

Carbon Pricing Initiatives in Western North America: Blueprint for Global Climate Change Policy

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ABSTRACT

In the absence of effective international and federal initiatives to combat the impacts of global climate change, many state, local and regional jurisdictions are passing or proposing measures to curb carbon dioxide (CO₂) emissions. The province of British Columbia, Canada, as well as the cities of San Francisco, California and Boulder, Colorado have carbon taxes in place, and similar actions have been proposed in the Oregon and Washington state legislatures. The state of California and the province of Québec have linked together in a joint cap-and-trade system. This Article will examine the fundamentals of carbon taxation, including identification of the tax base (the pollutant) and taxpayer (consumer, manufacturer, etc.), rates of taxation, measurement standards for tax assessment, exemptions, and use of revenue, and then compare them to cap-and-trade systems. It will assess this family of market initiatives based on the following criteria: (1) administerability, (2) political feasibility, (3) revenue generation, (4) efficiency, (5) equity, and (6) efficacy. Lastly, the Article considers the constitutional, practical, and political challenges to reform. The Article concludes that all states and provinces in North America should link together in a strict cap-

and-trade system while local jurisdictions within the region should pass broad-based carbon taxes. Any revenue generated from these market mechanisms can be recycled to low-income taxpayers and used for carbon sequestration and other “green” purposes. Although the urgency for binding law on a national and international scale is apparent but not immediately forthcoming, regional, state and municipal initiatives can serve as blueprints for innovative and effective climate policy change.

INTRODUCTION

Even though “no serious scientist” would disagree about the fact of climate change,¹ the countries of the world have been unable to successfully address this pressing problem, particularly the world’s richest countries.² Despite twenty United Nation summit meetings, no global initiative has resulted in any hard-law agreements on greenhouse gas (GHG) reductions.³ On the U.S. federal level, Congress has passed no cap-and-trade or carbon tax legislation.⁴ A few countries have been successful in their market-based initiatives to combat global warming, but most have failed.⁵

In the Western North America many promising regional, state and local initiatives have been passed or have been proposed.⁶ At the regional level,

1. See Dimitri Zenghelis, Book Review, *Science Fact, Climate Fiction—Clarifying the Debate*, AM. SCIENTIST, May-June 2010, <http://www.americanscientist.org/bookshelf/pub/science-fact-climate-fiction-clarifying-the-debate>.

2. See Alexander Jung et al., *The Warming World: Is Capitalism Destroying Our Planet?*, DER SPIEGEL (Feb. 25, 2015 6:05 PM), <http://www.spiegel.de/international/world/climate-change-failed-efforts-to-combat-global-warming-a-1020406.html>; see also Paul Brown, *World’s Richest Nationals ‘Failing’ to Address Climate Change*, CLIMATE HOME (Jan. 15, 2014, 8:34 AM), <http://www.climatechangenews.com/2014/01/15/worlds-richest-nations-failing-to-address-climate-change>. Even Pope Francis has been discussing this issue. See Daniel Henninger, *Why Can’t the Left Govern*, WALL ST. J., Mar. 27, 2014, at A15.

3. Justin Worland, *What to Know About the Historic ‘Paris Agreement’ on Climate Change*, TIME (Dec. 12, 2015), <http://time.com/4146764/paris-agreement-climate-cop-21/> (discussing the fact that emissions targets of individual countries are non-binding).

4. In the absence of mandates, the administration’s efforts have been limited to updating EPA standards, climate-related research, and voluntary emission reduction programs relating to GHG emissions. See discussion *infra* Part I.B. On March 28, 2014, President Obama initiated regulations on methane, etc. See EXEC. OFFICE OF THE PRESIDENT, CLIMATE ACTION PLAN—STRATEGY TO REDUCE METHANE EMISSIONS (Mar. 2014), https://www.whitehouse.gov/sites/default/files/strategy_to_reduce_methane_emissions_2014-03-28_final.pdf.

5. See discussion *infra* Part I.C.

6. See discussion *infra* Part III.

California and Québec have a cap-and-trade system in place⁷ and the British Columbia carbon tax has been effective at reducing carbon emissions with only minimal impact on the economy.⁸ At the state and local level, carbon taxes exist in both Boulder and San Francisco and have been proposed in Oregon and Washington. However, much more needs to be done to combat climate change.⁹ In the absence of federal and international action, regional, state and local market initiatives can serve as blueprints, giving other governments the opportunity to learn from these successful local innovative models.¹⁰

Local initiatives¹¹ are important in at least three key respects. First, many of the problems causing climate change stem from local problems.¹² Thus,

7. See discussion *infra* Part III.A.3.

8. See discussion *infra* Part III.B.2.a.

9. I guess I would put myself into the “transformative” school of thought when it comes to environmental taxation. I view that environmental harms are “regrettable consequences of economic development that can be minimized by different attitudes and concerted efforts at environmentally sensitive practices.” David G. Duff, *Tax Policy and Global Warming*, 51 CAN. TAX J. 2063, 2070 (2003) (Duff contrasts this transformative view with the economic and justice/morality views). According to this transformative view, the “main purpose of environmental taxes is not to internalize costs or assign blame for environmental harms, but to encourage environmental awareness and shared responsibility for creating a better environmental future.” *Id.* In addition, I believe that our outlook should be the “blueprint” model, as opposed to the “scramble model.” “Blueprint” is an optimistic viewpoint, stressing that change can come from the bottom up by focusing on local actions that can address environmental challenges. See MCKENZIE FUNK, WINDFALL: THE BOOMING BUSINESS OF GLOBAL WARMING ch. 2 (Penguin Press ed., 2014). “Scramble” is reactive, where events outpace actions and change only comes when nature forces it. *Id.* Under the “scramble” viewpoint, policy makers pay little attention to the problems. *Id.*

10. This Article strictly focuses on energy, for local green building initiatives, see Nancy E. Shurtz, *Eco-Friendly Building from the Ground Up: Environmental Initiatives and the Case of Portland, Oregon*, 27 J. OF ENVTL. LAW & LITIG. 237, 237–62 (2012).

11. “Local” hereinafter means regional, state, and local.

12. Climate change will affect different places in different ways, so the specific tax and other policies used to manage impacts must be tailored to respond to each locality’s unique conditions. When local governments create climate change policies, they should be evaluated within the context of their specific environments, on a case-by-case basis, and should establish a mix of strategies that reflect local priorities and the specific vulnerabilities of the community. For example, in areas such as California, which are not prone to hurricanes, but are prone to drought and high-traffic congestion, innovative transportation policies aimed at mitigating congestion, and GHGs created by cars, as well as policies to fortify and support road infrastructure, should be promoted. See Evan Mills, *Climate Change, Insurance and the Buildings Sector: Technological Synergisms Between Adaptation and Mitigation*, 31 BUILDING RES. & INFO. 257, 271 (2003). Alternatively, in areas that are prone to frequent hurricanes or typhoons, land use policies that promote redevelopment with green buildings, that are often more energy efficient and cost effective to begin with, would contribute to a reduction in GHG’s and ultimately reduce climate change. *Id.*

it is within the local jurisdiction's authority to plan and solve these problems.¹³ Second, changing the behavior of people and businesses is often more effectively accomplished when done “from the bottom up,”¹⁴ and may have a cumulative and thus a national (and international) impact.¹⁵ Third, in the absence of effective federal and international initiatives, state and local governments pursuing unique policies can serve as a petri dish for the federal government and ultimately the international community by offering innovative ideas that can translate into national and international initiatives.¹⁶

13. Gawain Kripke & Brian Dunkiel, *Taxing the Environment: Corporate Tax Breaks to Promote Environmental Destruction*, MULTINATIONAL MONITOR (Sept. 1998), <http://www.multinationalmonitor.org/mm1998/98sept/kripke.pdf>; BEVERLY I. MORAN, ECONOMIC DEVELOPMENT: TAXES, SOVEREIGNTY, AND THE GLOBAL ECONOMY IN TAXING AMERICA ch. 8 (Karen B. Brown & Mary Louise Fellows eds., N.Y. Univ. Press 1997). Moran questions “why localities continue to provide incentives, given the tremendous economic risks.” *Id.* at 198. Local initiatives referred to as “corporate welfare” or “perverse incentives” are used by local governments to attract new business. The focus of these incentives is to promote economic growth. However, the incentives are destructive to the environment because they often provide no incentives for the new businesses to pursue sustainable practices. To have an effective local climate change initiative, these local policies must be eliminated or made contingent upon green initiatives. When local governments offer large corporations income and property tax breaks to relocate within the city or state, but make no restrictions on the corporation's environmental activities, such unsustainable policies cause a strain on local resources. Thus, local governments must steer economic growth and urban development towards GHG reductions when they offer corporate welfare packages to new businesses or completely curb this practice.

14. See Gawain Kripke & Brian Dunkiel, *supra* note 13; see also Beverly I. Moran, *supra* note 13; see also Yair Listokin and David M. Schizer, *I Like to Pay Taxes: Taxpayer Support for Government Spending and the Efficiency of the Tax System*, 66 TAX L. REV. 179 (2013). Since most people now live in urban areas and even more are expected to move there in the future, changing behaviors in just a few city sectors, such as transportation, land use, waste, and energy consumption, could make a considerable impact on climate change.

15. Katherine A. Trisolini, *All Hands on Deck: Local Governments and the Potential for Bidirectional Climate Change Regulation*, 62 STAN. L. REV. 669 (2010).

16. See Patricia M. DeChristopher, *Flexibility, Efficiency, Integration: Local Lessons in Sustainable Development*, 16 COLO. J. INT'L ENVTL. L. & POL'Y 157 (2005); Myanna M. Dellinger, *Localizing Climate Change Action*, 14 MINN. J. L. SCI. & TECH. 603 (2013); Joe Loper, *Evaluating Existing State and Local Tax Codes from an 'Environmental Tax' Perspective: The Case of Energy-Related Taxes*, 12 PACE ENVTL. L. REV. 61 (1994); Robert B. McKinstry, Jr., *Laboratories for Local Solutions for Global Problems: State, Local, and Private Leadership in Developing Strategies to Mitigate the Causes and Effects of Climate Change*, 12 PENN. ST. ENVTL. L. REV. 15 (2004); Hari M. Osofsky & Janet Koven Levit, *The Scale of Networks: Local Climate Change Coalitions*, 8 CHI. J. INT'L L. 409 (2008) (“A growing scholarly and public policy dialogue examines . . . the role of localities in

Tax initiatives in particular can provide a price signal that can direct investment into new technologies or provide a motivation for people to change their behavior.¹⁷ Thus, tax initiatives can have a triple-effect on curbing climate change. First, tax deductions and credits in the income tax system can incentivize good behavior.¹⁸ Second, environmental taxes can punish bad behavior.¹⁹ Third, the revenue generated from environmental taxes can be used to promote environmental practices that can combat carbon emissions and climate change.²⁰ New and innovative local tax policies, in combination with other initiatives, such as cap-and-trade, should be instituted that allow us to move forward in the fight against climate change.²¹

Part I of this Article examines International and U.S. federal climate change initiatives, as well as those in several Scandinavian and European countries. Part II of this Article compares carbon tax to cap-and-trade and assesses these market initiatives based on economic, equitable, and other criteria. Part III explores regional, state and local carbon reduction initiatives in the Western North America and urges these types of initiatives be expanded throughout the U.S. and Canada. Part IV makes some general assessments and addresses the challenges to reform, such as constitutional, practical, and political issues. Lastly, the Article concludes with a call for the federal U.S. and international communities to take note of the innovative policies that have been implemented in Western North America. A state/province lead multilateral cap-and-trade program expanding throughout North America combined with local carbon taxes would be the best way to approach

climate change regulation. To date, however, analyses of cities' participation in climate policy have largely focused on some combination of law and policy initiatives, urban theory, and the intersection of international law with political science.”).

17. See Kenneth R. Richards, *Framing Environmental Policy Instrument Choice*, 10 DUKE ENVTL. L. & POL’Y F. 221, 225 (2000); see also Jonathan Baert Wiener, *Global Environmental Regulation: Instrument Choice in Legal Context*, 108 YALE L.J. 677, 677–800 (1999).

18. Janet E. Milne, *Environmental Taxation in the United States: The Long View*, 15 LEWIS & CLARK L.R. 424 (2011) [hereinafter *Environmental Taxation in the United States*]; see also Stanley S. Surrey, *Tax Incentives as a Device for Implementing Governmental Policy: A Comparison with Direct Government Expenditures*, 83 HARV. L. REV. 705, 713–38 (1970) (Surrey is of the view that direct subsidies are as good as, if not better than, tax subsidies); Charles D. Patterson, III, *Environmental Taxes and Subsidies: What is the Appropriate Fiscal Policy for Dealing with Modern Environmental Problems?* 24 WM. & MARY ENVTL. L. & POL’Y REV. 121, 121–59 (2000).

19. Milne, *Environmental Taxation in the United States*, *supra* note 18.

20. See Stephen Sewalk, *Carbon Tax with Reinvestment Trumps Cap-and-Trade*, 30 PACE ENVTL. L. REV. 580, 580–83 (2013); available at <http://digitalcommons.pace.edu/pelr/vol30/iss2/8>; Marie Al Kirk & Christian L. Wade, *A Taxing Problem for Environmental Justice: The Tax Money From Hazardous Waste Facilities, Where It Goes, and What It Means*, 16 STAN. ENVTL. L.J. 201 (1997).

21. See *infra* notes 289–91 and accompanying text.

this problem.²² Such a plan might “nudge” the federal government into passing needed legislation, but would at least give a message to the world that it is possible to address the problems of climate change.²³

I. INTERNATIONAL & U.S. FEDERAL CLIMATE CHANGE INITIATIVES

International and U.S. federal climate change initiatives have proven to be inadequate at preventing climate change. UN Conventions and international treaties have failed to stop global warming. The U.S. has also failed in its passage of a carbon tax and cap-and-trade regime. Very few countries have been successful at harnessing market initiative into effective global change policy.

A. *International Climate Change Initiatives Have Failed*

At the Rio Earth Summit in 1992, the first major international agreement on climate change—the United Nations Framework Convention on Climate Change (UNFCCC)—was drafted.²⁴ The UNFCCC states as its ultimate objective is to achieve²⁵

Stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, ensure that food production is not threatened, and enable economic development to proceed in a sustainable manner.

UNFCCC sets forth a framework of guiding principles and includes general commitments applicable to all parties. This framework was significant because

22. See WORLD BANK GROUP, *States and Trends of Carbon Pricing* 22 (May 13, 2014), <http://www-wds.worldbank.org/external/default/WDSPContentServer/WDSP/IB/2014/05/27/00045628620140527095323/Rendered/PDF/882840AR0REPLA00EPI2102680Box385232.pdf> [hereinafter WORLD BANK] (stating market instruments can “co-exist in harmony and complement each other effectively”).

23. RICHARD H. THALER & CASS. R. SUNSTEIN, *NUDGE: IMPROVING DECISIONS ABOUT HEALTH, WEALTH, AND HAPPINESS* 5 (Yale University Press ed., 2008) (describing “libertarian paternalism” as a way to try to influence people’s behavior in a direction that will benefit them); see also Annabelle Jaeger, *Five Reasons Why Local Government Should Influence Climate Change Plans*, THE GUARDIAN (Jan. 6, 2015, 2:00 PM), <http://www.theguardian.com/public-leaders-network/2015/jan/06/local-government-climate-change-plans>.

24. United Nations Framework Convention of Climate Change, INC/FCCC 5th Sess., 2d Part, at Annex I, U.N. Doc. A/AC.237/18 (Part II) (May 9, 1992), <https://unfccc.int/resource/docs/convkp/conveng.pdf>.

25. *Id.* at 4.

it represented a solid collaborative commitment from all corners of the globe to prevent GHG concentrations in the atmosphere.

Five years after the original Rio Earth Summit, the first international protocol was passed in 1997, at Kyoto, Japan, and entered into force in 2005.²⁶ The Protocol set forth national emission reduction targets for developed nations to meet in two commitment periods between 2008-2012 and 2013-2020, as well as a flexible mechanism to meet them.²⁷ By 2009, the Protocol had been adopted by 192 parties.²⁸ However, the United States, along with many other nations who signed the Protocol, refused to ratify it.²⁹ Canada signed and ratified the Treaty, but withdrew in 2011.³⁰ In the second commitment period, only 12% of the world's GHG emissions were covered and only 9 countries had ratified the Treaty.³¹ Russia, Japan, and New Zealand, three major carbon emitters, officially pulled out during this second commitment period.³² Therefore, while the Kyoto Protocol initially seemed like a significant step in the right direction, in recent years

26. See Kyoto Protocol to the United Nations Framework Convention on Climate Change 3 (1998), <http://unfccc.int/resource/docs/convkp/kpeng.pdf> [hereinafter "Protocol" or "Kyoto Protocol" or "Treaty"]. The Protocol set forth specific limitations on annual GHG emissions. The limit could be satisfied by reducing GHG emissions, investing in carbon "sinks" that remove GHG from the atmosphere, or by acquiring emission reduction units from other parties. *Id.* at 3-9. See also United Nations Framework on Climate Change, *UN Climate Change Newsroom* (1992), <http://unfccc.int/index.html>; see also United Nations Framework on Climate Change, *Status of Ratification of the Kyoto Protocol* (2014), http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php.

27. The Protocol was amended in 2012 to accommodate the 2013-2020 commitment period in what was known as the Doha Amendment of the Kyoto Protocol. However, as of August 2015, the Doha Amendment was not yet in force. See International Institute for Sustainable Development, *August Update on Doha Amendment Ratification*, Climate Change Policy & Practice. (Aug. 18, 2015), <http://climate-iiisd.org/news/august-update-on-doha-amendment-ratification/>; see also United Nations Framework Convention of Climate Change, *Status of the Doha Amendment* (Dec. 21, 2015), http://unfccc.int/kyoto_protocol/doha_amendment/items/7362.php (providing interactive map showing ratification of the Doha Amendment establishing the Second Commitment Period of the KP.).

28. United Nations Framework Convention on Climate Change, *Status of Ratification of the Kyoto Protocol* (2014), http://unfccc.int/kyoto_protocol/status_of_ratification/items/2613.php.

29. See Sewalk, *Europe Should Dump Cap-and-Trade in Favor of Carbon Tax with Reinvestment to Reduce Global Emissions*, WASH. & LEE J. CLIMATE ENERGY & ENV'T 355, 364 n.51 (2014) [hereinafter *Europe Should Dump Cap-and-Trade*].

30. Trisolini, *supra* note 15, at 671; see also David G. Duff, *Carbon Taxation in British Columbia*, 10 VT. J. ENVTL. L. 87, 88 (2008), http://vjel.vermontlaw.edu/files/2013/06/Carbon_Taxation_in_British_Columbia.pdf ("GHG emissions in Canada increased substantially throughout the 1990s and early 2000's; reaching 747 million tons in 2005-over 25% higher than 1990 level and almost 34% higher than Canada's commitment under the Kyoto Protocol").

31. WORLD BANK, *supra* note 22, at 14.

32. *Id.* at 16.

it has been a disappointing failure. At best, it has resulted in non-binding, soft targets from most participants.

The lack of binding participation on the international level became apparent in 2007 at the Intergovernmental Panel on Climate Change (IPCC), when the Panel released its Fourth Assessment Report.³³ This report indicated that global emissions would need to be reduced by 80-90% or more by 2050.³⁴ In the same year, the comprehensive Stern Review on the Economics of Climate Change carried out by the U.K. Treasury concluded that economic cost of delayed greenhouse gas reductions would be far greater than previously projected.³⁵ Yet, in 2009, at the UNFCCC's 15th Conference of the Parties (COP15) in Copenhagen, a binding agreement had still not been created. The agreement that was created at COP15 in 2009, the "Copenhagen Accord," provided a "soft" commitment to keep the global temperature increase below two degrees and a scheme to protect tropical rainforests known as Reducing Emissions from Deforestation and Forest Degradation (REDD).³⁶ While the COP18 in 2013 in Warsaw modified REDD (REDD+)³⁷ and focused on "urbanization, and specifically buildings and transport, and on the role of local government to enhance global mitigation efforts,"³⁸ nothing binding was passed.³⁹

Yet, despite these efforts, REDD+ has failed.⁴⁰ In addition, the United Nations Convention to Combat Desertification has failed.⁴¹ This convention's

33. See *Climate Change 2014 Synthesis Report Summary for Policymakers*, INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, (2014), http://ipcc.ch/pdf/assessment-report/ar5/syr/AR5_SYR_FINAL_SPM.pdf.

34. *Id.*

35. NICHOLAS STERN, *THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW*, xv, 511 (Cambridge University Press ed., 2007).

36. Proposal by the President, Copenhagen Accord (Dec. 18, 2009), <http://unfccc.int/resource/docs/2009/cop15/eng/l07.pdf>.

37. WORLD BANK, *supra* note 22, at 37, 42.

38. *Id.* at 37. Although the past climate change initiatives have failed, the Mediterranean Action Plan and Montreal Protocol on ozone depletion were a success. See Paul G. Harris, *Collective Action on Climate Change: The Logic of Regime Failure*, 47 NAT. RESOURCES J. 195 (2007).

39. See Press Release, United Nations Climate Change Conference in Warsaw Keeps Governments on a Track Towards 2015 Climate Agreement (Nov. 23, 2013), http://unfccc.int/files/press/news_room/press_releases_and_advisories/application/pdf/131123_pr_closing_cop19.pdf.

40. Chris Lang, *The Dismal Failure of the REDD+ Partnership*, REDD MONITOR (Nov. 20, 2014), <http://www.redd-monitor.org/2014/11/20/the-dismal-failure-of-the-redd-partnership>.

41. STEPHEN EMMOTT, *TEN BILLION 188* (Vintage Books 2013).

“emphasis on a bottom-up approach” to stop land degradation and desertification “suggests that a different approach may lead to more meaningful results.”⁴² Recent United Nations data “suggest that fifty percent of drylands currently under agricultural cultivation are moderately or severely degraded, and 12 million hectares of productive land become barren each year due to desertification and drought.”⁴³ Lastly, the Convention on Biological Diversity has failed.⁴⁴ With no compliance mechanism, this Convention is very weak and thus fails to stop “monstrous projects.”⁴⁵ If global temperatures rise by more than 3.5°C “70% of the world’s known species risk extinction.”⁴⁶

The twenty-first Climate Change Conference in Paris in December 2015, made some significant steps in our fight against climate change, but will only become legally binding if fifty-five parties to the Agreement sign on.⁴⁷ Over 190 countries “pledged” to hold average global temperatures to below 2 degrees Celsius (or 3.6 degrees Fahrenheit).⁴⁸ The Agreement calls on the countries to report their progress and revisit their targets every five years.⁴⁹ Unfortunately, nonbinding global climate change initiatives have failed in the past and may not succeed in the future.⁵⁰

42. Alon Tal & Jessica A. Cohen, *Bringing “Top-Down” to “Bottom-Up”: A New Role for Environmental Legislation in Combating Desertification*, 31 HARV. ENVTL. L. REV. 163, 215–17 (2007).

43. Selley Weton, Michela Biasutti & Michael B. Gerrard, *Legal & Scientific Integrity in Advancing a “Land Degradation Neutral World,”* 40 COLUM. J. ENVTL. L. 39, 40 (2015).

44. EMMOTT, *supra* note 41, at 188.

45. Rachael Waxler Ruiz, *The Convention on Biological Diversity: An Affectionation of Conservation Exposed by the Interoceanic Chinese-backed Nicaraguan Canal*, 28 TUL. ENVTL. L.J. 455, 479 (2015); *see also* Rachelle Adam, *Missing the 2010 Biodiversity Target: A Wake-up Call for the Convention on Biodiversity?*, 21 COLO. J. INT’L ENVTL. L. & POL’Y 123 (2010).

46. Anup Shah, *Loss of Biodiversity and Extinctions*, GLOBAL ISSUES, <http://www.globalissues.org/article/171/loss-of-biodiversity-and-extinctions> (last updated Jan. 19, 2014).

47. Adoption of the Paris Agreement, Proposal by the President (Dec. 11, 2015), <http://unfccc.int/resource/docs/2015/cop21/eng/l09r01.pdf> [hereinafter Paris Agreement].

48. WORLD BANK, *supra* note 22, at 22 (stating an aspiration of “much needed international partnerships”); *see also* 2015 Paris Climate Conference, FRANCE DIPLOMATIE, <http://www.diplomatie.gouv.fr/en/french-foreign-policy/climate/2015-paris-climate-conference-cop21> (last visited Dec. 23, 2015).

49. Paris Agreement, *supra* note 47, at 4.

50. Harris, *supra* note 38, at 197. (“Despite the Kyoto Protocol entering into force in February 2005, the climate regime has been a failure”); *see also* Press Release, General Assembly, Failure to Constrain Climate Change Will Create ‘Climate Chaos’, Secretary-General Says at High-Level General Assembly Event Aimed at Inspiring Ambitious Accord, U.N. Press Release GA/11658 (June 29, 2015).

B. U.S. Federal Climate Change Policies Have Failed

The U.S. federal government's climate change policies have been largely ineffective at reducing GHG emissions and preventing climate change. In the absence of Congressional action mandating a cap-and-trade system or a carbon tax, the federal government's climate change policies have largely revolved around new EPA rules and a limited number of tax policies.⁵¹ In general, the U.S. federal climate change policies have mostly failed.

