



2021

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Seo Jung Park

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Recommended Citation

Seo J. Park, *How South Korea Can Improve Its Carbon Market: The Importance of Economic Incentives and International Cooperation in the Fight Against Climate Change*, 35 Emory Int'l L. Rev. 485 (2021). Available at: <https://scholarlycommons.law.emory.edu/eilr/vol35/iss3/4>

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HOW SOUTH KOREA CAN IMPROVE ITS CARBON MARKET: THE IMPORTANCE OF ECONOMIC INCENTIVES AND INTERNATIONAL COOPERATION IN THE FIGHT AGAINST CLIMATE CHANGE

INTRODUCTION

Many countries across the globe have been endeavoring to mitigate the impacts of global warming. The key to achieving this goal is to reduce the emission of carbon dioxide, the main driver of global warming.¹ Thus far, a wide variety of policies have been developed and implemented in an effort to reduce carbon emissions, and these policies can be classified into two broad categories: non-market-based approaches and market-based approaches.² Command-and-control regulation, reporting requirements, and promotion of research on renewable technology with subsidies are a few examples of non-market-based approaches.³ These approaches can be fairly described as direct regulation of pollution-producing activities.⁴ For instance, command-and-control regulation involves setting a standard to govern performance; specific examples could include prohibiting the use of energy-inefficient technology or prohibiting a party from emitting carbon dioxide beyond a predefined limit.⁵

Market-based approaches differ in that they involve indirect regulation of parties' behavior by modifying their economic incentives.⁶ As opposed to directly regulating parties' behavior, market-based approaches let the parties themselves decide whether to adjust their behavior in response to the modified economic incentives.⁷ Two prominent examples of market-based approaches are the carbon tax and emission trading scheme (ETS), the latter being a term that is often referred to as cap-and-trade.⁸ These two approaches are similar in that they both put a price on carbon emissions, clearly indicating that they involve a

¹ See *The Causes of Climate Change*, NASA, <https://climate.nasa.gov/causes/> (last visited Oct. 31, 2019). CO₂ and carbon dioxide are used interchangeably throughout this Comment.

² See generally *Market-Based Climate Policy Instruments*, CLIMATE POL'Y INFO HUB, <https://climatepolicyinfohub.eu/market-based-climate-policy-instruments> (last visited Mar. 29, 2020); *Non-Market-Based Climate Policy Instruments*, CLIMATE POL'Y INFO HUB, <https://climatepolicyinfohub.eu/non-market-based-climate-policy-instruments> (last visited Mar. 29, 2020).

³ *Non-Market-Based Climate Policy Instruments*, *supra* note 2.

⁴ See *id.*

⁵ *Id.*

⁶ *Market-Based Climate Policy Instruments*, *supra* note 2.

⁷ See *id.*

⁸ Clemens Kaupa, "Market-based" Approaches to Regulating Emissions: Cap-and-trade and Carbon Tax, MEDIUM: CLIMATE CHANGE LAW (Nov. 28, 2016), <https://medium.com/climate-change-law/7-national-and-regional-regulation-of-emissions-i-market-based-approaches-cap-and-trade-and-b128755a82c5>.

market system.⁹ In addition, both approaches have been supported by economists who argue that adopting at least one approach would be an ideal solution for governments seeking to mitigate the problems of global warming at the lowest possible cost.¹⁰ The argument for a market-based solution, which has been voiced by many economists, has led many governments around the world to consider implementing either one or both of these approaches.¹¹

Regardless of scholarly debates over which market-based approach is better suited to accomplishing the goal of cutting emissions, this Comment focuses on cap-and-trade because it is the policy choice that makes international collaboration feasible. As opposed to implementing a carbon tax which is solely determined by the sovereign power of a state, implementing a cap-and-trade program would, by virtue of possible linkage between cap-and-trade programs of different countries, involve joint efforts between members of an international community. South Korea has been operating the second-biggest carbon market in the world.¹² However, this market possesses several inherent flaws that relate to its cap-and-trade program.

In Section I, this Comment explains how the two market-based approaches—carbon tax and cap-and-trade—help reduce carbon emissions. In Section II, this Comment provides information about how countries such as the United States, the nations of the European Union, China, India, and South Korea have thus far implemented cap-and-trade. Next, in Section III, this Comment looks at the three most important international agreements with regard to global warming, agreements that were established by recognizing the importance of international cooperation in combating climate change. Lastly, because it is often difficult for the international community to speak with one voice, this Comment proposes two viable solutions for countries where building a consensus is problematic. Section IV of this Comment will pay special attention to South Korea, proposing that South Korea should link its cap-and-trade programs with the cap-and-trade programs of other countries. In addition, South

⁹ See Xueman Wang, *Putting A Price on Carbon: Nations Opt For Market-Based Solutions*, WORLD BANK (Mar. 6, 2014), <https://blogs.worldbank.org/climatechange/putting-price-carbon-nations-opt-market-based-solutions>.

¹⁰ See Grantham Research Institute, *Carbon Tax v. Cap-and-Trade: Which is Better?*, GUARDIAN (Jan. 31, 2013), <https://www.theguardian.com/environment/2013/jan/31/carbon-tax-cap-and-trade>.

¹¹ See Noah Kaufman, *Carbon Tax vs. Cap-and-Trade: What's a Better Policy to Cut Emissions?*, WORLD RES. INST. (Mar. 1, 2016), <https://www.wri.org/blog/2016/03/carbon-tax-vs-cap-and-trade-what-s-better-policy-cut-emissions>; see generally *ETS Map*, INT'L CARBON ACTION P'SHIP, <https://icapcarbonaction.com/ko/ets-map> (last visited Mar. 19, 2020).

¹² INT'L CARBON ACTION P'SHIP, KOREA EMISSIONS TRADING SCHEME 1, https://icapcarbonaction.com/en/?option=com_etsmap&task=export&format=pdf&layout=list&systems%5B%5D=47 (Sept. 15, 2020).

Korea should provide non-participating countries with financial assistance so that they, too, can develop viable cap-and-trade programs of their own; in so doing, South Korea can effectively counteract negative impacts imposed by non-cooperating countries and therefore, contribute to the global response to climate change.

I. MARKET-BASED APPROACHES IN REDUCING CARBON EMISSIONS: CARBON TAX AND CAP-AND-TRADE

A. Carbon Tax

A carbon tax, one of the two prevailing market-based approaches, is an added cost imposed by the government on each metric ton of carbon dioxide (CO₂) emitted.¹³ Because it creates an additional tax burden for emitting carbon dioxide, businesses will most likely seek ways to reduce their carbon emissions in order to avoid paying the additional cost.¹⁴ As a result of a carbon tax, businesses may switch to cleaner and more environment-friendly technology that emits less carbon dioxide, or alternatively, may simply decide to emit less carbon dioxide to save money.¹⁵ One advantage of implementing a carbon tax is that governments can raise revenue by imposing prices on carbon emissions.¹⁶ The revenue can then be invested in developing environment-friendly technologies or policies to further reduce carbon emissions.¹⁷ In addition, because a carbon tax is a fixed cost determined by the government, it provides polluting entities with certainty as to costs that they will incur as a result of emitting a certain amount of carbon dioxide.¹⁸ Knowing the costs in advance will help the polluting entities better plan their carbon emission reduction strategies.¹⁹

However, there are two main disadvantages of a carbon tax. Although a carbon tax provides certainty as to the price imposed on carbon emissions, it is less likely than cap-and-trade to achieve emission cuts, which will be covered in

¹³ Erik Haites et al., *Experience with Carbon Taxes and Greenhouse Gas Emissions Trading Systems*, 29 DUKE ENVTL. L. & POL'Y F. 109, 111 (2018).

¹⁴ See Kaupa, *supra* note 8.

¹⁵ See *Carbon Tax Basics*, CTR. FOR CLIMATE & ENERGY SOLS., <https://www.c2es.org/content/carbon-tax-basics/> (last visited Mar. 19, 2020).

¹⁶ Robert N. Stavins, *A Meaningful U.S. Cap-and-trade System to Address Climate Change*, 32 HARV. ENV'T L. REV. 293, 350 (2008).

¹⁷ See CTR. FOR CLIMATE & ENERGY SOLS., *supra* note 15.

¹⁸ See *id.*

¹⁹ See generally *id.*

the next Section, I.B.²⁰ This is because the tax does not directly regulate the amount of carbon dioxide emitted by polluting entities.²¹ It is true that the carbon tax disincentivizes polluting entities from emitting carbon dioxide by making them pay extra costs for doing so; however, because the carbon tax is not a “quantity-based approach[,]” it is not clear how effectively it would reduce carbon emissions.²² Instead, the carbon tax is more similar to a price-based approach.²³ Even with the carbon tax, polluting entities can still emit as much carbon dioxide as they want provided that they pay for it. In addition, a general animosity towards taxes in the business community is another disadvantage of the carbon tax.²⁴ Because businesses generally dislike paying taxes, there would likely be more resistance to any implementation of the carbon tax scheme—unlike cap-and-trade, as mentioned in Section I.B.²⁵

B. *Cap-and-Trade*

In contrast with a carbon tax, cap-and-trade is a “quantity-based approach” to lowering carbon emissions.²⁶ The system of cap-and-trade entails a cap, or the maximum amount of carbon that can be emitted, and trade, which is related to the buying and selling of carbon emission permits.²⁷ As opposed to a carbon tax, cap-and-trade is more closely correlated with the market economy in determining the price of emitting carbon dioxide.²⁸

The cap-and-trade system generally works as follows. First, a government places a cap on carbon emissions.²⁹ Then, the government distributes permits, otherwise called allowances, for emitting CO₂ to the polluting entities through various methods.³⁰ For example, the government can choose to sell permits through an auction, distribute the permits for free, or a combination of both.³¹ These permits ensure that the amount of carbon dioxide emitted remains under the cap.³² After the initial distribution of carbon permits by the government, the

²⁰ *See id.*

²¹ *See id.*

²² *See Stavins, supra* note 16, at 352.

