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Emissions Trading and Social Justice

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ABSTRACT.

Cap and trade is controversial in part because of claims that it is unjust, an issue that was highlighted by recent litigation against California's proposed carbon market. This essay considers an array of fairness issues relating to cap and trade. In terms of fairness to industry, the conclusion is that distributing free allowances overcompensates firms for the cost of compliance, assuming any compensation is warranted. Industry should not receive, in effect, ownership of the atmosphere at the expense of the public. Environmental justice advocates argue that cap-and-trade systems promote hotspots and encourage dirtier, older plants to continue operating to the detriment of some communities. Designers of cap-and-trade systems should be alert to possible hotspots, particularly in disadvantaged communities. Little reason exists, however, to believe that any such hotspots are systematically linked with disadvantage. Finally, any regulation of emissions raises costs, with a disproportionate impact on low-income consumers. This effect can be greatly ameliorated through adroit use of revenue from auctions. The bottom line is that fairness issues are not a deal-breaker for cap and trade, but do deserve thoughtful consideration in designing a system.

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I. INTRODUCTION

Cap and trade is promoted by economists as a cost-reduction measure[2] and is a common part of proposals to reduce greenhouse gas emissions.[3] Use of these systems is controversial, however, in part because of concerns about fairness. For instance, one advocate of environmental justice[4] charges that "evaluation of the world's oldest and largest pollution trading programs for urban air quality reveals immorality, injustice, and ineffectiveness in their outcomes."[5] Another critic contends that "many market-based approaches are designed in a way that will inevitably treat low-income communities unfairly."[6] But others view these criticisms as misguided obstacles to necessary

[2] See Hahn and Hester, *Marketable Permits: Lessons for Theory and Practice*, 16 Ecology L.Q. 361 (1989).

[3] On the international use of these programs, see David M. Driesen, *Sustainable Development and Market Liberalism's Shotgun Wedding; Emissions Trading Under the Kyoto Protocol*, 83 Ind. L.J. 21 (2008). For an assessment of proposed U.S. initiatives, see Sergey Paltsev, et al., Assessment of U.S. Cap-and-Trade Proposals, MIT Joint Program on the Science and Policy of Global Change Report 146, 2007), available at http://web.mit.edu/globalchange/www/MITJPSPGC_Rpt146.pdf ("[a] number of alternative approaches to greenhouse-gas mitigation are under consideration in the United States, but the policy instrument now receiving greatest attention is a national cap- and-trade system.") The report also provides a good introduction to the design issues involved in creating such a system and to methods for estimating costs.

[4] For an introduction to this school of thought, see Richard J. Lazarus, *Pursuing "Environmental Justice": The Distributional Effects of Environmental Protection*, 87 Nw. U. L. Rev. 787 (1993). One thread of environmental justice relates to community participation. See Sheila Foster, *Environmental Justice in an Era of Devolved Collaboration*, 26 Harv. Env. L. Rev. 459 (2002). Cap and trade is criticized on this basis, since market transactions between polluters do not require community input. However, disclosure of transactions and their pollution impacts would at least give communities a chance to advocate program modifications.

[5] Richard Toshiyuki Drury, Michael E. Belliveau, J. Scott Kuhn and Shipra Bansal, *Pollution Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 Duke Envtl. L. & Pol'y F. 231, 289 (1999). Similarly, in 2008, "environmental justice groups from California issued a declaration against cap-and-trade, stating that pollution already disproportionately affects low-income, communities of color, and they will 'fight at every turn' against regulations that create a carbon-trading system that would only exacerbate those trends." Kate Sheppard, Environmental Justice v. Cap-and-Trade, The American Prospect (Feb. 28, 2008), http://prospect.org/csnc/blogs/tapped_archive?month=02&year=2008&base_name=environmental_justice_v_capand .

[6] Stephen M. Johnson, *Economics v. Equity: Do Market-Based Environmental Reforms Exacerbate Environmental Injustice?,* 56 Wash. & Lee L. Rev. 111, 118 (1999).

environmental measures, particularly when environmental justice advocates use litigation against environmental agencies for leverage.[7]

To see the basic argument for cap and trade, suppose that the United States has decided to reduce levels of a hypothetical pollutant – call it kryptonite – and that the pollutant is fairly well-mixed in the atmosphere. The question then is how to reach the goal cost-effectively. The government can attempt to do this by setting individual emission standards for plants, but this has several disadvantages. It can be a cumbersome process, with many opportunities for judicial review and other delaying tactics. It also requires the government to determine the cheapest way for industry to reduce emissions, but industry itself has better knowledge of its own costs and technological opportunities. An alternative

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[7] For example, in discussing litigation in California, Ann Carlson concludes:

> I should note that I'm quite sympathetic to concerns by environmental justice groups about reducing air pollution from large sources in California. And in fact a number of the measures CARB [the California Air Resources Board, which implements the state's greenhouse gas program] has included in its scoping plan should help on the air pollution front: aggressive moves to cut greenhouse gases from automobiles should also produce cleaner cars; the state's requirement that utilities get 33 percent of their energy from renewable sources by 2020 should do the same. But I also think that the focus of AB 32 should mainly be on reducing greenhouse gases. Other statutes require very strict limits on air pollution, including both the federal Clean Air Act and the state's own air pollution laws. Those are the statutes that should be used to regulate air pollution directly. CARB should have as much flexibility as possible to implement AB 32 with a focus on reducing greenhouse gases as cost effectively as possible. If it can do so by also maximizing co-benefits like air pollution they should do so but the board's central focus should remain greenhouse gas emission reduction.

Ann Carlson, AB 32 Lawsuit: Assessing the Environmental Justice Arguments Against Cap and Trade, Legal Planet (March 22, 2011), available at https://legalplanet.wordpress.com/2011/03/22/ab-32-lawsuit-assessing-the-environmental-justice-arguments-against-cap-and-trade/. Another observer suggested more simply that "the EJ folks want to make life difficult enough for CARB that the Board gives in and gives their constituency something." Jonathan Zasloff, Two Cheers for Environmental Justice Cynicism, Legal Planet (March 23, 2011), available at http://legalplanet.wordpress.com/2011/03/23/two-cheers-for-environmental-justice-cynicism/. He added: "If you don't like that attitude, you call it a shakedown; if you do like it, then you call it leverage." *Id.* But, in his view, this leverage comes at a price:

> AIR [the EJ group] is taking a real risk here: either they don't have leverage, in which case CARB will re-analyze and just move ahead, or they *do* have leverage, in which case the program might go defunct (I'm doubtful of this, but at some level AIR must believe this is a possibility). And since the prime victims of climate change will be low-income people of color in the Global South, calling it "environmental justice" in those circumstances will be, shall we say, ironic.

Id.

is to set a national limit on emissions (the "cap"), allocate permits to industrial firms, but then let the firms trade the permits among each other. To see why this might reduce costs, suppose that one firm can eliminate a ton of kryptonite for $1000 per ton while another can do so for $500. Then the first firm could come out ahead by buying permits from the second firm for $500-1000 dollars. The first firm would increase its kryptonite emissions but this would be a wash, since the second firm would firm would reduce its emissions by an equal amount. After a series of such trades, a competitive market should reach the point where no further trades are possible because total emission control costs have been reduced as much as possible. Real-world trading systems have additional bells and whistles, but the kryptonite cap and trade system illustrates the heart of the idea.

Even assuming this market worked out as planned, some fairness objections might arise. Some firms would end up buying emission rights and others would be selling them, leaving some richer than others. The distribution of winners and losers depends on the initial allocation process, and at least some firms may find the result unfair. Furthermore, according to the hypothetical, kryptonite is fairly well mixed in the atmosphere, but it is still possible that after trading the high emission plants would all end up in one place, producing an undesirable amount of pollution in the locality. The same could be true of co-pollutants that are produced along with kryptonite. Finally, the costs of controlling kryptonite are likely to be passed onto consumers at least to some extent, and this may pose a special hardship on low-income groups.[8]

[8] In the law review literature, the classic article favoring this approach is Bruce Ackerman and Richard Stewart, *Reforming Environmental Law*, 37 Stan. L. Rev. 1333 (1985).

