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A Comparative Study on Carbon Emission Reduction Systems

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Abstract:

The overwhelming majority of scientists have concluded that global warming is unequivocal. The Intergovernmental Panel on Climate Change (IPCC) fifth report in 2013 concluded that the challenge of climate disruption to human beings is even more imperative than the previous report claimed,[1] and that anthropogenic greenhouse gases (GHGs) emissions have extremely likely been the dominant causes of the observed global warming since the mid-20th century.[2]

Anthropogenic GHGs emissions have many implications, including more intensive, extreme meteorological events, spreading of diseases, and threatening human health and life. Climate change also causes injustice in human society because of the dislocation of the consequences from it in time and space for the affected people. As a response, a variety of policies and laws have been initiated from regions and nations. Among them, economic incentive instruments are employed to combat global warming, including a carbon emission trading system (ETS) and a carbon tax.

Carbon emission trading as a market means has its advantages, such as political feasibility and certainty for environmental benefits. Its volatility of carbon price could be avoided by a proper design, for instance, a price containment mechanism. In contrast, a carbon tax is less politically feasible and also may have an effect on trade and market distortion, such as border and tariff adjustments (BATS).

[1]Intergovernmental Panel on Climate Change [hereinafter "IPCC"], FIFTH ASSESSMENT REPORT, at 3, (2013) SPM WGI-12 AR5.

[2]*Supra* at 12.

Allowing parties to buy CERs from CDM and Reduced Emissions from Deforestation and forest Degradation (REDD+) projects will be conducive to carbon emissions reduction.[3]

The European Union Emission Trading System (EU ETS) is the largest and most successful market based system in the world. The lessons learned in its development, detailed in the body of this thesis, set invaluable examples from which other market based systems can greatly benefit.

The Regional GHG Initiative (RGGI), the first mandated cap-and-trade program for GHGs, is another pioneer cap and trade program herein discussed in depth. It is a regional program of Northeastern U.S. states. RGGI is regarded as an effective and efficient system. It successfully decoupled economic growth and the reduction of carbon emissions. RGGI states surpassed other states in economic growth and the decline of carbon emissions simultaneously.

RGGI's challenges and shortcomings are also documented. Thus RGGI encountered carbon leakages through importing electricity from non-RGGI states. The Cost Containment Reserve also needed improvement. When reserve allowances were sold, additional emissions tended to inflate the original cap. To avoid this scenario, some portion of allowances needed to be held back in the allowance reserve.

[3] U.N. Framework Convention on Climate Change [hereinafter "UNFCC"], http://redd.unfccc.int/ (last visited Nov. 6, 2017). (This is so despite the fact that a small minority, less than 3%, express doubts about global warming and a few even deny climate change.)

Another pioneer U.S. cap and trade initiative, The Western Climate Action Initiative, is a unique multi-jurisdictional program among western U.S. states and Canadian provinces. In one element of it, California and Quebec have created the first international cap-and-trade system of sub-national jurisdictions. It is the most ambitious program in North America, but it encountered difficulties from the dramatic change in the political landscape accompanying the 2008 economic crisis and the change in U.S. administrations.

The emission trading systems of a number of other nations that are experimenting with emission trading systems are also covered in depth, including the Korea Emission Trading System begun in South Korea in 2015 and the Tokyo Metropolitan Government cap-and-trade program which was the first mandatory ETS in Japan, begun in 2010.

The China approaches to these issues and their prospects are a major focus of this study. China officially launched seven state pilot ETS programs starting in 2013 and plans to initiate a national ETS this year in 2017. The many accumulated experiences from the pilot programs include such findings as the importance of setting realistic targets balancing the needs for carbon reductions with those of economic growth and pollution control and the need for legislation specifying the actions to be taken, provisions for disclosure, allowance allocations, offsets, infrastructure building, monitoring reporting and verification, and adoption of a compliance mechanism. Deficiencies in the pilot programs are evaluated, such as those derived from lack of a national legal basis and unified rules for the carbon market, an excess of free allocation of allowances, a lack of liquidity of the market, lenient punishment for

non-compliance, and absence of a sound monitoring and regulatory mechanism.

The requisites for sound market based programs are described, with particular emphasis on the need for a comprehensive legal basis on which programs can be built. The pluses and minuses of cap and trade market based programs versus carbon taxes are explored in depth, including the possibilities of combining the two systems. Various bottom up and top down approaches are explored and the key elements of success and failure.

From the perspective of international cooperation under the Paris Agreement in the long run, it is concluded that it is necessary to identify a formula to link the domestic carbon markets to those in other jurisdictions. A multi-lateral club approach is suggested. The role of the judicial branch in carbon emission reduction is explored with several recent relevant cases described.

Conclusions of the study seek to identify what alternative systems of carbon emission controls are being applied throughout the world, what lessons can be learned from them, and what are the important elements needed for successful programs.

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Chapter 1 Introduction

1.1The challenges of climate change and climate justice

The overwhelming majority of scientists have concluded that the "warming of the climate system is unequivocal."[4] The Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5) summarized that, "many of the observed changes are unprecedented over decades to millennia."[5] Since the 1950s, the atmosphere and the ocean have warmed, the amounts of snow and ice have diminished, the sea level has risen, and the concentrations of greenhouse gases have increased.[6]

This trend has already been manifested in many aspects, including effects on the atmosphere, ocean, cryosphere, sea level, and carbon and other biogeochemical cycles. For instance, global mean surface temperature exhibits substantial multi-decadal warming. "Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. In the Northern Hemisphere, 1983-2012 was *likely* the warmest 30-year period of the last 1400 years."[7]

Scientific evidence also shows that temperature has increased near the surface of the ocean (0-700m): on a global scale, the upper 75m has warmed by 0.11℃ per decade

[4]IPCC, *supra* note 1.

[5]*Id.*

[6]*Id.*

[7]*Id.*

over the period 1971-2010.[8] The cryosphere confirms the same challenge of global warming: "Over the last two decades, the Greenland and Antarctic ice sheets have been losing mass, glaciers have continued to shrink almost worldwide, and Arctic sea ice and the Northern Hemisphere spring snow cover have continued to decrease in extent."[9]

Meanwhile, the global mean sea level rose by 0.19m during the period of 1901-2010, with the most rapid mean rate of sea level rise since the mid-19th century in comparison with the previous two millennia.[10] "CO_2 concentrations have increased by 40% since pre-industrial times, primarily from fossil fuel emissions and secondly from net land use change emissions."[11] In fact, 30% of the anthropogenic induced carbon emissions have been absorbed by the ocean, resulting in acidification,[12] a disastrous effect to oceanic ecosystems.

The IPCC Fifth Report drew the conclusion that "equilibrium climate sensitivity is *likely* in the range 1.5℃ to 4.5℃, *extremely unlikely* less than 1℃, and *very unlikely* greater than 6℃. The lower temperature limit of the assessed *likely* range is thus less than the 2℃ indicated in the IPCC Fourth Assessment Report."[13] This conclusion indicates that challenge of climate disruption to human society is more imperative than the IPCC Fourth Report claimed. Moreover, the "evidence for human influence

[8] *Supra* note 1, at 4.

[9] *Supra* note 1, at 5.

[10] *Supra* note 1, at 6.

[11] *Supra* note 1, at 7.

[12] *Id*.

[13] *Supra* note 1, at 11.

has grown since AR4",[14] which states "it is *extremely likely* that human influence has been the dominant cause of the observed warming since the mid-20th century."[15] "Natural causes alone cannot explain all of these changes. Human activities contribute to climate change, primarily by releasing billions of tons of carbon dioxide (CO_2) and other heat-trapping gases into the atmosphere every year."[16] Human causes contributed to a global mean surface warming likely to be in the range of 0.5℃ to 1.3℃ during the period of 1951-2010, including the cooling effect of aerosols. These assessed contributions are consistent with the observed warming of approximately 0.6℃ to 0.7℃ over this period.[17]

The Fifth Assessment Report further concluded that "continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions."[18]

Human influence on climate system has many implications. Human induced climate disruption is intensifying droughts, storms, floods, wildfires, heat waves, and diseases all across the globe.[19] Since 1979, over "9,000 Americans were reported to have died as direct result of heat-related illness such as heat stroke."[20] And "a total of about 28,000 heat-related hospitalizations were recorded across 20 states" during the period

[14] *Supra* note 1, at 12.

[15] *Supra* note 1, at 12.

[16] JERRY M. MELILLO, TERESE RICHMOND & GARY W. YOHE, CLIMATE CHANGE IMPACTS IN THE UNITED STATES: THE THIRD NATIONAL CLIMATE ASSESSMENT, (U.S. Global Change Research Program, 2014).

[17] *Supra* note 1, at 12-13.

[18] *Supra* note 1, at 14.

[19] Friederike E.L. Otto, *Climate Change: Attribution of Extreme Weather*, 8 Nature Geoscience 81, 82 (2015).

[20] U.S. Environmental Protection Agency, *Climate Change Indicators: Health and Society*, https://www.epa.gov/climate-indicators/health-society (last visited Nov. 6, 2017).

of 2001-2010, according to the Environmental Protection Agency (EPA).[21]

"Global warming is also contributing to species extinctions and ecosystem degradation on a scale that rivals the five great mass extinction events in the Earth's history."[22] One expert claims that "the best scientific minds in the world are warning of far more serious and irreversible consequences for humanity unless there is a concerted effort by government and the private sector to end the fossil fuel era in time to avoid utter catastrophe."[23]

Climate change also incites injustice in human society, because of the dislocation of the results from climate disruption in time and space among people in different groups, different geographical locations and different generations; this is an intergenerational and an intra-generational problem. The limited carrying capacity and scarcity of the climate resources determine the uneven impacts on the world by climate change.

Since the climate system itself has characteristics of liquidity and inseparability, the direct effect of climate change has reached every corner of the world, but the most vulnerable and poorest countries and *peoples* are the first and most severely affected, even if they are not related to the major manufacturers who cause the disruptions of climate change.[24] Second, the biggest emitters of greenhouse gases are not those who are the most seriously affected by climate change.[25]

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[21] *Id.*

[22] Patrick Parenteau & Mingde Cao, *Carbon Trading in China: Progress and Challenges*, 46 Environmental Law Reporter 10194, 10194 (2016). *See also*, Gerarda Ceballos et al., *Accelerated Modern Human-Induced Species Losses: Entering the Sixth Mass Extinction*, 1 Sci. Advances, 19 (2015).

[23] *Supra* note 22, at 10195.

[24] NICHOLAS STERN, THE STERN REVIEW ON THE ECONOMICS OF CLIMATE CHANGE, EXEC. SUMMARY 1 (CAMBRIDGE UNIVERSITY PRESS 2007).

[25] AGNES MICHELOT, ET AL., CLIMATE JUSTICE: CHALLENGES AND PERSPECTIVES 77-105 (Bruylant 2015).

Developed countries contribute most to climate change, but according to the Alliance of Small Island States (AOSIS), the Least Developed Countries (LDCs) suffer most from the impact of climate change. This is because the AOSIS and LDCs countries are located in climate sensitive and fragile areas, coupled with their low economic development status and weak capacity for addressing climate change.[26]

Furthermore, since carbon dioxide and other greenhouse gases generally have long lifecycles and are difficult to remove from the atmosphere, climate change has a long term accumulation; thus, one generation enjoys the benefits of industrialization, and future generations bear the adverse consequences of it. These characteristic of climate change raise the issue of climate injustice. Lord Nicholas Stern, a leading world economist of the London School of Economics, states that climate change has caused the "greatest and most widest-ranging market failure ever seen."[27]

Carbon dioxide emissions are a classic example of a market externality that can only be corrected by governmental policies. "But those policies must be intelligent, well-designed, and cost-effective."[28] Therefore, justice requires internalizing the social cost of carbon emissions; that means that "those who have benefited the most from the industrial era, and who have the resources and technologies to make a difference, must take the lead" in paying for the social costs of the carbon pollution through regulatory and fiscal policies.[29]

[26] *Id.*

[27] *Supra* note 24.

[28] *Supra* note 22, at 10195.

[29] *Id*.

1.2Policies and regulatory response to climate change challenges and climate injustice

Climate change as a compelling threat to humanity has been widely recognized by national governments and international society. As a response, a host of policies and laws have been initiated. Among them, the traditional command and control method is still playing a critical role in combating global warming, such as with renewable portfolio standards, pollution standards, building codes and standards, appliance efficiency standards, and vehicle efficiency standards. Some experts have held that with such standards "renewable energy and efficiency resources should play a major role from the energy aspects of sustainable development."[30]

Meanwhile, a variety of economic instruments have also been employed as alternatives to cope with the issue, particularly cap-and-trade systems and carbon taxation. Critics of command and control mainly assert that for a fixed climate goal, an efficient cap-and-trade system should suffice, and that command and control measures increase overall compliance costs without producing additional environmental benefits.[31]

Proponents of command and control, on the other hand, argue on the basis of welfare economics. They claim that multiple externalities exist in energy and climate policy, and they cannot be internalized by an isolated carbon market.[32] Apart from climate change, serious and costly externalities arise from continued dependence on fossil

[30]ADRIAN J. BRADBROOK & RICHARD L. OTTINGER, EDS., ENERGY LAW AND SUSTAINABLE DEVELOPMENT 79-113 (The World Conservation Union, 2003).

[31]Larry Kreisler et al. eds., *Envtl Pricing: Studying in Policy Choices and Interactions*, Vol. XVI 51, (Edward Elgar Publishing 2015).

[32]*Id.*

fuels, with life-threatening air, water and chemical pollution and the impacts of extraction of traditional energy resources.

In addition to negative externalities, positive effects also come from the energy transformation process, such as from innovation in renewable energy and energy efficiency technologies. For the sake of internalizing externalities, command and control proponents often advocate that a policy mix of complementary instruments to adoption of standards, such as carbon pricing and feed-in-tariffs are justified.[33] Moreover, they assert that the cap size of carbon emission trading is often based on political acceptability rather than on environmental necessities or overall abatement costs. They conclude that "hence, real-world cap-and-trade systems will probably never be cost efficient or sufficiently effective."[34] Therefore, complementing a politically weakened cap and trade program with additional measures could be a more reasonable alternative.[35]

From the dimension of sustainability established at Rio Summit in 1992 and the 2030 Agenda for Sustainable Development [36] environmental effectiveness, economic efficiency and social justice should be included in energy and climate policies. One expert emphasizes the significance of evaluation of climate change related policies, for policymaking is strongly influenced by politics and that the choice of available policy options is limited by institutional dependencies and political factors.[37] She

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[33] *Id.*

[34] *Id.*

[35] *Id.*

[36] U.N. Dep. of Econ. & Soc. Affairs, Transforming Our World: 2030 Agenda for Sustainable Development, https://sustainabledevelopment.un.org/post2015/transformingourworld/ (last visited Nov. 7, 2017). .

[37] NATALIE STOINANOFF, LARRY KREISER ET AL., CARBON PRICING: DESIGN, EXPERIENCES AND ISSUES 177 (Edward

claims that an efficient and effective policy might still be defective if it dangerously compromises equity.[38]

Unfortunately, there are not many examples of climate change methodology effectiveness evaluations in practice.[39] She cited the Multi-Party Climate Change Committee established by the then first female Prime Minister of Australia, Julia Gillard as an example. The Committee was meant to design a climate change policy framework and specifically to establish a carbon price mechanism. Eleven policy principles, intended to lay a basis for the deliberations on a carbon price, were provided by the Committee, including environmental effectiveness, economic efficiency, budget neutrality, competitiveness of Australian industries, energy security, investment certainty, fairness, flexibility, administrative simplicity, clear accountabilities, and support of Australia's international objectives and obligations. The Committee specified that these principles would facilitate the development of the carbon pricing mechanism.[40]

Parties to the 2015 Paris Climate Change Agreement committed to hold the increase in the global temperature to well below 2℃ above pre-industrial levels and pursue efforts to limit the temperature increase to 1.5℃ above pre-industrial levels.[41] This would require a fuel transformation from fossil fuels to renewable energy as being indispensable for the de-carbonization of the energy supply.

Elgar Publishing 2015).

[38] *Id.*

[39] *Id.*

[40] *Id.*

[41] Paris Agreement, UNFCC, art. 2(1)(a), Dec. 12, 2015.

From the perspective of politics and economics, a rapid and complete internalization of externalities remains practically impossible. Market oriented approaches, e.g., carbon taxation or carbon emission trading have been regarded as cost-efficient. They have reduced compliance costs by up to 50 percent compared with command-and-control methods in various cases in practice.[42] But a sudden conversion would be unacceptably disruptive of national economies.

Regarding the aspect of social equity, the impact of the financial burden resulting from the energy transformation on poor households is significantly higher than that for rich ones.[43] It has been observed that carbon emission trading with other instruments such as the German feed-in-tariff raised overall compliance costs and thus further increased covered industries' resistance to ambitious carbon pricing.[44] In fact "several arguments support the view that an ambitious policy mix might be easier to implement than a single carbon pricing system."[45] However some conservative commentators have asserted that subsidizing renewable energies by a feed-in-tariff mainly paid by households, although highly questionable from the dimension of equity, might weaken the opposition from industries.[46]

Last, but not least, "supporting renewable energy and thus fostering the renewable energy industry creates a new potent political player in the energy policy discourse

[42]A.D. ELLERMAN ET AL., MARKETS FOR CLEAN AIR (Cambridge University Press 2000).

[43]*Supra* note 31, at 54.

[44]*Supra* note 31, at 55.

[45]E. Gawel et al., *A public choice view on the climate and energy policy mix in the EU-How do the emissions trading system and support for renewable energies interact?*, 64 Energy Policy 175, 175-182 (2014).

[46]*Supra* note 31, at 56.

and weakens the relative influence of traditional fossil-fuel based utilities.[47] Some experts found that the theoretical arguments on the necessity of a policy mix convincing, and the political process to provide more ambitious carbon pricing systems as insufficient.[48] Nonetheless, they insist that cap-and-trade is the most promising carbon pricing option among market-based approaches due to its environmental advantages; and they imply that regressive effects of carbon pricing on equity would be bigger than other methods, therefore they should be remediated by compensating poor communities or households through revenues from taxes or auctions.[49] The merits and demerits of cap-and-trade in comparison with carbon taxation will be further discussed below.

1.3 What role the judicial branch may play in combat with climate change?

The executive branch plays a major role in compliance and enforcement of climate law and policy. However, when the executive branch fails to enforce the laws and regulations to protect the climate, or it is regarded that it has overstepped its power, disputes arise. Judiciary intervention is finally required.

What role the judicial branch may play in the climate change arena has been a heated debate in recent years. Among a group of cases related to climate change, *Urgenda Foundation v. the State of the Netherlands*[50] and *Asghar Leghari v. Federation of Pakistan*[51] are good examples.

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[47] *Id.*

[48] *Supra* note 31, at 63.

[49] *Id.*

[50] Urgenda Foundation v. the State of the Netherlands, C/09/456689/HA ZA 13-1396 (The Hague District Court, Netherlands 2015).

[51] Ashgar Leghari v. Federation of Pakistan, etc., No:HCJD/C-121, W.P.No.25501/2015, 5 (The Lahore High Court,

On the 24th of June 2015, the Urgenda Foundation, partly on behalf of 886 Dutch concerned citizens, launched a suit against the government of the Netherlands in The Hague District Court (Civil Section), on the grounds that the Netherlands had breached the government required standard of due care by implementing a policy that would lead only to a reduction of CO2 emissions by 2020 of less than 25% compared with the baseline of 1990 level. The Urgenda Foundation is a citizens' platform established in 2008 that aims to stimulate and accelerate the transition to a more sustainable society. The court ordered the Netherlands to cut CO2 emissions by 25% by 2020 from the base of the 1990 level. This case has been regarded as unprecedented by commentators.[52]

In 2012, Urgenda wrote a letter to the Dutch government stating that there was scientific proof that the European Union's commitment to reduce emissions by 20% on the basis of 1990 level was simply not enough to avoid dangerous climate change, and that the Dutch reduction goal derived from the European target was therefore inadequate.[53] Urgenda urged the Netherlands to do more. The government's response to the letter was found by the Court to be unsatisfactory. Urgenda therefore requested the Court to rule that the State was liable for its role in causing dangerous global climate change in 2013. The claim asserted that the State would be acting unlawfully if it failed to reduce the annual greenhouse gas emissions in the Netherlands by 40%,

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Pakistan, 2015).

[52]K. J.de Graaf, *The Urgenda Decision: Netherlands Liable for Role in Causing Dangerous Global Climate Change*, J. ENVTL. L. (2015) 27(3): 517,518(2015).

[53]*Id.*

in any case by at least 25%, compared with 1990 levels, by the end of 2020.[54]

In its defense, the Netherlands argued that there was no legal duty under national or international law for the government to take measures to achieve the reduction targets claimed by Urgenda. Furthermore, it maintained that any court order to amend the State's climate change mitigation policy would violate the government's prerogative over environmental policies and interfere with the system of separation of powers.[55] One of the key elements of the court's decision is that it relies on the current climate of science and international climate policy, and that agreements to establish that the Dutch reduction target is below the standard deemed necessary for developed countries (25-40% by 2020) in order to prevent dangerous global climate change (2℃ target). Since the Dutch target is similar to the EU target, the court ruled that the EU target was (unlawfully) below the necessary standard as well.[56]

Urgenda also alleged that the government was acting contrary to the statutory duty of article 21 of the Dutch Constitution. Article 21 imposes a duty of care on the State relating to the habitability of the country and the protection and improvement of the living environment.[57] The court established several factors from international law and certain elements from Dutch case law on negligence in determining the scope of the duty of care owed by the State: (1) the nature and extent of climate change damage; (2) the foreseeability of such damage; (3) the chance that hazardous climate change will occur; (4) the nature of the acts or omissions of the State; (5) the onerousness of taking precautionary measures; and (6) the extent of the discretionary powers of the

[54] *Id.*

[55] *Id.*

[56] *Supra* note 52, at 519.

[57] *Id.*

State, with due regard to public law principles.[58]

The court recognized that the Dutch government had broad discretionary powers with regard to its environmental policies, but that they were not unlimited. Hence, the court ruled that the Netherlands was in breach of its duty of care and therefore acting unlawfully towards Urgenda.[59] Furthermore, the court concluded that, in light of the latest scientific knowledge, it would be more efficient to mitigate and more cost effective to take adequate action immediately than to postpone measures in order to prevent future hazardous climate change.[60]

In addition, regarding the causation issue, the Netherlands government argued that it did not emit GHGs itself. But the court refuted all arguments against a causal link in few words, by referring to important case law of the Dutch Supreme Court on joint liability. That case law basically provides that when one actor's contribution to the damage is minor, that is no reason to reject liability.[61] "The fact that the amount of the Dutch emissions is small compared to other countries does not affect the obligation to take precautionary measures in view of the State's obligation to exercise care."[62]

The Urgenda decision is controversial in several aspects. First, whether the court overstepped its powers by issuing the order; second, whether the court's assessment of

[58] *Id.*

[59] *Id.*

[60] *Supra* note 52, at 522.

[61] *Id*.

[62] Urgenda v, The Netherlands, ECLI:NL:RBDHA:2015:7196 479 (The Hague District Court 2015) (original language:ECLI:RBDHA:2015:7155).

the scope of the State's unwritten duty to take due care was proper; finally, whether the Netherlands government should have lodged an appeal against the court's judgment.[63] Critics hold that setting mitigation targets and finding efficient and effective instruments to achieve climate targets is generally considered a matter of policy. Therefore, the Dutch system of separation of powers between the legislator and the judiciary does not allow for the order given by the court;[64] as a result, they assert that the court decision probably could not have survived if the government had lodged an appeal. One professor commented that, although the court's reasoning was questionable from a legal perspective, the judgment was nothing short of ground-breaking. This case seems to be the very first decision by any court in the world that ordered a state to limit GHG emissions for reasons other than statutory mandates.[65]

In the case of Asghar Leghari v. Federation of Pakistan,[66] a farmer challenged Pakistan's federal and provincial governments in Lahore High Court through public interest litigation in September 2015. Lambasting the inaction, delay and lack of seriousness on the part of the Federal Government and the Government of the Punjab to address the challenges associated with climate change, the judge said there had been "no progress on the ground" despite a National Climate Change Policy adopted in 2012 and an implementation framework on the books.[67] The plaintiff accused

[63] *Supra* note 62, at 527.

[64] C. Warnock, *The Urgenda Decision: Balanced Constitutionalism in the Face of Climate Change*, OUP Blog (22 July 2015), http://blog.oup.com/2015/07/urgenda-netherlands-climate-change/ (last visited Nov. 7, 2017).

[65] *Supra* note 62, at 527.

[66] Ashgar Leghari v. Federation of Pakistan, etc., No:HCJD/C-121, W.P.No.25501/2015 5 (Lahore High Court, Pakistan, 2015).