²³ *Cf. id.* (stating that cap-and-trade is a “quantity-based” approach).

²⁴ *See id.* at 351.

²⁵ *Id.*

²⁶ *See id.* at 352.

²⁷ *See Market-Based Climate Policy Instruments, supra* note 2.

²⁸ *See id.*

²⁹ *Id.*

³⁰ *Id.*

³¹ Stavins, *supra* note 15, at 316–17.

³² Kaupa, *supra* note 8.

distributed permits can be freely traded in the so-called carbon market.³³ Market prices for the carbon permits are then determined based on supply and demand for the permits, and polluting entities can freely buy and sell permits depending on their individual needs.³⁴ Unlike a carbon tax, governments are not directly involved in setting the price for emitting carbon dioxide; instead, cap-and-trade lets the market decide on its own, without direct intervention by government.³⁵ Over time, governments can tighten the cap to eventually decrease the aggregate carbon emission.³⁶

The cap-and-trade mechanism provides numerous advantages to both polluting entities and governments.³⁷ First of all, cap-and-trade would likely spur the invention of low-carbon technologies.³⁸ Just like the carbon tax, carbon permit prices established under a cap-and-trade scheme are an additional burden on polluting parties.³⁹ The less carbon they emit, the less money they have to spend on purchasing carbon permits; therefore, carbon permit prices would incentivize polluting parties to create innovative technologies that would alleviate the financial burden imposed by emitting carbon dioxide.⁴⁰ In addition to saving money for polluting parties in the present, the invention of new environmentally-friendly technologies would undoubtedly contribute to further CO₂ reduction in the long term.⁴¹

Second, cap-and-trade provides polluting entities with flexibility.⁴² Because the carbon permit prices are determined by carbon market, the price will fluctuate by reflecting changed circumstances. However, cap-and-trade allows polluting entities to take advantage of fluctuations in price because they can buy permits when prices are low and use them when permit prices are high.⁴³ In this way, the cap-and-trade approach allows entities to behave strategically in complying with the carbon emission requirement.⁴⁴ This advantage

³³ *Market-Based Climate Policy Instruments*, *supra* note 2.

³⁴ *See id.*

³⁵ *Id.*

³⁶ *Cf.* Stavins, *supra* note 16, at 326.

³⁷ *See generally* ALEXANDER EDEN ET AL., BENEFITS OF EMISSIONS TRADING: TAKING STOCK OF THE IMPACTS OF EMISSIONS TRADING SYSTEMS WORLDWIDE, INT'L CARBON ACTION P'SHIP (Adelphi, July 2016).

³⁸ *Id.* at 16.

³⁹ *See Market-Based Climate Policy Instruments*, *supra* note 2.

⁴⁰ *See* EDEN ET AL., *supra* note 37, at 17.

⁴¹ *Id.* at 17.

⁴² *See id.* at 4.

⁴³ *See* Katelyn Roedner Sutter, *California-Quebec Market Continues to Thrive*, ENV'T DEF. FUND: CLIMATE 411 (Feb. 27, 2019), <http://blogs.edf.org/climate411/2019/02/27/california-quebec-market-continues-to-thrive/>.

⁴⁴ *How Cap and Trade Works*, ENV'T DEF. FUND, <https://www.edf.org/climate/how-cap-and-trade->

distinguishes cap-and-trade from a carbon tax because the carbon tax lacks flexibility because a government sets a fixed price on CO₂, which is unlikely to be adjusted promptly in response to changed circumstances.⁴⁵ Moreover, if polluting entities successfully achieve more CO₂ reductions than expected, they could even earn a profit by selling unused permits when permit prices are high. Cap-and-trade even allows polluting entities to maximize their economic profits by acting in ways that are environmentally friendly.⁴⁶ This is yet another incentive given to polluting parties to further reduce their CO₂ emissions.

Third, cap-and-trade provides governments with another opportunity to achieve further CO₂ reduction by connecting its cap-and-trade program with those of other countries. If two or more carbon markets are linked, the expanded market will result in more trade of carbon permits, due to having more participants in the market.⁴⁷ This will, in turn, reduce the cost of cutting carbon emissions—just as mass production reduces the overall cost of manufacturing. By lowering the cost, carbon emission permits will be more palatable to market participants.⁴⁸

Lastly, cap-and-trade enables governments to exercise complete control over the amount of carbon dioxide emitted, and in doing so, provides the governments with a great deal of certainty that their respective emission targets will be achieved.⁴⁹ Governments can set a carbon reduction plan and based on the plan, tighten the cap every year or at regular time periods.⁵⁰ This enables governments to effectively lower the total amount of CO₂ emission over time while also giving them the ability to track how well they are conforming to their reduction plans at various intervals.⁵¹

Cap-and-trade has been already implemented by many countries around the world, including the European Union, the United States, China, India, and South Korea; moreover, many other countries are currently considering implementing cap-and-trade.⁵²

works.

⁴⁵ Cf. IETA, BENEFITS OF EMISSIONS TRADING (Mar. 2015), <https://www.ieta.org/resources/Resources/101s/ieta-emissions-trading-101-library-april2015.pdf>.

⁴⁶ Cf. Sutter, *supra* note 43.

⁴⁷ IETA, *supra* note 45.

⁴⁸ *Id.*

⁴⁹ ENV'T DEF. FUND, *supra* note 44; see also Stavins, *supra* note 16, at 310–11.

⁵⁰ See ENV'T DEF. FUND, *supra* note 44.

⁵¹ See *id.*

⁵² See generally INT'L CARBON ACTION P'SHIP, *supra* note 11. According to the Emission Trading Scheme (ETS) map on the International Carbon Action Partnership (ICAP) website, countries that are currently considering implementing cap-and-trade programs include Russia, Japan, Vietnam, Thailand, Indonesia, Brazil,

II. CAP-AND-TRADE PROGRAMS IN THE EUROPEAN UNION, THE UNITED STATES, CHINA, INDIA, AND SOUTH KOREA

A. *The European Union*

The European Union has been a pioneer in the field of carbon emission trading by implementing the world's first cap-and-trade program—the European Union Emission Trading Scheme (EU ETS).⁵³ Since being implemented in 2005, the EU ETS remains the biggest carbon market in the world.⁵⁴ The EU ETS covers about forty-five percent of the European Union's carbon emissions from power plants, factories, and airlines.⁵⁵ Also, the EU ETS is divided into several trading periods, otherwise known as phases.⁵⁶ Thus far, there have been three phases: Phase I (2005-2007), Phase II (2008-2012), and Phase III (2013-2020).⁵⁷

The first phase was considered a pilot phase—the phase in which the European Council was able to learn lessons regarding the design of their carbon market.⁵⁸ For instance, during Phase I, a problem arose when there was an oversupply of permits in the market, which caused the carbon permit price to go down.⁵⁹ As a result of the low carbon permit price, the Council was not able to achieve as much reduction as they anticipated.⁶⁰ However, in Phase II, having learned from previous experience, the European Council was able to increase the permit price by reducing the number of permits distributed.⁶¹ During Phase I and Phase II, by means of the increased price caused by reducing the maximum number of permits distributed in the market, the EU ETS was able to leave a clear impression on Member States that emitting CO₂ is costly and that reducing future emission trajectories makes sense economically.⁶² As a consequence of

and Turkey. *Id.* A few states in the United States—Oregon, Washington, and New Mexico—are also considering a cap-and-trade approach. *Id.*

⁵³ *EU Emissions Trading System (EU ETS)*, EUROPEAN COMMISSION, https://ec.europa.eu/clima/policies/ets_en.

⁵⁴ *Id.* If China's carbon market is finally launched, the EU ETS will become the second-biggest carbon market in the world. *Id.*

⁵⁵ *Id.*

⁵⁶ *Id.*

⁵⁷ Chandreyee Bagchi & Eike Karola Velten, *The EU Emissions Trading System: An Introduction*, CLIMATE POL'Y INFO HUB, <https://climatepolicyinfohub.eu/eu-emissions-trading-system-introduction>.

⁵⁸ *See id.*

⁵⁹ *See id.*

⁶⁰ *See id.*

⁶¹ David B. Hunter & Nuno Lacasta, *Lessons Learned From the European Union's Climate Policy*, 27 WIS. INT'L L.J. 575, 588 (2009).

⁶² *Id.* at 591.

the EU ETS, Europe has been in a better position to take the lead “in a carbon-constrained future.”⁶³

In Phase III, the EU ETS expanded the areas that were covered by the program to include aviation emissions and other industrial sectors that had yet to be covered by the program.⁶⁴ The most noteworthy change in Phase III was that the EU ETS was able to become “fully integrated at the EU level” by replacing Member States’ respective emission targets with “a single, EU-wide ETS target[.]”⁶⁵ In other words, the cap-and-trade program in the European Union finally began to operate as one centralized scheme that controls carbon emissions in Europe.⁶⁶ It is clear that after each phase ended, the European Council revised the market design so as to reflect any market deficiencies that existed in previous phases.⁶⁷

Running the world’s largest carbon market for more than ten years, the EU’s carbon market has proven to be effective in lowering carbon emissions.⁶⁸ For instance, the industries covered by the EU ETS, such as power plants, were able to achieve 4.1% carbon reduction in between 2017 and 2018, whereas industries not covered by the EU ETS were only able to achieve 0.9% carbon reduction.⁶⁹ In addition, the European Union’s carbon market appeared to have maintained a relatively high carbon permit price that continues to provide polluting parties with incentives to modify their CO₂-emitting behaviors.⁷⁰

The next phase of the EU ETS, Phase IV, is expected to begin in January 2021 and will last until December 2028.⁷¹ Through the 2030 Climate and Energy Policy Framework, the European Council reaffirms that emission trading will be the primary means of achieving the European Union’s emission target.⁷²

⁶³ *Id.*

⁶⁴ *Id.* at 590.