This essay focuses on these issues of fairness. It does not attempt to assess the economic benefits, effectiveness, or political viability of using an environmental trading system versus alternatives such as pollution taxes or direct regulation of sources.[9] Although these are important issues, they are simply put to one side in order to focus on equity concerns.

The essay begins in Part II with background on cap and trade systems. Since 1990, experience with the design and operation of these systems has accumulated. The degree of success of these systems varies, but more important for our purposes is understanding the various design issues relating to fairness.

The article then considers fairness issues relating to existing firms. Part III presents arguments against the free distribution of allowances to industry on a large scale. It concludes that we can compensate industries (to the extent we want to do so) with relatively small allocations of free allowances in their favor, while auctioning other allowances.

Part IV considers hotspots and emissions of co-pollutants in disadvantaged communities. This is a major concern of environmental justice advocates. The possibility of hotspots (either of the regulated pollutant or of co-pollutants) cannot be dismissed since it is impossible to perfectly predict the operation of any market, whether for pollution allowances or otherwise. The empirical evidence suggests, however, that environmental

[9] For instance, the paper does not address the enforcement issues connected with environmental trading systems. See Lesley K. McAllister, *The Enforcement Challenge of Cap-and-Trade Regulation*, 40 Envtl. L. 1195 (2010).

trading systems have not performed badly in terms of fairness to disadvantaged communities.

Part B then considers fairness to low-income energy consumers (Part V), an issue that has received considerable attention from economists. Any method of reducing greenhouse gas emissions is likely to increase energy prices, which will have a regressive effect because energy is a larger percentage of the budget for low-income groups. The regressive effects of environmental trading systems can be ameliorated through several mechanisms, such as allocating auction revenues to expansion of the earned-income credit.[10]

The stakeholders in the design of an environmental trading system involve consumer advocates, environmental groups, environmental justice advocates, industry, and government agencies. These stakeholders have varying interests and worldviews. It may be impossible to reach a consensus on system design. But many of the conflicting concerns can be accommodated reasonably in designing the system without impairing its overall effectiveness or cost-savings.

II. EXISTING CAP-AND-TRADE SYSTEMS

[10] A good source of background information on allocation and consumer equity issues can be found in Economic and Allocation Advisory Committee, Allocating Emissions Allowances Under a California Cap-and-Trade Program, Recommendations to the California Air Resources Board and California Environmental Protection Agency (2010), available at http://www.climatechange.ca.gov/eaac/documents/eaac_reports/2010-03-22_EAAC_Allocation_Report_Final.pdf.

An environmental trading scheme is based on the issuance of emission allowances,[11] which allow a firm that reduces its emissions to profit by selling its allowance.[12] These allowances can be sold to other present or prospective dischargers, or to non-dischargers entering the market for speculative or environmentalist purposes. Most trading systems limit the duration of permits to some specified time, such as one year, but some systems allow banking of permits for future use or borrowing of permits from future allocations. The initial permit holders can be chosen in several ways. Permits can be allocated among existing polluters (free or for a price), or among broader groups of applicants by auction or lottery. Once the pollution permits have been allocated initially, they are transferable, and sale prices function as free-market equivalents of pollution taxes. The permits have scarcity value because emissions are subject to an overall cap.

Below, we will discuss the operation and structure of actual cap-and-trade programs. Part A discusses the acid rain program in the United States. Part B discusses another effort to use cap and trade to control conventional pollutants, the RECLAIM program in Southern California. Part C then turns to the use of cap and trade to control greenhouse gases by American states and the European Union.

A. The Acid Rain Trading Program

[11] An allowance authorizes the holder to emit a given unit of emissions, usually one ton, during a given time period, usually one year.

[12] For an conceptual overview, see Robert W. Hahn and Gordon L. Hester, *Marketable Permits: Lessons for Theory and Practice*, 16 Ecology L.Q. 361 (1989). A related concept is the use of transferable fishing quotas to help maintain sustainable fish stocks. See David Dana, *Overcoming the Political Tragedy of the Commons: Lessons Learned from the Reauthorization of the Magnuson Act*, 24 Ecology L.Q. 833 (1997); Kristen M. Fletcher, *When Economics and Conservation Clash: Challenges to Economic Analysis in Fisheries Management*, 31 Env. L. Rep. 11168 (2001).

The first significant environmental trading system was the U.S. acid rain program. Under the Reagan Administration, acid rain became a highly controversial, heavily politicized issue. The Administration opposed congressionally proposed control programs and refused to take action in cooperation with the Canadians on the problem.[13]

The political deadlock was broken during the first Bush Administration with the passage of the 1990 Amendments to the Clean Air Act. Congress entirely bypassed the existing mechanism for resolving interstate disputes and established a new system to reduce sulfur-dioxide emissions nationwide. In Title IV, Congress created a "cap and trade" market system for addressing sulfur-dioxide emissions. Congress set the absolute ceiling on emissions by electric utilities nationwide at 8.9 million tons (the "cap"), an estimated reduction of 10 million tons relative to 1980 levels. The mechanisms for achieving these reductions were left unspecified, allowing individual firms to determine the most appropriate compliance pathway, e.g., energy conservation, cleaner fuels, pollution control technology, or purchase of additional allowances. Congress authorized the Environmental Protection Agency (EPA) to distribute allowances annually through a combination of mechanisms, including auctions and free allocation to firms. Allowances can be transferred (bought and sold) beneath the cap (the "trade" part of cap and trade). Firms that are able to reduce their emissions can sell excess allowances, which is intended to create incentives to develop better emission-control technology.

The sulfur-dioxide trading program was divided into two phases. In Phase I, extending from 1995 to 1999 and covering only a minority of the nation's steam-electric

[13] *Canada Announces New Effort to Cut Acid Rain*, N.Y. Times, March 8, 1984. (Note the resemblance to the George W. Bush administration's approach to greenhouse gases and climate change.)

generating units, just over one hundred plants (listed in the statute by name) were required to meet a standard of 2.5 pounds of sulfur dioxide per million British Thermal Units (lbs SO_2/mmBTUs). The 111 utility power plants in question were those that in 1990 emitted more than 2.5 lbs SO_2/mmBTUs. This standard had to be attained by 1995, except that plants using scrubbers to meet the standards had until 1997.

Phase II, which began in 2000 and applies to virtually all steam-electric utility units in the country, requires utilities to reduce emissions by an additional 50 percent. Large, poorly controlled plants must reduce emissions to 1.2 lbs SO_2/mmBTUs. A complex formula applies to smaller plants. While total emissions cannot exceed 8.9 million tons annually, the EPA had a half million extra allowances in reserve for the first ten years. A further forty thousand allowances can be given to high-growth states. The allowances are allocated largely on the basis of past emissions and fuel consumption, but there are extra allowances for a variety of purposes. For example, from 1995 to 1999, 200,000 extra allowances were allocated to power plants in Illinois, Indiana, and Ohio.

From the outset, the ambitious, innovative sulfur-dioxide trading program provoked considerable scholarly discussion and controversy as to the program costs, cost savings, and environmental or public health benefits that would result.[14] The early history of the acid rain program produced mixed results in terms of trading, but the program has been an overall success in reducing emissions at low cost.[15] In the early days of the program,

[14] See, e.g., David M. Driesen, *Does Emissions Trading Encourage Innovation?,* 33 Envtl. L. Rep. 10094 (2003); Byron Swift, *How Environmental Laws Work: An Analysis of the Utility Sector's Response to Regulation of Nitrogen Oxides and Sulfur Dioxides Under the Clean Air Act*, 14 Tulane Env. L.J. 309 (2001); Curtis A. Moore, *The 1990 Clean Air Act Amendments: Failing the Acid Test*, 34 Envtl. L. Rep. 10366 (2004).

[15] Matthew L. Wald, *Risk-Shy Utilities Avoid Trading Emission Credits*, N.Y. Times, Jan. 25, 1993, at C2.

trading was limited by public utility rules and perhaps by flaws in the implementation of the trading programs, though intra-company trades were more common.[16] Trading later expanded. For several years, the Chicago Board of Trade has conducted an annual auction of sulfur-dioxide emission allowances on behalf of the EPA, and during the March 2002 auction, the average purchase price for each of the 125,000 currently usable allowances sold at auction was around $167.[17]

Despite the overall success of the program, the trading program's performance has been uneven. In 2003, there was a four percent rise in sulfur-dioxide emissions over the previous year. According to environmentalists, the rise was due to lax enforcement of other regulations against power plants, whereas the federal government chalked the increase up to greater use of pollution allowances,[18] which may have been a drawdown of banked allowances. In 2004, there was also a jump in the price of allowances, apparently due to expectations regarding future air pollution regulations.[19]

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[16] See Dallas Burtraw, *Trading Emissions to Clean the Air: Exchanges Few but Savings Many*, Resources, Winter 1996, at 3.

