatory programs) and Drury et al., *supra* note 51, at 275-77 (discussing poor innovation incentives created by Los Angeles' trading program).

56. *See* ELLERMAN ET AL., *supra* note 49, at 34.

57. *See* Burkett, *supra* note 23; Drury et al., *supra* note 51; Stephen M. Johnson, *Economics v. Equity: Do Market-Based Environmental Reforms Exacerbate Environmental Injustice?*, 56 WASH. & LEE L. REV. 111 (1999).

58. *See, e.g.*, Miller & Sisco, *supra* note 11, at 2 (describing the first principle for just climate change policies: "Stop Cooking the Planet").

59. *See, e.g.*, Robert D. Bullard, *Climate Justice and People of Color* 3 (2000), *available at* http://www.ejrc.cau.edu/climatechgpoc.html (observing that the adverse impacts of climate change are likely to fall most heavily on the poor); Burkett, *supra* note 23, at 7-15 (describing the greater vulnerability of the poor in general, the dire threat to indigenous Inuit, and the racially and economically skewed consequences of Hurricane Katrina); REDEFINING PROGRESS, CLIMATE CHANGE IN CALIFORNIA: HEALTH, ECONOMIC, AND EQUITY IMPACTS (2006), Executive Summary *available at* http://www.rprogress.org/publications/2006/CARB_ES_0106.pdf (describing disparate impacts of climate change on people of color and low-income communities); Miller & Sisco, *supra* note 11, at 1-3 (describing poor communities' greater vulnerability to climate change).

60. *See* Dreisen, *supra* note 55, at 331-32; EPA, *supra* note 40, at 1-4.

61. *See* ELLERMAN ET AL., *supra* note 49, at v, vi, 29, and 34 (stating that averaging, banking, and trading programs established for mobile source standards led to a more stringent standard, since the standard was based upon the lower costs associated with the trading program); Byron Swift, *U.S. Emissions Trading: Myths, Realities, and Opportunities*, 20 NAT. RESOURCES & ENV'T 3, 4 (2005-2006). It should be noted that while some might urge the lowest cost system in order to achieve the highest possible reductions, others might urge the lowest cost system in order to reduce the program's economic impacts. In that case, lower costs would not translate into environmental benefits.

62. *See* ELLERMAN ET AL., *supra* note 49, at 34 (noting cap-and-trade program's role in breaking political stalemate on acid rain regulation).

63. Many trading proponents argue that the potential profits from trading will provide facilities with an incentive to control pollution, and develop innovative pollution controls. *See, e.g.*, Ackerman & Stewart, *supra* note 53, at 1336, 1349-50 (arguing that traditional regulation does not create an incentive for new technologies, and that, in contrast, decreasing caps and increasing allowance prices will create a powerful incentive "to develop cleaner products and processes"); Dudek & Palmisano, *supra* note 52, at 234-36 (suggesting that trading programs create economic incentives to develop more efficient pollution controls).

64. *See* Robert W. Hahn & Robert N. Stavins, *Incentive-Based Environmental Regulation: A New Era From an Old Idea*, 18 ECOLOGY L.Q. 1, 13 (1991).

65. *See id.* at 13.

66. *See* Dudek & Palmisano, *supra* note 52, at 234-35. Traditional regulatory approaches often rely on existing technology, but not necessarily. In the mobile source context, for example, car manufacturers were required to reduce vehicle emissions by 90% even though the technology did not exist at the time, creating an incentive for innovation under a traditional approach. *See* 42 U.S.C. §7521(b)(1)(A).

67. *See* Dreisen, *supra* note 55 (suggesting that cap-and-trade programs have not had stronger technology incentive effects than traditional regulation).

cable emissions rates are not exceeded.[68] Under a cap-and-trade program, any increased emissions would have to be offset by reductions elsewhere in order to meet the cap.[69]

Cap-and-trade programs could also offer potential economic advantages to disadvantaged communities. To the extent that lower pollution control costs are not translated into more stringent caps, but simply lower costs, a cap-and-trade program would reduce the system's economic impact on consumers. It should be noted that this economic benefit is in tension with the system's potential environmental benefits, since lower costs could result in a reduced incentive to develop emissions-reducing technologies.

In addition, if allowances are auctioned, the revenues could provide a variety of economic (and environmental) benefits to disadvantaged communities. I address the potential economic advantages of cap-and-trade programs further in Part III of this Article.

C. The Conflicts Between Environmental Justice and Cap-and-Trade Programs

1. The Fundamental Tension Between Cap-and-Trade Programs and Environmental Justice

Although this Article concludes that market mechanisms could be modified to address at least some environmental justice concerns, it is important to emphasize that the environmental justice community has historically had grave concerns about cap-and-trade programs[70] and that these concerns have manifested themselves in the climate change policy debate.[71] As environmental policies, environmental justice and market-based theories are diametrically opposed.[72] Market-based systems are designed to achieve aggregate reductions[73]; they are distribution-neutral.[74] The efficiency of pollution reduction is key[75]; spatial distribution is not. In the world of environmental justice, in contrast, distributive justice is key: the issue is who suffers the impacts of pollution.[76] Economic efficiency is less important than distributional fairness.[77]

The fundamental tensions continue. From a procedural standpoint, market-system advocates are seeking efficient administrative processes. Private market trades, with minimal governmental involvement (much less public participation) are the ideal.[78] Environmental justice advocates, in contrast, seek to maximize meaningful public participation in decisions affecting emissions within their community, such as siting and permitting decisions. From the market perspective, however, public participation in the trading process would create a significant transaction cost that would undermine the virtues of a trading system.

The ensuing parts explore in more detail the potential conflicts between pure cap-and-trade programs and environmental justice.[79] I first address two fundamental critiques of cap-and-trade programs that are raised by the environmental justice community but that extend beyond the confines of traditional environmental justice debates: the morality and efficacy of market mechanisms. I then turn to the tensions between cap-and-trade programs and the environmental justice movement's distributional and participatory goals. I elaborate these concerns not to condemn the adoption of a cap-and-trade program, but to increase aware-

68. *See* U.S. EPA, Tools of the Trade: A Guide to Designing and Operating a Cap-and-Trade Program for Pollution Control 1-2, 2-5, and 2-9 (2003) (observing that "traditional policy approaches such as command-and-control regulation generally do not establish absolute limits on allowable emissions but rather rely on emission rates that can allow emissions to rise as utilization rises"); Swift, *supra* note 49, at 5 (observing that caps achieve better environmental results than rate-based standards "which allow emissions to grow over time as more plants are built or as output increases"). It should be noted, however, that in nonattainment areas, new sources or modifications of existing sources are required to offset their new emissions. 42 U.S.C. §7503(c), ELR Stat. CAA §173(c).

69. A. Denny Ellerman and colleagues describe the dynamic in a report on emissions trading done for the Pew Center on Global Climate Change. They observe that a sudden demand in energy in California in 2000 led to sudden increases in electricity generation in southern California. A standard based upon emissions per unit of production would not have contained the increase: as production increased, emissions would have increased without constraint, as long as the rate of emissions did not change. Ellerman et al., *supra* note 49, at 25-26. Under the cap-and-trade program operating in the Los Angeles area, RECLAIM, emissions did end up exceeding the cap. As a consequence, however, the electricity generators had to pay mitigation fees to fund emissions reductions from other sources, and the shortfall was expected to result in fewer allocations in the future. *Id.* The authors argue that, under a cap-and-trade program, increases in emissions could lead to compensating measures that would not be required under a traditional regulatory approach. *Id.* at 26. It is worth noting, however, that had a traditional regulatory program imposed controls on all facilities in the first place, emissions might have increased less than they did during the 2000 energy demand spike.

70. *See generally* Drury et al., *supra* note 51 (critiquing Los Angeles' cap-and-trade programs based upon environmental justice concerns); Johnson, *supra* note 57 (discussing environmental justice implications of a range of market-based approaches to environmental protection).

71. AB 32 only permitted, rather than requiring, a cap-and-trade program due to opposition from the environmental justice community. *See* Mark Martin, *Nunez Slams Governor*, S.F. Chron., Oct. 17, 2006, at B-1. When Governor Schwarzenegger subsequently initiated steps to adopt a cap-and-trade program via executive order, some California lawmakers believed he had betrayed the legislative agreement. *Id.* In February 2008, a group of California environmental justice organizations issued a declaration which stated that they would "fight at every turn all efforts to establish a system of carbon trading and offset use in California[.]" California EJ Movement's Declaration, *supra* note 17.

72. *See* Lily N. Chinn, *Can the Market Be Fair and Efficient? An Environmental Justice Critique of Emissions Trading*, 26 Ecology L.Q. 80, 83 (1999) (observing the conflict between efficiency and distributional fairness); Drury et al., *supra* note 51, at 272 (observing the "direct conflict" between policies promoting environmental justice and policies promoting pollution trading).

73. *See* Burkett, *supra* note 23, at 47.

74. *See id.* at 45 (stating that "[t]he market is at best unmoved by the differential experience of the poor and of color).

75. *See* Dudek & Palmisano, *supra* note 52 (lauding the economic efficiency benefits of emissions trading programs); EPA, *supra* note 40, at 1-3 to 1-4.

76. *See* Burkett, *supra* note 23, at 48.

77. *See* Chinn, *supra* note 72, at 83–84.

78. *See* Raul P. Lejano & Rei Hirose, *Testing the Assumptions Behind Emissions Trading in Non-Market Goods: The RECLAIM Program in Southern California*, 8 Envtl. Sci. & Pol'y 367, [3 in web version] (2005) (observing the emergence of market mechanisms in the context of a more general movement "for deregulation away from state control and towards more decentralized, privatized modes of management").

79. This Article focuses on the environmental justice implications of cap-and-trade programs that control "downstream" facilities—those that emit GHGs. A cap-and-trade program focused on upstream facilities, which governed the carbon content of fuels produced by a refinery, for example, would not directly raise local environmental consequences, and therefore does not raise the distributional issues of a cap-and-trade program for downstream sources. *See* EPA, *supra* note 40, at 3-6 (describing distinction between upstream and downstream trading programs).

ness of its consequences and lay the groundwork for policy mechanisms to address them where possible.

2. The Morality of Trading

Market-based systems treat pollution as a commodity to be bought and sold, albeit to achieve environmental goals. Some environmentalists and environmental justice advocates argue that such commodification immorally legitimates pollution.[80] Moreover, permitting facilities to buy allowances would allow them to escape responsibility for reducing their own emissions. The issue of moral responsibility operates at the international level as well, where environmental justice groups are concerned that developed countries will use international trading to avoid taking direct responsibility for their disproportionate contribution to climate change.[81] In other words, international trading could allow developed countries to avoid changing unsustainable technology and consumption patterns.[82]

To the extent that allowances are distributed for free, facilities could accrue windfall profits through the sale of excess allowances or through customary accounting practices that allow them to increase prices in relation to the value of the allowances, whether received for free or not.[83] In its first phase, the European Trading System (ETS) resulted in substantial windfall profits to certain carbon-intensive industries.[84] Environmental justice advocates are concerned about the morality of transferring wealth from consumers, forced to pay higher prices, to corporations.[85]

Particular program features could raise additional moral concerns. California environmental justice advocates have expressed concern about purchasing offsets from developing countries. Rather than providing helpful funds for sustainable development, they fear that offset money could be used to direct investment in ways that disadvantage the poor within the developing world. For example, to the extent that the money is used for land preservation, it could deprive developing country citizens of agricultural resources and, more broadly, subject developing country land to control by developed nations.[86] That said, international trades that provide sustainable development resources for developing countries could, in some instances, provide developing countries with net benefits. Nonetheless, the potential for disadvantageous trades is worth noting.

3. The Efficacy of Trading

A central environmental justice critique of trading programs turns on their efficacy: are they an effective mechanism for reducing emissions and facilitating the transition to a low-carbon economy? As stated above, environmental justice communities are deeply concerned about the impacts of climate change, and recognize that the consequences are likely to fall disproportionately on the poor and of color communities that are the most vulnerable. Real reductions and technological transformations are therefore critical.

As explained further below, cap-and-trade programs present several challenges. First, if the cap is higher than actual emissions, no reductions will occur. Second, many environmental justice advocates are less optimistic than market advocates about the potential for a cap-and-trade program to generate innovation incentives. A cap that is not stringent enough would lead to low allowance prices that would fail to generate incentives to develop or adopt less-polluting technologies. Even if the cap were stringent enough to generate a price signal that would, theoretically, induce alternative technology development and adoption, the market could encounter a number of institutional and behavioral obstacles. Third, cap-and-trade programs rely on effective emissions monitoring, particularly since the potential for profit creates a corresponding risk of fraud. Without

80. *See* Burkett, *supra* note 23, at 48; Drury et al., *supra* note 51, at 270-71. The California EJ Movement's Declaration on Use of Carbon Trading criticizes the creation of the "right" to dispose of GHGs and the distribution of these rights to polluters. *See* California EJ Movement's Declaration, *supra* note 17, findings 10 and 11. *See also* Fact Sheet: The Cap and Trade Charade for Climate Change: 13 Reasons Why Trading and Offset Use Are NOT a Solution to Climate Change, *available at* http://www.ejmatters.org/docs/cap-Trade-FACTSHEET.pdf (#4: "What was once a wrong—polluting—is now a 'right' . . . . Instead of people having the right to breathe free, businesses have the right to pollute as much as they can afford.") [hereinafter Cap and Trade Charade]. The Fact Sheet accompanied the California EJ Movement's Declaration. *See supra* note 17.

81. *See* Burkett, *supra* note 23, at 20-21; *see* David Dreisen, *Free Lunch or Cheap Fix?: The Emissions Trading Idea and the Climate Change Convention*, 26 B.C. Envtl. Aff. L. Rev. 1, 68-69 (1998).

82. *See* California EJ Movement's Declaration, *supra* note 17 ("Whereas, the Clean Development Mechanism (CDM) under the Kyoto Accord, as well as voluntary private sector trading schemes, encourages industrialized countries and their corporations to finance or create carbon dumps in the Developing World as lucrative alternatives to reducing greenhouse gas emissions in Developed Countries . . . ."); Larry Parker, CRS Report for Congress, Climate Change: The EU Emissions Trading Scheme (ETS) Gets Ready for Kyoto 13 (2007) (noting environmentalist concern that the availability of credits from developing countries will interfere with achieving reductions in Europe).

83. When allowances are distributed for free, facilities that use rather than sell the allowances calculate the "opportunity cost" of not selling the allowance. The opportunity cost—the lost potential profit—is often passed along to consumers, even though the company did not have additional expenses. That leads to windfall profits that transfer wealth from consumers to industry. *See* Terry Dinan, Congressional Budget Office, *Trade-Offs in Allocating Allowances for CO_2 Emissions* 5 (Apr. 25, 2007).

84. *See, e.g.*, Parker, *supra* note 82, at 14 (observing that free allocation of allowances has led to what some have described as "windfall profits"). Industry profits from the second phase of the ETS, beginning in 2008, are projected to be 6 billion euros. *See* Danny Fortson, *Power Firms to Pocket 6Bn From Carbon "Handouts" in New Emissions Regime*, Independent, Jan. 2, 2008, *available at* http://www.independent.co.uk/news/business/news/power-firms-to-pocket-6bn-from-carbon-handouts-in-new-emissions-regime-767623.html.

85. *See* California EJ Movement's Declaration, *supra* note 17 (#11: Stating that the "EU-ETS . . . created one of the largest transfers of wealth from low- and middle-income people to private corporations in the modern industrial era."); The Cap and Trade Charade, *supra* note 80, at 2 (observing that the EU-ETS provided windfall profits to polluters while increasing consumer electricity prices); Michael K. Dorsey, *Carbon Trading Won't Work*, L.A. Times, Apr. 1, 2007 (observing that "a Citigroup report concluded that the [European] continent's biggest polluters had been the winners, with consumers the losers").

86. *See* California EJ Movement's Declaration, *supra* note 17 (#14: stating that trading programs could "finance[ ] projects such as private industrial tree plantations that appropriate land, water, and air needed to support the livelihoods of local communities in the Developing World"); The Cap and Trade Charade, *supra* note 80, at 3 (describing negative local impacts of international trades and quoting an Indian activist who argued that "[o]ffsets are a form of carbon colonialism").

effective monitoring, emissions reduction goals—and public health—could be undermined.

a. Setting a Sufficiently Stringent Cap: The Risk of Failing to Reduce Emissions

Whatever the collective reduction goal, such as 1990 levels by 2020, policymakers will have to set a separate cap for the sectors to be included in a cap-and-trade program. Environmental justice advocates (and others) are concerned that political pressure will result in a cap that is not stringent enough.[87] In that case, too many allowances would be allocated and the program would fail to generate reductions. They fear that a GHG cap-and-trade program could repeat the overallocation problems that have emerged in past trading programs. For example, the Los Angeles Regional Clean Air Incentives Market (RECLAIM), a trading program for criteria pollutants in southern California, initially overallocated allowances and, as a consequence, emissions did not decrease.[88] Similarly, in the first phase of the ETS, Member States had poor information on actual emissions and inflated emissions projections in response to political pressures, leading some member states to allocate allowances in excess of existing emissions.[89] As a consequence, the system failed to reduce emissions as intended.[90] A traditional regulatory approach that imposes reduction requirements on specific facilities would, in comparison, create a greater likelihood of real reductions.[91]

b. Do Markets Provide a Sufficient Incentive for Technology Development and Adoption?

