ON MORALS, MARKETS, AND CLIMATE CHANGE: EXPLORING POPE FRANCIS' CHALLENGE

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I
INTRODUCTION

The year 2015 saw conflicting messages about the value and desirability of carbon markets. On one hand, carbon markets advanced in and among several countries. The European Union's Emissions Trading System (EU ETS) continued to operate, now in its third phase. China announced plans to launch a nationwide carbon market to limit greenhouse gas (GHG) emissions, building on its seven pilot trading programs. The U.S. Environmental Protection Agency (EPA) incorporated market-based compliance options in the final version of its Clean Power Plan—a rule promulgated pursuant to the Clean Air Act to limit carbon dioxide emissions from existing power plants.[1] The newly elected government in Canada ran on a platform of a national program to integrate the different carbon pricing schemes emerging at the provincial level.[2] South Korea launched its own cap-and-trade program to limit GHGs. Proponents of carbon markets ended the year on a high note with the conclusion of the Paris Agreement in December, resulting in a new international regime to reduce global GHG emissions that includes a key provision implicitly allowing the use of market mechanisms as an option for doing so.[3]

On the other hand, critics of carbon markets also raised concerns in 2015. Pope Francis offered a high-profile contrary view in *Laudato Si*, the papal

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1. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 80 Fed. Reg. 64,661, 64,675 (Oct. 23, 2015) (codified as amended 40 C.F.R. § 60) [hereinafter *Clean Power Plan*].

2. Shawn McCarthy, *Trudeau announces carbon-pricing plan if Liberals win election*, GLOBE & MAIL (Feb. 6, 2015), http://www.theglobeandmail.com/news/politics/trudeau-vows-to-adopt-carbon-pricing-if-liberals-win-election/article22842010/ [https://perma.cc/V4XF-YBM8].

3. Paris Agreement, art. 6, *opened for signature* Apr. 22, 2016, U.N. FCCC/CP/2015/L.9/Rev.1 (authorizing the use of "voluntary . . . internationally transferr[able] mitigation outcomes").

encyclical released in July 2015. In a broad critique, the pope questioned whether market capitalism can effectively protect the poor, and in one passage specifically criticized "the strategy of buying and selling 'carbon credits.'"[4] As discussed in detail in part III of this article, there are conflicting views regarding the meaning of this passage,[5] but it is clear that the pope's language brought renewed attention to moral and ethical concerns regarding emissions markets.

Beyond markets or other policy mechanisms, the general debate about climate policy is often framed in moral and ethical terms.[6] Some proponents of GHG mitigation efforts emphasize a right to a stable climate system, a duty to protect the rights of future generations, nature, or divine creation, and the prospect that climate change will disproportionately afflict the world's poor — who had less to do with causing the global commons problem and who are more vulnerable to its impacts in rising sea levels, increased storm activity, floods, and drought.[7] Economic analyses of climate change policy may not appear to be presented in moral terms, but they typically rest on the premise that climate policy is warranted when it advances the moral/ethical objective of maximizing social net benefits or aggregate well-being. At the same time, various critics of climate policy (that is, opponents of climate policy in general, whether using markets or other policy mechanisms) also raise moral claims, such as the concern that climate policy would impinge on individuals' freedom from government control, would burden poorer countries' rights to develop free of eco-

4. POPE FRANCIS, LAUDATO SI': ON CARE FOR OUR COMMON HOME ¶ 171 (2015) ("The strategy of buying and selling 'carbon credits' can lead to a new form of speculation which would not help reduce the emission of polluting gases worldwide. This system seems to provide a quick and easy solution under the guise of a certain commitment to the environment, but in no way does it allow for the radical change which present circumstances require. Rather, it may simply become a ploy which permits maintaining the excessive consumption of some countries and sectors."). Other critics of carbon markets as a mechanism to combat climate change also argue that using such markets will disadvantage the poor, *see, e.g.*, FRIENDS OF THE EARTH, CLIMATE JUSTICE BRIEFS NO. 8: THE DANGER OF CARBON MARKETS (2010) ("In theory, carbon markets do not reduce emissions in developed countries but merely shift the burden of doing so to developing countries.").

5. *See infra* part III.

6. Framing pollution as immoral has a long history. *See* Arden Rowell, *Allocating Pollution*, 79 U. CHI. L. REV. 985, 990–95 (2012). In addition to the papal encyclical, recent examples of framing climate change in moral terms include C. ROSER-RENOUF ET AL., FAITH, MORALITY AND THE ENVIRONMENT: PORTRAITS OF GLOBAL WARMING'S SIX AMERICAS (Yale Program on Climate Change Comm'n ed., 2016), and James Garvey, *Climate Change and Moral Outrage*, HUM. ECOLOGY REV., Winter 2010, at 96, 96–101 (2010).

7. *See, e.g.*, Juliana v. United States, No. 6:15-cv-01517-TC, 2016 U.S. Dist. LEXIS 156014, at *51 (D. Or. Nov. 10, 2016) (upholding plaintiffs' argument that "the right to a climate system capable of sustaining human life is fundamental to a free and ordered society"); Glenn Althor et al., *Global Mismatch Between Greenhouse Gas Emissions and the Burden of Climate Change*, 6 SCI. REP. 20281 (Feb. 5, 2016) (concluding that higher emitting countries are less likely to be vulnerable to negative impacts of future climate change); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2014: IMPACTS, ADAPTATION, AND VULNERABILITY: TECHNICAL SUMMARY 7 (2014) ("People who are socially, economically, culturally, politically, institutionally, or otherwise marginalized in society are often highly vulnerable to climate change and climate change responses.").

imperialism, or exhibits hubris because humans cannot be powerful enough to alter divine creation.[8]

This article focuses on the morality of markets as a mechanism to mitigate climate change rather than on the morality of climate change itself or climate policy in general. Over the past half century, some environmental advocates favored using market mechanisms, while other environmental advocates opposed market-based policy design on both moral grounds.[9] Market-based policies, such as those aimed at reducing lead in gasoline and acid rain, were adopted in the 1980s and 1990s as a means to achieve environmental goals at lower cost than traditional, inflexible regulatory instruments.[10] As these market-based policies began to overcome political hurdles to their adoption, many environmental advocates (especially the large national environmental groups) came to view well-designed market-based policies more favorably. A new flank of critics arose opposing the growth of market-based environmental policies due to their opposition to the underlying environmental goals, rather than to markets as a policy mechanism.[11] Now, opposition to market-based policy design has been renewed by some advocates of strong climate policy, including Pope Francis and some environmental and social justice groups.[12]

This article explores the contrast between the movement toward environmental markets, characterized by the emergence of new carbon markets across the globe, versus the renewed opposition to markets manifested in the

8. *See, e.g.*, Michael Snow, *Global Warming Myth Buried Under Snowstorm of Hubris*, DAKOTA VOICE, Feb. 26, 2010, http://www.dakotavoice.com/2010/02/global-warming-myth-buried-under-snowstorm-of-hubris/ [https://perma.cc/VU7L-BZWM].

9. *See, e.g.*, Robert E. Goodin, *Selling Environmental Indulgences*, 47 KYKLOS 573 (1994) (analogizing "green taxes [to] medieval indulgences").

10. *See* A. DENNY ELLERMAN, PAUL L. JOSKOW, RICHARD SCHMALENSEE, JUAN-PABLO MONTERO & ELIZABETH M. BAILEY, MARKETS FOR CLEAN AIR: THE U.S. ACID RAIN PROGRAM (2005).

11. *See, e.g.*, Michael A. Livermore & Richard L. Revesz, *Interest Groups and Environmental Policy: Inconsistent Positions and Missed Opportunities*, 45 ENVTL. L. REV. 1 (2015) (arguing that the political left initially opposed market-based environmental policy but has come to favor it, while the political right initially favored it but has come to oppose it); *see also* Jonathan B. Wiener & Barak D. Richman, *Mechanism Choice*, *in* RESEARCH HANDBOOK ON PUBLIC CHOICE AND PUBLIC LAW (Daniel A. Farber & Anne Joseph O'Connell eds., 2010) (detailing the political economy of policy instrument choice). Moreover, those on the political right who express doubt about the science of climate change policy may do so because they fear the costs of the solution, so offering a more cost-effective policy solution, such as tax or cap-and-trade, may help enlist their support. Troy H. Campbell & Aaron C. Kay, *Solution Aversion: On the Relation between Ideology and Motivated Disbelief*, J. PERSONALITY & SOC. PSYCHOL., Nov. 2014, at 809. This is particularly likely if the alternative is more costly regulation, though perhaps not if the alternative is no regulation.

12. Arguments that frame mitigating climate change as a moral imperative are not necessarily arguments against using market-based incentive policy designs to do so. Some advocates of ambitious climate change mitigation are also advocates of using market-based incentive policies to achieve this goal. Some other advocates of ambitious climate change mitigation are critics of market-based policies, and that is the viewpoint to which this article responds. Meanwhile, some critics of market-based climate policies are really critics of any climate change mitigation action, in other words, those whose opposition to cap-and-trade is driven by antipathy to the cap (on emissions and, they fear, on economic growth or freedom) and not by antipathy to the use of trading markets (which they tend to favor in other domains).

pope's encyclical and the views of some environmental advocates. It considers the arguments raised by these latter critics, explores alternative views of their concerns, and examines how market-based climate policies could be designed to alleviate these concerns. Others have examined the moral and ethical dimensions of market-based climate policies,[13] but this article contributes to the literature by providing a contemporary examination of the papal encyclical's prominent questioning of the use of markets to address climate change. It also speaks to issues that more than 190 countries now face under the Paris Agreement[14] and that forty-eight U.S. states face under the Clean Power Plan[15] as they decide what role, if any, market-based instruments will play in their pursuit of the greenhouse gas reductions. And it explores options for designing a market-based instrument to address climate change in ways that could ease some of the moral criticisms, and discusses some of the tradeoffs involved in those design choices.

Part II reviews how market-based mechanisms are being designed for climate change policy. Part III examines the pope's encyclical and the moral issues it raises regarding carbon markets. Part IV assesses in more detail the moral objections to using market-based mechanisms for climate change policy and offers counterpoints to these arguments. Part V discusses possible ways to reconcile these viewpoints by designing market-based climate policies in ways that resolve or reduce the critics' concerns and discusses the tradeoffs associated with each approach. Part VI concludes by offering specific insights into the decisions faced and tradeoffs presented by market-based climate policies.