⁶⁵ *Id.*

⁶⁶ *See id.*

⁶⁷ *See id.* at 584–90.

⁶⁸ *See* EUR. COMM’ *Progress Made in Cutting Emissions*, https://ec.europa.eu/clima/policies/strategies/progress_en (last visited Feb. 11, 2020).

⁶⁹ *See id.*

⁷⁰ Hunter & Lacasta, *supra* note 61, at 589.

⁷¹ Bagchi & Velten, *supra* note 57.

⁷² EMISSIONS TRADING WORLDWIDE: INTERNATIONAL CARBON ACTION PARTNERSHIP (ICAP) STATUS REPORT 2015 [hereinafter EMISSIONS TRADING WORLDWIDE].

B. *The United States*

The United States, the second-largest CO₂ emitter in the world, has no national cap-and-trade program even though there have been several attempts to implement such a program nationwide.⁷³ Nonetheless, several states in the United States have already initiated efforts to alleviate the problem of global warming by implementing their own cap-and-trade programs.⁷⁴

The first cap-and-trade program in the United States was the Regional Greenhouse Gas Initiative (RGGI), a regional program designed to target carbon emissions from the electricity generation sector.⁷⁵ The program was launched in 2009, and initially, seven states from the northeastern and mid-Atlantic regions took their first steps to implementing RGGI.⁷⁶ As of January 1, 2020, ten states were participating in the program.⁷⁷ New Jersey rejoined the RGGI in 2020; in addition, since the passage of the Clean Economy Act in February 2020, Virginia has also been in the process of joining the program, with a goal of starting in 2021.⁷⁸

RGGI only covers the power sectors of the participating states.⁷⁹ This approach was clever in that state governments did not have to incur additional monitoring costs because power plants in the United States already had an obligation to report their carbon emissions to the federal government.⁸⁰ RGGI distributes carbon permits through auctions, and as an added benefit, the proceeds generated from the auctions are invested in renewable energy and energy efficiency programs that contribute toward mitigating the impacts of global warming.⁸¹ Since going into effect in 2009, RGGI has been found to be

⁷³ See Iman Ghosh, *All the World's Carbon Emissions in One Chart*, VISUAL CAPITALIST (May 31, 2019), <https://www.visualcapitalist.com/all-the-worlds-carbon-emissions-in-one-chart/>; CTR. FOR CLIMATE & ENERGY SOLS., *Market-Based State Policy*, <https://www.c2es.org/content/market-based-state-policy>.

⁷⁴ See UNION OF CONCERNED SCIENTISTS, *Existing Cap-and-Trade Programs to Cut Global Warming Emissions* (Nov. 9, 2007), <https://www.ucsusa.org/resources/existing-cap-and-trade-programs-cut-global-warming-emissions>.

⁷⁵ THE REG'L GREENHOUSE GAS INITIATIVE, <https://www.rggi.org/> (last visited Oct. 31, 2019).

⁷⁶ *Id.*

⁷⁷ *Id.* The seven states include Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont. As of January 1, 2020, Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, Vermont, and New Jersey were participating in the program. *Id.*

⁷⁸ Bruce Ho, *Back to the Future: New Jersey Rejoins RGGI Climate Program*, NRDC (June 17, 2019), <https://www.nrdc.org/experts/bruce-ho/back-future-new-jersey-rejoins-rggi-climate-program>; Carlie Clarcq, *Virginia Set to Join RGGI – A Massive Step Forward for Cap-and-Invest*, CLIMATEXCHANGE (Feb. 19, 2020), <https://climate-xchange.org/2020/02/19/virginia-set-to-join-rggi-a-massive-step-forward-for-cap-and-invest/>.

⁷⁹ THE REG'L GREENHOUSE GAS INITIATIVE, *supra* note 75.

⁸⁰ See Stavins, *supra* note 16, at 369.

⁸¹ See Sarah Shemkus, *As States Look to Cut Transportation Emissions, RGGI Offers a Model – And*

successful in achieving a forty percent reduction in carbon dioxide emissions among the participating states.⁸²

Furthermore, due to the success of RGGI, states participating in RGGI are now planning to expand this successful program to the transportation sector, which surpasses the power sector in emissions.⁸³ Nevertheless, careful attention is required in designing cap-and-trade for the transportation sector; an “issue of equity” arises because of the differences between the transportation sector as opposed to the power sector.⁸⁴ Unlike electricity, access to transportation differs by location and income levels.⁸⁵ Therefore, fairly distributing the benefits and burdens arising from the cap-and-trade program among people of various income levels would be difficult if not impossible.⁸⁶ Regardless of these difficulties, however, cap-and-trade is still one of the most effective means of limiting carbon emissions, and it is therefore strongly recommended that a cap-and-trade program be created for the transportation sector—the sector which produces the largest percentage of total carbon emissions in the United States.⁸⁷

More importantly, California is a state that is at the forefront of combating climate change through implementation of its own cap-and-trade program.⁸⁸ Based upon the California Global Warming Solutions Act of 2006 (AB 32), California launched its own cap-and-trade program in 2013, which in turn has become the fourth-largest cap-and-trade program in the world.⁸⁹ Despite initial criticism, California’s cap-and-trade program has proven to be effective insofar as it has gradually contributed to the reduction of CO₂ emissions.⁹⁰ For instance, from 2012 to 2017, California achieved five consecutive years of emission reductions.⁹¹ Moreover, California was not only able to lower carbon emissions,

Room to Improve, ENERGY NEWS NETWORK (Feb. 5, 2019), <https://energynews.us/2019/02/05/northeast/as-states-look-to-cut-transportation-emissions-rggi-offers-a-model-and-room-to-improve/>.

⁸² ACADIA CTR., *RGGI States Leading the Way Toward Economic and Environmental Success* (Sept. 25, 2017), <https://acadiacenter.org/rggi-states-leading-the-way-toward-economic-and-environmental-success/>.

⁸³ See Shemkus, *supra* note 81.

⁸⁴ *Id.*

⁸⁵ *Id.*

⁸⁶ See *id.*

⁸⁷ See EPA, *Fast Facts on Transportation Greenhouse Gas Emissions*, <https://www.epa.gov/greenvehicles/fast-facts-transportation-greenhouse-gas-emissions>.

⁸⁸ See CTR. FOR CLIMATE & ENERGY SOLS., *California Cap and Trade*, <https://www.c2es.org/content/california-cap-and-trade>.

⁸⁹ *Id.*; see generally CAL. AIR RES. BD., *Assembly Bill 32 Overview*, <https://ww3.arb.ca.gov/cc/ab32/ab32.htm> (last visited June 9, 2020).

⁹⁰ See Michael Hiltzik, *Column: No Longer Termed a ‘Failure,’ California’s Cap-and-trade Program Faces a New Critique: Is It Too Successful?*, L.A. TIMES (Jan. 12, 2018), <https://www.latimes.com/business/hiltzik/la-fi-hiltzik-captrade-20180111-story.html>.

⁹¹ Katelyn Roedner Sutter, *Full Compliance, Declining Emissions, Robust Action: It’s November in*

but also to prove that their economy could flourish in concurrence with efforts to protect the environment.⁹²

In addition, on January 1, 2014, California linked its cap-and-trade system with that of Quebec, a Canadian province.⁹³ The linked carbon markets are governed by Western Climate Initiative, a non-profit corporation that was created to facilitate the effective operation of the market through a set of guidelines.⁹⁴ Under the linkage, permits issued by California and Quebec are recognized by each country, and polluting entities in both regions are allowed to buy and sell those permits across the border.⁹⁵

Moreover, the linked carbon market is also proven to be working.⁹⁶ Indicators of carbon market viability include steadily increasing carbon permit prices, as well as a relatively low number of unsold carbon permits in the market.⁹⁷ That is to say, steadily increasing carbon permit prices and few or no unsold carbon permits are strong indicators of market effectiveness.⁹⁸ According to the data released by the California Air Resources Board after their fifteenth permit auction, the carbon market created by the linkage of markets between California and Quebec appeared to have such indicators; the price of carbon permits reached the highest point ever in the linked market, and there were no unsold carbon permits.⁹⁹ As the permit price increases—or as emitting CO₂ becomes more expensive—polluting parties will undoubtedly try to emit less carbon and they will seek to develop more effective methods of reducing their carbon emissions, creating a virtuous cycle that would help reduce the overall level of CO₂ in the atmosphere.¹⁰⁰

California's Cap-and-Trade Program, ENV'T. DEF. FUND (Nov. 21, 2018), <http://blogs.edf.org/climate411/2018/11/21/full-compliance-declining-emissions-robust-auction-its-november-in-californias-cap-and-trade-program/>.

⁹² See *id.*

⁹³ See Jean-Gregoire Manoukian, *California-Ontario-Quebec Harmonized Cap-and-Trade Program – Compliance Digest* (Dec. 8, 2017), <https://enablon.com/blog/california-ontario-quebec-harmonized-cap-trade-program-compliance-digest/>. Ontario joined the linked carbon market between California and Quebec on January 1, 2018; however, the newly elected Premier terminated the linkage in July 2018. *Id.*

⁹⁴ MARK PURDON ET AL., *The Political Economy of California and Quebec's Cap-and-Trade Systems*, SUSTAINABLE PROSPERITY 5 (2014).

⁹⁵ Manoukian, *supra* note 93.

⁹⁶ See Sutter, *supra* note 43.

⁹⁷ See Melanie Curry, *Latest Cap-and-Trade Auction Shows Strong Results*, STREETS BLOG CAL (May 22, 2019), <https://cal.streetsblog.org/2019/05/22/latest-cap-and-trade-auction-shows-strong-results/>.