[17] See Michael Bologna, *Results of Sulfur Dioxide Auction Suggest Companies Anticipate Gentler Enforcement*, 33 Env't Rep. (BNA) 678 (2002).

[18] *EPA Report Shows Uptick in SO2 in 2003, Amid 38% Decline in Emissions Since 1980*, Elec. Utility Wk., Sept. 27, 2004, at 6.

[19] See Jacob Kreutzer, *Cap and Trade: A Behavioral Analysis of the Sulfur Dioxide Emissions Market*, 62 NYU Annual Surv. Amer. L. 125 (2006):

> Recently, the price of sulfur dioxide emission allowances has jumped significantly. The price of an emission allowance on April 1, 2004 was $272. By June 2nd the price was $375, and by July 1st the price was $425. Since it seems unlikely that the demand for emissions moved so dramatically over a four-month span, something probably happened to change suppliers' outlook on the future value of emissions allowances.
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> Two factors stand out as contributing to this change in price. First, increases in oil prices make coal power more attractive. When investors see or fear rising oil prices, they would become much less willing to part with emissions allowances. The other factor affecting the price of emissions allowances springs from a rule proposed by the EPA in January of 2004.

Overall, however, the general verdict is that the program has been a success, due in part to the availability of low-sulfur coal because of decreased transportation costs. A 2011 review of the program's operation suggests that, overall, sulfur-dioxide allowances have been much cheaper than expected; the program has been quite effective at reducing emissions and may have saved up to one billion dollars per year in compliance costs.[20] Moreover, the program did not lead to increased emissions in poor or minority communities.[21] To some extent, the program benefitted from fortuitous changes in fossil fuel prices in favor of lower-sulfur coal and natural gas. Efforts to control for these changes report "savings of 43–55 percent compared to a uniform standard that would have regulated the rate of emissions at a facility" and savings of twice that amount as compared with a mandate to use post-combustion controls such as scrubbers.[22]

B. The RECLAIM Program

Another major experiment with cap-and-trade took place in Los Angeles, with the so-called RECLAIM program, Southern California's NO_x trading program.[23] California's South Coast Air Quality Management District adopted Rule 1610, creating the Regional Clean Air Incentives Market (RECLAIM), a "cap and trade" program under which stationary sources like oil refineries were given initial allowances of RECLAIM Trading Credits (or RTCs),

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[20] See William C. Whitesell, Climate Policy Foundations 165-166 (2011).

[21] See Evan J. Ringquist, *Trading Equity for Efficiency in Environmental Protection? Environmental Justice Effects from the SO_2 Allowance Trading Program*, 92 Soc. Sci. Q. 297 (2011); Jason Coburn, *Emissions Trading and Environmental Justice: Distributive Justice and the USA's Acid Rain Programme, 28 Env. Conserv.* 323 (2001).

[22] Dallas Burtraw and Sarah Jo Szambelan, U.S. Emissions Trading Markets for SO_2 and NOx 11 (RFF 2009), available at www.rff.org/Publications/Pages/PublicationDetails.aspx?PublicationID=21467.

[23] Criticisms of the program are presented in Richard Toshiyuki Drury, Michael E. Belliveau, J. Scott Kuhn and Shipra Bansal, *supra* note 5 (but note that many of the criticisms involve other aspects of the program apart from the NOx trading system).

which they could either consume or sell to other facilities. RECLAIM was expected to apply initially to about 400 facilities, accounting for between two-thirds and three-quarters of the emissions from stationary sources with permits. The initial allocation was set based on maximum emissions during 1989–1992, with an adjustment to control the total emissions from all sources. The amount of pollution represented by an RTC was to decline steadily each year.[24]

The program has had a mixed record. An overall assessment of the program by EPA staff observes that "[e]missions have been reduced under RECLAIM, but the program has also been criticized for delaying reductions, over-managing the market, and perpetuating complexity and uncertainty."[25] The California electricity crisis in 2000 caused a price spike that dramatically affected the market and resulted in the removal of the power sector from the NO_x market. There was a clear learning process. As EPA notes, "program modifications have changed the program in both subtle and significant ways over its lifetime, with the latest significant rule changes requiring more reductions to meet tougher air quality goals."[26] As the EPA report observes, initial over-allocation of permits provided no incentive to install control technology.[27] When electricity wholesale prices spiked at a time of high consumer demand, firms put older, dirtier units into service to cover demand while

[24] For a detailed description of the program, see Daniel P. Selmi, *Transforming Economic Incentives from Theory to Reality: The Marketable Permit Program of the South Coast Air Quality Management District,* 24 Envtl. L. Rep. 10695 (1994).

[25] EPA Clean Air Markets Division, An Overview of the Regional Clean Air Incentives Market (RECLAIM) (2006), available at http://www.epa.gov/airmarkt/resource/docs/reclaimoverview.pdf.

[26] *Id.*

[27] *Id.* at 6.

paying very high amounts for allowances.[28] Note that this is a case in which the older plants delivered a different "product" (off-peak electricity) than the newer plants, and the demand for this different product rose very quickly. In response, extensive changes were made to the system.[29] Ultimately, despite the problems, the program did result in a sixty percent decrease in NO_x emissions in the region from 1994-2004.[30]

C. Emissions Trading of Greenhouse Gases

The next step was to extend the use of a trading program to greenhouse gases. After prior discussion about adoption of a carbon tax, the European Union began operation of the world's first mandatory carbon dioxide (CO_2) emissions trading scheme in January 2005.[31] For reasons relating to internal politics, the EU distributed to "its then 15 member countries its internationally agreed target, ranging (relative to the 1990 base period under Kyoto) from cuts of 28 percent (Luxembourg) to an allowed increase of 27 percent (Portugal)."[32] The EU members then established their own trading programs, using a variety of schemes to allocate permits to their industries.[33] The program got off to a rocky start, with disputes arising over allocations of emissions among countries and the overall cap on carbon dioxide.[34] Allowance prices have fluctuated from as little as one euro to as

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[28] *Id.*

[29] *Id.* at 9-10.

[30] *Id.* at 12.

[31] Matthew Saltmarsh, *Market for Emissions Picks Up Steam as Kyoto Protocol Takes Hold*, Int'l Herald Trib., July 6, 2005, at 19.

[32] *Id.* at 2.

[33] *Id.* at 2-5.

[34] David Gow, *UK Victory Rips Hole in EU's Pollution Trading Scheme*, Guardian (London), Nov. 24, 2005, at 25.

much as thirty.[35] A third phase, with more ambitious targets and greater use of auctioning, is planned for 2013-2021.[36] The EU will "also deliberately favor its poorer members with permits in excess of what would be allocated to them under normal guidance – 12 percent of the EU total is to be used in this way."[37] To date, however, the European trading system does not seem to have had great success in reducing emissions.[38]

Although emissions trading for greenhouse gases has yet to develop into national legislation in the United States, several Northeastern states have confronted these design questions and agreed to a carbon cap and trade system among electrical power plants known as the Regional Greenhouse Gas Initiative.[39] Seven states signed a memo of understanding in December 2005, committing to a detailed trading program.[40] Currently, ten states participate, and the fourteenth auction of allowances has just taken place.[41] As will be discussed later, California is also on route to imposing an economy-wide trading scheme.

One common element to all of these stories is that implementing a working cap-and-trade scheme is not a simple matter. Almost all of these stories include slow starts in

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[35] Whitesell, *supra* note 20. The low initial price was apparently due to an overallocation of allowances. See Lesley McAllister, *The Overallocation Problem in Cap-and-Trade: Moving Toward Stringency*, 34 Colum. J. Env. L. 396 (2009). For more information on the EU system, see A. Denny Elleerman and Paul L. Joskow, The European Union's Emissions Trading System in Perspective 32 (2008).