Creating an effective climate change policy at the federal level has proven difficult for political reasons.⁵² During the 2008 presidential election, president-elect Obama supported the use of a cap-and-trade system to cut greenhouse gas emissions by 80% by 2050 made his intention known that he wanted the U.S. to become a leader in climate change.⁵³ The cap-and-trade system that President Obama supported was a federal environmental policy that imposed a mandatory cap on omissions while providing flexible compliance options.⁵⁴ The program aimed to reward innovation, efficiency, and early action without inhibiting economic growth.⁵⁵ Once elected, President Obama issued Executive Order 13514 on Oct. 5, 2009, requiring federal

51. Thomas M. Gremillion, *Setting the Foundation: Climate Change Adaptation at the Local Level*, 41 ENVTL. L. 1221, n.189 (2011) (citing Alejandro E. Camacho, *Adapting Governance to Climate Change: Managing Uncertainty Through a Learning Infrastructure*, 59 EMORY L.J. 1, 26 (2009)); see also Robert L. Glicksman, *Climate Change Adaptation: A Collective Perspective on Federalism Considerations*, 40 ENVTL. L. 1159, 1163 (2010) ("Despite the critical need for the development of adaptive response to climate change, the federal government has done little to stake out its turf on adaptation policy or to coordinate the response of lower levels of government"); and see J.B. Ruhl, *Climate Change Adaptation and the Structural Transformation of Environmental Law*, 40 ENVTL. L. 363, 412 (2010) ("The United States has compiled close to zero in the way of coordinated anticipatory adaptation policy for managing the risk in the United States of climate change catastrophe and crisis").

52. Many prominent Republicans do not even believe in global warming or climate change or do not believe it is an immediate threat. Ashley Parker, *Day After Fed Uproar, Perry Tones It Down*, N.Y. TIMES, Aug. 17, 2011, <http://www.nytimes.com/2011/08/18/us/politics/18perry.html>.

53. Robert N. Stavins, *Obama's Speech on a U.S. Cap-and-Trade System and Global Climate Negotiations*, BELFER CENTER (Nov. 20, 2008), http://belfercenter.ksg.harvard.edu/publication/18682/obamas_speech_on_a_us_capandtrade_system_and_global_climate_negotiations.html.

54. *Id.*

55. *Cap and Trade*, U.S. ENVTL. PROT. AGENCY, <http://www.epa.gov/captrade> (last visited Dec. 23, 2015).

agencies to undertake various measures to reduce GHG emissions⁵⁶ and to identify climate change strategies in conjunction with the interagency Climate Change Adaptation Task Force.⁵⁷ As of the writing of this Article however, most agencies have only made promises.⁵⁸ Some have argued that federal policy failed to encourage coordination with state and local authorities while others even argued federal policy inhibited best practices of local jurisdictions.⁵⁹ However, what is clear is that the policy got bogged down in the political doldrums and was never successfully fully implemented.

An equally exciting, but ultimately unsuccessful, attempt by a U.S. federal agency to control climate change came from the National Oceanic and Atmospheric Administration (NOAA). NOAA had proposed a reorganization to create a national Climate Service, centralizing federal sources of information on climate change strategies.⁶⁰ Congressional Republicans, unfortunately, have targeted NOAA's revenue-neutral reorganization in recent spending bills and cut off funding to the Climate Service.⁶¹

With the current failure of the Republican Congress to pass climate change legislation, the Obama administration's efforts have been focused on the EPA's initiative to treat greenhouse gas emissions as pollution under the Clean Air Act.⁶² The EPA recently set forth clean energy guidelines (the Clean Power Plan or CPP) for fuel-fired electric plants.⁶³ The CPP

56. Exec. Order No. 13514, 74 Fed. Reg. 52,117 (Oct. 5, 2009) (revoked by Exec. Order No. 13693, 80 Fed. Reg. 15,871 (Mar. 19, 2015)). Pursuant to the Executive Order, all federal agencies were required by June 2011 to issue an agency-wide climate change adaptation policy statement, which commits the agency to adaptation planning to address challenges posed by climate change risks to the agency's mission, programs, and operations. *Id.*

57. *Id.*

58. See, e.g., U.S. Dep't of Transp., *Strategic Sustainability Performance Plan*, June 2014, <https://www.transportation.gov/sites/dot.gov/files/docs/2014-DOT-Strategic-Sustainability-Performance-Plan.pdf>.

59. Alejandro E. Camacho, *Adapting Governance in Climate Change: Managing Uncertainty Through a Learning Infrastructure*, 59 EMORY L.J. 1, 26 (2009); Glicksman, *supra* note 51, at 26; Ruhl, *supra* note 51, at 412.

60. Emily Yehle, *Appropriations: House Votes to Slash Climate Research, Block New Red Snapper Fishing Plan*, E&E PUBLISHING, LLC, June 4, 2015, <http://www.eenews.net/stories/106001948>; see also *Examining NOAA's Climate Service Proposal: Hearing Before the H. Comm. on Sci., Space, & Tech.*, 112th Cong. 1–3 (2011) (statement of Dr. Jane Lubchenco, Administrator, NOAA).

61. Press Release. H. Comm. on Sci., Space & Tech., Republicans Raise Concerns with NOAA Climate Service, EPA Science Activities (Mar. 10, 2011), <https://science.house.gov/news/press-releases/republicans-raise-concerns-noaa-climate-service-epa-science-activities>.

62. The Clean Air Act of 1963, 42 U.S.C. § 7401(d)(2014).

63. *Clean Power Plan for Existing Power Plants*, U.S. ENVTL. PROT. AGENCY, <http://www2.epa.gov/cleanpowerplan/clean-power-plan-existing-power-plants#additional-resources> (last visited Dec. 24, 2015).

requires each state to submit an implementation plan for EPA approval by June 16, 2016 and authorizes the states to use market-based programs to meet emission targets.⁶⁴ Issues surrounding whether the CPP is within the scope of EPA authority has been tied up in litigation.⁶⁵ The Supreme Court is expected to hear the case in 2018 or 2019.⁶⁶ Unfortunately, the regulatory approach is often slow, complex and inefficient.

In the federal tax law area, environmental taxes and income tax incentives have largely failed to combat climate change.⁶⁷ Very few environmental initiatives exist; and, the ones that do have a very small effect on climate change.⁶⁸ Environmental taxes are imposed on crude oil and petroleum products (oil spill liability), the sale or use of ozone-depleting chemicals (ODCs), imported products containing or manufactured with ODCs,⁶⁹ and gas guzzling cars.⁷⁰ These taxes are antiquated, too narrowly tailored, and as a result, are ineffective in combatting climate change.⁷¹ Tax incentives have often subsidized bad environmental activities, such as oil and gas exploration, with minimal benefits for renewable energy and conservation.⁷²

64. See Craig Gannett, *Implementing Section 111(D) of the Clean Air Act: The Pathway to Regional Cap-and-Trade Programs?*, ROCKY MOUNTAIN MIN. L. FOUND. 8–3 (Jan. 2015) (noting the allowance of “market-based trading programs”).

65. *Massachusetts v. Envtl. Prot. Agency*, 549 U.S. 497 (2007); *Util. Air Regulatory Grp. v. Envtl. Prot. Agency*, 134 S. Ct. 2427 (2014).

66. Gannett, *supra* note 64, at 9–10 (“To make matters more complicated, the current demographics of the Court suggest that the outcome of this case may turn on the 2016 Presidential election”).

67. Roberta F. Mann, *Waiting to Exhale?: Global Warming and Tax Policy*, 51 AM. U. L. REV. 1135, 1135–1222 (2002).

68. See Janet E. Milne, *Environmental Taxation in the United States: Retrospective and Prospective*, in GREEN TAXATION IN EAST ASIA 113 (Richard Cullen et al. eds., 2011).

69. *Environmental Taxes*, INTERNAL REVENUE SERV., <https://www.irs.gov/publications/p510/ch03.html> (last visited Dec. 24, 2015).

70. See Milne, *supra* note 68, at 122 (Milne explains that the Gas Guzzler Tax has been largely ineffective because of the exception for non-passenger vehicles like SUVs and the tax rates have not been increased since 1990); see also Gas Guzzler Tax, 26 U.S.C. § 4064 (2005); and see 40 C.F.R. § 600.306-86 (2011).

71. See Yoram Margalioth, *Tax Policy Analysis of Climate Change*, 64 TAX L. REV. 63, 63–98 (2010).

72. Mona L. Hymel, *The Population Crisis: The Stork, The Plow, and the IRS*, 77 N.C. L. REV. 13, 18 (1998); see also Ajay Gupta, *Does the Tax Code Favor Fossil Fuels?*, 149 TAX NOTES 331 (2015) (“President Obama has annually called for eliminating a dozen or so tax preferences supposedly subsidizing fossil fuel production. According to the administration’s fiscal 2016 budget, retaining those items would cost an aggregate of \$49.7 billion in forgone revenue over 10 years.” Gupta goes on to enumerate the following tax provision the administration wants to eliminate or reduce: (1) Section 263(a) (expensing

Some successes have been made in wind and solar energy.⁷³ However, much more reform is needed. Federal tax policy should incentivize clean and renewable energy, preserve and protect carbon sinks, promote efficient and clean-fuel vehicles, subsidize energy-efficient buildings and appliances, and reduce methane and other harmful GHG gas emissions. *See* summary Chart I below for reform suggestions.

CHART I: ENVIRONMENTAL TAX INCENTIVES

Sector	The Bad	The Good	Reform
Energy ⁷⁴	Coal-fired ⁷⁵ Oil-fired ⁷⁶ Nuclear ⁷⁷	Renewable: Wind, solar, hydroelectric, geothermal Energy conservation Increasing efficiency Reducing waste	Reduce or eliminate the current oil, gas and coal subsidies. • Percentage depletion; • Intangible drilling cost; • Enhanced oil recovery credits;

of intangible drilling expenses); (2) Section 616(a) (expensing of development costs for mine or other natural deposits other than oil or gas well); (3) Section 617(a) (deduction for mining exploration costs); (4) Section 193 (qualified tertiary injectant expenses); (5) Section 174 (expensing of research and development costs); (6) Section 613 and 613A (percentage depletion); and (7) Section 199 (domestic manufacturing deduction for oil and natural gas)); *but see* John A. Bogdanski, *Reflections on the Environmental Impacts of Federal Tax Subsidies for Oil, Gas, and Timber Production*, 15 LEWIS & CLARK L. REV. 323, 332–33 (2011).

73. RUSSELL H. PLANTE, *SOLAR ENERGY PHOTOVOLTAICS AND DOMESTIC HOT WATER* 116 (1 ed. 2014); CRAIG M. KLINE, *SOLAR IN THE LAW OF CLEAN ENERGY: EFFICIENCY AND RENEWABLES* 391, 394 (Michael B. Gerrard ed., 2011); Eric Stoutenburg, *Combining Offshore Wind and Wave Farms to Facilitate Grid Integration of Variable Renewables*, STANFORD WOODS INST. FOR THE ENV'T (Apr. 23, 2012, 4:15-5:15 PM), <http://energyseminar.stanford.edu/node/429>.

74. Richard Westin, *What to Do With Proceeds of a Carbon Tax?*, 115 TAX NOTES 191–93 (2007); Shi-Ling Hsu, *Reducing Emissions From the Electricity Generation Industry: Can We Finally Do It?*, 14 TUL. ENVTL. L.J. 427 (2001).

75. Roberta Mann, *Another Day Older and Deeper in Debt: How Tax Incentives Encourage Burning Coal and the Consequences for Global Warming*, 20 PAC. MCGEORGE GLOBAL BUS. & DEV. L.J. 111 (2007).

76. Mona L. Hymel, *Environmental Tax Policy in the United States: A “Bit” of History*, 3 ARIZ. J. ENVTL. L. & POL’Y 157, 162 (2013).

77. Katarina Olivia Savino, *The Case of Nuclear Power Incentives*, 123 TAX NOTES 329, 331 (2009).

			<p>Pass new energy law extending and adding tax incentives</p> <ul style="list-style-type: none">• Extend and modify the renewable energy production tax credit;• Extend and modify the solar energy and fuel-cell investment tax credit;• Remove the caps on credits for residential solar property and residential fuel-cell property;• Create a tax credit for plug-in hybrid vehicles;• Create a credit for cellulosic alcohol production;• Extend the credit for biodiesel production;
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			<ul style="list-style-type: none"> • Extend and increase the credit for alternative refueling stations; • Eliminate the “SUV loophole,” which allows business to claim a tax break for buying less-efficient heavy vehicles; and • Create renewable energy bonds for public power providers and electric cooperative
Forestry ⁷⁸	Clear-cutting Logging Soil erosion Nonsustainable forest practices	Preserve existing forests Increase carbon sequestration by planting new forests Increase wildlife habitat and biodiversity Prevent soil erosion	Eliminating below-cost timber sales and other subsidies on public lands End preferential timber-tax treatment <ul style="list-style-type: none"> • Capital gains for timber sales

78. See generally Janet E. Milne, *Timber Taxes: A Critique of the Northern Forest Lands Council's Tax Recommendations*, 19 VT. L. REV. 423 (1995); LARRY KREISER ET AL., ENVTL. TAXATION AND CLIMATE CHANGE: ACHIEVING ENVTL. SUSTAINABILITY THROUGH FISCAL POLICY 150, 151 (Larry Kreiser et al. eds., 10th ed. 2011); Mann, *supra* note 67.

		Improve watershed management Harvest forests sustainably Preserve spiritual respite and scenic beauty for humans	<ul style="list-style-type: none"> • Expanding timber production • Continue incentives for conservation and reforestation • Allow tax credits for carbon sequestration
Industry ⁷⁹	Low energy efficiency Non or low recyclable content	High energy High recyclable content ⁸⁰	Limit the advertising deduction ⁸¹ Eliminate policies favoring debt and consumption Impose pollution tax on SO ₂ , NO, noise, air and water pollution
Agriculture ⁸²	Erosion of wetlands Nitrogen fertilizer High	Organic farming Local production Sustainable farming	Eliminate or reduce bad tax incentives

79. Mona Hymel, *The United States' Experience With Energy-Based Tax Incentives: The Evidence Supporting Tax Incentives for Renewable Energy*, 38 LOY. U. CHI. L.J. 43, 53, 67 (2006).

80. Britt Anne Bernheim, *Can We Cure Our Throwaway Habits by Imposing the True Social Cost on Disposable Products?*, 63 U. COLO. L. REV. 953, 966 (1992).

81. Mona L. Hymel, *Consumerism, Advertising, and the Role of Tax Policy*, 20 VA. TAX REV. 347, 349 (2000).

82. Hymel, *The Population Crisis*, *supra* note 72, at 76, 86.

	transportation costs Eutrophication		<ul style="list-style-type: none"> • Capital intensive subsidies • Capital gains preferences on sale of cattle • Cash method for farmers Impose tax on fertilizer
Transportation ⁸³	Fuel-inefficient cars Airplane travel Parking	Fuel-efficient cars Public transportation Walking/biking	Eliminate the tax preferences for commuting <ul style="list-style-type: none"> • Tax the parking provided by the employer • Reduce expensing of light trucks (SUVs) • Eliminate light truck exception to gas-guzzle tax Continue to promote hybrids and electric cars, carpooling, and biking Increase gasoline tax
Housing ⁸⁴	Urban sprawl Erosion of	High-density housing/multi-	Limit mortgage interest

83. See generally Roberta F. Mann, *On the Road Again: How Tax Policy Drives Transportation Choice*, 24 VA. TAX REV. 587, 595 (2005).

84. Mark Andrew Snider, *The Suburban Advantage: Are the Tax Benefits of Home Ownership Defensible?*, 32 N. KY. L. REV. 157, 158–87 (2005); Roberta F. Mann, *The*

	wetlands Large new and/or inefficient homes in open areas Inefficient appliances	family Renovated homes Energy efficient homes High energy efficient appliances	deduction on low energy- efficient homes or on large homes Disallow mortgage deduction on vacation homes Tax inefficient appliances
Population ⁸⁵	Over population Over consumption	Limit population Limit consumption	Limit dependency exemption Eliminate or limit the per- child credit Tax consumption (VAT or National sales tax)
Other ⁸⁶ Reduce methane and other GHG emissions			

(Not So) *Little House on the Prairie: The Hidden Costs of the Home Mortgage Interest Deduction*, 32 ARIZ. ST. L.J. 1347, 1347–97 (2000).

85. Hymel, *supra* note 72, at 48, 55.

86. See Duff, *supra* note 9, at 2107–09.

The main reason for the environmental climate change conundrum in America is political.⁸⁷ Therefore, like the failed attempts to prevent climate change on the international level, a large-scale solution to climate change at the U.S. federal level is unlikely in the near future.⁸⁸ Therefore, from a federal policymaking standpoint, the U.S. federal government's promises to reduce climate change have followed the global climate change trend—with a bunch of hot air.

C. A Few Countries Have Had Successes But Most Have Failed

Some Scandinavian and European countries have passed effective carbon taxes, usually in combination with other forms of energy and pollution taxation and tax subsidies.⁸⁹ In addition, many of these countries are also part of the regional emissions trading system (the EU ETS), thus demonstrating that a country can utilize both of these carbon pricing mechanisms.⁹⁰ Some countries, like Australia, have passed carbon taxes and then repealed them.⁹¹ Other countries have proposed carbon taxes, but never passed them.⁹² Most countries of the world, however, have never even contemplated a carbon tax.⁹³

87. A majority of the population thinks the economy, not the environment, is the most important problem the country faces today. *See Most Important Problem*, GALLUP, <http://www.gallup.com/poll/1675/most-important-problem.aspx> (last visited Dec. 26, 2015).

88. *See* Roberta F. Mann, *The Case for the Carbon Tax: How to Overcome Politics and Find Our Green Destiny*, 39 ENVTL. L. REP. NEWS & ANALYSIS 10118, 10119 (2009) (stating that “it appears inevitable that Congress will enact some sort of federal climate change legislation in the next few years”).

89. CARBON TAX CTR., *Where Carbon is Taxed*, <http://www.carbontax.org/progress/where-carbon-is-taxed> (last updated Apr. 6, 2016); *see also* Duff, *Tax Policy and Global Warming*, *supra* note 9, at 2092, 2094 (mentioning how Scandinavian countries use a combination of tax and subsidy approaches and pointing out the fertilizer tax in Sweden). Denmark also has a sulfur tax. *See infra* note 112.

90. Denmark, Finland, France, Finland, Germany, Ireland, Italy, the Netherlands Portugal, Sweden, and the UK are part of the EU. *See EU Member Countries*, EUROPEAN UNION, http://europa.eu/about-eu/countries/member-countries/index_en.htm (last visited Dec. 26, 2015).

91. For countries that have enacted a carbon tax, *see* CARBON TAX CTR., *supra* note 89.

92. For countries that have proposed a carbon tax, *see* CARBON TAX CTR., *supra* note 89.

93. *See* EUROPEAN ENV'T AGENCY, *Progress Towards 2008–2012 Kyoto Target in Europe* (2014), <http://www.eea.europa.eu/publications/progress-towards-2008-2012-kyoto#tab-news-and-articles>.

1. The Scandinavian Success Stories

The Scandinavian countries of Sweden, Denmark, Finland and Norway have been the pioneers in carbon taxation. Perhaps the most successful country has been Sweden, followed by Denmark and Finland. In contrast, Norway's carbon tax has been largely ineffective at reducing GHG emissions. The lessons learned here are that the effectiveness of the carbon tax depends on a number of factors, such as the scope of the tax, its rate, exemptions, and where the revenue from the tax goes.

The Swedish carbon tax, passed in 1991, has the highest rate of all countries in the world.⁹⁴ Like most successful carbon tax initiatives the initial rates were to increase over time.⁹⁵ As of 2014, the rate was equivalent to US \$168/tCO₂.⁹⁶ The tax is broad based in its scope, covering all fossil fuels used for heating and all motor fuels for transport—about 25% of the GHG emissions in the country.⁹⁷ To enhance business competitiveness and support economic efficiency, the tax is higher on households and the service sector⁹⁸ and lower in sectors subject to international competition.⁹⁹ The tax is compatible with EU ETS as fossil fuels regulated there are fully exempt and even non-ETS industry and agriculture are partially exempt.¹⁰⁰ Instead of directly providing exemptions to all GHG emissions covered under the EU Cap-and-Trade system, exemptions gradually increased over time.¹⁰¹ Administrative costs have been low, less than 0.1% of the revenue collected,¹⁰² and revenue from the tax has been steady from 1993 to 2000

94. WORLD BANK, *supra* note 22, at 17 (stating that the rates range from the high in Sweden to the low in Mexico of US \$1/tCO₂e).

95. Jacqueline Cottrell, Green Budget Economy, United Nations Environment Programme on Carbon Taxes: Fiscal Policies Towards an Inclusive Green Economy (Oct. 8, 2012), Exhibit 3, http://www.unep.org/greeneconomy/Portals/88/documents/research_products/Fiscal%20Policies/2_Cottrell_CarbonTax_IMF_UNEP_GIZ_2012_FINAL.pdf.

96. WORLD BANK, *supra* note 22, at 17.

97. WORLD BANK, *supra* note 22, at 82.

98. Cottrell, *supra* note 95, at 3 (stating that levels of taxation increased from €27 in 1991 to €114 in 2011); Mikael Skou Andersen, Europe's Experience with Carbon-Energy Taxation, 3 S.A.P.I.E.N.S 6–7 (2010), <http://sapiens.revues.org/1072#text> (The “large increase in household electricity taxes depressed real incomes in the short run”).

99. Cottrell, *supra* note 95, at 3 (showing low levels at €7 in 1991 and €34 outside EU, zero within EU ETS, 2011); *see also* WORLD BANK, *supra* note 22, at 82.

100. WORLD BANK, *supra* note 22, at 82.

101. WORLD BANK, *supra* note 22, at 82. (For example, “District heating plants participating in the EU ETS and heat from EU ETS plants are not used for manufacturing purposes now have to pay 80% of the tax rate compared to 94% before 2014.”)

102. Cottrell, *supra* note 95, at 3.

and then increased to \$3.65 billion annually in 2005-2007.¹⁰³ Sweden directs the revenues to the general budget.¹⁰⁴ In other words, Sweden has mainly recycled the revenues to lower income taxes, specifically the tax on labor.¹⁰⁵ Swedish studies have indicated that GHG emissions fell about 15% between 1995 and 1990 and have fallen by more than 40% since the mid-1970s.¹⁰⁶ At the same time, between 1990 and 2007, the Swedish economy has grown over 20%.¹⁰⁷ Interestingly, all political parties were willing to implement this tax.¹⁰⁸ A key ingredient of a successful tax is political leadership and population acceptance.

Denmark is “one of the carbon tax proponents’ favorite case studies.”¹⁰⁹ Passed in 1991, the carbon tax “was part of a larger environmental tax package, which included energy taxes,” a sulfur tax, and subsidies for wind and energy efficiency.¹¹⁰ The tax was broad-based covering all consumption of fossil fuels (oil, natural gas, coal and electricity) and thus approximately 45% of the total GHG emissions in the country.¹¹¹ Designed to minimally impact industry, the rates varied depending on energy use and phased-in over time.¹¹² Tax rates increased each year between 2008 and 2015 and now stand at US \$31/tCO₂ equivalence.¹¹³ Like Sweden, industries subject to the EU ETS are generally exempt, however fuels for the production of district heating are subject to the tax even though covered

103. Jenny Summer et al., Carbon Taxes: A Review of Experience and Policy Design Considerations, Nat’l Renewable Energy Lab, NREL/TP-6A2-47312, at 11 (2009), <http://www.nrel.gov/docs/fy10osti/47312.pdf>.

104. *Id.*

105. Andersen, *supra* note 98, at sec. 2.2 (“It would have been difficult for [Sweden and Finland] to follow the recommendations from the fiscal literature to aim reductions at employers’ social security contributions, because such contributions are relatively small in both countries”).

106. Summer et al., *supra* note 103, at 12; *see also* Sierra Rayne, *The Devil and the Details of National Carbon Tax Experiments*, AMERICAN THINKER (Feb. 21, 2015), http://www.americanthinker.com/blog/2015/02/the_devil_and_the_details_of_national_carbon_tax_experiments.html (“From 1991 to 2003, emissions declined just 0.9 percent. Since 2003, emissions have declined 19 percent and there has been only 19 percent real economic growth during this decade. . .”).

107. Summer et al., *supra* note 103, at 12; *but see* Cottrell, *supra* note 95, at Exhibit 4 (stating that GDP has gone from \$100 billion to \$143 billion). However, the consumer price index has also increased. *See* Andersen, *supra* note 98, at sec. 2.3 (“The Swedish experience suggests that combining carbon-energy taxes on households with reductions in income taxes could cause inflation rates at a level triggering a possible tax interaction effect, but further analysis is required to corroborate this”).

108. Cottrell, *supra* note 95, at 3.

109. Rayne, *supra* note 106.

110. WORLD BANK, *supra* note 22, at 84–85; *see also* Rayne, *supra* note 106.

111. WORLD BANK, *supra* note 22, at 79.

112. *Id.* (demonstrating how when the carbon tax passed, the tax on energy was reduced to maintain an overall even tax rate).