[67] Malini Mehra, *Pakistan ordered to enforce climate law by Lahore court*, Climate Change News (Sept. 20, 2014), http://www.climatechangenews.com/2014/09/20/pakistan-ordered-to-enforce-climate-law-by-la

government agencies of failing to develop the required resilience to climate change provided under the government's own framework for implementation of its National Climate Change Policy of 2013.[68]

The judge ruled that the delay and lethargy of the State in implementing the State's Framework Act offended the fundamental rights of the citizens which needed to be safeguarded. The judge elucidated that fundamental rights like the right to life include the right to a healthy and clean environment and right to human dignity. The judge continued, "environment and its protection have taken a center stage in the system of our constitutional rights."[69] He asserted the existing environmental jurisprudence has to be fashioned to meet the needs of the urgent and overpowering need, i.e. for climate change mitigation, and stated a need to move to climate change justice from other matters of environmental justice.[70]

Within one month of having heard the Ashgar Leghari's case, the judge summoned all of the country's main officials before him, and appointed a named Climate Change Commission to ensure implementation of Pakistan's climate change framework.[71] "The Leghari decision reveals the under-used power of the courts."[72] "The courts can bring remedies and will now increasingly be used to enforce political accountability and ensure climate justice."[73]

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hore-court/ (last visited Nov. 7, 2017).

[68] *Id.*

[69] *Supra* note 66.

[70] *Id.*

[71] *Supra* note 67.

[72] *Id.*

[73] *Id.*

The Chief Executive of Globe International commented that the Leghari and Urgenda cases set a model for fast track adjudication of climate change-related issues that are too often dismissed as too complicated for the courts to handle.[74] "The Leghari case highlights a simple but fundamental truth--individuals can and do make a difference. The case was brought by one man and judged by one man. Each made history. The case now sets a new high water mark for climate adjudication."[75] She added "bottom-up legal accountability through the courts could become a powerful enforcement mechanism."[76]

In Massachusetts v. EPA the Court granted "special solicitude" for standing in public interest cases championed by a state. The Court reasoned "Massachusetts has a special position and interest here. It is a sovereign State, and not, as in Lujan, a private individual, and it actually owns a great deal of the territory alleged to be affected."[77] Furthermore, the Court stretched the bounds of causation and redressability. The harms associated with climate change are serious and well recognized; a strong consensus among scientists indicates that global warming will cause such serious consequences as the rise of sea levels, severe and irreversible changes to natural ecosystems, a significant reduction in winter snowfall, flooding and draughts, and destructive wildfires, all with direct and significant economic, environmental and human harm consequences. The "EPA's failure to dispute the existence of a causal connection between man-made greenhouse gas emissions and global warming, its

[74] *Id.*
[75] *Id.*
[76] *Id.*
[77] Massachusetts v. EPA, 549 U.S. 497, 2 (2007).

refusal to regulate such emissions, at a minimum, 'contribute' to Massachusetts' injuries."[78]

Furthermore, the court held that the "EPA has a duty to take steps to slow or reduce greenhouse gas emissions. A reduction in domestic emissions would slow the pace of global emissions increase, no matter what happens elsewhere."[79] In addition, the "EPA's steadfast refusal to regulate greenhouse gas emissions presents a risk of harm to Massachusetts that is both 'actual' and 'imminent'. …There is a 'substantial likelihood that the judicial relief requested' will prompt the EPA to take steps to reduce that risk."[80]

Mass. v. EPA broadens the opportunities for non-state litigants in public interest litigation, but does not eliminate the requirements to prove causation and redressability where the facts of the case cannot show a strong connection. For example, in Washington Environmental Council v. Bellon, WEC and the Sierra Club, Washington State Chapter, under the citizen-suit provision of the federal Clean Air Act (CAA), 42 U.S.C. sections 7401-7671q, sought to compel the Washington State Department of Ecology and the other regional agencies to regulate greenhouse gas emissions from the state's five oil refineries under the Clean Air Act. The 9th Circuit held that plaintiffs failed to satisfy the causality and redressability requirements to establish standing. Plaintiffs alleged that their injuries were causally linked to the agencies' failure to set and apply "reasonably available control technology" standards. However, the court reasoned that "greenhouse gases, once emitted from a specific

[78] *Id.* at 3.
[79] *Id.*
[80] *Id.*

source, it quickly mixes and disperses in the global atmosphere and has a long atmospheric lifetime"[81] Plaintiffs relied on an "attenuated chain of conjecture" to establish standing, but the court held they failed to satisfy their evidentiary burden of showing causality at the summary judgment stage.[82]

The Court held that it is undisputed that GHG emissions are not a localized problem endemic to Washington, but a global occurrence.[83] The five oil refineries in Washington emitted 4.94 metric tons of carbon dioxide equivalents, and were responsible for 4.9% of GHG emissions in Washington. The court held that the effect of collective emissions from the oil refineries on global climate change were "scientifically indiscernible"[84]

Besides the causation and traceability issues raised in climate change cases, the displacement and political question doctrines would be legal obstacles to plaintiffs in climate change litigation as well. In the Native Village of Kivalina v. ExxonMobil, Kivalina alleged that massive greenhouse gas emissions from the defendant energy producers had resulted in global warming, which, in turn, had severely eroded the land where the city of Kivalina is located and threatened it with imminent destruction. Kivalina sought damages under a federal common law claim of public nuisance.[85] The district court held that the "political question doctrine" precluded judicial consideration of Kivalina's federal public nuisance claim and that these issues were matters more appropriately left for determination by the executive or legislative

[81]Washington Environmental Council v. Bellon, 732 F. 3d 1131 (9th Cir. 2013).

[82]*Id.*

[83]*Id.*

[84]*Id.*

[85]Native Village of Kivalina v. ExxonMobil, no. 09-17490, D.C. opinion, 6-7 (2012).

branches in the first instance.[86] The district court also held that Kivalina lacked standing to bring a public nuisance suit, for Kivalina could not demonstrate either a "substantial likelihood" that defendants' conducts caused the plaintiff's injury or that the "seed" of its injury could be traced to any of the energy producers.[87]The court also concluded that Kivalina could not establish the causal connection between the injuries plaintiffs suffered and the alleged conducts of the defendants because of the remoteness of its injury claim.

Upon appeal, the D.C. Circuit held that "when federal statutes directly answer the federal question, federal common law does not provide a remedy because legislative action has displaced the common law."[88] Under Supreme Court jurisprudence, "if a cause of action is displaced, displacement is extended to all remedies."[89] But it said that Kivalina might file a state law nuisance claim in state court.[90]

The district court also found Kivalina failed to prove the traceability of its injury to the appellees from the aspects of space and time. The court reasoned "global warming has been occurring for hundreds of years and is the result of a vast multitude of emitters worldwide whose emissions mix quickly, stay in the atmosphere for centuries, and, as a result, are undifferentiated in the global atmosphere. Further, Kivalina's allegations of their injury and traceability to appellees' activities is not bound in time."[91] The court concluded that Kivalina lacked standing for seeking to hold some

[86]*Supra* note 85, at 9.

[87]*Supra* note 85, at 9.

[88]*Supra* note 85, at 12.

[89]*Supra* note 85, at 14.

[90]*Supra* note 85, at 30.

[91]*Supra* note 85, at 34.

particular appellees out of a vast number of GHG emitters throughout history liable for millions of dollars in damages.

West Virginia v. EPA was a testing ground for climate policy in the U.S. At issue before the U.S. Court of Appeals for the District of Columbia Circuit was the administration's ambitious effort to require every state to cut CO2 emissions from coal-fired power plants, so as to implement the Clean Power Plan issued by the Environmental Protection Agency (EPA) under Obama's Administration. The controversy in the case was whether the EPA exceeded its authority to regulate CO2 under the Clean Air Act. The EPA and its backers argue that existing law gave it clear authority to regulate carbon pollution.[92]

However, the 27 state attorney generals, joined by some coal companies, utilities and a lengthy list of Republican lawmakers led by Senate Majority Leader Mitch McConnell of Kentucky, proclaimed totally different views. They asserted that the agency was overstepping its legal authority, in part by going further than Congress intended in the Clean Air Act.[93] A coalition of power companies filed a brief stating that "regardless of the importance of the global issue the EPA seeks to address, it may not usurp lawmaking authority that belongs to Congress or judicial power that belongs to the courts."[94]

A professor at the University of California at Los Angeles commented, "What the court has to say about the EPA's authority…will be important for future

[92]Brady Dennis & Ann E. Marimow, *WV v. EPA goes before DC Circuit Court*, THE WASHINGTON POST (Sept. 26, 2016), Http://www.wvgazettemail.com/news/20160926/wv-v-epa--goes-before-dc-circuit-court (last visited Nov. 8, 2017).
[93]*Id.*
[94]*Id.*

administrations. It will have consequences."[95] The court's decision will not only affect the fate of the Clean Power Plan, a key part of Obama's environmental legacy, but also have a significant impact on U.S. efforts on global warming.

An immediate effect was felt in the cap and trade program initiated by several Northeast U.S. states known as the Regional Greenhouse Gas Initiative (RGGI). It issued a Status Report Part I: Measuring Success, showing that over the three months following the Supreme Court's stay of the Clean Power Plan allowances prices fell by 30%. The report stated that "these dramatic swings in prices occurred in the absence of material changes in RGGI policy or the region's fundamental energy market trends."[96] The report said that the court decision in *West Virginia v. EPA* "will undoubtedly influence the supply and demand dynamics in the RGGI market."[97]

Chapter 2 Carbon Emission Trading as A Market-Based Measure (MBM) to Combat Climate Change after Paris Agreement

Global warming caused by anthropogenic GHG emissions, leads to enormous environmental externalities to society as a whole, and causes a disproportionate burden to vulnerable countries and groups.[98] Therefore, internalizing the externality of GHG emissions is necessary from the perspectives of climate change justice.[99]

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[95] *Id.*

[96] Acadia Center, *Status Report Part I: Measuring Success*, REGIONAL GREENHOUSE GAS INITIATIVE 12 (2016).

[97] *Id.*

[98] AGNES MICHELOT ET AL., EDS., CLIMATE JUSTICE: CHALLENGES AND PERSPECTIVES 77-106 (Bruylant 2016).

99. David M. Driesen, *Sustainable Development and Market Liberalism's Shotgun Wedding: Emissions Trading Under the Kyoto Protocol*, 83 IND.LJ.21,51(2008); *see also*, DAVID M. DRIESEN, ECONOMIC INSTRUMENTS FOR SUSTAINABLE DEVELOPMENT IN ENVIRONMENTAL LAW FOR SUSTAINABILITY: A CRITICAL READER 303 (Stepan Wood & Benjamin J. Richardson eds, 2005).

Solutions for internalizing the social costs of carbon are many. Traditional methods such as command and control, still work and will continue to be effective in many areas. These include, for example, appliance efficiency standards, building codes and standards, renewable portfolio standards, vehicle standards, pollution standards, emission permits, carbon emission caps, carbon budgets, and carbon labeling.[100]

However, market-based approaches give regulated entities more flexibility. These approaches promote low carbon technologies and reduce the social costs of carbon emission reductions. This has been demonstrated by the Acid Rain Program under the Clean Air Act (CAA) in the U.S.[101]

The basic principle of carbon emission trading is quite simple: "The cap (an absolute limit on emissions) creates scarcity, and a price incentive, which makes investment in environmental technology viable."[102] "Trading, buying and selling allowances to emit greenhouse gases results in participating companies abating emissions where it is most cost effective."[103] Carbon emission trading is regarded as a cornerstone of the EU's policy to combat climate change among the matrix of climate policy. Carbon taxation requires unanimous consent of the EU member states, which is tantamount to giving each member state veto power over the proposal. In comparison, carbon trading does not need unanimous consent, and therefore is far more feasible to

[100]ADRIAN J. BRADBROOK ET AL., EDS., IUCN ACADEMY OF ENVIRONMENTAL LAW RESEARCH STUDIES: THE LAW OF ENERGY FOR SUSTAINABLE DEVELOPMENT 103-123 (Cambridge University Press, 2005).

101. 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, 5 (2009).

[102]International Carbon Action Partnership, Emissions Trading Worldwide: International Carbon Action Partnership (ICAP) Status Report 10 (2016).

[103]*Id.*

implement.

This chapter will discuss the feasibility of carbon emission trading compared with another widely used economic incentive, carbon taxation. It then briefly touches on the issue of what role can be played in mitigating climate change effects by carbon emission trading in line with the Paris Agreement.

2.1 The feasibility of carbon emission trading

Conceptually, carbon trading and a carbon tax both have some advantages and disadvantages.[104] Professor Janet E. Milne at Vermont Law School in the U.S. claimed "predictability of cost and efficiency lends heft to the carbon tax side, and certainty of result weighs in on the cap-and-trade side. But the issue should not be overstated."[105] Moreover, "either a carbon tax or an economy-wide cap and trade system would create the backbone for a comprehensive program, although neither would necessarily supplant policies targeted toward specific issues…the Western Climate Change Initiative is exploring how a tax may work in concert with a cap-and-trade regime. Policymakers can choose combinations from a large portfolio

104.*See,* Helmuth Cremer &Philippe de Donder Firouz Gahvari, *Political Sustainability and the Design of Environmental Taxes,* 11 INT'L TAX & PUB.FIN.703, 703 (2004); David G.Duff, *Tax Policy and Global Warming*, 51 CAN. TAX.J. 2063, 2090(2003); David M. Driesen, *Sustainable Development and Market Liberalism's Shotgun Wedding: Emissions Trading Under the Kyoto Protocol,* 83 Ind.LJ.21,51(2008); *see also,* DAVID M. DRIESEN, ECONOMIC INSTRUMENTS FOR SUSTAINABLE DEVELOPMENT IN ENVIRONMENTAL LAW FOR SUSTAINABILITY: A CRITICAL READER 303(Stepan Wood & Benjamin J. Richardson eds, 2005); 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, 5(2009); Natalie Stoianoff, et al., eds., *Market Instruments and the Protection of Natural Resources, Critical Issues in Environmental Taxation,* Vol XVIII 157-170 (Edward Elgar Publishing, 2016).

105. Janet E. Milne, *Carbon Taxes in the United States: the Context for the Future*, 10 VER. J. OF ENVTL LAW 1, 29-30 (2008).

of options."[106]

Whether a carbon tax or carbon trading regime would be more feasible to cope with climate change should be in line with the specific circumstance in the communities affected. The author prefers carbon trading to a carbon tax based in consideration of the following aspects: the time framework for implementation, certainty for environmental benefits, cost of administrative management, the volatility of carbon prices, competitiveness, the market distortion effect, and transparency.

2.1.1 Time framework for implementation

Climate change is happening much faster than experts originally predicted during the IPCC Third and Fourth Reports. The urgency of global warming needs a rapid response from society. The time framework for taking prompt actions is tilting to carbon emission trading rather than carbon taxation after the successful climate negotiation of COP21 in Paris 2015. All the 195 parties of COP21 agreed to a voluntary reduction of GHGs emissions under the Paris Agreement, which came into effective on November 4, 2016. The agreement gives parties discretion to make their own choice to determine how to implement their Nationally Determined Contributions.[107]

The Paris Agreement gives flexibility for parties to make policy choices. However, the trend toward adopting carbon emission trading by many nations and regions is obviously demonstrated in recent years.

106. *Id.* at 27.

[107]Paris Agreement, UNFCC, art. 3, Dec. 12, 2015.

The landmark 2014 agreement between China and the U.S.,[108] committing each nation to reduce emissions and promote cleaner energy sources was the key that enabled the successful climate agreement in Paris. It inspired a record number of nations to submit their intended nationally determined contributions to climate mitigation and adaptation.[109] And many of these contributions involved adoption by nations, regions and cities to adopt incentive programs to reduce their carbon emissions such as those considered here.

Thus, China announced its initiation of pilot cap and trade programs that were to culminate in a national market of carbon emission trading in 2017 covering power generation, steel, cement, civil aviation, and other key industrial sectors. Despite the abandonment by the Trump Administration in the U.S., many U.S. states, regions and local governments have stepped up to the plate, several including three adoption of carbon markets by Regional Greenhouse Gas Initiative (RGGI), Western Climate Initiative (WCI), and Midwestern Greenhouse Gas Reduction Accord (MGGA). At the same time, carbon emission trading programs are growing in Latin America and the Caribbean, Asia-Pacific region and Central Asia.

The European EU ETS was adopted to become by far the largest and most instructive carbon trading initiative. It has been proved an effective method to fight climate change and now covers more than 11,000 installations in 31 countries, including 28

[108]Office of the Press Secretary, U.S.-China Joint Announcement on Climate Change, The White House (Nov. 12, 2014), https://www.whitehouse.gov/the-press-office/2014/11/11/us-china-joint-announcement-climate-change (last visited Nov. 8, 2017).

[109]Patrick Parenteau & Mingde Cao, *Carbon Trading in China: Progress and Challenges*, 46 ENV'TL LAW REPORTER 10194, 10194 (2016)*; see also*, Gerarda Ceballos et al., *Accelerated Modern Human-Induced Species Losses: Entering the Sixth Mass Extinction*, 1 SCI. ADVANCES 19 (2015).

EU member states, as well as Norway, Iceland and Lichtenstein and airlines performing aviation activities between European Economic Area (EEA) airports, creating a functioning market infrastructure and a liquid market.[110]

A California cap-and-trade program provides a progressively declining cap serving to drive down emissions reductions in line with its ambitious climate change targets. From 2015 onwards, the state's cap is scheduled to be cut by about 3% each year.[111] At the same time, the program also increased revenues and job opportunities. "California Delivers," a broad coalition of stakeholders, asserted that "polluters are paying for their emissions through the cap and trade program, creating revenues that flow into California communities, spurring the growth of clean energy and contributing to more affordable housing, facilitating construction jobs across the state, as well as affording living opportunities for working families."[112]

The Regional Greenhouse Gas Initiative (RGGI) of Northeastern U.S. states has also shown significant environmental and economic benefit. The RGGI report states "fuel-switching, improved energy efficiency, and growing renewable energy output have caused emissions to drop by 37% since RGGI launched."[113] The rate of pollution reductions continues to exceed expectations, with 2015 emissions falling 6%

[110]International Carbon Action Partnership, Emissions Trading Worldwide: International Carbon Action Partnership (ICAP) Status Report 8 (2015).

[111]*Supra* note 102, at 12.

[112]California Delivers, *Bring real benefits to California consumers*, http://www.cadelivers.org/wp-content/uploads/2014/11/CAdelivers-ConsumersFactSheet-FINAL5715.pdf (last visited Nov. 8, 2017).

[113]Acadia Center, Status Report 1: Measuring Success, Regional Greenhouse Gas Initiative [hereinafter "RGGI"] 12 (2016).

below an emissions cap that was tightened only in 2013.[114]

RGGI has also generated significant economic benefits. By auctioning allowances, RGGI states raised over $1.56 billion in energy bill savings during its first six years of operation.[115] The majority of program revenue (59% during the second control period, 2012 to 2014) has been invested in renewable energy and energy efficiency programs that reduce consumers' bills and reduce demand for power.[116] Furthermore, with the continuing downward trend of carbon emissions of recent years, electricity prices are lower than they were before RGGI's inception in 2009. Retail electricity prices from 2008 to 2015 show that prices have dropped by 3.4% across the region.[117] This is so while the rest of country experienced an average 7.2% increase in retail electricity prices over the same period.[118]

The details of these programs will be explained further and analysis of their strengths and weaknesses will be presented.

Finally, carbon emission trading is designed to achieve emission reductions that comply with the targets set. According to the RGGI report "all nine states have established economy-wide GHG emissions reduction targets for 2030, and eight of the nine states have corresponding targets for 2050."[119]A study predicts that achieving a 40% reduction not only yields $25.7 billion in total savings from 2016 through 2030,

114.*Supra* note 113, at 3.

115. *Supra* note 113, at 9.
116. *Id.*
117. *Supra* note 113, at 4.
118. *Id.*
[119]Acadia Center, Status Report Part II: Achieving Climate Commitments, RGGI 4 (Aug. 2016).

but also generates benefit for consumers, workers, and the environment.[120]

2.1.3 Cost of administrative management and volatility of carbon price

The core of a carbon tax is the setting of a tax rate and selection of affected taxpayers - the design of a carbon tax is simple. Therefore, a carbon tax is easy to manage. By comparison, carbon trading is more sophisticated. Critics regard the complexity of carbon trading as one of its "inherent defects."[121] Compared with U.S. acid rain sulfur dioxide cap-and-trade system instituted in the early 1990s, the scale of a carbon trading system would be up to 100 times larger than that for sulfur. Evidence from the EU ETS suggests that price volatility and gaming by market participants can undermine the effectiveness of this complex, opaque indirect method of pricing carbon pollution.[122] A report admits that "a degree of complexity is unavoidable in any ETS."[123]

The complexity of an ETS system also increases the transaction costs and administrative burden.[124] However, a simple ETS would be possible. A recent study into the administrative burden of the EU ETS shows that the average burden, represented as transaction costs, is relatively high for small emitters and drops sharply as emissions increase above a certain threshold.[125] Therefore, if small emitters were given the option to opt out partway through a trading period, then the ETS could be

120. *Supra* note 119, at 5.
[121]Carbon Tax Center, *Cap-and-Trade's Inherent Defects*, http://www.carbontax.org/cap-and-trade-problems/ (last visited Nov. 8, 2017).
122. *Id.*
[123]*Supra* n.102, at 10.
124. *Id.*
125. *Id.*

made considerably more efficient.[126]

Some other simplification measures could also alleviate the administrative burden and transaction costs. For example, simplifying requirements for monitoring, reporting and verification for small emitters, and improving the CO2 trading registry for companies that do not trade on a regular basis.[127]

The volatility of carbon prices in the EU ETS is regarded as a major defect for a carbon trading system, which historically has discouraged investments in carbon-reducing energy efficiency and carbon-replacing renewable energy.[128] There were a variety of reasons for the volatility of carbon price, including the surpluses of allowances by free over-allocating, inaccurate historical data, the economic crisis, and other factors.

Nonetheless, this problem could be alleviated by an appropriate design. RGGI has designed a successful price control policy. It employs price controls to contain allowance prices within predetermined ranges, namely a floor price and ceiling price-Cost Containment Reserve.[129] The price floor represents the minimum price at which allowances can be sold at auctions, beginning at $1.86 in 2009 and rising gradually to $2.10 in 2016.[130] RGGI states also implemented a Cost Containment Reserve in 2012 to dampen allowance prices during extraordinary periods, so as to protect market participants and ratepayers from extreme and unexpected spikes in

126. *Id.*
127*Supra* note 123, at 11.
128*Supra* note 121.
129*Supra* note 113, at 10.
130*Id.*

demand.[131] As a result, the Reserve has effectively inflated the RGGI cap by 15 million tons during 2014 to 2015. In addition, there was a 140 million ton allowance surplus by the end of 2013 accumulated in the program's early years. In order to prevent this bank of allowances from undermining the program's future environmental performance, the RGGI states created a novel solution: gradually eliminating the redundant allowances by adjusting future cap levels accordingly.[132] Thus, through policy interventions, the volatile carbon price has been reduced as was shown in the EU ETS results.

2.1.4. Competitiveness and market distortion

Carbon pricing may lead to carbon leakage; as a result, it will affect the competitiveness of covered industries. However, a well-designed carbon trading program can avoid the weakening of competitiveness of covered industries. The legislative proposal for the EU ETS Phase-Four (2021-2030), submitted to the European Council and European Parliament by the European Commission in July 2015, fully acknowledges the need to maintain the competitiveness of European industry. For this reason, it suggests the continuation of free allocation to sectors which are exposed to the risk of carbon leakage with a considerably reduced list for around 50 sectors.[133]

RGGI states have experienced economic growth even as emissions have declined. A report claims that "while similar trends are seen across the country, RGGI states have

[131] *Id.*

[132] *Supra* note 113, at 11.

[133] *Supra* note 102, at 8.

out-paced other states on emissions reductions and economic growth."[134] RGGI states' economies increased by 24.9% in comparison with 21.3% in states that do not regulate or put a price on carbon emissions during 2008 to 2015.[135] However, the risk of carbon leakage exists. RGGI treats emissions from new and existing sources equally.

In contrast, the now abandoned U.S. Clean Power Plan (CPP) only required that states cover emissions from existing sources, making coverage of emissions from new sources optional, because the EPA's authority to implement the CPP was drawn from section 111(d) of the Clean Air Act, which pertains narrowly to existing sources of emissions.[136] States that choose not to cover emissions from new sources risked emissions leakage, because emissions from new sources were not subject to the CPP, which would have led to a shift of emissions from existing sources to new sources.[137] For the sake of avoiding carbon leakage and market distortion, the RGGI states should not trade with states that fail to cover emissions from new sources.

Critics of cap-and-trade are concerned about polluters who offshore some emission cuts, for instance, by buying CO2 reductions from planting tropical tree plantations in foreign countries instead of cutting their domestic emissions. This is regarded as a loophole in the carbon trading program.[138] But, the fact is that the reduction of GHGs

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[134] *Supra* note 113, at 9.

[135] *Id.*

[136] Varun Kumar, Peter Shattuck & Jordan Stutt, Status Report II: Achieving Climate Commitments, RGGI 10 (Acadia Center, Aug. 2016), http://acadiacenter.org/document/measuring-rggi-success (last visited Nov. 9, 2017).