[36] Richard N. Cooper, Europe's Emissions Trading System 12-13 (Harvard Project on International Climate Agreements 2010), available at belfercenter.ksg.harvard.edu/files/CooperETSfinal.pdf.

[37] *Id.* at 15.

[38] *Id.* at 21-22.

[39] See http://www.rggi.org.

[40] See RGGI Memorandum of Understanding (2005), available at http://www.rggi.org/docs/mou_12_20_05.pdf.

[41] See http://www.rggi.org.

trading, initial over-allocation of permits, or other problems. There is still a great deal that we do not know about how environmental trading systems actually operate. As the lead authors in one review of the experience with environmental trading programs concluded, "[t]hough we have some evidence of significant cost savings through emissions trading schemes, we know much less about how effective (in terms of measurable environmental benefits) and fair (in terms of distributional burdens) they are."[42] The authors also noted that "[t]he studies that do exist are laudable and informative, yet their methodological limitations caution against strong conclusions."[43] As we will see, later research has filled some of these gaps, but there is still much that we do not know.

The remainder of this article explores the fairness issues relating to these schemes, with primary attention to possible use of cap and trade to control greenhouse gases. We begin with the question of how to allocate allowances fairly to industry.

III. FAIRNESS TO INDUSTRY

The mechanism for distributing allowances is a key part of an environmental trading system. In terms of the U.S. acid rain program, the allocation seems to have been manipulated in the interests of regional equity, however, so that utilities that are required to engage in heavy investments will be able to recoup part of their expenses. The initial allocations are large enough that some of these utilities will find it feasible to control emissions more than required to stay within their initial allowance, thereby allowing them

[42] Jody Freeman and Charles D. Kolstad, *Prescriptive Environmental Regulations versus Market-Based Incentives*, in Jody Freeman and Charles D. Kolstad (eds), Moving to Markets in Environmental Regulation 14-15 (2007).

[43] *Id.*

to sell excess allowances. At least some of these excess allowances will have to be purchased by new utility plants in order to operate.

In the case of the original U.S. cap-and-trade system for sulfur dioxide, allocation was a central focus of the legislature. One observer concluded that it was "difficult to imagine what lies behind these special bonuses and exemptions [under the Act], other than the kind of special interest deal that proponents of emissions trading had hoped their system would preempt.[44] Indeed, according to some critics, "It would appear that the Senators saw little distinction between the Clean Air Act and a fight over which defense installation to close, or an appropriation for public works projects. The pork tastes as good, from whichever barrel it comes."[45]

Thus, raw politics may certainly affect the distribution of allowances across industries and even across sources. But the politics may be complex. A study by two economists found that some coal-producing states concentrated on benefits for miners and sustaining demand for high-sulfur coal rather than obtaining allowances, and that some states using high-sulfur coal accelerated their allowances into earlier years rather than receiving higher total allocations.[46] The absence of recorded votes on allowance distribution makes it hard to tease out the political coalitions.[47]

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[44] Lisa Heinzerling, *Selling Pollution, Forcing Democracy*, 14 Stan. Envtl. L.J. 300, 330 (1995). "Pork" is a traditional term for government spending that is designed to benefit special interests.

[45] *Id.*

[46] Paul L. Joskow & Richard Schmalensee, *The Political Economy of Market–Based Environmental Policy: The U.S. Acid Rain Program*, 61 J.L. & Econ. 37 (1998) (statistical study of voting patterns finding only limited influence by "special interests").

[47] *Id.* at 67.

It is tempting to try to neutralize the impacts of a trading scheme by awarding allowances based on current pollution levels. This in effect provides "grandfathering" to current emitters. Economists report that this mechanism can protect stock prices in the fossil fuel industry and firms relying on fossil fuels.[48] Notably, this may be accomplished through providing only a small portion of allowances through grandfathering.[49]

As a general matter, environmental scholars and economists are critical of grandfathering existing pollution sources. A recent review of the literature concludes that "[m]ost of those economists and policy analysts who have examined the practice [of grandfathering, also called transition relief] have concluded that in many circumstances, relief undermines the goals of policy change."[50] As one economist has said, "grandfathering is in the selfish interest of incumbents in an activity, especially of firms in an industry, and allows them to benefit without appearing to stand in the way of legal change."[51] Use of a historic baseline for allocating allowances can have a similar effect to the extent it allows some sources to benefit from poor past efforts to control pollution.

In response, advocates of free distribution might argue for recognizing an implicit property right to emit "on the grounds that firms have been given rights by the state to

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[48] A. Lars Bovenberg and Lawrence H. Goulder, *Neutralizing the Adverse Industry Impacts of CO_2 Abatement Policies: What Does It Cost?,* in Carlo Carraro and Gilbert E. Metcalf, Behavioral and Distributional Effects of Environmental Policy 45 (2000).

[49] *Id.* at 79.

[50] Bruce R. Huber, *Transition Policy in Environmental Law*, 35 Harv. Env. L. Rev. 91, 110 (2011). Quite apart from these equity concerns, it may be necessary to consider the impact of carbon prices on globally-competitive energy-intensive industries where a carbon price might result in leakage of emissions to countries without a carbon price? See, e.g., http://www.rff.org/Publications/Pages/PublicationDetails.aspx?PublicationID=21608

[51] Steven Shavell, *On Optimal Legal Change, Past Behavior and Grandfathering*, 37 J. Leg. Studies 37, 82 (2008).

operate on the basis that they provide socially beneficial goods and services to society."[52] These firms produce valuable goods and services for society. Hence, the argument proceeds, since emissions are an unavoidable byproduct of the production process, firms should not be charged for emissions within the boundaries set by pollution laws.[53] The conclusion, then, is that firms should not have to pay for emission permits, regardless of whether these permits are marketable. This is an interesting, if somewhat counterintuitive, argument. If valid, it would provide a basis for opposition to auctioning of allowances or to a carbon tax.

It is helpful to put to one side the argument for transition relief based on the claim that companies justifiably planned their investments on the assumption that carbon emissions are free. In order to do so, we can ask whether a country that is just beginning industrialization and is about to establish a carbon trading system for future use should use free allocation or an auction. Even without getting into normative arguments for public ownership,[54] a practical argument is that the effect of the cap on emissions is to decrease energy output within the country's economy below what it would otherwise be. A decrease

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[52] Gilbert Metcalf, *Paying for Greenhouse Gas Reductions: What Role for Fairness*, 15 Lewis & Clark L. Rev. 393, 397 (2011). Although he does not take a position on the validity of this argument, Metcalf argues that recognizing such a property right would not be inconsistent with imposition of a cap on emissions:

> At first blush this appears to conflict with the economic prescription for efficiency that firms recognize the full costs of using resources in production. Those full costs include the climate change damages arising from greenhouse gas emissions. There is, in fact, no conflict at all. Tradable emission schemes have two key design elements. The first is the carbon price which is set by the intersection of demand for permits and the supply. The second is the means of allocating those permits. The carbon price ensures that firms internalize the external costs of climate change. As noted above, how the permits are allocated is entirely separate and can be determined through political negotiation or the reliance on some principal of property rights.

Id.

[53] *Id.*

[54] See Peter Barnes, Who Owns the Sky? Our Common Assets and the Future of Capitalism 53-59 (2001).

in output corresponds to an increase in price, whether the decrease is caused by the cap or by a cartel. Making allowances free means that energy firms capture the resulting monopoly profit. This seems to be a windfall to them that they have done nothing to earn, received at the expense of consumers. Unlike other cases such as intellectual property law where we allow firms to earn monopoly profits in order to provide an incentive for useful activity, in this situation the monopoly profits are unrelated to the firm's activities and serve no incentive function. Thus, granting emitters what amounts to a property interest in their right to emit simply results in windfall profits for shareholders, received at the expense of consumers.

If a historic baseline is used to distribute allowances, it is important to include safeguards against "gaming" the system.[55] Such safeguards include adequate data to establish the baseline; using a baseline prior to the proposal of the trading scheme (to avoid the temptation to increase emissions in order to get a higher baseline); adjusting past emissions based on available control technologies; and a clear definition of how to calculate the baseline amount.