113. *Id.*

in the cap-and-trade.¹¹⁴ Energy-intensive sectors not in the cap-and-trade are given exemptions similar to free allowance in the EU ETS,¹¹⁵ and up until 2014, these sectors could negotiate voluntary agreements to be exempt if covered under the EU ETS.¹¹⁶ In 2008, the revenue from the Danish carbon tax was \$905 million.¹¹⁷ 40% of that revenue is used for environmental subsidies while the other 60% is returned to industry.¹¹⁸ Studies showed that Denmark's industrial emissions "decreased by 23% during the 1990s, after adjusting for growth and market-induced industry restructuring."¹¹⁹ However, unlike Sweden, the Danish economy has "contracted in real terms by 3 percent since 2006."¹²⁰

Finland was the first country to adopt a carbon tax in 1990.¹²¹ This tax was broad-based and imposed on gasoline, diesel, light fuel and heavy fuel oil, jet fuel, aviation gasoline, coal natural gas and electricity.¹²² The tax covers all consumers of fossil fuels, except for fuels for electricity production, commercial aviation and commercial yachting.¹²³ Its scope was limited to covering only 15% of the total GHG emissions in the country.¹²⁴ Like Sweden and Finland, the rates varied on type of fuel and gradually increased over time.¹²⁵ In 2013, the liquid traffic fuel rate was US \$83/tCO₂, whereas the rate for heating fuels increased to US \$48 from \$41.¹²⁶ Like Sweden, all revenues from the tax went directly to the general budget without any earmarking. By lowering income taxes on labor, the impact on lower-income taxpayers was made more equitable.¹²⁷ In 2000,

114. *Id.*

115. *Id.* ("From 2013 incineration plants are included in the EU ETS and thus also doubly regulated.")

116. *Id.*

117. Cindy Bae, *Denmark's Carbon Tax Policy*, THE UNIV. OF BRITISH COLUMBIA BLOG (Feb. 7, 2013), <http://blogs.ubc.ca/cindybae/2013/02/07/denmarks-carbon-tax-policy>.

118. Summer et al., *supra* note 103, at 13.

119. *Cf.* Rayne, *supra* note 106, at 1 ("[B]etween 1992 and 2006, there was absolutely no reduction in Denmark's carbon dioxide emissions—actually, there was a slight increase. Since 2006, there has been a large decrease in emissions (by about one-third)").

120. *Id.*

121. Summer et al., *supra* note 103, at 9.

122. *Id.* ("Coal is subject to a tax of \$73.97 per metric ton, natural gas is subject to a reduced tax rate of \$3.02 per MWh, and liquid fuels are taxed between \$-.07 and \$0.09 per liter." (citing European Environmental Agency).)

123. WORLD BANK, *supra* note 22, at 79.

124. *Id.*

125. *Id.*

126. *Id.*

127. Andersen, *supra* note 98, at 6.

the Finnish government determined that the tax resulted in a reduction of roughly 4 million metric tons of CO₂ (or 7% of emissions) between 1990 and 1998.¹²⁸ Between 2007 and 2012 emissions declined 23 percent.¹²⁹ On the other hand, unlike Sweden, the Finnish national economy “shrunk almost 4 percent in real terms.”¹³⁰

Like Sweden and Denmark, Norway passed a carbon tax in 1991.¹³¹ The taxed sectors include gasoline, light and heavy fuel oil, and oil and gas in the North Sea. Certain industries pay a reduced rate (pulp and paper, fishmeal, domestic aviation, domestic shipping and continental shelf fleet) while some industries (foreign shipping, fishing, and external aviation) are exempt.¹³² Industry “included in the EU ETS are (partially) exempted from the carbon tax, except for the offshore petroleum industry.”¹³³ The tax covered 50% of the GHG emissions in the country.¹³⁴ Like its sister states of Finland and Sweden, revenue from the tax goes into the general government budget.¹³⁵ However, the funds were to be used to finance a special pension fund.¹³⁶ Unfortunately, studies have shown that GHG emissions have increased by 15% from the time the tax was first implemented.¹³⁷ Thus, the Norway carbon tax has mostly failed.

128. Summer et al., *supra* note 103, at 9.

129. Rayne, *supra* note 106.

130. *Id.*

131. WORLD BANK, *supra* note 22, at 10, 81.

132. *Id.* at 10.

133. *Id.* at 80.

134. *Id.* at 81.

135. Summer et al., *supra* note 103, at 10.

136. *Id.*

137. *Id.* Norway also experienced an increase in GDP of 70% since 1990 and that is the excuse used to explain the failure of the carbon tax. See Sumner et. al., *supra* note 103, at 10.

2. Other Countries Carbon Taxes

Several European countries have also passed carbon taxes: France,¹³⁸ Iceland,¹³⁹ Ireland,¹⁴⁰ Italy,¹⁴¹ Netherlands,¹⁴² Portugal,¹⁴³ Switzerland,¹⁴⁴ and the United Kingdom.¹⁴⁵ (See Appendix A) Under these systems, price signals vary, ranging from low tax rates of \$10t/CO₂ in Iceland to \$68t/CO₂ in Switzerland. The taxes are generally broad-based. UK's tax covers approximately 25% of GHG emissions,¹⁴⁶ whereas Iceland's covers 50%.¹⁴⁷ Exemptions, or partial exemptions, are given for firms included in the EU ETS. The use and amount of the revenue collected from the tax have also varied. In the United Kingdom the tax was intended to be revenue neutral with offsetting cuts to the National Insurance Contributions, but ended up being revenue negative.¹⁴⁸ In contrast, the Netherlands tax revenues were

138. See generally Dominique Bureau, *The Political Economy of the 2009 French Carbon Tax Project*, ORGANIZATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (2012), <http://www.oecd.org/env/tools-evaluation/The%20Political%20Economy%20of%20the%202009%20French%20Carbon%20Tax%20project.pdf>.

139. WORLD BANK, *supra* note 22, at 10.

140. See *id.* at 80. In 2010, Ireland passed a carbon tax on emissions from fossil fuels, including kerosene, diesel fuel, liquid petroleum, fuel oil and natural gas. See JENNY H. LIU & JEFF RENFRO, CARBON TAX AND SHIFT: HOW TO MAKE IT WORK FOR OREGON'S ECONOMY 9 (2013), <http://www.pdx.edu/nerc/carbontax2013.pdf>. In 2013, the tax was expanded to solid fuels such as peat and coal. *Id.* The tax only applies to sectors not part of the EU ETS. *Id.* The tax slowly phased in at higher amounts. *Id.* The tax is estimated to generate 500 million pounds of revenue in 2013 and potentially offset the Irish income tax. *Id.* Ireland's Environmental Protection Agency estimates that overall GHG emissions dropped 6.7% and energy GHG emissions dropped by 10.5%. *Id.* This was all done with slight growth in the Irish economy. *Id.*

141. See Svetlana Kovalyova, *Italy to Introduce Carbon Tax to Fund Green Energy*, REUTERS, Apr. 17, 2012, <http://www.reuters.com/article/2012/17/italy-carbontax-idUSL6E8FHALR20120417>.

142. WORLD BANK, *supra* note 22.

143. See *Putting a Price on Carbon with a Tax*, WORLD BANK 1, 3 [hereinafter WORLD BANK 2], http://www.worldbank.org/content/dam/Worldbak/document/Climate/background-notex_carbon-tax.pdf.

144. WORLD BANK, *supra* note 22.

145. *Id.*

146. *Id.* at 83.

147. *Id.* at 80.

148. The United Kingdom passed a limited carbon tax in 2001. Summer et al., *supra* note 103, at 13, 14. The tax covered electricity, natural gas supplied by gas utilities, liquefied gas supplied in a liquid state for heating, and solid fuel, such as coal and coke, lignite. *Id.* at 13. The sectors covered include industrial, commercial, agricultural, public and service sectors and the rates vary depending on the sector. *Id.* Residential sectors were

substantial—over \$4.819 billion and the revenues are used to shift the tax burden off individuals and business as well as recycle a portion for the purchase of environmental equipment.¹⁴⁹ More often the revenue goes into the general fund and is used to shift taxes off individuals and businesses. As far as effectiveness, the taxes vary, as does the impact on the country's economy.¹⁵⁰ (See Chart 4 in Appendix B).

Only a few countries outside Europe have passed carbon taxes. For example, South Africa and Kazakhstan have a carbon tax.¹⁵¹ The countries in South America are just starting to implement carbon taxes.¹⁵² Both Chile and Brazil have proposed a carbon tax.¹⁵³ Australia passed a carbon tax in 2012 and then repealed it in 2014.¹⁵⁴ African countries and Middle Eastern countries including Russia have not enacted any such taxes.¹⁵⁵ Asian countries have generally preferred cap-and-trade, although the Republic of Korea has a carbon tax.¹⁵⁶ (See Appendix A)

3. The EU ETS Has Failed

In 2005, the EU implemented the EU Emissions Trading System (EU ETS) encompassing 27 countries.¹⁵⁷ The EU ETS program covered the electric power sector and the major energy-intensive industrial sector.¹⁵⁸ Many of

excluded. *Id.* A study estimated that the tax would reduce energy demand by 15%. *Id.* at 14.

149. *Id.* at 9. The Netherlands passed a carbon tax in 1990. *Id.* at 1. The tax is broad-based, covering natural gas, electricity, blast furnaces, coke ovens, refinery and coal gas, coal gasification gas, gasoline, diesel, and light fuel. *Id.* at 9. The Netherlands Ministry of Housing, Spatial Planning and the Environment estimated that the tax would be effective in reducing annual emissions by 5%. *Id.*

150. Rayne, *supra* note 106, at 1, 2.

151. WORLD BANK, *supra* note 22, at 83.

152. Costa Rica passed a carbon tax in 1997, but has provided no data since 2005. See Rayne, *supra* note 106, at 1.

153. WORLD BANK, *supra* note 22, at 84.

154. The price was \$23 per ton of carbon emissions and this was “extraordinarily high by international standards and [it] lacked the phased-in approach of other programs such as the EU ETS or the British Columbia carbon tax.” Michael Wara, *Instrument Choice, Carbon Emissions, and Information*, 4 MICH. J. ENVTL. & ADMIN. L. 261, 299 (2015). When the conservative party won the election, the tax was repealed. *Id.* Since it was enacted by a simple majority of the parliament, repeal was easy with the election changes. *Id.* This did not operate as a fixed price tax, it “was not actually a carbon tax.” *Id.*

155. WORLD BANK, *supra* note 22, at 78, 83.

156. *Id.* at 62–68, 84.

157. *Id.* at 70; Rachel Cleetus, *We Need a Well-Designed Cap-and-Trade Program to Fight Global Warming*, UNION OF CONCERNED SCIENTISTS (Jan. 2009), http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/capandtradebackgrounder.pdf.

158. Cleetus, *supra* note 157.

the Scandinavian and European countries discussed above are part of the EU, so in addition to their state carbon taxes, their carbon emitters are subject to a cap-and-trade regime.¹⁵⁹ Usually these industries are exempt or partially exempt from the carbon tax, which could present an issue of effectiveness because the EU ETS had been ineffective.¹⁶⁰

The EU ETS has been criticized on several grounds. First, the cap was set at a too high level and thus was too generous for polluters. In fact, no reduction of emissions occurred because the price of allowances collapsed.¹⁶¹ Second, the allowances were not auctioned but grandfathered to existing industries.¹⁶² The EU ETS ended up distributing 95% of the allowances for free.¹⁶³ Thus, the EU failed to meet its goals under the Kyoto Protocol.¹⁶⁴

Several other jurisdictions outside the EU have passed cap-and-trade systems. Switzerland, New Zealand, Japan, and Kazakhstan have a cap-and-trade, as does Alberta and Québec in Canada.¹⁶⁵ The U.S. has the California (CA) Cap-and-Trade and the Northeastern Regional one.¹⁶⁶ A growing number of countries are considering cap-and-trade, more so than carbon taxes.¹⁶⁷ When added to carbon taxes, about “40 countries and over

159. For a list of the European Union member countries, see *Member countries of the EU*, EUROPEAN UNION, http://europa.eu/about-eu/countries/index_en.htm (last visited Dec. 29, 2015).

160. For Sweden, see *supra* notes 104–08 and accompanying text; for Denmark, see *supra* notes 109–20 and accompanying text, for Norway, see *supra* note 131–37 and accompanying text.

161. See Sewalk, *Europe Should Dump Cap-and-Trade*, *supra* note 29, at 374 (“Phase I of the EU-ETS implementation saw another issue with an over-allocation of allowances causing the price of those allowances to fall again.... During Phase II, the price for allowances plummeted further, diminishing the incentive polluters had to reduce their GHG emissions.”).

162. Andrew J. O’Connell, *A Critical Analysis of Allowance Allocation in Cap-and-Trade and Its Effect on Linked Carbon Markets*, 44 TEX. ENVTL. L.J. 339, 360–61 (2014). In the first two periods allowances were grandfathered but in the later period they were auctioned and benchmarked. *Id.*

163. Reuven S. Avi-Yonah & David M. Uhlmann, *Combating Global Climate Change: Why a Carbon Tax is a Better Response to Global Warming than Cap and Trade*, 28 STAN. ENVTL. L.J. 3, 41 (2009).

164. *Id.* at 42; see also EUROPEAN ENVTL. AGENCY, TECHNICAL REP., *supra* note 93.

165. Duff, *supra* note 9, at 90.

166. See discussion *infra* Part III.A.

167. Avi-Yonah & Uhlmann, *supra* note 163, at 5; see Ann E. Carlson, *Designing Effective Climate Policy: Cap-and-Trade and Complementary Policies*, 49 HARV. J. ON LEGIS. 207, 207 (2012) (stating that the cap-and-trade system is “the dominant policy choice” to date); cf. Haifeng Deng, *Improving the Legal Implementation Mechanisms for A Carbon Tax in China*, 32 PACE ENVTL. L. REV. 665, 684 (2015) (stating that carbon trading is a

20 sub-national jurisdictions are putting a price on carbon” and together these carbon pricing instruments cover around “12% of the annual global GHG emissions.”¹⁶⁸ Of course, this is not enough and more needs to be done.¹⁶⁹

II. CARBON TAXES VS. CAP-AND-TRADE

A heated battle currently is being fought as to whether a cap-and-trade or a carbon tax will be better to solve our climate change problem. Many commentators and authors of law reviews have advocated that a cap-and-trade is better,¹⁷⁰ whereas many others have argued that a carbon tax is best.¹⁷¹ My thesis is that both carbon taxes and cap-and-trade should be used on the local and regional level, particularly for Canada and the U.S., two of the largest contributors to climate change and two of the biggest beneficiaries of climate change.¹⁷² If designed properly, these market mechanisms can work together and be effective.¹⁷³

A. A Heated Debate

Most economists prefer carbon taxes. According to most economists, price instruments, such as carbon taxes, can be expected to be more efficient and effective than quantity instruments, such as tradable allowances.¹⁷⁴

more natural regulation of the market economy than a carbon tax); *available at* <http://digitalcommons.pace.edu/pelr/vol32/iss3/2>.

168. WORLD BANK, *supra* note 22, at 14.

169. Sewalk, *Carbon Tax with Reinvestment Trumps Cap-and-Trade*, *supra* note 20, at 580–82, 609.

170. Avi-Yonah & Uhlmann, *supra* note 163, at 6–7; Carlson, *supra* note 167, at 208 n.8; Alex Rice Kerr, *Why We Need a Carbon Tax*, 34 ENVTL. L. & POL’Y J. 69, 92, 97 (2010); Mann, *The Case for the Carbon Tax*, *supra* note 88; Joshua Meltzer, *A Carbon Tax As a Driver of Green Technology Innovation and the Implications for International Trade*, 35 ENERGY L.J. 45, 67 (2014); Sewalk, *Carbon Tax with Reinvestment Trumps Cap-and-Trade*, *supra* note 20, at 602–09; Wara, *supra* note 154, at 284.

171. See LARRY KREISER ET AL., *supra* note 78, at 41–42; *see also* David P. Warren & Scott Tomashefsky, *The Western Climate Initiative*, 41 STATE & LOCAL GOV’T REV. 55 (2009), *available at* <http://slg.sagepub.com/content/41/1/55.full.pdf+html>; *see also* Melinda Harm Benson, *Regional Initiatives: Scaling the Climate Response and Responding to Conceptions of Scale*, 100 ANNALS OF THE ASS’N OF AM. GEOGRAPHERS 1025, 1025–35 (2010).

172. See discussion *infra* Part II.B. *But see* Carlson, *supra* note 167, at 226–47, for a discussion of complementary policies as unnecessary in conjunction with a cap-and-trade program absent market failure.

173. See *infra* Part IV.

174. For example, former Treasury Secretary Larry Summers, Nobel laureate Joseph Stiglitz, and Republican economist N. Gregory Mankiw all are in favor of a carbon tax. Deborah Solomon, *Climate Change’s Great Divide*, WALL ST. J. (Sept. 17, 2007, 12:01 AM), <http://www.wsj.com/articles/SB118955082446224332>. David Driesen notes that

Economists favor taxes because “they provide the clearest price signal, unencumbered by factors like baselines, allowance allocation, and use of credits.”¹⁷⁵ Price instruments are thought to perform better under uncertainty, to raise valuable revenues and to avoid transaction costs.¹⁷⁶ Economists say a viable market for tradable pollution rights can rarely exist unless the government makes the right decision and clears all market barriers to free trade.¹⁷⁷ Furthermore, tradable allowances may lead to environmental hot spots in low-income communities and diminish the pressure on emitting companies to make technological changes to restrict GHG emissions.¹⁷⁸

On the other hand, most environmentalist and politicians favor cap-and-trade.¹⁷⁹ Environmentalists want a certain cap on emissions to assure environmental benefits.¹⁸⁰ Politicians hate taxes and have even signed

cap-and-trade can stifle innovation and result in concentrated local pollution. Parisa Smith, *Can the Success of Carbon Emission Cap-and-Trade Market be Predicted Based on the EPA’s Acid Rain Program*, 6 APPALACHIAN NAT. RESOURCES L.J. 57, 70 (2011-2012) (construing David Driesen, *Linkage and Multilevel Governance*, 19 DUKE J. COMP. & INT’L L. 389, 409 (2009)).

175. Avi-Yonah & Uhlmann, *supra* note 163, at 34 n.120 (quoting N. Gregory Mankiw, *One Answer to Global Warming: A New Tax*, N.Y. TIMES (Sept. 16, 2007), http://www.nytimes.com/2007/09/16/business/16view.html?_r=0).

176. *Id.* at 40–43.

177. Richard Posner, *Should There be a Carbon Emissions Tax?* BECKNER-POSNER BLOG (July 7, 2013), <http://www.becker-posner-blog.com/2013/07/should-there-be-a-carbon-emissions-tax-posner.html>.

178. Industry groups can essentially lobby to continue to pollute. Avi-Yonah & Uhlmann, *supra* note 163, at 44. The cap-and-trade framework sends an “ambiguous message” that government allows you to pollute as long as you pay, essentially signaling that “it a purchase price for a right to pollute”, in contrast to “a carbon [tax that] sends a clear signal.” *Id.*

179. John Dingell, Democrat from Michigan and powerful chair of the Energy and Commerce Committee, is one of the few politicians that favors carbon taxes. Kimberley Strassel, *Some Inconvenient Truths*, WALL ST. J. (Oct. 6, 2007, 11:59 PM), <http://www.wsj.com/articles/SB119162838307050834> (stating it is “easy . . . to rig a [Cap-and-Trade] system. Europe has shown that this is hell to make work. They’re going back to the drawing board again, with no assurance they won’t make the same mistakes they did before.”).

180. See generally Yale Sch. of Forestry & Env’tl. Stud., *Putting a Price on Carbon: An Emissions Cap or a Tax?*, YALE ENV’T 360 (May 7, 2009), http://e360.yale.edu/feature/putting_a_price_on_carbon_an_emissions_cap_or_a_tax/2148 (“From an environmental point of view, the advantage of an emissions cap over a carbon tax is clear: A cap puts a legal limit on pollution.”).

pledges not to raise them.¹⁸¹ Furthermore, cap-and-trade systems allow politicians to allocate original allowances to favored constituents.¹⁸²

Business groups can go either way. Businesses usually like a certain price so they can accurately determine their profit and calculate whether they can pass on the increased cost to their consumers.¹⁸³ Cost certainty “enables business to plan ahead, secure in the knowledge that raising the tax rate beyond any automatic adjustment, which can be planned for, requires another vote” in the legislature.¹⁸⁴ Nonpolluting companies might support a carbon tax if they do not pollute and the revenues from the tax will reduce their corporate tax.¹⁸⁵ Of course, if the exiting industry can be grandfathered into the cap-and-trade without paying for the initial allowance, they would favor the cap-and-trade.¹⁸⁶ In addition, business groups that can sharply reduce their emissions will prefer cap-and-trade as they can profit from selling their excess allowances to others.¹⁸⁷ Lastly, Wall Street would also most likely support cap-and-trade as “hefty fees” can be charged “for arranging trades in allowances and futures trading.”¹⁸⁸

B. A Comparison

Both the carbon tax and the cap-and-trade are market-based mechanisms so both can encourage cost-effective technological innovation.¹⁸⁹ Both can be superior to the regulatory approach, which specifically mandates emissions,

181. Most politicians like cap-and-trade because it is a hidden tax but is not called a tax. See Strassel, *supra* note 179. Most Republicans have signed onto the Norquist Pledge. See Paul Waldman, *Nearly All the GOP Candidates Bow Down to Grover Norquist*, WASH. POST (Aug. 13, 2015), <https://www.washingtonpost.com/blogs/plum-line/wp/2015/08/13/nearly-all-the-gop-candidates-bow-down-to-grover-norquist>.

182. See Yale Sch. of Forestry & Envtl. Stud., *supra* note 180 (comment by Roger A. Pielke, Jr. stating that a cap-and-trade is doomed to failure).

183. Avi-Yonah & Uhlmann, *supra* note 163, at 46; see also Mann, *The Case for the Carbon Tax*, *supra* note 88, at 10122, 10125.

184. Avi-Yonah & Uhlmann, *supra* note 163, at 42.

185. See Wara, *supra* note 154, at 297 (explaining that Walmart may support high carbon tax if carbon tax will reduce its corporate income tax: “Wal-Mart, once it has received the benefit of a reduction in tax liability, will be loath to return to a higher rate so that American Electric Power can face a lower carbon tax liability.”); see also AviYonah & Uhlmann, *supra* note 163, at 46.

186. See Mann, *supra* note 88, at 10120–21. (“[F]ree allowances ease the transition for exiting emitters, but could raise the cost of reducing carbon emissions. They also have the anomalous result of rewarding exiting emitters with valuable allowances. This allocation forms the main ‘winner-picking’ mechanism in cap-and trade.”).

187. Avi-Yonah & Uhlmann, *supra* note 163, at 46.

188. *Id.*; see also Wara, *supra* note 154, at 289.

189. See Richard B. Stewart, *A New Generation of Environmental Regulation?*, 29 CAP. U. L. REV. 21, 95 (2001).

tends to be complicated, and is slow to be fully implemented.¹⁹⁰ In addition, these mechanisms can be better than tax incentives for renewable energy as they “incentivize efficiency improvements, reduction in energy use, and fuel switching from higher-to-lower emissions fuels.”¹⁹¹ Since greenhouse gas emissions occur throughout the world, a market-based instrument, such as cap-and-trade, when linked with other countries, could prove the best approach to solve the climate change problem.¹⁹² Nevertheless, both of these market mechanisms can work together and be administered, politically feasible, revenue generating, efficient, equitable, and effective.

I. Administerability

Whether a carbon tax or cap-and-trade system is adopted at the regional or national level, the administerability issues are similar. Thus, both can be effectively designed with a broad base, a low cap/or high tax, and few exemptions. Both carbon taxes and cap-and-trade schemes can be imposed “upstream” or “downstream.” Upstream measures usually hit emissions from fossil fuel production (oil, coal and natural gas), such as refineries and power plants.¹⁹³ Such a system could be effective because it would ensure that all sources of carbon dioxide at the point entering the economy are covered and would impact fewer entities than downstream.¹⁹⁴ The upstream approach also reduces complexity because it covers large sources. Downstream would work better locally as it hits consumption, such as motor vehicle drivers, electricity users, and arguably all sectors of the economy emitting heat.¹⁹⁵ However, this might impact political feasibility as it more directly affects the consumer.¹⁹⁶ In addition, the broader range

190. Avi-Yonah & Uhlmann, *supra* note 163, at 28–29 (explaining the “inherent complexity of the Clean Air Act and the delays that would face any regulatory system to reduce carbon dioxide emissions. Indeed, if past experience under the Clean Air Act is any guide, litigation would ensue once a new regulatory regime was established leading to even greater delays in carbon dioxide reductions.”).

191. Claudia O’Brien et al., *Implementing Carbon Taxes: Considerations, Realities, and Lessons Learned*, ENERGY & CLIMATE REP., May 6, 2013, at 6.

These mandates and market initiatives often beat out voluntary agreements, all of these mechanisms have a place. *See generally* Stewart, *supra* note 189.

192. *See* Wiener, *supra* note 17, at 692.

193. Avi-Yonah & Uhlmann, *supra* note 163, at 31.

194. *Id.*

195. *Id.*

196. *See* Janet E. Milne, *Carbon Taxes in the United States: The Context for the Future*, 10 VT. J. ENVTL. L. 1, 13–14 (2008) [hereinafter Milne, *Carbon Taxes in the United States*].

of sources could make administration more complex, because of the necessity to increase the monitoring.