⁹⁸ See *id.*

⁹⁹ *Id.*

¹⁰⁰ See *id.*

C. China

China has been the largest carbon emitter in the world since 2006 and the country has been responsible for about thirty percent of global carbon emissions over the past decade.¹⁰¹ The United States emitted the most carbon dioxide in the world until 2006, when China's emissions surpassed that of the United States.¹⁰² Ever since then, China continues to hold the title of the largest carbon emitter.¹⁰³ China's carbon emissions impact the entire world; nevertheless, for many years China had neglected to take care of this increasingly worrisome situation, claiming that dealing with increased carbon emissions would hinder economic growth.¹⁰⁴

However, as of 2011, China has begun to change its attitude towards environmental concerns and has taken actions to reduce its carbon footprint.¹⁰⁵ In 2017, China expanded its pilot program from "seven experimental markets" and announced a plan to launch a national carbon market.¹⁰⁶ Although the initial plan, which involved launching a national carbon market by 2017, has been delayed, the Chinese government expects the first trading of carbon permits to happen in 2020.¹⁰⁷ When the market is operational, the Chinese government expects it to be the largest carbon market in the world, surpassing the current largest carbon market in the world—the European Union Emission Trading Scheme (EU ETS).¹⁰⁸ Even though China's carbon market will only cover the coal-fired power industry, the amount of carbon emissions that will initially be covered by the market will be twice the amount of carbon emissions covered by the EU ETS.¹⁰⁹

¹⁰¹ See Ghosh, *supra* note 73; Thomas C. Frohlich & Liz Blossom, *These Countries Produce The Most CO₂ Emissions*, USA TODAY (July 14, 2019), <https://www.usatoday.com/story/money/2019/07/14/china-us-countries-that-produce-the-most-co-2-emissions/39548763/>.

¹⁰² Frohlich & Blossom, *supra* note 101.

¹⁰³ See *id.*

¹⁰⁴ Mat Hope, *Analysis: China's Big Carbon Market Experiment*, CARBON BRIEF, (Sept. 2, 2014), <https://www.carbonbrief.org/analysis-chinas-big-carbon-market-experiment>.

¹⁰⁵ See *id.*

¹⁰⁶ *Id.*; Muyu Xu & Michael Martina, *Update 1 – China Expects First Trade in National Emissions Scheme in 2020*, REUTERS (Mar. 30, 2019), <https://www.reuters.com/article/climate-change-china/update-1-china-expects-first-trade-in-national-emissions-scheme-in-2020-idUSL3N21H02B>.

¹⁰⁷ *Id.*

¹⁰⁸ See Lili Pike & Yao Zhe, *Five Things to Know About China's National Carbon Market*, CHINADIALOGUE (Dec. 19, 2017), <https://www.chinadialogue.net/blog/10303-Five-things-to-know-about-China-s-national-carbon-market/en>; see also Jill Baker, *All Eyes on China as National Carbon Market Plan Emerges From Haze*, ETHICAL CORP. (Sept. 1, 2019), <http://www.ethicalcorp.com/all-eyes-china-national-carbon-market-plan-emerges-haze>.

¹⁰⁹ *Id.*

In preparation for the official opening of its national carbon market in 2020, China has been running seven pilot carbon markets throughout the country since 2013.¹¹⁰ These programs are intended to test whether the national carbon market will be effective in reducing carbon emissions.¹¹¹ In particular, through the pilot markets, the Chinese government has attempted to enhance the regulatory and administrative framework for its carbon market.¹¹² Thus far, the pilot markets appear to be working, as seen by the fact that the number of trades has increased.¹¹³ Also, the pilot markets, especially the Beijing market, have been effective in achieving a high compliance rate and have helped establish stable carbon prices, which indicates effectiveness.¹¹⁴

Along the way, China has been able to implement a measurement, reporting, and verification (MRV) system that requires all local governments to report their carbon emission history.¹¹⁵ The MRV system will enable the Chinese government to effectively oversee carbon emissions when its national carbon market is finally launched.¹¹⁶ Although there is a lot to be done in terms of market infrastructure, it is evident that China has been endeavoring to create a carbon market that works.¹¹⁷ Furthermore, this endeavor will likely continue, as China's commitment to develop an effective carbon market was reaffirmed by the Central Committee of the Communist Party of China and the State Council, both of which have repeatedly cited it as a top priority.¹¹⁸

D. India

In 2017, India was responsible for 6.8% of global CO₂ emissions, and the country was ranked the third-biggest carbon emitter in the world.¹¹⁹ Despite its high levels of carbon emissions, India had shown little interest in setting up mandatory emission targets before 2010.¹²⁰ This was, perhaps, largely due to the

¹¹⁰ See *What's New with China's National Carbon Market?*, PAULSON INST. (Sept. 11, 2018), <https://www.paulsoninstitute.org/green-finance/green-scene/whats-new-with-chinas-national-carbon-market/>.

The pilot markets have been operating in the following cities: Beijing, Tianjin, Shanghai, Shenzhen, Chongqing, Hubei, and Guangdong. *Id.*

¹¹¹ *See id.*

¹¹² *See id.*

¹¹³ Pike & Zhe, *supra* note 108.

¹¹⁴ *See id.*

¹¹⁵ PAULSON INST., *supra* note 110.

¹¹⁶ *See id.*

¹¹⁷ *See id.*

¹¹⁸ *See id.*

¹¹⁹ Ghosh, *supra* note 73.

¹²⁰ MANASVINI VAIDYULA, KATHERINE RITTENHOUSE, PETER SOPHER, DANIEL FRANCIS, & JEFF SWARTZ, INDIA: AN EMISSIONS TRADING CASE STUDY 2 (2015), https://www.icta.org/resources/Resources/Case_Studies_

prevailing belief in India that more developed countries were at fault for climate change.¹²¹ Therefore, instead of having a system based on reducing carbon emissions, the country focused on reducing energy consumption in energy-intensive industries through programs such as Perform, Achieve, and Trade (PAT), which was first introduced in 2009 and went into effect in 2012.¹²²

While the PAT scheme is not the same as a cap-and-trade program, they bear many similarities.¹²³ For example, although the PAT scheme does not directly involve reducing carbon emissions, the scheme resembles a cap-and-trade scheme in that it allows participating parties to trade so-called energy efficiency certificates if the parties achieve excess energy saving, which ultimately contributes to decreased carbon emissions.¹²⁴ Following the success of these programs, it seems that India decided to take a more decisive action in combating global warming, and in 2017, received \$8 million USD from the World Bank for designing and piloting a carbon market.¹²⁵

E. South Korea

In 2017, South Korea was ranked ninth in CO₂ emissions and responsible for 1.7% of global carbon emissions.¹²⁶ In recognition of the need to lower its carbon footprint, South Korea launched a domestic carbon market in the beginning of 2015, a result of the Act on Allocation and Trading of Greenhouse Gas Emissions Allowances.¹²⁷ The carbon market is currently the second-largest market—topped only by the European Union’s carbon market, which was created by the EU ETS.¹²⁸ Unlike RGGI, which covers only the power sector, South Korea’s cap-and-trade program covers a broad range of CO₂ emitting industries.¹²⁹ The program covers not only the power sector, but also,

Worlds_Carbon_Markets/2015/india_case_study_may2015.pdf.

¹²¹ *See id.*

¹²² *See id.* at 1–2.

¹²³ *See id.* at 2.

¹²⁴ *See Perform, Achieve, Trade (PAT) Scheme*, INT’L ENERGY AGENCY, <https://www.iea.org/policies/1780-perform-achieve-trade-pat-scheme> (June 5, 2019); *see generally* ASHWINI HINGNE, CARBON MARKETS IN INDIA: EXPLORING PROSPECTS & DESIGN CONSIDERATIONS (Mar. 2018).

¹²⁵ Chirag Gajjar, *A Carbon Market to Drive India’s Climate Action*, WRI INDIA (Aug. 31, 2017), <https://wri-india.org/blog/carbon-market-drive-india%E2%80%99s-climate-action>.

¹²⁶ *See Ghosh, supra* note 73.

¹²⁷ *See* ASIAN DEV. BANK, THE KOREA EMISSIONS TRADING SCHEME: CHALLENGES AND EMERGING OPPORTUNITIES 7 (Nov. 2018), <https://think-asia.org/handle/11540/9341>; *see also* INT’L CARBON ACTION P’SHIP, *supra* note 12, at 1.

¹²⁸ *See Ghosh, supra* note 73. If China’s national carbon market becomes operational, then South Korea’s carbon market will be the third largest. *Id.*

¹²⁹ *Cf.* THE REG’L GREENHOUSE GAS INITIATIVE, *supra* note 75.

transportation, aviation, and waste management sectors, among others.¹³⁰ As such, the program has ended up covering about sixty six percent of South Korea's total carbon emissions.¹³¹

Like the EU ETS, South Korea's cap-and-trade program divides the program into different phases: Phase I (2015-2017), Phase II (2018-2020), and Phase III (2021-2025).¹³² Just as the EU ETS was able to reflect market deficiencies in previous phases, South Korea's cap-and-trade program has also been able to evaluate previous phases and make adjustments for the upcoming phases so as to improve the overall carbon market.

For example, during Phase I, South Korea's cap-and-trade program was governed by various governmental entities.¹³³ As such, the cap-and-trade program failed to voice a single message that would have provided better instruction to market participants.¹³⁴ This created uncertainty in the market and caused market participants to become hesitant in actively engaging in carbon permit transactions during Phase I.¹³⁵ Recognizing this market deficiency in Phase I, the government of South Korea decided to restructure its oversight system by placing more responsibilities on the Ministry of Environment.¹³⁶

Below is another example of how the government of South Korea has tried to improve its carbon market. The problem South Korea sought to correct occurred during an early stage of the implementation of its cap-and-trade program.¹³⁷ The problem related to the low carbon permit prices set by the market.¹³⁸ In South Korea, coal power plants were largely responsible for carbon emissions; therefore, it was important to bring power plants into the plan.¹³⁹ Due to poorly designed regulatory policies in the first year of the market, however, South Korea's cap-and-trade program was unable to effectively impact coal

¹³⁰ See ASIAN DEV. BANK, *supra* note 127, at 13.