Using a historic baseline to distribute allowances has three major disadvantages. First, it penalizes emitters who took earlier action to reduce their emissions as opposed to laggards who ignored the problem. Second, it favors current emitters over new sources, which are hopefully more efficient and have lower emissions, but receive lower amounts of allowances just because of these positive features. Third, if grandfathering is at the level of the individual source rather than the firm, sources with high emissions may be encouraged

[55] See J.B. Ruhl and James Salzman, *Gaming the Past: The Theory and Practice of Historic Baselines in the Administrative State*, 64 Vand. L. Rev. 1 (2011).

to remain in operation since they will often be cheap to operate and provide a source of marketable allowances.

In principle, it seems better to auction allowances to avoid these problems. At most, only a relatively small share of allowances should be distributed free to firms in order to compensate their shareholders for the burden of reducing their carbon emissions.

IV. FAIRNESS, HOTSPOTS, AND CO-POLLUTANTS

Co-pollutants are essentially other pollutants besides carbon that result from the use of fossil fuels. Power plants and vehicles are major sources of pollution, and measures to reduce carbon will probably reduce in reduction of other forms of pollution in many cities. There is controversy, however, over whether the benefits from this reduction would be spread fairly between different communities.[56] The basic concern is the possibility that "[i]f facilities with high costs of control are located in polluted areas and rely upon allowance purchases rather than reducing emissions, air quality will not be improved."[57]

Even if a trading system provides overall co-pollutants benefits, disadvantaged communities might not receive their fair share of benefits, and, in fact, if air pollution regulations are not strict enough, air pollution in those communities could increase if these facilities are used more heavily.[58] For instance, it might turn out that plants in those communities would increase their facility usage under a cap-and-trade system, resulting in higher emissions of other pollutants such as toxics. It would be possible to design the

[56] Eileen Gauna, *An Essay on Environmental Justice: The Past, The Present, and Back to the Future*, 42 Nat. Resources J. 701 (2002), provides a good summary of the concerns of environmental justice advocates.

[57] Alice Kaswan, *Reconciling Justice and Efficiency: Integrating Environmental Justice into Domestic Cap-and-Trade Programs for Controlling Greenhouse Gases*, in Denis G. Arnold, The Ethics of Global Climate Change 240 (2011).

[58] *Id.* at 241.

program or related regulations in order to counter this effect,[59] or to use auction revenues to benefit impacted communities.[60] In principle, the best solution might be to improve the general regulations of the pollutants in question to prevent hotspots or reduce impacts on disadvantaged communities, but the ideal solution is not always feasible in the context of real-world regulatory politics. We begin with a general discussion of the normative and economic arguments in Part A, and then consider real-world experience with the issue of hotspots.

A. Normative and Economic Arguments

The intuition underlying these concerns is that "[o]lder, heavily polluting industries may find that it is more cost-effective to continue polluting and to buy pollution rights than to install new technologies to reduce pollution."[61] This intuition may sound more plausible than it really is. Essentially, a cap-and-trade system is like a rationing system. Suppose you owned a new car and an old clunker. It is not easy to imagine circumstances where the imposition of gas rationing would cause you cut back on driving the new car more than the old car.

Of course, in general, it is more profitable to continue to pollute than to install new technologies. But the question is why this would be truer for older plants than newer ones. Under a cap-and-trade scheme, the older plant can only continue to pollute at the same level if newer plants reduce their pollution correspondingly. This makes business sense only if it is more expensive to reduce emissions at the newer plant than the older one. But

[59] *Id.* at 249-251.

[60] *Id.* at 252.

[61] Johnson, *supra* note 6, at 129. The same intuition would presumably apply to a pollution tax, and the analysis in the next few paragraphs of the text are equally applicable in that setting.

"[t]he economic logic of trading suggests that the largest, dirtiest facilities should be able to reduce emissions most easily (i.e., they should have relatively low marginal abatement costs), and hence emissions trading might lead to a cooling effect rather than the creation of hot spots."[62]

The contrary seems more likely. Newer plants, which already have advanced pollution control technology, would probably find further upgrades even more expensive than older plants that do not yet have the same technology. Hence, the newer plants would seemingly be likely to purchase allowances from older plants, reducing production at the older plants. In other words, there seems to be more "low-hanging fruit" in terms of pollution control at older plants. Of course, there could be countervailing factors: perhaps newer plants are deliberately designed to make it easier to add further pollution control equipment in the future as needed, whereas no one imagined that further pollution controls would ever be needed when the old plants were built. This engineering issue may be worth investigation but there seems to be no reason to assume it to be present.

Another way to reduce a plant's need for allowances is to reduce capacity utilization. Conceivably, it might be more economical to do so at newer plants than older ones. This situation is not impossible but requires special circumstances. Consider two plants, one older than the other. If the two plants produce the same product, the outcome would depend on the cost-curves. The new plant would cut back more only if, prior to the

[62] Dallas Burtraw and Sarah Jo Szambelan, *supra* note 22, at 8. They also report "empirical evidence from Phase I supporting the notion that the largest, dirtiest plants cleaned up the most. The greatest reductions in emissions by far (in tonnage and percentage) were in the Midwest, the area with the greatest power plant emissions historically." *Id.* Another study investigated "the market-based system compared to a command-and-control alternative and [found] that that low-income populations received slightly lower benefits on average from Title IV, echoing environmental justice concerns, although predominately black and Hispanic communities received a disproportionately large share of benefits relative to their costs." *Id.*

imposition of the cap, it had been operating at a level where the marginal cost curve was flatter than at older plant, so that the old plant's profits were higher.[63] This could be tested by examining how plant usage varies with demand fluctuations; if the hypothesis is correct, new plants should cut back production more than older ones when demand goes down.

There are other scenarios where a new plant might cut back more than an older one. Perhaps the two plants produce what is in some sense different products (for instance, baseload power versus peak electricity), and demand for the two products changes differently due to the price increase caused by the output reduction under the cap-and-trade scheme. (In other words, demand is more elastic for one product than the other.) Finally, in a regulated industry such as the retail electrical market, some quirk in the regulatory system might produce perverse results.

These are possible scenarios but none of them seem particularly likely. The existence of a systematic bias in favor of reducing emissions at newer plants rather than older ones needs to be demonstrated, not simply assumed. Similarly, where the trading scheme operates across industries, we need to some reason to believe that higher polluting industries would cut back less or adopt fewer technological responses to the cap-and-trade scheme.

The foregoing discussion assumes that the baseline for comparison is the status quo, prior to the imposition of the cap-and-trade scheme. Another possible baseline might be an alternative regulatory scheme. For instance, we might assess the impact of the cap-and-

[63] If one plant produces more emissions per unit of output than the other, the situation is more complicated. If it is the older plant that is more emission intensive (which seems likely because older plants are likely to be less efficient and have poorer emission controls), then the output reduction is even more likely to take place at the older plant. On the other hand, in the unusual case where the older plants are less emission intensive, this factor would favor shifting cutbacks to the newer plants.

trade scheme relative to the use of a requirement that industry use the best available technology to reduce emissions. This is a difficult comparison to make for two reasons. First, it may be feasible to demand greater overall emission cuts through a cap-and-trade scheme because the cost is lower.[64] Second, it is not easy to forecast emissions under a hypothetical best-technology requirement because of the difficulty of projecting the contents of future regulations. In addition, as noted above, it is not clear whether alternative technology regulations are the appropriate baseline, unless we think that fairness requires selection of the emission control regime that is most favorable to disadvantaged communities.

For example, consider the situation where the easiest way to meet the cap is for all plants to switch to a different, more expensive fuel. Further assume that newer plants are more profitable, that the price of the new fuel is passed entirely onto consumers, and that the new fuel produces the same amount of co-pollutants as the existing fuel. The higher price will cause some decrease in demand, which will be translated into lower output in the less profitable, older plants. Consequently, there will be some reduction of co-pollutants. On the other hand, the government might mandate the use of an expensive pollution control technology to control the pollutant. This new technology might be so expensive that older, less profitable plants would be required to close entirely, causing a larger decrease in the co-pollutant, or the technology might also decrease the co-pollutant directly.