In general, a cap-and-trade tends to be more administratively complex.¹⁹⁷ First, a baseline must be set to establish an emissions cap and this might be inaccurate.¹⁹⁸ If this is set too high, then the system will be ineffective in reducing carbon emissions. If the cap is set too low, the costs to the emitters will be too high and make carbon allowances more expensive on the market. Once a cap is set, a mechanism must be instituted to determine how allowances will be created and distributed. Free allowances will benefit the current industries or polluters and no money will be raised. In the alternative, a charge can be made for the allowance or the allowance can be auctioned off.¹⁹⁹ Third, the trading in allowances must be established, creating a market for purchases and sales. Fourth, monitoring of the trading must occur, to prevent fraud and punish violators.²⁰⁰ Fifth, to prevent cost uncertainty banking and borrowing need to be established. Banking will allow a holder to save its allowances for use in the future.²⁰¹ Borrowing allows the holder to emit now and pay back later by emitting less.²⁰² However, these very mechanisms can prevent the desired certainty of benefit. Sixth, offsets must be established for carbon sequestration. Offsets allow the emitter to invest in forest conservation and other projects that absorb carbon.²⁰³ Finally, to be internationally effective, the cap-and-trade program needs to be coordinated with other cap-and-trade regimes and carbon tax systems.²⁰⁴ Often, it is difficult, both politically and design-wise, to coordinate with other systems.²⁰⁵

For a carbon tax, one must decide whether to tax upstream or downstream, then set a tax rate, decide on any exemptions or credits, and monitor. Unlike

197. Avi-Yonah & Uhlmann, *supra* note 163, at 37–38.

198. Wara, *supra* note 154, at 261 (arguing that the U.S. energy-related carbon dioxide emissions DOE energy model is “biased and imprecise to such a degree as to make its use impractical”).

199. See Mann, *supra* note 88, at 10120.

200. Sewalk, *Carbon Tax with Reinvestment Trumps Cap-and-Trade*, *supra* note 20, at 605 (“Control must be stringent so that the same allowance cannot be used more than once.”); see also Avi-Yonah & Uhlmann, *supra* note 163, at 39 ([A]n elaborate mechanism would need to be set up to distribute and collect allowances and to ensure that allowances are real and that polluters are penalized if they emit greenhouses [sic] gases without an allowance.”).

201. *Managing Allowance Prices in a Cap-and-Trade Program*, CONGRESSIONAL BUDGET OFFICE at vii (Nov. 2010), <https://www.cbo.gov/sites/default/files/111th-congress-2009-2010/reports/11-04-2010-cap-and-trade.pdf>; Mann, *supra* note 88, at 10121.

202. *Id.*

203. Mann, *supra* note 88, at 10121 (discussing problems of accurate measurement of these offsets giving the example of a tropical forest in Brazil).

204. O’Connell, *supra* note 162; Avi-Yonah & Uhlmann, *supra* note 163, at 38–39.

205. See discussion *infra* Part IV.B.

cap-and-trade, carbon taxes can be enforced by existing revenue departments. Thus, carbon taxes are generally simpler than the cap-and-trade regime, but do not work as well on the international level.

CHART 2. COMPARISON OF CAP-AND-TRADE AND CARBON TAX

CAP-AND-TRADE	CARBON TAX
Upstream/downstream Set level of emissions Determine quantity of allowances Determine allocation of allowances (free/fee/auction) Create a market Monitor emissions Monitor market Banking, borrowing, credits and offsets	Upstream/downstream Set tax Determine Exemptions Determine Credits Monitor emissions

Cap-and-trade programs take a long time to get passed and implemented,²⁰⁶ whereas, a carbon tax can be enacted and enforced practically overnight.²⁰⁷ Most cap-and-trade bills are long and complicated, whereas carbon tax

206. If Waxman-Markley Cap-and-Trade passed then we would be “stuck with a situation in which relatively little abatement was occurring, allowance price were very low, and the prospect of report . . . was a remote possibility. By contrast, passage of a carbon tax with prices similar to those envisioned by all parties for the allowances under Waxman-Markey, would have led to much greater abatement than anticipated and few, or at any rate likely unsuccessful, calls for weakening of the pollution pricing scheme. Given the bias and variance in emission forecasts, and the sensitivity of outcomes under cap-and-trade to these projections, carbon taxes offer a much greater likelihood that all sides in a climate regulation negotiation enjoy the benefit of the bargain.” See *Wara, supra* note 154, at 300. Designing real cap-and-trade programs may require information that regulators currently do not possess and are unlikely to ever possess. *Id.* at 265. Given weakness in forecast models, likely cap-and-trade not achieve the objectives that environmentalists want. *Id.* at 301. At least two examples: CA RECLAIM and CA Bill 32. *Id.* at 293–95. “[E]vidence exists that cap-and-trade programs are vulnerable to weakening in the face of higher than expected allowance prices.” *Id.* at 295.

207. Avi-Yonah & Uhlmann, *supra* note 163, at 39. “A new administration determined to implement cap and trade would probably have to take at least two years to get the [cap-and-trade] program passed in Congress and set up for implementation.”

proposals are shorter and simpler.²⁰⁸ The longer the text the more likely it will not be understood—and the greater possibly of loopholes.²⁰⁹

Allowances under cap-and-trade raise interesting securities, tax, and international trade issues.²¹⁰ Securities issues arise with the regulation of futures trading in allowances.²¹¹ Tax issues arise when allowances are free, upon trading and selling of allowances, and when banking borrowing and offsets are involved.²¹² World Trade Organization compliance issues also arise with cap-and-trade.²¹³ Carbon taxes, on the other hand, do not raise securities or tax issues and do not pose international trade problem because they can be collected on imports and rebated on exports and not imposed on domestic production.²¹⁴

2. Political Feasibility

At the local level, just as at the federal level, differences arise between the traditional values of Republicans and Democrats. In general, Republicans are reluctant to pass a tax, so a cap-and-trade regime is probably more politically feasible.²¹⁵ The public might also not like a tax, although a cap-and-trade will also result in higher gas and electric bills. In general, polls have shown that citizens have a “strong public resistance to new

208. Avi-Yonah & Uhlmann, *supra* note 163, at 38 “A carbon tax is inherently simple: a tax is imposed at X dollars per ton of carbon content on the main sources of carbon dioxide emissions in the economy.”

209. See Sewalk, *Carbon Tax with Reinvestment Trumps Cap-and-Trade*, *supra* note 20, at 604.

210. Avi-Yonah & Uhlmann, *supra* note 163, at 38–39.

211. See *id.* at 40.

212. *Id.*

213. *Id.* at 49.

214. *Id.*; see also Keith Kendall, *Carbon Taxes and the WTO: A Carbon Charge Without Trade Concerns?*, 29 ARIZ. J. INT’L & COMP. L. 49, 50, 87 (2012) (“Under [a border tax adjustment (BTA)], exports have the tax rebated, so they enter the world market free of the carbon charge, with imports being subjected to the same impost as domestically produced goods. In this way, the domestic policy has a neutral effect on a domestic industry’s international competitiveness.... The major hurdle for a carbon tax to be legitimate under the WTO is its uncertain status as an indirect tax—that is, as a tax on a produce rather than on the producer (or the PPB). There are strong arguments in both directions, making this the major hurdle in terms of introducing an economically appropriate carbon tax. There is strong potential, though, that even if a carbon tax BTA were found to violate the substantive provisions of the WTO, it may qualify for one of the exceptions under Article XX.”).

215. See Chris Good, *Norquist’s Tax Pledge: What It Is and How It Started*, ABCNEWS (Nov. 26, 2012), <http://abcnews.go.com/blogs/politics/2012/11/norquists-tax-pledge-what-it-is-and-how-it-started/>.

taxes.”²¹⁶ Since a tax is more transparent, it is more likely to have citizen complaints.²¹⁷ For example, a July 2014 poll showed that taxpayers in California would not support the cap-and-trade if their gas and electric bills would go up.²¹⁸ On the other hand, the British Columbia carbon tax has had sustained popularity even with the recession and several administrations.²¹⁹

It is possible that a cap-and-trade may be more politically acceptable because the U.S. has already experienced a very successful permit system under the Acid Rain Program, implemented under the Clean Air Act Amendments of 1990.²²⁰ This program offered a successful model in the trading system of sulfur-dioxide and nitrogen oxide—pollutants that cause acid rain and smog.²²¹ This success at the federal level could translate into a more politically feasible regional cap-and-trade system.²²²

A cap-and-trade is probably more consistent with pre-existing government environmental regulations.²²³ The new EPA rules under the CPP specifically cover “market-based trading programs.”²²⁴ Although nothing in the plan mentions carbon taxes,²²⁵ EPA officials have mentioned that local carbon taxes would be acceptable.²²⁶ However, cap-and-trade can “more easily

216. See Keibun Mori, *Washington State Carbon Tax*, WASH. STATE DEP’T OF COMMERCE 1, 13 (2011), <http://www.commerce.wa.gov/Documents/Washington-State-Carbon-Tax.pdf> (A disadvantage of carbon taxes is “the strong public resistance to new taxes”).

217. Avi-Yonah & Uhlmann, *supra* note 163, at n.151.

218. Madhu Ravi, *Making Sense of California’s Cap-and-Trade System*, CAL. COMMON SENSE (May 4, 2015), <http://cacs.org/research/californias-cap-and-trade-and-what-will-influence-its-future/>.

219. For example, the “British Columbia carbon tax was introduced by the province’s finance minister at the time, Carole Taylor, and was considered alongside other revenue measures, including changes in numerous other taxes.” Wara, *supra* note 154, at 297, 300. The status quo, once established, is very difficult to alter. *Id.*

220. Clean Air Act of 1963, Pub. L. No. 101-549, 104 Stat. 2584 (codified as amended at 42 U.S.C. §§ 7651–7651 (1990)).

221. *Id.* Avi-Yonah & Uhlmann, *supra* note 163, at 34 (the program “focused on 111 facilities in the Midwest (the so-called “Big Dirties”)).

222. *We Need a Well-Designed Cap-and-Trade Program to Fight Global Warming*, UNION OF CONCERNED SCIENTISTS (2009) [hereinafter CONCERNED SCIENTISTS], http://www.ucsusa.org/sites/default/files/legacy/assets/documents/global_warming/capandtradebackgrounder.pdf.

223. Claudia O’Brien et al., *supra* note 191, at 5, n.56.

224. Gannett, *supra* note 64, at 8-3, n.15.

225. See Clean Air Act, *supra* note 62.

226. Coral Davenport & Peter Baker, *Taking Page from Health Care Act, Obama Climate Plan Relies on States*, N.Y. TIMES, June 3, 2014, at A16; see also *infra* note 482, at 34, 832–33.

dovetail with similar existing and proposed regimes” in other regions.²²⁷ Thus, cap-and-trade can be regionally connected. Commentators have favored cap-and-trade for a similar reason in the international realm.²²⁸

There is also a difference in political economy between a cap-and-trade and a carbon tax. The legislative, administrative, and budgetary considerations for a tax can be quite different. Taxes are passed in the legislature by a finance, not an energy or environment committee, and are administered by the department of revenue.²²⁹ In addition, different requirements exist for how the funds are distributed.²³⁰ These differences were illustrated by the recent cases challenging the CA Cap-and-Trade regime.²³¹ In August 2013, the courts held the cap-and-trade system was a fee and not a tax.²³² As the court said, a tax has to be passed by supermajority of the California state legislature, a voting requirement in the state constitution.²³³ Fees only need a majority in the state agency authorized in the statute.²³⁴ Here, the state’s landmark carbon dioxide legislation of 2006 was passed by a simple majority and granted power to the Air Resources Board (ARB), a branch of the California Environmental Protection Agency, to establish the cap-and-trade regime.²³⁵ The court also points out another difference—revenue from taxes can be spent on anything, such as rebates to the poor, whereas a fee must go into programs closely aligned with the fee itself.²³⁶ Because the purpose of the CA Cap-and-Trade is to reduce GHG, the fees from the auctions of the permits must go into the Greenhouse Gas Reduction Fund.²³⁷ Thus, California has struggled to make the cap-and-trade system equitable.²³⁸

This political difference between a tax and a fee could be significant for the states in the western United States. Oregon, like California, has a similar

227. Avi-Yonah & Uhlmann, *supra* note 163, at 38–39.

228. See Wiener, *supra* note 17.

229. See Surrey, *supra* note 18, at 728–30.

230. *Id.*

231. Alan Durning & Yoram Bauman, *17 Things to Know About California’s Carbon Cap*, SIGHTLINE INST. (May 22, 2014, 6:30 AM), <http://www.sightline.org/2014/05/22/17-things-to-know-about-californias-carbon-cap/>.

232. Cal. Chamber of Commerce et al. v. Cal. Air Res. Bd. et al., No. 34-2012-80001313 (Cal. Super. Ct. Aug. 28, 2013), *Joint ruling with Morning Star Packing Co. et al. v. Cal. Air Res. Bd. et al.*, No. 34-2013-80001464 (Cal. Super. Ct. Aug. 28, 2013), http://www.arb.ca.gov/html/decision_111413.pdf.

233. Durning & Bauman, *supra* note 231.

234. *Id.*

235. *Id.* (“AB 32 passed by a simple majority in 2006”).

236. Durning & Bauman, *supra* note 231.

237. *Id.*

238. The state got the utilities to give a rebate and have designated a 25% percentage of the revenues to “disadvantaged communities.” *Id.* Solar panels on public buildings, etc. could result, as well as mass transportation systems that could benefit the poor. *Id.*

supermajority rule for new revenue measures.²³⁹ However, Washington does not have such a requirement.²⁴⁰ Therefore, Washington has tremendous flexibility in what carbon mechanism to choose. Furthermore, if they join the CA Cap-and-Trade system, they can use the revenues to reduce the regressive effects of the Cap-and-Trade system or in any manner they so desire.

3. Revenue Generation

Both carbon tax and cap-and-trade can generate revenue—in money from selling permits and with funds raised from carbon taxes. However, if the initial permits are given away and not auctioned, then no money will be generated. A carbon tax, however, will always result in revenue.²⁴¹

Most states have to balance their budget so any new revenue could be desirable from the state's viewpoint.²⁴² However, the use of the revenue can determine the impact on efficacy, economic growth and equity. To accomplish efficacy, the revenues should go to fund research into low-emission technologies or recycled into green practices,²⁴³ or to mass transit, research and development, carbon sequestration, and other greenhouse-gas reducing efforts.²⁴⁴ To promote economic growth, economists often favor a reduction in capital taxes or reduction in deficits.²⁴⁵ To ensure equity, the money should be used to “shift the tax” burden off labor or sales taxes, lessen the tax on small businesses and low-income taxpayers, or used for lump sum rebates or refundable credits to poor households.²⁴⁶

In the alternative, the revenue could be used for multiple purposes. Many of the state economic studies have run models using various percentages for reinvestment into green practices and into a tax shift off the poor.²⁴⁷ They conclude that there will be no serious impact on the

239. *Id.*

240. *Id.*

241. Sewalk, *Carbon Tax with Reinvestment Trumps Cap-and-Trade*, *supra* note 20, at 607. For example, a \$10 per ton carbon tax should generate \$50 billion. *Id.*

242. Every state but Vermont has to balance its budget.

243. Sewalk, *Carbon Tax with Reinvestment Trumps Cap-and-Trade*, *supra* note 20, at 614 (stating the revenue could go to “building a new energy economy” and the creation of “new jobs”).

244. Avi-Yonah & Uhlmann, *supra* note 163, at 41.

245. *See infra* note 259 and accompanying text.

246. *See* Milne, *Carbon Taxes in the United States*, *supra* note 196, at 8; *see also* Milne, *Environmental Taxes in the United States*, *supra* note 18, at 439.

247. *See, e.g.,* Liu & Renfro, *supra* note 140.

economy with minimal reinvestment of the funds into green initiatives.²⁴⁸ The studies show that the greater the reinvestment the more adverse the impact on the economy but the more environmentally effective the mechanism; whereas, a greater percentage going to a tax shift would be more equitable.²⁴⁹

4. Efficiency or Economic Growth

One of the biggest issues with a carbon tax is the impact on business and industry. The companies that will suffer the most from a carbon fee or tax are those in cement, chemicals, car manufacturing, iron and steel, aluminum, mining and oil.²⁵⁰ If the cost of doing business goes up for these industries, they could move to other jurisdictions. This so-called “leakage” can have an adverse impact on the economy and employment of the state or region.²⁵¹ However, to eliminate this negative economic effect, the carbon systems can exempt industries (allocate free permits to them) and/or use the revenue to reduce their taxes.

The rate of the carbon tax or the cap set on the cap-and-trade will impact the criteria of efficiency or economic growth. In general, the higher the rate of carbon tax or lower the emissions cap, the more adverse impact on the economy. For example, the Congressional Budget Office estimates that in order to decrease CO₂ levels by 20% below 1990 levels, a \$250 per ton tax would be needed.²⁵² However, if even a \$50 per metric ton tax is imposed, estimates are that U.S. gross national product will decline by as much as \$146 billion.²⁵³ With a moderate carbon tax of \$20 or \$30, economic studies in several European Countries, British Columbia, and Oregon have all shown no significant adverse impact on the economy.²⁵⁴

Where the revenue from the carbon tax or cap-and-trade is directed or earmarked will also impact the criteria of efficiency or economic growth. One study concluded that using pollution tax revenues to lower other

248. *Id.* at 12.

249. *Id.* at 6.

250. Mark J. Perry, *Carbon Tax Would Kill Major Industries, Hurt U.S. Consumers*, INVESTOR’S BUS. DAILY (Oct. 16, 2012), <http://news.investors.com/ibd-editorials-on=the-right/101612-629540-carbon-tax-would-kill-off-growth-in-american-economy.htm>.

251. Claudia O’Brien et al., *supra* note 191, at 5.

252. David Kreutzer, *The Impacts of Carbon Taxes on the U.S. Economy*, U.S. SENATE FIN. COMM., 3 (Sept. 16, 2014), <http://www.finance.senate.gov/imo/media/doc/Testimony%20-%20David%20Kreutzer.pdf>.

253. *Id.* at 11–12. (discussing the costs of the Climate Security Act of 2013, which would impose a \$50 per-metric-ton tax by 2030. Kruetzer estimates that such a tax would impose a cost of \$146 billion to the US economy in the year 2030 alone).

254. See Liu & Renfro, *supra* note 140; *but see* Kreutzer, *supra* note 252, at 4.

distortionary tax burdens can even improve economic performance,²⁵⁵ and no decline in GNP would result.²⁵⁶ A study by the Economic Policy Institute even concluded that over 2 million jobs could be created over the next twenty years with a fifty percent reduction in U.S. carbon emissions under alternative market approaches.²⁵⁷ Other economic studies²⁵⁸ have shown that the most economically efficient use of the tax revenue would be to cut taxes on capital, followed by reducing payroll taxes²⁵⁹ and that recycling the revenues with lump-sum rebates to lower-income households would have the worst economic efficiency outcomes.²⁶⁰

5. Equity or Incidence

The incidence, and thus the equity, of the carbon tax or cap-and-trade will also depend on how much revenue is generated and how the revenue is used.²⁶¹ Both mechanisms will increase the energy costs to consumers

255. Avi-Yonah & Uhlmann, *supra* note 163, at 41; *see also* Jared Carbone et al., *Getting to an Efficient Carbon Tax: How the Revenue is Used Matters*, RES. FOR THE FUTURE 35 (Jan. 13, 2014), http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-Resources-185_Feature-Carbone.etal.pdf; and Charles Komanoff, *Carbon Tax Polling Milestone: 2/3 Support if Revenue Neutral*, CARBON TAX CTR. (Apr. 15, 2015), <http://www.carbontax.org/blogarchives/2015/04/15/carbon-tax-polling-milestone-23-support-if-revenue-neutral>; *but see* Oren Cass, *Carbon Taxes in Revenue Fantasyland*, WALL ST. J. (Apr. 30, 2015), <http://www.wsj.com/articles/carbon-taxes-in-revenue-fantasyland-1430436869>.

256. Carbone et al., *supra* note 255, at 35.

257. Bill Dougherty et al., *Clean Energy and Jobs*, ECON. POLICY INST. 2 (Feb. 2002), <http://www.epi.org/files/page/-/old/studies/cleanenergyandjobs.pdf>.

258. Dale W. Jorgenson et al., *Carbon Taxes and Fiscal Reform in the United States*, 68 NAT'L TAX J. 121 (2015); Warwick J. McKibbin et al., *Carbon Taxes and U.S. Fiscal Reform*, 68 NAT'L TAX J. 139 (2015); Sebastian Rausch & John Reilly, *Carbon Taxes, Deficits and Energy Policy Interactions*, 68 NAT'L TAX J. 157 (2015); Sugandha D. Tuladhar et al., *Environmental Policy for Fiscal Reform: Can a Carbon Tax Play a Role?*, 68 NAT'L TAX J. 179 (2015); Robertson C. Williams III et al., *The Initial Incidence of a Carbon Tax Across Income Groups*, 68 NAT'L TAX J. 195 (2015).

259. Williams, *supra* note 258, at 198; *see also* Sebastian Rausch & John Reilly, *Carbon Taxes, Deficits and Energy Policy Interactions*, 68 NAT'L TAX J. 157 (2015).

260. Williams, *supra* note 258, at 198. A lump sum transfer or a cut in sales tax would benefit older generations at the cost of younger generations, whereas a cut in labor taxes would have the opposite effect. *Id.*

261. *Id.* at 210; SEBASTIAN RAUSCH, ET AL., MIT JOINT PROGRAM ON THE SCIENCE AND POLICY OF GLOBAL CHANGE, DISTRIBUTIONAL IMPACTS OF A U.S. GREENHOUSE GAS POLICY: A GENERAL EQUILIBRIUM ANALYSIS OF CARBON PRICING, (Nov. 2009), http://globalchange.mit.edu/files/document/MITJPSPGC_Rpt182.pdf. National carbon taxes may have uneven regional impacts due to vastly differing energy structures and energy consumption patterns from region to region. *See infra* note 265. The Northeast opposes taxes because

and thus could have some inequitable impacts on lower-income taxpayers. An American Enterprise Institute paper estimates that a tax of \$15 per ton of carbon dioxide emitted would increase the cost of a gallon of gas by 24 cents and the price of coal-fired electricity by \$1.63 per kilowatt-hour.²⁶² The Congressional Budget office estimates a 15% cut in emissions would cost the poorest households an additional \$677 a year in current dollars.²⁶³ Other studies²⁶⁴ also demonstrate that low-income households spend greater percentage of their income on energy and that the distribution of the tax revenues from a carbon tax can make the tax less regressive.²⁶⁵ If the consumer can substitute public transportation for driving then the carbon mechanism will have less of an adverse impact. However, electricity tends to be inelastic and could have a larger impact on the consumer.²⁶⁶ At least a carbon tax guarantees revenue that can be used to alleviate the burden on the poor, whereas there is no such guarantee when the cap-and-trade constitutes a fee.

6. Efficacy

Regional or local cap-and-trade initiatives alone will not be enough to solve the climate change problem. Scientists say that emissions of greenhouse gasses must be cut by at least 60% to stabilize global warming.²⁶⁷ Limiting the average global temperature rise to less than 2°C “is commonly regarded as a prerequisite to avoid dangerous climate change.”²⁶⁸ The investment needed, however, in the energy sector alone, to accomplish this objective

they could increase the price of heating oil. *Id.* The West dislikes increase in gasoline taxes because of greater than average driving distances. *Id.* The Corn-belt states are sensitive to diesel fuel price increases due to agricultural use. *Id.* The Midwest and Southeast are energy-producing and oppose any form of energy taxes. *Id.* In addition, the Midwest uses electricity generated primarily by coal-fired power plants. *Id.*

262. Aparna Mathur & Adele Morris, *Distributional Effects of a Carbon Tax in Broader US Fiscal Reform*, AM. ENTER. INST. 18 (Dec. 14, 2012), https://www.aei.org/wp-content/uploads/2012/12/mathur-distributional-effects-of-a-carbon-tax-in-broader-us-fiscal-reform_17161031273.pdf.

263. Kevin Brady, Editorial, *Who Pays for Cap and Trade?*, WALL ST. J. (Mar. 9, 2009), available at <http://waysandmeans.house.gov/wsj-who-pays-for-cap-and-trade/>.

264. *Id.*; Bill Dougherty et al., *supra* note 257.

265. Dallas Burtraw et al., *The Incidence of U.S. Climate Policy: Where You Stand Depends on Where You Sit*, RES. FOR THE FUTURE (Sept. 2008), <http://www.mistra.org/download/18.3a618cec141021343374fa7/1379435883778/Burtraw%2Bet%2Bal%2B2008%2Ba.pdf>; see also Sewalk, *Carbon Tax with Reinvestment Trumps Cap-and-Trade*, *supra* note 20, at 607 n.175.

266. Andersen, *supra* note 98, at 8.

267. See Harris, *supra* note 38, at 197 n.8 (citing WORLD RESOURCES INST., *The Difficulty of Stabilizing Emissions*, World Resources: The Urban Environment (1996–97), http://population.wri.org/pubs_content_text.cfm?ContentID=792).