[137] *Id.*

[138] Charles Komanoff, *Carbon tax be a remedy for toxic hot spots*, CARBON TAX CENTER (Sept. 13, 2016) https://www.carbontax.org/blog/2016/09/13/carbon-tax-can-be-a-remedy-for-toxic-hot-spots/ (last visited Nov. 8, 2017).

elsewhere means a reduced amount of GHGs emission into the atmosphere, and perhaps in a cheaper manner. And, with most countries engaged in the Paris Agreement, carbon leakage will be alleviated to a large extent.

With regard to a carbon tax, offering preferential tax treatment for economic operators or imposing higher taxes on the emission intensive use of energy by government will have an effect on competitiveness. As a result, this could lead to carbon leakage and market distortion. Industries might shift from areas covered by carbon tax to those areas that are not covered in order to avoid additional cost.

Opponents to carbon trade hold that "carbon taxes are replicable across borders; since the price 'metric' embodied in a carbon tax is far more universal than the quantity-reduction metric underlying cap-and-trade."[139] This point of view is questionable. Actually, scenarios of the border tariff adjustments for carbon and like subsidies are regarded as competition distortion, bearing the risk of being non-compliant with international trade law under the World Trade Organization (WTO) requirements.[140] WTO members are bound by the fundamental principles of WTO law, namely the obligation to accord national and most-favored nation treatment to the like products of all WTO members, in light of Article I and Article III of the General Agreement on Tariffs and Trade (GATT).

Regarding the design of domestic tax systems in particular, WTO members are obligated to abide by the nondiscrimination principle set forth in Article III of

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[139]Supra note 121.

[140]Larry Kreiser, et al. eds., *Environmental Pricing: Studying in Policy Choices and Interactions*, Vol. XVI 161 (Edward Elgar Publishing, 2015).

GATT,[141] that states that members shall not levy higher taxes on imported products than on the "like", "directly competitive" or "substitutable" domestic products, according to Article III(2) of GATT.[142] The exceptions for justification of trade distorting taxes and subsidies concerning environmental protection lying on the conservation of exhaustible natural resources in Article XX(g), and the protection of human, animal or plant life and health in Article XX(b) GATT. Therefore, carbon taxes might have effects on competitiveness as well, and would be a distorting factor for trade, if they are not designed well, and could possibly lead to international trade friction.

2.1.4 Transparency and Measuring Reporting Verification (MRV)

Non-transparency is regarded as one inherent defect of emission trading system.[143] Nevertheless, the so-called opaqueness of emission trading could be overcome by measuring reporting and verification (MRV) mechanisms. In light of Article 12, the United Nations Framework Convention on Climate Change (UNFCCC) and Kyoto Protocol, Parties to the Convention are obliged to communicate information on actions they have taken or will take to the Conference of the Parties (COP) through the secretariat. This constitutes "a key implementation aspect of the Convention, as it allows Parties to inform one another of their national level actions and serves as a basis for the COP to assess the implementation of the Convention by Parties."[144]

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[141] *Id.*

[142] *Supra* note 140, at 166.

[143] *Supra* note 139.

[144] Christiana Figueres, Executive Secretary, *Handbook on Measurement, Report and Verification for Developing Parties*, foreword, UNFCCC Secretariat 2014.

MRV was initially coined at Bali Action Plan at COP 13 in 2007.[145] The Bali Action Plan introduced the principle of measuring, reporting and verification (MRV) for both developed and developing parties to make their enhanced mitigation actions measurable reportable and verifiable. This principle was further elaborated through a number of subsequent COP decisions,[146] such as COP of Copenhagen, Cancun, Durban, resulting in a comprehensive MRV framework under the Convention. For developing country Parties, the MRV framework before the Paris Agreement encompassed submitting national communications every four years and biennial update reports every two years, undergoing international consultation and analysis, setting up a domestic MRV of domestically supported nationally appropriate mitigation actions (NAMAs), and undertaking MRV of REDD-plus activities for the purpose of obtaining and receiving results-based incentives.[147]

The Paris Agreement enhanced the MRV framework and made the framework more concrete for both developed Parties and developing Parties in a more balanced manner. Article 13 of the Paris Agreement requires each Party to regularly provide a national inventory report of GHGs emissions by sources, removals and by sinks, this information related to nationally determined contribution (NDC) related to climate change impacts and adaptation. Developed country Parties are requested to submit information on financial, technology capacity-building transfer and support provided to developing country Parties; whereas developing country Parties are required to give information on financial, technology transfer and capacity-building support needed

[145] Melissa Mucci, *Measurement, Reporting and Verification: A note on the Concept with An Annotated Bibliography*, International Institute for Sustainable Development (IISD) 3, Apr. 2012.

[146] *Supra* note 144.

[147] *Id.*

and received.[148] The above-mentioned information submitted by each party is to undergo "a technical expert review" in accordance with decision 1/CP.21.[149] In addition, the Paris Agreement established a mechanism of "global stocktake" for the purpose of assessing the collective progress of the implementation of the agreement periodically. The first global stocktake will be undertaken in 2023 and every five years thereafter.[150]

This MRV framework is also designed to strengthen the transparency of the programs of emission trading, Clean Development Mechanism and REDD-plus. For instance, results-based REDD-plus activities seeking payments need to undergo international MRV. MRV for anthropogenic forest-related emissions resulting from the implementation of REDD-plus emissions changes are required to be consistent with the methodological guidance for REDD-plus activities, and any guidance on MRV of NAMAs by developing country Parties.[151]

Implementation of MRV guidelines by all Parties increases the reliability of data for GHG emission reduction, produces consistency and transparency across project types, and enhances the credibility of the projects with stakeholders. One expert commented that "implementing a comprehensive MRV framework under the Convention will enable Parties and the UNFCCC to fulfill a number of important objectives."[152] Firstly and perhaps most obviously, accurate reporting and verification provides a framework for accountability. Secondly, an integrated MRV system provides

[148]Paris Agreement, UNFCC, art. 13, Dec. 12, 2015.

[149]*Id.*

[150]Paris Agreement, UNFCC, art. 14, Dec. 12, 2015.

[151]*Supra* note 144, at 52.

[152]*Supra* note 145, at 14.

international recognition to the different actions. Thirdly, MRV also facilitates implementation of low-carbon policies and actions at the national and local levels by establishing baselines and facilitating improvement from experience.[153]

MRV is intended to solve the transparency problem arising from emission reduction, and it is a building block in the climate change arena. Current MRV requirements for Parties reflect the nature of commitments and actions in light of the principle of equity, common but differentiated responsibilities, and respective capabilities, in the light of different national circumstances.[154] The framework recognizes the special circumstances of the least developed countries (LDCs) and small island developing states (SIDS), and is to be implemented in a facilitative, non-intrusive, non-punitive manner. It gives some flexibility for developing country Parties in order to avoid placing too much of a burden on them. However, establishing an independent third party MRV regime to oversee the regulated entities would be an important added provision to provide for reliable, consistent, accurate and transparent information relating to carbon emission reductions.

2.2 What role carbon emission trading can play after the Paris Agreement?

2.2.1 Carbon emission trading under the Kyoto Protocol of the UNFCCC

The significant role of the cap-and-trade approach has already been recognized by international treaties and agreements since the Kyoto Protocol of 1997. As one of the three mechanisms created by the Kyoto Protocol, international emission trading (has been employed for carbon emission reductions between countries with commitments

[153] *Id.*

[154] Paris Agreement, UNFCC, art. 2, Dec. 12, 2015.

under the Kyoto Protocol. Article 17 which provides "the Parties included in Annex B may participate in the emission trading for the purposes of fulfilling their commitments under Article 3."[155] However, this approach "shall be supplemental to domestic actions for the purpose of meeting quantified emission limitation and reduction commitments under that Article."[156] And an international transaction log, a software-based accounting system, is designed to ensure secure transfer of emission reduction transaction units between countries.[157]

The Kyoto Protocol inspired the establishment of the EU ETS and provided the possibility for the growth and linking of carbon emission markets regionally and globally. Also, the Western Climate Initiative (WCI) is a joint system among several U.S. States and several Canadian provincial governments. It aims to build a regional carbon emission trading program to cut greenhouse gas emissions collectively.[158]

The Executive Vice Chairman of Rothschild observed that "the cap-and-trade system is becoming the dominant methodology for CO2 control."[159] He claimed "unlike taxation, or plain regulation, cap-and-trade offers the greatest scope for private sector involvement and innovation."[160] Furthermore, "taxation and regulation can only be levied at local and national levels, whereas cap-and-trade can operate on a global

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[155]Kyoto Protocol to the United Nations Framework Convention on Climate Change art. 17, Dec. 11, 1997 [hereinafter "Kyoto Protocol"].

[156]*Id.*

[157]http://unfccc.int/resource/docs/publications/mechanisms.pdf.

[158]*Supra* note 102, at 41.

[159]Simon Linnet, *Carbon trading must be globally regulated*, THE TELEGRAPH (Jan. 31, 2008), http://www.telegraph.co.uk/news/earth/earthcomment/3323732/Carbon-trading-must-be-globally-regulated.html (last visited Nov. 8, 2017).

[160]*Id.*

level."[161]

The other mechanism created by the Kyoto Protocol is Joint Implementation (JI). Through the JI mechanism, countries with binding emission cut targets under Annex I, are allowed to achieve their commitments jointly through a JI project. The emission reduction units through JI projects must be real, measurable, verifiable and additional to what would have occurred without the project, in accordance with Article 6 of the Kyoto Protocol. This mechanism encourages developed countries to make joint efforts to control carbon emission through market-based methods. However, this mechanism cannot be used as a primary tool to achieve an Annex I country's GHGs reduction goal, and it "shall be supplemental to domestic actions for the purposes of meeting commitments under Article 3" of the Kyoto Protocol.[162]

The third mechanism under the Kyoto Protocol is the Clean Development Mechanism (CDM). It is worth noting that the CDM under the Kyoto Protocol is a complimentary component to a carbon market as well. Pursuant to Article 12 of the Kyoto Protocol, the CDM allows emission reduction projects in developing countries to earn certified emission reduction (CER) credits, each equivalent to one ton of CO2. These tradeable CERs can be used by industrialized countries to comply with part of their quantified emission limitation and reduction commitments under Article 3 of the Kyoto Protocol.[163] The project activities for CERs are supervised by an executive board of the CDM and are subject to the requirements of real, measurable, verifiable emission reductions that are "additional to any that would occur and in the absence of the

[161]*Id.*

[162]Kyoto Protocol to the UNFCC [hereinafter "Kyoto Protocol"] art. 6, Dec. 11, 2017.

[163]Kyoto Protocol art. 12, Dec. 11, 1997.

certified project activity."[164]

CERs are the first global, environmental investment and credit system of its kind, providing a standardized emission offset instrument.[165] The offset instrument of the CDM provides lower costs for industrialized countries' compliance with emission reduction targets required by the Kyoto Protocol, while the participating developing countries benefit from project activities resulting in certified emission reductions. Therefore, it's a win-win strategy for developed countries and developing countries. Nonetheless, offset credits have an effect of diluting allowances, which will depreciate the value of the allowances. Thus, the European Committee has set a limit on offset usage from the Kyoto mechanisms to a maximum of 11% for installations allocation.[166]

2.2.2 Carbon emission trading under Paris Agreement

The Paris Agreement follows the Kyoto Protocol's approach. The agreement adopts a holistic methodology to fight climate change. Article 5 of the Paris Agreement encourages "positive incentives for activities relating to reducing emissions from deforestation and forest degradation" (REDD+) and the role of conservation. This includes sustainable management of forests and enhancement of forest carbon stocks in developing countries and "alternative policy approaches, such as joint mitigation and adaptation approaches."[167] Given that the "result-based payments" for the joint mitigation and adaptation approaches have not yet been defined, offset for CERs would be applicable for REDD+.

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[164] *Id.*

[165] http://unfccc.int/resource/docs/publications/mechanisms.pdf.

[166] European Union, Commission Regulation No.1123/2013.

[167] Paris Agreement, UNFCC, art. 5, Dec. 12, 2015.

Nationally Determined Contributions (NDCs) constitute the primarily bottom up approach to fulfill the Paris Agreement by all parties. NDCs also can be achieved through "cooperative approaches" between parties. Parties may use the "internationally transferred mitigation outcomes towards NDCs" and shall be subject to robust accounting to ensure the avoidance of "double counting." And the use of internationally transferred mitigation outcomes to achieve NDCs under the agreement shall be voluntary and authorized by participating parties.[168]

The Paris Agreement has established a mechanism to contribute to the mitigation of greenhouse gas emissions and support sustainable development, which recognizes the contribution to the reduction of emission levels in the host party. This mechanism can also be used by another party to fulfill its nationally determined contributions in light of Article 6(4) of the agreement.[169] Although, the wording of the Paris Agreement is ambiguous, it appears that either offset credits from CDM or certified emission reductions (CERs) could be transferred as mitigation outcomes between the participating parties. International emission trading and joint implementation mechanisms can serve the end of fulfilling its nationally determined contributions as well, if the parties both qualify under the Kyoto Protocol.

Moreover, "internationally transferred mitigation outcomes" would be a potential vehicle for mobilizing financial resources. A certain portion of the transaction value from internationally transferred mitigation outcomes could be set aside as a source of climate finance to support the least developed countries and small islands developing

[168]Paris Agreement, UNFCC, art. 6, Dec. 12, 2015.

[169]*Id.*

States. This is similar to a portion set aside from auctioning allowances from emission trading system in RGGI to support renewable energy and energy efficiency.

The above arrangement is a potential vehicle conforming to the common but differentiated responsibility principle of the UNFCCC and will make developed countries' commitments to mobilize progressive financial sources concrete, because developed countries with higher GHGs reduction commitments, will act as potential buyers in the mitigation outcomes transfer.

Article 9 of the Paris Agreement emphasizes the significance of climate finance. It states: "As part of a global effort, developed country Parties should continue to take the lead in mobilizing climate finance from a wide variety of sources, instruments and channels…Such mobilization of climate finance should represent a progression beyond previous efforts."[170] The availability of financial resources to developing countries is crucial for the successful implementation of the UNFCCC and the Paris climate agreement.

2.2.3 Carbon Offsetting and Reduction System for International Aviation (CORSIA)

The aviation sector accounts for more than 2% of global CO2 emissions produced by human activity; among these emissions, international aviation is responsible for approximately 1.3 %, according to the Intergovernmental Panel on Climate Change (IPCC),[171] and 13.1% of total transport emissions in 2014,[172] one of the world's top

[170]Paris Agreement, UNFCC, art. 9, Dec. 12, 2015.

[171]International Civil Aviation Organization, *Why ICAO decided to develop a global MBM scheme for international aviation?*, https://www.icao.int/environmental-protection/Pages/A39_CORSIA_FAQ1.aspx (last

ten sources of emissions. A 2009 study conducted by eight international scientists by using radioactive forcing showed a stronger impact on climate change from the aviation sector. It claimed that aviation was responsible for 4.9% of manmade climate change.[173] And if left unchecked, international aviation emissions were projected to increase by up to 300% by 2050.[174]

To control greenhouse gases emissions from the air transport sector is a challenging issue for all energy and climate change policy decision makers because of the mobile feature of the emission sources and the involvement of a wide range of stakeholders, which makes an introduction of new policy more difficult. A fossil fuel tax could be a useful tool to reduce the domestic emissions, but any to reduce emissions from international aviation and shipping is not as yet widely accepted.

The European Union, as the pioneer in controlling emissions from aviation sector, amended the Directive 2003/87/EC in Nov. 2008, to include aviation activities in the EU ETS system.[175] The intention behind the inclusion of aviation in the EU ETS was to enable reduction of GHGs at a lower cost by allowing airline operators to purchase general ETS allowance.[176] The lower the de facto cap from aviation sector, the more

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visited Nov. 8, 2017).

[172]European Commission, *Reducing emissions from transport: A European strategy for low-emission mobility*, https://ec.europa.eu/clima/policies/transport/index_en.htm (last visited Nov. 8, 2017).

[173]Jos Dings eds., *Aviation ETS-gaining altitude: An analysis of the aviation*, Transport & Environment EU ETS 2013-2015, 14 (Sept. 16).

[174]International Civil Aviation Organization (2009), www.icao.int/environmental-protection/GIACC/Giacc-4/CENV_GIACC4_IP1_IP2%20IP3.pdf (last visited Nov. 8, 2017).

[175]European Union, Directive 2008/101/EC.

[176]*Supra* note 173, at 14.

allowances airline operators have to purchase from the general ETS.[177] The European Federation for Transport and Environment estimated that airline operators had to purchase 42.7 million allowances to cover their emissions above the aviation cap.[178] The purchase of emission allowances constitutes the main cost for airline operators as a result of their inclusion into the aviation EU ETS. The costs associated with purchased allowances to airline operators were approximately €152 million in 2013, €148 million in 2014, and €178 million in 2015 respectively, without the inclusion of the costs of international credits used for compliance because the purchase and surrender of international credits could no longer be tracked.[179]

The projected costs that would be imposed on the aviation sector from their inclusion in the EU ETS were at the forefront of industry attacks on the inclusion of aviation in the EU ETS. Emerging economies, especially China with the rapid expansion of its aviation industry, strongly opposed the levy of a carbon emissions fee by the EU. As of 2008, the International Air Transport Administration claimed that "in its first year of operation, the ETS would have added €3.5 billion to industry costs and that this cost would rise year-on-year."[180]

As mentioned above, the Directive 2003/87/EC in 2008 included aviation emissions under the EU ETS and provisionally capped aviation emissions below their average level between 2004 and 2006. The cap on aviation allowances was separated from the general EU ETS cap. The provisional cap on the aviation sector was set to apply for

[177] *Id.*

[178] *Id.*

[179] *Supra* note 173, at 27.

[180] International Air Transport Association, *European ETS Vote: The Wrong Answer*, (July 8, 2008), http://www.iata.org/pressroom/pr/Pages/2008-07-08-01.aspx (last visited Nov. 8, 2017).

the periods of 2012 and 2013-2020. Starting from the beginning of 2012, both commercial and non-commercial aircraft operators' departure from or arrival to an airport within the European Economic Area were required to surrender an emission allowance for every ton of CO2 emitted,[181] no matter how much of the proportion accounting for in the total mileage of the flight was beyond the territory of the EU and its member states.

This unilateral decision by the EU has incited fierce international resistance.[182] After the EU decided to include aviation into EU ETS in 2008, US carriers acting through Airlines for America, a powerful US industry lobby, brought a case in the UK courts in December 2009 alleging that inclusion of international aviation into the EU ETS was illegal under international law, for both internal and international flights departing from and arriving at European Union airports, asserting that this inclusion violated international law. The American lobby was later able to convince the Obama Administration, specifically the U.S. Federal Aviation Administration (FAA), to oppose and to orchestrate foreign resistance to the EU legislation.[183] However, the European Court of Justice ruled in late 2011 that the full scope of the EU ETS was fully consistent with international law.[184] China also strongly opposed the inclusion of international aviation in the EU ETS, and threatened not to purchase aircraft from Airbus on order, despite the fact that it had paid a non-refundable deposit.[185]

As a result of this resistance, the European Commission waived its independent right

[181] *Supra* note 173, at 9.

[182] *Supra* note 173, at 8.

[183] *Supra* note 173, at 9.

[184] *Id.*

[185] *Id.*

to propose new laws in such an unprecedented manner and issued a proposal to stop the clock on imposition of the aviation proposal on 12 November 2012.[186] This stop-the-clock law formally agreed between the European Council and European Parliament in April 2013, came just before airline operators would have been required to surrender allowances for their emissions in the previous year. The justification claimed by the European Commission's decision to stop the clock for a year was to gather the political momentum at the approaching 2013 International Civil Aviation Organization Assembly to develop a Global Market Based Mechanism.[187] In March 2014, the EU issued a regulation (421/2014) to extend the stop-the-clock a second time until the end of 2016, with provision for a full snap back of the original scope of the EU ETS from the beginning of 2017, unless otherwise amended in light of the 2016 International Aviation Organization assembly.[188]

After many rounds of negotiations among member states, consensus to mitigate greenhouse gas emission by using market-based solutions in the international aviation sector was achieved. In October 2013, the 38th Session of the International Civil Aviation Organization (ICAO) Assembly adopted Resolution A38-18, which set a medium term global goal of maintaining the net CO2 emissions from international aviation sector from 2020 at the same level as then existed, a so-called "carbon neutral growth 2020."[189] The Assembly also defined a basket of measures designed to help reach the global goal, including market-based measures.

In October 2016, the 39th International Civil Aviation Organization passed Assembly

[186] *Id.*

[187] *Id.*

[188] *Id.*

[189] *Supra* note 171.

Resolution A39 and decided to implement a global "Market-Based Measures" system in the form of the Carbon Offsetting and Reduction System for International Aviation, so as to address any annual increase in total CO2 emissions from this sector. Sixty six countries have already declared to support this "CORSIA"[190] agreement, representing 87% of total international aviation emissions. The CORSIA system makes international aviation the first sector at global scale to set a target of carbon neutral growth from 2020. Member states will use the market-based measures to offset their international aviation emissions above 2020 levels.

In line with Assembly Resolution A39, the CORSIA system will be implemented in phases, starting with a pilot phase with participation of states on a voluntary basis, followed by participation of all states except certain exempted states. The pilot phase runs from 2021 through 2023, and first phase runs from 2024 through 2026, and Second phase runs from 2027 through 2035.[191]

The CORSIA agreement calls for international aviation to address and offset emissions through market-based measures, namely, to offset a member's emissions from other sectors by emission trading or crediting mechanism. The carbon emissions from an international aviation operator can be offset by buying emission allowances from emission trading systems, or by buying certified emission reduction credits (CERs) from a crediting mechanism, such as CDM and REDD+ mechanisms, or other

[190] CORSIA refers to the agreement of Carbon Offsetting and Reduction System for International Aviation.

[191] International Civil Aviation Organization, *What is CORSIA and how does it work?*, http://www.icao.int/environmental-protection/Pages/A39_CORSIA_FAQ2.aspx (last visited Nov. 8, 2017).

projects.[192]

The coverage of CORSIA is on the basis of routes between states participating in the CORSIA system. A route will be covered by the system if both states connecting it are under CORSIA; otherwise, a route will not be covered, in line with paragraph 10 of the Assembly Resolution A39.[193]

Given that CO2 emissions from the international aviation sector are not covered under the UNFCCC and the Paris Agreement, and as a result, are not included in the Nationally Determined Contributions of the Parties, CORSIA complements the level of ambition set by the Paris Agreement. Because the CORSIA system provides for participating states to use market-based measures to offset their carbon emissions, it will increase the demand for emission units, thus increasing incentives to invest in emissions reduction projects in the participating states. The CORSIA system is regarded as significant progress in the climate change arena after the Paris Agreement, for it is a sector-wide action at a global level to reduce carbon emissions from the international community and sets a model for other sectors to fight climate change, a global challenge.

Chapter 3 The Typical Carbon Emission Trading Markets in the World

Many regard a carbon emission trading mechanism (ETS) as "the most promising

[192] *Id.*

[193] *Id.*

policy tool for reducing the emission of traditional air pollutants as well as greenhouse gases."[194] A U.S. professor concluded that the political success of the mechanism can be credited to" its ability to accommodate the very distinct interests at play in environmental policy."[195] The political acceptability of ETS is a key advantage in comparison with alternative regulatory tools[196] compared to the failed efforts to establish a carbon tax in Europe in the 1990s and resistance to stringent environmental regulations.[197]

A carbon emission trading regime provides individual regulated sources much greater flexibility than any other approaches under conventional regulation "to decide if, how, and when they will reduce emissions."[198] Environmentalists, on the other hand, like the regime because of the cap: certainty for environmental benefit.[199] For these reasons, carbon emission trading has been prevalent in the world since the establishment of European Union Emission Trading System (EU ETS).

This chapter will analyze in detail the carbon emission trading systems, their pluses and minuses, which presently exist worldwide, elaborating on the references above to many of them.

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[194]Lesley K. McAllister, *The over-allocation problem in cap-and-trade: moving toward stringency*, 34 COLUM. J. ENVTL. L. 395, 396 (2009).

[195]*Id.*

[196]Ammar Lulla, *Emissions trading is undoubtedly a powerful regulatory tool that has the potential to help achieve dramatic reductions in greenhouse gas emissions. But the European Emissions Trading System is, quite simply, unfit for the purpose*, 4 MANCHESTER REV. L. CRIME & ETHICS 87, 92 (2015).

[197]T. Laing et al., *Assessing the effectiveness of the EU Emissions Trading System*, Working Paper No. 126, (2013).

[198]*Supra* note 194, at 396.

[199]*Id.*

3.1 EU ETS

The European Union has been the consistent world leader in promoting climate change mitigation measures and set an example for the world in its own emission trading system (ETS). The evolution of the ETS in its successful creation of a multi-country carbon market and the problems it encountered along the way have provided invaluable guidance for all the other world trading systems.