As discussed above, a key attribute of cap-and-trade programs is their capacity to create incentives for the development and adoption of new, less-polluting technology. Some environmentalists and environmental justice advocates have questioned this assertion. Given the extent of the reductions necessary to stabilize the climate, no sector is likely to be able to continue business as usual. Critics contend that programs that allow facilities to continue current operations by allowing them to buy allowances could allow some sectors to continue current operations, and fail to stimulate the comprehensive change necessary to stabilize the climate.[92]

A market system could fail to stimulate technological innovation and adoption in two ways: (1) if the price signal is too low; and (2) if market imperfections prevent even adequate prices from stimulating technology innovation and adoption.

The risk of insufficient allowance prices arises if the emissions cap is not stringent enough, so that the number of allowances equals or even exceeds actual emissions. In that case, allowance prices are very low if not zero, and regulated facilities are likely to simply buy allowances to cover their emissions. They have no incentive to install pollution reducing technology, and the technology sector has no incentive to develop new, less-polluting alternatives. In the RECLAIM program, for example, where allowances were initially overallocated, the large utilities in the area purchased allowances rather than adopting control technology.[93] The ETS' low allowance prices have also resulted in few innovations in Europe.[94] In contrast, even if a traditional regulatory approach provides limited incentives for technology innovation, it provides greater certainty that all facilities will adopt pollution control mechanisms.[95]

Allowance prices could also be too low to stimulate innovation if regulated entities are permitted to purchase very inexpensive offsets, such as those that might be available through international trading.[96] As Prof. David Dreisen has noted, the goal of lowering reduction costs could thus compete with the goal of fostering technology adoption and innovation,[97] unless lower costs are translated into more demanding environmental goals that maintain high allowance prices. Since using existing technology is likely to be cheaper than developing new technology, firms have an in-

87. *See* The Cap and Trade Charade, *supra* note 80, at 1-2 (#2: observing that political pressure is likely to lead to caps being set too high); *Cap and Charade: The Political and Business Self-Interest Behind Carbon Limits*, WALL ST. J., Mar. 3, 2007 (observing that setting a cap in an emissions trading scheme is likely to be a "political football" and suggesting that corporate interest in cap-and-trade programs is generated by their desire to influence the cap).

88. During the first three years of the RECLAIM program, from 1994 through 1996, emissions did not decrease from 1993 levels. *See* McAllister, *supra* note 42, at 291. By 2000, they had decreased 19%, much less than initially predicted, and less than the 38% reduction that had been achieved through traditional regulation prior to the onset of the market-based system. *See* McAllister, *supra* note 42, at 291.

89. *See* PARKER, *supra* note 82, at 5-6.

90. *See id.* at 5-6 (noting uncertainty about achievement of real reductions and possibility of purported reductions being "merely paper artifacts").

91. For example, in 2001 the RECLAIM program was substantially revised to remove power-producing facilities from the market system and require them to install pollution control technology. *See* McAllister, *supra* note 42, at 290. As a consequence of the technology-based requirements, as well as lower production levels, emissions were reduced by 85% from 2000 to 2002, far more than the 19% reduction that had been achieved through the trading system. *Id.* at 291.

92. *See* Dreisen, *Free Lunch or Cheap Fix?*, *supra* note 81, at 42–47 (arguing that trading creates an incentive to make "cheap fixes" rather than innovate); Cap and Trade Charade, *supra* note 80 (#4: Trading stifles technological innovation needed to achieve long-term goals for GHG reductions).

93. *See* McAllister, *supra* note 42, at 293 (stating that "[t]he low allowance prices in the first five years of the [RECLAIM] program led facilities to decide not to install emission reduction technologies"). The cost of installing pollution control technology was 50 times the average price of 1997 allowances, leading firms to purchase credits rather than adopt controls. *See* Drury et al., *supra* note 51, at 277.

94. *See Trading Thin Air: The Carbon Market Is Working, But Not Bringing Forth as Much Innovation as Had Been Hoped*, ECONOMIST, May 31, 2007. Although allowance prices have recently increased, they have not increased enough to generate widespread innovation. *Id.*

95. In the RECLAIM program, power-producing facilities that had not adopted pollution controls under the market-based system were removed from the program and required to install controls. *See* McAllister, *supra* note 42, at 290.

96. *See* Dorsey, *supra* note 85 (reporting observation that allowing polluters to purchase cheap international offsets creates "a license for big polluters to carry on business as usual," and fails to generate the necessary shift away from fossil fuels); *Trading Thin Air, supra* note 94 (observing that under the ETS, the availability of cheap offsets from international trades has led to low allowance prices and reduced the incentive to invest in new technologies or switch fuels to reduce European emissions).

97. *See* Dreisen, *Free Lunch or Cheap Fix?, supra* note 81, at 43. Higher costs would, of course, lead to a greater economic impact on the most vulnerable. As discussed below, a just climate change policy will need to address its adverse economic impacts on the poor.

centive to use existing technology if they can and to buy allowances, rather than innovate, if they cannot.[98] The lower costs generated by trading could thus dampen innovation incentives for industries that are most in need of innovation due to the absence of existing reduction strategies.[99]

Moreover, even if allowances do not exceed actual emissions and allowance prices are theoretically sufficient to motivate pollution reductions, technology innovation and adoption might not occur as seamlessly as economists hope. Market advocates presume knowledgeable players who can respond to market signals by innovating and by adopting less-polluting alternatives. In practice, industry may be less responsive to market signals than economists predict.

With respect to technology adoption, inertia could lead some facilities to purchase allowances rather than change, even if doing so is more expensive. Some facilities could fail to adopt less-polluting alternatives because they are not aware of the alternatives or not effective at engaging in long-term strategic planning.[100] In the long run, certain alternatives could be cheaper than purchasing allowances, but require up-front capital investments that the facility cannot accommodate.[101] Less-polluting alternatives could require greater expertise, expertise that the existing workforce does not have. Thus, the invisible hand of the market may fail to generate hoped-for technology adoption.

With respect to technology development, the price signal must be steady and clear to justify the long and expensive process of research and development. If allowance prices are not consistent, due to changes in production levels and other variables, then they will be less effective at stimulating investment. Moreover, since a technology's financial viability depends upon restrictions in place when the technology comes to market, rather than when it is developed, technology developers confront inherent uncertainty that could deter sufficient investment.[102] Some commentators therefore believe that environmental regulations, whether traditional or market-based, cannot effectively generate the level of innovation required to address climate change.[103]

The innovation debate is too complex to resolve in these pages. Nonetheless, it is clear that a trading program must be sufficiently stringent to generate innovation incentives. It is also clear that achieving the profound transition away from a carbon-based economy is unlikely to be accomplished solely through traditional environmental standards or a trading system; it is likely to require proactive governmental technology-promotion policies.

98. *See* Dreisen, *supra* note 55, at 336–37; Dreisen, *Free Lunch or Cheap Fix?, supra* note 81, at 42–43.

99. *See* Dreisen, *Free Lunch or Cheap Fix?, supra* note 81 at 42–43.

100. *See* McAllister, *supra* note 42, at 294–97.

101. *Cf.* Dresien, *Free Lunch or Cheap Fix?, supra* note 81, at 45 (noting, in homeowner context, that homeowners might not invest in energy efficiency measures due to up-front costs or a fear of being unable to realize the invesment's value over time).

102. *See* David E. Adelman & Kirsten H. Engel, *Reconceiving State Climate Change Regulation*, Ariz. L. Rev. 15-17 (forthcoming 2008).

103. *Id.* at 15 & n.90 (citing W. David Montgomery & Anne E. Smith, *Price, Quantity, and Technological Strategies for Climate Change Policy*, *in* Human-Induced Climate Change: An Interdisciplinary Assessment (M. Schlesinger et al. eds., 2005).

c. Monitoring: The Key to the Integrity of a Cap-and-Trade Program

Finally, monitoring is critical to a trading program's efficacy. Since a cap-and-trade program would not require facility-specific permitting, the government loses control over the installation of control technologies. Therefore, the government's ability to monitor and enforce emission levels becomes of paramount importance. Proponents of cap-and-trade programs recognize that accurate emissions monitoring is essential to meeting environmental goals.[104] Environmental justice advocates fear that a program that includes sectors that cannot be easily monitored will be ineffective at accomplishing its goals and create risks for local communities.

Accurate accounting of emissions reductions offered for sale is critical because the purchasing facilities are being allowed to increase emissions based solely upon purported reductions at other facilities. If the reductions do not, in fact, take place, then the purchased allowances would lead to a net increase in pollution, rather than simply a shift in location. Given the economic value of emissions reductions, facilities could be tempted to inflate projected reductions.[105] Such inflation has been reported in connection with some existing cap-and-trade programs.[106]

On the other side of the equation, if facilities purchasing allowances did not purchase enough to cover actual emissions, then pollution would exceed the overall emissions cap.[107] Excess emissions would not only compromise the cap, they would further increase the risk of co-pollutant hot spots. Given the cost of allowances, facilities could have an incentive to deflate their allowance needs.[108] Studies of existing cap-and-trade programs indicate that such deflation has occurred in some programs.[109]

A sophisticated technological and administrative infrastructure for enforcement is necessary to keep allowance sellers from inflating their reductions and allowance purchasers from deflating their needs. Administratively, regu-

104. *See* EPA, *supra* note 40, at 1-3 & 3-10; Market Advisory Committee to the California Air Resources Board, Recommendations for Designing a Greenhouse Gas Cap and Trade System for California 73 (2007), *available at* http://www.Climatechange.ca.gov/documents/2007-06-29_MAC_FINAL_REPORT.PDF (emphasizing the critical importance of rigorous and accurate monitoring to an effective cap-and-trade program) [hereinafter Market Advisory Committee Recommendations].

105. *See* EPA, *supra* note 40, at 4-1 (noting that the economic value of allowances could lead to misrepresentation without careful government monitoring); Cap and Trade Charade, *supra* note 80 (observing that "pollution trading programs create strong incentives for regulated entities to manipulate numbers and cheat so long as fraudulently-created credits are still opportunities for profit" and that "trading intensifies financial incentives for fraud").

106. In Los Angeles' car scrapping program, car scrappers sold credits for destroying cars that were not, in fact destroyed; the car scrappers salvaged and re-sold the polluting engines. Drury et al., *supra* note 51, at 261. Other cars had been inoperable, but were then repaired just enough to sell to car scrappers and generate emission reduction credits. *Id.* at 262.

107. *See* McAllister, *supra* note 42, at 282; EPA, *supra* note 40, at 2-4.

108. In Los Angeles' car scrapping program, industries purchasing credits significantly underreported their emissions and failed to buy sufficient allowances. According to one analysis, actual emissions were 10 to 1,000 times greater than projected emissions, and purchased allowances therefore failed to account for the facilities' real emissions. *See* Drury et al., *supra* note 51, at 259-60.

109. *See id.*

latory agencies must have the ability and resources to verify actual emissions. One of the purported keys to the relative success of the acid rain cap-and-trade program is that all participating facilities installed continuous emissions monitoring devices that automatically report emissions to the regulatory agency, which automatically imposes penalties.[110] In contrast, the RECLAIM program regulates a much wider variety of sources with greater variation in monitoring requirements and enforcement practices and, as a consequence, has faced significant monitoring, verification, and enforcement challenges.[111]

Administratively, the effectiveness of a monitoring and enforcement program depends upon the heterogeneity of the sources and pollutants covered and the ease of automating and verifying emissions data. Calculating GHG emissions for large point sources is purportedly relatively straightforward.[112] In some instances, monitoring of smaller point sources could be more challenging.[113] Monitoring emissions of non-carbon GHGs, like methane and nitrous oxides from agricultural sources, is likely to be very challenging.[114]

Monitoring and verification issues are even more complicated if a cap-and-trade system permits the use of offsets—the use of reductions made by entities that are not formally included in the cap-and-trade program.[115] California's Market Advisory Committee suggests that offsets must be "real, additional, independently verifiable, permanent, enforceable, predictable, and transparent."[116] For example, an offset would not be "real" if it represented a reduction from allowable, but not actual, emissions. It would not be "additional" if the entity would have reduced emissions in any case. Using offsets that were not real or additional would ultimately increase net emissions, undermining the integrity of the cap. Some offset projects, like carbon sequestration, are also difficult to verify and monitor.[117]

The efficacy of a cap-and-trade program in reducing emissions and inducing technological change are clearly complex questions that cannot be fully resolved in this Article. Nonetheless, the environmental justice movement's critiques suggest important factors for policymakers to consider, factors that could influence policy independent of environmental justice considerations.

4. Carbon Trading and Distributive Justice

While CO_2 emissions do not raise direct distributive justice concerns, they implicate distributive justice because CO_2 emissions do not occur in a vacuum. The combustion that generates CO_2 also generates a range of harmful co-pollutants, including criteria pollutants like particulates, sulfur oxides, nitrogen oxides (NO_x), ozone precursors, and carbon monoxide (CO), as well as a wide range of toxic pollutants, including many volatile organic compounds (VOCs), benzene, and other toxics.[118]

The distribution of these co-pollutants in a trading system would, presumably, continue to be governed by the Clean Air Act's (CAA's) and the states' existing pollution control requirements. But, notwithstanding improvements in air quality, the existing regulatory structure has failed to achieve air quality goals. Climate change policy could have a significant environmental co-benefit: helping to achieve the as-yet unattained goals of the CAA. Climate change policies will require changes to the same industrial processes that produce co-pollutants and, as a result, have the potential to not only reduce GHGs, but their more locally damaging co-pollutants as well. Depending upon their design, climate change policies could help prevent the creation of co-pollutant hot spots—hot spots that current law allows—as well as helping heavily polluted areas achieve air quality goals that have proven unattainable using current measures.

Policymakers have consistently emphasized the co-benefits of climate change regulation in justifying climate change policy,[119] co-benefits that include not only co-pollutant reduction benefits, but greater energy security, benefits for local industries, and the potential economic benefits of new technology development.[120] Given the centrality of carbon-emitting activities to almost every aspect of our industrial society, it is neither surprising nor inappropriate to implement climate change regulation so as to maximize its co-benefits, so long as GHG emission reductions are achieved.

110. Ellerman et al., *supra* note 49, at 16-17; McAllister, *supra* note 42, at 282-87.

111. *See* McAllister, *supra* note 42, at 298-304.

112. *See* John M. Reilly et al., Multi-Gas Contributors to Global Climate Change: Climate Impacts and Mitigation Costs of Non-CO_2 Gases 34 (2003), *available at* http://www.Pewclimate.org/global-warming-in-depth/all_reports/multi_gas_contributors/. If combusted fuels have a constant carbon content, then fuel use could provide a reasonably accurate emissions predictor. *See* Market Advisory Committee Recommendations, *supra* note 104, at 74. Facilities could also monitor stack gases. *See id.* at 74.

113. California's Market Advisory Committee suggests that smaller sources might not be able to afford the best monitoring systems. *Id.* at 75.

114. *See* Reilly et al., *supra* note 112, at 35-37.

115. *See* Market Advisory Committee Recommendations, *supra* note 104, at 62 (noting that implementing offsets presents "significant challenges and risks").

116. *Id.*

117. According to a report that advocates the use of carbon sequestration techniques, scientists have developed tools to measure actual carbon stocks associated with various land uses. Kenneth R. Richards et al., Agricultural and Forestlands: U.S. Carbon Policy Strategies 50-52 (2006), *available at* http://www.pewclimate.org/docUploads/Agricultural%20and%20Forestlands-U.S.%20Carbon%20Policy%20Strategies.pdf. More complicated, however, is measuring how the preserved carbon stock compares with what would have been available in the absence of the sequestration activity, *id.* at 52-53, and determining leakage: whether the sequestration activity simply shifts carbon dioxide producing activities to other lands, resulting in no net sequestration, *id*. at 53-54, or is temporary, resulting in later emissions, *id.* at 54, or leads to new emissions (such as nitrous oxide emissions resulting from fertilizer use). *Id.* at 54.