268. WORLD BANK, *supra* note 22, at 22.

is “estimated to be US \$910 billion per annum during 2010-2050.”²⁶⁹ Obviously, state and local governments are not prepared to make that kind of investment. In addition, tax rates would have to be prohibitively high and the caps prohibitively low to get these emissions under control.²⁷⁰

In terms of efficacy, the key difference between a carbon tax and a cap-and-trade is that a cap-and-trade places a cap on emissions so there is what is called “benefit certainty,” whereas carbon taxes set an exact price on emissions or a cap on the costs of abatement, so there is “cost certainty.”²⁷¹ The benefit certainty of the cap, however, is not an advantage if the cap is not set accurately.²⁷² This is the “Achilles heel” of the cap-and-trade system.²⁷³ Once the price is set, it may not be effective, as the market (such as low gas prices) might depress the price.²⁷⁴ Furthermore, changing the cap might be difficult—unless of course, it is somehow phased-in incrementally over the years in the initial legislation.

The only way to prevent cost uncertainty in a cap-and-trade is to have safety value mechanisms. If the market price allowances become too high, businesses can receive or purchase at a fixed price additional allowance at a set price from the government.²⁷⁵ If the cap amount “begins to seriously hurt business and the price allowances spikes,” the cap can be lowered.²⁷⁶ These mechanisms, however, frustrate the efficacy or benefit of the cap-and-trade.

Similarly, a carbon tax cannot guarantee a certain benefit, it can just set a price. Again, the tax rate may not be effective to impact behavior.²⁷⁷ If the tax is set too low, it will not cause a reduction in carbon consumption

269. *Id.*

270. See Kevin Brady, *supra* note 263; Andersen, *supra* note 98.

271. Avi-Yonah & Uhlmann, *supra* note 163, at 35–37.

272. See *supra* pp. 72–85.

273. Rita Chandiok, *Climate Change Law in California and Massachusetts: Lessons for State Policymakers*, 21 HASTINGS W.-NW. J. ENVTL. L. & POL’Y 249, 284 (2015) (referring to the measuring of the additionality of carbon emissions).

274. Dingell says the cap-and-trade system alone does not convey the real cost of climate change and that companies would be allowed under cap-and-trade to spew a certain amount of carbon dioxide into the air. See Strassel, *supra* note 179.

275. Avi-Yonah & Uhlmann, *supra* note 163, at 43 (“The fundamental problem is that the reduction in the cap that is built into the cap and trade would necessarily make allowances more expensive. How much more expensive depends on the development of future technologies, which cannot be predicted with an accuracy over the longer time period (fifty years or more) required for a cap and trade program to achieve its environmental goals.”).

276. *Id.*

277. *Id.*

and if the tax is set too high, it may have adverse equity or economic repercussions.²⁷⁸ Like cap-and-trade, the rates can be increased over time with a phase-in. Arguably, the tax could be set to accomplish the benefit desired.²⁷⁹ However, exemptions can also make the tax ineffective, and credits can be given to carbon sequestration projects and other projects that reduce greenhouse gas emissions, but dilute the price signal.²⁸⁰ In the end, carbon taxes, like cap-and-trade, leave environmental outcomes uncertain.²⁸¹

Even if the revenues from the tax or cap-and-trade program go back and are 100% reinvested in lower-carbon alternatives, such as renewable energy, or into energy efficiency, “the efficacy of those projects is similarly uncertain.”²⁸² And any revenue used in this way would not be available to mitigate the regressive impacts of such policies.²⁸³ In the end, there is no authoritative evidence that putting a price on carbon (either through a carbon tax or a cap-and-trade regime) by themselves will effectively reduce emissions.²⁸⁴

C. Conclusion

Both carbon tax and cap-and-trade systems can be designed to be effective.²⁸⁵ Both can have strict cost-containment mechanisms: setting a stringent cap, including all economic sources of emissions, covering all heat-trapping gas emission, and excluding loopholes.²⁸⁶ Allowances can

278. Claudia O’Brien et al., *supra* note 191, at 4.

279. Avi-Yonah & Uhlmann, *supra* note 163, at 32–33 (“If the carbon tax did not produce the desired reduction in carbon dioxide emissions, the tax would be increased; if the tax “overcorrected” and produced greater than anticipated reductions, it could be decreased.”).

280. Kenneth Johnson, *Beware of the Dogmatist: A consensus perspective on the Tax-versus-Cap debate* (Working Paper Series 2008), available at <http://ssrn.com/abstract=1154638> (“[The] price stability [of a carbon tax] could theoretically be five times more cost-efficient than cap-and-trade.”).

281. Claudia O’Brien et al., *supra* note 191, at 4.

282. *Id.*

283. *Id.*

284. Sewalk, *Carbon Tax with Reinvestment Trumps Cap-and-Trade*, *supra* note 20, at 609 (“[B]oth carbon tax and cap-and-trade bills have failed to give proof of any real emission reductions. . . . There is no firm data to show that putting a price on carbon will reduce emissions. The EU-ETS has created a carbon market, but the successes are economical rather than environmental.”).

285. The effectiveness of MMs depends on: the number of regulated sources, the physical and chemical nature of a regulated pollutant, the range of technology option available, the existence of cost-effective monitoring, reporting and verification systems, adaptive decision-making process, etc. See CONCERNED SCIENTISTS, *supra* note 222.

286. These would include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. See *id.* at 2.

be auctioned off and revenue used for the public good. Although emissions have been reduced by these market mechanism, they have not been reduced enough.²⁸⁷ A cap-and-trade program is thus alone “not sufficient to meet the challenges of climate change.”²⁸⁸ Therefore, we need local carbon taxes in addition to regional level cap-and-trade, but other policies are also needed. We should require utilities to provide a greater percentage of their electricity from renewable energy sources, require automakers and producers of appliances to increase performance standards, and mandate stronger energy efficiency for new and existing buildings.²⁸⁹ In addition, policies should be established to create positive tax incentives for good behavior. We should promote conservation, encourage smart growth, and provide incentives for investment in low-carbon or renewable technologies.²⁹⁰ Lastly, we need to eliminate the bad policies, such as the removal of fossil fuel subsidies, at the federal level and the perverse corporate welfare subsidies at the local level.²⁹¹ A comprehensive approach is what is needed to solve our climate change crisis.

III. WESTERN NORTH AMERICAN CLIMATE CHANGE INITIATIVES

Because of the failure of binding climate change law at the international and U.S. federal government levels, the market-based initiatives at the regional, state and local level can offer some hope to solve our climate change problems. This part of the Article looks at U.S. regional cap-and-trade systems, and then examines state and local carbon taxes, focusing on British Columbia, Boulder, San Francisco, Oregon, and Washington.

A. Regional Cap-and-Trade Initiatives

The history of regional cap-and-trade programs in the U.S. has been rather tumultuous. California set up a cap-and-trade system, which originally

287. *See id.*

288. *Id.*

289. *See Shurtz, supra* note 10.

290. CONCERNED SCIENTISTS, *supra* note 222. Energy efficiency certificate trading are also needed. For example, the Union of Concerned Scientists say: The government must implement parallel policies alongside a cap-and-trade regime to ensure development and deployment of the full range of clean technologies. Studies have shown that a comprehensive approach including these parallel policies would lower the price for allowances, cut emissions, and save consumers money by lowering their electric and gasoline bills. *Id.* at 4.

291. *See* WORLD BANK, *supra* note 22, at 23.

included six Western states and two Canadian provinces but now includes only California and Québec.²⁹² The Chicago Climate Exchange founded in 2003 boasted big company participants like Ford, Amtrak, but went defunct in 2010.²⁹³ The Regional Greenhouse Gas Initiative (RGGI), established in 2005, has had New Jersey withdraw, and had to shrink its cap by 45%.²⁹⁴

1. *The Western Climate Initiative Has Failed*

The Global Warming Solutions Act of 2006 set goals for California to reduce its greenhouse gas.²⁹⁵ In 2007, Governors Arnold Schwarzenegger of California, Bill Richardson of New Mexico, Ted Kulongoski of Oregon and Christine Gregoire of Washington signed an agreement, called the Western Climate Initiative (WCI).²⁹⁶ Later the governors of Utah and Montana and the premiers of British Columbia, Manitoba, Ontario and Québec joined as partners.²⁹⁷ An additional 14 jurisdictions joined including Alaska, Colorado, Idaho, Kansas, Nevada, Wyoming and the Canadian provinces of Nova Scotia and Saskatchewan and even Mexican states of Baja Chihuahua, Coahuila Nuevo León, Sonora and Tamaulipas.²⁹⁸ In September 2008, the WCI released a document calling for economy-wide emission program covering “nearly 90% of the region’s greenhouse gas emissions.”²⁹⁹ The program was to reduce emissions 15% below 2005 levels by 2020 and start mandatory emission monitoring starting January 2010.³⁰⁰ Under the WCI, each state and province agreed to set up their own cap-and-trade regime and link with the other

292. *Multi-State Climate Initiatives*, CTR. FOR CLIMATE AND ENERGY SOLUTIONS, <http://www.c2es.org/us-states-regions/regional-climate-initiatives> [hereinafter CCES] (last visited Dec. 31, 2015); Michael Hiltzik, *Emissions Cap-and-Trade Program is Working Well in California*, L.A. TIMES (June 12, 2015), <http://www.latimes.com/business/hiltzik/la-fi-hiltzik-20150613-column.html>.

293. See generally Ilan Gutherz, *Current Developments in Carbon & Climate Law North America: United States*, 8 CARBON & CLIMATE L. REV. 69, 70 (2014).

294. *Id.* (“[RGGI] announced that it would reduce the available number of GHG allowances for 2014 by 45 percent to correct for a significant oversupply in the market. The cap will be reduced by 2.5 % annually through 2020”).

295. The California Global Warming Solutions Act of 2006, ch. 488, 2006 CAL. STAT. 3419 (to be codified at CAL. HEALTH & SAFETY CODE § 38500 et seq.).

296. *Western Climate Initiative Work Plan: October 2007–August 2008*, W. CLIMATE INITIATIVE 2 (Oct. 29, 2007), <http://www.westernclimateinitiative.org/document-archives/general/workplans/2008-WCI-Work-Plan/>.

297. *Id.*

298. *Id.*

299. *Id.* at 3; see also CTR. FOR CLIMATE AND ENERGY SOLUTIONS, *supra* note 295; and *Design for the WCI Regional Program*, W. CLIMATE INITIATIVE (July 2010), <http://www.westernclimateinitiative.org/the-wci-cap-and-trade-program/program-design> [hereinafter *WCI Design*].

300. *WCI Design*, *supra* note 299, at 5.

systems. Each jurisdiction could verify the other jurisdiction's program.³⁰¹ In addition, they agreed to share information and management in support of such a system.³⁰² Nevertheless, unresolved issues arose, "including allowance apportionment between the states and among the sectors, percentages of allowances to be auctioned, design and structure of both the auction market and the market oversight and enforcement mechanisms to address market manipulation, and the use of offsets."³⁰³

From 2008 to 2011, the WCI began to fall apart.³⁰⁴ First, elections occurred in Arizona, New Mexico, and Utah, whose new governors opposed cap-and-trade.³⁰⁵ Second, state legislatures in Washington, Oregon, and Montana failed to enact carbon trading schemes.³⁰⁶ Third, the Great Recession occurred. Finally, in November 2011, six states withdrew from the WCI.³⁰⁷ In that same month, in an attempt to salvage the plan, the Western Climate Initiative, a nonprofit corporation was formed.³⁰⁸ Its function now is limited to providing "administrative and technical support to state and provincial governments" implementing cap-and-trade programs.³⁰⁹ On the whole, the Western Climate Initiative has failed.

2. *It is Too Early to Pronounce the CA Cap-and-Trade Program a Success*

The current CA Cap-and-Trade program was implemented under the Global Warming Solutions Act under AB32, the state's landmark carbon dioxide legislation of 2006.³¹⁰ The ARB is in charge of its design and implementation.³¹¹ The cap-and-trade covers the "broadest range of industries

301. *Id.* at 2–3.

302. Gannett, *supra* note 64, at 8–4.

303. Warren & Tomashefsky, *supra* note 171, at 57.

304. Gannett, *supra* note 64, at 8–5.

305. Geoffrey Craig, *Six US States Leave the Western Climate Initiative*, PLATTS, (Nov. 18, 2011, 4:15 PM EST), <http://www.platts.ru/latest-news/electric-power/washington/six-us-states-leave-the-western-climate-initiative-6695863>.

306. *Id.*

307. *Id.*

308. *History*, W. CLIMATE INITIATIVE, <http://www.westernclimateinitiative.org/history> (last visited May 5, 2016).

309. *See* CCES, *supra* note 292.

310. *Assembly Bill 32 Overview*, CAL. ENVTL. PROT. AGENCY, AIR RES. BD. (Aug. 5, 2014), <http://www.arb.ca.gov/cc/ab32/ab32.htm>.

311. The California Air Resources Boards' Climate Change Scoping Plan Updates the past five years and outlook. *Id.* Looking ahead—collaborative efforts with others, allocation rules, market program and offset program implementation. WORLD BANK, *supra* note 22,

of any such program in North America,” including transportation.³¹² Over 85% of California’s GHG emissions are covered by the regime.³¹³ Because of interstate commerce issues the program does not cover planes or ships with destinations beyond the state border.³¹⁴ It does cover “carbon by wire”—emissions from out-of-state coal and natural gas plants that sell electricity into the state’s grid.³¹⁵ Exemptions also occur for agricultural and food producers.³¹⁶

The cap-and-trade system is fairly straightforward and simple. It is imposed upstream on some 600 companies.³¹⁷ It provides for banking but not borrowing.³¹⁸ The trading is tightly regulated so gaming is unlikely.³¹⁹ The ARB carefully restricts and monitor offsets, which have to be third-party verified.³²⁰ Firms can substitute offsets for reforestation programs and methane recapture from livestock manure for 8% of their emissions permits.³²¹

Allocation of permits were not grandfathered, but based on a combination of free allowances and auctioned ones. In 2013 and 2014, the ARB distributed about 90% of the permits free of charge.³²² These free permits were given to large industrial firms whose products compete with products from outside of California and to large electric and natural gas utilities.³²³ In addition, extra permits were given to companies that had been the most successful in reducing their emissions.³²⁴ When the cap expands in 2015, most of the new permits—those for petroleum and other fuels, will be auctioned.³²⁵ CA Cap-and-Trade does not allow waivers and exemptions but has a price containment reserve that holds back a few percent of permits

at 57; *see also* Hiltzik, *supra* note 292 (noting that this legislation included mandates for renewable fuels and emissions standards for new vehicles).

312. Hiltzik, *supra* note 292; *see also* Durning & Bauman, *supra* note 231 (“[C]ap will be the most comprehensive, though not the most aggressive, carbon-pricing regime in the world.”).

313. Durning & Bauman, *supra* note 231.

314. *Id.*

315. *Id.* (pointing out the comparison between BC, which only covers only fossil fuel, and Northeast Regional and EU that only cover electricity, but that California covers both plus “carbon by wire.”).

316. *See id.*

317. *Id.*

318. *See* discussion *supra* Part II.B.1.

319. Durning & Bauman, *supra* note 231.

320. *Id.*

321. *Id.*

322. *Id.*

323. *Id.*

324. *Id.*

325. *Id.* at 3–4.

in reserve so that if the carbon prices rise too high, these permits can go to auction.³²⁶

It is too early to make statements as to the regime's effectiveness.³²⁷ However, the markets have been working effectively with current prices around \$12.73.³²⁸ Approximately \$3.5 billion of revenue was raised since 2012.³²⁹ The system has been linked to Québec and plans are in the works to link with Ontario and the EU ETS.³³⁰

One aim of the CA Cap-and-Trade is to reduce the state's carbon emissions to 1990 levels by 2020.³³¹ To meet these 1990 levels emissions must be cut by almost 16%.³³² However, the cap was initially set too high and the prices remained exceptionally low.³³³ The cap is restricted to a ceiling of approximately \$40-50 so as not to harm the California economy.³³⁴ In addition, a price floor exists (\$11.34 in 2014 dollars). A floor price is set which rises slightly each year and the total supply of emissions permits will decline by 2-3 % per year until 2020.³³⁵ Governor Brown is advocating more stringent targets for 2020-2030. He issued a nonbinding executive order to reduce emissions an additional 80% by 2050.³³⁶ Another aim of the cap-and-trade

326. *Id.* at 9.

327. *Id.* at 2. Durning and Bauman note that California's emission rose from 1996 to 2007 and then dropped during the Great Recession. *Id.* To return to 1990 levels by 2020 will require a 5% drop below the 2011 levels. Because California's population continues growing quickly, emissions per capital will have to be reduced even more. Mary D. Nichols, the chairwoman of the California Air Resources Board, which administers cap-and-trade, states that "[a]t \$12 a ton . . . 'that's enough of a signal for industries to make dramatic investments in clean energy.'" Hiltzik, *supra* note 292. However this is disputed by Severin Borenstein, an energy expert at UC Berkeley's Haas School of Business in the same article. *Id.*

328. CALIFORNIA AIR RESOURCES BOARD, CA Cap-and-Trade Program and Québec Cap-and-Trade System February 2016 Joint Auction #6 Summary Results Report 4 (Feb. 17, 2016), http://www.arb.ca.gov/cc/capandtrade/auction/feb-2016/summary_results_report.pdf.

329. *Id.* at 3.

330. See CCES, *supra* note 292 ("As of January 1, 2014, California's program is linked to that of Québec"); see also Malin Ahlberg et al., *Linking Different Emissions Trading Systems—Current State and Future Perspectives*, GER. EMISSIONS TRADING AUTH. 1, 8, 11 (May 2013), <http://www.mei.de/wp-content/uploads/2013/07/ETS-Current-State-and-Future-Perspectives.pdf> (discussing the prospects of linking California's Cap-and-Trade to Ontario's and the EU ETS').

331. See Durning & Bauman, *supra* note 231.

332. *Id.*

333. Ravi, *supra* note 218.

334. *Id.*

335. *Id.*

336. Durning & Bauman, *supra* note 231.

system is “to encourage other governments to act to combat rising GHG.”³³⁷ California produces 1% to 1.5% of the world’s greenhouse gases,³³⁸ so even if California reduces its emission, other governments need to join them to make an effective difference in the world. As of January 2014, only Québec and California have linked their programs.³³⁹ Allowances in California are expected to drive the price in the two jurisdictions.³⁴⁰

Thus far, the system has had no adverse impacts on the economy, although the price of gas did go up around 10 cents.³⁴¹ The revenues collected through 2014 were \$969 million and an estimated \$3.4 to \$10.3 billion more could be collected by 2020.³⁴² All funds from the auctions go into the Greenhouse Gas Reduction Fund,³⁴³ which focuses on (1) sustainable communities and clean transportation, (2) energy efficiency and clean energy, and (3) natural resource and waste diversion.³⁴⁴ Twenty-five percent of the funds are to go into the high-speed rail from L.A. to San Francisco, 35% into disadvantaged communities and some mass-transit, and 40% to the state legislature to decide where the remaining funds should go.³⁴⁵

A July 2014 poll found that the majority of Californians would not support a cap-and-trade if it meant paying more for electricity or gas.³⁴⁶ The program will inevitably cause a rise in utility bills. Although some consumers may be able to reduce their use of cars and substitute mass transportation, electricity is inelastic and consumers cannot easily change their behavior and substitute another product.³⁴⁷ The California Legislative Analyst’s Office estimates that gas prices will rise “between 13 and 50 cents

337. Ravi, *supra* note 218.

338. Hiltzik, *supra* note 292 (stating California produces 1% of world’s greenhouse gases); *but see* Ravi, *supra* note 218 (stating 1.5%).

339. Guthertz, *supra* note 293, at 70; *see also* WORLD BANK, *supra* note 22, at 57.

340. *See* Guthertz, *supra* note 293, at 70 (“Québec’s carbon market is significantly smaller than California’s, the demand for allowances in the California market is expected to drive price in the two jurisdictions”).

341. Severin Borenstein, Op-Ed, *Learning to Love Paying 10 Cents More Per Gallon*, L.A. TIMES (Dec. 13, 2014), <http://www.latimes.com/opinion/op-ed/la-oe-borenstein-gas-prices-emissions-20141214-story.html> (stating that California’s oil and gas industry predicted that it would drive up gas prices 16 to 76 cents per gallon); *see also* Chandiok, *supra* note 273, at 265–66 (“California’s successes . . . are a guide for other states who are trying to design a climate change law that will survive the inevitable legal challenges.”).

342. Ravi, *supra* note 218; *see also* Durning & Bauman, *supra* note 231 (study states \$2 billion a year for the rest of this decade).

343. Durning & Bauman, *supra* note 231 (“AB 32 passed by simple majority in 2006, granting power to ARB to establish a cap and trade.”). Thus, a state agency can impose fees authorized by simple majorities. *Id.*

344. WORLD BANK, *supra* note 22, at 114.

345. Ravi, *supra* note 218.

346. *Id.*

347. Warren & Tomashefsky, *supra* note 171, at 59.

per gallon by 2020” and electric bills “could rise between 5% and 12%.”³⁴⁸ And because this is a fee and not a tax, no rebates or tax shifting off labor are allowed.³⁴⁹ If enough voters oppose the cap-and-trade, it could be repealed. Thus, it is too soon to declare this program a success.

3. *The Midwestern Greenhouse Gas Reduction Accord Has Failed*

The Midwestern Greenhouse Gas Reduction Accord (MGGRA) or Midwestern Accord, was established in 2007 and covered six U.S. states (Illinois, Iowa, Kansas, Michigan, Minnesota, and Wisconsin) and one Canadian province (Manitoba).³⁵⁰ Another three U.S. states and one Canadian province were formally observing this process.³⁵¹ Under the Accord, the members agreed to set up a multi-sector cap-and trade system and meet targets of 60–80% below 2007 emission levels.³⁵² In early 2008, participating jurisdictions appointed an Advisory Group comprised of representatives from environmental groups, industry and participating jurisdictions to develop recommendations on a regional cap-and-trade program.³⁵³ In May 2009, the Advisory Group released their draft of final design recommendations.³⁵⁴ After releasing their draft in April 2010, “the states and province in MGGRA did not continue pursuing their greenhouse gas goals under the Accord.”³⁵⁵ Thus, the Midwestern initiative has failed.

4. *The Regional Greenhouse Gas Initiative Has Been a Success*

The Regional Greenhouse Gas Initiative (RGGI) was established in 2005 and has been the most successful cap-and-trade in North America.³⁵⁶ It

348. *Id.*

349. Durning & Bauman, *supra* note 231. Still, the California Public Utility Commission ordered Pacific Gas and Electric to give “climate credits” averaging \$35 to residential customers for several months a years. *Id.*

350. CCES, *supra* note 292.

351. *Id.*

352. *Id.*

353. Chris Lau & Nicholas Bianco, *The Bottom Line on Regional Cap-and-Trade Programs*, 13 WORLD RES. INST. 1, 2 (July 2009), available at http://www.wri.org/sites/default/files/pdf/bottom_line_regional_cap_and_trade.pdf.

354. CCES, *supra* note 292.

355. *Id.*

356. *Id.*; Jason Brown, *RGGI States Make Major Cuts to Greenhouse Gas Emissions from Power Plants*, REG’L GREENHOUSE GAS INITIATIVE (Jan. 13, 2014), http://www.rggi.org/docs/PressReleases/PR011314_AuctionNotice23.pdf; Chandiok, *supra* note 273, at n.197 (citing *Overview of RGGI CO₂ Budget Trading Program*, REG’L GREENHOUSE GAS

initially covered ten Northeast and Mid-Atlantic States (Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island and Vermont). It aims to reduce emissions from electric power and thus applies only to emission from regulated fossil fuel power plants that “together produce 95% of the region’s electric-generation carbon emissions.”³⁵⁷ Importantly, it did not include the transportation, agriculture, commercial and residential sectors of the economy. Thus, it is more limited in scope than the CA Cap-and-Trade.

Under the RGGI, each state limits emissions, issues allowances and encourages participation in regional auctions.³⁵⁸ Thus, state programs are integrated into a single regional market for carbon emissions. RGGI, like the California program, included banking allowances and soft price ceilings and a minimum auction price.³⁵⁹ Unlike the EU Cap-and-Trade program, however, the majority of the allowances were auctioned off in 2008.³⁶⁰ Subsequent auctions have occurred quarterly. So far, these auctions have earned more than \$1.5 billion since 2009 and over 80% of the revenue has gone back to programs in renewable energy projects, energy efficiency programs and other initiatives to benefit the consumer.³⁶¹

RGGI can be applauded for its flexibility in making changes to its cap. The cap was criticized because it was set too high and thus the prices were seen as too low.³⁶² Thus, RGGI updated and reduced the cap by 45% in January 2014.³⁶³ The cap was set at 188 million short tons of carbon for the first control period (2009-2011) and then reduced to 91 million short tons.³⁶⁴ The cap will be reduced by 2.5% each year from 2015 to 2020.³⁶⁵ Some say this “increase in stringency is dramatic and represents evidence” that cap-and-trade systems can be subsequently modified.³⁶⁶ Others might

INITIATIVE 2 (Oct. 2007), http://www.rggi.org/doc/program_summer_10_07.pdf); *Regulated Sources*, REG’L GREENHOUSE GAS INITIATIVE, https://www.rggi.org/design/overview/regulated_sources (last visited Jan. 1, 2016).

357. Gannett, *supra* note 64, at 7; *Overview of RGGI CO₂ Budget Trading Program*, REG’L GREENHOUSE GAS INITIATIVE 2 (Oct. 2007), http://www.rggi.org/doc/program_summer_10_07.pdf.

358. *Overview of RGGI CO₂ Budget Trading Program*, *supra* note 356, at 4.