II
MARKET-BASED MECHANISMS AND CLIMATE POLICY

The following subparts provide an overview of the economic theory underlying emissions markets, as well as some equity considerations that arise when evaluating whether and how to implement an emissions market.

A. Pricing Via a Pollution Tax

The idea of putting a price on pollution as an economically efficient way to reduce its incidence has been around for almost 100 years. Arthur Pigou's *The Economics of Welfare* formally established the idea that pollution and other negative externalities are excessive because those who produce the polluting goods do not pay the full cost of production; namely, they avoid paying for the

13. *See, e.g.*, Simon Caney & Cameron Hepburn, *Carbon Trading: Unethical, Unjust and Ineffective?*, 69 ROYAL INST. PHIL. SUPP. 201 (2011); Michael K. Goodman & Emily Boyd, *A Social Life for Carbon? Commodification, Markets and Care*, 177 GEOGRAPHICAL J. 102 (2011).

14. Paris Agreement, *supra* note 3.

15. *Clean Power Plan*, *supra* note 1. As this article goes to press, the fate of the Clean Power Plan is uncertain. The U.S. Court of Appeals for the D.C. Circuit is considering multiple challenges to the Clean Power Plan. *E.g.*, *West Virginia v. EPA*, No. 15-1363 (D.C. Cir. filed Mar. 28, 2016), and President Trump indicated during his campaign that he would "scrap" the rule. *See* Robert Walton, *Trump Vows to Scrap the Clean Power Plan*, UTILITY DIVE (Sept. 23, 2016), http://www.utilitydive.com/news/trump-vows-to-scrap-clean-power-plan/426905/ [https://perma.cc/RY7L-WMN4].

harm to other parties who bear the consequences of the environmental damage they cause.[16] The standard correction is to assess a fee (often referred to as a Pigouvian tax) equal to the value of the harm caused for each unit of pollution produced. Requiring emitters to internalize the cost of environmental harm changes their economic calculation regarding production and consumption of energy, agriculture, or other goods and services. Higher emitting options that were deemed attractive in the absence of an emissions price may become economically unattractive once the cost of those emissions is incorporated into the production process.

Incorporating externalities into the cost of production has the virtue of "getting the price right" and moves the market toward the economically efficient outcome, from a utilitarian social welfare maximization perspective, in which the price paid for a good reflects the full marginal cost of its production. If the price paid also equals the marginal benefit to the consumer, the result is an efficient product market outcome wherein the marginal benefit of the last unit consumed equals the marginal cost of its production, inclusive of the value of the harm it imposes on parties external to the private goods transaction. In the context of climate change, the harm is the damage imposed on society from the GHG emissions generated by the production process—commonly referred to as the "social cost of carbon" (SCC).[17]

The efficiency of such a Pigouvian GHG policy—commonly called a "carbon tax"—in the product market is coupled with its cost-effectiveness in GHG abatement across firms. For firms facing a tax on GHG emissions, the optimal response will be to reduce emissions by incurring costs up to the size of the tax. If all polluters do this, it ensures two things. First, if the tax is set at the SCC, then the marginal cost of abatement equals the marginal value of abatement (avoided SCC), which is the socially efficient level of abatement. Second, regardless of whether the tax is set at the SCC, emitters subject to the tax will equate their marginal costs of abatement to the common tax they face, thereby minimizing cumulative abatement costs across the covered sources. Equal marginal cost across all sources allows emission reductions to occur where they are most cost-effective because the total cost of abatement cannot be lowered by shifting reductions from one source to another.

B. Emission Allowance Trading As An Alternative To a Carbon Tax

The regulator concerned about climate change can address the problem with a price-based instrument such as a carbon tax, as described above, or by setting a quantitative limit on emissions and issuing permits (also called "allowances") that parties may trade subject to the emissions limit, a system that is commonly called "cap-and-trade." The trading market will then yield a price for each allowance. The choice between a tax and an allowance trading system is referred to as the

16. ARTHUR C. PIGOU, THE ECONOMICS OF WELFARE (1920) (Palgrave Macmillan, 4th ed. 2013).

17. William Pizer et al., *Using and Improving the Social Cost of Carbon*, SCIENCE, Dec. 5, 2014, at 1189.

price-versus-quantity choice in economic instruments for GHG abatement and other forms of pollution control.[18] Currently, cap-and-trade programs are more commonly used than taxes to regulate GHGs, though carbon taxes have emerged in some settings and are under consideration in several others.[19]

Cap-and-trade systems share common theoretical elements with pollution taxes. Under a cap-and-trade system, as with a tax, polluters will reduce emissions up to the point where the marginal cost of abatement equals the price paid to pollute. Under cap-and-trade, however, the price paid equals the market price for an emissions allowance, formed by the supply and demand of available allowances in the so-called "carbon market." A fundamental difference between the two is that a pollution tax fixes the price to emit (while letting the quantity of emissions adjust in response to the tax), whereas a cap-and-trade allowance price varies due to shifts in allowance supply and demand (while the quantity of emissions is fixed). In both cases, the expectation is that the marginal cost of GHG abatement is equated across sources at any one time—resulting in a cost-effective outcome.

Under cap-and-trade, the price that emerges is effectively determined by the marginal cost of meeting the fixed emissions cap. Although regulators may attempt to set this emissions quantity cap at the socially optimal level, at the point where the marginal benefits (avoided SCC) of further reductions equal their marginal cost of abatement, there is uncertainty about what the socially optimal emissions level is, given the uncertainty in marginal costs and marginal benefits.[20] The price that emerges from a carbon market, therefore, may not be equal to the SCC, and thus the abatement outcome, though cost-effective, may not be purely efficient. Meanwhile, such uncertainty about actual marginal costs and benefits may lead a carbon tax to differ from the optimal quantity of emissions, whereas cap-and-trade assures a cap on the quantity of emissions, an attribute that environmental advocates have often favored. Of course, the carbon tax may also be set at a different level than the SCC due to either the same sources of uncertainty or political reasons.[21]

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18. Martin L. Weitzman, *Prices vs. Quantities*, 41 REV. ECON. STUD. 477, 477 (1974). *See also* Lawrence H. Goulder & Andrew R. Schein, *Carbon Taxes Versus Cap-and-Trade: A Critical Review*, CLIMATE CHANGE ECON., Nov. 18, 2013, at 1350010-1 ("examin[ing] the relative attractions of a carbon tax, a 'pure' cap-and-trade system, and a 'hybrid' option"); Jonathan B. Wiener, *Property and Prices to Protect the Planet*, 19 DUKE J. COMP. & INT'L L. 515–34 (2009) (comparing tax versus allowance trading systems for global GHG abatement).

19. ALEXANDRE KOSSOY ET AL., STATE & TRENDS OF CARBON PRICING 2015 22 (World Bank Group ed., 2015). *See also* Brian Murray & Nicholas Rivers, *British Columbia's Revenue-Neutral Carbon Tax: A Review of the Latest "Grand Experiment" in Environmental Policy*, 86 ENERGY POL'Y 674, 675 (2015) ("While [emissions trading systems] predominate[] in climate policy, several jurisdictions either have or are considering a tax alone or in some combination with an [emissions trading system]").

20. *See* Weitzman, *supra* note 18 (discussing "uncertainty" in his model and its importance in policy discussions).

21. *See* Wiener, *Property and Prices to Protect the Planet*, *supra* note 18, (discussing institutional and political economy attributes at the international level that may inform the choice between cap-and-trade versus carbon taxes).

A well-designed tax or cap-and-trade policy, therefore, can achieve emission reduction goals for the targeted pollutant(s) at the least cost. Both policy approaches provide incentives for firms to invest in innovation to reduce emissions at even lower cost, thereby either avoiding more of the tax, or freeing up additional allowances for sale. Other policy instruments are less likely to be as efficient. For example, prescriptive technology standards prevent flexibility in the choice of methods of abatement, and prevent locational flexibility in the face of variations in the cost of abatement across firms. Performance standards allow flexibility in the choice of methods of abatement, but not flexibility across firms. Information disclosure policies may be low-cost, but may also yield an uncertain amount of abatement.

C. Markets, Flexibility, Global And Localized Effects

The overarching appeal of emissions markets is that they can reduce pollution at the lowest overall cost to society—a strategy that is particularly well suited to a class of pollutants such as GHGs that cause global, rather than local, impacts. One ton of GHG emitted in one location has the same climate impact as one ton emitted in another location, so the flexibility allowed by trading an emission allowance from one place to another should have a neutral effect on the climate so long as the emissions are verified in both places. Trading allows for the same net GHG emission-reduction benefit at a lower cost.

However, even though GHGs emitted anywhere have similar global effects, the sources of these GHG emissions may also emit other pollutants that have local and regional impacts (such as sulphur dioxide, nitrous oxides, and mercury from coal-fired power plants). Allowing GHG emitters the cost-saving flexibility to respond to a market price on GHGs may not address these local pollution effects. Some of the moral criticisms of GHG markets discussed below relate to such local impacts, especially where the co-pollutants affect poor or disadvantaged communities. Policymakers may want to tailor the structure of emissions markets to address these local co-pollutant effects, even if doing so lowers the cost-effectiveness of the GHG reduction pathway. There may also be local economic dislocations from closing emitting facilities. An optimal approach to address all of the impacts may involve complementary global and local policies.

III

THE POPE'S ENCYCLICAL AND THE MORALITY OF CARBON MARKETS

In May 2015, Pope Francis released *Laudato Si*, a papal encyclical discussing the themes of environmental protection, inequality, and the failures of the modern economy to provide for the wellbeing of all. This encyclical is important not only because it is a powerful statement from the leader of one of the world's largest religious denominations, but also because the pope offers a wide-ranging, forceful, and detailed series of arguments outlining why, and in some cases, how, the "whole human family" should address climate change and other pressing

environmental challenges.[22] Pope Francis emphasizes the importance of individual responsibility and rejects overreliance on technology and markets as solutions to the world's ills.