118. *See* Drury et al., *supra* note 51, at 287 (observing that fine particles and toxic products are frequent co-pollutants associated with CO_2-generating combustion).

119. AB 32 repeatedly refers to the importance of maximizing the co-benefits of climate change regulation. *See infra* notes 159 to 160 and accompanying text (discussing AB 32's references to climate change co-benefits).

120. *See* Barry G. Rabe et al., *State Competition as a Source Driving Climate Change Mitigation*, 14 N.Y.U. Envtl. L.J. 1, 22-41 (2005) (arguing that states have engaged in climate change mitigation when they perceive competitive advantages, such as natural resource protection, electricity security and reliability, local industry protection, and innovation and technology development).

a. The Hot Spots Problem

Market proponents and critics have talked past one another on the hot spot issue. Environmental justice advocates routinely critique market-based systems due to the risk of hot spots: the risk that, instead of reducing their emissions, one or more facilities could buy allowances that increase emissions above the existing status quo.[121] In general, environmental justice advocates fear that the hot spots from trading could arise or be perpetuated in the poor communities of color which contain the nation's older, more polluting, facilities.[122] Some market proponents dismiss the hot spot concern because CO_2 does not have adverse local effects.[123] Environmental justice advocates then point to the risks presented by GHG co-pollutants and argue that if facilities can initiate or increase production by purchasing carbon allowances, then co-pollutant emissions are likely to increase.[124] Market proponents respond that carbon trading would not lead to an increase in co-pollutants because existing co-pollutant permits would constrain them.[125]

As explained below, I conclude that a cap-and-trade program would not, in most instances, directly cause co-pollutant hot spots. Nonetheless, because the existing regulatory system does not fully constrain hot spots, a GHG trading system would do less to control the existing risk than a regulatory approach that required all facilities to reduce GHGs. Even if the hot spot risk is generally caused by the existing regulatory system, not a GHG cap-and-trade system, a GHG-control program that can provide the co-benefit of reducing the existing hot spot risk is superior to one that does not.

☐ *Potential for Hot Spots of Regulated Co-Pollutants*. In a carbon trading system, many GHG co-pollutants would presumably continue to be controlled by existing permits and regulatory standards. Existing permits and standards do not, however, ensure that actual emissions will not increase. Existing permits will protect communities only to the extent that they are adequately enforced.[126] If not adequately enforced, then allowance trading could lead to increases not authorized by existing permits.

Moreover, existing permits allow increases even if fully enforced. First, many facilities' actual emissions are much lower than their allowable emissions.[127] Until actual emissions increase enough to trigger the rigorous pollution control requirements imposed on modified sources by the federal new source review (NSR) rules,[128] facilities could in-

121. *See* Drury et al., *supra* note 51, at 251-58 (describing creation of toxic hot spots as a consequence of Los Angeles' car scrapping and emissions trading program); Johnson, *supra* note 57, at 129-30 (describing risk of hot spots); *see also Market Advisory Committee Recommendations*, *supra* note 104.

For example, under Los Angeles' Rule 1610 car scrapping program, licensed car scrappers could purchase old, heavily polluting vehicles, scrap them, and then sell emission credits based upon the vehicles' foregone emissions. *See* Drury et al., *supra* note 51, at 247. Most of the emissions reduction credits generated by this program were purchased by four oil companies, three of which were in close proximity to one another. *Id.* at 252. Pollution that was formerly widely distributed was, as a result, concentrated in a particular hot spot. *Id.* at 253. Under Los Angeles' RECLAIM program, which governed nitrogen oxide (NO_x) trading among stationary sources, the trading led to an increase in NO_x emissions in Wilmington, California, a heavily polluted community. Lejano & Hirose, *supra* note 78, at 9 [14 of web version].

The same problems emerge if an existing facility banks emissions reductions for future use. While reducing emissions in the short term, banked allowances could be used to increase emissions in the future. In the Acid Rain Program, for example, firms reduced emissions twice as much as was required to meet Phase I's relatively lenient cap in order to bank emissions to help them meet Phase II's more demanding requirements. *See* Ellerman et al., *supra* note 49, at 14. The RECLAIM program in Los Angeles did not allow banking due to fears about how the unpredictable future use of banked allowances could impact the region's attainment. *See id.* at 21. EPA's trading program for NO_x emissions in the East Coast-imposed restraints on the use of banked allowances. *Id.* at 30.

122. *See* Drury et al., *supra* note 51, at 251; Johnson, *supra* note 57, at 130-31.

123. *See* Ellerman et al., *supra* note 49, at 40-41. Some market advocates have also suggested that the apparent absence of hot spot problems under the CAA's acid rain and NO_x trading programs indicates that trading in similar programs is not likely to cause adverse pollutant concentrations. *See* Byron Swift, *Emissions Trading and Hot Spots: A Review of the Major Programs*, Env't Rep., May 7, 2004, at 16 (of reprint). In his study of hot spots, Byron Swift observed that large facilities reduced the most, a result he attributed to the greater economies of scale large facilities realize in implementing pollution reduction mechanisms. *See id.* at 12, 16 (of reprint). Assuming large facilities cause the greatest risk of hot spots, programs that encourage large facilities to reduce would be likely to cool existing hot spots, not create them. He also noted that the acid rain program created a greater incentive for heavily polluting facilities to reduce because it distributed allowances to power plants based on prior energy throughput, not emissions, which gave more-polluting facilities fewer allowances for a given level of emissions than their cleaner counterparts, thereby creating a stronger reduction incentive. *Id.* at 8, 16 (of reprint). A more detailed study of plant-specific emissions confirmed that Phase I of the Acid Rain Program did not lead to greater emissions in poor and of color communities. *See* Jason Corburn, *Emissions Trading and Environmental Justice: Distributive Fairness and the USA's Acid Rain Programme*, 28 Envtl. Conservation 323 (2001).

Swift's study demonstrates that hot spots are not inevitable. On the other hand, the acid rain program experience might not be replicated in other trading programs. While larger facilities might generally realize greater economies of scale in adopting pollution controls, in some instances the oldest, most polluting facilities might find it more expensive to reduce emissions than less-polluting newer facilities, and could therefore be more likely to purchase allowances than reduce. In addition, even if larger sources were more likely to adopt pollution controls, that does not address hot spots caused by concentrations of smaller sources.

124. *See* Cap and Trade Charade, *supra* note 80 at 4-5 (#11: stating that "Pollution Trading Can Create and Exacerbate Existing Pollution 'Hot Spots'"); *cf.* Drury et al., *supra* note 51, at 257 (describing possibility that trading of primary pollutants could lead to incidental hot spots of co-pollutants).

125. In one part of its report, California's Market Advisory Committee states that "[i]n no case will the introduction of the trading program cause an increase in emissions." *Market Advisory Committee Recommendations, supra* note 104, at 12. *See also id.* at 13 (Box 2-2) (explaining why trading programs would not increase emissions). *But see id.* at 13 (observing possibility of increase and importance of careful monitoring to avoid such increases).

126. *See, e.g.*, Tom Pelton, *State Gives Power Plants a Pass on Pollution*, Balt. Sun, May 28, 2006, at 1A (describing lax air pollution permit enforcement in Maryland); Zachary Coile, *Pollution Pouring Into Nation's Water Far Beyond Legal Limits*, S.F. Chron., Oct. 12, 2007, at A1 (describing national study reporting that more than one-half of all permitted facilities have violated their water pollution permits); Environmental Integrity Project, Polluters Breathe Easier; EPA Environmental Court Actions Decline (2004), *available at* http://www.environmentalintegrity.org/pubs/lawsuitoct041.doc (describing general decline in federal environmental enforcement actions).

127. *See* New York v. EPA, 413 F.3d 3, 29, 35 ELR 20135 (D.C. Cir. 2005) (recounting the EPA observation that "typical source operation frequently . . . result[s] in actual emissions that are below allowable emission levels").

128. New source requirements are triggered when physical modifications at existing facilities lead to significant net increases in actual emissions, regardless of a facility's allowable emissions. *See*, *e.g.*, 40 C.F.R. §51.166(b)(3) (describing net emissions increase in PSD program in terms of actual emissions). Thus, if actual emissions are significantly below allowable emissions, a significant increase could

crease their actual emissions and still remain within the terms of their permits.

Second, existing permits do not generally place absolute caps on the total quantity of actual emissions[129] and thus allow emissions increases.[130] Regulatory agencies analyze the technology available for the relevant industry or facility and then, most commonly, set performance standards.[131] Performance standards are based on a selected pollution control technology's capacity, and are usually expressed in terms of a required emissions rate. Absolute quantities of actual emissions could generally increase under most of the different types of performance standards agencies might establish, so long as the rate of emissions did not exceed the permitted level.[132] The primary constraint on co-pollutant emissions increases is the NSR program.[133]

A key issue, therefore, is how much facilities can increase emissions before being required to install more stringent pollution controls under NSR. NSR is required when facilities engage in "modifications" that lead to a significant increase in emissions.[134] The increase in emissions that would trigger NSR varies by the pollutant, by whether an area is in attainment or not and, for many pollutants, by the degree of nonattainment.[135] While the thresholds vary, many are in the range of 40 tons per year. The actual impact of the thresholds, and the consequences of the increases they allow without triggering NSR, is likely to be context-specific. Nonetheless, increases approaching but not exceeding that level could in some instances be locally, even if not legally, significant, particularly in light of recent changes to the NSR rules that could allow facilities to increase emissions from their most recent levels quite considerably.[136]

Moreover, not all significant emissions increases require NSR. Of relevance in this context, increases that result solely from an increase in the hours of operation, usually as a result of increased production, without an accompanying physical change in the plant, do not trigger NSR even if

trigger NSR even if it did not exceed the allowable emissions specified in a permit.

129. Some facilities will, however, accept absolute limits on annual emissions in their permits in order to keep their annual emissions below the level that would render them a major source subject to new source standards. *See* DAVID WOOLEY & ELIZABETH MORSS, CLEAN AIR HANDBOOK §1:113 (2007). Facilities making modifications might also accept absolute limits in order to keep their emissions below the level that would be considered a "significant emissions increase" that would trigger NSR.

130. *See* EPA, *supra* note 40, at 1-2 (observing that command-and-control regulations "allow emissions to rise as utilization rises") and 2-5, 2-9.

131. Many of the standards are, by definition, performance standards, such as the new source performance standard (NSPS) required for all new sources, *see* 42 U.S.C. §7411, ELR STAT. CAA §111, and the lowest achievable emission rate that must be met for new sources in nonattainment areas. *See* 42 U.S.C. §7503(a), ELR STAT. CAA §173(a). If necessary, however, regulatory agencies will impose a design standard instead of a performance standard. *See, e.g.*, 42 U.S.C. §7411(h), ELR STAT. CAA §111(h) (allowing the EPA to set a design, equipment, or operational standard as an NSPS instead of an emissions performance standard).

Some of the statutory control requirements that appear to require facilities to install particular technologies, rather than meeting a performance standard, in fact require emissions standards where feasible. For example, the maximum achievable control technology requirement for toxics requires the EPA to establish emission standards, 42 U.S.C. §7412(d), ELR STAT. CAA §112, although the agency has the latitude to specify design or equipment standards if necessary. 42 U.S.C. §7412(h), ELR STAT. CAA §112(h). Similarly the best available control technology requirement for new facilities in attainment areas, *see* 42 U.S.C. §7475(a)(4), ELR STAT. CAA §165(a)(4), is generally expressed as an emissions limitation, *see* 40 C.F.R. §52.21(b)(12), unless such a standard is not technically feasible, at which point a design or operational standard is imposed. WOOLEY & MORSS, *supra* note 129, §1:120. Design or work practice standards, like performance standards, do not constrain absolute quantities of actual emissions. So long as the operational requirements are followed or the required technology is in place, actual emissions could increase without violating the permit.

132. If the performance standard limited emissions per unit of production, e.g., "x" tons pollutant/million British thermal unit, emissions could increase so long as the rate of emissions per unit of production remained within the limit. If the emissions rate were stated in terms of the concentration of the pollutant, e.g., "x" parts per million or "x" pounds/cubic meter of emissions, then emissions could increase so long as the pollutant concentrations within the emissions did not change. Finally, if the performance standard limited emissions to a certain rate over time, e.g., "x" tons per hour, a facility could increase its hours of operation and thereby increase its absolute quantity of actual emissions.

133. *See* Lejano & Hirose, *supra* note 78, at [10 in web version] (in considering potential for co-pollutant emissions increases from a nitrogen oxide (NO_x) trading system, observing that facilities' emissions vary from year to year, and that a firm could purchase NO_x allowances, and thereby increase particulate and toxic co-pollutant emissions, so long as the increases do not violate the action thresholds for these co-pollutants). It should be noted that NSR and the basic technology requirements are not the only factors that could affect existing emissions; existing emissions could be impacted by additional regulations depending upon a facility's location. States have the authority to impose additional requirements on existing facilities as part of their strategy to meet ambient air quality standards. Utilities are subject to additional constraints, albeit flexible market constraints, on acid rain and ozone precursors through the acid rain program and a regional program to control NO_x. In some regions of the country, facility emissions are restricted to control haze. *See* New York v. EPA, 413 F.3d 3, 28, 35 ELR 20135 (D.C. Cir. 2005) (describing the EPA's assertions about programs in addition to NSR that control existing sources). The EPA's conclusion that programs in addition to NSR impose significant constraints on emissions is contested. *See* ENVIRONMENTAL INTEGRITY PROJECT, COUNCIL OF STATE GOVERNMENTS/EASTERN REGIONAL CONFERENCE, REFORM OR ROLLBACK: HOW EPA'S CHANGES TO NEW SOURCE REVIEW COULD AFFECT AIR POLLUTION IN 12 STATES 1-1 (2003) (concluding that, contrary to EPA's assertions, "emissions growth from industrial facilities will often not be limited by other federal programs absent NSR"). A full analysis of the impact of these additional programs is beyond the scope of this Article.

134. *See* WOOLEY & MORSS, *supra* note 129, §1:111 (providing general description of NSPS and NSR program for modified facilities).

135. *See id.* §1:113 (providing table indicating the threshold for determining significant increases in nonattainment areas for each criteria pollutant and, where applicable, each degree of nonattainment). The most common thresholds range from 15-40 tons per year (tpy). *Id.* The lowest is for lead, at 0.6 tpy, and the highest is for CO in a moderate nonattainment area, where the threshold is 100 tpy. *Id. See also* 40 C.F.R. §52.21(b)(23) (stating the significance threshold for numerous pollutants in attainment areas, thresholds which are similar to those for nonattainment areas). The more severe the degree of nonattainment, the lower the threshold, providing greater protection from hot spots in the most polluted areas. However, the boundaries of nonattainment areas are large, and may not capture truly local impacts.

136. In determining the baseline from which to measure the increase, facilities can choose the emissions average from any two-year period in the preceding 10 years. 40 C.F.R. §52.21(b)(48)(ii)(c). Thus, if a facility had historically high emissions, but has since reduced emissions, it could nonetheless use the earlier high emissions as its baseline for assessing whether a proposed increase is significant. For example, if it emitted 250 tpy 8-10 years earlier, and emitted 150 tpy in recent years, it could choose the 250 tpy as its baseline. If a significant increase is measured as 40 tpy, the facility could increase its emissions to 289 tpy without triggering NSR. Assuming that emissions for the preceding years had been 150 tpy, the neighboring community would be confronted with an immediate increase of 139 tons. Nonetheless, that increase would not trigger NSR because the relevant baseline was the historic 250 tons per year rather than the more recent 150 tpy.

emissions increase more than the threshold amount.[137] Thus, a facility that increased production without changing the physical plant would not be required to go through NSR and reduce co-pollutant emissions.

The foregoing analysis focused on increases from existing sources. New sources are generally required to adopt strict pollution controls.[138] However, if a new facility can purchase allowances rather than having to reduce carbon emissions, its co-pollutant emissions might be higher than if it had been required to reduce its carbon emissions.

The risk of hot spots just described exists with or without a carbon trading system. A cap-and-trade system would not enable these increases, but it would allow them to continue.

In some instances, however, a market-based mechanism could lead to increases that would not otherwise have occurred. As California's Market Advisory Committee noted:

> It is conceivable that . . . the flexibility afforded by trading could cause a firm to shift production from one facility to another in order to reduce GHG emissions at a lower overall cost and that, because of differences in the industrial processes involved, this could lead to an increase in emissions of a local pollutant at one facility.[139]

Although the increases would presumably be constrained by existing permit limitations if those limitations are adequately enforced, the increases would nonetheless have been directly caused by the incentives created by a cap-and-trade program.