359. Gannett, *supra* note 64, at 7–8.

360. *Id.*

361. *Id.*; Chandiok, *supra* note 273, at 275 n.198.

362. See Gutherz, *supra* note 293, at n.8 (citing *The RGGI CO₂ Cap*, REG’L GREENHOUSE GAS INITIATIVE, http://www.rggi.org/docs/program_summary_10_07.pdf (last visited Jan. 1, 2016)).

363. WORLD BANK, *supra* note 22, at 58 (“The new 2014 cap is 91 million short tons of CO₂, representing a 45% reduction from the previous cap”).

364. *Id.*

365. *Id.*; The cost containment reserve CR was triggered for the first time in March 2014. *Id.*

366. Wara, *supra* note 154, at 35.

say the cap is too low—that by 2020, we must cut 15 to 20% off current levels, and the RGGI decline does not meet that standard.³⁶⁷ Empirical studies have shown that the emissions were 40% lower than in 2005; however, many factors were cited as contributing to this reduction.³⁶⁸

The RGGI economies have grown. An independent study by the Analysis Group projected positive economic outcomes including \$1.6 billion in net economic benefits, \$1.1 billion in electricity bill savings for consumers, 16,000 additional jobs, and \$765 million retained in local economies due to reduced fossil fuel demand.³⁶⁹ Despite this favorable economic report, New Jersey, with the urging of Governor Christie, withdrew from the program in 2011.³⁷⁰ In New Hampshire, the House tried to end the state participation in RGGI by 2015 and a compromise was passed in the Senate stating that if two other New England states withdraw then New Hampshire will withdraw.³⁷¹ In addition, a conservative group tried to block New York's

367. CONCERNED SCIENTISTS, *supra* note 222.

368. Richard Cowart, *Carbon Caps and Efficiency Resources: How Climate Legislation can Mobilize Efficiency and Lower the Cost of Greenhouse Gas Emission Reduction*, 33 VT. L. REV. 202, 213–18 (2008). The power sector's greenhouse gas emissions are more than 40% lower in the RGGI region than they were in 2005. *Id.* at 213. There are many factors that contribute to this reduction, including improved energy efficiency measures, a broad switch from coal and oil to natural gas use in power plants, carbon price signals, and regulatory predictability. *Id.*

369. Paul Hibbard et al., *The Economic Impacts of the Regional Greenhouse Gas Initiative on Nine Northeast and Mid-Atlantic States*, ANALYSIS GRP., 1, 11, 19 (July 14, 2015), http://www.analysisgroup.com/uploadedfiles/content/insights/publishing/analysis_group_rggi_report_july_2015.pdf.

370. Harriet Shugarman, *Fact Sheet: The Regional Greenhouse Gas Initiative, (RGGI)*, N.J. PUB. POL'Y NETWORK 1, 2 (Nov. 11, 2011), http://uulmnj.org/wp-content/uploads/rggi_fact_sheet.pdf. New Jersey Governor Chris Christie stated that “our analysis of the Regional Greenhouse Gas Initiative or RGGI reveals that this program is not effective in reducing greenhouse gases and is unlikely to be in the future.” *Id.* The governor called it a “failure” because of low auction prices and industry's ease of compliance. *Id.* Several environmental groups challenged the governor's actions, with some success. *See* Jonathan D. Salant, *Christie's withdrawal from air pollution compact has cost N.J. \$114M, Pallone says*, NJ ADVANCE MEDIA FOR NJ.COM (Mar. 18, 2015, 12:11 AM), http://www.nj.com/politics/index.ssf/2015/03/rep_pallone_says_christies_withdrawal_from_regiona.html. *See also* Chris Fallon, *Appeals Panel: Christie Administration Improperly Pulled N.J. Out of Program to Cut Greenhouse Gas Emissions*, NORTHJERSEY.COM (Mar. 25, 2014, 5:33 PM), <http://www.northjersey.com/news/appeals-panel-christie-administration-improperly-pulled-n-j-out-of-program-to-cut-greenhouse-gas-emissions-1.750770>.

371. Matthew Spolar, *Negotiators Reach RGGI Deal*, CONCORD MONITOR, May 26, 2012, <http://www.concordmonitor.com/article/332107/negotiators-reach-rggi-deal>.

participation but this failed.³⁷² Despite these minor glitches, the RGGI seems to be going strong and must be considered a success.³⁷³

5. Conclusion

What we can learn from these emissions trading programs is their success will largely depend on the political will of the state, the administrative details of the program (its scope, the cap, the allocation approach, use of offsets, price stabilization mechanisms, and enforcement) its performance and effectiveness, its ability to be flexible given the need for change based on competitiveness or efficacy concerns, and its ability to link to other systems. What is needed is for the original signers of the Western Climate Change to join the California and Québec Cap-and-Trade systems. Then, California should link to Alberta, Ontario and other state and provinces in North America. The Midwestern initiative should be revived and RGGI should be expanded to cover transportation. All systems should be coordinated with similar auction allowances, sector coverage, and cap limits.³⁷⁴ North America needs to be the leader in the reduction of carbon dioxide emissions.³⁷⁵ Canada and the U.S. have been some of the largest polluters of carbon and will also be some of the biggest beneficiaries from the melting ice. Since the impact of climate change will fall mainly on poor countries, it is imperative that the richer countries take the lead in these climate initiatives.

372. John C. Dernbach et al., *United States: Making the States Full Partners in a National Climate Change Effort: A Necessary Element for Sustainable Economic Development*, MONDAQ (Aug. 2010), <http://www.mondaq.com/unitedstates/x/103786/Climate+Change/Making+the+States+Full+Partners+in+a+National+Climate+Change+Effort+A+Necessary+Element+for+Sustainable+Economic+Development+>.

373. Wara, *supra* note 154, at 293. “(O)verallocation and a general lack of stringency are serious concerns in many cap-and-trade programs.” *Id.* However, if they become too stringent then evidence exists that programs will be weakened (i.e., RECLAIM and CA Bill 32). WORLD BANK, *supra* note 22, at 58. The RGGI states have submitted comments to the EPA in relation to the Clean Air Act, advocating flexibility in how states approach carbon pollution, emphasizing market-based approach over a regulatory approach and emphasizing the need to reward early actors. Rob Klee et al., *RGGI States’ Comments on Proposed Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units*, REG’L GREENHOUSE GAS INITIATIVE 1 (Nov. 5, 2014), http://www.rggi.org/docs/PressReleases/PR110714_CPP_Joint_Comments.pdf.

374. WORLD BANK, *supra* note 22 at 58. Fifty percent of the total GHG emissions in Alberta are covered by the Alberta Greenhouse Gas Reduction Program. Facilities that emit more than 0.1Mt CO₂e per year are required to reduce their emissions by 12% or buy permits. *Id.* at 42.

375. *Id.* Alberta Greenhouse Gas Reduction Program could also be linked, but challenges include political aversion to “new taxes,” the powerful fossil fuel interest groups, and divergent and diffuse interests of the public. However, looming deficits and real environmental concerns could result in change.

B. State and Province Carbon Tax and Other Initiatives

Some states in the U.S. and provinces in Canada have established creative climate change initiatives. Some of these are merely aspirational in tone. However, others, such as carbon taxes in British Columbia, Boulder and San Francisco, have been effective in reducing CO₂ emissions with minimal economic impact. This section examines those initiatives.

1. Many State and Local Initiatives are Merely Aspirational

Climate change initiatives at the local level have tended to focus on GHG mitigation.³⁷⁶ Cities work with International Council for Local Environmental Initiatives (ICLEI),³⁷⁷ the Mayors Climate Protection Agreement (MCPA),³⁷⁸ and C40 Cities (a climate leadership group),³⁷⁹ to inventory emissions, develop climate action plans, and pursue sustainable development goals. States and regions have also signed agreements to fight climate change. All of these initiatives are voluntary and thus do not by themselves guarantee effective climate change policy.³⁸⁰ However, like the countries in the recent COP 21, local governments can band together with other cities and become agents for change in the world war against climate change.

The Council for Local Environmental Initiatives (ICLEI) “serves as a clearinghouse on sustainable development and environmental protection policies, programs, and techniques, initiates joint projects or campaigns among groups of local governments, organizes training programs, and publishes reports and technical manuals on the art of environmental management practices.”³⁸¹ As of October 2015, more than one thousand

376. See Trisolini, *supra* note 15, at 679.

377. *ICLEI Members*, INT’L COUNCIL FOR LOCAL ENVTL. INITIATIVES (ICLEI), <http://www.iclei.org> (last visited Jan. 1, 2016); see also *Mayors Leading the Way on Climate Protection*, MAYORS CLIMATE PROT. CTR. (2009), <http://www.usmayors.org/climateprotection/revised>.

378. This initiative should be contrasted with the EU Covenant of Mayors which has “a more binding nature.” See Dellinger, *supra* note 16, at 632 (“But whereas the Covenant appears to be both procedurally and substantively successful, more action needs to be demonstrated by the MCPA and GreenClimateCities before these can reasonably be determined to be effective. . .”).

379. C40 CITIES, <http://www.c40cities.org/> (last visited Jan. 2, 2016).

380. See Duff, *supra* note 9, at 2075–76 (stating that these voluntary agreements have their place in the global warming fight).

381. *International Council for Local Environmental Initiatives (ICLEI)*, SUSTAINABLE CMTYS. ONLINE (2016), <http://www.sustainable.org/creating-community/inventories-and-indicators/149-international-council-for-local-environmental-initiatives-iclei>; see also *Green ClimateCities Program: A Pathway to Urban Low-Carbon Development*, INT’L COUNCIL

cities were members of ICLEI, including Portland, Seattle, San Francisco and other major cities in Western North America and around the globe.³⁸²

ICLEI's first initiative was the Cities for Climate Protection (CCP) campaign that focused on the following five "milestones": (1) require a baseline emissions inventory; (2) set forth an emissions reduction target for the forecast year; (3) develop a local plan of action by involving community stakeholders; (4) implement the plan and policies; and (5) monitor and verify results.³⁸³ Unfortunately, these last steps are still lacking in many places.³⁸⁴ ICLEI's newest initiative, launched in June 2012, is the GreenClimateCities Program.³⁸⁵ Here, a three-step approach is adopted: (1) analyzation (again doing a GHG inventory, identify opportunities for emissions reduction, etc.), (2) action (develop a mitigation and adaptation action plan, identify finances for projects, etc.), and (3) acceleration (measure progress and report on achievements).³⁸⁶ As a result of their effort, "232 cities from 25 countries . . . reported 561 climate and energy commitments, 557 GHG inventories, and a total of 2092 mitigation and adaptation actions."³⁸⁷ The problem is that all of this is voluntary with no enforcement method to assure compliance, other than the "threat of potential public scorn."³⁸⁸ To conclude: ICLEI is just "too new to demonstrate any substantive success."³⁸⁹ However, in the absence of binding global and federal initiatives, it is definitely a promising program.

The Mayors Climate Protection Agreement (MCPA) has been adopted by over one thousand mayors, within all 50 of the states (plus the District of Columbia and Puerto Rico.)³⁹⁰ Again, the mayors of Seattle, Portland, and San Francisco have signed this simple one-page agreement.³⁹¹ The agreement strives to beat the Kyoto Protocol target of 7% GHG reduction within the city and urges the mayors to try to get their state and federal

FOR LOCAL ENVTL. INITIATIVES, http://www.iclei.org/fileadmin/PUBLICATIONS/Brochures/ICLEI_GreenClimateCities_Brochure.pdf.

382. *Local Governments for Sustainability*, INT'L COUNCIL FOR LOCAL ENVTL. INITIATIVES, <http://www.iclei.org/iclei-members/iclei-members.html> (last visited Jan. 2, 2016).

383. *Five Milestones of Emissions Management*, INT'L COUNCIL FOR LOCAL ENVTL. INITIATIVES, <http://www.iclei.org/index.php?id=810> (last visited May 4, 2016).

384. See Dellinger, *supra* note 16, at 634.

385. *Id.* at 635.

386. *Id.*

387. *Id.* at 636.

388. *Id.* at 636–37.

389. *Id.* at 637.

390. *List of Participating Mayors*, MAYORS CLIMATE PROT. CTR. (2007), <http://www.usmayors.org/climateprotection/list.asp>.

391. *Id.*; see also *The U.S. Conference of Mayors Climate Protection Agreement—Signature Page*, THE U.S. CONFERENCE OF MAYORS, <http://www.usmayors.org/climateprotection/mayorsclimateagreementsignaturepage.pdf> (last visited Jan. 2, 2016).

governments (including the U.S. Congress) to enact GHG reduction legislation.³⁹² Unfortunately, the 7% target reduction now needs to be increased “tenfold.”³⁹³ Thus, the MCPA “appears to have become more of a political public relations tool than an agreement with much real bite.”³⁹⁴

The C40 Cities Climate Leadership Group is also a voluntary group of cities concerned with climate change. Now in its 10th year, it includes over 75 cities in its membership, covering over 500 million people and one quarter of the world’s economy.³⁹⁵ It focuses on “tackling climate change and driving urban action that reduces greenhouse gas emissions and climate risks, while increasing the health wellbeing and economic opportunities of urban citizens.”³⁹⁶ As a primer to the recent meeting in Paris, C40 showcased research and stories “that help explain why a global agreement on climate change matters, and why cities are so important to the success of any agreement.”³⁹⁷

In addition to the aspirational city initiatives,³⁹⁸ many state and regional initiatives exist at the state and regional level in western North America. For example, in 2008, The Pacific Coast Collaborative (PCC), was established and signed by Alaska, British Columbia, Washington, Oregon and California.³⁹⁹ The aim here is to promote clean energy innovation and low-carbon developments to reduce climate change in the region. Through the PCC, jurisdictions hope to “coordinate, propose, and adopt policy frameworks aimed at generating investment in renewable energy, climate resilience, low-carbon transportation infrastructure, and environmental conservation.”⁴⁰⁰ Then, in 2009, California, Washington and Oregon signed a climate change pact with British Columbia stating their intent to implement cap-and-trade programs, and achieve long-term reductions in GHG emissions.⁴⁰¹ While not binding, this pact represents a commitment to

392. *U.S. Conference of Mayors Climate Protection Agreement*, THE U.S. CONFERENCE OF MAYORS (2008), <http://www.usmayors.org/climateprotection/agreement.htm>.

393. Dellinger, *supra* note 16, at 633.

394. *Id.*

395. *About C40*, C40 CITIES, <http://www.c40.org/about> (last visited Jan. 8, 2016).

396. *Id.*

397. C40 CITIES, *supra* note 395.

398. See Kenneth Abbott, Arizona State University, Presentation at the Seventh Annual San Diego Climate and Energy Law Symposium (Nov. 6, 2015).

399. CCES, *supra* note 292, at § 4.

400. *Id.*

401. Paul Rogers, *Climate Change Pact Signed by California, Oregon, Washington and British Columbia*, SAN JOSE MERCURY NEWS, Oct. 29, 2013, http://www.mercurynews.com/ci_24406734/california-oregon-washington-andbritish-columbia-sign-climate;

multilateral cooperation and, like the other initiatives, is hopeful but not binding.⁴⁰² Thus, it appears that many cities are following the global approach, which is just to enter into nonbinding “soft” agreements that can easily be avoided.

2. *Some State and Local Carbon Taxes Have Been Successful*

Luckily, some state and local initiatives in the Western North America are more binding. Those would include the provincial carbon tax in British Columbia and the local carbon taxes in Boulder, Colorado and San Francisco, California. This section also highlights the proposed carbon taxes in Oregon and Washington.

a. *British Columbia*

In July 2008, British Columbia introduced its carbon tax.⁴⁰³ The BC carbon tax is just one of the key parts of the Climate Action Plan to reduce BC’s GHG emissions by 33% below 2007 levels by 2020.⁴⁰⁴ The BC tax

see also *Pacific Coast Action Plan on Climate and Energy*, PAC. COAST COLLABORATIVE (Oct. 28, 2013), <http://www.pacificcoastcollaborative.org/Documents/Pacific%20Coast%20Climate%20Action%20Plan.pdf>.

402. John Stegman, *Cooperative State Cap and Trade to Mitigate Climate Change*, 55 SANTA CLARA L. REV. 215, 225–26 n.67 (2015).

403. *Carbon Tax*, B.C., MINISTRY OF FIN. (2015), http://www.fin.gov.bc.ca/tbs/tp/climate/carbon_tax.htm. Québec and Alberta have similar taxes but they are limited. See Mori, *supra* note 216. British Columbia combines several policies to reduce GHG emissions by 33% by 2020 and by 80% by 2050, compared to 2007 levels. *Climate Action*, B.C., MINISTRY OF TRANSP. & INFRASTRUCTURE, <http://www2.gov.bc.ca/gov/content/transportation/transportation-environment/climate-action> (last visited May 4, 2016).

404. WORLD BANK, *supra* note 22, at 86. British Columbia successfully implemented the GHG reduction initiative in the transportation sector by imposing a parking fee, the proceeds of which are used to offer incentives to City employees to encourage them to carpool, walk or bike, or take public transportation to work. See Sustainable Commuting, CITY OF VANCOUVER, <http://vancouver.ca/green-vancouver/sustainable-commuting-for-staff.aspx> (last visited Apr. 11, 2016). British Columbia’s Sustainable Commuting Program offers:

1. Rebates on transit passes;
2. Monthly incentives and access to reserved parking for staff who share rides;
3. Incentives for biking, walking, skateboarding, and rollerblading, such as gift cards for rain gear;
4. Cycling skills courses and subsidized bike tune-ups; and a “guaranteed ride home” program in the event of emergency or sickness.

See Campus & Community Planning, *Transportation Options*, THE UNIV. OF B.C., <http://planning.ubc.ca/vancouver/transportation-planning/transportation-options> (last visited Jan. 2, 2016). British Columbia has also recently created a program called LiveSmart on the Road. See *LiveSmart on the Road*, LIVESMART BC (2015), <http://www.livesmartbc.ca/road>. The LiveSmart on the Road program provides incentives for people to scrap old, inefficient cars instead of selling them and provides additional incentives for people who buy clean-energy vehicles under a component program called the Clean Energy Vehicle

has at least four core features that have remained the same as when first enacted and have contributed to its success.⁴⁰⁵

First, the tax is broad based—taxing twenty carbon-based fossil fuels, each at different rates.⁴⁰⁶ It covers “approximately three-quarters of all the GHG emissions in the province.”⁴⁰⁷ Some legitimate leakage occurs with exemptions in the agriculture sector and for marine and aviation fuels.⁴⁰⁸ Essentially the tax exempts fuel in interstate commerce and exported out of the province and taxes fuels coming in and being used in the province.⁴⁰⁹ Despite its broad base, the tax has been criticized as it does not apply to certain industrial processes.⁴¹⁰ These exemptions were based on the prospect

Point of Sale Incentive Program. See *Transportation Rebates and Incentives*, LIVESMART BC (2015), <http://www.livesmartbc.ca/incentives/transportation/CEV-rebates.html>. As part of the LiveSmart on the Road program, British Columbia also offers rebates of up to \$500 on residential electric car charging stations. *Id.* And, in January 2013, British Columbia invested \$1.3 million in 13 new direct current (DC) fast-charging stations throughout the province to help electric vehicle owners charge their cars. David Karn, *News Release: B.C. plugging in to electric vehicle fast chargers*, B.C., MINISTRY OF ENV'T 1 (Jan. 17, 2013), http://www2.news.gov.bc.ca/news_releases_2009-2013/2013ENV0002-000067.pdf. The cumulative effect of British Columbia's combined public transportation, ride share, cycling, guaranteed ride home program, LiveSmart on the Road program, and Clean Energy Point of Sale Incentive Program is fewer individual fossil fuel burning commuters on the road, thus fewer GHGs being released into the atmosphere. See *id.*; *LiveSmart on the Road*, *supra*; *Transportation Rebates and Incentives*, *supra*.

405. See *LiveSmart on the Road*, *supra* note 404; see also Rodney L. Brown Jr., *State-by-State or Regional Solutions?*, ROCKY MTN. MIN. L. FOUND. (2015); see also WORLD BANK, *supra* note 22, at 86.

406. Carbon Tax Act, S.B.C. 2008, P. 14, Schedule 1 (Can.).

407. Brian C. Murray & Nicholas Rivers, *British Columbia's Revenue-Neutral Carbon Tax: A Review of the Latest "Grand Experiment" in Environmental Policy*, NICHOLAS INST., DUKE UNIV. 1 (May 2015), https://nicholasinstitute.duke.edu/sites/default/files/publications/ni_wp_15-04_full.pdf.

408. WORLD BANK, *supra* note 22, at 79. These are considered the “trade-exposed” sectors. *The Effects of H.R. 2454 on International Competitiveness and Emission Leakage in Energy-Intensive Trade-Exposed Industries: An Interagency Report Responding to a Request from Senators Bayh, Specter, Stabenow, McCaskill, and Brown*, ENVTL. PROT. AGENCY 10 (Dec. 2, 2009), available at http://sallan.org/pdf-docs/EPAReport_Steel_Cement.pdf. “Exported fuels and fuel consumption by aviation and shipping also travelling outside British Columbia are not covered by the carbon tax. Non-combustion GHG emissions such as industrial process emissions, venting and fugitive emissions are not covered either.” WORLD BANK, *supra* note 22, at 79. From 2014, “80% exemption to the carbon tax on natural gas and propane for heating and CO₂ production for green house growers, and exemption for colored gasoline and colored diesel purchased by farmers.” WORLD BANK, *supra* note 22, at 79.

409. Duff, *Carbon Taxation in British Columbia*, *supra* note 30, at 94.

410. *Id.* (“such as the production of oil, gas, aluminum, or cement”)

of the implementation of a cap-and-trade system covering these industries, but that initiative has failed.⁴¹¹ In addition, the tax also does not cover all GHG gases, such as methane and nitrous oxide.⁴¹² Thus, the tax is not as comprehensive as it could be.

Second, the BC tax started at a low rate, varied depending upon the carbon content of the fuel, and increased gradually over the years.⁴¹³ This gave consumers a warning of increased prices and certainty.⁴¹⁴ It started at a relative low rate of CAD \$10 per ton of carbon dioxide equivalent emissions and progressively increased each year by \$5 until 2012, when it reached the final and current price of CAD \$30 per ton.⁴¹⁵ In 2008, that meant a 2.4 cents per liter increase in the price of gasoline and an increase of 6.7 cents per liter by 2012.⁴¹⁶ The problem here is that the rate is now frozen and is not scheduled to increase further to reduce GHG emissions. The BC government has said it might increase those rates if it does not meet its emissions targets or if other jurisdictions pass similar carbon pricing instruments.⁴¹⁷

Third, the BC tax is simple, piggybacking on an existing fuel tax paid mostly by wholesalers,⁴¹⁸ (although natural gas was paid at the retail level).⁴¹⁹ This upstream approach meant that the tax needs to be collected only from

411. *Id.* at 95, n.52; *see also* WORLD BANK, *supra* note 22, at 86 (“The tax will be integrated with other measures”).

412. Duff, *supra* note 30, at 94 (“from the disposal of solid waste and agricultural sector”).

413. For an extensive analysis and charts of B.C.’s carbon tax shift, *see* Alan Durning & Yoram Bauman, *All You Need to Know About BC’s Carbon Tax Shift in Five Charts*, SIGHTLINE INST. (Mar. 11, 2014, 6:30 AM), <http://www.sightline.org/2014/03/11/all-you-need-to-know-about-bcs-carbon-tax-shift-in-five-charts/>.

414. Duff, *Carbon Taxation in British Columbia*, *supra* note 30, at 98; Clare Demerse, *Proof Positive: The Mechanics and Impacts of British Columbia’s Carbon Tax*, CLEAN ENERGY CAN. 2, <http://cleanenergycanada.org/wp-content/uploads/2014/12/Carbon-Tax-Fact-Sheet.pdf> (last visited Jan. 3, 2016) (“The tax started at \$10 per metric ton of carbon dioxide-equivalent in 2008 and ramped up by \$5 each year to reach \$30 a ton by 2012. In 2008, that meant a 2.4 cents per liter (US \$.09/gallon) increase in the price of gasoline. By 2012, the tax increased gas prices by 6.7 cents per liter (\$0.25/gallon).”).

415. Duff, *Carbon Taxation in British Columbia*, *supra* note 30, at 97. This tax translated into roughly for \$10—and C\$7.23 per liter of gasoline. WORLD BANK, *supra* note 22, at 79 (“CAN\$30/tCO₂e (US\$28/tCO₂e)”).

416. Demerse, *supra* note 414, at 2.

417. There are some problems here with such linkage. *See* discussion *infra* Part IV.B.2.

418. Fuel wholesalers include fuel importers or domestic producers. Demerse, *supra* note 414, at 3 (“Wholesalers pass the tax on to retailers, who pass it on to consumer—who see it itemized on their receipts at the pump.”).