The encyclical gives voice to longstanding concerns regarding emissions trading markets and reflects many of the major criticisms of these mechanisms.[23] First, much of the encyclical critiques free market ideologies as fundamentally flawed frameworks for distributing resources in an ethical manner, at least as currently practiced.[24] The pope specifically criticizes the pursuit of profit maximization, which he argues can harm future generations and the environment.[25] Numerous provisions also reject technocratic decisionmaking and overreliance on technological advancements in place of taking personal responsibility for one's actions.[26]

Second, the encyclical is rooted in a concern that the modern market-based economy leads to unjust results, primarily for the world's poor.[27] The pope dedicates two sections of the encyclical to global inequity and the inadequate governmental response.[28]

Third, the pope specifically criticizes "[t]he strategy of buying and selling 'carbon credits'" out of concern that the strategy "can lead to a new form of speculation which would not help reduce the emission of polluting gases worldwide."[29] He says that such a carbon credit market "seems to provide a quick and easy solution under the guise of a certain commitment to the environment, but in no way does it allow for the radical change which present circumstances require. Rather, it may simply become a ploy which permits maintaining the excessive consumption of some countries and sectors."[30]

Commentators disagree on whether this "surprisingly specific and unambiguous language"[31] is a general rebuke of emissions trading as a policy instrument, or an attempt to call attention to specific potential problems with the

22. POPE FRANCIS, *supra* note 4, at ¶ 13.

23. *Laudato Si*' is part of a long tradition of papal encyclicals and Catholic social teachings that explore the workings of the market and neoliberal economic orthodoxy more generally. *See, e.g.,* PAPAL DOCUMENTS, VATICAN, http://www.vatican.va/offices/papal_docs_list.html [https://perma.cc/2FV6-68B3] (last accessed Feb. 1, 2017); Stephen Beale, *7 Papal Encyclicals that Changed the World*, CATHOLIC EXCHANGE (June 24, 2013), http://catholicexchange.com/7-papal-encyclicals-that-changed-the-world [https://perma.cc/4SAR-9MUW]; Bruce Duncan, *Tackling Capitalism: What Vatican II Achieved and What Still Needs to Be Done*, 26 PACIFICA 199 (2013). This paper does not attempt a theological interpretation of the Pope Francis' viewpoints. Rather, the paper considers *Laudato Si'* in the context of climate policy design and the use of markets therein.

24. POPE FRANCIS, *supra* note 4, at ¶ 190.

25. *Id.* at ¶ 195.

26. *E.g.*, *id.* at ¶¶ 106–14.

27. *See id.* at ¶ 51.

28. *Id.* at ¶¶ 48–59.

29. *Id.* at ¶ 171.

30. *Id.* at ¶ 171.

31. Robert Stavins, *The Papal Encyclical and Climate Change Policy*, ECON. VIEW ENV'T, (Oct. 5, 2015), http://www.robertstavinsblog.org/2015/10/05/the-papal-encyclical-and-climate-change-policy/ [https://perma.cc/KAE8-HNUN].

application of such markets.[32] The ambiguity rests in part on the pope's use of the term "carbon credits," which could refer to credits in uncapped offset markets, or to allowances in markets governed by a mandatory emissions cap, or to both.[33] Environmental economists and policy experts could agree that the generation and sale of credits in an uncapped system (such as voluntary offsets) are of lesser reliability in reducing actual emissions, but still favor cap-and-trade allowances under a mandatory cap with monitoring and compliance (such as the U.S. acid rain trading market) as far more effective.[34] The environmental outcomes, market oversight, number of market participants, and economic efficiency may vary significantly between voluntary uncapped offset credit markets and capped allowance trading markets. Furthermore, there is some evidence that the Vatican's own experience with a failed investment in a voluntary carbon offsets project in Hungary may have colored the pope's views on carbon markets generally.[35]

Thus, a careful reading of the encyclical suggests a more nuanced understanding of the "carbon credits" language—and a shared understanding that actually favors well-designed market-based climate policies (such as cap and trade, rather than uncapped offset credits). The encyclical repeatedly invites a dialogue regarding the environment, the economy, and public policy.[36] Other provisions of the pope's encyclical criticize a system that allows "business [to] profit by calculating and paying only a fraction of the [ecological and social] costs involved" in the production process.[37] An efficient carbon market or tax, however, would require businesses to pay the full social and environmental costs of their emissions, not just a fraction.

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32. *Compare* Anabela Carvalho, Commentary, *The Pope's Encyclical as a Call for Democratic Social Change*, 5 NATURE CLIMATE CHANGE 905 (2015) (arguing that the encyclical calls for "rejecting futile market 'fixes', such as carbon trading") *with* Ottmar Edenhofer et al., Commentary, *Science and Religion in Dialogue Over the Global Commons*, 5 NATURE CLIMATE CHANGE 907 (2015) ("[T]he Pope's concerns might rather be considered as an invitation to discuss [policy alternatives] in light of deeper ethical concerns.").

33. William D. Nordhaus, *The Pope & the Market*, N.Y. REV. BOOKS, Oct. 8, 2015, http://www.nybooks.com/articles/2015/10/08/pope-and-market/ [https://perma.cc/LHC6-RSAT] ("The term 'carbon credits' is not a term of art in environmental policy.").

34. *E.g.*, RICHARD B. STEWART & JONATHAN B. WIENER, RECONSTRUCTING CLIMATE POLICY (Am. Enterprise Inst. for Pub. Pol'y Res., 2003) (criticizing uncapped offset credits but favoring capped allowance markets).

35. Kenneth R. Richards, *Of Markets and Morals, Encyclicals and Environment, Poverty and the Pope*, THE HILL: CONGRESS BLOG (July 1, 2015, 12:00 PM), http://thehill.com/blogs/congress-blog/energy-environment/246312-of-markets-and-morals-encyclicals-and-environment [https://www.http://perma.cc/W2BS -XKC5].

36. POPE FRANCIS, *supra* note 4, at ¶ 16. *See also id.* at ¶ 14 (calling for a "new dialogue about how we are shaping the future of our planet"), ¶135 ("A broad, responsible scientific and social debate needs to take place, one capable of considering all the available information and of calling things by their name. It sometimes happens that complete information is not put on the table; a selection is made on the basis of particular interests, be they politico-economic or ideological. This makes it difficult to reach a balanced and prudent judgement on different questions, one which takes into account all the pertinent variables.").

37. *Id.* at ¶ 195.

According to Pope Francis, an ethical market will not exist until "the economic and social costs of using up shared environmental resources are recognized with transparency and fully borne by those who incur them."[38] This language argues for internalizing the full social and environmental costs of GHG emissions—which is precisely the objective and method of carbon markets. Well-designed market-based climate policies could both avoid the inefficacies of "carbon credits," as highlighted by Pope Francis, and achieve the shared goal of fully internalizing environmental costs.

More generally, when the encyclical criticizes reliance on markets, it is crucial to distinguish unfettered "free" markets from market-based environmental policies which are "reconstituted" efficient markets.[39] The pope's criticism is of unfettered markets, the very kinds of markets that generate environmental harms.[40] By contrast, market-based environmental policies, such as taxes and cap-and-trade, are not unfettered markets—rather, they are the measures needed to correct unfettered markets. "While critics of incentives may feel the environment is too important to leave to markets, the better view is that environmental protection is too important to leave *out* of markets."[41] The move to incorporate environmental values into markets through market-based policy instruments is part of a long process of reshaping markets to internalize social values that had been previously omitted.[42] Therefore, the pope's criticism of markets in general could be seen as an endorsement of market-corrective policies. Viewed in this light, his criticism of carbon credits in particular may be seen as an invitation to design more effective capped allowance trading markets rather than abandoning markets all together.

38. *Id.* at ¶ 195 (quoting POPE BENEDICT XVI, CARITAS IN VERITATE (2009)). *See also id.* at ¶ 167 (citing Declaration of the United Nations Conference on the Human Environment, June 16, 1972, U.N. Doc. A/Conf.48/14/Rev. 1 (1973) [hereinafter *1972 Stockholm Declaration*] (stating that the 1972 Stockholm Declaration established "the obligation of those who cause pollution to assume its costs.")).

39. *See generally* Richard B. Stewart, *Madison's Nightmare*, 57 U. CHI. L. REV. 335, 352 (1990) (describing how "reconstitutive law" can internalize externalities toward efficient markets); Jonathan B. Wiener, *Global Environmental Regulation*, 108 YALE L.J. 677, 719 n.166 (1999) (distinguishing reconstituted-market incentives both from unfettered inefficient markets and from centralized command regulations).

40. *See, e.g.*, POPE FRANCIS, *supra* note 4, at ¶ 190 (arguing against "a magical conception of the market" where "profits alone count" without regard for anything else, like the environment or the poor).

41. Wiener, *supra* note 39, at 724.

42. *See generally* DOUGLASS C. NORTH, INSTITUTIONS, INSTITUTIONAL CHANGE AND ECONOMIC PERFORMANCE (James Alt ed., 1990) (examining how institutions evolve in response to changing social values).

IV
FURTHER EXAMINATION OF THE MORAL ARGUMENTS RAISED BY MARKET-BASED GHG POLICY

Despite the differing interpretations regarding the pope's intent, and the potential compatibility of cap-and-trade markets with his remarks, the language of the encyclical still invokes elements of three morality-based critiques of emissions markets, analyzed further here. The first is an argument that market-based environmental policies are intrinsically immoral. This argument is premised on the view that by pricing emissions (whether they are tax payments or allowance transactions), policymakers are endorsing some non-zero level of emissions and thereby undermining emitters' responsibilities to the environment and eroding the societal norm that pollution and polluters are inherently bad. The second and third criticisms focus on the implementation of emissions markets. The second finds immoral the distributional impacts that may arise if emitters do not all face the same emission limits, thereby burdening some communities with a higher share of the local environmental and public health harms. The third finds emissions markets immoral on the view that they will be ineffective at addressing climate change or will result in unjust enrichment.[43]

A. Argument 1: The Policy Instrument Is Intrinsically Immoral

For some, opposition to emissions trading is rooted in the view that allowing entities to buy and sell emissions credits is equivalent to licensing the "right to pollute."[44] Under this view, the market for units of emissions is objectionable on three grounds.[45] First, emissions markets establish allowances or credits equal to a unit of pollution—typically the equivalent of a ton of carbon dioxide in the carbon market context. This view argues that the act of creating a tradable good out of an environmental harm—commodifying the environment and undermining the norm of pollution as intrinsically wrong—is itself immoral.