In addition, while reductions in GHGs are expected to generate reductions in co-pollutants, it is possible that some mechanisms for decreasing GHGs could, in fact, increase co-pollutants. For example, if an industry switched from gasoline to diesel due to diesel's greater efficiency, harmful co-pollutant emissions could increase. Moreover, power plants have been developing technologies that generate fewer GHGs, but that increase harmful particulate emissions. While these increases would presumably be controlled to some extent by existing permits, they nonetheless represent increases caused by the flexibility inherent in a market-based mechanism.

In sum, a market mechanism would allow existing facilities to purchase allowances that would enable them to increase emissions so long as they complied with applicable technology and performance standards, unless and until they reached the thresholds that trigger NSR and the consequent duty to install modern pollution controls. If their increases are due solely to increases in hours of operation and production rates, however, then they could increase emissions beyond the NSR thresholds without the regulatory interventions that would likely have controlled co-pollutant emissions. New sources must adopt stringent controls, but might have fewer co-pollutant emissions if they could not buy GHG allowances and were required to reduce GHG emissions. Finally, some GHG reduction strategies could increase, rather than decrease, co-pollutants. Thus, unlike other potential approaches to GHG reductions,[140] a market-based system does not help solve the hot spot risks created by the existing regulatory system.

☐ *Potential for Hot Spots of Unregulated Co-Pollutants*. The co-pollutant risk is most pronounced where the co-pollutants of concern are not regulated, since existing permits would not impose any constraints on increased co-pollutant emissions. For example, many toxic air pollutants have yet to be regulated under the federal CAA.[141] Although a cap-and-trade program would not cause these increases, it would facilitate them to a greater extent than a direct regulatory approach to reduce GHGs.

☐ *Potential for Hot Spots Caused by Inter-Pollutant or Mobile-to-Stationary Trades.* The discussion to this point has assumed CO_2 trades. Some have considered regulating potential climate change contributors, like black carbon particulates,[142] that have significant local impacts.[143] If black carbon were included in a GHG trading system, and inter-pollutant trading were permitted, a facility could increase emissions of black carbon through allowances created by CO_2 sequestration or reductions. Unless the black carbon is controlled by other regulations, the trading system could directly, not just incidentally, worsen localized pollution.

Trading from mobile to stationary sources could also cause distributional inequities. If carbon reductions from automobiles were used to facilitate increases from stationary sources, then widely distributed co-pollutants would become more concentrated.[144]

137. NSR and the NSPS apply to modifications of existing facilities. A modification is defined as physical changes to a facility that results in a significant emissions increase. *See* 42 U.S.C. §7411(a)(4), ELR STAT. CAA §111(a)(4) (defining modification for the NSPS program); *id*. §7479(2)(C), ELR STAT. CAA §169(2)(C) (defining modification for the prevention of significant deterioration (PSD) program by reference to the NSPS definition); *id*. §7501(4), ELR STAT. CAA §171(4) (defining modification for nonattainment areas by reference to the NSPS definition). Emissions increases alone do not trigger new source requirements; there must be an enabling physical change in the plant. The EPA regulations make clear that an increase in hours of operation or in the production rate would not constitute a "physical change or change in the method of operation." *See* 40 C.F.R. §51.166(b)(2)(iii)(f) (PSD regulation).

138. *See* WOOLEY & MORSS, *supra* note 129, §1:111 (describing basic permitting requirements for new sources).

139. MARKET ADVISORY COMMITTEE RECOMMENDATIONS, *supra* note 104, at 13. The committee indicated that the regulatory agency should therefore maintain "close vigilance over potential impacts on local pollutants . . . ." *Id.*

140. *See infra* Part II(D)(2(a) (discussing combining market mechanisms with traditional regulatory approaches).

141. The federal list of hazardous air pollutants currently contains 187 contaminants. *See* U.S. EPA, *Modifications to the 112(b)(1) Hazardous Air Pollutants*, http://www.epa.gov/ttn/atw/pollutants/atwsmod.html (last visited Mar. 28, 2008). California, in contrast, includes 244 contaminants on its Toxic Air Contaminant List. *See* California Environmental Protection Agency, CARB, *Toxic Air Contaminant (TAC) List*, http://www.arb.gov/toxics/id/taclist.htm (last visited Mar. 28, 2008). Thus, the federal government's regulation is not fully comprehensive, and other states may not fill in the gap as California has done. *See also* ENVIRONMENTAL INTEGRITY PROJECT, *supra* note 126, at 1-4 (stating that there are federal hazardous air pollutant standards only for "some volatile organic compounds and some of the pollutants that form particulate matter").

142. Black carbon, a particulate created during combustion, probably causes a net increase in global warming. *See* CARB, FACT SHEET: HEALTH EFFECTS OF DIESEL EXHAUST PARTICULATE MATTER 4-5 (2006), *available at* http://www.arb.ca.gov/research/diesel/dpm_draft_3-01-06.pdf. However, scientists remain uncertain about the interplay between black carbon's combination of warming and cooling effects. *See* REILLY ET AL., *supra* note 112, at 13, figs. 1 & 19.

143. *See* CARB FACT SHEET, *supra* note 142 (describing health effects of diesel exhaust particulate matter, consisting of carbon black).

144. *See* Drury et al., *supra* note 51, at 285 (proposing that intersource trading, like mobile-to-stationary source trading, be banned). *See also supra* note 51 (noting Drury and colleagues' assessment that intersource trading between automobiles and stationary sources in Los Angeles led to a significant pollution hot spot).

b. Distribution of Co-Pollutant Reduction Benefits

The environmental justice community is concerned not only about the risk of co-pollutant increases, but about the distribution of co-pollutant reduction benefits. Communities near facilities that reduce CO_2 emissions and purchase fewer allowances are likely to benefit from the concurrent reduction in co-pollutant emissions,[145] while communities near facilities that buy more allowances will not. Even if a facility only maintains, and does not increase, emissions, the neighboring community will not have obtained the potential pollution-reduction benefit of climate change regulation. To the extent that the facilities that choose to purchase allowances rather than reduce emissions are located in heavily polluted poor and minority communities, an unfettered market mechanism could deepen existing disparities.

These concerns are implicated not only by trades within a particular cap-and-trade system, but by proposals that would link different trading systems and allow regulated facilities to purchase allowances from outside the program's geographic scope. For state programs, for example, if in-state facilities could purchase allowances based upon reductions made outside the state, then the state's co-pollutant emissions would remain the same or could even increase.[146] The state's residents would fail to obtain the co-pollutant reduction co-benefit that the state's emission reduction goals would otherwise have provided.[147] This is not to say that other areas should be precluded from obtaining pollution reduction co-benefits. But states or regions that are willing to incur the sacrifices that climate change regulation could entail have a legitimate expectation of reaping potential co-benefits. In addition, states or regions may want to retain control over the distribution of co-benefits to ensure that pollution reductions occur in the most-polluted areas.

In addition, the ability to use offsets, particularly biological carbon sequestration offsets, affects the extent of the pollution control co-benefits accompanying climate change regulation.[148] Credits obtained from carbon sequestration would allow a facility to maintain co-pollutant emissions without a corresponding decrease in another facility's co-pollutant emissions.[149] Carbon sequestration efforts may achieve other important environmental values, but it is worth noting that they do not provide a co-pollutant reduction benefit.

Since the issue of the distribution of climate change regulation co-benefits is not about worsening pollution, but about unfairly depriving disadvantaged communities of a benefit, the argument may seem less compelling. But as long as policymakers consider co-benefits in evaluating climate change policies, then the distribution of those benefits is a legitimate issue. If the co-pollutant reduction benefits of climate change regulation are achieved in areas that do not suffer from serious air pollution, while communities that do suffer from serious air pollution do not experience reductions, then the policies are exacerbating existing disparities and raising legitimate distributional equity concerns.

5. Participation

Idealized cap-and-trade systems not only create the risk of distributional disparities, they conflict with the environmental justice movement's participatory and democratic ideals. Cap-and-trade systems are intended to streamline facility decisionmaking. Such streamlining could jeopardize community participation in determining appropriate pollution control levels.[150]

In a cap-and-trade system, the government's role is reduced to setting the cap, distributing allowances, recordkeeping and enforcement. Facilities themselves are responsible for determining what technologies or process changes to apply to reduce emissions or whether and to what extent to purchase allowances. In existing cap-and-trade programs, many trades occur through the private sector without the need for government intervention.[151] Privatized trading designed to maximize industry autonomy and flexibility does not provide opportunities for public participation in industry decisionmaking.[152]

145. *See, e.g.*, Market Advisory Committee Recommendations, *supra* note 104, at 13 (observing that "[c]hanges in production methods that cause reductions in GHG emissions tend to reduce emissions of other pollutants as well, since many combustion processes produce multiple types of emissions"); EPA, *supra* note 40, at 3-20 n.23 (observing that GHG emissions do not have local impacts, but that "ancillary reductions of criteria pollutants may have local benefits").

146. *See Market Advisory Committee Recommendations*, *supra* note 104, at 70 (noting that if linking to another system results in higher GHG emissions in California due to the purchase of allowances from outside of California, then "emissions of local air pollutants may also be relatively higher").

147. *See* Drury et al., *supra* note 51, at 287 (observing, in context of international trading, that U.S. purchases of emissions credits from other countries would lead to less air pollution reduction for U.S. communities than would occur if the United States required domestic reductions); *Market Advisory Committee Recommendations, supra* note 104, at 8, 63-64 (describing environmental justice community's concern about offsets and linkages); Matthew Yi, *Dems, Governor Spar Over Road to Clean Air*, S.F. Chron., July 17, 2007, at A1 (quoting environmental justice advocate's statement that "[c]ap-and-trade will not get us into a different world; it'll get us planting more eucalyptus trees in Brazil").

148. *See generally Market Advisory Committee Recommendations, supra* note 104, at 64-65 (recognizing "that the environmental justice community is particularly concerned that offsets could seriously reduce incentives for emissions reductions in urban areas where pollution levels are relatively high").

149. Allowing facilities to use offsets could, however, generate economic benefits for disadvantaged communities if the offset purchases helped finance green opportunities (for development or preservation) in disadvantaged communities. *See infra* Part III(b)(2)(c) (discussing potential economic benefits to disadvantaged communities from offset transactions).

150. *See* California EJ Movement's Declaration, *supra* note 17 (#16: observing that "carbon trading transactions and markets are undemocratic because they do not allow for full public participation by impacted communities and lack responsible government oversight as entrenched polluter interests determine whether and how to reduce greenhouse gases and co-pollutant emissions in vulnerable communities worldwide"); Cap and Trade Charade, *supra* note 80, at 3 (#6: stating that "[t]rading is undemocratic, secretive, and excludes the public from decisionmaking about whether and how to address greenhouse gas emissions").

151. *See* Drury et al., *supra* note 51, at 279 (observing that allowances in Los Angeles' RECLAIM program could be purchased through private brokers, without agency or public oversight); *cf. Market Advisory Committee Recommendations, supra* note 104, at 77 (suggesting that in a California market system, sources could make trades online).

152. *See* Drury et al., *supra* note 51, at 278-79 (discussing lack of public participation in trades occurring through Los Angeles' car scrapping and RECLAIM programs). Professors Lejano and Hirose observed that in the RECLAIM program, communities could not participate in trades and that the regulating agency explicitly exempted individual trades from environmental review requirements. As a result, "residents in Wilmington [a heavily polluted area that experienced an increase in pollution due to trading] did not have a forum in which to begin, collectively and with the agencies, judging the potential for

In contrast, under traditional regulation, permitting processes include public participation.[153] Affected community members and environmental groups generally have the opportunity to participate in written and sometimes oral hearings. Government decisionmakers have the benefit of the information the community provides,[154] and the public has at least some opportunity to influence the decision. Although that participation does not always offer affected communities as much power in the permitting process as they might like, it provides more opportunity to influence a facility's permit than a system of autonomous private-sector trades. A significant drawback to market-based systems is thus their impact on the environmental justice movement's community participation and empowerment goals.

6. Conclusion

To the extent they facilitate the adoption of more demanding environmental goals, cap-and-trade programs could benefit disadvantaged communities who are ill-prepared to weather the impacts of climate change, could stimulate innovation, and could also provide more absolute limits on emissions than traditional regulations. At the same time, if improperly designed, cap-and-trade programs could fail to achieve hoped-for reductions and technological innovation. They could also fail to address existing distributional disparities in co-pollutant emissions and are likely to preclude public participation in facility-specific permitting. Recognizing these concerns is critical to the development of climate change policies that attempt to resolve and balance the competing interests at stake.

D. Integrating Environmental Justice Into Cap-and-Trade Programs

Notwithstanding the fundamental tensions between market-based systems and environmental justice, reconciliation is possible. In this part, I suggest preliminary ideas for designing cap-and-trade programs to minimize their risk of failure and address their potentially adverse distributional impacts. The goal is to devise a cap-and-trade program that achieves a wide range of goals, including, but not limited to, economic and administrative efficiency.

In this part, I will first describe how California's GWSA provides a model for requiring the integration of environmental justice into climate change policy, although it does not specify actual mechanisms. I will then introduce several potential mechanisms for controlling impacts. Finally, I will directly address the central tension between the proposals and administrative and economic efficiency.

1. California's GWSA Environmental Justice Provisions

Environmental justice provisions in California's climate change legislation, AB 32, suggest that a California cap-and-trade program, if developed, will have to address the program's distributional consequences.[155] In terms of the risk of hot spots, the law states generally that the CARB, the implementing agency, must "[e]nsure that activities undertaken to comply with [its] regulations do not disproportionately impact low-income communities."[156] In a portion of the statute devoted to market mechanisms, the law states that prior to adopting a market-based compliance mechanism, CARB must "[c]onsider the potential for direct, indirect, and cumulative emission impacts from these mechanisms, including localized impacts in communities that are already adversely impacted by air pollution."[157] More specifically, the law requires CARB to design market mechanisms "to prevent any increase in the emissions of toxic air contaminants or criteria air pollutants."[158] If California chooses to implement a cap-and-trade program, it will have to design the program so as to avoid the creation of localized hot spots.

Several provisions in the law also provide a basis for addressing the distribution of the benefits of co-pollutant reductions. In other words, AB 32 could not only prevent trades that increased emissions, but prevent trades that allowed a facility in a disadvantaged area to maintain its emissions. Several sections of the statute discuss the importance of maximizing the environmental co-benefits of climate change regulation.[159] These co-benefits are particularly im-

adverse impacts due to any trade." Lejano & Hirose, *supra* note 78, at [13 in web version].

153. *See* Environmental Law Institute, A Citizen's Guide to Using Federal Environmental Laws to Secure Environmental Justice 15-18 (2002) (describing public notice, comment, and hearing opportunities associated with permitting actions).

154. *See* Johnson, *supra* note 57, at 159 (noting that government agencies need the information provided through public participation).

155. Although AB 32 did not require a cap-and-trade program due to resistance in the California Legislature, Governor Schwarzenegger is a strong advocate of a cap-and-trade approach. *See* Mark Martin, *Nunez Slams Governor on Emissions Law*, S.F. Chron., Oct. 17, 2006, at B1. To jump start deliberations on program design, he created a Market Advisory Committee two months after signing AB 32. *See* Exec. Order No. S-20-06, ¶ 3, *available at* http://gov.ca.gov/index.php?/executive-order/4484.

156. Cal. Health & Safety Code §38562(2).

157. *Id.* §38570(b)(1). California's Market Advisory Committee also emphasized that a cap-and-trade program should not create co-pollutant hot spots. The Market Advisory Committee established, as a first "guiding design principle," that a California cap-and-trade program should "[a]void localized and disproportionate impacts on low-income and disadvantaged communities or communities already adversely impacted by air pollution." *See Market Advisory Committee Recommendations, supra* note 104, at 16 (noting that the uneven distribution of mitigation efforts could affect co-pollutant emissions, and indicating that CARB should "anticipate and address concerns about emissions hotspots").

158. Cal. Health & Safety Code §38570(b)(2).

159. *See id.* §38501(h) (articulating legislative intent to establish emissions reductions measures that "maximize[] additional environmental . . . co-benefits for California, and complement[] the state's efforts to improve air quality); *id.* §38562(b)(6) (requiring CARB to consider the regulations' "overall societal benefits, including reductions in other air pollutants . . . and other benefits to the economy, environment, and public health"); *id.* §38570(b)(3) (stating that before incorporating market-based mechanisms, CARB should "[m]aximize additional environmental and economic benefits for California, as appropriate"). Similarly, California's Market Advisory Committee included, as its fourth guiding design principle, that a cap-and-trade program should "maximize total benefits to California, including reducing other air pollutant emissions . . . and advancing other economic, environmental, and public health objectives." *Market Advisory Committee Recommendations, supra* note 104, at 11. The committee's second design principle states that a cap-and-trade program should "[a]void interference with the achievement of state and federal ambient air quality standards," *id.*, thus suggesting that the program should facilitate reductions in co-pollutants in nonattainment areas. In determining how to distribute allowances, the committee stated that California should "distribute allowances in a manner that . . . advances the state's broader environmental goals by ensuring that environmental benefits accrue to overburdened communities . . . ." *Id.* at 55.

portant in the state's most polluted areas. AB 32 also emphasizes the importance of complementing "efforts to achieve and maintain federal and state ambient air quality standards and to reduce toxic air contaminant emissions."[160] Trades that maintained, rather than reducing, co-pollutant emissions in areas that were nonattainment or heavily impacted by toxics would fail to serve the statute's goals.