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[64] The cost difference can be quite large. See Dallas Burtraw, Anthony Paul, and Matt Woerman, Retail Electricity Price Savings from Compliance Flexibility in GHG Standards for Stationary Sources (RFF 2011), available at http://www.rff.org/RFF/Documents/RFF-DP-11-30.pdf.

This does not mean that the technology standard is necessarily more desirable. Because of its greater expense, it will curtail output more heavily, resulting in higher consumer costs that may fall heavily on lower income groups. Moreover, as in the case of acid rain, it may not be possible to enact any emissions reductions without the cost-savings of the cap-and-trade scheme. Finally, it may be cheaper to use the cap-and-trade scheme to control one pollutant and other measures to control the co-pollutants, rather than trying to do both through a single measure. In any event, in this situation, although the cap-and-trade scheme probably reduces co-pollutants compared with the status quo, it does not do so relative to the alternative, technology-based regulation.

Energy markets are very complex. Compliance may take a variety of forms, depending on technologies and other tax and regulatory policies. The kind of qualitative argument made here is no substitute for detailed modeling. Clearly, however, the initial plausibility of the idea that cap and trade increases emissions by older, dirtier emitters is much weaker on closer examination. It may still be true, however, that direct regulation, while probably more expensive, would decrease those emissions more than a cap-and-trade system.

At this point, it is important to think more carefully about the concept of fairness. One might argue that fairness requires at most that disadvantaged communities receive no greater pollution exposure due to the trading system than they received previously. At the other extreme, one might argue that the interests of these communities be given the highest priority, so society should select the emissions reduction method that produces the greatest possible pollution reductions in these communities. (Note, however, that this

method might also produce a higher cost of compliance, which could be felt by disadvantaged communities in the form of higher energy costs.) An intermediate position would use proportional reductions of co-pollutants across all communities as a benchmark.

Without trying to resolve these normative issues, it does seem reasonable to require at least that the trading system would not significantly worsen exposure to co-pollutants relative to the status quo, at least in the absence of very strong countervailing considerations. On the other hand, it seems unwarranted to insist that society select the emissions reduction method that produces the greatest reduction in disadvantaged communities without regard to costs or impacts on pollution in other communities. We may agree on the importance of improving the welfare of disadvantaged communities, but it seems too strong to insist that this be the highest priority of *every* government program regardless of the main purpose of the program.

In the context of climate change, it seems particularly misguided to give overriding priority to American disadvantaged communities. From the point of view of social justice, they are not the most urgent priority in terms of climate change. Climate change will have the cruelest impact on the poorest nations. As the economist Thomas Schelling explains regarding this possibility. "dikes can't save Bangladesh: not only is there too much coastline, but dikes would produce fresh water floods [because] [r]ivers cannot rise up over a dike to reach the sea." Thus, he says, "tens of millions of Bangladeshi would have to migrate or die."[65] Thus, we should not allow disputes about the impact of co-pollutants on disadvantaged U.S. communities to imperil the adoption of effective climate policies.[66]

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[65] Thomas Schelling, Climate Change: *The Certainties, the Uncertainties, and What They Imply About Action,* in The Economist's Voice 4 (2007), available at http://www.bepress.com/ev/vol4/iss3/art3/. Climate change

B. The Hotspot/Co-Pollutant Problem in Real Trading Schemes

Although empirical evidence is limited, it seems not to support concerns about hotspots. The oldest and best-tested program, the U.S. acid rain initiative, did not lead to increased emissions in poor or minority communities.[67] Even with respect to the RECLAIM program, which sparked great criticism among environmental justice advocates, the evidence suggests that the hotspot issue was greatly overblown. A recent, very sophisticated empirical study showed that the program's health benefits over the status quote were spread across communities.[68] The study found that sources in the program reduced their emissions approximately twenty percent more than similar sources that were covered by conventional pollution control regulations, presumably because the lower cost of the program made it politically feasible to mandate greater pollution reductions.[69] The study found that no demographic group experienced higher pollution exposures relative to the use of conventional regulations, but that the extra benefits (compared with

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is not only a threat to current income levels in poor countries but also impairs their prospects for economic growth. Growth in poor countries is affected by severe weather events and by rainfall variability (especially droughts), which are likely to increase with climate change. Nicholas Stern, The Economics of Climate Change 123-124 (2007).

[66] To be sure, environmental justice advocates may also doubt the effectiveness of cap-and-trade systems. That issue, however, is beyond the scope of this article.

[67] See Evan J. Ringquist, *Trading Equity for Efficiency in Environmental Protection? Environmental Justice Effects from the SO_2 Allowance Trading Program*, 92 Soc. Sci. Q. 297 (2011); Jason Coburn, *Emissions Trading and Environmental Justice: Distributive Justice and the USA's Acid Rain Programme, 28 Env. Conserv.* 323 (2001).

[68] Meredith Fowlie et al., What do Emissions Markets Deliver and to Whom? Evidence from Southern California's NOx Trading Program (2011) (forthcoming, American Economic Review). A summary of the study is available at http://dornsife.usc.edu/pere/presentations/Fowlie_USC(2).pdf (June 30, 2009). For background on the program's development, see Dale B. Thompson, *Political Obstacles to the Implementation of Emissions Markets: Lessons from RECLAIM,* 40 Nat. Res. J. 645 (2000).

[69] *Id.*

conventional regulation) were not spread equally, with high-income households and whites receiving the largest reductions in pollution relative to conventional regulation.[70]

Whether benefits from co-pollutant reduction are distributed fairly has emerged as a significant issue in connection with California's trading system for greenhouse gases. California's AB 32 is one of the most ambitious efforts in the world to address climate change.[71]

AB 32 explicitly recognizes the importance of environmental justice. It mandates that the implementing agency must consider emission impacts, "including localized impacts in communities that are already adversely impacted by air pollution, and design any trading system to prevent any increase in the emissions of toxic air contaminants or criteria air pollutants such as sulfur dioxide, nitric oxides, and particulates.[72]

Under section 38561, an Environmental Justice Advisory Committee must advise the regulator. In an October 1, 2008 letter, the advisory committee expressed concern that the public health impacts were not being sufficiently considered and also complained about the lack of consideration of using a carbon fee as an alternative to carbon trading (although such a fee would probably have been unacceptable politically).

When the government did not respond to these suggestions, environmental justice advocates filed suit. A trial judge ruled that the government had violated the California Environmental Quality Act because it had failed to adequately analyze alternatives to a cap-

[70] *Id.*

[71] For information about AB 32, see California Air Resources Board, Assembly Bill 32: Global Warming Solutions Act, http://www.arb.ca.gov/cc/ab32/ab32.htm.

[72] California Health and Safety Code Section 38570(b) (2011).

and-trade system.[73] The court ruled, however, that by using a study of a specific, typical community, the government did carry out its duty to consider local effects of reducing co-pollutants.[74]

In response, the government issued a new environmental assessment.[75] In terms of localized co-pollutant impacts, the report adopts a strategy of adaptive management. It forecasts that localized air quality impacts are "highly unlikely" and the possible location of these impacts was quite uncertain.[76] The air board then expressed a "commitment to monitoring the data on localized air quality impacts and to adjusting a Cap-and-trade Regulation adopted, if warranted."[77]

The California experience and recent studies suggest a combination of measures to deal with potential fairness issues regarding co-pollutants. The first is a consideration of projected impacts on sample communities. The second is the use of adaptive management to the extent that unforeseen impacts might arise in the future.

A related problem is posed by the use of offsets. Greenhouse gas offsets, also commonly called carbon offsets, allow an emitter to meet the requirements of a cap-and-trade scheme by purchasing a carbon reduction by a third-party who is outside the trading system. These offsets could take the form of reduced emissions in the United States or perhaps elsewhere, such as the substitution of a natural gas electricity generator for a coal-

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[73] Association of Irritated Residents v. California Air Resources Board (SF District Ct. 2011)(CPF-09-509562).

[74] *Id.*

[75] See Supplement to Scoping Plan, http://www.arb.ca.gov/cc/scopingplan/document/Supplement_to_SP_FED.pdf (June 13, 2011).