A second line of argument suggests that emissions markets conflict with a shared duty not to cause environmental harm.[46] Rather than imposing mandatory emission reduction requirements at each source, emissions markets explicitly

43. This taxonomy is similar to the one put forth by Caney and Hepburn, *supra* note 13, in separating purely philosophical arguments about whether markets are inherently immoral from whether they lead to poor outcomes when implemented in real world settings.

44. *See, e.g.*, Todd Gitlin, *Buying the Right to Pollute? What's Next?*, N.Y. TIMES (July 28, 1989), http://www.nytimes.com/1989/07/28/opinion/buying-the-right-to-pollute-what-s-next.html [https://perma.cc/S4CH-N5BE] (using a satirical slippery-slope argument to say that a pollution rights market will lead to markets in "felony rights" and "torture rights," among others).

45. Some may also object to markets in general as immoral, and thereby consider carbon markets immoral by extension.

46. *See, e.g.*, Kirk W. Junker, *Ethical Emissions Trading and the Law*, 13 U. BALT. J. ENVTL. L. 149, 161 (2006) ("Emissions trading is inconsistent with rights to a clean environment (specifically, clean air) and the appurtenant duties not to pollute because the necessary underlying theories of contract, tort and property that would be needed to enable emissions trading must begin with an assumption that the traders own something of value, measured by nothing more than their measurable compliance with a pre-existing duty established by law.").

embrace compliance flexibility.[47] At the end of a compliance period, entities subject to the emissions cap must submit the number of allowances equal to the corresponding units of pollution emitted. Emissions from an individual facility may increase, decrease, or remain unchanged, provided that: (1) each individual entity submits enough allowances to cover its actual emissions (or pay a heavy penalty); and (2) the cumulative emissions from all covered entities do not exceed the cap for that compliance period.[48] Because some emitters may avoid reducing the environmental harm caused by their facilities by purchasing allowances or credits—that is, extra reductions in emissions—from other emitters who therefore emit less, detractors of carbon markets view this compliance flexibility as allowing some polluters to avoid responsibility for reducing their contribution to harming public health or the environmental commons.[49] If there is a universal duty to avoid environmental harm, the critics say, allowing some facilities to evade this responsibility by purchasing emission credits is wrong.[50]

A third argument underlying the "inherent immorality" viewpoint rests on the view that national and international laws and treaties call for a clean and safe environment for all people.[51] On this view, even if those laws have not achieved uniform protections, together they create a societal norm that pollution is bad and those responsible for emitting the pollution have a responsibility to reduce their impacts. According to Sandel, for example, the permits-and-fines-based environmental policy embedded in environmental statutes in the 1970s carried a "moral message" that polluting the environmental commons was wrong. These fines required companies to pay penalties for violating their legal and moral obligations. In contrast, some argue, using public policy to establish a market for emission credits undermines the societal norm of shared sacrifice to protect the environment, replacing it with the view "that nature is a dumping ground for those who can afford it."[52] Sandel argues that this line of reasoning distinguishes carbon taxes from carbon trading—that taxing environmental harm conveys the

47. *See* Daniel A. Farber, *Pollution Markets and Social Equity: Analyzing the Fairness of Cap and Trade*, 39 ECOLOGY L.Q. 1, 5 (2012) ("[L]et polluters trade permits among themselves so that the emission reductions will come from the sources that can most cost-effectively reduce their emissions.").

48. *E.g.*, *How Cap and Trade Works*, ENVTL. DEF. FUND, https://www.edf.org/climate/how-cap-and-trade-works [https://perma.cc/6SL5-AFJN].

49. Alice Kaswan, *Justice in a Warming World*, ENVTL. F., July/Aug. 2009, at 48, 51–52. *See also* MICHAEL J. SANDEL, WHAT MONEY CAN'T BUY: THE MORAL LIMITS OF MARKETS 75 (2012) ("The moral problem with a global market in pollution permits is . . . the outsourcing of an obligation.").

50. SANDEL, *supra* note 49.

51. *See, e.g.*, *1972 Stockholm Declaration*, *supra* at 38, Principle 1 ("[Humans have a] fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being. . . ."); *Clean Power Plan*, *supra* at 1, 64663–64 ("Under the authority of Clean Air Act (CAA) section 111(d), the EPA is establishing CO2 emission guidelines . . . . The purpose of [these guidelines are] to protect human health and the environment by reducing CO2 emissions from fossil fuel-fired power plants in the U.S."); *see also* Montreal Protocol on Substances That Deplete the Ozone Layer, Sept. 16, 1987, 1522 U.N.T.S. 3. For a discussion of universal environmental rights, see Victor B. Flatt, *This Land Is Your Land (Our Right to the Environment)*, 107 W. VA. L. REV. 1 (2004).

52. SANDEL, *supra* note 49, at 76–77. *See also* MARK SAGOFF, THE ECONOMY OF THE EARTH: PHILOSOPHY, LAW, AND THE ENVIRONMENT (2d ed. 2008).

moral stigma, while allowing emissions trading legitimizes the environmental harm provided the polluter is willing and able to purchase the permission to cause the harm.[53]

While Pope Francis does not invoke the "licensing the right to pollute" language, the encyclical's criticism of free market ideologies, of carbon credits, and of prioritizing profit maximization over personal responsibility, all suggest sympathy for the arguments that carbon markets are inherently immoral.

These arguments, however, are unpersuasive on several grounds. First, all environmental policies license some amount of pollution, except those rare cases that require a total ban. Alternatives to market-based instruments, such as traditional regulation via prescriptive technology standards or performance standards, also license residual pollution—indeed, for free—whereas market-based instruments force the polluter to pay for each residual unit of emissions through an allowance obligation. This is true even if traditional policies are backed by heavy penalties for noncompliance, because even a firm in full compliance (for example, achieved by installing a scrubber), is permitted to continue to release residual (unabated) emissions (despite full compliance) at no penalty. On the other hand, under market-based policies, even firms in full compliance still must pay the allowance obligation (or tax, if applicable) on their residual emissions, or forego the proceeds they could have earned by selling their remaining allowances.[54] Thus, traditional regulation may represent granting the right to pollute even more than market-based policies. Market-based policies can force the polluter-pays principle to apply to every unit of emissions, whereas traditional regulation exempts residual emissions for free. Imposing a penalty only on emissions above some permitted amount expresses the message that the permitted amount is legitimate, whereas an emissions tax or cap-and-trade expresses the message that the polluter must pay for every unit of emissions.[55]

Second, if what is immoral is licensing pollution, or, licensing increased environmental harm, then a rejection of market-based approaches may itself be an immoral choice. This is particularly true where market-based instruments are more likely to address an environmental harm in a cost-effective manner, generate more pollution-control for a given expenditure, stimulate greater dynamic innovation in new methods of pollution reduction, or enable society to buy more environmental protection.[56] In such cases, the act of opposing market-based instruments may actually license greater pollution, which would

53. SANDEL, *supra* note 49, at 76–77. Yet the polluter paying the tax is also paying for permission to emit—as is the polluter paying the fine.

54. The obligation to pay for all emissions is true in principle and in practice when all allowances must be purchased (for example, at auction). But in many cases allowances are given for free and thus only impose opportunity costs on emitters. Allowance allocation is one method of addressing undesirable distributional outcomes in a cap-and-trade system.

55. Even if emitters receive free allowances, they must consider the opportunity cost associated with (not) selling the allowance or using it for compliance.

56. Including also by attracting more acceptance from skeptics who are actually fearful of the high cost of policy solutions. *See* Campbell & Kay, *supra* note 11.

presumably be an immoral position (according to the critics).[57] Third, this point is even stronger if morality includes concern for non-human life and the environment. Other life on earth suffers from climate change impacts and benefits from improving environmental quality and preventing damaging climate change—but presumably does not care about humans' moral scruples and norms about how humans prevent climate change. If market mechanisms offer an opportunity to achieve greater environmental benefits and successfully prevent climate change damages, then opposing market mechanisms in order to vindicate asserted human ethical scruples means thereby sacrificing some climate protection for the rest of life on earth, and is therefore at odds with a moral stance that includes concern for non-human life and the environment.

B. Argument 2: The Policy Instrument Leads To Immoral Distributional Results

Emissions markets are considered attractive policy strategies precisely because of their ability to achieve the goals of lower aggregate emissions and lower overall compliance costs while allowing individual operators to decide whether to reduce emissions or purchase additional allowances.[58] It is often this flexibility that stakeholders focusing on impacts on local communities or individuals find objectionable.[59]

Under an emissions market cap, cumulative GHG emissions from the covered sectors will fall to meet the cap, but emissions from individual facilities may decrease, increase, or remain unchanged. From a GHG standpoint, this shifting of emissions is acceptable because emissions are globally mixed, having

57. *See* Wiener, *supra* note 39, at 723–26, 779–80 (arguing that opposing more cost-effective market-based incentives actually licenses greater pollution, so that the critique of immorally licensing pollution should favor market-based incentives); *see also* Carol M. Rose, *Scientific Innovation and Environmental Protection: Some Ethical Considerations*, 32 ENVTL. L. 755, 755–56 (2002) (arguing that "market-based environmental regulation[s] . . . may have ethical value that can offset ethical qualms, because they can motivate economic actors [who invest mainly for privately appropriable returns] to channel research toward the environment, and thus help to narrow the research gap as between 'propertized' goods and environmental goods.").

58. Benjamin K. Sovacool, *The Policy Challenges of Tradable Credits: A Critical Review of Eight Markets*, 39 ENERGY POL'Y 575 (2011).