3.1.1 The origin and the evolution of EU ETS

The Emission Trading System in the EU follows the cap-and-trade approach where a fixed number of permits are created and allow a specific unit of emission. These allowances are then allocated for free or are auctioned to firms which may trade them on the open market on the condition of surrendering the equivalent number of allowances for their actual emissions.[200]

The Europe ETS was greatly influenced by the success of the U.S. acid rain cap and trade program.[201] Commentators contend that the acid rain program has significantly reduced the sulfur dioxide (SO2) emissions from power plants responsible for acid deposition and its adverse health effects.[202]

Pursuant to the *Directive of Establishing a System for Greenhouse Gas Emission*

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[200]R Baldwin, *Regulation Lite: The Rise of Emissions Trading*, Society and Econ. Working Papers 3/2008 (LSE Law, 2008).

[201]Environmental Protection Agency for the United States [hereinafter "EPA"], *Acid Rain Program 2005 Progress Report*, https://www.epa.gov/sites/production/files/2015-08/documents/2005report.pdf (last visited Nov. 9, 2017).

[202]Lauraine G. Chestnut & David M. Mills, *A Fresh Look at the Benefits and Costs of the U.S. Acid Rain Program*, 77 J. OF ENVTL. MAMT. 252, 256-56 (2004).

Allowance Trading adopted in 2003 (Directive 2003/87/EC)[203], the EU formally commenced to build its Emission Trading System (ETS). Preliminary efforts can be divided into two phases: Phase I (2005-2007), and Phase II (2008-2012). Thereafter the EU adopted Phase III (2013-2020) and Phase IV (2021-2030) providing the most comprehensive and thorough revisions to the ETS.

Phase I and Phase II

Phase I (2005-2007) of the EU ETS was regarded as a "learning by doing" pilot phase. The EU faced problems of political opposition to a centralized (top down) approach and a lack of historical emission data on industry emissions.[204] As a compromise, it allowed member countries to submit National Allocation Plans which established caps country-wide and for each individual installation, resulting in an ETS for every EU country (bottom up), resulting in the ETS' initial National Allocation Plan.[205]

Under both Phase I and Phase II each individual Member country's allocations had to be approved or adjusted by the European Commission, and a sum of the member country national emission caps was to be the emission cap at the EU level.

The National Allocation Plan was required to be based on objective and transparent criteria, taking due account of comments from the public. It was to be published and notified to the Commission and to other Member countries within the specified period.

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[203] The EU has thrice amended the Directive 2003/87/EC for emission trading, including the Directive 2004/101/EC to link the Kyoto project-based mechanisms to the EU ETS, the Directive 2008/101/EC to include aviation activities in the EU ETS, and the Directive 2009/29/EC to improve and extend the greenhouse gas emission allowance trading system.

[204] R Calel, *Carbon markets: a historical overview*, Wiley Interdisciplinary Reviews: Climate Change 107 (2013)4(2).

[205] *Supra* note 200, at 9.

Plans were to be considered within a special committee under the Commission. The Commission could reject a plan or any aspect thereof, on the basis that it was incompatible with the criteria adopted and give reasons for the rejection. A Member country could propose a new amendment, and could only take a decision if the proposed amendment was accepted by the Commission.

The Commission allowed a substantial cut to the National Allocation Plans of a number of countries, for example, a 6% cut for Germany and 56% cut for Latvia. In Phase I and Phase II, the European Court of Justice accepted a great number of cases filed by the Member countries that were dissatisfied with the plan cuts made by the Commission. Eventually, the Court ruled in favor of Poland and Estonia on the ground that the Commission did not follow due process and exceeded its scope of authority.[206]

The difference of the base level in Phase I and II plans is that the plans in Phase I were based on emission levels in 1990 (8% emission reduction compared to 1990 levels), while those in Phase II were based on 2005 levels, resulting in a 6.5% reduction in emission caps compared to 2005 levels.

As for allowance allocations, including methodology and calculation criteria, to avoid resistance to the EU ETS, in Phase I emission allowances were awarded mostly for free. Member countries were allowed to auction no more than 5% of emission allowances, and in Phase II, this figure was raised to 10%. However, in fact, allowances auctioned accounted for no more than 0.2% in Phase I and only around 3%

[206] Huizhen Chen, *Target Setting: Lessons from the EU ETS and Their Apocalypse for China*, 4 J. OF JIANGSU UNIV. (SOC. SCI. EDITION) 14, (15) (2013).

in Phase II.[207] To ensure the fairness of allocation, Phase I and Phase II both provided a New Entrants Reserve with the allocations decided by Member Countries in their Plans. On average, the Reserve accounted for 2.4% of emission caps in Phase I and up to 5.8% in Phase II. However, Member countries did not have consistent rules on new entrants. For allowance calculation criteria, free allocation in Phase I and Phase II both adopted an historical-emission-based grandfather clause.

In Phase I and Phase II only carbon dioxide was covered, and enterprises were limited to heavy industry, heavy pollution, heavy emission and energy-intensive production enterprises with a rated thermal input exceeding 29 MW, including power stations, refineries, coke ovens, steel plants, and manufacturers of cement, glass, lime, brick, ceramic product, pulp, paper and paper board. Aviation emissions initially were expected to be included in Phase II, but due to complaints by various air carriers and other countries, this had to be postponed to Phase III.[208]

Described below are provisions for market controls and regulation mechanisms, including systems for monitoring, reporting and verification; registry; carbon price intervention and compliance safeguards.

From 2005 to 2012, Member countries were responsible for measuring, reporting and verifying respective carbon missions, and the EU just promulgated the *Guidelines for Monitoring and Reporting Greenhouse Gas Emissions*, which was instructive but not

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[207] Haiqing Hao & Jianyun Mao, *The Evolution of the Legal System for the EU ETS and Revelations to China*, 6 PERIODICAL OF OCEAN UNIV. OF CHINA (SOC. SCI.) 82, (84) (2015).

[208] Fang Wan & Li Du, *Optimization and Improvement of Chinese Carbon Trading System Mechanism - Based on Operational Analysis and Alternation of EU-ETS*, 4 RESEARCH ON ECON. AND MGMT. 19, (19) (2015).

legally binding. So, in practice, Member countries had different understandings of key terms and data selection and reporting requirements; combined with the absence of historical emission data and pursuit for self-interest, they varied from each other in terms of data reliability, rationality and validity.[209]

As for registry in Phase I and Phase II, the EU and each Member State established and maintained a registry. At the EU level there was a Community Independent Transaction Log for recording the issue, transfer and cancellation of allowances within the EU and to check each transaction. At the national level Member countries, separately or jointly, established a national registry to record and track the issuance, ownership, transfer and cancellation of allowances within national territory and to directly connect to the Community Log.[210]

Carbon price intervention mechanisms in Phase I and Phase II were limited and had much to be improved, including: (1) inter-period banking and usage: pursuant to the Directive, allowances within Phase I could be used in the preceding or following year during the same period, but could not be extended to Phase II. So, allowances in Phase I were cancelled by the end of 2007; (2) allowances banking and borrowing: pursuant to the Directive 2003/87/EC, allowances allocated to the same emission producers during the same period could be deposited and borrowed; (3) emission offset mechanism: Phase I permitted unlimited offsets with "offset credits" from CDM/JI projects, and Phase II allowed the use of "offset credits" from most CDM/JI projects, with varying degrees of application in Member countries with the exception

[209] Markus Wrake, Dallas Burtraw & L. Zetterberg, *What Have We learnt from the European Union's Emissions Trading System, AMBIO*, 41 A J. OF THE HUMAN ENV. 12, 22 (2012), Suppl 1.

[210] Maorong Zhou & Xiujie Tan, *The Reform of EU Emissions Trading System Phase III*, 5 J. OF INT'L TRADE 94, 98 (2013).

that offsets were not allowed for verified emissions from land use, land use change, nuclear facilities and large hydropower stations.[211]

As for compliance safeguards and penalty mechanisms, according to the Directive, the excess emissions penalty was EUR 40 for 1 tCO2e in Phase I and raised to EUR 100 in Phase II.[212]

Post-Kyoto Period – Phases III and IV

After 2013 and after more than three years of reforms, the EU ETS formally entered into Phase III (2013-2020), which is also referred to as "the Post-Kyoto Period."[213] In mid-July 2015 the European Commission presented a legislative proposal to revise the EU ETS for the period after 2020 (Phase IV (2021-2030)). It proposed to revise the system in four aspects: emission reduction, carbon leakage, green energy and low-carbon technology, and reform of traditional energy.

In emission reduction the overall number of emission allowances in the sectors covered by the ETS is to decline at an annual rate of 2.2% from 2021 onwards, compared to 1.74% currently. In carbon leakage it was proposed to further narrow the list of sectors exposed to potential risk of carbon leakage, and classify them into different groups in accordance with risk. In green energy and low-carbon technology it was proposed to set up an Innovation Fund to encourage investment in green energy,

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[211] Zhuo Li & Xiaofen Li, *A Discussion on the Offset Mechanism in the Carbon Emission Permit Trading System*, 11RESOURCES ECONOMIZATION & ENVTL PROTECTION 133, 133 (2015).

[212] Long Zhang, *A Study of Core Mechanisms of the EU ETS*, 1 MODERN ECON. INFORMATION 25, 26 (2015).

[213] Minken Chen & Jianying He, *The Building of EU Carbon Emission Permit Trading Market and Its Revelations*, 8 GLOBAL MARKET INFORMATION GUIDE 23, 23 (2015).

carbon capture technology, carbon storage and low-carbon technology. In reform of traditional energy it was proposed to create a Modernization Fund with 2% of the overall gains of allowances emissions to facilitate Member countries' modernization of their traditional energy sectors which the Fund projected to amount to around EUR 8 billion, to be allocated pro rata to Member countries with a GDP per capita in 2013 below 60% of the EU average.[214]

The new Directive 2009/29/EC has made the most extensive revisions to the previous regime in Directive 2003/87/EC, including new measures relating to emission cap determinations, allowance allocation modes, scope of emission control, and mechanisms for market control and regulation as follows:

Emission cap determination revisions: To avoid imposing too high emission caps and excessive allowances, from the start of Phase III, there was to be a centralized allocation of allowances through a top-down approach. Specifically, the European Commission was to decide on an EU ETS-wide emission cap on the basis of an emission and linear reduction rate in a base year and then allocate it in accordance with specific principles to various Member countries, and the latter were to submit its action to the Commission for its National Implementation Measures.[215] According to

[214] The reform of the EU ETS Phase III began with the Communication from the Commission on Building a Global Carbon Market dated in November 2006, and then, from March to June 2007, the Commission reviewed the four ETS proposals within the framework of the Commission and submitted a legislative proposal in January 2008. The Proposal was adopted in April 2009, i.e. the Directive 2009/29/EC to improve and extend the greenhouse gas emission allowance trading system. Department of Energy and Climate Change of UK, Transposition of EU Directive 2009/29/EC 9-10 (2012), https://www.gov.uk/government/uploads/systemsystem/uploads/attachment_data/file/66842/Transposition_of_EU_Directive_2009_29_EC_revising_EU_Directive_2003_87_EC.pdf (last visited Nov. 9, 2017) (revising EU Directive 2003/87/EC).

[215] Xiaobin Pan & Xueying Shi, *Cap Setting and Adjustment in EU-ETS and its Influence to China's*

the EU commitment in 2007, by 2020 greenhouse gas emissions in the EU are to be reduced at least by 20% below 1990 levels and by 14% below 2005 levels. Some sectors included in the ETS are required to reduce their emissions by 21% below 2005 levels. Meanwhile, the Commission is to decide to implement strict linear emission reduction limits with annual decreases of the new cap at 1.74% from 2013 to 2020 and after, and the quantity of allowances for initial allocation are to be determined and adjusted on the average of the quantities of the national plans from 2008 to 2012 and the expanded coverage of the ETS.[216]

Allowance allocation methods are also to be revised. Pursuant to the Directive, free allocation is to be gradually replaced by auctioning. In 2013 allowances allocated through auctioning are to be 40%, and by 2020 this figure is to be 70%. However, considering the effect on enterprises of different categories that may be in different circumstances, Phase III still allows some exceptions. For example, allowances for energy production enterprises (such as power sector) are to be completely auctioned, while, for energy-concentration sectors (such as district heating and high-efficiency cogeneration), new entrants and sectors with risk of carbon leakage (mainly energy-intensive sectors), will be allowed a period of transition; that is, in Phase III, they will enjoy free allocation of a considerable proportion of allowances, but this proportion will gradually decrease until full replacement by auctioning.

In Phase III a benchmark is to be used to calculate free allocations and to address market distortions arising from a "grandfather clause." The benchmark is to be the

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National ETS, 5 THEORY AND MODERNIZATION 18, 19 (2015).

[216] Hui Liu & Yanqiu Tan, *Internal and External Constraints for and Development Tendency of the EU ETS Reform*, 1 DEUTSCHLAND-STUDIEN 45, 47 (2015).

average emission of the 10 percent most efficient installations in a sector or subsector in a community, and this benchmark multiplied by installation output is to be the total allowance permitted for this installation. However, existing installations are not subject to the same proportion of free allocations, depending on objective circumstances. The Directive divides them into power and carbon capture and sequestration installations, installations with risk of carbon leakage and those other than the first two categories, and subjects them to different allocation proportions and transition periods.[217]

New entrants and those that opt out are to be subject to harmonized rules. 5% of the emission caps from 2013 to 2020 will be set aside as a New Entrants Reserve, and the allocation approach is to be consistent with provisional measures for existing installations of the same category. With the benchmark rule installations no longer will be allowed to continue with inefficient operations for the sake of obtaining free allocations, and an installation with operations that have ceased will not be qualified for free allocations unless it can demonstrate that it will resume production within a specified and reasonable time.

There are specific arrangements to be made for the auctioning of allowances, including 88 percent as basic allowances, 10 percent for the purpose of the Joint Implementation (JI) mechanism, and 2 percent to be distributed to reward Member countries with outstanding emission performance in the preceding period.[218]

The scope of emission control also is revised. In Phase III the scope of emission

[217] *Supra* note 210, at 96.

[218] *Supra* note 215, at 19.

control is expanded by including nitrous oxide and perfluorocarbon as greenhouse. Sectors previously not included are incorporated, including new industries like the chemical industry, ammonia manufacturers and aluminum manufacturers, carbon capture and carbon sequestration. The cap limit of some previous sectors is revised to incorporate other industry activities, including gypsum, nonferrous metals, calcinations of dolomite, Also, Directive 2009/29/EC provides an explicit broad definition of "combustion installations" and greenhouse gases covered with increases of about 40-50 million tons. Finally, in order to avoid the high administrative costs in Phase I and Phase II due to inclusion of many small installations, in Phase III Member countries are allowed to exclude installations the emissions from which do not exceed a threshold of 25,000 tons per year and units with a rated thermal input under 3 MW.[219]

The mechanisms for market control and regulation also are reformed. To eliminate monitoring and reporting inconsistencies between Member countries and to improve data quality and comparability, Directive 2009/29/EC empowers the Commission to formulate and harmonize the Monitoring and Reporting Regulation and the Accreditation and Verification Regulation, normalizing third-party verification institutions the oversight of which was adopted and became effective in 2012. The Shipping MRV Regulation became effective in July 2015.[220]

Directive 2009/29/EC creates a single registry system to administer emission accounts, allocate, surrender or cancel allowances. This will greatly improve security of the

[219] *Supra* note 210, at 102.

[220] MINGDE CAO, MINGMING LIU, JINXING CUI ET AL., A STUDY OF EMISSION TRADING LAWS AND REGULATIONS IN CHINA 139 (China University of Political Science and Law Press, 2016).

carbon market and facilitate settlement of carbon transactions;[221] a unified registry should overcome the problems arising from relying on the national registry system of each of the member countries.

To resolve the carbon price volatility that was experienced in Phase I and Phase II, carbon price intervention mechanisms in Phase III were subject to substantial revisions and improvements, including:

(1) Pursuant to the directive, allowances accumulated in Phase II could be used in Phase III to prevent the kind of drastic drop in the carbon price at the end of 2012;

(2) In order to address loosely verified credits under CDM/JI in Phases I & II, in Phase III, offset mechanisms were readjusted, and there were different institutional arrangements specified depending on whether the Paris international agreement on climate change would be reached in 2012. Meanwhile, pursuant to the Directive 2009/29/EC, at EU level, the use of carbon credits was required not to exceed 50 percent of total emissions in Phase III;[222]

(3) In order to reduce trade volume and raise the carbon price, the Commission proposed to auction a lesser amount, or delay auctions in Phase III, freeze a total of 900 million allowances for the period 2014-2015, and postpone their auction to the end of Phase III, and to increase by 300 million and 600 million allowances for auctioning in 2019 and 2020 respectively, so that the supply of

[221] Haiqing Hao & Jianyun Mao, *The Evolution of the Legal Systemfor the EU ETS and Revelations to China*, 6 PERIODICAL OF OCEAN UNIV. OF CHINA (SOC. SCI.) 82, 84 (2015).

[222] Ling Xiong & Shaozhou Qi, *The EU ETS: Structural Deficiency, Institutional Reform and Influence*, 1 CHINESE J. OF EUROPEAN STUDIES 60, 61 (2012).

emission allowances can be more fairly redistributed;[223]

(4) To compensate for the deficiency of delayed auctioning in the initial stage of Phase III, the Commission proposed to introduce a Market Stability Reserve in 2021, so that, when excessive allowances exceed 833 million, the Reserve would be increased to stabilize market, and the reserved allowances would be deducted from future auctions; when excessive allowances fall under 400 million, some allowances would be released from the Reserve and included in future auctions;[224]

(5) In order to stabilize carbon price, under the Directive, the Commission was empowered with three additional functions, including the requirement to monitor the performance of the EU carbon market and submit an annual report to the European Parliament and the European Council, offer a proposal to the European Parliament and the Council when it has evidence that the carbon market is not functioning properly, and auction future allowances when the allowance price for more than six consecutive months is more than three times the average price of allowances during the two preceding years on the European carbon market.[225] As for a compliance safeguard and penalty mechanism, penalties in Phase III were more rational and will link with the European index of consumer prices.[226]

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[223] Yuan Yuan & Jixian Liu, *Revelation of EUA Supply Management Reformation for China*, 8 FORUM ON SCI. & TECH IN CHINA 147 (2015).

[224] *Supra* note 220, at 142.

[225] *Supra* note 210, at 10.

[226] *Supra* note 212, at 25.

4.1.4. Carbon leakage and trade conflict in the ETS

There are two kinds of carbon leakage. One is industrial leakage, which occurs when a country outside the EU expands production on the basis of cost advantage and causes a substantial increase in carbon emissions outside the EU, and Member countries move their industries out of the EU, with emissions moved out as a consequence. Such leakage is a sort of "race to the bottom." A typical example is that under fierce international competition some petrochemical companies have successively moved to countries where greenhouse gas emission regulation is relaxed to avoid high emission reduction costs.

The other is rebound leakage, which occurs when a high carbon price inside the EU reduces emission demand and thus pulls down the global carbon price and raises emissions outside the EU.[227]

At present, industrial leakage is the focus of the EU action. Under industrial leakage greenhouse gas emissions in technically backward countries or regions are increasing without actual emission reductions by relevant enterprises, causing an illusion that the ETS has greatly reduced greenhouse gas emissions in the EU. Currently, the EU has 164 sectors and subsectors (steel, manufacturing, heating, etc.) that are susceptible to carbon leakage, and their outputs account for 77% of the EU manufacturing industry and their emissions account for 1/4 of the total of the EU ETS.[228] In light of this risk, the European Council is requiring that some sectors have fewer allowances for auctioning, and it will regularly prepare and update a catalogue and grant more free

[227] *Supra* note 216, at 44.

[228] Minsi Zhang et al., *An Analysis of Developments of the EU Carbon Market and its Lessons for China*, 8 ENVTL. PROTECTION 65, 66 (2014).

allowances to enterprises listed in this catalogue.[229]

Rebound leakage often occurs in global carbon markets. For the present, the EU neither pays due attention to this phenomenon nor takes into full consideration that the rebound and global unfairness may offset the effect of its carbon emission policy.

The EU ETS is an incentive-based regulatory instrument adopted to address greenhouse gas emission reduction inside the EU. Its main purpose is to encourage enterprises to invest in low carbon activities and emission reduction and to prevent global climate change from further deterioration by trading increasingly scarcer emission allowances in Member Countries. However, like its efforts to establish a global carbon market, its ETS is not a stand-alone trade mechanism, and rather it is closely connected to and even sometimes conflicting with other countries and regions across the world.

For example, an international dispute arose when the European Commission in 2012 proposed to include aviation under the coverage as described above.[230] Also, a shipping MRV Regulation was adopted in 2015, incorporating the shipping industry under the coverage of its ETS. This no doubt would also clash with other trade mechanisms.

ETS Critiques

The ETS system has been severely criticized mainly owing to problems of a large

[229] *Supra* note 220, at 133.

[230] Fang Wan & Li Du, *Optimization and Improvement of Chinese Carbon Trading System Mechanism - Based on Operational Analysis and Alternation of EU-ETS*, 4 RESEARCH ON ECON. AND MGMT. 21,22 (2015).

oversupply of allowances, windfall profits and questions regarding achievement of its purpose.[231] Political acceptability of ETS and political compromise to gain acceptance led at the beginning to free allocation of at least 95% of estimated emissions.[232] Over-allocation of allowances along with the prohibition of transferring allowances from Phase I to Phase II and the economic recession contributed to lack of demand and led to a free fall of the carbon prices reaching near zero levels by mid-2007.[233]A professor of law at University of San Diego asserted that lower allowance prices caused by over allocation resulted in fewer emission reductions, which greatly limited the extent to which the program created incentives for emissions reductions.[234]

Moreover, when a cap-and-trade program provides for banking allowances, over-allocation can result in accumulation of a huge allowance bank, which allows emissions beyond the emission caps set for future years.[235] The banked allowances will not represent emissions reductions designed by the program, instead they will allow installations to emit more in the future.[236] As a result, this leads to delays in emission reductions.[237] In these ways over-allocation reduces the environmental effectiveness of cap-and-trade programs.[238]

In addition, due to the sub-global nature of the EU ETS program, its implementation

[231]*Supra* note 196, at 93.
[232]*Supra* note 196, at 94.
[233]*Id.*
[234]*Supra* note 194, at 413.
[235]*Supra* note 194, at 414.
[236]*Supra* note 194, at 424.
[237]*Supra* note 194, at 419.
[238]*Supra* note 194, at 414.

caused some carbon leakage rather than inducing carbon emission reduction. One researcher indicated that "where the coverage of an emissions trading system (ETS) is sub-global, covered installations face higher cost of production, *ceteris paribus*, than similar installations in countries without, or with less stringent emissions constraints."[239] Thus, in the world of unequal carbon prices, carbon intensive production flees to regions without costly climate policies.[240]

Further, if a carbon price induces a decrease of fossil fuel prices, it stimulates their consumption in countries where stringent climate regulations are lacking.[241] In this scenario, a sub-global ETS could threaten competitiveness and lead to carbon leakage, where emissions were simply displaced rather than reduced.[242] So far, the enforcement of EU ETS has not yet adopted measures to adequately address these concerns.[243] The professor further explained that in the absence of a uniformly applicable global climate policy, companies engaging in carbon-intensive production inevitably encounter different emissions constraints in different jurisdictions.[244] The specific designs of the climate change regulation will influence the availability of cost-effective abatement options and affect industries' ability to pass through the carbon costs to consumers without losing their market share or profits.[245] He explained that highly carbon intensive industries are likely to face higher carbon

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[239]Fitsum G. Tiche, Stefan E. Weishaar & Oscar Couwenberg, *Carbon Leakage, Free Allocation and Linking Emissions Trading Systems*, CARBON & CLIMATE L. REV. 97 (2014).

[240]*Id*.

[241]*Id*.

[242]*Id*.

[243]*Id*.

[244]*Supra* note 239, at 98.

[245]*Id*.

reduction costs than the less carbon intensive ones.[246]

A firm's ability to pass through the carbon costs to its consumers depends, *inter alia*, on the elasticity of demand, the structure of the market in which it is operating, and its trade exposure.[247] Competitiveness and leakage concerns would be acute within those sectors and sub-sectors that shoulder high carbon costs where demand is elastic, "but are unable to pass through these costs without losing market share or profits."[248] Thus, in the long run, the "differentiated carbon policy may cause some industries to migrate to emission-unconstrained regions."[249] These differentiated carbon policies also encourages investors to make their decisions in favor of less efficient technologies and energy sources in the "pollution havens"[250] resulting in environmental ineffectiveness policy and an increased societal carbon reduction cost.