¹³¹ MANASVINI VAIDYULA, KATHERINE RITTENHOUSE, PETER SOPHER, DANIEL FRANCIS, & JEFF SWARTZ, *supra* note 120, at 2.

¹³² ASIAN DEV. BANK, *supra* note 127, at 8.

¹³³ *Id.* at xii.

¹³⁴ *Id.*

¹³⁵ *See id.*

¹³⁶ *See id.* at 9.

¹³⁷ See Yongrok Choi & Chao Qi, *Is South Korea's Emission Trading Scheme Effective? An Analysis Based on the Marginal Abatement Cost of Coal-Fueled Power Plants*, 11 SUSTAINABILITY 1, 10 (Apr. 29, 2019).

¹³⁸ *See id.*

¹³⁹ PAOLA YANGUAS PARRA ET AL., *TRANSITIONING TOWARDS A COAL-FREE SOCIETY: SCIENCE BASED COAL-PHASE OUT PATHWAY FOR SOUTH KOREA UNDER THE PARIS AGREEMENT 6* (2020), https://climateanalytics.org/media/south_korea_coal_phase_out_feb17_eng.pdf.

power plants, resulting in low carbon permit prices.¹⁴⁰ The carbon permit price was “too low to encourage coal-fueled power plants to actively participate in the carbon emissions-trading market.”¹⁴¹ In addition, the permit price was too low to induce the power plants to develop innovations for cutting carbon emissions.¹⁴² As a result, low carbon permit prices impeded the effective operation of the carbon market.¹⁴³

Although adjustments were made to regulatory policies to improve the carbon market after the first year, there are still problems with South Korea’s carbon market that have yet to be resolved.¹⁴⁴ One problem is the lack of liquidity in the carbon market, meaning that the expected trading behavior in the market has not occurred due to the small number of market participants.¹⁴⁵ Because of the lack of market liquidity, carbon permit prices have become more susceptible to changes, and therefore, have fluctuated quite drastically.¹⁴⁶ To make the situation worse, because the market participants have expected a carbon permit price surge, many have attempted to hold their carbon permits in anticipation of higher prices in the future.¹⁴⁷ This again has led to a shortage of available carbon permits on the market.¹⁴⁸ Ultimately, uncertainty in the carbon market of South Korea has greatly increased, leading to ineffectiveness and volatility in the Korean carbon market as a whole.¹⁴⁹

Nonetheless, the problem inherent in a single carbon market can potentially be resolved by linking one country’s cap-and-trade program with cap-and-trade programs of other countries, an approach that will be covered in Section IV.C.1.

III. INTERNATIONAL COOPERATION IN COMBATING GLOBAL WARMING

It cannot be emphasized enough how important each individual government’s efforts are in reducing carbon emissions. However, in combating climate change, international cooperation is just as important as each government’s efforts. Because global warming results from the total carbon

¹⁴⁰ See Choi & Qi, *supra* note 137, at 10.

¹⁴¹ *Id.*

¹⁴² Sangmin Shim, *Korea’s Leading Role in Joining the Kyoto Protocol with the Flexibility Mechanisms as “Side-Payments,”* GEO. INT’L ENVTL. L. REV. 203, 211 (2003).

¹⁴³ See Choi & Qi, *supra* note 135, at 10.

¹⁴⁴ See ASIAN DEV. BANK, *supra* note 125, at 31–32.

¹⁴⁵ See *id.* at 31.

¹⁴⁶ See *id.*

¹⁴⁷ See *id.*

¹⁴⁸ *Id.* at 29.

¹⁴⁹ See *id.*

emissions produced by every country in the world, the goal of halting global warming is unlikely to be achieved without collaboration within the international community. As the importance of international collaboration has become more widely recognized, more countries have worked together to produce agreements related to global warming. Indeed, several such agreements have been reached within recent history, including three major multilateral agreements.

A. The United Nations Framework Convention on Climate Change

The first of these multilateral agreements, and the one that has become the foundation for other international agreements regarding global warming, is the United Nations Framework Convention on Climate Change (UNFCCC), which went into effect in 1994.¹⁵⁰ This agreement was joined and ratified by 197 countries.¹⁵¹ The importance of the framework lies in the fact that it “[r]ecognized that there was a problem[.]” in spite of limited technologies available at the time to corroborate such an assertion and “kick[ed] off formal consideration of adaptation to climate change.”¹⁵² Article 2 of the UNFCCC states the main objective of the agreement, which was to “stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.”¹⁵³

Furthermore, the UNFCCC demands that developed countries, called Annex I countries, undertake a key role in leading this initiative to combat climate change.¹⁵⁴ Even though many of the countries have successfully fulfilled their responsibilities, one drawback to the framework is that it lacked an enforcement mechanism, which could have been helpful in realizing its main objective.¹⁵⁵ This deficiency, as well as the UNFCCC’s guideline as to how subsequent international treaties or protocols may be negotiated led to the establishment of another significant international agreement that compelled developed countries to take action.¹⁵⁶

¹⁵⁰ UNFCCC, *What is the United Nations Framework Convention on Climate Change?*, <https://unfccc.int/process-and-meetings/the-convention/what-is-the-united-nations-framework-convention-on-climate-change>.

¹⁵¹ *Id.*

¹⁵² *Id.*

¹⁵³ UNFCCC, *Climate Get the Big Picture*, <https://unfccc.int/resource/bigpicture>; *see also* United Nations Framework Convention on Climate Change, art. 2.

¹⁵⁴ *See id.* at 7.

¹⁵⁵ UNFCCC & Kyoto Protocol, ASIA PAC. ADAPTATION NETWORK <http://www.asiapacificadapt.net/about-us/unfccc> (last visited May 30, 2020).

¹⁵⁶ *See id.*

B. *The Kyoto Protocol*

The second major international agreement regarding global warming was the Kyoto Protocol. The protocol was adopted in 1997 and became effective in 2005.¹⁵⁷ As opposed to the UNFCCC, which was effective only to the extent that the agreement encouraged state parties to take some action to prevent global warming, the Kyoto Protocol committed state parties to reducing their carbon emissions.¹⁵⁸ Importantly, the protocol had a binding effect on developed countries with regard to setting emission reduction targets.¹⁵⁹ Furthermore, the Kyoto Protocol was significant in that it recognized different responsibilities of countries with regard to global warming by taking into account differences in past industrial activities, in accordance with the principle of “common but differentiated responsibilities.”¹⁶⁰

Although countries should focus on reducing domestic emissions, the protocol provides countries with flexibility in determining ways to meet their emission targets.¹⁶¹ The Kyoto Protocol provides countries with three options to achieve reduction targets: (1) International Emission Trading, (2) Joint Implementation projects, and (3) the Clean Development Mechanism.¹⁶² Emission trading refers to the cap-and-trade program.¹⁶³ Alternatively, Joint Implementation projects and the Clean Development Mechanism are credit programs.¹⁶⁴

According to Article 6 of the Kyoto Protocol, Joint Implementation projects allow Annex I countries to meet their reduction commitments by investing in a carbon dioxide reduction project in other Annex I countries.¹⁶⁵ By following this option, a country can receive credits, “emission reduction units,” for reducing emissions in another country.¹⁶⁶ This option may better allow Annex I countries to cost-effectively satisfy their reduction targets because investments in emission reduction projects of other Annex I countries can be relatively cheaper

¹⁵⁷ UNFCCC, *What is the Kyoto Protocol?*, https://unfccc.int/kyoto_protocol (last visited Mar. 20, 2020).

¹⁵⁸ See UNFCCC, *supra* note 153.

¹⁵⁹ See *id.*

¹⁶⁰ See *id.*; see also Kyoto Protocol, art. 2.

¹⁶¹ See UNFCCC, *supra* note 157.

¹⁶² *Id.*

¹⁶³ Stavins, *supra* note 16, at 367.

¹⁶⁴ *Id.*

¹⁶⁵ See Kyoto Protocol, art. 6. Annex I countries are usually industrialized countries with binding reduction targets. UNFCCC, *supra* note 157.

¹⁶⁶ See *id.*; see also UNFCCC, *Joint Implementation*, <https://unfccc.int/process/the-kyoto-protocol/mechanisms/joint-implementation>.

than lowering carbon dioxide emissions domestically.¹⁶⁷ Furthermore, Joint Implementation promotes conveyance of environment-friendly technologies from one country to another.¹⁶⁸ Notwithstanding the fact that Joint Implementation is indeed cost-effective in achieving reduction targets, acquiring emission reduction units must be “supplemental to domestic actions” when it comes to meeting reduction targets.¹⁶⁹

The Clean Development Mechanism (CDM), the last flexible option provided by Article 12 of the Kyoto Protocol, allows non-Annex I countries to earn “certified emission reductions” (CERs) by developing carbon dioxide emission reduction projects in developing countries.¹⁷⁰ In other words, non-Annex I countries could support developing countries both financially and technologically so as to better accomplish the main purpose of the Kyoto Protocol: lowering the aggregate carbon emissions.¹⁷¹ The earned credits, CERs, could then be applied to a country’s reduction targets.¹⁷² The mechanisms of the Joint Implementation and the Clean Development Mechanism are pretty much the same, but they differ with respect to which countries can implement either one of the schemes.¹⁷³ Just like Joint Implementation, acquiring CERs must also be “supplemental to domestic actions.”¹⁷⁴

The Kyoto Protocol also establishes a compliance mechanism to ensure that state parties to the protocol meet their reduction targets.¹⁷⁵ The mechanism calls for the creation of a compliance committee, consisting of two branches: 1) a facilitative branch and 2) an enforcement branch.¹⁷⁶ The role of the facilitative branch is to provide assistance to countries when they have problems in achieving their emission targets, while the role of the enforcement branch is to ensure that countries meet their emission targets by determining the consequences for non-compliance.¹⁷⁷

¹⁶⁷ UNFCCC, *supra* note 157.

¹⁶⁸ Shim, *supra* note 142, at 213.