59. *See, e.g.*, Farber, *supra* note 47, at 29 ("A major concern of environmental justice advocates is that emissions allowances might disproportionately end up in the hands of dirtier plants, which may themselves be disproportionately located in disadvantaged communities."); Sheila Foster, *Environmental Justice in an Era of Devolved Collaboration*, 26 HARV. ENVTL. L. REV. 459, 468 (2002) ("Although considering net benefits or risks in isolation of their distribution may satisfy the standard of efficiency, consideration of costs and benefits without considering their distribution surely violates most notions of equity and justice. Environmental justice advocates have bemoaned the failure of utilitarian-based comparative risk analysis—specifically its focus on measuring aggregate environmental and health losses—to consider the distributional effects of environmental and health risks on subpopulations that may be disproportionately impacted by various environmental hazards.") (citations omitted); Alice Kaswan, *Decentralizing Cap-and-Trade? State Controls Within A Federal Greenhouse Gas Cap-and-Trade Program*, 28 VA. ENVTL. L.J. 343, 351–52 (2010); Richard Toshiyuki Drury et al., *Pollution Trading and Environmental Injustice: Los Angeles' Failed Experiment in Air Quality Policy*, 9 DUKE ENVTL. L. & POL. F. 231 (1999).

the same overall impact on the climate no matter where they are released and essentially no localized effects.[60] However, steps to reduce GHG emissions also typically reduce releases of more localized co-pollutants, such as particulate matter, sulfur dioxide, mercury, and water pollution.[61] Thus, the locational flexibility allowed by GHG emissions trading may create co-benefits at some locales, but co-pollutant increases (or other environmental impacts, such as on land use) at other locales. Put another way, the effort to correct negative externalities from GHG emissions may generate additional negative externalities for parties in some locales affected by co-pollutants or other impacts.[62]

This second argument contends that prioritizing cost-effectiveness and reductions in aggregate pollution levels without protections to prevent concentrations of pollutants with local or regional public health risks would facilitate an immoral distributional impact of market-based environmental policy. The pope emphasizes this kind of argument, as the encyclical is rooted in a concern that modern markets lead to unjust results for the world's poor.[63]

Distributional impacts of pollution, however, are not unique to emissions trading as a regulatory remedy.[64] Communities located in close proximity to fossil fuel–fired power plants and industrial facilities generally face a higher environmental burden, and these communities may predominately include lower income and minority populations, with or without GHG emissions trading.[65] Nor

60. *See* V. Ramanathan & Y. Feng, *Air Pollution, Greenhouse Gases and Climate Change: Global and Regional Perspectives*, 43 ATMOSPHERIC ENV'T 37 (2009) (explaining how long-lived GHGs such as CO_2 become uniformly disbursed globally and create a warming "blanket" effect).

61. This may occur because reducing GHG emissions involves reducing the use of GHG-emitting fossil fuels (for example, by shifting from coal to gas or nuclear or wind/solar, or increasing energy efficiency), so that the co-pollutants emitted by burning those fossil fuels are also reduced—a co-benefit of GHG abatement. But reducing GHG emissions can also yield countervailing risks (ancillary harms). These reductions with ancillary harms could include, for example: reducing CO_2 from coal but increasing CH_4 from conventional gas or unconventional fracking; or, reducing GHGs but increasing nuclear waste. If GHG abatement is achieved, not through reduced fossil fuel use, but through carbon capture and storage (CCS), then emissions of co-pollutants could increase if CCS requires more fuel to produce electricity.

62. *See, e.g.,* MARKET ADVISORY COMMITTEE TO THE CALIFORNIA AIR RESOURCES BOARD, RECOMMENDATIONS FOR DESIGNING A GREENHOUSE GAS CAP-AND-TRADE SYSTEM FOR CALIFORNIA 13 (2007), http://www.energy.ca.gov/2007publications/ARB-1000-2007-007/ARB-1000-2007-007.PDF [https://perma.cc/W8YP-6NXS]; *see also* Jonathan Remy Nash & Richard L. Revesz, *Markets and Geography: Designing Marketable Permit Schemes to Control Local and Regional Pollutants*, 28 ECOLOGY L.Q. 569, (2001) (explaining how to design a cap-and-trade system that avoids local hotspots).

63. POPE FRANCIS, *supra* note 4, at ¶ 51.

64. *See, e.g.*, Stephen M. Johnson, *Economics v. Equity: Do Market-Based Environmental Reforms Exacerbate Environmental Injustice?*, 56 WASH. & LEE L. REV. 111, 117–18 (1999) (noting that *traditional* air quality regulation "has not adequately addressed distributional inequities" and does not explicitly require the government to avoid actions that "disparately impact low-income or minority communities").

65. *See* U.S. EPA, EJSCREEN: ENVIRONMENTAL JUSTICE SCREENING AND MAPPING TOOL, https://www.epa.gov/ejscreen [https://perma.cc/HTU5-5ZB2] (providing an online mapping tool allowing users to explore pollution levels and demographic data); David Pace, *Minorities Suffer the Most from Industrial Pollution*, NBC NEWS (Dec. 14, 2015), http://www.nbcnews.com/id/10452037/ns/us_news-environment/t/minorities-suffer-most-industrial-pollution/ [https://perma.cc/B6JV-3CM2] ("Residents in neighborhoods with the highest pollution scores also tend to be poorer, less educated and more often

are pollution hotspots an automatic outcome for emissions markets: the risk of hotspots depends on firms' compliance choices, the locations of facilities, the pattern of abatement under the market-based policy (and its alternative), and the pattern of exposure near each facility.[66] Further, other policies can protect against co-pollutants: the EPA recently updated limits on sulfur dioxide, nitrogen dioxide, particular matter, and ozone pursuant to the Clean Air Act's National Ambient Air Quality Standards section.[67] The agency also promulgated the Mercury and Air Toxics Standards rule in 2011, reducing mercury emissions from the electric power sector.[68] Emission trading systems, including carbon markets, do not allow individual emitters to violate their permitting requirements under these other programs, although those requirements do not necessarily eliminate the pollutants and may face implementation and updating delays to respond to new information regarding public health risks.[69] Nonetheless, without careful consideration of the characteristics of a pollutant and the underlying regulatory goals, unfettered emissions trading might in some unusual cases exacerbate, or at least fail to mitigate, air quality problems in some locations.[70]

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unemployed than those elsewhere in the country, AP found.").

66. Farber, *supra* note 47, at 56 (citing studies finding that there was not a correlation between the Acid Rain Program and increased SO_2 concentrations in majority African American or Hispanic neighborhoods, although one study did find an increased SO_2 concentrations in communities with less formal education); Jonathan B. Wiener, *Hormesis, Hotspots and Emissions Trading*, 23 HUM. & EXPERIMENTAL TOXICOLOGY 289 (2004) (examining the circumstances necessary to yield hotspots under cap and trade systems, including a weak overall cap, the unlikely case of sources purchasing allowances to enable them to emit even more than they would have in the absence of the allowance price, a non-linear dose-response function for the pollutant, and a particular pattern of abatement and allowance purchases that yields a shift of emissions to source locations associated with downwind exposure to vulnerable communities). *See also* H. RON CHAN, B. ANDREW CHUPP, MAUREEN L. CROPPER & NICHOLAS Z. MULLER, THE NET BENEFITS OF THE ACID RAIN PROGRAM: WHAT CAN WE LEARN FROM THE GRAND POLICY EXPERIMENT? RESOURCES FOR THE FUTURE DISCUSSION PAPER RFF DP 15–25 (2015) (finding that the Acid Rain Program SO_2 trading system unintentionally increased local exposure to a co-pollutant, fine particulate matter, in the eastern United States).

67. National Ambient Air Quality Standards for Ozone; Final Rule, 80 Fed. Reg. 65292 (Dec. 28, 2015) (codified at 40 CFR 50 & 58); National Ambient Air Quality Standards for Particulate Matter; Final Rule, 78 Fed. Reg. 3086 (Jan. 15, 2013) (codified at 40 CFR 50–53 & 58); Secondary National Ambient Air Quality Standards for Oxides of Nitrogen and Sulfur; Final Rule, 77 Fed. Reg. 20218 (Apr. 3, 2012) (codified at 40 CFR 50).

68. Mercury Air Toxics Standards, 77 Fed. Reg. 9304 (Feb. 16, 2012) (codified at 40 CFR 60 & 63).

69. *See, e.g.*, Kaswan, *supra* note 59, at 356 (discussing the issues with implementing a cap-and-trade system); Jonas J. Monast, *Maximizing Utility in Electric Utility Regulation*, 42 FLA. ST. UNIV. L. REV. 135 (2016).

70. See, for example, environmental justice advocates' concerns about the Regional Clean Air Incentives Market (RECLAIM) implemented by California's South Coast Air Quality Management District in the 1990s. Nash & Revesz, *supra* note 62, at 580 ("Environmental justice advocates, in particular, worry that marketable permit regimes will exacerbate hot spots."). Yet analyses of the RECLAIM program's environmental impact have not found a "distinct shift in geographic distribution of emissions," due in part to the fact that the program prevented downwind facilities from trading credits with upwind facilities to address the localized health concerns, but advocates still view the program as a cautionary tale regarding market-based environmental policy. DALLAS BURTRAW & SARAH JO SZAMBELAN, U.S. EMISSIONS TRADING MARKETS FOR SO_2 AND NO_X 20 (Resources for the Future, 2009). In another example, critics worried that the EPA's 2005 Clean Air Mercury Rule might have raised hotspot concerns, had the D.C. Circuit not overturned the rule for reasons unrelated to its cap-and-trade

Although the concern with GHGs is total atmospheric concentration, not local impacts, GHG emissions are indeed often associated with other pollutants.[71] Concerns about the distributional impacts of a carbon market relate not only to possible increases in local environmental harm, but also to inequitable differences in reductions in local environmental harm. Even if additional air quality standards prevent an increase in co-pollutant emissions at facilities purchasing GHG allowances, some locations will experience larger reductions while others may remain unchanged or experience smaller reductions (a pattern that can occur under non-market-based policies as well). Under that scenario, some communities could face a higher environmental burden than others, even though, in the aggregate, all communities accrue overall environmental benefits due to the large reductions in GHG emissions. This suggests the value of designing policies to reduce GHGs and co-pollutants in concert, yielding both global climate and local health benefits.[72]

A related distributional critique of carbon markets focuses on the potential mismatch between an economically efficient distribution of policy costs and the actual costs borne by affected parties. When either the tax or cap-and-trade approach yields the efficient outcome (marginal benefits of abatement equal the marginal cost), the underlying assumption is that the bearer of the harm caused by the pollutant could be fully compensated (such as through the imposition of the tax and subsequent transfer to the aggrieved party), but it does not require that such a transfer occur. This subsequent transfer, referred to as a "potential Pareto improvement" (PPI), is one of the core tenets of utilitarian welfare economics.[73]

Even if a PPI outcome is economically efficient, however, it could be inequitable if the party bearing the pollution damage or mitigation cost is not the party that actually receives compensation or otherwise directly benefits from abatement (for example, via a reduction in local co-pollutant levels).[74] In the case

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design. Mercury emissions from coal-fired power plants were not then covered by other Clean Air Act provisions. If the court allowed the rule to remain in effect, the market system included in the rule might have allowed some facilities to maintain, or possibly increase, emissions in some locales, while other facilities necessarily reduced their emissions to meet the overall 70% reduction cap. Robert N. Stavins, *A Meaningful U.S. Cap-and-Trade System to Address Climate Change*, 32 HARV. ENVTL. L. REV. 293, 364 (2008). In most cases, emissions trading markets have not led to such hotspots or unfair distribution. *See* Farber, *supra* note 47.