3.2 The regional carbon emission trading markets in US

3.2.1 The Regional Greenhouse Gas Initiative (RGGI)

The Regional Greenhouse Gas Initiative (RGGI) was the first mandatory cap-and-trade program for greenhouse gas emissions in the United States. RGGI involves nine states—Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont, after the withdrawal of New Jersey at the end of 2011. RGGI was established in 2005 and administered its first auction of CO2 emissions allowances in 2008. The RGGI CO2 cap is projected to contribute to a 45 percent CO2 emission reduction in the region's annual power sector

[246] *Id.*
[247] *Id.*
[248] *Id.*
[249] *Id.*
[250] *Id.*

emissions by 2020 from 2005 levels, or between 80 and 90 million short tons of CO2.[251]

The RGGI program applies only to carbon dioxide (CO2) emissions from electric power plants with capacities to generate 25 megawatts or more--approximately 168 facilities.[252] The total CO2 emissions from the nine RGGI states account for approximately 7 percent of U.S. CO2 emissions and 16 percent of its gross domestic production. RGGI's aggregate emissions rank in the top 20 among all nations.[253]

RGGI's history can be traced back to at least 2003, beginning with discussions and meetings among governors in the northeastern and mid-Atlantic region, according to a report by a specialist in environmental policy.[254] These activities eventually led to a 2005 Memorandum of Understanding (MOU) with seven signatory states: Connecticut, Delaware, Maine, New Hampshire, New Jersey, New York, and Vermont. As of 2007, RGGI was expanded to include Maryland, Massachusetts, and Rhode Island. The ten signatory states agreed to be jointly responsible for carrying out the provisions featured in the MOU.[255]

The ten states addressed two key issues that led to the ultimate implementation of the RGGI program. First, they "agreed to adopt individual shares of the overall RGGI CO2 cap by agreeing to implement state-level CO2 emissions budgets specified in the

[251]Lucas Bifera, *Regional Greenhouse Gas Initiative*, CENTER FOR CLIMATE AND ENERGY SOLUTIONS, (Dec. 2013).

[252]Jonathon L. Ramseur, *The Regional Greenhouse Gas Initiative: Lessons Learned and Issues for Congress*, CRS Report R41836 2 (Apr. 27, 2016).

[253]*Id.*

[254]*Supra* note .252, at 5.

[255]*Supra* note 251.

MOU."[256] Second, the ten states "assumed responsibility for developing a Model Rule to serve as a common framework for individual state-level regulations."[257]

On December 31, 2008, a final version of the Model Rule of cap-and-trade regulations was issued by the states, which served as a regulatory blueprint for the program. Under the Model Rule framework, each member state enacted individual regulations by which covered entities were required to comply to participate in the regional cap-and-trade program.[258] The CO2 emissions from covered entities in the RGGI states accounted for approximately 20 percent of all GHG emissions in the RGGI states. The remaining majority of GHG emissions came from fossil fuel combustion in the industrial, commercial, residential, and transportation sectors.[259]

The RGGI program includes many of the design elements of the EU ETS, such as three-year compliance periods, emission allowance banking, emission allowance auctions, consumer benefit allocation, cost containment, and offset use.[260]

In the first control period from 2009 to 2011 RGGI auctioned 395 million CO2 allowances, starting when the allowance submission requirements became effective. The clearing price[261] for CO2 allowances ranged as high as $3.35 and as low as $1.86.[262] The first control period yielded over $922 million in revenue from auctions

[256]Supra note 251, at 2.

[257]*Id.*

[258]*Id.*

[259]*Supra* note 252.

[260]*Supra* note 252, at 6.

[261]Clearing price means the price paid by all successful bidders.

[262]*Supra* note 25, at 3.

of CO2 allowances.[263] Nonetheless, CO2 emissions in RGGI states fell below the cap during this period, leaving a surplus of unsold CO2 allowances.[264]

Some analyses attribute the decrease of CO2 emissions in the region to fuel-switching from petroleum and coal generation to less carbon-intensive natural gas generation, lower demand for electricity by consumers, and increased nuclear and renewable capacity.[265] Thus, in the Program Review for the first control period compiled by member state agencies and stakeholder groups as required by RGGI MOU, a stronger reduced cap was strongly recommended. The Program Review culminated with the release of the updated Model Rule on February 7, 2013, which lowered the 2014 CO2 cap to 91 million tons and demand for allowances increased dramatically. As a result, clearing prices soared as high as $3.21 during auction with 100 percent of allowances sold upon the release of the reduced cap for 2014.[266]

The second control period of RGGI ran from 2012 to 2014. From the beginning of 2014, member states began to implement the update Model Rule adopted in late 2013. The reduced cap of 2014 with 91 million tons of CO2 represents a 45 percent reduction from the previous year. The cap will further decline 2.5 percent annually until 2020.[267]

The updated Model Rule also allows allowance banking. CO2 allowances acquired by compliance entities before 2014 can be used in the future. In 2014 RGGI designers

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[263] *Id.*

[264] *Id.*

[265] *Id.*

[266] *Id.*

[267] *Supra* note 251, at 4.

determined that these banked emissions accounted for 140 million tons of CO2, a considerable amount when compared to the 91 million tons of the CO2 emission cap of 2014.[268] To ensure the annual target is met with real reductions rather than with the use of banked allowances since the latter would lead to the actual emissions higher than the revised emissions cap, RGGI has made cap adjustments, which are applied each year between 2014 and 2020.[269] This novel solution may gradually eliminate the allowance surplus by adjusting future cap levels downward.

The updated Model Rule also alters the cost containment provisions in the RGGI program. Under the original model rule (2009-2013), potential cost concerns were addressed by allowing for the use of additional offsets if emission allowances reached specific levels.[270] The updated Model Rule which took effect in 2014 eliminated this approach and added a Cost Containment Reserve to the cap-and-trade program, intended to prevent the price of allowances from rising above a program-wide trigger price. The Reserve consists of a limited supply of additional CO2 allowances separate from the annual RGGI program CO2 budget.[271] The Reserve was triggered in 2014 and 2015, allowing for the sale of 5 million and 10 million additional allowances respectively.[272] In the abovementioned circumstances, all the additional allowances for the Reserve were successfully sold, thus effectively inflating the cap.

The RGGI program sets a clear limit on greenhouse gas emissions and translates this limit into tradeable emission allowances, which are auctioned or allocated to regulated

[268] *Supra* note 252, at 2.

[269] *Supra* note 252, at 10.

[270] *Supra* note 252, at 18.

[271] *Supra* note 251, at 4.

[272] *Supra* note 252, at 18.

emitters. At the end of each compliance period, each regulated entity must surrender to the state enough allowances to cover its actual emissions for the compliance period. Power plants within the region may comply with the cap by purchasing emission allowances through quarterly auctions, purchase from other emitters within the region or offset projects.[273] Otherwise, any breach will induce a penalty.

With some variance among the RGGI states, particularly in the early years, a substantial percentage of emission allowances were distributed through quarterly auctions.[274] During 2008 to 2015, the RGGI states had offered 91 percent of their budgeted emission allowances at auction.[275] Some of the offered allowances that were not sold subsequently have been retired. Other allowances were sold at fixed prices or distributed to various entities to support a variety of objectives.[276]

The auctions include a reserve price below which the seller refuses to part with the allowances for sale. The reserve price started at $1.86 in 2008, increasing to $2.10 in 2016 because RGGI states decided to increase the reserve price by 2.5 percent each year after 2014.[277] One expert indicated that "a reserve price may address certain logistical concerns, such as bidder collusion, that may be associated with auctions."[278] In addition, a reserve price may provide assurance to parties making emission reductions that will have a minimum value in the allowance market.[279] The clearing price equaled the reserve price in auctions conducted between June 2010 and

[273]*Supra* note 251, at 1.

[274]*Supra* note 252, at 6.

[275]*Supra* note 252, at 11.

[276]RGGI, *Allowance Allocation*, http://rggi.org/market/tracking/allowance-allocation (last visited Nov. 9, 2017).

[277]*Supra* note 252, at 12.

[278]*Id.*

[279]*Supra* note 252, at 11.

December 2012, reflecting the abundance of emission allowances in the market.[280] In this scenario, the reserve price acted like an emissions fee or carbon tax.[281]

The RGGI allowance auctions have generated over $2.4billion revenue in cumulative auction proceeds.[282] RGGI states have experienced economic growth with the decline of emissions and outpaced other states in this regard over the same period. During 2008 to 2015, RGGI states' economies grew by 24.9 percent versus 21.3 percent in non-RGGI states except California.[283] At the same time emissions in the RGGI region dropped by 30 percent versus 14 percent in other states.[284]

Member states have agreed under the RGGI MOU to direct at least 25 percent of all revenues generated at auction to consumer benefits such as renewable energy or energy efficiency programs.[285] A report attributed over $679 million in funding for energy efficiency, $151 million in funding for direct bill assistance programs for low-income families through the RGGI states.[286] Many viewed the allowance auctions as successful in terms of price discovery, transparency, transaction costs, logistical issues, and revenue generation.[287]

The RGGI program also has an offset provision. An offset is a measurable reduction, avoidance, or sequestration of GHG emissions from a source not covered by an

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[280]*Id.*

[281]*See*, Jane A. Leggett, Jonathan L. Ramseur & Molly F. Sherlock, *Carbon Tax: Deficit Reduction and Other Considerations*, CRS Report R42731 (2012).

[282]*Supra* note .252, at 12.

[283]*Id.*

[284]*Id.*

[285]*Supra* note 251, at 8.

[286]*Supra* note 252, at 15.

[287]*Supra* note 252, at 12.

emission reduction program.[288] Experts have observed that an offset has the potential to provide considerable cost savings and other benefits if it is allowed as a compliance option in a cap-and-trade program. However, offsets have generated considerable controversy "primarily over the concern that illegitimate offsets could undermine the ultimate objective of a cap-and-trade program: emission reduction."[289] RGGI sets a 3.3 percent limit for entities to use offsets to cover their allowance submission, a relatively low percentage compared to 8 percent by California's cap-and-trade system and some federal proposals.[290] RGGI also limits offset projects to five types, which must be located within RGGI states. Some offset projects raise concerns because they may not represent real emission reductions.[291] Nevertheless, there are no offset projects developed under the RGGI program yet, according to the RGGI offsets tracking database.[292]

The RGGI program is regarded an effective one.[293] Through almost eight years of operation after its inception from January 1, 2009, RGGI has helped northeast and Mid-Atlantic States achieve significant reductions in emissions of CO2 and other pollutants from the electric power sector. Fuel-switching, improved energy efficiency, and growing renewable energy output have caused emissions to drop by 37 percent since RGGI was launched.[294]

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[288] *Supra* note 252, at 17.

[289] Jonathon L. Ramseur, *The Role of Offsets in a Greenhouse Gas Emissions Cap-and-Trade Program: Potential Benefits and Concerns*, CRS Report RL34436 (Sept. 30, 2013).

[290] *Supra* note 252, at 17.

[291] *Id.*

[292] *Id.*

[293] *Supra* note 113.

[294] *Supra* note 113, at 3.

A 2015 report by the Acadia Center claims that "the decline in carbon dioxide emissions from power plants in the RGGI region has been accompanied by reductions in hazardous pollutants that threaten public health. Emissions of sulfur dioxide (SO2), nitrogen oxides (NOx), and mercury (Hg) are all down significantly since the program began."[295] The 2015 Acadia Center report estimated that over $10 billion health benefits have been achieved from the regional reductions in SO2 and NOx since RGGI's launch.[296]

All nine RGGI states now have Renewable Portfolio Standards that require electric utilities to procure increasing quantities of renewable electricity.[297] Many of the RGGI states are increasing commitments to renewable energy. New York has committed to a 50 percent renewable energy supply by 2030, and Rhode Island recently adopted a 40 percent renewable energy requirement by 2035.[298]

However, the design of RGGI cannot avoid emission leakage by importing electricity from non-RGGI states. In the worst case scenario, maximum leakage would occur if imported electricity from a coal-fired power plant replaced in-state electricity generated from a zero-emission source.[299]

The Cost Containment Reserve also needs to be improved. When the price thresholds are reached Reserve allowances will be sold, thus leading to emissions additional to the original cap. To overcome the current shortcomings of the Reserve, the cost

[295] *Supra* note 113, at 5.

[296] *Id.*

[297] *Supra* note 113, at 8.

[298] *Id.*

[299] *Supra* note 252, at 16.

containment approach adopted by the California emissions trading program has been recommended.[300] Unlike the Reserve in RGGI, about 4 percent of California's original number of allowances from the capped budget is held back in the allowance price containment reserve.[301] If this reserve of allowances is exhausted, limited borrowing is allowed from the latest program years. Thus, the cumulative supply of allowances would not be increased when the Reserve prices' threshold are triggered.

In addition, it is worth noting that the proposed striking down of the Clean Power Plan (CPP) by the courts and the current U.S. Administration will undoubtedly impact the supply and demand dynamics in the RGGI market, even though the RGGI program has offered an attractive option for states considering how best to meet CPP requirements.[302] The announcements related to the Clean Power Plant proposal appear to have driven speculative behavior in the RGGI market. From first auction following the release of the drafted Clean Power Plant proposal to the auction in December 2015, RGGI allowances prices soared by 49 percent. Over the three months after the Supreme Court suspended the enforcement of the Proposal, allowances prices plunged by 30 percent.[303]

3.2.2 The Western Climate Action Initiative (WCI)

The Western Climate Action Initiative (WCI) is a multi-jurisdictional collaboration that aims to develop regional strategies to combat climate change in North America. WCI partners originally include 11 jurisdictions: Arizona, California, Montana, New Mexico, Oregon, Utah, and Washington in the US; and British Columbia, Manitoba,

[300] *Supra* note 136, at 10.

[301] *Id.*

[302] *Supra* note 289, at 12.

[303] *Id.*

Ontario and Quebec in Canada. The program encompassed 19 percent of the population of the US and 79 percent of the population of Canada. The program began in January 2012 with these original jurisdictions.[304] However, the WCI is currently composed of British Colombia, California, Ontario, Quebec, and Manitoba.[305] Other participating states in the US and the provinces in Canada either withdrew from the WCI program or remained within the program nominally without any substantial actions for a variety of reasons.[306]

Along with other two regional climate initiatives in North America, RGGI, MGGRA and WCI had joined in a cooperative effort to share experiences in the design and implementation of regional cap-and-trade programs, inform federal decision making on climate change policy, and explore the potential for further collaboration among the three regional programs in the future. The three regional programs together included 23 U.S. states and 4 Canadian Provinces accounting for approximately one-half of the U.S. population, over one-third of U.S. greenhouse gas emissions, over three-quarters of the Canadian population and one-half of Canadian greenhouse gas emissions.[307]

The WCI was the most ambitious North American cap-and-trade system under development. It was anticipated that it would become the second-largest program on the globe from the beginning of the program and many felt that it would be an initial

[304]Carbon Offset Research and Education, Western Climate Initiative, Stockholm Environment Institute & Greenhouse Gas Management Institute (Jan. 2011), http://www.co2offsetresearch.org/policy/WCI.html (last visited Nov. 9, 2017).

[305]*Id.*

[306]*Id.*

[307]*Id.*

platform for US and Canadian federal systems. However, federal cap-and-trade was not adopted by the two national governments, with only California and the three Canadian Provinces remaining committed.[308]

Only California and Quebec started their first compliance periods on January 1, 2013 independently. One year later, on 1 January 2014, California and Quebec linked their systems creating the first international cap-and-trade system consisting of sub-national jurisdictions. In 2015, Ontario and Manitoba then announced plans to develop an ETS.[309]

The program experienced three periods: 2003-2008, when the WCI was coalescing; 2008-2011, when it largely disintegrated; and 2011 to the present, when its membership has greatly reduced.[310]

The shared WCI emissions cut target for greenhouse gases was 15 percent below 2005 levels by 2020. The covered entities with the first phase included direct emissions from stationary installations with emissions of over 25,000 tCO2e annually.[311] The WCI program intended to cover emissions of carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. Covered industries include electric utilities, industrial and commercial facilities, industrial processing (including oil and gas), residential, commercial and fuel combustion facilities, and

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[308]Sonja Klinsky, *Bottom-up policy lessons emerging from the Western Climate Initiative's development challenges*, 13 CLIMATE POLICY 143, 169 (2012), http://dx.doi.org/10.1080/14693062.2012.712457 (last visited Nov. 9, 2017).

[309]*Supra* note 102, at 41.

[310]*Supra* note 308, at 145.

[311]*Id.*

transportation fuel combustion.[312] The program was to be expanded to cover 90 percent of regional greenhouse gas emissions by 2015.

The WCI program is a decentralized structure, which allows each jurisdiction to develop its own targets and regulations, a typical bottom-up approach. This decentralized structure and bottom-up approach have aided the early development of the WCI program and probably facilitated its coalescence.[313]

Despite the rapid coalescence of the WCI up to 2008, the policy landscape had changed dramatically by the middle of 2010; this, along with other reasons, led to disintegration of the WCI. Sonja Klinsky, a researcher at Cambridge Centre for Climate Change Mitigation, attributed the disintegration of the original WCI due to the economic crisis and increased emphasis on state-specific economic cost; increasing climate skepticism, which changed electoral politics among states; and political polarization and a shift within the Republican Party in the US.[314]

As a result, by the beginning of 2011, only California and the four Canadian Provinces remained in the WCI program. And the maintenance of the WCI program is still encountering challenges, such as fractures due to the unbalanced structure that would be created.

California has always been a leader within the WCI with a large portion of the market. California's decisions made it difficult for the remaining partners to design their own

[312]Western Climate Initiative, *Design recommendations for the WCI Regional Cap-And-Trade Program*, http://www.westernclimateinitiative.org/WCI_Documents.cfm (last visited Nov. 9, 2017).

[313]*Supra* note 312, at 152.

[314]*Supra* note 312, at 158.

regulations that reflect their economic and political needs.[315] However, the diversity of the WCI policies encompass a portfolio approach allowing jurisdictions to stay nominally within the WCI, even those who rejected cap-and-trade.[316] Some experts have concluded that the WCI program cannot be regarded as a complete success, but neither should be regarded as a failure.[317]

3.2.3 California Cap-and-Trade Program

The California Cap-and-Trade Program was inaugurated in 2012. California has been part of the Western Climate Initiative (WCI) since 2007, and formally linked its system with Quebec's on January 1, 2014.[318] The cap-and-trade program covers approximately 85 percent sources of greenhouse gas emissions in the state. Sectors covered by the program include transportation, electricity, commercial and residential sector, industries, agriculture and forestry.[319]

The targets of emission reduction set by the California cap-and-trade program are as follows: reducing emission to 1990 GHG levels by 2020; reducing emission by 40 percent from 1990 GHG levels by 2040; and reducing emission by 80 percent from 1990 GHG levels by 2050. The program also set the caps for three compliance periods: first compliance period (2013-2014); second compliance period (2015-2017); and third compliance period (2018-2020).[320] The cap of the program was designed to strengthen by declining slightly each year.

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[315] *Supra* note 312, at 158.

[316] *Supra* note 312, at 160.

[317] *Id.*

[318] *Supra* note 102, at 41.

[319] International Carbon Action Partnership [hereinafter "ICAP"], USA-California Cap-and-Trade Program 1 (Feb. 10, 2017).

[320] *Supra* note 319, at 1.

Greenhouse gases targeted by the California cap-and-trade program encompass CO2, CH4, and N2O with a threshold for the covered entities being facilities with 25,000 tCO2e (metric) or more per data year. Allowances are distributed either through auction or free allocation. Industrial facilities receive free allowances for transition assistance and to prevent leakage. Transition assistance will decline from 2018. The amount of free allowances is determined by leakage risk in line with emission intensity and trade exposure and sector-specific benchmarks. Each entity's allocation declines annually in proportion to the cap. The majority of industrial allocation is based on production benchmarks and is updated annually based on verified production data.[321]

The California cap-and-trade program provides flexibility in enforcement. The program allows allowances' banking for future use, but the emitter is subject to a general holding limit. Borrowing[322] of future vintage[323] allowances is not allowed. Offsets and credits are also permitted by the program with some restraints. The quantitative limit for offsets and credits is less than 8 percent of each entity's compliance obligation. The qualitative limit for offsets and credits is also provided by the program. Only six domestic offset types are accepted as compliance units originating from projects carried out in light of the projects protocols.[324] The six

[321]*Supra* note 319, at 3.

[322]A covered entity borrows allowances from the next compliance period for its compliance obligation when there is a shortfall between the amount of credits or allowances it holds and its actual carbon emissions during the compliance period.

[323]Allowances are either allocated annually or in accordance with certain compliance period, or purchased through auctions. Each auction is labeled with year or quarter. The specific type of allowances is the vintage of allowances.

[324]*Supra* note 319, at 3.

types of offset projects include U.S. forest projects, urban forest projects, livestock projects (methane management), ozone depleting substances projects, mine methane capture projects, and rice cultivation projects.

The California cap-and-trade program also has provisions for price management. The program set a floor price for allowances at auction. The 2017 Auction Reserve Price, serving as the floor price, is $13.57 per allowance. The auction reserve price increases annually by 5 percent plus inflation measured by Consumer Price Index. A ceiling price for allowance auction, referred to as Allowance Containment Reserve, is also provided by the program.

There is a reserve sale administrator who can sell accumulated allowances on a regular basis in three equal price tiers. Take the year 2017 as an example; the prices are $50.69, 57.04, and 63.37 respectively. Tier prices increase by 5 percent plus inflation measured by the Consumer Price Index on the basis of the closest previous price of the reserved allowances.[325] An Allowance Containment Reserve will be allocated allowances from various budgets, the total amount of allowances being 1 percent for budget years 2013-2014; 4 percent for budget years 2015-2017; and 7 percent for budget years 2018-2020.[326] If the allowances in the Allowance Containment Reserve from a current year are sold out, allowances from future years are transferred to the reserve and made available for sale.[327]

[325] *Supra* note 319, at 1.

[326] *Supra* note 319, at 3.

[327] *Supra* note 319, at 1.

The California cap-and-trade program, which anchors North America's largest carbon market,[328] was created by a 2006 climate law known as AB32. The market has generated more than $4 billion in revenue from carbon emission reductions.[329] AB32 stated that the market-based system for achieving pollution cuts was "applicable" until the end of 2020.[330]

The performance of the carbon prices has been far below anticipation at the beginning of the launch of the program. Prices for allowance trading on the secondary market[331] remained consistently below the auction price floor, the minimum price set by the California Air Resources Board, the state environmental protection agency, being in charge of air quality and the carbon market in the state.[332] Several events accounted for the weak auction prices since the inception of the market from 2012. First, California's relatively gradual recovery from the recession in 2008 curbed industrial activities and the demand for carbon credits.[333] Second, California progressed toward its 2020 emission reduction target much faster than predicted due to the success of other state policies,[334] such as renewable portfolio standards, and energy efficiency standards for vehicles and buildings. These policies reduced the overall demand for carbon allowances on the cap-and-trade market.[335] Another factor was the legal

[328]Chris Busch, *Carbon Prices Rise in California's Cap-and-Trade Program as Legal Certainty Grows*, FORBES (Feb 8, 2017), http://www.forbes.com/sites/energyinnovation/2017/02/08/carbon-prices-rise-in-californias-cap-and-trade-program-as-legal-certainty-grows/#450b188474 (last visited Nov. 9, 2017).

[329]*Id.*

[330] John Upton, *Legal Doubts over California's Cap-and-Trade Program*, CLIMATE CENTRAL (Aug. 16, 2016), http://www.climatecentral.org/news/legal-doubts-over-californias-cap-and-trade-20607 (last visited Nov. 9, 2017).

[331] Allowances allocation is regarded as primary market, while buying and selling allowances and offset credits from carbon market is regarded as secondary market.

[332]*Supra* note 328.

[333] Dale Kasler, *California's cap-and-trade program sputters again*, THE SACRAMENTO BEE, (Aug. 23, 2016), http://www.sacbee.com/news/politics-government/capitol-alert/article97380457.html (last visited Nov. 9, 2017).

[334]*Supra* note 328.

[335]*Supra* note 333.

uncertainty that the cap-and-trade program would be continued after its expiration date in 2020. The plain language of state law dictates that the state's cap-and-trade program "may not be applied or used" after 2020.[336]

It is still unclear that whether the legislature will renew cap-and-trade program after its expiration date. The Senior Science Writer at Climate Central maintained that legal doubts over the cap-and-trade program's future are coinciding with long-running legislative battles in Sacramento over efforts to enact California climate laws affecting the period after 2020. And the battle over cap-and-trade is stated to be more confounding than the battle over California's climate targets.[337] Additionally, several business groups are challenging the constitutionality of the program before the 3rd District Court of Appeal. All of this is occurring despite the fact that state Governor Jerry Brown reiterated his commitment to extending cap and trade beyond 2020.[338] The secondary market data, which reflects transactions between allowances holders and buyers outside of government-managed auctions, now indicates a price increase from the November 2016 quarterly auction will continue in the upcoming auctions, due to increasing legal certainty over the program's future.[339]

It's worth mentioning that California's program has been linked with the Canadian Province of Quebec's cap-and-trade system since January 1, 2014. This is the first time sub-national jurisdictions have coordinated and linked their cap-and-trade

[336] *Supra* note 330.

[337] *Id.*

[338] *Supra* note 333.