419. *Id.*; WORLD BANK, *supra* note 22, at 86 (“carbon tax is applied and collected in the same way that motor fuel taxes are currently applied and collected, except for natural gas which is collected at the retail level”).

a limited number of companies,⁴²⁰ and it did not require any additional administration or enforcement resources.⁴²¹ The tax is also transparent, as consumers see it itemized on their receipts at the pump, or on their gas bills.⁴²²

Fourth, the carbon tax was designed to be economically efficient, politically feasible, and equitable. The tax was originally planned to have the “double dividend” effect by being “revenue neutral,” meaning the revenues raised were to be returned or recycled or shifted to business and individuals by reducing other taxes.⁴²³ The tax has in fact been revenue negative.⁴²⁴ Although it raised about \$880 million in 2010/2011, all revenues (and more) are recycled back to taxpayers.⁴²⁵ In addition, when the tax was first imposed, all residents got a \$100 dividend or rebate check as a “sweetener” to “reduce public opposition to the tax.”⁴²⁶ The tax also included a refundable Climate Action Tax Credit for low-income households.⁴²⁷ Thus, the tax was crafted to be politically palatable. But if these credits and rebates were not enough, by law, the Minister of Finance is required to outline how the revenues are to be recycled.⁴²⁸ If the revenue neutrality cannot be ensured, the Minister’s salary will be cut 15%.⁴²⁹ Recent studies have found that the BC tax “does not disadvantage low-income residents” and is in fact “highly progressive, an effect enhanced by the provinces’ low-income tax credits.”⁴³⁰

420. Demerse, *supra* note 414, at 3.

421. *Id.* at 2–3.

422. *Id.* at 3.

423. Duff, *Carbon Taxation in British Columbia*, *supra* note 30, at 96–100. This is in contrast to Québec, where revenues go to a Green Fund to support climate change initiative. *Id.* at 96–97.

424. Mori, *supra* note 216, at 18–19.

425. Duff, *Carbon Taxation in British Columbia*, *supra* note 30, at 98–99; *see also* Mori, *supra* note 216, at 16–19.

426. Duff, *Carbon Taxation in British Columbia*, *supra* note 30, at 99.

427. *Id.* at 99.

428. WORLD BANK, *supra* note 22, at 86.

429. *Id.*

430. Demerse, *supra* note 414, at 6. It is also possible that consumers can substitute public transportation for cars and thus reduce the regressive impact of the tax. *Id.* Tax on certain fuels, however, might not be inelastic, meaning the consumer might be able to substitute another energy form. *Id.*

In 2012, British Columbia conducted a five-year review of its carbon tax.⁴³¹ Their economic analysis showed it had only a small impact on the economy and that the province continued to grow well compared to other Canadian provinces.⁴³² Furthermore, statistics showed that the tax had reduced emissions by making carbon-intensive activities more expensive.⁴³³ Consumption of petroleum products declined by 19%⁴³⁴ compared to an increase of 3% in the rest of Canada.⁴³⁵

The public has generally supported the BC tax.⁴³⁶ Polls have shown that a majority of British Columbians supported the tax at its inception and a majority continue to support it today.⁴³⁷ In the 2009 election the governing party's opposition ran on an "Axe the Tax" campaign to kill the carbon tax, but lost the election and later dropped their opposition to the tax.⁴³⁸ Even the business community has been "mildly supportive" of the tax.⁴³⁹ When interest groups complained after the 2012 review, the government made several concessions through grants and exemptions.⁴⁴⁰ Thus, it seems the BC tax is flexible in its implementation, integral to BC fiscal policy, and likely to remain in place.⁴⁴¹

However, this tax alone is not enough to effect significant climate change. The BC legislature specifically designed the carbon tax to be integrated with other measures, such as cap-and-trade programs.⁴⁴² Because the carbon tax rate is frozen and the tax does not cover those industries that would have been subject to a cap-and-trade, BC should sign on to the California and Québec Cap-and-Trade system.⁴⁴³ They could also link up with the Alberta

431. Marlo Lewis, *Is British Columbia's Carbon Tax a Model for the U.S.?*, GLOBALWARMING.ORG (Aug. 7, 2014), <http://www.globalwarming.org/2014/08/07/is-british-columbias-carbon-tax-a-model-for-the-u-s/>.

432. *Id.*

433. Mori, *supra* note 216, at 18.

434. WORLD BANK, *supra* note 22, at 87.

435. Stewart Elgie, *British Columbia's carbon tax shift: An environmental and economic success*, WORLD BANK BLOGS (Sept. 10, 2014), <http://blogs.worldbank.org/climate-change/british-columbia-s-carbon-tax-shift-environmental-and-economic-success>.

436. WORLD BANK, *supra* note 22, at 87.

437. Demerse, *supra* note 414, at 4 ("Polling shows that a majority of British Columbians (54 percent) supported the tax when it was introduced, and a majority (52 percent) continue to support it today. In 2012, public support for the tax reached a high of 64 percent just as the tax reached its maximum level."). Businesses were "cautiously accepting" of the carbon tax when it was first introduced. *Id.*

438. *Id.*

439. WORLD BANK, *supra* note 22, at 87.

440. *Id.*

441. *Id.*

442. *Id.* at 86.

443. Duff, *supra* note 30, at 94; *see also* WORLD BANK, *supra* note 22, at 86.

system.⁴⁴⁴ In the alternative, the BC carbon tax base should be expanded and the rates increased.

b. Boulder's Carbon Tax

One city that has successfully implemented a carbon tax is Boulder, Colorado. The carbon tax in Boulder was implemented in 2012 and will expire in 2018.⁴⁴⁵ Boulder's carbon tax, which is officially called the Climate Action Plan Excise Tax, charges very low rates of \$0.0049 per kWh for residential, \$0.0009 per kWh for commercial, and \$0.0003 per kWh for industrial consumers.⁴⁴⁶ Boulder effectuates this tax by stating directly in the City Code, § 3-12-1 that "the City Council determines and declares that the consumption of electricity within the City is the exercise of a taxable privilege."⁴⁴⁷ Revenues are to be reinvested in environmental initiatives.⁴⁴⁸ Thus, Boulder's implementation of the Climate Action Plan Excise Tax demonstrates that a city can declare energy usage within its jurisdictional boundaries to be a privilege that can be subject to taxation. Furthermore, by taxing centralized power consumption, cities can reinvest that money in policies that provide tax incentives for consumers who invest in localized power sources or green buildings that require less power to operate. Therefore, instituting a carbon tax can be the first step in creating a sustainable, GHG reduction plan for many cities.⁴⁴⁹

444. See discussion *infra* Part IV.B.2.

445. Boulder Climate Action Plan Excise Tax, BOULDER, COLO. REV. CODE §§ 3-12-1, 3-12-2 (2012).

446. Neha Bhatt & Michael Ryan, *Carbon Energy Tax*, SMALL GROWTH AM. 1, <http://www.smartgrowthamerica.org/documents/Boulder-Carbon-Tax.pdf> (last visited Jan. 3, 2016).

447. COLO. REV. CODE § 3-12-1.

448. *Id.*

449. Boulder is also proposing a 2.16 cents per KWh charge for cannabis growers. See Jan Lee, *Boulder County Proposes Cannabis Carbon "Tax,"* TRIPLE PUNDIT (Nov. 25, 2014), <http://www.triplepundit.com/2014/11/boulder-county-imposes-cannabis-carbon-tax> ("According to one industry source, it takes about 5,000 kilowatt hours of electricity to grow about 2.2 pounds of good-quality pot."). It is not yet clear how the tax will be used, but pesticide pollution and carbon dioxide levels are problems related to marijuana growing. *Id.*

c. *San Francisco's Carbon Tax*

In 2008, San Francisco approved a carbon tax.⁴⁵⁰ Pursuant to this tax, more than 2,500 businesses were required to pay a low rate of 4.4 cents per ton for the carbon dioxide they emitted.⁴⁵¹ Despite the relatively low tax rate, about seven power plants and oil refineries had to pay more than \$50,000.⁴⁵² These fees are expected to generate \$1.1 million in the first year, which will be used to pay for emissions-reduction programs around the city.⁴⁵³

Policy analysts say the relatively small fee probably will not cause business to change their practices or incentivize new clean technologies.⁴⁵⁴ However, these programs have already brought remarkable gains in climate change mitigation. By 2010, the programs contributed to a reduction in carbon emissions by 12% below the 1990 levels.⁴⁵⁵ Specifically, in 2010, San Francisco's citywide carbon footprint totaled 5.4 million metric tons of carbon dioxide equivalent (CO₂e), down from 6.2 million metric tons in 1990.⁴⁵⁶ This reduction translates to taking roughly 128,000 cars off the road, or avoiding burning 1.5 million barrels of oil per year.⁴⁵⁷ These tremendous reductions have exceeded emission reduction goals set forth by both the United Nations at the Kyoto Protocol, which called for emissions reductions of 7% by 2012.⁴⁵⁸ Furthermore, San Francisco's impressive reduction in CO₂ was achieved despite a growth in the City's population.⁴⁵⁹ In addition, all the revenues from the carbon tax are to be reinvested in green programs.⁴⁶⁰ Thus, the tax has set a precedent and raises significant revenue that can be reinvested in additional green initiatives that can help prevent climate change.

The Bay Area Air Quality Management District's board of directors voted 15-1 in favor of the tax.⁴⁶¹ Thus, San Francisco has demonstrated that government policy makers do not have to wait for federal and state mandates before taking action. Cities can pursue grass-roots local-initiative that exceed

450. *San Francisco Approves Carbon Tax*, SUSTAINABLEBUSINESS.COM (May 22, 2008, 7:50 AM), <http://www.sustainablebusiness.com/index.cfm/go/news.display/id/16079>.

451. *Id.*

452. *Id.*

453. *Id.*

454. *Id.*

455. *San Francisco's Leadership in Carbon Emission Reduction*, THE GLOBAL COMPACT CITIES PROGRAMME, <http://citiesprogramme.com/archives/1426> (last visited Jan. 3, 2016).

456. *Id.*

457. *Id.*

458. *Id.*

459. *Id.*

460. SUSTAINABLEBUSINESS.COM, *supra* note 450.

461. *Id.*

the expectations of the larger governmental bodies and achieve exceptional results by implementing minimally intrusive carbon taxes.

3. Oregon and Washington's Proposed Carbon Taxes

In 2009, the Oregon Legislature considered a cap-and-trade program, but the bill did not make it out of committee.⁴⁶² Then, in 2014, the Legislature proposed a carbon tax which would have taxed fuel suppliers (coal, natural gas and petroleum products) and utilities (on electricity). Exemptions were provided for fuels transported out of state and not used in the state and for fuels used in interstate commerce, such as maritime and aviation fuel.⁴⁶³ The funds from the tax were to fund tax credits that would reduce personal income and corporate excise tax. In addition, a part of the funds were to be used for the “construction or installation of alternative energy systems” and for “implementation of systems or programs that result in the reduction of the use of carbon fuels.”⁴⁶⁴ The tax was expected to start at \$10/metric ton and increase until \$60/metric ton by 2015.⁴⁶⁵

The legislature commissioned the Northwest Economic Research Center at Portland State to study various combinations of tax rates and revenue uses.⁴⁶⁶ The study used various carbon prices (up to \$60/ton) with reinvestment into energy efficiency programs of 10% and 25%. The study concluded that a “BC-style carbon tax and shift could generate significant amount of revenue and reduce tax distortions while raising new jobs and reducing carbon emission.”⁴⁶⁷ Despite these favorable findings, the tax was never passed.

A similar scenario happened in Washington State where Governor Jay Inslee proposed a carbon tax plan⁴⁶⁸ and Washington State Senator Kevin Ranker (D-Orcas Island) introduced a bill into Washington legislature

462. Christina Williams, *Oregon Steps Back from Western Climate Initiative*, PORTLAND BUS. J. (June 20, 2014, 5:57 PM), <http://www.bizjournals.com/portland/blog/sbo/2011/11/oregon-steps-back-from-western-climate.html>.

463. H.B. 2082, 78th Leg. Assemb., Reg. Sess. (Or. 2015).

464. *Id.*

465. LIU & RENFRO, *supra* note 140, at 16 (“With a tax starting in 2013 with a \$60 maximum and \$10 annual increase, in 2015 emissions would be 2% below the baseline forecast. . .”).

466. Alan Durning & Yoram Bauman, *Will Oregon Cook Up a Carbon Tax?*, SIGHTLINE INST. (Apr. 1, 2014, 6:35 AM), <http://www.sightline.org/2014/04/01/will-oregon-cook-up-a-carbon-tax/>.

467. *Id.*

468. John Stang, *Turbulence ahead for Inslee's climate plan*, CROSSCUT.COM (Jan. 16, 2015), <http://crosscut.com/2015/01/supporters-push-inslees-climate-plan-legislative-a/>.

creating a carbon tax system similar to the one in British Columbia.⁴⁶⁹ The tax was to be on fossil fuels as well as on the carbon content in electricity consumed within the state. The tax rate was \$15 per metric ton of carbon dioxide and increase to \$25 by July 1, 2018, with automatic increases thereafter by 3 1/5 % plus inflation.⁴⁷⁰ All the revenue would go to the general budget, but unlike BC, there is no income tax in Washington. Thus, the general sales tax could be reduced. Like Oregon, the Washington legislature requested a study be done to assess the economic and equitable consequences.⁴⁷¹ The study concluded, as did the Oregon economic study, that a tax system similar to British Columbia could be effective to help carbon emissions while maintaining a balance between economic growth and equity to low-income energy consumers.⁴⁷² As of this writing, nothing has been passed, or is likely to pass in Washington or in Oregon.

IV. ASSESSMENT AND CHALLENGES TO REFORM

Overall, my study of carbon tax and cap-and-trade initiatives results in the following conclusions:

1. The number of world-wide carbon initiatives is disappointing.
2. Cap-and-trade seems to be the dominant system world-wide, rather than carbon taxation.
3. Many of the countries taking action are the richer countries that have benefited from GHG emissions in the past.
4. Many cities, states, and regions propose climate change initiatives that are never implemented.
5. Because of economic, business, and political concerns, many carbon initiatives are not that effective.
6. These initiatives can only work with community support and political leadership.
7. Market mechanisms will work best with mandates and other environmental policies to effectively combat climate change.
8. North America should link and expand all cap-and-trade systems throughout the region (and world) and local states and cities should pass carbon taxes (while additional environmental initiatives should be implemented).

469. Cassandra Profita, *A Carbon Tax In Oregon?*, OR. PUB. BROAD. (Jan. 8, 2013), <http://www.opb.org/news/blog/ecotrope/a-carbon-tax-in-oregon/>.

470. *Initiative Measure No. 732*, OFFICE OF THE SEC'Y OF STATE, WASH. 5 (Mar. 20, 2015), http://sos.wa.gov/assets/elections/initiatives/FinalText_779.pdf.

471. Keibun Mori, *Washington State Carbon Tax*, WASH. STATE DEP'T OF COMMERCE 1 (July 2011), <http://www.commerce.wa.gov/Documents/Washington-State-Carbon-Tax.pdf>.

472. *Id.* at 44–47.

The challenges to a North American comprehensive global warming regional and carbon pricing initiative are many. First, constitutional issues arise as to whether these state and regional plans violate the interstate commerce or other constitutional doctrines. Second, design issues arise as to how different cap-and-trade regimes can work together and alongside carbon taxes. Third, political issues arise as to whether cities, states and regions have the will to pass these measures. What is clear is that ethically North America should move forward with these initiatives on a city, state and regional level.

A. Constitutional Hurdles

Most local/regional tax and cap-and-trade programs in the U.S. are not going to violate the Commerce Clause or the EPA's authority under the Clean Air Act if they are crafted appropriately. Under the standards established by the courts, if the state regulates "even-handedly to effectuate a legitimate local public interest" affecting interstate commerce in an insignificant manner, it "will be upheld unless the burden imposed on such comer is clearly excessive in relation to the putative local benefits."⁴⁷³ State regulations that impact some interstate commerce but that do not discriminate against interstate commerce will be upheld.⁴⁷⁴

Usually, the carbon system will exempt aviation and maritime activities in interstate commerce, exempt exports and only tax imports. This is done so the businesses within the state can compete fairly with businesses bringing their products into the state. However, care must be taken to craft the carbon system appropriately.

A recent Ninth Circuit case,⁴⁷⁵ challenging the California Air Resources Board's (CARB) Low Carbon Fuel Standard (LCFS) under the Commerce Clause illustrates this issue. The challengers were arguing that LCFS discriminated against ethanol producers from out-of-state. The Ninth Circuit Court of Appeals remanded stating that the LCFS did not "facially discriminate against out-of-state commerce" but calling on the lower court to determine if LCFS discriminated in purpose or effect against out-of-state commerce. On remand the court granted defendants motion for summary judgment stating that LCFS in fact facially discriminated.

473. Pike v. Bruce Church, Inc., 397 U.S. 137, 142 (1970).

474. Exxon Corp. v. Governor of Md., 437 U.S. 117, 126 (1978).

475. Rocky Mountain Farmers Union v. Corey, 730 F.3d 1070 (9th Cir. 2013).

Many law reviews have been written on this topic, so it is beyond the scope of this paper to delve deeply into this issue.⁴⁷⁶ However, both Washington and Oregon governors are contemplating executive orders to implement a LCFS in their respective states.⁴⁷⁷ Thus, if constitutional issues do impose obstacles, then state and city initiatives must be designed to alleviate those issues.

As for the issue of whether the EPA Clean Air Act (CAA) preempts state cap-and-trade and carbon tax proposals, consensus of commentator is that it does not.⁴⁷⁸ The EPA recently took steps to encourage states to use cap-and-trade programs and in its regulations encouraged additional linkage opportunities.⁴⁷⁹ Furthermore, EPA officials reported in the New York Times that states could comply with the act by “enacting state-level carbon tax on carbon pollution.”⁴⁸⁰ Thus, experts conclude: “EPA’s proposed regulations pursuant to section 111d of the CAA recognize the legitimacy of regional cap-and-trade programs and Congress is unlikely to develop a comprehensive cap-and-trade law, state-administered cap-and-trade programs linked with foreign governments do not conflict with the federal foreign affairs power.”⁴⁸¹

B. Design Issues

In addition to making the carbon and cap-and-trade systems consistent with interstate commerce and international trade rules, the cap-and-trade and carbon tax systems themselves must be designed to be effective with broad coverage, reasonable allocation of permits, tight caps or rates (with

476. See, e.g., Kathryn Abbott, *The Dormant Commerce Clause and California’s Low Carbon Fuel Standard*, 3 MICH. J. ENVTL. & ADMIN. L. 179 (2013); Ross Astoria, *The Export Clause and the Constitutionality of a National Cap and Trade CO₂ Mitigation Policy*, 26 GEO. INT’L ENVTL. L. REV. 117 (2014).

477. Stegman, *supra* note 402, at 235.

478. Chandiok, *supra* note 273, at 278; Karen Edson, California Independent System Operator, Presentation at the Seventh Annual San Diego Climate and Energy Law Symposium (Nov. 6, 2015); Amy Stein, University of Florida Levin College of Law, Presentation at the Seventh Annual San Diego Climate and Energy Law Symposium (Nov. 6, 2015); Kevin Poloncarz, Paul Hastings LLP, Presentation at the Seventh Annual San Diego Climate and Energy Law Symposium (Nov. 6, 2015).

479. Carbon Pollution Emission Guidelines for Existing Stationary Sources: Electric Utility Generating Units, 79 Fed. Reg. 34,830, 34,832 (Envtl. Prot. Agency June 18, 2014) (codified at 40 C.F.R. 60.5700), at <https://www.gpo.gov/fdsys/pkg/FR-2014-06-18/pdf/2014-13726.pdf>.

480. Davenport, *supra* note 226; see also Samuel D. Eisenberg et al., *A State Tax Approach to Regulating Greenhouse Gases Under the Clean Air Act*, THE BROOKINGS INST. (May 22, 2014), <http://www.brookings.edu/research/papers/2014/05/22-state-tax-regulating-greenhouse-gas-clean-air-act-morris>.

481. Stegman, *supra* note 402, at 238.

incremental phase-ins), and limited exemptions.⁴⁸² These systems must also be coordinated with other existing tax and fee structures within the jurisdiction. In addition, any cap-and-trade regime should be coordinated with any carbon tax within that same region. Lastly, if a cap-and-trade system within one jurisdiction is to be linked to another cap-and-trade system in another jurisdiction, then their design must be effectively integrated.

I. Coordination Issues

Any carbon tax or cap-and-trade fee must be coordinated with each other and with other existing taxes and fees within the city, state or region. Most jurisdictions have sales, consumption or VAT taxes, pollution taxes, or gas and motor fuel fees. Often these overlapping taxes are common and acceptable.⁴⁸³ But to reduce any negative effects on the economy and the competitiveness of the industry groups in the region, all taxing and fee systems must be analyzed to assess the risks from this harmful double taxation on business.⁴⁸⁴ Exemptions and reduced rates may be one way to handle this issue. For example, the Scandinavian countries that are part of the EU illustrate this approach through exemptions, discounts and phase-in rules.⁴⁸⁵ Some countries, like Finland, just exempt all electricity covered by EU ETS, while other countries, like Sweden and Denmark have limited exemptions, discounts and phase-ins.

Any adverse impact on the consumer from these double taxes and fees should also be assessed. When low-income taxpayers are faced with unfair burdens because of the inelasticity of the energy source, the government needs to be creative and come up with other mechanisms or programs to solve these issues. For example, the CA Cap-and-Trade system is a fee where all the funds have to go into a green fund. In order to make the overall system fair to low-income taxpayers, the state required the utility companies to give rebates.⁴⁸⁶ Also much of the money is to go into alternative transportation systems that could benefit the low-income citizen.

482. See CONCERNED SCIENTISTS, *supra* note 222; see Shurtz, *supra* note 10.

483. See Duff, *supra* note 9 (discussing automotive fuel taxes, motor vehicle taxes, etc., as well as fertilizer taxes and sulfur taxes).

484. See Deng, *supra* note 167, at 670 (“Above all, the integration of a carbon tax into the current tax system will achieve self-consistency and double dividend effects. In other words, the seamless implementation of a carbon tax into the current tax system is as important as devising a good tax plan.”).

485. See sources cited *supra* notes 94–137.

486. See discussion *supra* Part III.A.3.

For the same reasons, it makes sense to coordinate a carbon tax and cap-and-trade system in the same region. A cap-in-trade in one region could also be coordinated with a carbon tax in another jurisdiction. Some have stated that linking these systems “would be relatively easy, as the price in each is explicit.”⁴⁸⁷ For example, a business in a carbon tax country could purchase a permit in the country with a cap-and-trade, and then remit it in lieu of making a tax payment in their country. Conversely, a business in a cap-and-trade could remit carbon tax payments to its government in excess of its emissions and receive emissions-tax-payment credits for the excess tax payment which could be sold to firms in the country with a cap-and-trade and which that country could use in place of permits.

2. *Linkage Issues*

As we mentioned earlier California and Québec have effectively linked their cap-and-trade system. Both systems accept allowances from either regime to cover the businesses’ emissions.⁴⁸⁸ EU has bilaterally linked with New Zealand and with Australia and uses Kyoto credits interchangeably. Canada and the United States, and other countries that did not sign on to the Kyoto Protocol, “are not able to offer participants the option of submitting Kyoto units in place of domestic allocation.”⁴⁸⁹

Allocation differences can cause competitive disadvantages if they have two different allocation methods. If one system auctions the majority of allowances, like the RGGI, and the other, like the EU ETS, gives them out free, then the cost to the participant in the RGGI would be higher and would hurt their business as the consumer would have to pay a higher price for their product. Although these systems do not compete, this illustrates the potential problem of linkage of two systems in one region. Similar competitive problems arise when the two systems do not cover the same sectors. Again, the sector covered by the tax or cap-and-trade would have a higher cost and be more expensive to its consumers, causing them to shift to the lower priced competitor. A similar inequity might occur if the systems have different monitoring or enforcement mechanisms. In addition, a system with lower caps will result in a participant benefiting from having more allowances to cover their emissions that will give them a competitive advantage.

487. See WORLD BANK, *supra* note 22, at 93.

488. *Id.*

489. O’Connell, *supra* note 162, at 367–68.

3. Coordination with Other Policies

To become effective in significant GHG emissions, not only cap-and-trade and carbon taxes need to be passed, but other policies must be adopted.⁴⁹⁰ Sweden and Denmark illustrate this comprehensive approach as these countries use carbon taxes, in addition to gas taxes and other fees and taxes. For example, Sweden has a fertilizer tax and Denmark has a sulfur tax. These countries also use tax incentives and other green environmental initiatives. In North America, such a comprehensive approach is needed.⁴⁹¹

C. Political/Ethical Hurdles

In order for effective community and local tax initiatives to occur and succeed, several things need to happen. First, the citizens must be connected to their community and its needs. Second, local government must be willing to rid itself of its economic growth mindset—giving tax incentives for negative economic behavior. Third, an integrated plan must be developed, implemented, and monitored. Environmental taxes combined with cap-and-trade and other nontax policies provide the best approach, as illustrated by the Western North America initiatives.

We in North America have an ethical responsibility to act. First, we are not immune from the effects of global warming. Those in the western U.S. have experienced droughts. Those in the south and east have experienced severe storms. Rising sea levels will impact Florida, New York City, and many other coastal communities. In the U.S. millions of people depend on winter snowfall to fill rivers and supply water.⁴⁹² Hopefully, our concern

490. See WORLD BANK, *supra* note 22, at 93–94.

491. California has passed Senate Bill 375, “which requires the state’s Metropolitan Planning Organizations to include as part of their long-range transportation plans a ‘sustainable community’s strategy’ that is designed to meet greenhouse gas reduction targets set by the state Air Resources Board.” Keith Bartholomew, *Cities and Accessibility: The Potential for Carbon Reductions and the Need for National Leadership*, 36 FORDHAM URB. L.J. 159, 209 (2009) (citing 2008 Cal. Adv. Leg. Serv. 728).