71. Kaswan, *supra* note 59, at 351–52 ("[C]arbon dioxide emissions are almost always accompanied by more hazardous co-pollutants. Particulates, sulfur oxides, nitrogen oxides, volatile organic compounds, benzene, and mercury are common co-pollutants."). Still, reductions in GHGs could be associated with decreases, or increases, in other pollutants.

72. *See* Noah Scovronick et al., *Reduce Short-Lived Climate Pollutants for Multiple Benefits*, 386 LANCET e28 (2015); Drew Shindell et al., *Simultaneously Mitigating Near-Term Climate Change and Improving Human Health and Food Security*, 335 SCIENCE 183 (2012).

73. The concept was first advanced by the 19th–20th century Italian economist, V Pareto. *See generally* VILFREDO PARETO, COURS D'ÉCONOMIE POLITIQUE PROFESSE A L'UNIVERSITE DE LAUSANNE, Vol. I (1896), Vol. II (1897).

74. *See, e.g.*, RICHARD SCHMALENSEE & ROBERT N. STAVINS, LESSONS LEARNED FROM THREE DECADES OF EXPERIENCE WITH CAP-AND-TRADE 18 (Harvard Project on Climate Agreements, 2015),

of climate change, a carbon tax imposed on GHG emitters, or, alternatively, a carbon allowance price emerging from a cap set at the optimal level, would be socially efficient in that the social cost of the problem is internalized into production and consumption decisions. This does not ensure, however, that the proceeds of the price imposed, say, on an American power plant, will find their way to the villagers in a low-lying island nation that is being displaced by sea level rise as a result of those emissions.

In principle, policymakers could remedy this problem through a transfer scheme that directs tax or allowance proceeds to the aggrieved party, but this is politically challenging to say the least. It also involves tradeoffs with other potential uses of those proceeds, such as ameliorating the costs incurred by disadvantaged households facing higher energy prices that reflect the cost of GHG abatement, using revenues to finance the development of low-carbon energy technologies or climate adaptation actions, or correcting the distortions and inequities of the existing income tax system by swapping carbon taxes for other taxes.

The potential mismatch between those afflicted by an environmental problem and those who would benefit from, or bear the cost of, policy interventions is not unique to emissions markets, however. Other policy instruments, such as prescriptive technology standards, performance standards, or information disclosure policies, are designed to lower emissions but do not generally provide any flow of compensation to those harmed by emissions. Emissions markets and tax policies do present at least an opportunity to match the harms and proceeds, an opportunity that may not exist under these other policy instruments. For example, policymakers may direct some of the proceeds of the allowance auction or tax directly to the relevant people or countries or to fund certain activities aimed at addressing the harms.[75] Policymakers could also opt to match costs and attract participation by allocating some allowances to cost-bearing entities or activities.[76]

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http://belfercenter.ksg.harvard.edu/files/dp80_schmalensee-stavins.pdf_ [https://perma.cc/5WUP-PTY7] ("Applications of cap-and-trade systems have been based either on the reality of uniformly-mixed pollutants (AB-32, EU ETS, RGGI) or the assumption of uniform mixing (lead phasedown, SO_2 allowance trading). In theory, with a non-uniformly mixed pollutant, a cap-and-trade system could lead to localized hot spots with relatively high levels of ambient concentrations raising distributional issues and potentially also efficiency issues."). *But cf.* Wiener, *supra* note 66 (detailing the limited conditions under which hotspots may arise and warrant a remedy).

75. For example, the parties to the UNFCCC established a Green Climate Fund to finance mitigation and adaption to climate change via transfers from developed to developing countries. REPORT OF THE CONFERENCE OF THE PARTIES ON ITS SIXTEENTH SESSION, HELD IN CANCUN FROM 29 NOVEMBER TO 10 DECEMBER 2010, Art. 102, http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=17 [https://perma.cc/JYC7-RFHP].

76. *See* Wiener, *supra* note 39, at 747–50 (discussing using allowance allocations to engage participation in the market).

C. Argument 3: The Policy Instrument Is Ineffective And Leads To Unjust Enrichment

The pope's reference to "speculation" that will "not help reduce emission[s]," and the buying and selling of "carbon credits" as a "ploy" to "maintain . . . excessive consumption," frame the criticism of emissions markets as mechanisms that may fail to achieve desired environmental goals due to lax emission caps or improper market design and may enrich the winners of market manipulation at the expense of the poor without improving environmental outcomes.[77] If there is a moral obligation to mitigate climate change, and to help the poor, then, by extension, there is a moral obligation to choose effective strategies to achieve both goals. Critics fear that market mechanisms may offer an escape from such obligations that shifts burdens from the rich to the poor.

Some early efforts to implement carbon markets may have fueled these concerns. The first phase of the EU ETS suffered from over-allocation of allowances due to a lack of reliable data when policymakers set the emissions cap.[78] If emission allowances turn out to exceed actual emissions, the result is a nonbinding cap and low or falling prices. Moreover, allowances issued in Phase I were not able to be banked for use in subsequent periods when the cap would be tighter. As allowance prices fell toward zero, there was little additional incentive for further reductions. But these problems were not necessarily a result of the use of a market in allowance trading—if the cap had been set without allowing trading, it still would have been set too high—instead, these problems were due to a lack of initial data and design of the trading system when setting the cap. Data have improved over time, and subsequent phases of the EU ETS have included both cap tightening and allowance banking that helped prop up prices while emissions have declined. Despite these policy adjustments, the ETS allowance prices have remained low, primarily due to three factors: tepid economic growth in the European Union reducing emissions, and hence reducing demand for allowances compared to the forecasts when the caps were set; the success of the allowance market in motivating sources to find low cost abatement options; and the role of other complementary policies in reducing emissions, such as feed-in tariffs for renewable energy in several EU countries.[79] Ex post studies

77. POPE FRANCIS, *supra* note 4, at ¶ 171. *See, e.g.*, MICHELLE CHAN, TEN WAYS TO GAME THE CARBON MARKET (Friends of the Earth, 2010) http://www.foe.org/sites/default/files/10WaystoGametheCarbonMarkets_Web.pdf [https://perma.cc/QM37-ZA7K]; FRIENDS OF THE EARTH, *supra* note 4 (discussing concern that market mechanisms may shift burdens to the poor); Kaswan, *supra* note 49, at 51–53 (discussing market features that could invite manipulation).

78. A. Denny Ellerman & Barbara K. Buchner, *Over-allocation or Abatement? A Preliminary Analysis of the EU ETS Based on the 2005–06 Emissions Data*, 41 ENVTL. & RESOURCE ECON. 267, 267 (2008) ("The release of installation-level data for verified emissions and allowance allocations for the first 2 years of the trial period for the European Union's CO2 Emissions Trading Scheme (EU ETS) revealed that CO2 emissions were on average about 60 million tonnes or 3% lower than the number of allowances distributed to installations for these years."); Lesley K. McAllister, *The Overallocation Problem in Cap-and-Trade: Moving Toward Stringency*, 34 COLUM. J. ENVTL. L. 395, 409 (2009).

79. These complementary policies may pose higher abatement costs than the allowance trading market. *See* SCHMALENSEE & STAVINS, *supra* note 74, at 15–51.

of the EU ETS and other cap-and-trade systems generally show that they do reduce emissions below projected levels that would have occurred without the policy.[80]

Another market design that has raised concerns about efficacy is the use of offset credits from emissions reductions in uncapped entities to meet compliance obligations for capped ones.[81] For example, the Kyoto Protocol's Clean Development Mechanism,[82] intended to foster investments in emissions reduction projects in developing countries, raised a number of these concerns. It appeared to enable some project developers to manipulate emission baselines so as to receive credits for emission reductions that did not actually occur or were not additional to changes that would have occurred anyway.[83] As noted above, the Vatican's own experience with voluntary carbon markets demonstrates the risk that offset projects may fail to deliver emission reductions without the proper protocols and oversight.[84] Regulators in jurisdictions that use uncapped offsets to meet a mandatory cap, such as in California, and voluntary program authorities, such as the Verified Carbon Standard (VCS)[85] and the American Carbon Registry,[86] have tried to address these concerns over time by instituting protocols that limit which activities are potentially creditable and require a series of tests and data to demonstrate that only reductions that are real, additional, verifiable, and permitted get credited.

Critics also point to concerns that unjust enrichment resulting from carbon markets could exacerbate distributional concerns by enabling wealthy sources to continue to emit ("maintain excessive consumption"), by buying emission credits from poorer countries who must reduce their emissions in order to sell those credits.[87] But a trading opportunity itself does not compel anyone to sell allowances or credits. In a well-functioning market, the choice to sell credits

80. *See, e.g.*, Brian C. Murray & Peter T. Maniloff, *Why Have Greenhouse Emissions in RGGI States Declined? An Econometric Attribution to Economic, Energy Market, and Policy Factors*, 51 ENERGY ECON. 581, 584–85 (2015) (citing data indicating that the EU ETS decreased emissions by 0.5–8 percent).

81. *See* Brian C. Murray, *Emissions Offsets in a Greenhouse Gas Cap-and-Trade Policy*, ISSUES OF THE DAY: 100 COMMENTARIES ON CLIMATE, ENERGY, THE ENVIRONMENT, TRANSPORTATION, AND PUBLIC HEALTH POLICY 30–31 (Ian W.H. Parry & Felica Day eds., 2010) (discussing common criticisms of offsets and possible solutions).

82. Kyoto Protocol to the United Nations Framework Convention on Climate Change, art. 12, Dec. 10, 1997, 37 I.L.M. 22 (1998).