[339] *Supra* note 328.

systems.[340] The successful joint carbon market provides a model for future linkage, as carbon markets continue to grow and mature across North America and the rest of the world.[341] This joint program between California and Quebec will expand further with the amendment proposal to link it with the emerging emissions trading system of Ontario in 2018.[342]

3.3 Emission trading in other countries

3.3.1 Emission trading in South Korea

At the 60th anniversary of the foundation of the Republic of Korea on August 15, 2008, President Lee Myung-bak proclaimed 'Low Carbon Green Growth' as a national strategy for the next 60 years. To realize a low carbon economy, ROK announced its voluntary mid-term carbon reduction target—30 percent below business-as-usual (BAU) levels by 2020, at the Copenhagen climate summit in 2009. The country then became the first non-Annex I country of the UNFCCC to set the maximum recommended reduction target voluntarily in the world.[343] On April 14, 2010, the Framework Act on Low Carbon, Green Growth (hereinafter Framework Act) was enacted. Article 46 of the Framework Act endorsed for the government to establish market mechanisms to meet the national GHGs reduction goals.[344]

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[340] *Supra* note 102, at 8.

[341] *Supra* npte 102, at 13.

[342] *Supra* note 319, at 4.

[343] Suh-Yong Chung, Chris Salatiello, and Bora Youn, *An Overview of the Emission Trading System of Korea*, Asian Journal of Climate Change and Sustainable Development: Law, 1 Economics and Politics 1, 1(2012).

[344] *Supra* note 343, at 10.

With the enactment of the Act on the Allocation and Trading of Greenhouse Gas Emissions Allowances (hereinafter "Emissions Trading Act") for a national emission trading system on May 2, 2012, the Republic of South Korea chose an emissions trading system as its main mitigation policy to achieve its voluntary mid-term carbon reduction target of 30 percent below business-as-usual levels by 2020.[345] The Emissions Trading Act lays out a general framework of the carbon emission trading system. More specifics on carbon emissions trading system are provided by a Presidential Decree, based on the legislation aforementioned.[346]

Take allocation as an example, the Enforcement Decree provided that 100 percent free allocation to eligible industries for the first commitment period, and 97 percent for second commitment period. From 2021, the allocation rate of free allowances will be decided through the Presidential Decree and is expected to be around 90 percent.[347] The Enforcement Decree also provided for an emission allowance exchange, trading, measures for market stabilization, offsets, surrender of allowances, MRV, and penalties in a concrete manner.

With the enactment of the Framework Act, the Republic of Korea established a Greenhouse Gas and Energy Target Management System (hereinafter Management System) in 2010, serving the purpose of introduction of a mandatory ETS.[348] The entities which were subject to the Management System include administrative agencies, local governments, public institutions, local public corporations, public universities, hospitals, each with emissions above the 25,000 t/CO2e threshold (the

[345] *Id.*

[346] *Supra* note 343, at 7.

[347] *Supra* note 343, at 17.

[348] *Supra* note 343, at 10.

threshold will be subject to adjustments). These entities accounted for more than 60 percent of national GHGs emissions. In 2011, 470 entities participated in the Target Management System. Covered entities that exceeded their annual cap were simply required to pay a one-off penalty.[349]

Though, the Target Management System did not have provisions for credits or emissions trading, it enabled a much smoother transition for corporations and public entities leading up to the later requirement for the emissions trading system because of the accumulated data and experience in reporting, monitoring and achieving carbon emission reduction goals.[350]

On January 1, 2015, the Republic of Korea launched its national ETS (KETS), the first nation-wide cap-and-trade program in operation in East Asia. The KETS covers 525 of the South Korea's largest emitters including 5 domestic airlines, which account for about 68 percent of its national greenhouse gas emissions.[351] Direct emissions from six gases specified in the Kyoto Protocol[352] as well as indirect emissions from electricity consumption are covered by the system. The sectors covered by KETS also include fuel combustion, transport, fugitive emissions, industrial processes, agriculture and waste. The KETS set the goals of cutting carbon emissions by 30 percent below business as usual by 2020, and 37 percent 2030. The latter represents a

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[349] *Supra* note 343, at 11.

[350] *Id.*

[351] *Supra* note 319.

[352] The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC) commits its parties to binding targets based on a "basket" of six GHGs, including carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). *Annex A*, Kyoto Protocol to the United Nations Framework Convention on Climate Change, *available at* http://unfccc.int/kyoto_protocol/items/2830.php.

22 percent carbon emissions reduction below 2012 greenhouse gas levels.[353]

The KETS set up three trading periods: phase one for 3 years, starting from 2015until 2017; phase two for 3 years, 2018 to 2020; phase three for 5 years, 2021 to 2025. During the first phase, all of the allowances were to be allocated for free. Most sectors were to receive free allowances according to the average GHG emissions of the base year (2011-2013). Three sectors (grey clinker, oil refinery, and aviation) were to be allocated free allowances following the benchmarks in light of their previous activity data from the base year (2011-2013).[354]

Around 5 percent of total allowances were to be retained in a reserve for market stabilization measures, early action, new entrants and other purposes in the first Phase. In addition, any unallocated allowances and withdrawn allowances were to be transferred to the reserve.[355]

In Phase two, 97 percent of the allowances were to be free, allocated to covered entities; 3 percent of the allowances were to be auctioned. In Phase three, less than 90 percent of allowances are to be distributed for free, more than 10 percent of the allowances are to be auctioned.[356] Energy-intensive and trade-exposed sectors will receive 100 percent free allowances in all phases,[357] because of the consideration of international competitiveness of relevant industries, impacts on the national economy,

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[353] *Id*.

[354] *Id*.

[355] *Id*.

[356] *Id*.

[357] *Id*.

and other factors.[358]

The KETS also has provisions on banking and borrowing. Banking is allowed without any restrictions. Borrowing is allowed only within a single trading phase, with the limitation of a maximum of 10 percent of entity's obligation in 2015. The ratio of borrowing has been increased to 20 percent in 2016 and 2017. Offsets and credits are provided by KETS as well, with some qualitative and quantitative limits. Only domestic credits from external reduction activities implemented by non-ETS entities, that meet international standards, may be used for compliance, as the qualitative requirements.[359] Eligible activities include those eligible under the Clean Development Mechanism (CDM) and Carbon Capture and Storage.[360] Offset credits submitting for each entity's compliance obligation cannot exceed 10 percent, as a quantitative limit.[361]

The KETS also has provisions regarding price stabilization. The stabilization measures include additional allocation from the reserve of up to 25 percent, establishment of an allowance retention limit: minimum 70 percent or maximum 150 percent of the allowance of the compliance year, an increase or decrease of the borrowing limit up to 20 percent currently, an increase or decrease of the offsets limit up to 10 percent currently, the temporary establishment of a price ceiling or price floor.[362]

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[358] *Supra* note 343, at 17.

[359] *Supra* note 319.

[360] *Id*.

[361] *Id*.

[362] *Id*.

Measuring, reporting, and verification (MRV) is mandatory for the covered entities, according to article 31 of the Enforcement Decree.[363] Annual reporting of emissions must be submitted within three months from the end of a given compliance year by the end of March.

With a statement of emissions, the regulated entities are also required to make an electronic submission of a verification report issued by an independent third party verifier. If a regulated entity fails to report emissions correctly, the report will be disqualified. A third party verifier is required to be an institution equipped with skilled personnel and necessary resources to conduct professional verification.[364] It is also required to be accredited by the competent authority to verify emissions. In addition, a verifier has an obligation to purchase liability insurance re greenhouse gas emission verification.[365]

There are penalties for the violations of KETS laws and regulations, including securities and trading laws and regulations relating to market manipulation, fraudulent market transactions, and insider information. The penalty for not submitting or not submitting enough allowances is three times the average market price for that given compliance year (EUR70/ton).[366] Civil and criminal penalties can also be assessed against individuals and corporations for fraud, market manipulation, insider trading, and negligent failure to comply with the Emissions Trading Act.[367]

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[363] *Supra* note 343, at 25.

[364] *Supra* note 343, at 26.

[365] *Id*.

[366] *Supra* note 319.

[367] *Supra* note 343, at 27.

3.3.2 Emission trading in Japan

3.3.2.1 JVETS

Japan is the world's third largest economy with a GDP of $4.41 trillion,[368] and overall greenhouse gas emissions of 1,365 million tons of carbon dioxide equivalent (tCO2e) in 2014, a 7.5 percent increase in comparison with 1990 levels.[369] In 2014, CO2 emissions from the energy sector accounted for 87.2 percent of total emissions.[370]

In 1998, Japan enacted the Act on the Promotion of Global Warming Countermeasures. The act was amended to implement the Japan Voluntary Emission Trading System (JVETS) in 2005, the first carbon emissions trading system ever implemented in the country.[371] The scope of the JVETS covered CO2 emissions from industrial process (production and energy consumption), offices (energy consumption) and waste management (waste incineration, waste combustion, and waste recycling).[372] Certified Emissions Reduction credits (CERs) for compliance were allowed with the condition that these credits were not the primary means for achieving reduction targets. Unlimited banking of allowances and credits was also allowed between compliance periods, while borrowing was not allowed.[373] At Phase 7 in 2012, the final phase of the JVETS, the system had 389 participants and achieved a 59,419-tCO2 emission reduction. The average carbon price was roughly

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[368] *Economy of Japan*, WIKIPEDIA, *available at* https://en.wikipedia.org/wiki/Economy_of_Japan.

[369] *Japan's National Greenhouse Gas Emissions in Fiscal Year 2014 (preliminary Figures)*, Ministry of the Environment, Government of Japan (November 26, 2015) *available at* https://www.env.go.jp/en/headline/2197.html.

[370] *Japan's National Greenhouse Gas Emissions in Fiscal Year 2014 (Preliminary Figures , Executive Summary*, Ministry of the Environment, Government of Japan, *available at* https://www.env.go.jp/press/files/en/635.pdf

[371] *Japan: An Emissions Trading Case Study*, Environmental Defense Fund, [hereinafter EDF] at 1, (May 2015).

[372] *Supra.*note 371, at 3.

[373] *Id.*

$2.60/tCO2.[374] During fiscal year 2006 to 2012, the accumulative carbon emission reductions achieved were 2,217 million tCO2e. The average price from fiscal year 2006 to 2012 was $9.76/tCO2.[375]

The Act on the Promotion of Global Warming Countermeasures was amended again in 2008 for the purpose to establish the Japanese Verified Emissions Reduction, which was launched in November 2008.[376] In 2008, Japan enacted the Action Plan for Achieving a Low-Carbon Society established by Council on the Global Warming Issue. The action plan began in October 2008 and ended in 2012, and it implemented experimental introduction of an integrated domestic market for emissions trading. The experimental ETS is comprised of two parts: the experimental domestic ETS and two offset crediting systems.[377] The former requires firms setting their emissions reduction targets and surrendering allowances and credits to comply their obligation. The latter provides credits to participating firms from the Internal Crediting system (domestic CDM) and the international Kyoto crediting mechanism. A certification Committee was established in 2013 to supervise the new credit system and is responsible for the approval of the methodologies and protocols from the offset projects.[378]

The objective of the credit system is to support regional joint efforts within Japan's territory to achieve the greenhouse gas emissions reduction goal. Firms may earn certified credits through the implementation of energy saving equipment, usage of

[374] *Id.*

[375] *Supra* note 371, at 4.

[376] *Id.*

[377] *Supra* note 371, at 3.

[378] *Supra* note 371, at 4.

renewable energy, and emissions removal through forest management in Japan.[379] The credit system will expire on 31 March, 2021. Credits from the Domestic CDM will expire as well at the same time.[380]

Japan also launched a Bilateral Offset Crediting System, which is known as the Joint Crediting Mechanism. The end of the Mechanism is to assist Japan achieving its 2020 emissions cut target at a lower cost and to develop export markets for low carbon technology, products and services.[381]This system allows Japanese firms acquiring offset credits through investing greenhouse gas emissions reduction projects in developing nations. To date, Japan has already signed bilateral agreements with 12 countries, including Bangladesh, Cambodia, Costa Rica, Ethiopia, Indonesia, Kenya, Laos, Maldives, Mexico, Mongolia, Paula, and Vietnam.[382] The first bilateral project was conducted with Mongolia and was signed in January 2013, and the first registered project was conducted with Indonesia in October 2014. The scope of this project covers electricity generation and distribution, transportation, industry and waste management, renewable energy and energy efficiency, avoided deforestation, etc.

The Japanese government also enacted a Basic Act on Global Warming Countermeasures in 2010, which encompassed the following aspects: a mid-term target to reduce GHG emissions 25 percent by 2020 below 1990 levels; a long-term target to cut GHG emissions 80 percent by 2050 below 1990 levels; a target to increasing the share of renewable energy within the total primary energy mix to 10

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379 *Id.*

380 *Supra* note 371, at 5.

381 *Supra* note 371, EDF, at 6.

382 *Id.*

percent by 2020; a carbon tax, and; the introduction of a feed-in-tariff program.[383]

Nevertheless, Japan declined to sign up for a second commitment period under the Kyoto Protocol at the end of 2010, and abandoned the proposed national ETS in 2012. After the Fukushima nuclear power plant accident, the Japanese govern halted electricity generation from the country's nuclear power plants. This led to a downwards revision in the country's 2020 GHG reduction target to 3.8 percent by 2020 below 2005 levels, a significant setback from the original target.[384]

The Japan Voluntary Emission Trading System (JVETS) was launched by the Ministry of the Environment in 2005, aiming to provide companies with opportunities to master technical skills regarding emissions trading procedures, such as validation, verification, monitoring, reporting, and trading.[385] Although JVETS was based on entities' voluntary participation, participants were required to set an absolute emission target. The targeted gas was CO2, direct emissions and indirect emissions from electricity and heat usage. Participants were free to sell the allowances but needed to ensure that they held allowances equal to their actual verified emissions by the end of the compliance period.

Thirty-one parties participated in Round 1, which was from April 2005 to August 2007. Fifty-eight parties were involved in Round 2, from April 2006 to August 2008. And 61 participants engaged in Round 3, which ran from April 2007 to August

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[383] *Supra* note 371, EDF, at 3.

[384] *Id.*

[385] Shuta Mano, Jusen Asuka, and Yasushi Ninomiya, *Japan Voluntary Emission Trading System: Lessons for Policy, Proceedings of International Symposium on EcoTopia Science 2007*, ISETS07 at p1311 (2007).

2009.[386] The total emission reduction in Round 1 was 377,056 tCO2, accounting for 29 percent of the aggregated base-year emission of the participants and was increased comparing with the assumed emission reduction. The total transactions of emission trading were 24 times and the total amount of allowances transferred was 82,624 tCO2, excluding allocation, retirements, and cancellations.[387]

Unlike EU ETS, the JVETS system was based on entities, including all emission sources within a factory building, while EU ETS was based on facilities. A researcher at Mitsubishi Research Institute explained why EU chose installations as the boundaries of EU ETS. The main reason was because EU already regulated companies to report emissions from each installation including greenhouse gases under an Integrated Pollution Prevention and Control program at the time of introducing EU ETS. But, in Japan, regulated companies are required to monitor/report all emissions within a factory (building) under law specifically regulating greenhouse gases emissions and Energy Conservation Law.[388]

MRV was recognized to be of significantly importance under the JVETS. Unlike commodities such as food or energy, which have an inherent value of their own, carbon credits in themselves have no inherent value but only have value in the context that they can be used to satisfy an emission target.[389] Thus, consistent and transparent rules for MRV had to be established to ensure a reliable carbon credit market and

[386] *Supra* note 385, at 1312.

[387] *Id.*

[388] *Supra* note 385, at 1313.

[389] *Supra* note 385, at 1311.

achieve environmental goals.[390]

However, JVETS showed that there was over a 10 percent gap between the actual emission reduction and the estimated one. This posed a question regarding the credibility of carbon credits issued under the system.[391] If the MRV rule is not sufficiently robust, there is a perceived opportunity to systematically under report annual emissions, or over report emission reductions, which will undermine the credibility of carbon credits.[392]It was therefore suggested that designing an MRV system based on transaction data of entities would be superior to a system based on the data from actual measurements, because the data in a transaction monitored by proper entity measurements is governed by measurement law and transaction law, while the data from actual measurements is internally controlled and, being less reliable, must be checked by an independent third party, such as a verifier.[393]

3.3.2.2 Tokyo Cap-and-Trade Program

Japan abandoned its national ETS proposal in 2012.Instead it established a Feed-in-tariff and global warming tax. However, an emission trading system still exists at the local level. Tokyo Metropolitan Government Cap-and-Trade Program is a good example. After the approval of the Climate Change Strategy, and the amendment of the Tokyo Metropolitan Environmental Security Ordinance in June 2008, the Tokyo Greenhouse Gas Emission Trading System was officially created.[394] The Tokyo CO2 Emissions Reduction Program provided Tokyo with necessary capacity to enact

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[390] *Supra* note 385, at 1313.

[391] *Id.*

[392] *Id.*

[393] *Id.*

[394] *Supra* note 371, at 3.

Japan's first mandatory ETS in April 2010.[395]Tokyo was the first large scale city to implement a cap-and-trade program in the world, which targeted energy-related

carbon dioxide.[396] The Tokyo ETS includes coverage of large scale office buildings.[397]

As of 9 January 2015, 1232 facilities had reporting obligations under the Tokyo ETS.[398] The threshold of the system for the covered facilities applied to facilities with fuel consumption over 1, 500 kiloliters of crude oil-equivalent annually. The base year emissions were determined by average annual emissions from any three consecutive fiscal years (FYs) between FY2002 and FY2007.[399] Its first compliance period was from FY2010 to FY2014, with a 6 to 8 percent reduction for this period. Its second compliance period began from FY2015 until FY2019, a 15 to17 percent reduction for this period. The third compliance period will run through from 2020 to 2022, without a determined target.[400]

The principle for allowances allocation was based on historical emissions, a grandfathering approach. Base-year emissions for the first compliance period were based on the average emissions of three consecutive years between FY2002-FY2007. Allocation to new entrants was based on past emissions or on emissions intensity

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[395] *Supra* note 319, at 1.

[396] *The World Bank, Tokyo's Emissions Trading System, A Review of its Operation Since 2010*, Urban Development and Resilience Unit, at 1 (June 2013).

[397] *Supra* note 371, at 9.

[398] *Supra* note 371, at 3.

[399] *Supra* note 371, at 2.

[400] *Supra* note 371, at 3.

standards: emissions activity (floor area)×emission intensity standard.[401] The formula of allocation was as follows: base year emissions-compliance factor (6-8percent, or 15-17percent)×compliance period (5 years). For the second year of each compliance period, reductions in excess of annual obligations could be traded as credits, subject to a limitation of one-half of base year emissions.[402]

Overall GHG emissions by sector covered include commercial, transport, residential, industrial and waste. The overall targets of GHG reduction set by Tokyo ETS program encompass a 25 percent reduction by 2020 from 2000 GHG levels, and a 30 percent reduction by 2030 from 2000 GHG levels.[403]

The Tokyo ETS set an absolute cap at the facility level that aggregates to a Tokyo-wide cap. The formula for calculation is the sum of base year emissions of covered facilities × compliance factor × number of years of compliance period (five years).[404]

Regarding flexibility issues in the Tokyo ETS, banking is allowed between the two compliance periods. Banking from first compliance period to the second compliance period is allowed, but banking from the first to third is not. Borrowing allowances are not permitted. Currently, credits from the following four types of loans are allowed. The amount of emission reductions achieved by implementing emission reduction measures from non-covered small and medium sized facilities in Tokyo since FY2010

[401] *Supra* note 319, at 1.

[402] *Supra* note 396, at 2.

[403] *Supra* note 319, at 1.

[404] *Id.*

can be used for compliance without limit.[405] Emission reductions achieved from large facilities outside of the Tokyo area can be used for compliance for up to one-third of a facilities' obligation. Credits from renewable energy, such as solar, wind, geothermal, or hydro (under 1,000 kW) can be used for compliance without limit as well. In addition, two types of Saitama Credits, including excess credits from the Saitama system, and small and mid-size Facility Credits issued by the Saitama Prefecture can also be used for compliance without limit.[406] All offsets have to be verified by verification agencies. There are no provisions for price management. However, the supply of credits available for trading may be increased in case of excessive price increases.[407]

Monitoring, reporting, and verification are required in the compliance process in the Tokyo ETS. If the regulated entities do not comply with laws and regulations, enforcement measures are prescribed. In the first stage of enforcement, the Governor orders the facility to reduce emissions by the amount of the reduction shortfall multiplied by 1.3. In the second stage of enforcement, any facility that fails to carry out the order will be publicly named, and subject to fine up to JPY500,000 ($4,360), with 1.3 times the shortfall surcharges.[408]

Information on market prices has been very limited. This first trade was announced in August 2010, when 22 tons were traded at JPY12,000 ($142). In 2012, 600 tons of offsets from green electricity certificate were sold in the Tokyo ETS market. Two estimated reference prices were recorded: JPY15,000 ($131) per ton based on the

[405] *Supra* note 319, at 3.

[406] *Id.*

[407] *Id.*

[408] *Id.*

price of solar energy under the Renewable Portfolio Standard law, and between JPY8,000 ($70) and JPY26,000 ($227) per ton based on the price of Green Energy Certificates as reported by the Japan Ministry of Environment.[409] The average carbon price in 2014 was $95.[410]A report attributes the relatively limited trading activities under the Tokyo ETS to the fact that it does not intend for trading to be a primary option. Instead, trading is intended as the last option for facilities that are unable to meet their reduction obligations by other means.[411]

The Tokyo TMG ETS has been expanded to the Saitama prefecture which decided to adopt a city-based ETS in 2009. Tokyo and Saitama have agreed to link their markets with each other since 2010. The two cities agreed that participating facilities in each ETS can trade credits across the boundary between Tokyo and Saitama. Specifically, excessive reductions from a large facility in either jurisdiction can be utilized by a facility in the other jurisdiction to fulfill its reduction obligation, from the end of the first compliance period in 2015. Credits from small and medium sized facilities in either jurisdiction can also be used by a large facility in the other jurisdiction to fulfill reduction obligation from 2012.[412]

The experience of the Tokyo ETS since 2010 clearly demonstrates the effectiveness of a cap-and-trade approach. It demonstrates that the availability of data is essential for a robust monitoring, reporting and verification. The Tokyo ETS also provides flexibility for participating facilities, such as with the selection of the base year for emissions. In addition, predictability enables participants to plan and implement their emissions

[409] *Supra* note 396, at 4.

[410] *Supra* note 371, at 1.

[411] *Supra* note 396, at 4.

[412] *Id.*

reduction activities well in advance,[413]fostering a benign market environment for participating facilities to shape their long term planning for investment. However, the efforts to implement a national ETS in Japan were postponed in December 2010, and there is no momentum surrounding such a policy at present in Japan.[414]

Chapter 4 The China ETS Experience

4.1 Introduction

In 2014, carbon dioxide (CO_2) emissions in China accounted for 29.6 percent of the world's total[415]. The amount of CO_2 emissions in 2013 and 2012 accounted for 29 [416] and 26 percent respectively.[417] Indeed, as the largest CO_2 emitting country, China's carbon dioxide emissions have continued to increase since 2007, when China first exceeded the annual GHG emissions of the US.[418] And it is predicted to soar to over 1/3 of the total global amount by 2023, when the first global stocktake, a mechanism for National Determined Contribution (NDC) adjustments, will be implemented according to article 14 of the Paris Climate Change Agreement.[419] The International Energy Agency (IEA 2009) has estimated that about half the growth in global energy-related CO_2 emissions from now until 2030 will come from China.[420] And

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413 *Supra* note 396, at 6.

414 *Supra* note 371, at 9.

415 *Guangdong Will For a Carbon Emissions Trading Market*, CHINA IRN (March 1, 2013). http://www.chinairn.com/news/20160120/163542488.shtml.

416 *China's Total Carbon Emissions Exceed the Sum of Carbon Emissions Per Capita in Europe and the United States the First Ultra-EU*, GUANCHA (Sept. 22, 2014) http://www.guancha.cn/strategy/2014_09_22_269609.shtml.

417 *Environmentalist China Carbon Market Research Report 2016*, Environmentalist, International Finance Corporation [hereinafter IFC], at 17.

418 *Id.*

419 Art.14, Paris Agreement of UNFCCC.

420 Guoyi Han, Marie Olsson, Karl Hallding, David Lunsford, *China's Carbon Emission Trading: An Overview of Current Development*, 1FORES Study 1, 1(2012).

China's per capita CO_2 emissions had already reached 6.8 tons in 2014,[421] higher than France's and on a par with Italy's.[422]

Consequently, China has faced intense international pressure in last decade regarding its GHG emissions.[423] If China would like to build a responsible image for itself in the international community and mitigate the "China threat" theory, it should make a fair contribution to reducing carbon emissions.[424] Under this background, the Chinese government announced its target of cutting GHG emissions per unit of gross domestic production (GDP) by 40-45 percent by 2020 based on 2005 levels existing before the commencement of the Copenhagen UN climate conference (COP15) in 2009.