[76] *Id.* at 16

[77] *Id.* at 33.

fired generator in China. Alternatively, they could involve the creation of additional carbon sinks, such as planting trees.[78] If an offset system is properly designed, it can lower the overall cost of reducing carbon. However, it does so by requiring fewer emission reductions than would otherwise be required, with a correspondingly lower reduction in co-pollutants. Thus, it may have fewer collateral co-pollutant benefits, particularly to lower income communities in high pollution areas, than alternatives such as a carbon tax or direct regulation. On the other hand, the reduced cost of the system will mean significantly lower energy costs, which are in the interest of low-income communities.[79]

Ideally, co-pollutants would already be subject to optimal control that would minimize potential harm to disadvantaged communities. In principle, it would be better to deal with issues pertaining to co-pollutants separately rather than allowing those issues to influence the choice of regulatory instrument or the design of the trading system. But given the complicated politics of pollution control, this ideal approach may not always be feasible in practice.

It is also important to be realistic about alternatives. Failure to regulate also carries costs for disadvantaged communities. Even if it turns out that technology-based regulation

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[78] See Nathan Richardson, *International Greenhouse Gas Offsets under the Clean Air Act* (2010), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1586037.

[79] Burtraw, Paul, and Woerman, *supra* note 64, at 14, report that a a flexible standard, involving at least some trading, produces dramatically smaller increases in consumer prices:

> In 2020 the greatest change in electricity price occurs under an inflexible standard ($2.84/Mwh or 3.3 percent) and it is 85 percent greater than the change that would result under a cap-and-trade with an auction and 245 percent greater than under a flexible approach. The price change under the flexible approach, compared to the national average baseline level of $86.91/MWh, is $1.16 (1.3 percent).

It should be noted, however, that they find that technology-based standards result in retiring more older coal plants from service, while a flexible standard results in greater energy efficiency improvements. *Id.* at 3.

would reduce co-pollutants more than a cap-and-trade system, there are tradeoffs. The technology-based regulation is also likely to cost more and hence increase burdens on low-income consumers in the form of higher prices. In addition, conventional regulation may take a considerable time to implement, so that the benefits of regulation (including co-pollutant reductions) may be delayed.

In situations where hotspots of the regulated pollutant itself are a problem, it may well be worth redesigning the cap-and-trade system accordingly. A recent unpublished economic study shows that when damages vary significantly depending on the location, there can be substantial benefits to adjusting the trading program accordingly.[80] But it is unclear how frequently such geographic disparities exist or whether they correlate with socioeconomic boundaries.

V. FAIRNESS TO LOW-INCOME CONSUMERS

Putting a price on carbon – whether through a trading system, a carbon tax, or otherwise – will increase energy costs. Even if allowances are distributed free, companies will have to reduce emissions, generally by making less use of cheap, coal-fired plants, which will raise prices. Moreover, companies that choose instead to comply by buying allowances will also raise their prices. Thus, even with free distribution of allowances to emitters, an environmental trading system in effect puts a price on carbon. In this respect, it is much like a carbon tax in terms of its effect on energy prices.

The increases in energy prices are regressive: "[t]hey impact the poor more than the rich, since the poor spend a larger portion of their budgets on basic need, like heating and

[80] Meredith Fowlie and Nicholas Muller, *Designing Markets for Pollution When Damages Vary Across Sources: Evidence from the NOx Budget Program* (Dec. 17, 2010).

power."[81] Economic analysis indicates, for example, that 90 percent of a carbon tax on coal is added to coal prices.[82] In addition, lower-income consumers spend more of their income on energy-intensive products.[83] The regressive effect can be ameliorated by promoting efficiency measures in low-income households, which decrease energy demand and connected emissions while also lowering consumer energy costs.

Determining who ultimately pays for implicit price on carbon, and how the burden correlates with wealth, is not a simple matter. Using current household income as a gauge may be misleading since some households with low incomes are composed of students who will enjoy a higher income later in life or of retirees who can enjoy a better standard of living from savings.[84] Putting a price on carbon seems "considerably less regressive when lifetime income measures are used than when annual income measures are used.[85] However, the lifetime income approach "relies on strong assumptions about household

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[81] Alice Kaswan, *Greening the Grid and Climate Justice*, 39 Env. L.1143-1155 (2009).

[82] Sebastian Rausch, Gilbert Metcalf, and John M. Reilly, *Distributional Impacts of Carbon Pricing: A General Equilibrium Approach with Micro-Data for Households* 4 (NBER Paper 17087) (2011), available at www.nber.org/papers/w17087. In contrast, the tax on crude oil is gradually shifted back to producers because consumers are able to find new energy sources.

[83] According to the Congressional Budget Office,

> The rise in prices would impose a larger burden, relative to income, on low-income households than on high-income households for two reasons. First, low-income households spend a much larger fraction of their income than do high-income households. In addition, energy-intensive items compose a greater share of low-income households' total expenditures. Data collected by the Bureau of Labor Statistics indicates that, measured as a share of income, spending on energy-intensive items by households in the lowest income quintile averages more than five times that by house- holds in the highest income quintile.

Terry M. Dinan, The Distributional Consequences of a Cap-and-Trade Program for CO_2 Emissions, Statement before the Subcommittee on Income Security and Family Support Committee on Ways and Means U.S. House of Representatives 6 (March 12, 2009), available at http://www.cbo.gov/ftpdocs/100xx/doc10018/03-12-ClimateChange_Testimony.pdf.

[84] Rausch, Metcalf, and Reilly, *supra* note 82, at 14.

[85] Metcalf, *supra* note 52, at 404.

consumption decisions."[86] In addition, some might question whether a low-income household's needs should receive less concern simply because of higher income at another point in the lifecycle.

A key issue is: who captures the value of the emissions allowances? Or to put it another way, who collects the carbon price? The value of allowances may be captured by energy firms if distribution is free or by the government if allowances are auctioned, but taxes and government spending can redistribute the benefits. Also, pricing carbon has a host of indirect effects that may affect wages and returns on capital, which themselves will impact income distribution even apart from the direct effects of the price of carbon. If the allowances are free, energy firms and their shareholders will have higher income, which may be taxed by the government, or they may engage in greater expenditures subject to a value-added tax (VAT). If the government collects the revenue from auctioning allowances, it can either spend the funds or reduce other taxes. This choice, too, will impact demand for energy by the recipients of the benefits, and hence energy prices and availability. Because the government is itself an energy consumer (and purchases goods that are produced with the use of energy), taxpayers must absorb these higher costs.

Untangling these effects is no simple matter, but it does seem likely that the overall effect is to burden poorer households more than richer ones. A 2002 analysis shows that, if the government gives allowances away and uses the increase in taxes on firm revenues to reduce the corporate tax rate, lower income households could lose up to 6 percent of their

[86] *Id.* at 405.

income, whereas wealthy households could actually see an increase in income.[87] The study also found that international trading improved the situation of lower income households compared with that of the wealthier.[88]

It is helpful to distinguish between auctioning and free distribution. To begin with auctioning, the immediate effect is equivalent to a carbon tax, which falls most heavily on lower-income households.[89] However, this regressive effect can be countered by changes in the income tax, resulting in distributional neutrality.[90] Moreover, the income sources of lower income groups, such as government transfer payments, may be less affected by carbon pricing, reducing regressive effects.[91] Another recent study indicates that the distributional impacts are small if government revenues are returned to individuals in the form of a taxable "dividend" and can even be progressive if the revenues are used to improve the tax treatment of lower income individuals by decreasing payroll taxes or expanding the earned-income credit[92] or to fund a supplement to food-stamp benefits for energy costs.[93]

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[87] Terry Dinan and Diane Lim Rogers, *Distributional Effects of Carbon Allowance Trading: How Government Decisions Determine Winners and Losers*, 55 Nat'l Tax J. 199, 213 (2002). There are some technical issues with estimating household consumption that could significantly affect this result. See *Id.* at 209-210.

[88] *Id.* at 219.

[89] Metcalf, suprate note 85, at 407.

[90] *Id.*

[91] *Id.* at 413.

[92] See Dallas Burtraw, Richard Sweeney, and Margaret Walls, *The Incidence of U.S. Climate Policy: Alternative Uses of Revenues from a Cap-and-Trade Auction* (Resources for the Future 2009).

[93] Dinan testimony, *supra* note 83, at 16.