AB 32 provides less guidance for including public participation in connection with trades. Although AB 32 requires the inclusion of environmental justice stakeholders in the development of climate change policy,[161] it does not explicitly address public participation in trades.

Thus, at least in its substantive commitments, AB 32 establishes environmental justice as a central principle in its climate change policy. California presents a model for national and state policymakers. To the extent that environmental justice considerations are not incorporated at the federal level, national policymakers should, at a minimum, design programs that allow the states to realize their own environmental justice goals. That is likely to require a non-preemption clause as well as a division of implementation responsibility between the federal and state governments.[162] This cooperative federalist model, a model that is typical of most federal environmental laws, allows states to realize goals that might not be shared at the national level. Preempting or short-circuiting California's environmental justice goals would sacrifice not only Californians' efforts to achieve greater equity, but cut short California's chance to act as a "laboratory of invention" for the nation.

While AB 32 clearly sets forth environmental justice as a guiding principle, the devil is in the details. The next part provides a conceptual sketch of possible mechanisms to incorporate environmental justice into a market-based system.

2. Mechanisms for Incorporating Environmental Justice

I present here some initial ideas for incorporating environmental justice into a cap-and-trade program. The discussion below first describes three basic approaches to address distributional concerns: (1) combine a market system with traditional regulations; (2) condition trades; and (3) use auction revenues to reduce co-pollutant emissions in disadvantaged areas. The discussion is intended to provide a sense of the options that policymakers could consider severally or in combination. This part then briefly addresses several design issues: setting the cap; auctions versus free distribution; public participation; geographic linkages; offsets; and banking.

The proposals are intended to stimulate discussion and begin the process of envisioning a reconciliation of efficiency and justice. I note that other key factors, besides environmental justice considerations, could shape program design, and create new opportunities and obstacles for considering environmental justice.

a. Use a Market System to Supplement a Traditional Regulatory Approach for GHG Emissions

In the context of cap-and-trade programs more generally, a number of scholars have suggested that traditional regulatory mechanisms could provide a safety net.[163] While existing regulations of co-pollutants already provide a partial safety net, they do not fully avoid the hot spot risk and might not distribute co-pollutant reduction benefits equitably. To better distribute the benefits of climate change regulation, all facilities could be required to reduce GHGs to a certain extent using familiar regulatory mechanisms.[164] These GHG reduction requirements would likely lead to incidental reductions in co-pollutants.[165]

Once all facilities have reduced a certain amount, trading could be used to achieve greater reductions.[166] As long as the reduced co-pollutant baseline became the baseline for determining the propriety of future increases in co-pollutants,[167] future trades or allowance purchases would start from a lower baseline and be less likely to lead to increases in co-pollutants relative to current levels. In other words, since all spots would have been "cooled" to a certain extent, subsequent trading would be less likely to increase co-pollutants above their existing levels. To the extent that GHG reductions reduced co-pollutants, all communities would initially benefit from traditional climate change regulation.[168]

A traditional regulatory component could also control the potential co-pollutant increases that could result from some GHG reduction efforts. Although most GHG reduction efforts are likely to reduce co-pollutants, additional limits or

160. Cal. Health & Safety Code §38562(4).

161. *See supra* notes 31-33 and accompanying text (discussing creation of Environmental Justice Advisory Committee and requirement that public workshops for CARB's regulatory scoping plan be held in polluted and disadvantaged communities).

162. *See* Alice Kaswan, *A Cooperative Federalism Proposal for Climate Change Legislation: The Value of State Autonomy in a Federal System*, __ Denver U. L. Rev. (forthcoming 2008).

163. *See* Drury et al., *supra* note 51, at 284-85 (proposing, in the context of ambient air pollutants, that facilities continue to be required to meet the reasonably available control technology standard currently required of existing facilities in nonattainment areas); Johnson, *supra* note 57, at 162, 165 (suggesting that a command-and-control safety net might soften the impact of market-based reforms); EPA, *supra* note 40, at 3-22 and 3-25 (discussing imposition of traditional regulations to control hot spots) and 3-21 (noting that the Acid Rain Program supplemented rather than replaced traditional pollutant regulations).

164. Policymakers could consider a variety of traditional regulations. Standards could be set on an industrywide basis, could be attuned to each facility's specific conditions, or could simply require a certain percentage reduction.

165. Like most other pollution standards, a traditional regulatory approach to GHG emissions would probably consist of technology or performance standards. As such, they would likely allow for subsequent increases in actual emissions of GHGs, and hence allow an increase in associated co-pollutants, so long as the requisite emissions limitations were met. However, the impact of such increases would likely be less than in a cap-and-trade system because the facilities would already have reduced emissions at the outset. In other words, any emissions increases would be starting from a lower baseline.

166. *See* Drury et al., *supra* note 51, at 288 (suggesting technology-based regulations as a floor, with supplemental market programs to encourage the development of less-polluting technologies).

167. I recognize that this is a big "if," since facilities now have the benefit of using historic baselines for evaluating when co-pollutant increases trigger NSR. *See supra* note 136. Distributional gains could be erased if, after initially reducing emissions due to required reductions, facilities then purchased allowances to increase their level of co-pollutant emissions above the levels prior to the GHG restrictions.

168. *See* Drury et al., *supra* note 51, at 285 ("Ensuring that all companies install feasible technology . . . establishes a technology-based floor to safeguard public health in all communities.").

controls could be placed on those GHG reduction efforts that increase, rather than decrease, co-pollutants.

In addition to addressing distributional concerns, coupling a market mechanism with traditional regulation could jumpstart essential emissions reductions. In light of the large-scale reductions that must be achieved to avert catastrophic climate change, most facilities are likely to have to reduce emissions to some extent. If the reductions are inevitable, then traditional regulation could be more effective and certain than the market at ensuring that existing mechanisms for reducing GHGs are in fact adopted.[169] Once a regulatory system has ensured that available mechanisms have been adopted, a market-based system could harness the knowledge and creativity of the impacted sectors to generate new mechanisms for reducing emissions beyond the reductions that can be achieved using existing technology.[170]

The appropriate stringency of a regulatory component, if adopted, is likely to be contested. The more demanding the regulatory requirements, the greater the community protections. On the other hand, the more demanding the regulatory requirements, the greater the potential impact on economic efficiency, which has implications for both overall social costs and, potentially, the stringency of the environmental goals society is willing to achieve.

b. Condition Trades

An alternative or additional approach, as scholars have noted, would be to place conditions on trades to achieve distributional fairness.[171] Conditions could be imposed on a case-by-case basis or be determined according to preestablished geographic boundaries.[172] Trades into disadvantaged areas could be discouraged and offset projects in disadvantaged areas could be encouraged.[173]

☐ *Individualized Review.* In theory, agencies could review individual allowance transactions, whether purchased on the market or through an auction, to determine their impact on co-pollutant emissions in disadvantaged areas.[174] Trades that maintained or increased criteria or toxic co-pollutants could be limited or prohibited, unless the increases were de minimis.

This approach would be the most carefully tailored to the particular consequences of individual trades or auction purchases. It would, however, require agencies to gather much more environmental data than is usually the case in most traditional permitting transactions, which focus on determining appropriate control technology rather than immediate environmental impacts.[175] Furthermore, given the uncertainties in environmental monitoring and modeling, the potential environmental consequences of each transaction could be highly contested by community and industry stakeholders. In general, it would impose significant administrative transactions costs on the trading process, including delay and government oversight resources.

Whatever its theoretical advantages, the administrative burdens generated by such an approach, and the impact of such procedures on facilities' willingness to trade, could render such an approach incompatible with a trading system.[176]

☐ *Predetermined Geographic Restrictions*. Restrictions based upon predetermined geographic restrictions could be more compatible with a market system. Initially, regulatory agencies would have to identify disadvantaged areas.[177] A regulatory agency would have to determine the level and type of emissions that would constitute disadvantage, as well as the size of the relevant area and whether it should be evaluated in broad terms, e.g., nonattainment area, or with reference to specific impacts experienced by local communities. Policymakers will have to weigh the trade offs between accuracy and simplicity. Large geographic boundaries, such as nonattainment areas, would be easier to designate, but could fail to adequately capture the localized effects of pollution. Geographic boundaries that reflected the real pollution exposure experienced by communities would lead to a much more accurately targeted program. That would require agencies to gather new information about the actual distribution of environmental risks, an endeavor that could be valuable in its own right.[178]

169. *See supra* note 95 and accompanying text.

170. *See* J. Andrew Hoerner, A Golden Opportunity: Strengthening California's Economy Through Climate Policy 4 (2006) (suggesting, in comments to California regulators, that adding a cap-based market approach to a regulatory approach would provide an incentive for new technologies).

171. *See* Drury et al., *supra* note 51, at 284 (proposing that *trades* into overburdened communities be prohibited and that *trading programs* that are "projected to have a disproportionately adverse impact on low-income communities of color be prohibited"); *see also* Johnson, *supra* note 57, at 162 (noting that market systems could prohibit trades having a disparate impact, but doubting the administrative and political viability of such a prohibition); Lejano & Hirose, *supra* note 78, at [14 in web version], (suggesting that "caps on trading volumes, particularly with regard to cumulative trades in local jurisdictions" could address hot spots, but noting that that proposal conflicts with a trading system's "free market regime"); EPA, *supra* note 40, at 3-22 (noting that concerns about pollutant concentrations could be addressed by limiting allowances in sensitive areas, but expressing concern about the efficiency impacts of such restrictions).

172. Such trading limitations would create an unequal playing field for the affected industries, since industries located in disadvantaged neighborhoods would have less flexibility in addressing their carbon emissions. That raises all of the issues of inconsistent standards that have racked environmental policy since the days of nuisance law. However, the idea of having differing pollution control expectations based upon differing air quality is nothing new, and has much to recommend it. The existing CAA already imposes differing requirements depending upon whether a facility is in an attainment or nonattainment area, and upon the degree of nonattainment. 42 U.S.C. §§7501-7515, ELR Stat. CAA §§171-193 (CAA) provisions establishing separate requirements for nonattainment areas).

173. The California Market Advisory Committee suggests that CARB give "preferences to in-State offset projects associated with lower income and disadvantaged communities" so that they receive the economic (and, presumably, environmental) benefits of reductions. *See Market Advisory Committee Recommendations, supra* note 104, at 10. It is not clear how these preferences would be realized. One option might be to discount offsets that are not from disadvantaged communities.

174. *See* Chinn, *supra* note 72, at 120 (stating option of requiring individualized trade approval in context of criteria pollutant trading program).

175. *See* Johnson, *supra* note 57, at 162-63 (observing that requiring government agencies to determine whether trades cause a disparate impact would be "time-consuming and expensive" and "will be prone to legal challenge").

176. *See* Chinn, *supra* note 72, at 120–21 (suggesting that individualized review of trades would inherently conflict with a market-based system and that it "destroys the cost-efficiencies driving the market").

177. Los Angeles' RECLAIM program contained certain basic geographical limits on trades to prohibit emissions from moving from less polluted areas to more polluted areas. *See* Ellerman et al., *supra* note 49, at 20.

178. Air quality monitoring is not comprehensive, and impacted areas may not currently contain air monitoring stations. *See* Lejano &

To avoid the creation of hot spots, trades or auction purchases that increased actual net co-pollutant emissions for the disadvantaged area could be prohibited or discouraged. To address equity in the distribution of benefits, trades into disadvantaged areas that simply maintained, rather than increased, emissions could also be limited or discouraged.[179] The limitations could vary depending upon the degree of pollution in the affected area, with more stringent limitations on more polluted areas.[180] Conditions could be placed on trades from non-disadvantaged areas to disadvantaged areas, so that less impacted areas would not reap the benefits of climate change reductions at the expense of disadvantaged areas. So long as they did not increase pollution, however, trades within disadvantaged areas, or from one disadvantaged area to another, could be permitted, since at least one disadvantaged area could benefit from the trade. Trades from disadvantaged areas to non-disadvantaged areas could also be permitted.[181]

Prohibitions or limitations based directly upon emissions increases would require detailed information on existing baseline emissions, a frequently controversial issue subject to gaming and dispute.[182] To avoid baseline battles, trades or auction purchases could be indirectly controlled in disadvantaged regions by requiring a greater number of allowances per ton of emissions in disadvantaged areas.[183] In an auction system, another option would be for the government to charge higher allowance prices for facilities in disadvantaged areas. A higher allowance ratio or higher fee would create a stronger incentive to reduce emissions rather than purchase allowances.

c. Finance Co-Pollutant Emission Reductions With Auction Revenues

The California Market Advisory Committee, charged with developing recommendations for a cap-and-trade program in California, has suggested that, if allowances are auctioned, some of the auction revenue could be used "to finance reductions of GHGs and criteria pollutants in communities that bear disproportionate environmental and public health burdens."[184] That approach could address the potential negative environmental consequences of a cap-and-trade program without requiring such concerns to be integrated into trading mechanisms, and could thereby avoid some of the negative efficiency consequences that incorporating environmental justice might otherwise impose. It would delink the trading mechanism from its co-pollution reduction benefits.

Co-pollutants in impacted communities could be reduced in a variety of ways. The fund could be used to subsidize reductions at the facility purchasing the allowances or at other facilities in the area,[185] finance mass transit, subsidize or finance less-polluting private vehicles, or for any other number of pollution-reducing activities. Subject to overarching state guidelines, community residents could participate in the selection of co-pollutant reducing activities, thus providing a role for public participation that, as discussed below, is otherwise difficult to incorporate into autonomous trading regimes.

Policymakers would have to determine the highest priority areas for emissions reductions and whether the reductions should be linked to purchases of allowances into the communities or based purely on existing environmental conditions, regardless of trading. While this proposal could preserve the administrative efficiency of the trading program, regulatory agencies would also have to develop a government program to implement the reductions.

d. The Public Participation Challenge

Given the centrality of community participation to environmental justice goals, a key issue is the public's role in both the design and operation of a trading system. Public participation would be critical in the development of all threshold regulations, including the standards to be applied in a command-and-control safety net, or the designation of disadvantaged areas in a system imposing geographic limits based upon existing pollution levels.

Given the public's role in providing the government with information and the environmental justice movement's participatory and empowerment goals, participation would also be desirable in connection with individual trades or auction purchases.[186] However, it is likely to be particularly controversial due to its impact on the fluidity of the trading market. Conceivably, public participation procedures could be reserved for allowance sales into the most polluted communities, where the stakes are highest and the need for public vigilance over the process is greatest.

In the event that public participation in individual allowance sales is not feasible, trading systems should seek to maximize the public transparency of all allowance trading and all monitoring results.[187] Public access to such informa-

Hirose, *supra* note 78, at [7 and 14 of web version] (noting the absence of air quality monitoring in Wilmington, California, a heavily polluted area, and the general sparseness of air quality monitoring stations). If developing actual monitoring data is too expensive and contested, policymakers could identify cumulative emissions and associated population levels as a proxy for actual impacts.

179. These goals could be achieved in an auction system by limiting allowance purchases in disadvantaged areas to a certain percentage of existing emissions.

180. *See* Chinn, *supra* note 72, at 119 (proposing that the percentage of certain types of allowances that facilities could use "could vary according [to] each source's surrounding community demographics . . .").

181. *See id.* at 121–22.

182. *See* HOERNER, *supra* note 170 at 11.

183. *See* EPA, *supra* note 40, at 3-22. This approach is similar to the CAA's program requiring new sources in nonattainment areas to obtain offsets at a higher than 1:1 ratio.

184. *See Market Advisory Committee Recommendations*, *supra* note 104, at 57.

185. Rather than requiring the polluting facilities to reduce emissions at their own cost, this proposal essentially subsidizes reductions in the most affected communities using revenues collected from all participants in a cap-and-trade program. It could address the competitiveness concerns that industries in disadvantaged areas would raise if they are required to make reductions themselves (as a consequence of limitations on allowance purchases). Facilities purchasing allowances could, however, resist financing pollution reductions at other facilities.

186. *See* Drury et al., *supra* note 51, at 285 (suggesting public participation process in which affected communities would be allowed to review and comment upon proposed trades); Johnson, *supra* note 57, at 159-61 (proposing public participation procedures in all market-based environmental protection programs).