83. Michael Wara, *Measuring the Clean Development Mechanism's Performance and Potential*, 55 UCLA L. REV. 1759, 1763 (2008).

84. Richards, *supra* note 35.

85. VERIFIED CARBON STANDARD, VCS STANDARD VERSION 3 REQUIREMENTS DOCUMENT (2016), http://database.v-c-s.org/sites/vcs.benfredaconsulting.com/files/VCS_Standard_v3.6.pdf [https://perma.cc/95FJ-GDGZ] (provides structure and details of the VCS offsets program).

86. AMERICAN CARBON REGISTRY AT WINROCK INTERNATIONAL, THE AMERICAN CARBON REGISTRY STANDARD, VERSION 4.0 (2015), http://americancarbonregistry.org/carbon-accounting/standards-methodologies/american-carbon-registry-standard/acr-standard-v40-january-2015.pdf [https://perma.cc/L37R-4F39] (provides structure and details of the American Carbon Registry offsets program).

87. *See* POPE FRANCIS, *supra* note 4, at ¶ 171.

would only occur if the seller views the proceeds from the sale as worth more than the opportunity to emit. Perhaps the underlying concern is that some people are not willing sellers, and are being coerced to refrain from emitting or from using resources. If so, coercion is the problem, not the market per se, and the remedy is to establish rules against coercion.

If the same aggregate abatement had to be attained without trading and with the same obligations to abate, the wealthy countries would only be spending on abatement activities in their own countries and the poor countries would not have the opportunity to receive payments for abatement. Creating a well-designed allowance trading market thus can open an opportunity for those who have low-cost abatement opportunities to earn a beneficial new stream of income. This income can be used to finance low-carbon development (such as renewable energy, cleaner cook stoves, or conservation of forests) and other socially beneficial expenditures, while reducing GHG emissions.[88]

As another example of the concern about speculation and market manipulation, in the EU ETS, in addition to the over-allocation problems in its first phase, there were also high profile instances of "windfall profits" whereby entities were able to pass along the market price of the allowances to consumers even when the entities received the allowances for free. But EU countries were able to adjust their allocation methodologies to control for this concern. Following the 2008–2009 financial crisis, concerns also arose regarding the potential for market manipulation in carbon markets as part of broader concerns about financial markets in general.[89]

These examples offer cautionary tales regarding the importance of proper market design, but do not support a rejection of markets. Carbon markets with mandatory emissions caps operate pursuant to the rules imposed by public policy (as do other markets). Even if the climate regulations do not include specific market design requirements, other generally applicable market regulations may still apply to carbon markets,[90] and policymakers may choose to implement new restrictions to address particular concerns. For example, the California Cap-and-Trade Program addressed market manipulation concerns by implementing a robust tracking system to monitor spot market allowance and offset transactions, implementing holding limits preventing a single entity from exercising undue market power, and utilizing an independent market monitor to evaluate market activity.[91]

It is important for any climate policy to be reviewed and adjusted over time to reflect evolving realities and pursuit of long-term emission goals. The EU ETS

88. *See* Jill Warren Lucas, *Keeping the Trees from Falling in Guyana*, DUKENVIRONMENT MAG., Spring 2015, at 29 (explaining how programs to pay developing countries to generate carbon credits by reducing deforestation can finance a wide range of environmental and social benefits).

89. *E.g.,* Jonas Monast, *Climate Change and Financial Markets: Regulating the Trade Side of Cap and Trade*, 40 ENVTL. L. REP. 10051, 10054 (2010).

90. *Id.*

91. CAL. EPA AIR RES. BD., CAP AND TRADE: MARKET OVERSIGHT AND ENFORCEMENT (2011), http://www.arb.ca.gov/cc/capandtrade/market_oversight.pdf [https://perma.cc/W34V-KNK4].

has revised its rules over time to address windfall profits, cap stringency, and other factors. The northeast U.S. Regional Greenhouse Gas Initiative also goes through periodic program review, the last of which tightened the emissions cap dramatically (by forty percent) and incorporated measures to provide more price certainty.[92] New jurisdictions are joining existing trading systems (Quebec and Ontario with California[93]) or creating their own (China[94]) which should allow them to benefit from learning about evolving reforms and best practices if properly governed.

V
HOW MIGHT CARBON MARKETS BE DESIGNED TO RECONCILE THE MORAL CONCERNS?

This part engages in the pope's call for a "forthright and honest debate" regarding environmental challenges and public policy by exploring options to address the moral critiques of carbon markets described in part IV.[95] Emissions markets are explicitly designed to achieve a public policy goal. Policymakers may tailor market design and implementation and may coordinate with other policies, if necessary, to address potential problems, such as co-pollutants coming from the same sources. These alternative or complementary rules generally introduce tradeoffs, however, and may share some of the moral challenges or face unique problems of their own. This discussion identifies policy measures designed to address the moral issues raised above, and highlights key tradeoffs posed by designing GHG markets to accommodate these concerns.

A. Setting Aggressive, Enforceable, All-Inclusive Emissions Caps

If one concern is that a market-based approach does not reduce emissions rapidly or effectively enough, and thereby fails to fulfill what critics see as a moral imperative to address climate change, a solution is to set a more stringent emissions cap, one so stringent that it achieves more ambitious climate protection goals, and even obliges virtually all parties to take substantial action to reduce emissions. There are important differences between policies that aim to stabilize emissions at modest levels in the near term and those that aspire to very steep long-term reductions.[96] The former could lead to a subset of emitters with low

92. Murray & Maniloff, *supra* note 80 (describes revisions to the RGGI program in response to program review).

93. In April, 2015, Ontario Premier Kathleen Wynne announced Ontario's intention to join the cap-and-trade program established by California and subsequently joined by Quebec. Allison Martell & Mike De Souza, *Ontario confirms it will join Quebec, California in carbon market*, GLOBAL ENERGY NEWS (Apr. 13, 2015), http://www.reuters.com/article/us-climatechange-canada-idUSKBN0N41X220150413 [https://perma.cc/CJ5L-3WBH].

94. See John Fialka, *China Will Start the World's Largest Carbon Trading Market*, SCI. AM. (May 16, 2016), https://www.scientificamerican.com/article/china-will-start-the-world-s-largest-carbontrading-market/ [https://perma.cc/JHL3-DESB].

95. POPE FRANCIS, *supra* note 4, at ¶ 16.

96. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), CLIMATE CHANGE 2007:

abatement costs undertaking most of the actual reductions, though the other emitters are not getting off free; other emitters still pay for their emission-reduction obligations (by paying taxes or forgoing allowance sale revenues), just at less cost than if they had to reduce emissions on their own (and allowance sellers are earning revenues). Under a far steeper, more comprehensive, and faster cap, it is unlikely that any emitter would be able to buy all of its required emissions reductions from others, as the demand (and therefore price) will be too high. Steeper emissions reductions across the board could also increase the likelihood of co-pollutant net reductions at most locales—although the steeper ambition might also induce increases in countervailing risks from the expansion of low or zero emitting energy, such as natural gas (methane emissions, water pollution, seismic risks), nuclear power (accidents, wastes), or utility scale renewables (land use, habitat), as well as sharper economic dislocations for local communities of shuttered facilities.

B. Implementing Policies To Directly Address Co-Pollutant Concerns

Ideally, all of the pollutants generated at a facility that also emits GHGs would be well-regulated to protect local populations, with or without the GHG reduction policies. The addition of GHG reduction policies would not undo these other pollutant policies. In the United States, the Clean Air Act requires the EPA to revisit national ambient air quality standards on a regular basis to ensure that the standards protect public health and welfare based on currently available scientific data and technological options for reducing emissions.[97] Other provisions of the Clean Air Act, such as for toxic air pollutants, also call for periodic review.[98] Where local pollution concerns persist, these Clean Air Act provisions provide an opportunity to impose tighter regulations that operate alongside a carbon market.

GHG emissions trading would not exempt covered facilities from meeting other applicable regulatory requirements. Implementing a suite of emission restrictions, therefore, would address at least some of the co-pollutant impacts associated with GHG emissions, and, in effect, the co-pollutant policies would limit locational flexibility of GHG emissions trading. Because co-pollutant concerns would be more serious in countries lacking a suite of emissions restrictions addressing co-pollutants, such countries could be encouraged and assisted to adopt and implement such policies.

Where regulatory systems do not respond adequately, the potential for local hotspots of other pollutants and exposure of vulnerable households may still exist. Where there are remaining concerns regarding co-pollutant emissions, the most effective solution would be to reform laws and regulations as needed to ensure adequate local protections, rather than to prohibit GHG emissions trading. Meanwhile, a potential transition policy is to incorporate limits on co-

MITIGATION OF CLIMATE CHANGE, § 13.3.3.3 (2007).

97. Clean Air Act, 42 U.S.C. § 7409 (2012).

98. Clean Air Act, 42 U.S.C. § 7412 (2012).

pollutants into GHG trading for certain local facilities by using real-time data on co-pollutant concentrations in electronic allowance trading platforms.[99] If policymakers identify facilities presenting particular concerns regarding co-pollutant increases associated with carbon trading,[100] they could limit the ability of those facilities to meet their compliance obligations via purchased allowances.

Still, some questions remain. The moral argument may also be on the opposite foot: if measures to restrict local co-pollutants would also reduce the ambition and efficacy of the GHG emissions reduction policy, then there could be a moral argument that stringent control of local co-pollutants is increasing the risk of climate damage to other distant, possibly poorer populations. Would there be a moral objection to facilities with highly localized co-pollutant problems reducing their GHG emissions beyond their GHG compliance obligations (and thereby reducing the co-pollutants too, or increasing countervailing risks) in order to generate surplus GHG allowances for sale?