¹⁶⁹ See Kyoto Protocol, art. 6(1)(d); *see also* Shim, *supra* note 142, at 213.

¹⁷⁰ UNFCCC, *The Clean Development Mechanism*, <https://unfccc.int/process-and-meetings/the-kyoto-protocol/mechanisms-under-the-kyoto-protocol/the-clean-development-mechanism>.

¹⁷¹ See Shim, *supra* note 142, at 213–14.

¹⁷² UNFCCC, *supra* note 168; *see also* Kyoto Protocol, art. 12.

¹⁷³ Shim, *supra* note 142, at 213.

¹⁷⁴ *Id.*

¹⁷⁵ See UNFCCC, *The Compliance Committee of the Kyoto Protocol*, <https://unfccc.int/Compliance-Committee-CC>.

¹⁷⁶ UNFCCC, *Introduction*, <https://unfccc.int/process/the-kyoto-protocol/compliance-under-the-kyoto-protocol/introduction>.

¹⁷⁷ *See id.*

If a country fails to meet its emission reduction targets under the Kyoto Protocol, that country must submit a plan explaining how it intends to establish future compliance with the protocol.¹⁷⁸ As a penalty, the country must reduce carbon dioxide emissions in the upcoming commitment period by the same amount that they failed to reduce carbon emissions in the previous period; the country is furthermore required to decrease thirty percent of the emissions that the country failed to achieve in the previous period.¹⁷⁹ As a final consequence for failing to meet its reduction commitments, the country will forfeit its right to sell its carbon permits to other countries.¹⁸⁰

C. *The Paris Agreement*

The third major international agreement on the topic of global warming is the Paris Agreement, which entered into force in November 2016.¹⁸¹ The Paris Agreement went one step further than the Kyoto Protocol by requiring every country that ratified the agreement—not just developed countries—to take action to cut carbon dioxide emissions.¹⁸² The main goal of this agreement is to “hold[] the increase in the global average temperature to well below 2°C above pre-industrial levels and pursu[e] efforts to limit the temperature increase to 1.5°C above pre-industrial levels . . .”¹⁸³ In order to achieve the goal, the Paris Agreement places an emphasis on international cooperation in combating global warming by stipulating in Article 2.1 that, the Paris Agreement “aims to strengthen the global response to the threat of climate change[.]”¹⁸⁴

Of great importance in the Paris Agreement are the Nationally Determined Contributions (NDCs).¹⁸⁵ Article 3 of the Paris Agreement demands that the NDCs be “ambitious.”¹⁸⁶ In addition, Article 4 of the Paris Agreement requires state parties to “prepare, communicate, and maintain” NDCs; this means that state parties have to regularly update their emission status and how they are making an effort in reducing carbon emissions.¹⁸⁷ Essentially, NDCs are plans

¹⁷⁸ Jon Hovi, et al., *Enforcing the Kyoto Protocol: Can Punitive Consequences Restore Compliance?*, 33 REV. INT'L STUDIES 3, 435, 439 (July 2007).

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

¹⁸¹ United Nations Climate Change, *What is the Paris Agreement?* <https://unfccc.int/process-and-meetings/the-paris-agreement/what-is-the-paris-agreement> (last visited Mar. 20, 2020).

¹⁸² See Melissa Denchak, *Paris Climate Agreement: Everything You Need to Know*, NRDC (Dec. 12, 2018), <https://www.nrdc.org/stories/paris-climate-agreement-everything-you-need-know#sec-important>.

¹⁸³ Paris Agreement, art. 2.1(a).

¹⁸⁴ Paris Agreement, art. 2.1.

¹⁸⁵ See Paris Agreement, art. 4.

¹⁸⁶ Paris Agreement, art. 3.

¹⁸⁷ Paris Agreement, art. 4.

for identifying how a country will contribute to realizing the ultimate goal of the agreement as prescribed in Article 2 of the Paris Agreement.¹⁸⁸

Furthermore, just as in the Kyoto Protocol, the Paris agreement also recognizes and emphasizes “the need to support developing country Parties for the effective implementation of this Agreement.”¹⁸⁹ Accordingly, it obliges developed countries to provide financial support to developing countries pursuant to Article 9, Section 1 of the Paris Agreement, stating, “[d]eveloped country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention.”¹⁹⁰

IV. EVER-CHANGING GLOBAL DYNAMICS AND THE SIGNIFICANCE OF CAP-AND-TRADE PROGRAMS IN RELATION TO SOUTH KOREA’S COMPLIANCE WITH INTERNATIONAL AGREEMENTS

A. *Difficulties Involved with Changing Climate Policies in Different Countries*

Countries’ policies regarding global warming are inherently interdependent. If one country reduces carbon emissions while another country increases carbon emissions by the same amount, the total amount of carbon emitted will remain the same. For this reason, every country must work together to tackle the problem of global warming.

In practice, it is quite difficult to find viable solutions to such a complex problem. Regardless of countries’ commitments to various international agreements, the policies of each country are susceptible to changes depending on domestic politics.¹⁹¹ In June 2017, for example, President Trump announced that the United States would withdraw from the Paris Agreement.¹⁹² Moreover, carbon emission regulations in the United States have been made

¹⁸⁸ See Paris Agreement, art. 4.2.

¹⁸⁹ Paris Agreement, art. 3.

¹⁹⁰ Paris Agreement, art. 9.1.

¹⁹¹ See, e.g., Justin Worland, *Trump Announces Withdrawal From Paris Agreement*, TIME (June 1, 2017), <https://time.com/4801134/paris-agreement-withdrawal-donald-trump-rose-garden>; Juliet Eilperin & Brady Dennis, *Trump Administration to Relax Restrictions on Methane, a Powerful Greenhouse Gas*, WASH. POST (Aug. 29, 2019), <https://www.washingtonpost.com/climate-environment/2019/08/29/trump-administration-reverse-limits-methane-powerful-greenhouse-gas/>; Timothy Gardner, *EPA to Relax Fuel Efficiency Standards for Autos*, REUTERS (Apr. 2, 2018), <https://www.reuters.com/article/us-usa-epa-autos/epa-to-relax-fuel-efficiency-standards-for-autos-idUSKCN1H91OD>; Ellie Kaufman, *EPA Rolls Back Obama-era Plan Limiting Coal-Fired Power Plant Emissions*, CNN (June 19, 2019), <https://www.cnn.com/2019/06/19/politics/epa-rolls-back-obama-coal-emissions/index.html>.

¹⁹² See Worland, *supra* note 191.

significantly less stringent.¹⁹³ As evidence of this fact, the EPA recently allowed states to establish their own emission standards for coal-fired power plants and reduced fuel efficiency standards for automobiles.¹⁹⁴ In addition, the Trump administration sued California for linking its cap-and-trade system to a foreign province, Quebec.¹⁹⁵

Such changes in policy show how a country with a large carbon footprint can make a big difference in terms of global carbon emissions. Even slight policy changes in the United States, a major CO₂ emitter, could undermine efforts of smaller countries, like South Korea, to reduce carbon levels in the atmosphere and mitigate the impact of global warming.¹⁹⁶ Unfortunately, smaller countries that try hard to protect the environment often have limited power to change the environmental policies of larger or more powerful nations.

Periodic fluctuation in climate policies in various countries prevents international cooperation towards reducing carbon emissions. Therefore, it is important that South Korea develops ways to attack the problem of global warming head-on while continuing to encourage other nations to take a similar approach.

B. Problems in South Korea Regarding Compliance with the Paris Agreement

In addition to the ever-changing environmental policies, South Korea itself is having trouble with respect to its emission reduction target under the Paris Agreement.¹⁹⁷ South Korea committed to the Paris Agreement to decrease greenhouse gas emissions by signing the Agreement on April 22, 2016.¹⁹⁸ In accordance with its obligations under the Agreement, South Korea proposed that it would decrease carbon emissions by thirty seven percent below its business-as-usual level by 2030, a figure that could be achieved through a 32.5% domestic emission reduction and a 4.5% of international emission reduction.¹⁹⁹

¹⁹³ See Eilperin & Dennis, *supra* note 191.

¹⁹⁴ See Gardner, *supra* note 191; Kaufman, *supra* note 191.

¹⁹⁵ Phillips et. al, *Trump Administration Sues California Over Cap-and-Trade Agreement with Canada*, L.A. TIMES (Oct. 23, 2019), <https://www.latimes.com/environment/story/2019-10-23/trump-administration-sues-california-cap-and-trade-canada>.

¹⁹⁶ Cf. Thomas C. Frohlich & Liz Blossom, *These Countries Produce the Most CO₂ Emissions*, USA TODAY (July 14, 2019), <https://www.usatoday.com/story/money/2019/07/14/china-us-countries-that-produce-the-most-co-2-emissions/39548763>.

¹⁹⁷ See Climate Action Tracker, *South Korea: Pledges and Targets*, (Dec. 2, 2019), <https://climateactiontracker.org/countries/south-korea/2019-12-02>.