187. *See* Johnson, *supra* note 57, at 150 (stating that market-based systems should require that affected communities be provided with full information on all trades and their potential impacts); *Market Advisory Committee Recommendations*, *supra* note 104, at 75 (suggesting that quarterly emissions data be posted on the agency

tion would facilitate the public's ability to assess the impacts of trading and allow the public to provide a check on industry behavior to curtail the risk of fraud.[188] In addition, if the trading system fails to improve air quality in disadvantaged areas, regulatory agencies could be given the authority to impose additional limitations to better distribute the benefits of climate change regulation.

e. Ancillary Design Issues: Setting the Cap, Allowance Distribution, Geographic Linkages, Sectoral Scope, Offsets, and Banking

This part addresses a number of design features that could be influenced by the environmental justice concerns raised above. I recognize that each of these features will be shaped by a variety of considerations that are beyond the scope of this Article. It is nonetheless useful to identify how each would be affected by environmental justice considerations.

☐ *Set a Stringent Cap*. Setting a sufficiently stringent cap will be key to a trading program's efficacy in reducing emissions and stimulating technology adoption and innovation. Notwithstanding the difficulties encountered in RECLAIM and the ETS, trading programs like the acid rain program have succeeded in reducing emissions. Caps for covered sectors should be based on verified data regarding the most recent actual emissions.[189]

☐ *Allowance Distribution*. Auctioning, rather than freely distributing, allowances would indirectly address some of the moral concerns raised by a trading system. By requiring facilities to purchase the right to pollute, the facilities would be forced to internalize the costs of pollution. It could also reduce the potential for windfall profits.[190] In addition, auctioning would allow agencies to avoid the potential for gaming or fraud inherent in one of the most politically controversial steps in distributing allowances for free: determining preexisting baseline emissions. As discussed below, auctions could also provide revenue to address a wide range of environmental and economic concerns.

☐ *Geographic Linkages*. If a linked program contains comparably stringent restrictions, then trading could be mutually beneficial. However, if linking would result in emissions reductions taking place outside the program area, then the program area would not realize environmental or economic co-benefits, would fail to take responsibility for its own emissions, and would fail to incentivize changes to its own infrastructure. Geographic constraints or incentives could be implemented to maximize the pollution reduction co-benefits for the regulated area. Limits could be placed on the percentage of allowances permitted from outside the program area, and a greater than 1:1 ratio could be required.

In California, for example, California's Market Advisory Committee recommended that the allowance market be adjusted "to encourage in-state emissions reductions and in-state investments in low-emissions technologies"[191] so that California can realize the co-benefits of climate change regulation. Jurisdictions that have accepted the potential sacrifices associated with stringent GHG regulation have a legitimate claim to the ancillary benefits of that regulation.[192]

International trades with developing countries are particularly problematic.[193] They would fail to achieve domestic co-benefits. While providing developing countries with co-benefits and facilitating their sustainable development are laudable goals, it is not clear that piecemeal trades with developed countries are the best way to achieve them.[194] Moreover, if the lower costs associated with financing developing country reductions are not translated into higher developed-country caps, inexpensive allowance prices could fail to incentivize the technology innovation that is necessary to reduce emissions sufficiently to avert catastrophic climate change.

☐ *Sectoral Scope and Marketing*. A key issue in addressing the sectoral scope of the program, as well as the size of the sources included in a cap-and-trade program, is the accuracy of monitoring. Given the centrality of accurate monitoring and enforcement to a properly functioning trading system, a trading system should be limited to those sectors and facilities whose emissions can be monitored and easily verified by the regulatory agency.

☐ *Offsets*. To be effective, offsets must, as noted earlier, be "real, additional, independently verifiable, permanent, enforceable, predictable, and transparent."[195] To the extent offsets are allowed, facilities in disadvantaged areas could be encouraged or required to purchase offsets from within the disadvantaged area. They could also be encouraged to purchase offsets that result in lower co-pollutant emissions in heavily polluted areas. Offset projects that do not reduce co-pollutants, like biological carbon sequestration, could be given a lower value. Moreover, since offset purchases help finance reductions outside, not within, the regulated sector, innovation within the sector would be encouraged by limiting the use of offsets.

website to "help address concerns about the local pollution effects of trading and . . . enable the public to track emissions changes in their communities").

188. *See* Johnson, *supra* note 57, at 150 (stating that providing full information to the public could "promote individual autonomy and advance democratic decisionmaking) even if communities lacked full control over the decision); *Market Advisory Committee Recommendations*, *supra* note 104, at 75 (suggesting that quarterly emissions data be posted on the agency website to "help address concerns about the local pollution effects of trading and . . . enable the public to track emissions changes in their communities"). The data could help identify fraud, since if a facility submitted emissions data that appeared inconsistent with the facility's actual operations, the surrounding community could bring the discrepancy to the attention of regulatory authorities.

189. Using verified data would avoid the emissions uncertainty present in the ETS. Focusing on recent actual emissions rather than allowable or past emissions would ensure that emissions are, in fact, reduced.

190. *See* Hoerner, *supra* note 170, at 13.

191. *Market Advisory Committee Recommendations, supra* note 104, at 9.

192. At some point, a state's efforts to control interstate trading could raise Commerce Clause issues. That interesting issue is beyond the scope of this Article.

193. I am assuming, for the purposes of this Article, that projects in developing countries produce fully legitimate and verifiable emissions reductions, an assumption that many question. If they are not fully verifiable, then the trades would undermine the achievement of domestic emission reduction goals.

194. A full discussion of the strengths and weaknesses of trades with developing countries is beyond the scope of this Article.

195. *Market Advisory Committee Recommendations, supra* note 104, at 62.

☐ *Banking*. The benefits of banking in encouraging early reductions and providing industries with a safety net must be weighed against the risk of increasing future releases. Limitations on the use of banked credits, such as time limits or requiring a greater than 1:1 ratio, could provide a compromise.[196] Alternatively, facilities could be required to seek approval to use banked credits based upon environmental considerations at the time of the proposed use.

E. The Tension Between Environmental Justice and Efficiency

In considering mechanisms for incorporating environmental justice, regulators will have to consider competing considerations including, fundamentally, the proposals' impact on administrative and economic efficiency. I would argue that some accommodation is appropriate. An exclusive focus on maximizing the success of a market, measured in terms of the volume of trading,[197] would fail to establish a holistic climate change policy. A market is a means to an end, and the end could encompass not simply high volumes of trading and lower costs, but protecting and improving environmental conditions in disadvantaged communities. While some environmental justice goals may ultimately be compromised to achieve worthwhile efficiency gains, policymakers should focus not only on market success in the abstract, but on an overall regulatory package that serves a broader set of goals.[198]

1. The Tension Between Environmental Justice and Administrative Efficiency

One of the purported benefits of a cap-and-trade system is its relative administrative efficiency.[199] The regulatory agency can be spared the task of determining technology-based standards for a multitude of industrial categories and establishing facility-specific permit requirements.[200] At least in theory, the government could become a "banker" whose primary responsibility is to make sure that regulated facilities have enough allowances to cover their emissions.[201] Market advocates emphasize the importance of simplicity in designing cap-and-trade programs so as to minimize administrative transactions costs.[202]

The foregoing proposals would all conflict with a trading system's aspirations for administrative efficiency. Combining a market system with a command-and-control mechanism would still require government agencies to evaluate technologies for each industry, develop detailed performance or operational standards based on those technologies, and apply the standards to the regulated community. A program requiring government agencies to condition trades based on their distributional impacts would involve an active governmental role.[203] If the conditions were based upon predetermined geographic boundaries, then at least at the outset, a government agency would have to determine those boundaries. If conditions were imposed on a case-by-case basis and included public participation, significant government resources would be required.[204] Using auction revenues to finance pollution reductions in disadvantaged areas is the only proposal that would not interfere with a cap-and-trade program, but it would require a separate administrative infrastructure. Incorporating environmental justice thus appears to run headlong into market proponents' vision of an administratively efficient regulatory system.

The additional administrative burdens could have three consequences: (1) they would continue the government's active role, contrary to market advocates' hopes for a more autonomous free market[205]; (2) they would consume governmental resources; and (3) the delays and costs of governmental review could reduce industries' incentive to participate,[206] and, consequently, could interfere with the system's

196. *Cf.* EPA, *supra* note 40, at 3-20 (describing some trading systems' limits on banking to achieve environmental purposes, but suggesting that the limits were not worthwhile).

197. Ellerman and colleagues measure a trading program's success by the number of trades, on the assumption that each trade is motivated by cost savings, and that cost savings define a program's success. *See* ELLERMAN ET AL., *supra* note 49, at 32.

198. *See* Dreisen, *Free Lunch or Cheap Fix?, supra* note 81, at 72 (arguing that a carefully designed trading program that considers multiple considerations, not simply cost-efficiency, could provide a worthwhile environmental policy tool).

199. *See* McAllister, *supra* note 42, at 286; EPA, *supra* note 40, at 2-8 (noting that cap-and-trade programs reduce administrative transactions costs).

200. *See, e.g.*, Ackerman & Stewart, *supra* note 53, at 1342-43 (describing trading system's advantages in reducing burdensome governmental role); Swift, *supra* note 49, at 387-88.

201. *See* McAllister, *supra* note 42, at 280-81.

202. *See* ELLERMAN ET AL., *supra* note 49, at 35-37 (describing impediments created for trading systems by too many requirements); EPA, *supra* note 40, at 3-1 (stressing general importance of simplicity); *id.* at 3-2 (stressing the importance of fungible, easily tradable allowances, without geographic or temporal restrictions). *See generally* Ackerman & Stewart, *supra* note 53, at 1351 (observing that "administrative feasibility is an important constraint on the degree of sophistication that we may reasonably expect" in a trading system).

Ellerman and his co-authors suggest that EPA's Emissions Trading Programs, including netting, offsets, bubbles, and limited emissions banking, were used sparingly and were unsuccessful due to burdensome regulations designed to address environmental concerns and the pre-certification process associated with each trade. *Id.* at 8-9. In contrast, they attribute the acid rain program's high rate of trading and associated economic efficiency gains with that program's low transactions costs. *Id.* at 16. They conclude that emissions trading programs work best when trades do not have to be certified on a case-by-case basis, *id.* at 35-37, concluding that "a cap-and-trade program would get bogged down if pre-approval of trades were required in order to guarantee that trades did not negatively impact air quality in some way." *Id.* at 37. *See also* Burkett, *supra* note 23, at 47 n.263 (stating that "a more just cap-and-trade system can only be accomplished if it loses its appeal as a low-cost alternative to command-and-control, revealing an inherent tension").

203. Johnson has noted that prohibiting trades that would disparately impact low-income communities or that would require an evaluation of a trade's impacts would "increase the government's role in reviewing and overseeing private actions in a market-based system and seems antithetical to the rationale for the reforms." Johnson, *supra* note 57, at 162. Although he expresses skepticism regarding the ability to impose trade-specific constraints at one point in his article, *see id.* at 162-63, he later concludes that regulatory safety nets and limits on trades into certain communities "may be necessary to prevent market-based actions that would disparately impact those communities." *Id.* at 166.

204. While concluding that they are ultimately worthwhile, Johnson notes that "public participation procedures could increase the administrative hurdles for market-based programs and, thereby, reduce the incentive to participate in those programs." *Id.* at 161.

205. *Cf.* Lejano & Hirose, *supra* note 78, at [14, 15 in web version] (observing that limits on trades would interfere with the free market ideology underlying trading systems, but suggesting that real institutions must deal with the real world, not an idealized world).

206. *See* Johnson, *supra* note 57, at 162 (noting that placing time-consuming conditions on trades could make regulated entities less likely to use market-based tools).

ability to achieve hoped-for economic efficiencies. The first two of these consequences are discussed in this part. The third is addressed below, where I discuss the tension between environmental justice and economic efficiency.

Unless strictly limited to particular sectors and large sources, market advocates' hopes for a free market requiring few government resources are likely unfounded. Thus, while environmental justice provisions could impose transaction costs, they would be adding to, rather than creating, a significant governmental role. Experience with trading systems to date suggests that trading programs with a wide variety of sources, including relatively small sources, are likely to require active government involvement to succeed.[207] Prof. Lesley McAllister has analyzed the significant government role required by RECLAIM, a cap-and-trade program designed to meet air quality standards in Los Angeles.[208] Due to the heterogeneity of the sources and the flexibility the agency wanted to maintain, the local air agency administering the RECLAIM program encountered numerous challenges in effectively monitoring participants' emissions and enforcing the requirements.[209] An agency official stated that "[i]t takes more resources to monitor the cap-and-trade program than [command-and-control programs].[210] Moreover, the RECLAIM experience demonstrates that smaller, less sophisticated facilities might not have the knowledge to respond effectively to market signals for pollution control because they are not able to master the emissions allowance markets and do not have sufficient technological knowledge to develop less-polluting alternatives.[211]

Government agencies in this context would need to move well beyond the role of emissions banker and provide information about (if not manage) the market, as well as provide technical information about pollution control options.[212] As a result of program failures, the regulatory agency administering the RECLAIM program began to require facilities to develop compliance plans, a governmental role that begins to approach the intensity of traditional regulatory approaches.[213] Professor McAllister notes that an EPA official describing the RECLAIM program stated that it "is far more resource intensive than CAC [command-and-control] regulations by orders of magnitude."[214] If a widespread cap-and-trade program with a wide diversity of sources is developed for GHGs, then it will require a strong government role independent of environmental justice considerations.

Thus, market-based systems are not necessarily more administratively efficient than traditional systems, particularly if they address multiple sectors with facilities of varying sizes, and if they integrate any flexibility into the monitoring and enforcement process. Environmental justice constraints would likely increase, but not cause, the administrative burdens of a cap-and-trade system. In fact, the potential administrative costs of a cap-and-trade system may justify adopting some degree of direct regulation, especially for simple measures for smaller sources.

More generally, while administrative considerations may preclude achieving certain environmental justice goals, like public participation in individualized trades, they should be balanced with the benefits of developing equitable and protective environmental programs.

2. The Tension Between Environmental Justice and Economic Efficiency

Making pollution control more economically efficient is a central goal of market-based systems.[215] Lower costs could translate into less impact on the economy, although lowering costs too far could jeopardize innovation. Alternatively, as discussed above, lower costs could translate into greater political acceptance for higher emission reduction goals, resulting in the same net costs, but with higher GHG emission caps. Thus, to some extent, environmental justice goals are served by developing economically efficient policy mechanisms.

At the same time, some of the environmental justice movement's distributional and participatory goals could impact a market mechanism's economic efficiency. If firms with high costs of control must meet the requirements of a command-and-control system, then they will have to reduce emissions even if other facilities could have accomplished the same reductions for less. In addition, if firms with high costs are in disadvantaged areas and face trading limitations, then they will have to reduce pollution more than if allowances were freely tradable.[216] Moreover, the administrative costs and delays of government reviews to ensure environmental justice could deter firms from trading and thus reduce the program's potential economic savings. The more that companies with high costs reduce emissions rather than purchase allowances, the higher the overall costs of pollution control.

Environmental justice therefore confronts a tension: increasing economic efficiency could lead to higher aggregate reduction goals, but the movement's distributional goals could interfere with the pursuit of efficiency. Acknowledging that tension suggests the need for balance.

Once again, markets are a means to an end, and that end includes but is not limited to efficiency. Defining a market's success solely by efficiency, with efficiency defined by the number of trades (since each trade presumes that the lower-cost reducer is reducing), could create perverse results. To take a non-environmental-justice example: A strin-

207. *See generally* McAllister, *supra* note 42, at 287-312 (describing problems in Los Angeles' RECLAIM program and extensive government role that would have improved the system's performance).

208. *See* McAllister, *supra* note 42.

209. *See id.* at 297-304.

210. *See id.* at 304.

211. *See id.* at 294-97.

212. *See id.* at 305-09.

213. *See id.* at 309-10.

214. *See id.* at 304.

215. *See* Ackerman & Stewart, *supra* note 53, at 1341-42; Dudek & Palmisano, *supra* note 52, at 223; ELLERMAN ET AL., *supra* note 49, at 1-4. EPA, *supra* note 40, at 1-3 to 1-4. The tension between environmental justice and economic efficiency will have to be confronted in California. AB 32's provisions protecting the public from co-pollutant increases and maximizing the pollution reduction benefits of climate change regulation are potentially in tension with the statute's simultaneous goal of minimizing economic costs. *See* CAL. HEALTH & SAFETY CODE §38501(h). The proposals above attempt to accommodate the two goals: they are designed to allow economically efficient trading to occur, thus reducing the economic cost of pollution reduction, but only when the trading will not deprive the state of the benefit of co-pollutant reductions in heavily polluted areas.