In addition, China and U.S. signed two landmark joint statements committing each nation to reduce emissions and promote cleaner energy sources which inspired a record number of nations to submit their nationally determined contributions (NDCs) to promote climate mitigation and adaptation under the Paris climate change accord.[425] In a 2015 U.S.-China Joint Presidential Statement on Climate Change, China announced its target of decreasing GHG emissions per unit of gross domestic production (GDP) by 60-65 percent by 2030 compared with 2005, and to enact a national emission trading system in 2017.[426] China and U.S. deserve a great deal of

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[421] *Supra* note 416.

[422] *Supra* note 420, at 1.

[423] *Supra* note 417, at 17.

[424] *Id.*

[425] Patrick Parenteau, Mingde Cao, *Carbon Trading in China: Progress and Challenges*, 46 ENVIRONMENTAL LAW RPRTR 10194, 10194 (2016).

[426] *U.S. and China Joint Presidential Statement on Climate Change*, THE WHITE HOUSE (Sept. 25, 2015), *available at* https://www.whitehouse.gov/the-press-office/2015/09/25/us-china-joint-presidential-statement-climate-change.

credit for the successful outcome in Paris UN climate conference (COP21).[427] But very sadly, the new U.S. Administration has declared that it will renege on its commitment. China, however, has stuck with its commitment and taken over from the U.S. the world climate change leadership role.

The construction of the national emission trading system is divided into three stages: 2015-2016 was the preparatory stage during which work on the carbon market infrastructure was completed; 2017-2020 is the stage for improving operation, which will witness the inception of carbon emission trading nationwide; and post 2020 is the stage for deepening the role of emission trading system when coverage will be further expanded, the rules of the system will be improved, and an international carbon market linkage is to be explored and researched.[428]

With energy supply and consumption deeply trapped in dependence on fossil fuels, China will be unquestionably confronting challenges of energy shortages and growing carbon emissions in the present and future. But this is also an opportunity for China to achieve a transformation from the pattern of economic growth dependent on a fossil fuels driven economy to a green and low-carbon economy.[429]

A study conducted by the International Finance Corporation claims that decisions needed to combat climate change, considering the reality of the Chinese energy situation facing policy makers, are as follows: first, China must curb its use of fossil fuels no matter what other major powers do, both because of energy security, the

[427] *Supra* note 425, at 10194.

[428] *Supra* note 417, at 23.

[429] *Id.*

health and economic effects of fossil fuel caused pollution, and its vulnerability to the effects of global warming; second, the command and control approaches to cut carbon emissions used by the Chinese government to date, such as the shutdown of coal-fired plants by fiat are less efficient than a market-based approach.[430] Some experts have concluded that "the 11th Five Year Plan showed the inadequacy and cost-inefficiency of heavy reliance on administrative and political measures."[431] One prominent authority held that "China had relied mostly on administrative means to achieve its 20 percent energy-intensity reduction goal for 2010."[432] And "such administrative measures were effective but not efficient."[433] As a result, China had limited success in meeting the goal.[434]

Others believe that these lessons also "provide a strong motivation for the Chinese government to build and rely much more on market-based instruments, such as environmental taxation and emission trading systems to ensure continued energy and carbon intensity reduction".[435]

The 12th Five Year Plan was the first official government document that explicitly identified a carbon trading market as one of the major measures for achieving the energy and carbon intensity reduction goals.[436] In the key decision of the third Plenum of the 18th Central Committee of Communist Party of China in 2013, the

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[430] *Supra* note 417, at 7.

[431] *Supra* note 420, at 4.

[432] Zhongxiang Zhang, *Carbon Emissions Trading in China: The Evolution from Pilots to a Nationwide System*, *CCEP Working Paper 1503*, Centre for Climate Economics & Policy, Australian National University, at 2 (April 2015)

[433] *Supra* note 432, at 2.

[434] *Id.*

[435] *Supra* note 420, at 4.

[436] *Supra* note 420, at 13.

market was assigned as a decisive role in allocating resources.[437] This served as the guiding principle on mapping out the 13th five-year plan (2016-2020), which called for increasing use of market-based approaches to complement conventionally dominated use of administrative measures.[438]

Since President Xi Jinping's landmark announcement in September 2015 on establishing the national emission trading system, draft legislation for the national ETS was submitted to China's State Council by the National Development and Reform Commission (NDRC) in 2016.[439] On January 19, 2016, the NDRC circulated a notice about China's national ETS to all provincial Development and Reform Commissions (DRCs), relevant governmental agencies, state-owned enterprises, and major industry associations in China.[440] The notice specified that companies from eight sectors and 18 sub-sectors with the consumption of over 10,000 tons of coal equivalent per year would be included in China's ETS.[441] These eight sectors include petrochemicals, chemicals, building materials, steel, ferrous metals, paper-making, power-generation and aviation. Over 7,000 such companies have been identified, accounting for about half of all China's carbon emissions.[442]

China's ETS is to set the carbon emissions reduction target according to carbon

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[437] *Supra* note 432, at 2.

[438] *Id.*

[439] Jeff Swartz, *China's National Emissions Trading System: Implications for Carbon Markets and Trade,, International Emissions Trading Association (IETA)* Issue Paper no.6, International Centre for Trade and Sustainable Development [hereinafter ICTSD], at 17 (March 2016),

[440] *"Notice on national ETS guidance",* National Development and Reform Commission [hereinafter NDRC], (January 2016) http://www.ndrc.gov.cn/zcfb/zcfbtz/201601/t20160122_772123.html.

[441] *Supra* note 439, at 17.

[442] Zhang Chun, *China prepares for world's biggest carbon market*, Climate Home, (November 22, 2016) http://www.climatechangenews.com/2016/11/22/china-prepares-for-worlds-biggest-carbon-market/.

intensity, and adjust allowances annually based on output. The criteria for allowance allocation will be based on sectoral baselines rather than a grandfathering principle[443] in order to avoid of unfair allocation to firms that have taken early actions. But an analyst of the International Green Development Partnership (IGDP) said it is likely that the Chinese national carbon market will start with three industries instead of eight.[444] The power industry, the cement industry, and the electrolytic aluminum industry will be included at the starting stage. National allocation plans of China's ETS for the three sectors were released at a training workshop in Sichuan in May 2017. Benchmarks for the above mentioned three industries were discussed in the training workshop.[445]

The presence of a China's ETS will have significant implications for climate policymaking around the world, and it will substantially change the dynamics and landmarks of current carbon markets. With a projected cap size of at least four billion tons, China's ETS would be twice the size of the EU ETS and greater than all existing carbon markets combined.[446] To date, 56 jurisdictions, including 35 national and 21 sub-national jurisdictions, have adopted a carbon trading system. These jurisdictions accounted for 40 percent of global GDP by early 2016.[447] The presence of a China's ETS has the potential to create a dynamic towards scaling up climate action through a carbon trading system, for example by incentivizing other nations to implement

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[443] *Id.*

[444] *China is about to launch the biggest national Carbon Trading System in the world*, Climate Action, (August 3, 2017), http://www.climateactionprogramme.org/news/china-is-about-to-launch-the-biggest-national-carbon-trading-system.

[445] Sun Miao, *It is likely that the Chinese national carbon market will start with three industries, instead of eight*, iGDP.

[446] *Supra* note 439, at 18.

[447] *Id*. at 7.

carbon pricing policies, committing a more ambitious National Determined Contribution (NDC), and encouraging further carbon market cooperation.[448] This ultimately will facilitate the implementation of the Paris Agreement and better curtail global warming. The current global NDC commitments will only be able to limit global warming to within 2.7℃ by 2100. By 2030, the total levels of GHGs in the atmosphere are projected to reach 55 billion tons.[449] This means that future carbon emission reduction efforts need to be far greater than those associated with the current NDCs alone so as to cut emissions to 40 billion tons. Only then can global average temperature increases be contained below 2℃ in contrast with the pre-industrial level, let alone 1.5℃.[450]

China officially launched pilot programs of emission trading in seven places in 2013, and is expected to establish a uniform national carbon emission trading market from 2017 to 2020. In practice, these pilots have proved effective to some extent, but exposed some deficiencies. There are a number of problems displayed in the seven pilots, for example: weak investor confidence in carbon markets in the future since the emission trading regime does not have a sufficient legal basis at the national level, inactive trading, volatility of carbon prices, a lack of historical emission data and oversupply of emission allowances.

These problems, on the one hand have affected the performance of the pilots to some extent. And on the other hand, they have given rise to different views on an emission trading system among decision makers, regulated sectors, the public and academia.

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[448] *Supra* note 439,, at 7.

[449] *Supra* note 439, at 18.

[450] *Supra* note 417, at 18.

For regulators, an emission trading system is still a primary market instrument, and a uniform market will be piloted across the country at the end of 2017 onwards. Therefore, national legislation and specific carbon emission trading regulations will be focal points in the short run.

At the same time, the combination of traditional command and control methods, a carbon tax and other market instruments will also come to the notice of the decision makers, the general public and scholars. The roles of an emission trading program and a carbon tax in addressing climate change and their compatibility with each other as well as future development of the emission trading policies in China will be an important subject matter for research, and may have a significant impact on future policy making.

4.2. An overview of the emission trading of the seven pilots in China

At the beginning of 21st century, China set ambitious goals of energy saving and climate related policies as a cornerstone of the 11th Five Year Plan (2006-2010). The program was implemented through top down measures, which fit well with the Chinese administrative system, but came at a higher cost than market-based measures,[451] and gave no flexibility for the enterprises. Recognizing the limited efficacy of the conventional command and control approach and the difficulties in maintain their efforts, China then sought market-based alternatives to reduce the energy and carbon intensity of its economy.[452]

Apart from the activities relating to the Clean Development Mechanism (CDM)

[451] *Supra* note 420, Executive Summary, at 19.

[452] *Id.*

provided by the Kyoto Protocol, China had no experience with any functional carbon market at all until 2012.[453] While the CDM was helpful to introduce the concept and practice of carbon trading into China, it has several serious deficiencies including many "that would differentiate it substantially from a functional domestic carbon trading system in China."[454]

First of all, the CDM does not encourage competition within sectors or between regions in China to find cheaper ways to reduce carbon intensity and increase energy efficiency, because the buyers of CDM projects are almost exclusively from other countries.[455] Second, the CDM means much less for China in terms of actual emission reductions than would be expected, in comparison with other measures. China had avoided about 1.6 billion tons of CO2 emission through energy intensity reductions during its 11th Five Year Plan. Nevertheless, with the direct experience from the Clean Development Mechanism projects, China's major industrial firms likely had a large influence on the NDRC's policymaking and confidence in establishing the seven pilot programs, and also led to the creation of the Chinese Certified Emissions Reductions (CCER) offset program.[456]

In 2012, the National Development and Reform Commission (NDRC) inaugurated the Chinese Certified Emission Reduction program described below. Its purpose was to promote project-based Post-Kyoto-Protocol emission trading. Without statutory restraints on carbon emissions, however, this system provided poor motivation resulting in considerable inertia. To overcome this deficiency, the State Council,

[453] *Id.*

[454] *Supra* note 420, at 16.

[455] *Supra* note 420, at 16.

[456] *Supra* note 439 at12.

China's Cabinet, promulgated the *Working Plan for Curbing Greenhouse Gas Emission during the Twelfth Five-Year* in December 2011. To facilitate the implementation of the *12th Five-Year Plan for National Economic and Social Development*; the cabinet explicitly required measures to establish and improve greenhouse gas emission reduction compliance, including requirements for provision of statistics and accounting systems, and thus to establish a reliable emission trading market. In 2013, China introduced its seven pilot allowance-based emission trading programs.[457]

The seven places in which the pilot programs were initiated are Beijing, Tianjin, Shanghai, Chongqing, Hubei, Guangdong and Shenzhen. However, other provinces, such as Qinghai and Shandong, are also voluntarily exploring and attempting to establish an emission trading market within their respective administrative areas.

Moreover, emission trading pilots in the initial seven places are not confined to their respective administrative areas. Some of them have tried to establish regional emission markets on the basis of their own circumstances. For instance, at the end of 2014, Beijing worked with the city of Chengde in Hebei province and, Erdos and Hohhot of Inner Mongolia to pilot cross-region emission trading, and with emission reduction projects of six cement manufacturers in Chengde incorporated into the Beijing carbon market. Shenzhen has achieved substantial cooperation with Baotou of Inner Mongolia and Huai'an of Jiangsu Province in building a regional emission trading market and capacity.[458]

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[457] *Carbon Trading Pilots Have Been Launched Successively in Seven Provinces and Municipalities*, China News Network (2013) http://www.chinanews.com/gn/2013/11-26/5549138.shtml.

[458] Lu Zhenwei, Tang Weiqi, *Domestic Carbon Market: How to Forward to A National Market from Regional*

4.2.1 The performance of emission trading from the seven pilots

The maximum amount of CCER credits allowed for use as an offset to the obligation by regulated enterprises is 5 or 10 percent in the seven pilots.[459] By August 2016, there were a total of 2,310 CCER projects approved, 762 projects filed, 254 projects with emission reduction filed, and emission reductions already filed totaling about 43.90 million metric ton of CO2e.[460]

Upon official launch of the CCER in January 2015, it had become an object of trading in pilot markets. On March 9, 2015, the Guangdong Emission Exchange completed the first CCER transaction, which comprised two 100,000 tons traded. The price of the transaction disclosed for only one of those trades was $3.06/ton. The Beijing Environment Exchange made its first CCER trade on March 12, 2015. The 378,000 tons transaction was the single largest CCER trade. The emission reductions were mostly generated from hydro projects.[461] The Tianjin Emission Exchange also completed a CCER trade of 60,000 tons from waste heat recovery projects without disclosure of price information.[462]

Experiment? FINANCIAL NEWS, (Aug. 31, 2016)
http://www.financialnews.com.cn/yw/gd/201608/t20160831_102953.html.

[459] *China Voluntary Emissions Trading System Events*, TAN PAI FANG (Jan. 4, 2014)
http://www.tanpaifang.com/vers/2014/0104/27752.html.

[460] Above information is compiled on the basis of relevant data obtained from *CDM Project Management Database and China Certified Emission Reduction Exchange Info-Platform.*, *see*
http://cdm.ccchina.gov.cn/NewItemList.aspx; see *also*
http://cdm.ccchina.gov.cn/yba.aspx?clmId=169&page=2.

[461] *China Carbon Market Monitor*, Partnership For Market Readiness [hereinafter PMR], , No.1, at 6 (May 2015)..

[462] *Id.*

By June 2016, CCER trading in the seven pilots totaled 92.053 million metric tons.[463] As of June 30, 2017, the aggregated carbon turnover was 446 million tons, totally 100.71 billion Yuan in value.[464] The seven pilots cover a wide range of different economic, industrial, and geographic circumstances.[465] Together they comprise about 25 percent of China's annual GDP and represent the spectrum of economic development and wealth within the country.[466]

In order to improve market activity and liquidity, some areas have introduced carbon financial derivatives, such as carbon collateral security, carbon bonds, carbon funds and other carbon-related financial products or services with local allowances or CCER as the subject. Carbon collateral security refers to a situation in which a debtor or a third party submits his carbon assets to a lender as collateral security for debt. The lender has right to priority payment by selling the carbon assets under its possession when the lender cannot otherwise recover debt repayment under the law. Usually, carbon collateral security is regarded as a means for using carbon assets, such as credits from project or carbon emission allowances as collateral security to receive loans from financial institutions.[467] For instance, in August 2015, Hubei Branch of Export-Import Bank of China signed an agreement providing RMB 100

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[463] *A Summary of Recent Developments in CCER Projects*, China Emission Trading, *available at* http://www.tanpaifang.com/CCER/201607/2054761.html.

[464] *Climate Action in partnership with UN Environment, China is about to launch the biggest national Carbon Trading System in the world*, Climate Change Programme (August 3, 2017), http://www.climateactionprogramme.org/news/china-is-about-to-launch-the-biggest-national-carbon-trading-system.

[465] *Supra* note 425, at 10195.

[466] *Id.*

[467] *Comprehensive Analysis of Carbon Asset Management Classification and Business Model*, Carbon Emission Trading Network, (Nov. 14, 2016), http://www.tanpaifang.com/tanzichanguanli/2016/1114/57575_4.html.

million carbon emission credits as collateral security under a loan for the Hubei Yihua Group.[468]

A carbon bond is a debt certificate issued by government or companies, for the purpose of encouraging loans from investors for low carbon projects, with the condition for repaying the payment of interest and principal when the debt is due.[469]

A carbon fund is a special fund provided by government, financial institutions, enterprises, or individuals, aiming at purchasing credits from carbon emission reduction projects or investing in projects of greenhouse gases emissions reduction. A carbon fund has a function to mitigate global climate change.[470] For example, China has a Green Carbon Foundation which makes carbon reduction grants. It has operated since 2010 under the supervision of the State Forestry Administration of the PRC.[471] The China National Petroleum Corporation, a state-owned oil and gas company, injected RMB300 million into the foundation for afforestation and forestry management pursuant to reducing the concentration of greenhouse gases in the atmosphere.[472]

In contrast with the EU, where emission trading amounted to $119.2 billion in 2010 alone, the seven emission trading pilots still have a long way to go; but in the course

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[468] *The EIBC Provides Carbon Emission Permit Mortgage Loans,* CPCIF, (2015), http://www.cpcia.org.cn/html/13/20158/149636.html.

[469] China's Green Bond Issuance, the World's First Green Investment Philosophy to by Nurtured, Carbon Emission Trading Network, (Aug. 19, 2016), http://www.tanpaifang.com/tanzhaiquan/.

[470] Qihoo 360 Privitization Incident, MBA Encyclopedia Think Tank http://wiki.mbalib.com/wiki/%E7%A2%B3%E5%9F%BA%E9%87%91.

[471] China Green Carbon Foundation, *available at* http://www.thjj.org/.

[472] *Supra* note 470.

of their exploration and practice activities, they can provide valuable experience for future establishment of a national emission trading market. Some of the achievements from the seven pilots in terms of rules, emission cap determinations and allowance allocations, trading capacity and compliance mechanisms are described below.

First, as for rules, China has put in place a set of policies and rules concerning core elements of emission trading, mainly including departmental rules and local rules and regulations promulgated in pilot provinces and municipalities. Currently, at the local level, the seven pilot provinces and municipalities have promulgated their own interim measures and supporting rules for emission trading administration. At the national level, the NDRC has promulgated the *Measures for Administration on the Operation of the Clean Development Mechanism Project*s (2005, revised 2011),[473] the *Interim Measures for the Administration of Transactions in Voluntary Emission Reduction of Greenhouse Ga*s (2012),[474] and the *Interim Administrative Measures on Carbon Emission Trading*(2014).[475]

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[473] The document aimed to regulate the operation of CDM projects, implement UNFCCC and its Kyoto Protocol, facilitate environmentally friendly technology transfer, and defined the key areas in China as energy saving, energy efficiency, exploration and utilization of new energy, renewable energies, and recycling of methane. NDRC was designated as the department in charge of CDM projects in the light of article 9 of the document. Application and implementation procedures for CDM projects were also provided by the document. *See* http://www.gov.cn/gongbao/content/2012/content_2101188.htm.

[474] The document intended to achieve carbon intensity reduction goals set by the Chinese government to go into effect by 2020, facilitate the establishment of carbon trading market set by 12th Five-Year-Plan, raise the awareness of carbon reduction through the market-based approach, explore and experiment with the procedures and rules of the carbon trading system, and accumulate experiences skills and rules for building the carbon trading market step by step. The management of CCER projects, management and trade of the reduction volume from the projects, review and verification management were also provided by the document. *See* http://qhs.ndrc.gov.cn/zcfg/201206/t20120621_487133.html.

[475] The document was aimed at pushing forward the construction of the national carbon market in China, letting the market play a decisive role in resource allocations regarding GHGs emission reduction, and regulating the construction and operation of carbon emission trading. Allowances allocation, transaction, verification and surrender were provided by the document. *See* http://qhs.ndrc.gov.cn/zcfg/201412/t20141212_652007.html.

However, in the future, the promulgation of national administrative regulations or laws, such as the promulgation of the *Regulations* for *Carbon Emission Trading Administration*,[476] *or the Law on Dealing with Climate Change*,[477] may alter the existing set of rules. The NDRC has drafted and submitted the *Regulations for Carbon Emission Trading Administration* to the State Council, with a purpose of providing legal foundation for the carbon market, since carbon emission reduction, as an obligation imposed on enterprises, is required to be specified by laws or administrative regulations.

Regulations for *Carbon Emission Trading Administration* provides some fundamental requirements for China's carbon markets under construction, including the total amount of allowances to be issued and their distribution, allowances and credit transactions, monitoring and verification of emission reductions, a carbon emissions' report by key emitters, offset mechanisms, property of allowances as intangible assets, and accountabilities for non-compliance, etc.[478]Unlike a natural market formed by demand and supply, such as a food market, where the goods supplied by the market have their practical value-in-use because of their scarcity, carbon allowances or credits don't; their scarcity is created by law, as a result, they have value-in-exchange. Otherwise, there wouldn't be a market for carbon, because it would not have

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[476] *Carbon Emissions Trading Regulations*, Tan Pai Fang (March 29, 2016) http://www.tanpaifang.com/zhengcefagui/2016/032951731.html.

[477] NDRC planned to draft the Law on Dealing with Climate Change of the PRC in its 12th Five Year Plan (2011-2015) legislation. It cooperated with Chinese Academy of Social Sciences to make a draft of the law. As one member of the research team, I participated in the drafting process. The draft was submitted to the NDRC, and published online to public for consultation. *Law of the People's Republic of China on Coping with Climate Change*, CHINA NEWS (March 18, 2012) http://news.china.com.cn/txt/2012-03/18/content_24923504.htm.

[478] *Id.*

value-in-use. Thus, it's crucial for a carbon market to have a legal foundation.[479]

For the emission cap determination and allowance allocations, pilot provinces and municipalities respectively determine an annual emission cap on the basis of different factors and allocated emission allowances to specific emission producers in specific sectors in accordance with diverse approaches.

As for emission caps, they reflect regional carbon intensity goals set by the local governments; therefore, they are subject to adjustment because the actual GDP growth would differ based on projected economic growth.[480]The pilot areas have also taken into account other factors, including their actual carbon emissions, economic and social development, total energy consumption and incremental target, energy intensity target, historical emission data and emission reduction potential and capacity of those emission producers that are incorporated into the emission trading system. For instance, carbon intensity between the eastern area and western areas is different. The former has more intensive carbon in its economy and thus the NRDC would give a preferential treatment to the western area in cap setting. For the power sector, because it is exposed to trade competition and cannot automatically pass through all of its costs to the consumer, it will be given a feasible carbon emission reduction target; the allowances allocation will be based on its historical emission data.

During the process of policy making, stakeholders are involved in order to obtain their

[479]Policies and Regulations, Tan Pai Fang (2014) http://www.tanpaifang.com/zhengcefagui/2065/032951731.html.

[480] Clayton Munnings et al., *Assessing the Design of Three Pilot Programs for Carbon Trading in China 17 Resources for the Future Discussion Paper* No. 14-36, (Oct. 2014), http://www.rff.org/files/sharepoint/WorkImages/Download/RFF-DP-14-36.pdf.

opinions and address their concerns. A lot of meetings among governmental agencies, covered enterprises, and environmental groups were convened in public hearings held by a local competent governmental agency, mainly the local Development and Reform Commission.

The agency was required to have determined sectors covered by the emission trading system and an annual emission cap through a combination of top down and bottom up approaches, including allowances for existing enterprises, allowances for additional production capacity and allowances for reserve containment. For instance, the covered entities were required to provide their emission data and their production, and a provincial DRC was entrusted as an accredited verifying institute to evaluate the data submitted by the entities. If there was a reasonable doubt to the data, the verifying institute was charged with scrutinizing the data submitted.

Allowance allocations initially were totally free of charge in some pilot areas such as Beijing, Shanghai, Chongqing and Hubei, while subject to a combination of free of and auctioned allowances in Shenzhen, Tianjin and Guangdong. Where allocation was made free of charge, a historical emission approach, benchmark approach or a combination of both was adopted. With different institutional arrangements, these pilot provinces and municipalities have offered a variety of explorations, which may have a positive role in analyzing pilot experiences and forming a better carbon emission allowance allocation approach appropriate to China's national conditions.

Third, for trading capacity, pilot provinces and municipalities have taken the lead in setting up a trading and settlement management platform and have worked

consistently to enhance technical support and third-party service to ensure effective implementation of the MRV (Measurable, Reportable and Verifiable) rules,[481] which are essential for a successful emission trading system. Pilot provinces and municipalities have formulated a great number of technical criteria for emission trading, including criteria for truthful and accurate carbon emission reporting, an emission registry, and for the entire emission trading system, approaches and guidelines for carbon emission measurement and reporting, and third-party inspection standards. They also have set up relevant exchanges and trading systems.