¹⁹⁸ *Id.*

¹⁹⁹ *See id.*

Nevertheless, according to the Climate Action Tracker, an independent agency that measures the effectiveness of governmental climate action, South Korea's emission target was rated as "highly insufficient" when compared to the aims of the Paris Agreement.²⁰⁰ The Climate Action Tracker defines "highly insufficient" emission targets as those that "fall outside the fair share range and are not at all consistent with holding warming to below 2°C let alone with the Paris Agreement's stronger 1.5°C limit."²⁰¹ By rating South Korea's emission reduction target as "highly insufficient," the Climate Action Tracker emphasized the need for more rigorous and ambitious approaches in helping achieve the main objective of the Paris Agreement.²⁰²

C. *Suggested Policies*

Despite such unfavorable circumstances and domestic problems inhibiting the development of South Korea's cap-and-trade program as outlined in Section II.E, it should be noted that Korea's ability to shape the future is bolstered by the fact that it has the second-largest carbon market in the world.²⁰³ Moreover, there are several policies that South Korea can implement with respect to the cap-and-trade system so as to continue being a responsible party to several international agreements on global warming.²⁰⁴

One policy would be for South Korea to further restrict its own carbon cap. Doing so would both cope with changes in environmental policies that occur in other countries and better comply with the Paris Agreement. Additionally, there are two particularly important policies that would enable South Korea to considerably lower its CO₂ emissions while complying with the spirit of international agreements through international cooperation.²⁰⁵ These two policies are: (1) the linkage of the cap-and-trade system and (2) economic aid to developing countries.²⁰⁶

²⁰⁰ *See id.*

²⁰¹ *Id.* Targets are classified according to six categories: critically insufficient, highly insufficient, insufficient, 2°C compatible, 1.5°C Paris Agreement compatible and role model. *Id.*

²⁰² *See id.*

²⁰³ *See* Katie Valentine, *South Korea Launches World's Second-Largest Carbon Trading Market*, THINKPROGRESS (Jan. 12, 2015), <https://thinkprogress.org/south-korea-launches-worlds-second-largest-carbon-trading-market-5e9c24da32b2/>.

²⁰⁴ *See* ASIAN DEV. BANK, *supra* note 127, at 36–37.

²⁰⁵ *See id.*

²⁰⁶ *See id.*

1. *Linkage with Other Countries' Cap-and-trade Programs*

One way to alleviate global warming is through linkage of carbon markets between regions or countries. There are clear benefits to operating cap-and-trade programs together, both regionally and internationally.²⁰⁷ California's linkage of its cap-and-trade program with that of Quebec, for example, resulted in a net reduction of carbon dioxide.²⁰⁸ Even though RGGI is a regional linkage system, it is still a combined carbon market insofar as it is a combination of carbon markets from different states.²⁰⁹ Accordingly, RGGI provides another example of how linking cap-and-trade programs can be highly effective.²¹⁰ This effectiveness is backed by other existing models of carbon market linkage.²¹¹ For example, in Switzerland, which is not a part of the European Union, a cap-and-trade program is already in place that links Switzerland's carbon market to the EU ETS.²¹² The benefits of linking cap-and-trade systems so as to create bigger carbon markets are explained below.

a. *Benefits of Linkage*

Linking cap-and-trade systems of different countries provides a variety of advantages.²¹³ First, as more polluting parties participate in the expanded market, transactions involving carbon permits become more effective and liquid.²¹⁴ Due to the increased number of market participants, more trading will happen in the market, and therefore, big fluctuations in carbon permit prices are less likely.²¹⁵ As a result, confidence in the market will increase, and there will be less market volatility.²¹⁶ Eventually, overall market efficiency will be enhanced.²¹⁷ Thus, through linkage of carbon markets, South Korea would be able to solve many of the problems relating to market efficiency that have plagued its carbon market since it was first implemented in 2015.²¹⁸

²⁰⁷ See, e.g., ACADIA CTR., *supra* note 82; Manoukian, *supra* note 93.

²⁰⁸ See Sutter, *supra* note 43.

²⁰⁹ See THE REG'L GREENHOUSE GAS INITIATIVE, *supra* note 75.

²¹⁰ See, e.g., ACADIA CTR., *supra* note 82.

²¹¹ EUR. COMM'N, *EU and Switzerland Sign Agreement to Link Emissions Trading Systems* (Nov. 23, 2017), https://ec.europa.eu/clima/news/eu-and-switzerland-sign-agreement-link-emissions-trading-systems_en.

²¹² *Id.*

²¹³ See Marissa Santikarn, et al., *A Guide to Linking Emissions Trading Systems*, INT'L CARBON ACTION PARTNERSHIP 1, 26–29 (Sept. 2018).

²¹⁴ See *id.* at 27.

²¹⁵ See *id.*

²¹⁶ See *id.* at 27–28; Cf. ASIAN DEV. BANK, *supra* note 127, at 31, 35.

²¹⁷ Cf. ASIAN DEV. BANK, *supra* note 127, at 35.

²¹⁸ Cf. *id.*; Choi & Qi, *supra* note 137, at 10.

Second, linkage of cap-and-trade programs provides participating parties with benefits.²¹⁹ In particular, a country with a higher compliance cost would benefit from having reduced costs for carbon emission reduction, while a country with a relatively lower compliance cost would benefit by being able to raise money.²²⁰ That is, linkage with other countries' cap-and-trade programs allows participating states to cost-efficiently meet emission reduction targets.²²¹

According to a study that was conducted before the launching of California-Quebec's linked carbon market, it was anticipated that both California and Quebec would benefit from connecting their carbon markets.²²² This conclusion was based on the fact that, because Quebec utilized hydroelectric resources to generate power, and as a result, maintained lower emission intensity than California, Quebec incurred relatively higher costs associated with decreasing carbon emissions.²²³

In the absence of a linked carbon market, the carbon permit prices in Quebec were expected to be approximately \$37-43 per metric ton of CO₂ in 2013, increasing to \$59-69 per metric ton of CO₂ by 2020.²²⁴ In contrast, it was estimated that carbon permit prices in California would be in the range of \$17-36 per metric ton of CO₂ in 2013, subsequently increasing to \$27-54 per metric ton of CO₂ by 2020.²²⁵ The study, therefore, predicted that if the markets in California and Quebec were connected, a slight increase in carbon permit prices would be expected.²²⁶

By looking at these predicted permit prices, the study showed that entities in need of carbon permits in Quebec would be better off by having cheaper options to reduce their carbon emissions.²²⁷ Despite the slight increase over its carbon permit price, California would benefit from earning revenue generated from entities in Quebec that had purchased permits from California.²²⁸ California could invest this additional revenue in developing more environment-friendly technologies that would emit less carbon dioxide.²²⁹ Although these predictions

²¹⁹ See PURDON ET AL., *supra* note 94, at 35-36.

²²⁰ *Id.*

²²¹ See Meredith Fowlie, *The Promise and Perils of Linking Carbon Markets*, ENERGY INST. AT HAAS (July 25, 2016), <https://energyathaas.wordpress.com/2016/07/25/the-promise-and-perils-of-linking-carbon-markets>.

²²² See PURDON ET AL., *supra* note 94, at 35.

²²³ *See id.* at 34.

²²⁴ *See id.* at 35.

²²⁵ *See id.*

²²⁶ *See id.*

²²⁷ *See id.* at 36.

²²⁸ *See id.*

²²⁹ *Cf.* CTR. FOR CLIMATE AND ENERGY SOLS., *supra* note 15.

were made before the carbon markets in California and Quebec were connected, time has prove them to be fairly accurate.²³⁰ For instance, through the carbon permit auction held in 2019, California was able to raise over \$740 million USD with which they could invest in further reducing carbon emissions.²³¹

Implementing a linked cap-and-trade program in South Korea would likely yield similar economic advantages for prospective participants. South Korea could benefit from buying cheaper permits abroad, and at the same time, raise money by selling permits to other countries, the proceeds of which could be used to fund environmental initiatives.²³²

If China's carbon market takes effect in 2020 and China agrees to link its carbon market, then South Korea could enjoy cheaper prices while decreasing carbon emissions.²³³ Alternatively, if South Korea sells permits to other countries whose compliance costs are higher, then South Korea could benefit from selling its carbon permits.²³⁴ If complying with its emission targets under the Paris Agreement becomes cheaper, South Korea could make additional reductions by utilizing saved resources. Furthermore, it would be able to set and achieve more ambitious emission reductions under the Paris Agreement so as to resolve the concerns proposed by the Climate Change Tracker.²³⁵

As an added benefit, linking the cap-and-trade programs of different countries would be a major step towards realizing the spirit of international cooperation upon which the Paris Agreement was created, as emphasized by Article 2.1.²³⁶ Furthermore, ambitious reduction targets that would not be possible if countries acted alone would become achievable through international cooperation and coordination.²³⁷

²³⁰ See Katelyn Roedner Sutter, *In Strong WCI Auction, Prices Clear Significantly Above Floor. Here's Why*, ENV'T DEF. FUND: CLIMATE 411 (May 22, 2019), <http://blogs.edf.org/climate411/2019/05/22/in-strong-wci-auction-prices-clear-significantly-above-floor-heres-why>.

²³¹ *Id.*

²³² *Cf.* PURDON ET AL., *supra* note 94, at 35; REUTERS, *supra* note 106 (explaining that due to the linked carbon market between Quebec and California, Quebec would be able to purchase carbon permits at a cheaper cost and California would be able to realize monetary gains by selling carbon permits to Quebec).

²³³ See REUTERS, *supra* note 106. *Cf.* PURDON ET AL., *supra* note 106, at 35–36 (showing that Quebec could enjoy cheaper carbon permit prices due to the linked carbon market between Quebec and California).

²³⁴ *Cf.* PURDON ET AL., *supra* note 94, at 35–36 (indicating that California would be able to gain from selling carbon permits to Quebec regardless of the expected rise in carbon permit price).

²³⁵ See Climate Action Tracker, *supra* note 197; ASIAN DEV. BANK, *supra* note 127, at 31–32.

²³⁶ *Cf.* Paris Agreement, art. 2.1 (recognizing the spirit of international cooperation by stating “[t]his Agreement . . . aims to strengthen the global response to the threat of climate change[.]”).

²³⁷ Santikam et al., *supra* note 213, at 28.

After China's carbon market opens up in 2020, South Korea could suggest linking its carbon market with China's, which soon would be the largest carbon market in the world.²³⁸ Professor Duan, who has been actively participating in the development of China's national carbon market, said that, "China wishes to develop a national system with great international influence and hopes to link its system with others."²³⁹ This suggests the future possibility of linking carbon markets in China and South Korea. Furthermore, if Asian countries such as China, India, Russia, Japan, and South Korea could work together to create an Asian carbon market, this market could have a tremendous impact on helping to mitigate global warming.²⁴⁰ After all, these countries are responsible for almost half of the global carbon emissions according to data from 2019.²⁴¹

The linkage of cap-and-trade programs is not limited to neighboring countries.²⁴² Countries can look to neighboring or even distant countries to form partnerships—without being discouraged by geographical distance.²⁴³ As proven by the linked carbon markets of California and Quebec, a large distance between countries should not preclude them from joining together to strengthen emission standards.²⁴⁴ Therefore, South Korea should seek out any countries that are willing to connect their carbon markets with South Korea's carbon market.