216. *See* Chinn, *supra* note 72, at 122 (observing that restricted trading areas would "diminish market efficiency").

gent environmental goal could make allowances scarce and expensive. As a result, many facilities could choose to innovate and reduce pollution rather than purchase allowances, resulting in relatively few trades. That would not mean that the trading program was unsuccessful, unless success is measured only by the level of trading activity and the low cost of reductions. Conversely, if allowance prices were very low and trading were active, but few facilities were reducing their own emissions and no price signal emerged to encourage the development of new, more effective, pollution control strategies, that robust market could not be considered a policy success.

Similarly, if we evaluate an environmental policy not only by its economic efficiency, but by its distributional impacts, then a program that achieves efficiency but fails to benefit heavily polluted areas cannot be viewed as a success. A high-volume trading system that allowed hot spots to continue or failed to provide overburdened communities with the benefits of pollution reduction might succeed as a market, but would not constitute an equitable environmental policy.[217]

That is not to say that efficiency is not worth achieving, both for environmental justice and its overall societal benefits. But it is a goal that can be fruitfully balanced with other equally important societal considerations.

3. Conclusion

Policymakers face a significant challenge in designing a trading program that addresses multiple conflicting objectives. Nonetheless, the public is better served by attempting, even imperfectly, to address the risks of trading rather than casting a blind eye to its consequences. I summarize here my initial assessment of the appropriate balance.

I would argue that a cap-and-trade program does offer benefits: lower costs could lead to higher environmental goals; if properly monitored, allowance distributions provide greater certainty about emissions than technology-based emission rates; and, if allowance prices are high enough and goals are strict enough, the program could give facilities and technology development companies at least some incentive for innovations that would facilitate necessary technological transformations.

That said, market mechanisms should be combined with traditional regulatory measures. To the extent that mechanisms to reduce GHGs, such as energy efficiency measures, are known and feasible, government agencies should simply require their adoption, rather than waiting for the market to create incentives. That approach would serve environmental justice goals, because it would likely cool co-pollutant hot spots and distribute co-pollutant reduction benefits equitably. It would also offer traditional opportunities for public participation. In addition, a regulatory approach would provide greater certainty that existing reduction mechanisms are employed than relying upon the invisible hand of the market. Requiring the adoption of known and feasible GHG reduction measures would not unduly compromise economic efficiency since the measures, by definition, are "known" and "feasible."

A traditional regulatory approach may also be appropriate in the event that some of the mechanisms to reduce GHGs increase harmful co-pollutants. Regulators could allow these new mechanisms to be adopted, but, at least in currently polluted areas, only if facilities adopt additional co-pollutant controls.

The extent to which a supplemental market mechanism should include constraints on trade would depend upon the stringency of the traditional regulatory approaches. If direct regulatory approaches do not significantly improve air quality, then a trading system should impose restraints on trade that would limit allowance purchases into areas with poor quality directly or through monetary incentives. Restraints based upon predetermined geographic boundaries would be more efficient to administer than individualized review of trades, and would assist distributional justice so long as the geographic boundaries are not drawn so broadly that they mask and therefore fail to protect areas with localized hot spots.

The creation of a mitigation fund to lessen co-pollutant hot spots where facilities in polluted areas purchase allowances is intriguing. It would have less impact on the trading system than the other options. Communities could also be given a participatory role in developing a co-pollutant reduction strategy with the available funds. However, determining what projects to subsidize and developing a program to do so is itself a daunting administrative challenge. In some communities the options may not be apparent or may be difficult to implement. The program's virtue is also its drawback: it intrudes less upon the trading system, but it is also the most disconnected from the actions that are contributing to poor air quality. A more integrated response would more directly respond to pollution increases. Nonetheless, it is an idea worth exploring.

In light of the administrative costs of incorporating public input into all trades, public participation in trading transactions may be incompatible with trading, notwithstanding the importance of that participation. But compromises may be necessary: for market advocates, the compromise is maximizing economic efficiency; for environmental justice advocates, the compromise may be participation in individual trades. Without direct public participation to keep the system "honest," however, accurate and transparent monitoring becomes all the more important. Without the check provided by public input into permitting processes, only facilities that can be easily and accurately monitored should be allowed to participate in a trading scheme. Moreover, emissions data should be regularly reported to the public so that the local consequences of trading decisions can be monitored and addressed. Government agencies should have the authority to impose limitations in the event that co-pollutant emissions increase in areas of poor air quality.

As for offsets, linkage with trading programs in other regions, and banking, it is premature to assert blanket conclusions. There may be a role for all three. But the trade offs need to be carefully weighed. In order to maximize co-pollutant reduction benefits, offsets and out-of-state allowance purchases could be available to a limited extent and where necessary to remedy problems in the market, rather than available as a matter of course. Banked emissions could be conditionally usable, depending upon air quality considerations at the time when the facility intends to use the banked emissions.

The above conclusions do not represent the only way to solve the puzzle of integrating environmental justice into

217. *See* Drury et al., *supra* note 51, at 271.

climate change policy. They demonstrate that, contrary to common assumptions, environmental justice and market-based systems are not fundamentally irreconcilable. While some compromise of each is necessary, a market mechanism could achieve both efficiency and justice.[218]

IV. The Economic Implications of Climate Change Policies for Disadvantaged Communities

One of the hallmarks of the environmental justice movement is its integration of environmental and economic justice. The economic impacts of environmental policies on disadvantaged communities, not just environmental results, matter.[219] Climate change policies have both positive and negative economic implications for disadvantaged communities, implications that decisionmakers should integrate into climate change policies. In this part, I provide an introduction to a number of the issues that are likely to arise.

A. Potential Economic Disadvantages

1. Potential Regressive Impacts

While some climate change policies, like increasing energy efficiency, could reduce costs and lead to net economic benefits in the long run, others, like the development of new energy technologies and infrastructures, are likely to be costly. Increases in energy costs could have pervasive economic impacts not only on the price of energy itself (through heating and fuel costs), but also throughout the economic system. When prices increase, the poor, by definition, suffer the greatest proportional impact.[220]

That said, the long-term adverse economic consequences of climate change are likely to be even greater than the short-term economic consequences of climate change policies.[221] There is no choice but to reduce GHG emissions. In deciding how to do so, policymakers can consider mechanisms for reducing their regressive impacts.[222] For example, in the cap-and-trade context, policymakers can consider auctioning allowances rather than distributing them for free to reduce the financial transfer from consumers to industry and to generate a fund that could be used to assist the poor and others likely to be most heavily impacted.[223]

2. The Indirect Consequences of Land Use Reforms

In the United States, transportation is the second largest contributor of GHG emissions,[224] in part due to dispersed land use patterns that create high levels of vehicle miles traveled (VMT). One mechanism for reducing emissions from the transportation sector could be greater infill within urban areas. If land use policies encourage greater development within urban areas, that development could increase land values. That increase could revitalize and benefit some inner-city communities. However, it could also cause gentrification that could adversely impact poor neighborhoods by increasing property values above the level sustainable by existing community members. In addition, redevelopment projects could end up replacing inner-city housing with higher priced housing units. Climate change policies implicating land use will need to address affordable housing impacts.

B. Potential Economic Advantages

1. The New Green Economy: Opportunities for Disadvantaged Communities

The fundamental restructuring required to address climate change provides a unique opportunity to direct new investments to currently disadvantaged communities.[225] Many state climate change policies have been motivated, in part, by the economic opportunities associated with green development.[226] Such opportunities include not only the development of cutting-edge technology, but significant avenues for employment. Residents of disadvantaged communities could be trained to install solar panels or to retrofit existing buildings to make them more energy efficient. Oakland, California, and Bronx, New York, have launched green-collar jobs training programs to help low-income minority communities participate in a new sustainable economy.[227]

Such redistributive goals could be integrated directly into climate change policies. California's law stands as a model. AB 32 explicitly requires the state, to the extent feasible, to

218. *See* Chinn, *supra* note 72, at 125 (noting that compromise is necessary to achieve both efficiency and fairness).

219. For example, when CARB proposed banning non-professional servicing of car air conditioning systems to lower emissions of halofluorocarbon (HFC) 134, a significant GHG, California's Environmental Justice Advisory Committee (EJAC) opposed the proposal due to its regressive impacts on the poor, who cannot always afford professional maintenance. *See* EJAC, *Recommendations Regarding Currently Proposed Early Action Measures*, http://www.arb.ca.gov/cc/ejac/ghg_eams_finalcommitteerec.pdf (last visited Mar. 31, 2008).

220. *See* Dinan, *supra* note 83, at 1, 3, 6–8; Hoerner, *supra* note 170, at 8.

221. *See* Nicholas Stern, Stern Review: The Economics of Climate Change (2007), *available at* http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm.

222. Several of the federal climate change bills target funds to low-income communities and workers displaced by inevitable economic transitions. *See supra* notes 26-27 and accompanying text (discussing bills). Funds could be used to increase energy efficiency, through weatherization or new appliances, which would mitigate the impact of higher energy costs.

223. *See* Dinan, *supra* note 83, at 8.

224. *See* U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005 ES-14 (2007), *available at* http://www.epa.gov/climatechange/emissions/downloads06/07ES.pdf (stating the transportation sector's contribution as of 2005).

225. *See* Burkett, *supra* note 23, at 39-45 (describing how a new "green economy" could benefit disadvantaged communities). At a recent conference on "Climate Justice," held at the University of Colorado Law School in March 2007, Jerome Ringo, then the president of the Board of the National Wildlife Federation, argued that climate change policies could provide new economic opportunities to currently marginalized communities.

226. *See* Rabe et al., *supra* note 120, at 37-41 (describing economic potential of new technology development as a motivation for state climate change policies). For example, AB 32 received widespread support due to the bill's anticipated economic benefits for the state, arising largely from California's anticipated role at the forefront of green technology. *See* Press Release, Office of the Governor of Cal., *Gov. Schwarzenegger Signs Landmark Legislation to Reduce Greenhouse Gas Emissions* (Sept. 27, 2006), *available at* http://gov.ca.gov/index.php?/print-version/press-release/4111/.

227. *See* Burkett, *supra* note 23, at 40-42.

"direct public and private investment toward the most disadvantaged communities in California."[228]

2. Economic Benefits of a Cap-and-Trade System

The environmental benefits and drawbacks to a cap-and-trade system were explored above. This part considers some of the potential economic benefits of a cap-and-trade system, benefits that have led some past critics to endorse market-based systems.

a. Lower control costs

As discussed above, transitioning to a less carbon-intensive society is likely to impose net economic costs.[229] To the extent that a cap-and-trade system lowered the cost of reducing GHG emissions, the overall costs of addressing climate change would be less regressive. Environmental goals might be better served, however, by translating cost savings into more rigorous goals, and addressing regressive impacts through compensation or other forms of assistance. As discussed below, auction revenues could provide the funding.

b. Auctions: A Source of Revenue for Environmental Justice Goals

Trading programs that distribute allowances through auctions, rather than distributing allowances for free, could generate government revenue that could compensate low-income households for the economic impact of climate change regulation.[230] Auction revenue could also be used to make low-income households more energy efficient, thus mitigating or eliminating the impact of higher energy costs resulting from climate change regulation.[231] Given the disparate impact of climate change on the poor and their relative inability to adapt,[232] auction revenue could also be channeled to help poor and of color communities adapt to climate change.[233] More broadly, Prof. Maxine Burkett has proposed using auction revenues to finance ambitious green development and adaptation projects in disadvantaged communities through a carefully structured Domestic Clean Development Mechanism.[234]

c. Offsets: A New Tool to Finance Domestic Development

In addition to financing domestic clean development projects with auction revenues, Professor Burkett's proposal contemplates financing such projects through offset purchases.[235] The entity responsible for implementing the Domestic Clean Development Mechanism could coordinate green development projects in Green Development Zones identified as in need of sustainable revitalization,[236] and would certify the offset credits these projects generate.[237] Facilities required to reduce emissions could purchase offsets from the domestic clean development mechanism that reflect the emission reductions its projects expect to achieve. The money generated by the sale of offsets would finance the projects.

V. New Technologies: The Case of Ethanol

A. Introduction

A fundamental re-tooling of the existing carbon-based economy will ultimately be necessary to achieve the profound reductions in GHGs required to avert catastrophic climate change. Technologies that result in fewer GHG emissions could, however, create inadvertent environmental (as well as economic, social, and political) problems. While some trade offs may be inevitable, policymakers will need to carefully weigh the trade offs before encouraging large-scale investments in technologies that could prove, on balance, problematic.[238]

This part will focus on one recently emerging technological alternative that is receiving significant political support: ethanol.[239] Ethanol is likely to provide an important alternative to oil that could, under certain circumstances, achieve both climate change and energy security objectives. Nonetheless, both the production and use of ethanol and other biofuels raise environmental and environmental justice concerns that should be considered in the development of biofuels policy itself and in assessing the appropriate role for biofuels in a more comprehensive approach to transportation-related emissions.[240]

Ethanol is produced by fermenting and refining plant-based materials. In the United States at present, 95% of the

228. Cal. Health & Safety Code §38565.

229. *See supra* note 220 and accompanying text.

230. *See Market Advisory Committee Recommendations, supra* note 104, at 56 (suggesting that auction revenues could be used "to increase assistance to low-income consumers). *See also supra* note 26 (describing federal bills proposing to use auction revenues to assist low-income energy consumers).

231. *See Market Advisory Committee Recommendations, supra* note 104, at 56-57 (suggesting that "California use a substantial portion of the value of allowances to promote end-use efficiency among residential, commercial, and industrial energy consumers).

232. *See supra* note 59 and accompanying text.

233. *See* Burkett, *supra* note 23, at 36-37.

234. *See id.* at 33-39. Note that while sharing some of the Kyoto Protocol Clean Development Mechanism's central goals, Professor Burkett's program differs considerably from that regime.

235. *See id.* at 39 (noting, in context of example, that the institution governing the Domestic Clean Development Mechanism would have to certify offsets for credit).

236. *See id.* at 37-38.

237. *See id.* at 39.

238. *See, e.g.*, Brian T. Turner et al., Creating Markets for Biofuels (2007), *available at* http://repositories.cdlib.org/its/tsrc/UCB-ITS-TSRC-RR-2007-1/ (stressing the importance of and developing suggested protocols for measuring biofuels' environmental costs and benefits).

239. Although reluctant to adopt mandatory GHG reduction goals, President Bush has supported greater use of ethanol. He recently signed energy legislation that will require a substantial increase in the use of ethanol, to 36 billion gallons a year, by 2022. *See Bush Signs Auto Fuel Economy Bill*, S.F. Chron., Dec. 19, 2007. In California, Governor Schwarzenegger promulgated an executive order that establishes a low carbon fuel standard, requiring transportation fuels within the state to reduce their carbon intensity by 10% by 2020. *See* Exec. Order No. S-01-07 (Jan. 18, 2007), *available at* http://gov.ca.gov/index.php?/print-version/executive-order/5172/. Biodiesel is also an important biofuel, but this Article focuses on ethanol given its greater short-term viability. *See* Turner et al., *supra* note 238, at 7 (observing that "domestic biodiesel is likely to remain expensive and its market small").

240. A more comprehensive approach would consider mechanisms to reduce vehicle emissions such as increases in fuel efficiency standards, land use planning to reduce vehicle miles traveled, and the development of public transportation alternatives.

ethanol is derived from corn.[241] The process of producing corn-based ethanol has raised a plethora of general environmental and economic concerns that others have well documented.[242] Recognizing the environmental limitations of corn-based ethanol, many policymakers have increasingly focused on cellulosic ethanol.[243] Cellulosic ethanol is not yet commercially viable, but it presents fewer ancillary environmental concerns[244] and would reduce net GHG emissions significantly more than corn ethanol.[245] In this Article, I will focus on those environmental problems with distributional justice implications: ethanol production and consumption.