C. Requiring Minimum Reductions From All Emitters

Another option to ensure shared burden is to require that emitters produce a minimum share of their respective required GHG reductions onsite, and then allow them to purchase emission reductions from other parties beyond that. This approach is consistent with the encyclical's theme of personal responsibility and invokes the concept of "supplementarity" in Article 17 of the Kyoto Protocol.[101] In the United States, emissions trading programs under the Clean Air Act operate in parallel with permitting requirements for individual emitters. Sources with compliance obligations under the Acid Rain Trading Program[102] or the Cross State Air Pollution Rule[103] may trade allowances, but they must also comply with any emission limits included in their respective operating permits.[104]

Requiring emission reductions at a particular source or within a particular sector may achieve public health goals, but could also undermine the efficiency benefits of a carbon market. This, in turn, could inhibit its ambition as its costs rise. Market restrictions, such as minimum abatement shares, may also prevent high-cost emitters from spending to reduce emissions at low-cost facilities, which may mean that wealthy countries are restricted from financing emissions abatement in lower-income countries. Such market restrictions could also lead to local economic dislocations near sources by causing units to retire that otherwise

99. *See generally* Nash & Revesz, *supra* at 62 (discussing how to design a cap-and-trade market to limit local concentrations).

100. For example, if an emitting power plant is expected to significantly increase utilization as other facilities in the area retire.

101. Kyoto Protocol, *supra* note 82, at art. 17.

102. 42 U.S.C. § 7651(a)–(o) (2012).

103. Federal Implementation Plans: Interstate Transport of Fine Particulate Matter and Ozone and Correction of SIP Approvals, 76 Fed. Reg. 48,207, 48,208 (Aug. 8, 2011) (codified at 40 C.F.R. § 51).

104. Although these permits generally identify maximum levels of pollution rather than requiring minimum reductions at a source, the example demonstrates precedent for trading programs operating in parallel with other emission limits applied to the same sources.

could have purchased allowances to remain in operation. Both impacts may be at odds with distributional equity. Determining the moral acceptability of each option, therefore, may depend on a careful assessment of the nature of the co-pollutant concerns and the multiple impacts of the market restrictions.[105]

D. Compensating Harmed Parties And Disadvantaged Final Consumers

Pricing carbon in a market can perpetuate or create equity problems if populations affected by climate change are still not compensated, and if carbon prices impose cost burdens on workers and consumers of GHG-emitting goods, like energy or food, with disproportionate impacts on poor people. A potential solution is to develop a system of monetary transfers to compensate those parties in some agreed upon proportion. For instance, the government could charge a GHG tax or auction allowances, and transfer some or all the revenues to the directly harmed parties and those affected by higher energy prices or lost jobs. It is likely to be impossible to parse out the payments to the billions of Earth's inhabitants who will be affected by climate change. Hence this transfer might work as part of an international allowance trading market with headroom allowances initially allocated to countries suffering harm.[106] Alternatively, it could be part of an international mechanism to compensate parties ex post for climate "loss and damage" as envisioned by advocates that such provisions should be part of the UN Framework Convention on Climate Change.[107] Should these payments go to all negatively affected parties (possibly everyone on the planet), or only to poor countries bearing the brunt of climate change impacts? If the latter, what about rich people in poor countries and poor people in rich countries? Similar issues arise for the recipients of transfers for higher energy prices, but those may be a bit easier to apportion to parties deemed vulnerable to such price increases because they are tied directly to energy purchase transactions.

E. Further Thoughts On Design Tradeoffs

These market designs attempt to address the moral misgivings some parties have about the use of markets to address climate change mitigation. Carbon markets operating pursuant to a mandatory emissions cap exist due to policy choices, and policymakers designing and overseeing those markets have numerous options regarding market design. Tradeoffs are inevitable, however. These tradeoffs may require balancing efficiency and equity goals, as well as

105. The encyclical acknowledges the distributional equity concerns. *See, e.g.*, POPE FRANCIS, *supra* note 4, at ¶ 165 ("[T]he international community has still not reached adequate agreements about the responsibility for paying the costs of this energy transition.").

106. STEWART & WIENER, *supra* note 34; Wiener, *supra* note 39.

107. *See, e.g.,* ALLIANCE OF SMALL ISLAND STATES, LOSS & DAMAGE (2012), http://aosis.org/loss-damage/ [https://perma.cc/XTJ7-3FPD] (arguing "for a system capable of compensating victims for the associated costs" of the impacts of climate change). The Paris Agreement, article 8, calls for measures to address "loss and damage," but the Decision adopting the Paris Agreement provides in paragraph 52 that "Article 8 of the Agreement does not involve or provide a basis for any liability or compensation."

equitably addressing different impacts among diverse disadvantaged parties. And such tradeoffs also arise from non-market policy instruments. Restricting climate markets may raise costs, reduce incentives for innovation, inhibit the ambition of mitigation, and leave the world more vulnerable to climate change. Of course, adopting any emissions cap that is not immediately zero would allow some damages to be incurred over time, but adopting an absolute immediate elimination of GHGs would impose exorbitant costs and risks on all—rich and poor. Carbon markets operate in an intermediate zone to reduce emissions cost-effectively over time. Limiting trading may also raise costs and incur distributional burdens on vulnerable households that bear those costs. The ultimate impact of market restrictions would depend on a number of factors, including the measures used, the stringency of the emissions cap, the total number of entities subject to the emissions cap, the number of facilities affected by the restrictions, the patterns of abatement and pollutant exposures, the pattern of financial flows to support cleaner development, and available mitigation measures. It is prudent to assess all of these tradeoffs when considering the moral implications of a policy choice.

Because there will unlikely be sufficient revenue to compensate both all those affected by climate change and all those affected by higher energy costs, there may be negative effects on some bearing the costs; realistic policies may yield net benefits (potential Pareto improvement), but not universal benefit. In addition, the revenues generated by a carbon market could have other socially beneficial uses. Even a large revenue pool that can be created by a large-scale market is finite and will require choices. For instance, auction revenues targeted for vulnerable populations could instead be used to reduce other taxes (perhaps progressively); to finance public investment in low-carbon research, development and deployment that can help accelerate the pace and lower the cost of carbon reductions and potentially reduce co-pollutants; or to support adaptation measures necessary to respond to the climate change that appears inevitable already. One might argue that all of these activities should indeed be funded, and moreover that a carbon market is not the only way to do this—regular government revenue appropriations can also be used.

VI
CONCLUSION

Climate change will have significant, although not uniform, impacts on individual well-being and on human societies as a whole. The pervasive nature of GHGs means that effective mitigation measures will require changes in energy production, agriculture, and land use. No single technological option will address the problem, and reducing emissions will likely be a long and expensive effort with an unequal distribution of the costs and benefits of doing so. The scale of the challenge raises a number of complex moral and economic questions.

Moral dimensions of the debate are not limited to the environmental impacts of climate change or distributional matters alone. Poverty has direct health

effects, and "energy poverty" is a key contributor to global inequity.[108] An estimated 1.4 billion people lack access to clean, affordable energy.[109] A rapid transition away from high-emitting sources could dramatically raise the price of energy in some areas, as well as pose other risk–risk tradeoffs, including health and environmental impacts.[110] Emission reduction measures could have significant distributional economic impacts for communities whose local economies depend heavily on jobs associated with the production and consumption of high-emitting fuels. These considerations do not mean that reducing GHG emissions is unwise; rather, they mean that GHG reduction policies must be carefully designed to address multiple kinds of impacts.

Assessing the morality of policy options for mitigating climate change, therefore, is a complex undertaking that should acknowledge the role of underlying value choices. This task requires balancing several considerations, including the aggregate harms of climate change and the aggregate benefits and costs of GHG emissions mitigation (including the co-benefits and countervailing harms of alternative mitigation options); the distribution of harms, benefits, and costs associated with climate change, GHG emissions mitigation, co-benefits, and countervailing harms; and the moral characteristics of the policy instruments used to achieve these aggregate and distributional outcomes. Conclusions regarding particular policy instruments may vary depending on the sectors in question and the location of the emitters.

Market-based approaches offer a number of advantages for addressing climate change and balancing interests, including cost-effectiveness, incorporating social costs of emissions into the price of goods produced (that is, the polluter pays), and incentivizing emission-reducing behaviors and technologies. Despite the alignment of the globally-mixing nature of GHGs and the cost effectiveness of market-based emission reduction strategies, however, carbon markets continue to face criticism, including those rooted in moral arguments such those articulated by Pope Francis.

It is undeniable that market-based instruments—and any policy approach—introduce distributional impacts in terms of who ultimately pays for the reductions, who suffers impacts from the actions taken to mitigate emissions, and who profits from the actions. Market flexibility also introduces uncertainty regarding where and how reductions occur, leading to uncertainty regarding local

108. *See, e.g.*, JIM ROGERS & STEPHEN P. WILLIAMS, LIGHTING THE WORLD 31–44 (St. Martin's Press, 2015) (discussing the negative effects of living without stable access to electricity in many parts of the world, with particular focus on Africa).

109. Nina Robertson et al., *As the World Burns: A Critique of the World Bank Group's Energy Strategy*, 43 ENVTL. L. REP. 10,760, 10,762 (2013) (citing INT'L ENERGY AGENCY, WORLD ENERGY OUTLOOK 96, 56 (2010)).

110. The UN Framework Convention on Climate Change (FCCC) (1992), article 4(1)(f), recognizes these tradeoffs and requires parties to "employ appropriate methods, for example impact assessments, formulated and determined nationally, with a view to minimizing adverse effects on the economy, on public health and on the quality of the environment, of projects or measures undertaken by them to mitigate or adapt to climate change."

co-pollutant impacts. These critiques raise important concerns, but they are not unique to market-based instruments. Many of these issues also arise from traditional source-specific, permit-based regulation as conventionally applied. For example, under the Clean Air Act, stationary source permits often vary based on the type of source and its location. Emission reductions are not uniform. Furthermore, conventional regulation does not require polluters to pay for each unit of emissions, and effectively licenses polluting for free beyond the emissions level specified in their respective permits. Market-based policy instruments, which reduce emissions more effectively at lower cost, and deliver financing to low-cost abaters, can thus be superior to conventional non-market policies on moral and equity criteria as well as on economic and environmental criteria.

As with any major policy initiative, it is important to evaluate available options and compare the full scope of potential outcomes to the policy goals. Market-based mechanisms are not a blanket panacea to the challenges associated with climate change, but a wholesale rejection of markets as policy instruments risks forgoing numerous benefits offered by carbon pricing and compliance flexibility. Furthermore, carbon markets and carbon taxes are functions of public policy choices. To the extent that concerns arise regarding these options, measures such as tailored market design, oversight, review, and revision, may offer preferable strategies that achieve the benefits associated with market-based policies while mitigating negative impacts.