On the other hand, if allowances are distributed for free, the result is more regressive than auctioning of allowances.[94] The reason is that the primary beneficiaries are shareholders, who are rarely poor people.[95] Free distribution of allowances raises energy prices, to the detriment of the poor, but provides no direct mechanism for offsetting this regressive effect.[96] On the other hand, because of the higher prices, energy firms collect windfall profits.[97]

In the United States, recent proposals in Congress to establish greenhouse gas cap-and-trade systems have included complex allowance allocation schemes, including mixtures of free distribution, auctions, and various other revenue mechanisms. A recent study shows that the overall effect would be progressive – that is, beneficial to lower income groups at the expense of the highest income group.[98]

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[94] Joshua Blonz, Dallas Burtraw, and Margaret A. Walls, *Climate Policy's Uncertain Outcomes for Households: The Role of Complex Allocation Schemes in Cap-and-Trade*, 10 B.E. J. of Econ. Analysis & Pol'y 1 (2010).

[95] *Id.*

[96] To be sure, since retail electricity markets are highly regulated, offsetting subsidies could be provided at the expense of other users. Doing so, however, would lower the incentive for lower-income consumers to decrease their energy use. Another option would be to allow consumers to sell offsets based on their decreased energy use or other carbon-positive measures. See Michael Vandenbergh and Brooke A. Ackerly, *Climate Change: The Equity Problem*, 30 Va. Env. L.J. 55 (2008).

[97] As a Congressional Budget Office analyst explains:

> If companies benefited from the [energy] price increases but did not have to purchase the allowances, they would receive windfall profits, which could be very large. For example, in 2000, CBO estimated that if emissions were reduced by 15 percent and all of the allowances were distributed free of charge to producers in the oil, natural gas, and coal sectors, the value of the allowances would be 10 times the combined profits of those producers in 1998. Thus, the windfall gains that they would receive as a result of the free allocation would far outweigh the loss in sales that they might experience as consumers cut back on their use of fossil fuels.

Dinan testimony, *supra* note 83, at 9.

[98] *Id.* at 3. The United States also has several programs specifically designed to assist low-income people with energy costs. See David A. Super, *From the Greenhouse to the Poorhouse: Carbon-Emissions Control and the Rules of Legislative Joinder*, 158 U. Pa. L. Rev. 1093, 1168-1175 (2010). The economic models do not seem to include these subsidies.

These models, as complex as they are, still leave out of account the effects of carbon policy on technology and the development of new industries, as well as the different effects that climate change will have on different income groups. Moreover, like all economic models, they can only approximate reality.

Despite all the complexities, there seem to be three major conclusions. First, putting a price on carbon is likely to have a regressive effect, considered by itself. Second, this direct effect can be amplified or countered depending on how the allowances are distributed. Again, calculating the effects is complex and involves uncertainties, but it is regressive to give allowances away and less regressive or progressive to use auction revenues to benefit lower income groups.[99] Finally, the estimated effects on lower income groups does not seem to be large enough that we should view it as a reason to avoid pricing carbon, but may be significant enough to take into account in designing the specifics of an allowance scheme.

It is not easy to forecast the effects of an ETS on low-income groups, whether we are considering the health effects of co-pollutants or the financial impacts of energy prices and

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[99] Alternatively, the revenue can be used to decrease other taxes. See Dallas Burtraw and Ian W.H. Parry, Options for Returning the Value of CO_2 Emissions Allowances to Households (RFF 2011). They argue that efficiency strongly favors this option:

> A theme of our discussion is that these trade-offs can be quite stark. In particular, economic theory suggests that addressing ethical, distributional, and feasibility goals can imply considerably higher overall program costs. In fact, using at least some of the revenue to execute a tax shift by lowering distortionary taxes may be needed to ensure that costs to the economy with cap-and-trade are lower than with other alternatives, including direct regulation.

Id. at 3. They contend that "[u]sing CO_2 revenue to reduce preexisting taxes would be an investment in economic efficiency that would be likely to have positive effects throughout the income distribution by promoting economic growth, even if the immediate beneficiaries of the tax reduction are not distributed evenly." *Id.* at 23.

allowance distribution. Consequently, it would be wise to include funding for follow-up studies and a plan for readjusting the ETS based on the findings.

A standard view among economists is that we should pick the most economically efficient regulatory approach and deal with any distributional issues through the taxing and spending system.[100] But politics does not always allow this kind of rational allocation of responsibility, and in particular, modifications in the taxation system trigger too many political sensitivities to be feasible.

It is important to keep in mind that the same distributional issues would attend any regulation of energy sources, whether through a tax, a trading system, or conventional regulation. To the extent that a trading system creates lower costs than alternatives, the distributional issue is also smaller.

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Environmental trading systems have been controversial since the idea first surfaced, based partly on fairness concerns. The debate involves normative disputes that are not easily resolved. Is it unfair to require firms to purchase emission rights, when they invested in facilities at a time when emissions were free? Is it fair to use an environmental trading scheme when an alternative method of controlling emissions might produce greater benefits for disadvantaged communities? Should we be concerned that an

[100] One plausible suggestion is to use a refundable income tax credit. See Tracey Roberts, *Mitigating the Distributional Impacts of Climate Policy*, 67 Wash. & Lee L. Rev. 209 (2010). The proposed Australian carbon tax contains such a refund mechanism. See Carbon Tax Plan Supports Low Income Australians, http://www.probonoaustralia.com.au/news/2011/07/carbon-tax-plan-supports-low-income-australians For suggestions about how to deal with timing issues in such a rebate scheme, see Brian Galle and Manuel Utset, *Is Cap-and-Trade Fair to the Poor? Shortsighted Households and the Timing of Consumption Taxes*, 79 Geo. Wash. L. Rev. 33 (2010).

environmental trading system could place more of a burden on the poor than the rich because the poor spend a greater percentage of their income on energy?

Although it is difficult to adjudicate between sharply conflicting normative views, we are beginning to have a better basis for assessing the factual issues that are linked with the normative ones. The available information supports four main conclusions. First, auctioning allowances is the preferred form of distribution in terms of distributive effect, because it allows benefits to be redistributed from shareholders to consumers (and low-income consumers in particular). However, if it is considered unfair to burden the regulated sources with the cost of reducing emissions, a small proportion of allowances can be freely distributed to the firms in compensation. It may also be necessary to modify the auction system to take into account impacts on trade-sensitive industries.

Second, the designer of the trading system should use case studies of low-income or minority communities to determine the side effects of the plan on conventional air pollutants such as sulfur dioxide. Since the operation of the trading system may not be completely predictable, it may be important to investigate a range of scenarios.

Third, the direct effect of the ETS is likely to be regressive (that is, to burden lower-income groups disproportionately). Auction revenues should be used to counter this effect. In addition, the regressive effect can be reduced by encouraging low-income consumers to adopt energy efficiency measures.[101]

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[101] See Dinan Testimony, *supra* note 83, at 17:

> Using revenues from auctioning allowances to subsidize household investments that reduced carbon dioxide emissions would lower the cost to households of adapting to higher energy prices. For example, subsidizing weatherization improvements would enable house- holds to use less energy for heating and cooling.

Finally, because of uncertainties on all of these points, adaptive management is crucial. In other words, the plan should contain specific mechanisms to study the impacts of the environmental trading system and make adjustments if the effects are unexpected. A vague commitment to the concept of adaptive management is not sufficient; there should be specific follow-up measures as part of the initial plan.

In this case of a global issue like climate change, an additional fairness issue needs to be considered. There is a clear relationship between GDP and carbon dioxide emissions, with richer countries using more energy and emitting more carbon dioxide.[102] Moreover, "emissions in some countries have imposed serious risks on others, [and] some nations, including those in Africa, face serious risks even though their own emissions are trivial."[103] Failure to take action against climate change would harm some of the poorest people on the planet, a fact that should matter greatly to advocates of environmental justice.

If we have strong reasons to control emissions, as we do with carbon, we should try to avoid getting bogged down in domestic distributional disputes to the detriment of addressing the fundamental environmental problem. We cannot expect to exclude distributional issues from the discussion, however. Fortunately, we have a growing body of information pertaining to these issues, and many of these concerns can be addressed constructively in the design of the trading system.

[102] Eric Posner and David Weisbach, Climate Change Justice 38-39 (2009).

[103] *Id.* at p. 101.