Due to the aforementioned benefits of linking carbon markets—improved market liquidity, reduced compliance and transaction costs, and contribution to international collaboration—South Korea will be able to address the problems that were mentioned in Section IV. South Korea should therefore seriously consider linking its cap-and-trade program with the cap-and-trade programs of other countries.

b. Potential Challenges Regarding Linkage of Carbon Markets

There are potential obstacles with regard to linking cap-and-trade programs of different countries. First, adjustments may have to be made to account for different cap-and-trade programs, and this could prove challenging.²⁴⁵ In

²³⁸ See Baker, *supra* note 108.

²³⁹ *Id.*

²⁴⁰ Cf. Ghosh, *supra* note 73 (showing that China, India, Russia, Japan, and South Korea are collectively responsible for a large percentage of global carbon emissions).

²⁴¹ See *id.*

²⁴² See, e.g., Manoukian, *supra* note 93; EUR. COMM'N, *supra* note 211.

²⁴³ See Manoukian, *supra* note 93.

²⁴⁴ Cf. *id.* (demonstrating that carbon markets of Quebec and California have been linked since 2014).

²⁴⁵ See Matthew Ranson and Robert Stavins, *Linkage of Greenhouse Gas Emissions Trading Systems:*

making adjustments, countries have to take into account different factors, including economic and political factors, and finally, compromise.²⁴⁶ The differences between the countries with respect to these factors might hinder the linkage of countries' cap-and-trade programs.

However, this might not be such a big problem when looking at the California–Quebec carbon market. When California and Quebec considered linking their carbon markets, they did not go through several rounds of negotiation. Instead of fighting against each other, which would have raised issues previously mentioned, they focused on scrutinizing each other's regulatory provisions so as to make sure that the provisions in both programs were mutually beneficial.

Specifically, California and Quebec divided their respective cap-and-trade programs' provisions into three basic categories: (1) identical provisions, (2) non-identical provisions with similar outcomes, and (3) entirely different provisions.²⁴⁷ The first category includes the number of carbon permits allowed in the market, a common registry, and rules that govern the transfer of carbon permits in the linked market.²⁴⁸ The second category includes the monitoring, reporting, and verification processes.²⁴⁹ The last category includes voluntary offset programs that have already been implemented by each country prior to consideration of the linked market.²⁵⁰ This division into separate categories facilitated conversation between the two parties, and ultimately, made linking markets much easier. If other countries who enter into negotiations follow a similar model, they will be able to enjoy the benefits of a linked market while overcoming some of the more obvious obstacles.

Furthermore, there is the possibility that such programs will encourage outsourcing of carbon emissions, which might result in an increase in total global carbon emissions.²⁵¹ This is called carbon leakage.²⁵² Because a country can satisfy reduction targets at a cheaper cost by buying relatively cheaper permits from other countries whose carbon markets are linked to its market, the country may continue emitting lots of carbon dioxide while still meeting its reduction

Learning from Experience 3 (Nat'l Bureau of Econ. Research, Working Paper No. 19824, 2014).

²⁴⁶ *See id.*

²⁴⁷ *See* EMISSIONS TRADING WORLDWIDE, *supra* note 72, at 10–11.

²⁴⁸ *Id.* at 10.

²⁴⁹ *Id.* at 10–11.

²⁵⁰ *Id.* at 11.

²⁵¹ Carbon Market Watch, *Carbon Leakage* (Aug. 29, 2014), <https://carbonmarketwatch.org/2014/08/29/carbon-leakage>.

²⁵² *Id.*

target.²⁵³ In addition, it is possible that such programs will disincentivize technological innovations aimed at achieving carbon efficiency.²⁵⁴ Due to having cheaper options arising from the linked carbon market, a country might have less incentives to create innovations that would greatly cut carbon emissions.²⁵⁵

Nevertheless, evidence suggests that the benefits of linked cap-and-trade programs vastly outweigh the costs. The evidence includes numerous examples of existing linked carbon markets around the world. The California-Quebec carbon market is an example of how countries can smoothly negotiate and successfully create a linked carbon market. South Korea should suggest to other countries that have already implemented cap-and-trade programs, or which are considering implementing cap-and-trade programs, to link their cap-and-trade programs to take advantage of the benefits of expanded carbon markets.

2. *Contributing Financial Assistance to Other Countries*

In addition to linking its carbon market with those of other countries, South Korea could contribute funds to other developing countries to encourage those countries to set up their own cap-and-trade programs.²⁵⁶ For example, Indonesia has yet to establish its own carbon market, but the country is ranked twelfth in amount of carbon produced in 2017.²⁵⁷ Therefore, by implementing a policy of subsidizing Indonesia to help them establish their carbon market, South Korea may be able to better contribute to the battle of combating climate change and environmental damage caused by global warming.

This approach closely resembles the Clean Development Mechanism, one of the options to satisfy reduction targets provided by the Kyoto Protocol.²⁵⁸ Since South Korea is classified as a non-Annex I country under the Kyoto Protocol, South Korea is not eligible for the Joint Implementation project as described in Article 6 of the Kyoto Protocol.²⁵⁹ Despite this fact, South Korea can still utilize the Clean Development Mechanism.²⁶⁰

²⁵³ Cf. PURDON ET AL., *supra* note 94, at 35 (showing that Quebec would be able to reduce the amount of money that is used to buy carbon permits by purchasing cheaper permits from California).

²⁵⁴ See ASIAN DEV. BANK, *supra* note 127; see also *Carbon Leakage*, EUROPEAN COMMISSION: ENERGY, CLIMATE CHANGE, ENVIRONMENT, https://ec.europa.eu/clima/policies/ets/allowances/leakage_en.

²⁵⁵ See *id.*

²⁵⁶ See Gajjar, *supra* note 125. This is similar to how the World Bank contributed funds to India in order to assist that country in creating its own cap-and-trade system. *Id.*

²⁵⁷ See Ghosh, *supra* note 73.

²⁵⁸ See UNFCCC, *supra* note 166.

²⁵⁹ See *id.*

²⁶⁰ See UNFCCC, *supra* note 153.

In addition, this approach could be a good way to mitigate global warming because it expands the potential pool of countries to which South Korea could link its cap-and-trade program. Furthermore, rather than simply providing financial support, South Korea can also help countries establish a viable carbon market by sharing the lessons that have been learned from its experience in this field.

Lastly, offering financial assistance to other countries in an effort to encourage them to establish their own carbon markets is fully consistent with the spirit of the two major international agreements: the Kyoto Protocol and the Paris Agreement.²⁶¹ As mentioned above, these international agreements emphasize the needs and responsibilities of developed countries to help developing countries in combatting climate change by providing the financial means necessary to achieve such an important goal.²⁶² Therefore, it is recommended that South Korea contribute funds to countries that are struggling to decide which instrument to implement as a means of reducing carbon emissions. This way South Korea can fully realize the spirit of the Kyoto Protocol and the Paris Agreement while simultaneously working to achieve carbon reduction.

CONCLUSION

To address the urgent need to remedy the problem of global warming, every country must make their best efforts to mitigate any impacts that would worsen this devastating problem. With the understanding of the importance of national efforts, many countries around the world have implemented cap-and-trade as a way of reducing carbon emissions. In addition, three major international agreements encourage a concerted response to global warming. This is because greater reductions in global carbon emissions will not be possible without cooperative efforts of the international community due to the transnational nature of global warming.

Undeniably, there have been cases where certain countries have gone against the efforts of other countries in mitigating the hazardous impacts of global warming, in spite of evidence that international cooperation is paramount. This, unfortunately, discourages efforts of countries that are trying hard to lower carbon emissions. It is a situation that sometimes occurs in countries emitting less carbon dioxide, where emission reductions may easily be surpassed by

²⁶¹ See generally UNFCCC, *supra* note 157; Denchak, *supra* note 182.

²⁶² See UNFCCC, *supra* note 157; Denchak, *supra* note 182.

carbon dioxide emissions of larger, non-cooperative nations.

However, by employing policies suggested herein, South Korea could alleviate the harm caused by countries that are deviating from global efforts to remediate global warming as well as solve its own problems related to the carbon market. First, South Korea should link its cap-and-trade program with those of other countries. Second, South Korea should also provide financial support to other countries to help them establish their own cap-and-trade programs. In so doing, South Korea would be better able to comply with international agreements related to global warming and more effectively support global efforts to combat climate change.

Furthermore, these suggestions are not only applicable to South Korea, but also to other countries of similar size and which have a similar level of carbon emissions. Even though this Comment focuses on addressing problems inherent in South Korea's cap-and-trade programs, the problems are not atypical. Other countries might experience similar difficulties in attempting to establish or improve their carbon markets. Therefore, these two suggested solutions should apply not only to South Korea, but also to other situations where similar circumstances arise. Other countries are welcome to adopt these solutions and to improve their own cap-and-trade programs. The implementation of these suggestions will help reduce carbon emissions worldwide, and to this end, should be considered seriously for the future of our planet. Countries around the globe must find ways to work together for their own mutual benefit. Only then will we be able to better address the seemingly insurmountable obstacles related to global warming.

SEO JUNG PARK*

* Managing Editor, *Emory International Law Review*, Volume 35; J.D. Candidate, Emory University School of Law (2021); B.S., University of California, Berkeley, in *Environmental Economics and Policy* (2017). The author would like to thank Professor Kirk for his helpful guidance and advice. The author would also like to thank her family and friends, who have given her the courage to overcome challenges.