492. Paul Kitagaki Jr., *As snowpack deepens, drought concern lingers*, ORANGE CNTY. REGISTER (Jan. 25, 2016 1:59 PM), <http://www.ocregister.com/articles/snowpack-701151-water-california.html>; see Anthony Watts, *Drought buster? Up to 10 Feet of Snow this Week for California’s Sierra Nevada*, WATTS UP WITH THAT? (Jan. 4, 2016), <https://wattsupwiththat.com/2016/01/04/drought-buster-up-to-10-feet-of-snow-this-week-for-californias-sierra-nevada/>; see also Dennis Dimick, *Lack Of Snow Leaves California’s ‘Water Tower’ Running Low*, NATIONAL GEOGRAPHIC (Mar. 24, 2015, 11:48 PM), <http://news.nationalgeographic.com/news/2015/03/150304-snow-snowpack-california-drought-groundwater-crisis/>.

of the impact of global warming on future generations will push us into a leadership role.

Second, the U.S. and Canada have been (and still are) some of the biggest consumers of carbon.⁴⁹³ The U.S. is the second largest contributor to climate change.⁴⁹⁴ Thus, based on this past and present usage in North America, we have the ethical duty to act. If all the states and provinces in North America signed on to a regional cap-and-trade and carbon tax program, they could together, reduce global emissions by one-third.⁴⁹⁵

Third, Canada and the U.S. are going to be two of the biggest beneficiaries of the melting ice at the North Pole. The five nations with Arctic frontage—Canada, Denmark, Norway, Russia and the United States—will be the winners.⁴⁹⁶ In addition, many businesses will reap huge profits from this tragedy.⁴⁹⁷ Many of these companies are from the U.S. and Canada.⁴⁹⁸

The countries that will be hit the hardest from global warming are mostly tropical and poor. For example, Bangladesh is second on the Climate Change Vulnerability Index,⁴⁹⁹ yet the average person there emits 0.3 tons of carbon a year. This is one seventieth of the average American rate.⁵⁰⁰ Other losers include the Maldives, Tuvalu, Kiribati, Seychelles, Bahamas and the Carteret.⁵⁰¹ Cities, such as “Manila, Alexandria, Lagos, Karachi, Kolkata, Jakarta, Dakar, Rio, Miami, and Ho Chi Minh City, are probably doomed.”⁵⁰² According to estimates, by “2050, a billion people would be pushed from their homes by global warming.”⁵⁰³ Already, large segments of these societies are struggling to relocate. Under New Zealand immigration quotas, “[s]eventy-five Tuvaluans and seventy-five Kiribatians” are able to relocate each year.⁵⁰⁴ The “first five of seventeen hundred Carteret Islanders moved to newly purchased land in Bougainville.”⁵⁰⁵ Ironically, these countries were the least responsible for the consumption of the fuels that produced the

493. See Johannes Friedrich et al., *Top 10 Greenhouse Gas Emitters: Find Out Which Countries Are Most Responsible for Climate Change*, EcoWatch (June 24, 2015, 10:42 AM), <http://ecowatch.com/2015/06/24/greenhouse-gas-climate-change/>.

494. *Id.* China is the largest emitter of greenhouse gases. *Id.*

495. Stegman, *supra* note 402, at 243.

496. See FUNK, *supra* note 9.

497. *Id.* at 4.

498. See *id.* at 9.

499. *Id.* at 205.

500. *Id.* at 199.

501. *Id.* at 64.

502. *Id.*

503. *Id.* at 65.

504. *Id.*

505. *Id.* at 65.

emissions that caused the global warming.⁵⁰⁶ And they will be the least able to afford the technology to adapt to it.

Climate change is most likely to be “different for those who can afford to adapt.”⁵⁰⁷ The rich countries will be able to afford “the desalination plants, the seawalls,” artificial islands floating beaches, etc.⁵⁰⁸ These countries, their companies, and wealthy citizens will most likely be the beneficiaries of technology advancement. The wealthy will “be the first to afford them, those who are emitting the most carbon, who are taking care of themselves before turning to the developing world.”⁵⁰⁹ Even geoengineering can result in winners and losers and that technology in the hands of the richer nations.⁵¹⁰ “A blueprint for disaster in any society is when the elite are capable of insulating themselves.”⁵¹¹

Policies that have been proven to be effective in one community should be just as effective in another community on the other side of the country or world. While these goals might present tall orders for many localities around the world, North American initiatives demonstrate that with a little creativity and innovation, sustainable and effective environmental policies can be created. It may be difficult to translate what has happened in developed North America to rural areas and to the undeveloped world. It may be even harder to translate these local policies into effective federal or international policies.⁵¹² Without action at the U.S. federal level, however, local jurisdictions may not be able to effectively impact agricultural policies, forestry policies,

506. Frontline states, such as Spain, Italy, Malta and Greece are policing the border of all of Europe—people from Africa and Syria, etc. *Id.* at 173.

507. *Id.* at 223.

508. *Id.* at 10.

509. *Id.* at 82.

510. *Id.* at 279–80.

511. *Id.* at 188.

512. One way that local governments can advocate for change outside their jurisdictional boundaries, however, is through their purchasing power in the international community. Take for example, San Francisco and the passage of Ordinance 88-04 that prohibits the use of rainforest lumber in new city projects. Tropical Hardwood and Virgin Redwood Ban, S.F. ENVTL. CODE, ch. 8 (2001), [http://library.amlegal.com/nxt/gateway.dll/California/administrative/administrativecode?f=templates\\$fn=default.htm\\$3.0\\$vid=amlegal:sanfrancisco_ca\\$sync=1](http://library.amlegal.com/nxt/gateway.dll/California/administrative/administrativecode?f=templates$fn=default.htm$3.0$vid=amlegal:sanfrancisco_ca$sync=1). By passing ordinances such as 88-04, cities can reduce the degradation of rainforests thousands of miles away. However, that does not mean that local governments cannot work with countries that supply lumber from rainforests. Local governments can push foreign countries to replant the forests that they clear-cut and engage in sustainable forestry processes. Local governments can do so by pledging to buy sustainable lumber or other sustainably harvested goods in exchange for a pledge that the country follows sustainable environmental practices.

natural resource extraction and other issues outside their boundaries.⁵¹³ Therefore, for large-scale issues to be addressed, the U.S. federal government is the only entity with jurisdiction to make a positive change.⁵¹⁴ Thus, the federal government should play a larger role in engaging local policymakers to foster local climate change efforts.⁵¹⁵ Perhaps these North American initiatives can send a clear and consistent message to the federal government and to other countries of the world.

V. CONCLUSION

This Article has compared carbon taxes with cap-and-trade and highlighted the successes of these programs in Western North America. It has advocated a comprehensive climate change plan to regionally link all cap-and-trade systems while passing local carbon taxes. Although programs at the state, local, and regional levels are critical for providing creative solutions to the climate change crisis, what is needed is a binding U.S. federal and international response. Nonetheless, local governments should continue to pass innovative market initiatives, combining both a cap-and-trade with a carbon tax, along with other environmental policies to help stop widespread and potentially disastrous climate change.

513. *Id.*

514. One promising development is the carbon tariffs proposed against the exports of countries that refuse to join the international efforts to limit CO₂ emissions. See Paul Krugman, Opinion, *China, Coal, Climate*, N.Y. TIMES (Nov. 13, 2014), <http://www.nytimes.com/2014/11/14/opinion/paul-krugman-china-coal-climate.html> (“Such tariffs probably wouldn’t even require any change in existing trade law, and they would provide a powerful incentive for handouts to get with the program.”).

515. See Thomas M. Gremillion, *Setting The Foundation: Climate Change Adaptation At the Local Level*, 41 ENVTL. L. 1221, 1251–53 (2011). One way the federal government could be effective at promoting more local climate change tax policies is by creating a national adaptation fund. *Id.* at 1252. A national adaptation fund could award grants for local projects to better integrate transportation, land use and natural resource planning. *Id.* Additionally, such a fund could help local governments phase-out antiquated travel demand models and make realistic assessments of how planned development will affect the local water supply and air shed as the climate changes. *Id.* National adaptation funds could help in areas where there is local opposition, such as revising zoning codes to relax requirements such as parking setbacks. *Id.* at 1252–53. Such reforms are often difficult for local policymakers to undertake because of local opposition. *Id.* at 1253. The enticement of federal funding could matter here and perhaps the prospect of creating jobs could also win support from local partners. *Id.* By creating a national adaptation fund, the federal government could finally make a meaningful contribution to the omnipresent need to halt climate change. *Id.*

APPENDIX A

CHART 1: EASTERN HEMISPHERE CARBON TAX POLICIES

COUNTRY/ JURISDICTION	START DATE	TAX RATE (\$USD UNLESS NOTED OTHERWISE)	ANNUAL REVENUE	REVENUE DISTRIBUTION
FINLAND ⁵¹⁶	1990	\$48/metric ton CO ₂	\$750 million (500 million euros)	government budget; accompanied by independent cuts in income taxes
NETHERLANDS ⁵¹⁷	1990	~\$20/metric ton CO ₂ in 1996	\$4.819 billion (3.213 billion euros)	reductions in other taxes; climate mitigation programs
NORWAY ⁵¹⁸	1991	\$33/metric ton CO ₂	\$900 million (1994 estimate)	government budget
SWEDEN ⁵¹⁹	1991	\$168/metric ton of CO ₂	\$3.665 billion (25 billion SEK)	government budget
DENMARK ⁵²⁰	1992	\$31/metric ton CO ₂	\$905 million	environmental subsidies and returned to industry
UNITED KINGDOM ⁵²¹	2013	\$15.75/metric ton of CO ₂	\$1.191 billion (714 million pounds)	reductions in other taxes
FRANCE ⁵²²	2014	\$10/metric ton of CO ₂ (12 euros) increasing to	\$4.499 billion (3 billion euros)	reductions in other taxes

516. WORLD BANK 2, *supra* note 143, at 2.

517. JENNY SUMMER ET AL., Nat'l Renewable Energy Laboratory, CARBON TAXES: A REVIEW OF EXPERIENCE AND POLICY DESIGN CONSIDERATIONS, at v (2009), <http://www.nrel.gov/docs/fy10osti/47312.pdf>.

518. Annegrete Bruvold & Bodil Larsen, *Greenhouse gas emissions in Norway: Do carbon taxes work?*, STATISTICS NOR., RESEARCH DEP'T (Dec. 2002), <http://www.ssb.no/a/publikasjoner/pdf/DP/dp337.pdf>.

519. WORLD BANK 2, *supra* note 143, at 3; *see also Energy Policies of IEA Countries: Sweden, 2008 Review*, INT'L ENERGY AGENCY (2008), http://www.iea.org/publications/free_publications/publication/Sweden2008.pdf.

520. WORLD BANK 2, *supra* note 143, at 2.

521. *Id.* at 4.

522. *Id.* at 2.

		22 euros in 2016		
IRELAND ⁵²³	2010	\$28/metric CO ₂ (20 euros)	\$448 million (400 million euros)	reduction on taxes
ICELAND ⁵²⁴	2010	\$10/metric ton of CO ₂		paid to treasury
SWITZERLAND ⁵²⁵	2008	\$68/metric ton CO ₂	\$22.92 billion	subsidies to families with children
PORTUGAL ⁵²⁶	2014	\$5/metric of CO ₂	\$178 million	tax reductions in sustainable policies and practices
SOUTH AFRICA ⁵²⁷	Proposed 2017	\$30/metric ton of CO ₂		reduce national welfare
JAPAN ⁵²⁸	2012	\$3.7/metric ton of CO ₂	\$2.2 billion	mitigate climate change
AUSTRALIA ⁵²⁹	2012; repealed 2014	\$19.60/metric ton CO ₂ (A\$23)		

523. Finance Act 2010, (S.I. No. 115/2011) (Ir.), available at <http://www.irishstatutebook.ie/eli/2010/act/5/enacted/en/html>; see also *Carbon Pricing as of 2014*, SIGHTLINE INST. (Nov. 17, 2014), <http://sightline.wpengine.netdna-cdn.com/wp-content/uploads/2014/11/global-carbon-programs-map-still-111714.png>.

524. WORLD BANK 2, *supra* note 143, at 2.

525. *Id.* at 3–4; see also Neil Maclucas, *Swiss Voters Reject Initiative to Replace VAT System With Carbon Tax*, WALL ST. J. (Mar. 8, 2015), <http://www.wsj.com/articles/swiss-voters-reject-initiative-to-replace-vat-system-with-carbon-tax-1425822327>.

526. WORLD BANK 2, *supra* note 143, at 3; see also *Portugal sees Crisis as Opportunity for Green Tax Reform*, WWF.GR (Sept. 26, 2014), <http://www.wwf.gr/crisis-watch/crisis-watch/economy-development/11-economy-development/portugal-sees-crisis-as-opportunity-for-green-tax-reform>.

527. WORLD BANK 2, *supra* note 143, at 3; *South Africa Gears Up for Carbon Tax*, PEOPLE'S DAILY ONLINE (Aug. 16, 2010), <http://en.people.cn/90001/90777/90855/7106312.html>; see also Theresa Alton et al., *Introducing Carbon Taxes In South Africa* 116 APPLIED ENERGY 344, 348 (2014), available at <http://www.sciencedirect.com/science/article/pii/S0306261913009288>; *How Will the Draft Carbon Tax Bill Affect You?*, THE CARBON REPORT, <http://www.thecarbonreport.co.za/the-proposed-south-african-carbon-tax/> (last visited May 10, 2016).

528. WORLD BANK 2, *supra* note 143, at 2–3; MINISTRY OF THE ENVIRONMENT JAPAN, DETAILS ON THE CARBON TAX 2, https://www.env.go.jp/en/policy/tax/env-tax/20121001a_dct.pdf (last visited May 10, 2016).

529. Peter Hannam, *Carbon price helped curb emissions, ANU study finds*, GUARDIAN (July 17, 2014), <http://www.theguardian.com.au/story/2423463/carbon-price-helped-curb-emissions-anu-study-finds/?cs=8>.

CHART 2: WESTERN HEMISPHERE CARBON TAX POLICIES

COUNTRY/ JURISDICTION	START DATE	TAX RATE (\$USD UNLESS NOTED OTHERWISE)	ANNUAL REVENUE	REVENUE DISTRIBUTION
BOULDER, CO ⁵³⁰	2007	\$7/metric ton CO ₂	\$1 million	climate mitigation programs
QUÉBEC ⁵³¹	2007	\$13/metric CO ₂	\$191 million (C\$200 million)	climate mitigation programs
BRITISH COLUMBIA ⁵³²	2008	\$28.64/metric ton CO ₂ (C\$30)	\$1 billion (C\$306 million)	reductions in other taxes
ALBERTA ⁵³³	2007	\$15/metric ton CO ₂	\$300 million	technology- fund
MARYLAND ⁵³⁴	2010; repealed 2012	\$5/metric ton CO ₂	\$10-15 million	residential energy efficiency upgrades
WASHINGTON ⁵³⁵	proposed	\$15/metric ton of CO ₂	expected \$1.7 billion	offset state sales tax and

530. *Id.*531. *Id.*532. *Id.*

533. *Id.*; see also *Carbon Tax Proposal a Non-starter in Alberta*, CBCNEWS (Jan. 8, 2008, 10:41 AM), <http://www.cbc.ca/news/canada/calgary/carbon-tax-proposal-a-non-starter-in-alberta-1.722194>. This is not a true carbon tax but rather a performance regulation on businesses. See Mark Jaccard, *Alberta's (Non)-Carbon Tax and Our Threatened Climate*, SUSTAINABILITY SUSPICIONS (Apr. 26, 2013), <http://markjaccard.blogspot.com/2013/04/albertas-non-carbon-tax-and-our.html>. Alberta has a true carbon tax proposed to start in 2017. See Jodie Sinnema, *New Alberta Climate-change Plan Includes Carbon Tax For Individual Albertans, Cap on Oils and Emissions*, EDMONTON J. (Nov. 23, 2015), <http://edmontonjournal.com/news/local-news/new-alberta-climate-change-plan-includes-carbon-tax-for-individual-albertans-cap-on-oilsands-emissions>.

534. *Adverse Economic Impacts of a Carbon Tax in Maryland*, NAT'L ASS'N OF MFRS., <http://www.nam.org/Issues/Tax-and-Budget/Carbon-Tax/State-Sheets/Maryland/> (last visited May 10, 2016); see also Sonal Patel, *Gas Taxes: Carbon Taxes Around the World*, POWER (Dec. 27, 2011), <http://www.powermag.com/gas-taxes-carbon-taxes-around-the-world/?printmode=1>.

535. *Our Policy*, CARBON WASH., <http://yeson732.org/plain-language/> (last visited May 10, 2016) (“This tax swap will take place over two years, with the sales tax reduction divided in two (a half-percentage-point reduction in each year) and the carbon tax phasing in from \$15 per ton in the first year to \$25 per ton in the second year and then increasing thereafter

				fund Working Families Rebate
OREGON ⁵³⁶	2016	\$10/metric ton of CO ₂	generate \$2.1-2.2 billion each year	generate \$2.1-2.2 billion each year
NEW YORK ⁵³⁷	Proposed	\$40/metric ton of CO ₂		60% goes to low income households, the rest goes to climate change programs; 40% for supporting the transition to clean energy in the State
SAN FRANCISCO, CA (BAAQMD) ⁵³⁸	2008	\$0.045/metric ton of CO ₂ (on businesses only)	\$1.1 million	climate change programs
COSTA RICA ⁵³⁹	1997	\$1-14/metric ton of CO ₂	\$15 million	climate mitigation programs
CHILE ⁵⁴⁰	2018	\$5/metric ton CO ₂	\$160 million	
MEXICO ⁵⁴¹	2014	\$3/metric ton of CO ₂	\$1 billion	

at 3.5% plus inflation (up to a maximum of \$100 in 2016 dollars) in order to maintain revenue neutrality.”).

536. See discussion *supra* Part III.B.3.; see also States, CARBON TAX CENTER, <http://www.carbontax.org/states/> (last visited Apr. 27, 2016).

537. *Carbon Tax Bill Introduced into Assembly*, PR NEWswire (Aug. 28, 2015, 2:51 PM), <http://www.prnewswire.com/news-releases/carbon-tax-bill-introduced-into-assembly-300134771.html>.

538. Craig Rubens, *Bay Area's Carbon Tax, the Nation's First, Rankles Big Oil*, GIGAOM (May 22, 2008, 11:00 AM), <https://gigaom.com/2008/05/22/bay-area-leads-with-nations-first-carbon-tax/>.

539. Kristin Eberhard, *All the World's Carbon Pricing Systems in One Animated Map*, SIGHTLINE INST. (Nov. 17, 2014, 6:30 AM), <http://www.sightline.org/2014/11/17/all-the-worlds-carbon-pricing-systems-in-one-animated-map/>.

540. Kate Galbraith, *Climate Change Concerns Push Chile to Forefront of Carbon Tax Movement*, N.Y. TIMES (Oct. 29, 2014), http://www.nytimes.com/2014/10/30/business/international/climate-change-concerns-push-chile-to-forefront-of-carbon-tax-movement.html?_r=0; see also Sao Paulo, *Chile Becomes the First South American Country to Tax Carbon*, REUTERS (Sept. 26, 2014, 1:00 AM), <http://uk.reuters.com/article/carbon-chile-tax-idUKL6N0RR4V720140927>.

541. Eberhard, *supra* note 539; see also SECRETARIA DE MEDIO AMBIENTE Y RECURSOS NATURALES, CARBON TAX IN MEXICO 2 (May 2014), <https://www.thepmr.org/system/files/documents/Carbon%20Tax%20in%20Mexico.pdf>.

APPENDIX B

CHART 3: ESTIMATED EMISSIONS REDUCTIONS IN EASTERN
HEMISPHERE JURISDICTIONS WITH CARBON TAXES

RANK FOR BEST CARBON TAX	JURISDICTION	START DATE	CHANGE IN CO ₂ EMISSIONS
1	Sweden ⁵⁴²	1991	emissions decreased 19% since 2003
2	United Kingdom ⁵⁴³	2001	emissions decreased by 13% since 2007
3	Denmark ⁵⁴⁴	1992	emissions decreased by 33% since 2006
4	Finland ⁵⁴⁵	1990	emissions decreased 23% from 2007 to 2011
5	Netherlands ⁵⁴⁶	1990	emissions were expected to be reduced by 1.7 to 2.7 million metric tons CO ₂ annually in 2000. In covered sectors, emissions were expected to be reduced by approximately 5%.
6	Norway ⁵⁴⁷	1991	emissions increased by 32% from 1991 to 2014
7	Ireland ⁵⁴⁸	2010	emissions have dropped 15% since 2008
8	Iceland ⁵⁴⁹	2005	increased 17% since 2005
9	Switzerland ⁵⁵⁰	2008	emissions have decreased 5% since 2008
10	France ⁵⁵¹	2005	emissions decrease 13% since 2005
11	Japan ⁵⁵²	2012	emissions increase 16% since 1990

542. Rayne, *supra* note 106.

543. *Id.*

544. *Id.*

545. *Id.*

546. Sumner et al., *supra* note 103, at 9.

547. Rayne, *supra* note 106.

548. CARBON TAX CTR., *supra* note 536.

549. Rayne, *supra* note 106.

550. *Id.*

551. *Id.*

552. Mari Iwata, *Japan CO₂ Emissions Worst on Record*, WALL ST. J. (Nov. 17, 2014, 5:50 PM), <http://blogs.wsj.com/japanrealtime/2014/11/17/japan-co2-emissions-worst-on-record/>.

CHART 4: ESTIMATED EMISSIONS REDUCTIONS IN WESTERN
HEMISPHERE JURISDICTIONS WITH CARBON TAXES

RANK FOR BEST CARBON TAX	JURISDICTION	START DATE	CHANGE IN CO ₂ EMISSIONS
1	British Columbia ⁵⁵³	2008	GHG emissions were expected to be reduced emissions by up to 3 million metric tons CO ₂ annually in 2020 due to the tax
2	San Francisco, CA ⁵⁵⁴	2008	by 2010, the program reduced emissions by 12% below 1990 levels
3	Boulder, CO ⁵⁵⁵	2007	emissions in 2007 and 2008 decreased from 2006 levels. Greatest reductions due to programs funded but the carbon tax: 1)Renewables energy activities (60,000 metric tons of CO ₂), 2)Transportation (33,000 metric tons CO ₂), and 3)Energy efficiency (6,700 metric tons CO ₂)
4	Québec ⁵⁵⁶	2007	emissions were expected to be reduced by 11.2 million metric tons CO ₂ by 2012 due to the carbon tax
6	Chile ⁵⁵⁷	2018	predicts to reduce its emissions 20% by 2020 below 2007 levels this includes reduction by increase in renewable energy
7	Oregon ⁵⁵⁸	2016	reduce emissions by 12-13% below baseline projections
8	Mexico ⁵⁵⁹	2012	emissions decreased 0.08% since 2008
9	Costa Rica ⁵⁶⁰	1997	increased 17% from 2000 to 2005

553. Sumner et al., *supra* note 103, at 20.

554. THE GLOBAL COMPACT CITIES PROGRAMME, *supra* note 455.

555. Sumner et al., *supra* note 103, at 20.

556. *Id.*

557. Galbraith, *supra* note 540.

558. Liu & Renfro, *supra* note 140.

559. CO₂ Emissions (Metric tons per Capita)-Mexico, WORLD BANK, <http://data.worldbank.org/indicator/EN.ATM.CO2E.PC/countries/MX-XJ-XT?display=graph>.

560. Rayne, *supra* note 106.

APPENDIX C

CHART 5: MAJOR TAXED SECTIONS IN EXISTING AND PROPOSED
CARBON TAX SYSTEMS IN THE EASTERN HEMISPHERE

JURISDICTION/ COUNTRY	FINLAND	NETHERLANDS	NORWAY	SWEDEN	DENMARK	UNITED KINGDOM	FRANCE	IRELAND	ICELAND	JAPAN	SOUTH AFRICA	SWITZERLAND
TYPE OF CARBON FUEL												
NATURAL GAS	X	X	X	X	X	X	X	X		X	X	X
GASOLINE	X		X	X	X	X	X	X	X	X	X	X
COAL	X			X	X	X	X	X		X	X	X
ELECTRICITY	X	X			X	X						
DIESEL	X		X				X	X	X			X
LIGHT AND HEAVY FUEL OIL	X	X*	X	X	X		X	X	X			X
LIQUEFIED PETROLEUM GAS			X	X		X		X	X			X
HOME HEATING OIL	X	X		X			X	X	X			X
SOLID FUEL						X		X				

* Light only.

CHART 6: MAJOR TAXED SECTIONS IN EXISTING AND PROPOSED
CARBON TAX SYSTEMS IN THE WESTERN HEMISPHERE

JURISDICTION/ COUNTRY	QUÉBEC	BRITISH COLUMBIA	BOULDER, CO	CALIFORNIA	SAN FRANCISCO, CA	CHILE	COSTA RICA	MEXICO
TYPE OF CARBON FUEL								
NATURAL GAS	X	X				X	X	
GASOLINE	X	X					X	X
COAL	X					X	X	X
ELECTRICITY	X		X			X		
DIESEL	X	X						
LIGHT AND HEAVY FUEL OIL	X							
LIQUEFIED PETROLEUM GAS	X							
HOME HEATING OIL	X							
PERMITTED FACILITIES	X			X	X			