B. Ethanol Production

To provide a significant replacement for or supplement to gasoline, ethanol production would need to increase considerably.[246] Although most ethanol plants have been and are expected to be located in rural areas so as to be close to their biomass feedstocks,[247] and concentrations of pollutants are less likely to be of concern than in urban areas already heavily impacted by pollutants, ethanol plants could nonetheless have environmental justice implications for impacted rural communities.[248] Ethanol plants emit VOCs, CO, NO_x, and particulate matter.[249] Emissions result from both the energy source used to power the refinery, such as gas- or coal-fired boilers, as well as the refining process.[250] The VOCs and NO_x contribute to the formation of ground-level ozone, and a number of the VOCs from ethanol plants,[251] such as acetaldehyde and formaldehyde, are themselves hazardous.[252]

The local impacts of ethanol plants are likely to increase since the U.S. Environmental Protection Agency (EPA) recently promulgated a rule to improve the nation's energy security by loosening the environmental requirements for new or modified ethanol plants.[253] The May 2007 rule increases,

241. Turner et al., *supra* note 238, at 5 n.3.

242. Environmental and health impacts arise from the heavy use of fertilizers and herbicides to grow corn. *See* The Rush to Ethanol: Not All Biofuels Are Created Equal 25-27 (2007), *available at* www.newenergychoices.org/uploads/RushtoEthanol-rep.pdf; Turner et al., *supra* note 238, at 6, 9. Increased demand for corn could also reduce land and soil conservation. *See* The Rush to Ethanol, *supra* at 22-24; Turner et al., *supra* note 238, at 9. Corn-based ethanol also puts a significant strain on water uses, both for growing and then refining the corn. *See* The Rush to Ethanol, *supra* at 29. Average water use at existing plants is around four gallons per gallon of ethanol; newer plants could be more efficient and achieve the Renewable Energy Association's estimate of three gallons per gallon of ethanol. *Id. See also* Turner et al., *supra* note 238, at 10 (discussing water use by corn ethanol facilities).

From a climate change perspective, corn-based ethanol could provide few benefits, since the energy required to grow and refine corn generates significant GHG emissions. Estimates vary, but corn ethanol may reduce GHG emissions by only 10 to 20%. *See* Brent D. Yacobucci, CRS Report for Congress, Fuel Ethanol: Background and Public Policy Issues 16-17 (2007). If new facilities turn to coal rather than natural gas to process ethanol, as some predict, then the net GHG reductions could be even lower. *See* Amanda Griscom Little, The Trouble With Ethanol (2006), *available at* http://www.salon.com/opinion/feature/2006/05/30/muckraker/print.html (web posting stating that 190 new ethanol plants are under consideration and that many are likely to be coal-fired).

Economically, greater use of corn for ethanol has already increased corn prices, and could impact food supplies domestically and abroad. *See* The Rush to Ethanol, *supra* at 39 (observing that the price of corn in the United States has increased, with likely price impacts on meat, dairy, and processed food prices). Increased demand for domestic corn could also increase global food availability and prices, since the United States has been a net exporter of cheap corn. *Id.* at 40. *See also* Turner et al., *supra* note 238, at 9. *See also* Joyce Hedges, *Rise in Use of Grain to Make Biofuels Said the Threaten Global Food Supply*, 37 Env't Rep. (BNA) 1582 (July 28, 2006) (describing global food security concerns expressed by Lester Brown, president of the Earth Policy Institute). Turner et al., *supra* note 238, at 38 (concluding that ethanol from coal-fired facilities generates the same or more net GHGs than gasoline).

243. *See* The Rush to Ethanol, *supra* note 242, at 52.

244. The woody plants that could be grown to produce cellulosic ethanol, like switchgrass and fast-growing trees, are likely to require less insecticides and fertilizer than corn. *Id*. at 54. They also compete less with food crops, since they can be grown on marginal lands, and could even enhance soil conservation and habitat quality on marginal lands. *Id.* at 54. Given the variety of potential feedstocks for cellulosic ethanol, and the variations in the way they could be grown and handled, considerable variations are possible in its net environmental impacts. *Id.* at 56.

245. Cellulosic ethanol could reduce GHG emissions by approximately 85% relative to gasoline. Turner et al., *supra* note 238, at 40.

246. In 2007, ethanol constituted only 3.5% of the U.S. gasoline supply, The Rush to Ethanol, *supra* note 242, at 10, and was produced by 119 ethanol refineries in the United States. *Id.* at 11. As of this writing, the demand for ethanol has cooled due to decreasing prices and concerns about corn ethanol's environmental and economic impacts. *See* Lauren Etter, *Ethanol Craze Cools as Doubts Multiply*, Wall St. J., Nov. 28, 2007, at A1. As climate change regulation progresses, however, oil-based sources are likely to increase in price and render ethanol more competitive, and biofuels, including some form of ethanol, are likely to remain an important component.

247. *Cf.* U.S. EPA, *Prevention of Significant Deterioration, Nonattainment New Source Review, and Title V: Treatment of Certain Ethanol Production Facilities Under the "Major Emitting Facility" Definition*, 72 Fed. Reg. 24060, 24072 (May 1, 2007) (stating that new facilities are more likely to be built in attainment areas near feedstocks than in nonattainment areas).

248. The website for the Energy Justice Network, an organization critical of biofuels, lists numerous local groups opposed to siting ethanol plants, suggesting that ethanol plant construction will have local impacts even in rural areas. *See* Energy Justice Network, *Existing and Proposed Ethanol Plants/Opposition Groups*, http://www.energyjustice.net/ethanol/locations. (last visited Mar. 31, 2008) Since facilities are often sited in areas with the least political power to oppose them, *see* Kaswan, *supra* note 5, at 1122-24, poor rural communities could prove most vulnerable to the new wave of ethanol plants. *See also* Tom Davies, *Ethanol Comes With Environmental Impact, Despite Green Image*, USA Today (May 5, 2007) (AP story describing local opposition to ethanol refinery).

249. *See* EPA, *supra* note 247, 72 Fed. Reg. at 24070-71.

250. *See id.*

251. *See Minn. Settlement Has National Implications for Ethanol Plants*, 11 Clean Air Permits: Manager's Guide to the 1990 Clean Air Act Newsl. 8 (2002) (describing discovery of greater-than-anticipated VOC emissions from ethanol plants). EPA's recent discovery that ethanol plants emit more than 100 tpy of VOCs led to an EPA enforcement effort to require greater emissions controls on ethanol plants. *See* U.S. EPA, *Fact Sheet: Ethanol Plant Clean Air Act Enforcement Initiative*, http://www.epa.gov/compliance/resources/cases/civil/caa/ethanol/ (last visited Mar. 31, 2008). As a consequence of the enforcement initiative, more than 83% of existing ethanol plants have been required to install additional pollution controls because their emissions exceeded 100 tpy. *See Higher PSD Applicability Threshold Set for Ethanol Production Plants*, 4 Air Pollution Consultant 2.1, 2.2 to 2.3 (2007). The history of these enforcement actions raises the question whether the ethanol industry sought the increase in threshold to avoid future restrictions on their efforts to expand production.

252. *See id.* (stating that "VOCs can cause serious health problems such as cancer and other effects" and noting the health impacts of other ethanol plant emissions); Office of Pollution Prevention & Toxics, U.S. EPA, *Chemical Summary for Acetaldehyde* (1994), *available at* http://www.epa.gov/chemfact/s_acetal.txt; U.S. EPA, Technology Transfer Network, Air Toxics Website, *Formaldehyde* (Apr. 1992; revised Jan. 2000), *available at* http://www.epa.gov/ttn/atw/hlthef/formalde.html.

253. *See* EPA, *supra* note 247. In July 2007, the Natural Resources Defense Council, Inc. challenged the rule in the U.S. Court of Appeals for the District of Columbia. *See* Steven D. Cook, *EPA Sued Over*

from 100 tons per year (tpy) to 250 tpy, the threshold emissions that would trigger the rigorous pollution control requirements imposed under the CAA's prevention of significant deterioration program for sources in attainment areas.[254] (The threshold in nonattainment areas will remain 100 tpy.[255])

EPA acknowledges "that there may be some emissions increases as a result of this rulemaking."[256] EPA claims, however, that the changes are likely to be minimal because "we do not expect many new facilities to be constructed (other than those already planned) in the short-term (e.g., over the next five years)."[257] EPA also suggests that other clean air regulations, like efforts to meet the national ambient air quality standards (NAAQS), and state programs to control minor sources, will control emissions.[258] These statements are surprising, however, since the purpose of the rule is to enhance the nation's energy security by facilitating the construction of new and larger facilities and reducing their pollution-control burden.[259] It is unclear why the rule was promulgated if it is assumed to have little impact. Even if EPA does not foresee significant expansion or construction in the next five years, the Administration would be hard-pressed to meet its 10-year goal of producing 35 billion gallons of renewable fuels goal by 2017 without significant expansion of the nation's ethanol supplies.[260]

EPA expects the new rule to create an incentive for facilities to build fewer, larger, and more economically efficient plants.[261] EPA claims that these facilities will emit fewer pollutants per gallon of ethanol created.[262] While EPA states that it is thus "more logical to increase the capacity at a larger facility than locating additional smaller capacity facilities in an area,"[263] the greater concentration of plant emissions could be detrimental to locally impacted communities. Moreover, critics have contended that, rather than reduce pollutants per gallon of ethanol, the Agency's rule will increase pollution rates. They claim that the rule is designed to make it easier for plants to build more polluting coal-fired rather than natural gas-fired boilers, a trend motivated by the low price of coal relative to the high cost of natural gas.[264]

EPA's rule also eliminates the requirement that ethanol facilities count their fugitive emissions in determining whether they meet regulatory thresholds.[265] This rule change applies not only in attainment areas, but also in nonattainment areas that, by definition, already have air quality that fails to meet public health standards.[266] For plants in attainment areas emitting just under 250 tpy of non-fugitive pollutants, EPA expects an additional 33 tpy in uncounted fugitive emissions.[267] In nonattainment areas, which remain subject to the 100 tpy NSR threshold, EPA estimates that the new rule would allow facilities to emit an additional 16 tpy of uncounted fugitive VOC and CO emissions.[268] Fugitive emissions impose as significant a threat to surrounding communities as stack emissions, and their omission could increase the risks posed by ethanol plants.

In its analysis of the environmental justice impacts of the rule change, EPA stated that the rule would not have adverse impacts on minority or low-income populations "because the final rule does not . . . change a permitting authority's obligation to maintain the NAAQS . . . ."[269] That analysis does not adequately assess the actual impacts on real communities. First, facilities in attainment areas can have adverse impacts on immediately adjacent neighbors even if they do not interfere with the region's attainment status. Second, by not counting fugitive emissions in nonattainment areas, the rule allows greater emissions in nonattainment areas than would be permitted absent the rule change.

In sum, while the decentralized, rural location of most ethanol facilities does not pose as much risk of the types of cumulative environmental impacts that often plague disadvantaged communities, ethanol facilities do emit noxious pollutants. It is questionable whether alternatives to oil should be promoted by deregulating pollution controls at the expense of local communities.

Ethanol Production Rule, Emissions Limits for Halogenated Solvents, 38 Env't Rep. (BNA) 1470 (July 6, 2007).

254. The rule removes ethanol plants from the category of "chemical process plants," a category that defines sources as "major," and subject to PSD requirements, if they emit 100 tpy of criteria pollutants. By de-listing ethanol from the chemical process plants category, the plants will not be considered major, and therefore subject to PSD requirements, unless they emit 250 tpy of a criteria pollutant. 72 Fed. Reg. at 24061. The rule now imposes the same requirements on fuel-producing facilities as those that had been and continue to be imposed on facilities creating ethanol for food. EPA justified the rule based, in part, on the desire to apply the same rules to both fuel- and food-producing ethanol plants, which the agency believes use similar processing techniques. *Id*. at 24062. Major sources exceeding the PSD threshold would be required to install technologies that have proven very effective at reducing emissions. For example, ethanol plants exceeding the threshold were required to install thermal oxidizers (or their equivalent) that reduce VOC emissions by 95%, presumably the best available control technology. *See Minn. Settlement Has National Implications for Ethanol Plants*, *supra* note 251.

255. All facilities in nonattainment areas are considered "major" if their emissions of any criteria pollutant exceed 100 tpy; nonattainment areas do not share the 100 tpy/250 tpy dichotomy present in the PSD program. 72 Fed. Reg. at 24071.

256. *Id.* at 24070.

257. *Id.* at 24070.

258. *Id.* at 24071, 24072-73.

259. *Id.* at 24062.

260. *See* The White House, *Twenty in Ten: Strengthening America's Energy Security* (2007 State of the Union Policy Initiatives), *available at* www.whitehouse.gov/stateoftheunion/2007/initiatives/print/energy.html. While not all of the renewable fuels would be ethanol, ethanol is the best-developed alternative fuel and is therefore likely to be a significant factor in meeting this goal.

261. To date, many ethanol facilities have production capacities under 100 tpy of emissions and did not have to install PSD controls. 72 Fed. Reg. at 24071. The new threshold will allow facilities to expand up to 250 tpy without triggering PSD requirements. *Id.*

262. *Id.* at 24072.

263. *Id.*

264. *See* Little, *supra* note 242. EPA acknowledges that "new plants may decide to use coal in lieu of natural gas because of the increased major source emissions threshold and because of it being a cheaper fuel source and that this could result in increases in emissions of pollutants not expressly regulated by the PSD program." 72 Fed. Reg. at 24073.

265. *Id.* at 24072.

266. *Id.*

267. According to EPA, fugitive emissions are approximately 13% of emissions from a 250 million gallons per year (mgy) facility, which emits just under 250 tpy of pollutants. 13% of 250 tpy translates into approximately 33 tpy of fugitive emissions. *Id.*

268. *Id.* According to EPA, fugitive emissions are approximately 16% of emissions from a 110 mgy facility, which emits just under 100 tpy of pollutants. Approximately, 16% of 100 tpy translates into approximately 16 tpy of fugitive emissions. *Id.*

269. *Id.* at 24077.

C. Ethanol Consumption

Given the ubiquitous nature of fuel consumption, the potential health effects of using ethanol are significant. While a percentage of ethanol has been required in polluted areas to address CO and ozone formation,[270] its effect on ozone formation is controversial.[271] The net environmental impact is not clear, and is likely to vary regionally depending upon air quality conditions. According to a recent study by Prof. Mark Jacobson, replacing gasoline-burning cars with ethanol-burning cars would reduce emissions of some carcinogens while increasing emissions of others, leading to a net carcinogenic impact that is equivalent to that of gasoline.[272] Professor Jacobson's study also found that in combination with other sources of certain pollutants, ethanol emissions could lead to regional increases in ground-level ozone in areas that already suffer from pollution.[273] Overall, his study concluded that the use of ethanol instead of gasoline would increase the death rate from ozone, relative to that from gasoline, by about 9% in Los Angeles and 4% nationwide, as well as increasing hospitalizations from asthma.[274] Others have concluded that burning pure ethanol would reduce ozone-forming emissions in comparison with gasoline. The net environmental impacts of ethanol consumption are controversial, and this Article is not the place to resolve them. Nonetheless, the potential risks suggest that the development of ethanol should be accompanied by careful studies of its potential consequences.

The environmental risks posed by ethanol suggest that it will not provide an easy answer to the problems posed by the transportation sector's reliance on oil. While cellulosic ethanol could reduce net GHG emissions, policymakers will need to consider developing vehicle emission standards for the specific environmental threats posed by ethanol. In addition, other mobile source approaches, such as increasing vehicle efficiency or substituting new technologies, such as electric vehicles, could prove less environmentally harmful. Finally, a comprehensive transportation strategy would consider public transportation and land use changes that decrease America's automobile dependency.

VI. Conclusion

The climate change debate is not only about the level of reduction necessary to mitigate catastrophic climate change. As with all environmental challenges, decisionmakers properly integrate a much broader range of concerns into the policy calculus. I argue that the distributional consequences of climate change policies, both positive and negative, should play a central role. Communities around the country continue to endure the legacy of past discrimination and the failings of existing environmental laws. The nation's response to climate change is likely to be transformative. That transformation contains the possibility of creating not only a safer, but a more equitable, future.

270. For example, in some regions of the country, refiners must include a small percentage of ethanol in their gasoline to reduce overall carbon monoxide emissions. *See* ROBERT V. PERCIVAL ET AL., ENVIRONMENTAL REGULATION: LAW, SCIENCE, AND POLICY 568 (5th ed. 2006). Ethanol reportedly also reduces particulate emissions. Carolyn Whetzel, *Researchers Say Ethanol Fuel Blend Poses Health, Air Pollution Problems*, ENV'T REP., Apr. 20, 2007, at 906. Ethanol has not, however, always reduced ozone formation.

271. Concerns about the environmental impacts of ethanol led California's EJAC to oppose California's adoption of a low-carbon fuel standard. *See supra* note 252 (describing standard). The EJAC opposed the measure due to uncertainties about the health consequences of using lower-carbon fuels as well as the environmental and economic issues associated with producing biofuels. *See* EJAC, *supra* note 219.

272. Mark Z. Jacobson, *Effects of Ethanol (E85) Versus Gasoline Vehicles on Cancer and Mortality in the United States*, 41 ENVTL. SCI. & TECH. 4150, 4 (2007), *available at* http://pubs.acs.org/cgi-bin/sample.cgi/esthag/2007/41/i11/html/es062085v.html.

273. *See id.* at 4.

274. *Id.* at 5.