Emission data reported in the past three years by more than 2,000 enterprises that are incorporated in the emission trading system has filled the data gap, and at the same time, third-party service providers in connection with emission trading producers have grown and expanded out of nothing, including carbon asset management bodies, carbon emission monitoring, and reporting and certifying institutions. Nonetheless, international companies are currently not allowed to perform data verification services for the seven pilots.[482]

As for compliance mechanisms, pilot provinces and municipalities have required emission producers to surrender allowances to them, as well as enforcement through relevant penalties; penalties may differ from place to place. At present, all pilots have built a variety of information disclosure and punishment mechanisms. Some pilots

[481] MRV is a mechanism, with the purpose of ensuring greenhouse gases emission measurable, reportable and verifiable. In light of article 25 and 26 of *Interim Administrative Measures on Carbon Emission Trading*, the key emitters are responsible for making a monitoring plan for their emissions, submitting emission report to provincial Development and Reform Commission (DRC) and verification report, which is issued based on emitter's emission report by a third independent party accredited by provincial DRC. *Interim Administrative Measures on Carbon Emission Trading*, Development and Reform Commission [hereinafter DRC] Art. 25, 26.

[482] *Supra* note 439, at 15.

include non-compliance in the credit record of non-complying entities and make it public. Some pilots also deprive those non-complying corporations from applying for public energy saving funds for a certain period of time and other projects with preferential treatment.[483]

For example, in Tianjin, there are just some general provisions on legal liabilities. In case of violation by a covered enterprise, the municipal Development and Reform Commission will demand a violator to rectify within a specified period and be disqualified for three years from relevant preferential policies (such as precedence in obtaining a bank loan and from applying for recycling economy, energy saving and emission reduction projects). In Shanghai, where a fine is imposed a non-performing enterprise may be subject to a fine of more than RMB 50,000 and less than RMB 100,000 ($7,900–$14,900). One professor held that, "these sticks are necessary, but not enough".[484]

4.2 .2Problems of Emission Trading in the Seven Pilot Locations

A functional carbon trading system requires five main components: (1) setting a cap on total emissions; (2) allocating allowances or quotas; (3) enacting stringent rules on measuring, reporting and verification (MRV); (4) creating transaction infrastructures, such as registries and exchanges; and (5) establishing an accountability system in case of non-compliance.[485]One expert study held that, "each of these components is indispensable, and together they require not only creditable carbon emission measurement and statistics, but also a fair allocation mechanism, free market

[483] *Supra* note 432, at 15.

[484] *Id.*

[485] *Supra* note 420, at 9.

conditions and reliable oversight, as well as strict monitoring."[486] The study indicated that the measurement of the performance of a carbon emission market includes its effectiveness (emission reduction), efficiency (reduction cost), innovation and investment in clean technology, and dealing with any resulting carbon leakage.[487] These elements for measuring the performance of a carbon trading market will be helpful to identify the problems reflected in China's pilot programs.

With three compliance periods respectively expired in June 2014, June 2015 and June 2016, the seven Chinese emission trading pilot programs have proved effective in implementing greenhouse gases emission reduction and control targets and providing a pragmatic basis for future establishment of a uniform national carbon market. However, the emission trading pilots also revealed a number of problems, and some of them have caused damage to the perception of the fairness of an emission trading system and the policy target of cost-effective emission reduction. Through overhauling emission trading pilot practice and experience in the seven pilot programs, this paper identifies problems in four aspects, as follows: (a) emission trading rules' lack of a national law basis; (b) primary emission trading market's lack of a uniform legal system; (c) secondary emission trading market's lack of adequate regulation; and (d) emission trading market's lack of a sound monitoring and regulatory mechanisms.

4.2.2.1 Emission trading rules lack of a national law basis

Pursuant to Article 80.2 of the *Legislation Law of the PRC*, without laws or administrative regulations, and with decisions or orders of the State Council as the basis, no provision in departmental rules shall lessen rights of citizens, legal persons

[486] *Id.*

[487] *Id.*

or other organizations or increase their obligations.[488] Therefore, it is obviously inconsistent with the *Legislation Law of the PRC* for the NDRC, through departmental rules, and pilot provinces and municipalities, through local regulations and governmental rules, to subject emission producers to additional fixed-period allowances or surrender their entitlements and be subject to penalties. In addition, regulating emission trading through local governmental rules or regulations results in lack of authoritativeness, stability and transparency of the relevant rules, and this is not conducive to the implementation and overall effectiveness of emission trading.

Governmental agencies and experts have expressed the need for a strong legal foundation for the national ETS for effective implementation and for potential punishment for non-compliance. NDRC is well aware of these legal challenges and is working with the Legislative Affairs Office under the State Council to have the interim measures and regulations promoted by State Council regulation.[489] The draft of such legislation has already been submitted to State Council in 2016.[490] Meanwhile, the draft of a Law on Dealing with Climate Change of the PRC is also under discussion. But due to procedures and a compulsory hearing requirement, its passage will take time. The valuable experience from Beijing and Shenzhen is worthwhile

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[488] Article 80.2 of the *Legislation Law of the PRC* provides departmental rules may provide for matters in connection with enforcement of laws or administrative regulations, decisions or orders of the State Council. Without laws or administrative regulations, decisions or orders of the State Council as the basis, no provision in departmental rules shall lessen rights of citizens, legal persons or other organizations or increase their obligations, or increase departmental authority or lessen statutory departmental duty." *Legislation Law of the People's Republic of China* (2015), *available at* http://www.lawinfochina.com/display.aspx?id=19023&lib=law.

[488] *Supra* note 417, at 24.

[489] *Id.*

[490] *Carbon Emissions Trading Regulations,* Tan Pai Fang (March 29, 2016), http://www.tanpaifang.com/zhengcefagui/2016/032951731.html.

sharing with other pilot programs starting to initiate carbon markets.[491]

4.2.2 .2Primary emission trading market lack of a uniform legal system

A primary emission trading market is the cornerstone for establishing and effectively operating the entire emission trading market, and mainly consists of emission cap determination and primary allowance allocation. Currently, a primary emission trading market in China lacks a uniform legal system.

First, each pilot adopted a different method to determine emission caps and allocate allowances. For the moment, each of the seven pilots employs a dispersed decision-making approach similar to that adopted by the EU ETS at Phase I and Phase II. The EU ETS has two approaches to determine its emission cap and allocated relevant allowance. In Phase I and Phase II, a dispersed approach was adopted; that is, each Member State formulated its own emission cap and allowance targets according to national allocation plans, and the EU had no authority to change or adjust specific allowances submitted by them. In Phase III, a centralized approach has been employed, that is, Member States no longer have the discretion, and instead, the European Commission determines the emission cap and allowance allocations for the entire EU.

However, the dispersed approach and a centralized approach each have its own advantages and disadvantages. The former will result in uncertainty and unpredictability. Member States are inclined to offer preferential treatment to domestic enterprises. While the centralized approach is likely to give rise to extra

[491] *Supra* note 417, at 24.

emission reduction efforts in one Member State to the industry involving emission trading that can be offset by relaxation in other Member States.[492]

However, the draft Regulations on Carbon Emission Trading submitted to the State Council for approval for the China pilots have specified a centralized approach for decision making. Pursuant to its article 6, the "competent department under the State Council shall determine the national emission allowance allocation plan on the basis of the national greenhouse gases emission control targets and circumstances of key emission producers, and define the allowance to be allocated to various provinces, autonomous regions, municipalities directly under the Central Government, cities separately listed in the national plan and the Xinjiang Production and Construction Corps."[493]

No doubt, the dispersed approach, by allowing provinces and cities to decide their own cap and allowance allocation, may undermine fair competition among enterprises and consistency among provincial emission targets. Nevertheless, by allowing the Central Government to directly decide national, provincial and municipal emission targets, under a centralized approach it is hard to accommodate local differences and may give rise to free rider issues, which have to be further clarified in future legal frameworks.

The legal status of carbon emission allowances or certified emission reductions is not well defined in the *Interim Administrative Measures on Carbon Emission Trading* and the draft Regulations for Carbon Emission Trading Administration. The two

[492] *Supra* note 206, at 23.

[493] *Supra* note 490.

documents define allowances as a certificate of carbon emission right.[494] Pursuant to article 11 of the Regulations for Carbon Emission Trading Administration (Draft), an emission allowance is defined as an intangible asset which shall be affirmed by the national registry system for the carbon trading system; and competent authorities under the State Council are responsible for establishing, operating, maintaining and supervising the national carbon trading registration system.[495]

In the supplementary provisions of the *Interim Measures for the Administration of Emission Trading,*[496]an emission allowance is also defined as a carbon emission quota allocated by the government to key emitters for a certain period of time and a certificate of carbon emission right. One allowance means that the key emitting unit that holds it is allowed to emit greenhouse gas equal to 1 ton of CO2e.[497]

The above two documents both regard an allowance as a certificate of carbon emission right. The draft Regulations for Carbon Emission Trading Administration even further defines it as an intangible asset, implying that allowance has economic value and is tradable. However, its legal nature is still ambiguous, for an asset is a concept of economics, not a legal terminology.

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[494] Art.11, *Regulations for Carbon Emission Trading Administration*.,Art. 3 *Regulations for Carbon Emission Trading Administration* defines allowances as a certificate of carbon emission right allocated by government, http://www.tanpaifang.com/zhengcefagui/2016/032951731.html; *see*
Art. 47, *Interim Administrative Measures on Carbon Emission Trading* also defines allowances as a certificate of carbon emission right allocated by government, http://www.tanpaifang.com/zhengcefagui/2014/121340808.html.

[495] Art. 11, *Regulations for Carbon Emission Trading Administration*, http://www.tanpaifang.com/zhengcefagui/2016/032951731.html.

[496] Art. 47, *Interim Measures for the Administration of Emission Trading* (2014), http://www.tanpaifang.com/zhengcefagui/2014/121340808.html.

[497] *Id*.

The nature of a carbon emission allowance would have a significant impact on its holders' right and the stability and predictability of the carbon market. If it is defined as private property, its holders enjoy full autonomy. The adjustment of a carbon emission allowance, or Chinese Certified Emission Reduction (CCER), by the government would constitute taking private property and create a need to compensate the property owner; this is not conducive to macro control by the government for the carbon market, but it is conducive for protecting private property. Otherwise, if a CCER is defined as a certificate of carbon emission right under public law issued to emitters by government through administrative license, its affirmation, alteration and cancellation will be determined by the government, which will have a significant impact on allowance acquisition or disposition. As a result protection to its holders would be weaker than for a private property right. Nonetheless, those legal provisions have not clarified legal nature of allowances up to now.

Similarly, the legal property of a Chinese Certified Emission Reduction (CCER) is also vague in the aforesaid two documents. In article 47 of the draft Regulations for Carbon Emission Trading Administration, CCER is defined as a voluntary greenhouse gas emission reduction registered in the national registration system by competent authorities of carbon trading under the State Council in accordance with relevant provisions. [498] This draft text is similar with the *Interim Measures for the Administration of Emission Trading*,[499] the *Interim Measures for the Administration of Transactions in Voluntary Emission Reduction of Greenhouse Gas*, [500] and

[498] *Id*.

[499] NDRC, *Interim Measures for Carbon Emission Trading Administration* (2014), http://qhs.ndrc.gov.cn/zcfg/201412/t20141212_652007.html.

[500] NDRC, *Interim Measures for the Administration of Transactions in Voluntary Emission Reduction of*

provisions promulgated by the various pilot areas.

For example, the *Tentative Measures of Guangdong Province for Emission Trading Administration* has specified that an emission allowance refers to the quantitative index of CO_2 emissions allocated by the government for enterprises to produce and operate.[501] A Chinese Certified Emission Reduction refers to the Certified Emission Reduction arising from voluntary greenhouse gas emission reduction projects as recorded by the NDRC in accordance with the *Interim Measures for the Administration of Transactions in Voluntary Emission Reduction of Greenhouse Gas*.[502]

Obviously, without clearly defining the legal nature of an emission allowance or CCER, this may negatively affect the stability and predictability of national emission trading markets and thus undermine the confidence of relevant market players.

Emission caps and allowance allocation approaches are not aligned in the seven pilots. As for emission caps, since pilot areas all lack basic emission data and cap and trade methodology and capacity, some key issues remain uncertain, including determination of current and future carbon emission caps, emission reduction goals, etc.

Moreover, inconsistency between data obtained by relevant governmental agencies

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Greenhouse Gas (2012) http://qhs.ndrc.gov.cn/zcfg/201206/t20120621_487133.html.

[501] Art. 42, the *Tentative Measures of Guangdong Province for Emission Trading Administration*, Guangdong Provincial Government. (2013), http://zwgk.gd.gov.cn/006939748/201401/t20140117_462131.html.

[502] *Id*.

and those obtained from enterprises reporting creates confusion[503]from repetitive calculation of emissions in the power sector, lack of assessment of the impact of emission caps on economic and social development, and lack of analysis of emission potentials and costs of various industries and enterprises. At present, emission cap setting is quite problematic, and as a result, some pilot areas have adopted rather loose definitions of allowances so as to mitigate resistance to implementation from the regulated entities. Only a few pilot areas have strict allowance allocation rules or modulate the loose caps ex post. Therefore, it is imperative to conduct total emission control in a more scientific and accurate manner so as to reliably define a national emission cap.

Consistency and fairness of allocation approaches and criteria are crucial to carbon markets. In some areas, allowances initially are allocated for free. And in other areas, a combination of auction and free allocation is employed. Allocations to existing emissions sources are either based on historical emissions in light of a grandfather clause, emission intensities or a benchmark rule (equipment output or sector output) depending on sectors.[504]

Moreover, the pilots allow the regulated entities to apply for adjustments in allowances in case a significant shortage of allowances occurs under specific

[503] For instance, the National Energy Administration did a survey of power sector's greenhouse gases emission inventory nationwide, requesting power plants to complete the questionnaire and forms; it found that many firms lack of expertise on carbon emissions, and could not properly provide accurate information relating to carbon emissions, and there were errors in their submissions leading to inaccurate emission data. *See supra* note 220, at 26.

[504] *Supra* note 432, at 9.

circumstances.[505]At present, the allocation in some areas, based on a grandfather clause or benchmark rule of equipment output is unfair since the treatment of early abatement actions differs among pilots in terms of the profile of historical emissions in certain periods of time, allocation methods, and allowance rewards.[506] This is sometimes due to emission producers' false reporting because of lack of reliable carbon emission data. The fairness of allocation based on a benchmark rule of sector output is also questioned.[507]

For the future national carbon market, equity issues may arise from the allocation of the carbon emission allowances, given the wide economic and emission intensity discrepancy of the provinces, autonomous regions and municipalities.[508] Some analyses examine the implication of different principles of carbon emission allowance allocations for different provinces and grandfathering principles based on historical emissions and per capita principles based on population. The former produces results that the larger the historical emissions, the greater the emission allowances will be available; the latter creates results that the larger the population of the province, the more emission allowances will be available.[509] Both scenarios result in the largest welfare losses to the western provinces with rich energy resources but scarcer populations relative to the eastern provinces. In contrast, the eastern provinces with high emissions and low emission intensity will suffer less welfare losses.[510]

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[505] *Id.*

[506] *Supra* note 432, at 11.

[507] *Id.*

[508] *Supra* note 420, at 40.

[509] *Id*.

[510] *Supra* note 420, at 42.

The present emission trading system has a narrow and inconsistent coverage. Coverage means sectors and specific emission producers to be included into the emission trading system. A proper coverage is critical for the system's normal operation. Pilot areas have defined sectors and emission producers to be included in accordance with their respective economic development, proportion of different sectors of local greenhouse gas emissions, and the different emission quantities of emissions from different industrial sectors, mainly including power plants, chemical, steel and iron, paper making, transportation, construction and service sectors.

The seven pilots cover not only direct CO2 emissions but also indirect CO2 emissions from fields such as heating and electricity consumption.[511]The coverage of indirect CO2 emissions is a new initiative that has rarely been carried out by other jurisdictions.[512]

The primary reason for including indirect CO2 emissions in the pilot systems is that a considerable amount of the electricity consumed in some pilot areas is purchased from other jurisdictions. For example, over 60 percent of the electricity consumed by Beijing is purchased from other regions. Thus, the indirect CO2 emissions have become the dominant emissions in Beijing.[513]This would be a strength of the Chinese pilot ETS programs in that it has the potential to raise standards for other jurisdictions.[514]However, the scope of industrial enterprises varies, and in some areas, industrial enterprises and non-industrial enterprises are subject to different criteria of

[511] Ying Shen, *Crossing the River by Groping for Stones: China's Pilot Emissions Trading Systems and the Challenges for a National System*, 18 Asia Pac. J. Envtl. L.1, 24 (2016).

[512] *Id.*

[513] *Id.*

[514] *Supra* note 511, at 25.

inclusion. Obviously, this does not help the establishment of a uniform national carbon market.

In some provinces and municipalities, the coverage of enterprises to be included in the emission trading is too narrow, and does not include non-industrial enterprises, most of which are in service sector. Without a sufficient number of main market players, it will be hard to maintain a stable and active emission trading market and to reduce costs through economies of scale.[515]

4.2.2.3 Secondary emission trading markets lack adequate regulations

Secondary emission trading markets refers to places where emission allowances or emission credits are traded and relevant transaction activities occur. Namely, those that are included into an emission trading system may buy or sell their allowances or credits as needed in secondary markets. Therefore, the efficacy of secondary market regulation will have a direct impact on the success or failure of the emission trading system. Currently, regulatory provisions tend to focus on primary emission trading market establishments and overlook the regulations of secondary markets.

Secondary markets have a number of defects: for example, allowances can be monopolized, and a sound price formation mechanism may be absent.

Emission allowances tend to concentrate in the hands of a few large enterprises, and the markets lack sufficient activity and liquidity to deal with it. Since key enterprises included in the emission trading system come from different sectors and their size

[515] *Supra* note 220, at 30.

varies greatly, there is a tendency for a monopoly of allowances in Shanghai, Guangdong and Hubei. This is quite similar to "windfall profits" arising from free over-allocation of permits at early stages of the EU ETS.

According to published statistics, in Shanghai, of allowances for 2013, about 70% were held by just a few enterprises, such as Baosteel, Huaneng Group and Shenergy Group. Combined allowances for the majority of enterprises in pilots are less than 30% of total allowances.[516]As a result, if a few enterprises with a great quantity of allowances only account for a small amount for trading so as to timely comply with their obligations during the pilot period, total carbon trade volume will be sparse in emission trading market. Moreover, the *Interim Measures for the Administration of Carbon Emission Trading* and relevant provincial or municipal provisions all fail to provide for adequate competition regulations for secondary emission trading markets. The emission allowances are very likely to have an "inborn" lack of liquidity, and this is not conducive to emission trading market's liquidity and efficiency.

Also, emission reduction targets are not directly linked to energy efficiency assessments, and thus, some enterprises do not have motivation to participate in an emission trading system. In contrast with energy efficiency subsidies that have been implemented for a number of years and accompanied by a lot of policy support, an emission trading pilot is still in the process of exploration and learning by doing.

On the one hand, some new incoming enterprises often cannot distinguish energy efficiency targets and emission reduction targets and have to spend much time

[516] Shuang Zheng et al., *A Survey and Study of Emission Trading Pilots in Seven Provinces and Municipalities of China*, China Economy Publishing House, at 137.(2014).

studying and comparing them. On the other hand, some enterprises are veterans in the energy efficiency program and prefer the former one, which will bring them a higher subsidy, resulting in substantially reduced participation and volume in the emission trading pilots. Meanwhile, at the present time it is worth mentioning that energy efficiency and emission trading belong to different competent authorities, and their powers are not clarified clearly.[517]

Emission trading markets lack a sound price formation mechanism. Behavioral choice of the enterprises and investors that are included into the emission trading system depends upon a predictable price signal for the emission allowance or CER.

From the past experience of the trial program of sulphur dioxide (SO2) emission trading that has been implemented in China at the local level since the 1990s, excessive government intervention prevailed in the emission markets.[518] Trading prices of SO2 emissions were modulated or instructed by arbitrary political manipulation and regulation to a great extent.[519] As a result, the SO2 emissions trading system in China has been distorted by the legacy of a planned economy.[520]

This phenomenon also was reflected in the energy efficiency targets during 11thfive year plan. One oft-cited example is China's achievement in reducing its energy intensity by 19.6 percent from 2006 to 2010 against the set target of 20 percent, which

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[517] *The Report on the Follow-up and Survey of the Progress of Emission Trading Pilot in Shanghai*, China Forestry Climate Change Response, http://www.forestry.gov.cn/portal/thw/s/1807/content-684673.html.

[518] *Supra* note 511, at 7.

[519] *Id.*

[520] *Id.*

was attributed to its governmental intervention, such as the electricity rationing.[521] Under severe scrutiny towards the end of 2010, data showed that many regulated entities stopped or slowed production rather than improving energy efficiency to achieve their energy targets, which led to a slight rebound of energy intensity in early 2011.[522]

Once a price signal is distorted or unpredictable, enterprises will find it hard to make a rational choice, and as a consequence, the efficiency of emission trading market will be affected. At present, emission trading pilots are seven segmented and closed markets that are independent and isolated from each other. And what's more, narrow coverage results in limited trade volume, and policy and market formation is just at the primary stage. Thus, trade volume and price cannot fairly reflect supply and demand of the market, emission reduction cost, compliance and the like. Besides, despite the fact that the volatility of allowance prices in the seven pilots is tending to be stable, carbon allowance transaction prices vary greatly between them. This means that carbon allowances in different areas lack homogeneity, while the establishment of a uniform national carbon market is preconditioned on mutual recognition and homogeneity of emission allowances in various areas. For future establishment of a uniform national emission trading market, the key is the homogenization of emission allowances in different pilot areas.[523]

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[521] *Supra* note 511, at 54.

[522] *Id.*

[523] For example, on 22 August 2016, carbon emission allowance transaction price on in Beijing, Shanghai, Guangdong, Shenzhen, Hubei, Tianjin and Chongqing was closed at RMB 52.6, 9.8, 12.85, 24.28, 14.68, 14.74 and 6.82 respectively. For relevant data and information, go to the website of China Emission Trading: http://www.tanpaifang.com.

4.2.2.4 Emission trading market lacks of sound supervision and regulatory system

Unlike the ordinary commodity markets, the emission trading market is subject to forceful state intervention, and it cannot be formed and operated without government regulation and control. However, the emission trading market in China is just at the very beginning and still has a number of problems with respect to management, such as an adequate supervision and regulatory system, a price intervention mechanism, compliance safeguard measures, third-party management, and carbon leakage supervision.

Emission trading lacks a sound regulatory system, in part due to the overlap of duty and power for different departments. For the present, a combination of centralization (Development and Reform Commission, DRC) and decentralization (relevant functional departments)in its regulatory system, as established in accordance with the *Interim Measures for the Administration of Carbon Emission Trading*, may easily give rise to government failure, such as over-regulation or under-regulation, aggravated corporate burdens, and incurred resistance from enterprises. Moreover, irrational static division of powers may result in a number of institutional obstacles, including with information collection, regulation and enforcement, technical criteria and third-party inspection.

Emission allowances are subject to improper price intervention, and the compliance cost for enterprises is uncertain. Under current emission trading pilots, mostly reserve allowances are used to control and regulate price. Namely, when the carbon allowance price is too high, the government will sell reserve allowances to lower the price.

Moreover, enterprises may employ the CER offset mechanism, and to some extent, this may indirectly alleviate the tight supply of allowances. When the carbon allowance price is too low, only some pilot areas like Shenzhen and Beijing allow the government to reduce market supply via allowance repurchases.[524] In the Beijing pilot program, the municipal government sets aside up to 5% of total annual allowances for cost containment purposes. In the Shenzhen pilot program, the allowances reserved for this purpose include those buybacks that the competent agency purchases from the carbon market at the preset conditions, the annual buyback maximum amount of 10% of the total allowances in that year.[525]This cost containment mechanism aims to reduce market supply or increase market demand for allowances in order not to let the allowance price go below the predetermined floor level.[526] In addition, banking is also allowed in the pilot phase, but borrowing is prohibited to improve the liquidity of the carbon market. And all pilot programs allow the use of the Chinese Certified Emission Reductions (CCERs) to some extent that meet the requirements of China's national measuring reporting and verification (MRV) regulation, ranging from 5% of their CO2 compliance obligation in Beijing and

[524] Art. 22 of the *Interim Measures of Shenzhen for the Administration of Carbon Emission Tradin*g (2014) provides that, in every year, competent authorities may repurchase allowances as per a predetermined scale and conditions to reduce market supply and stabilize market price. Allowances repurchased by competent authorities in a year may not exceed 10% of effective allowances for the year. Administrative measures for allowances repurchase must be separately promulgated by competent authorities and implemented upon approval by the Municipal Government. http://www.chinalawedu.com/falvfagui/22016/ca20140408165840723499 28.shtml.;
In light of article 20 of the *Tentative Measures of Beijing for the Administration of Carbon Emission Tradin*g (Trial) (2014), the municipal Development and Reform Commission shall strengthen the price regulation of the carbon emission permit trading market, and use auction, repurchase or other market means to regulate market price and maintain market order when necessary and within the permitted allowance quantity of adjustment. http://www.bjets.com.cn/article/zcfg/201407/20140700000255.shtml.

[525] *Supra* note 432, at 9.

[526] *Id.*

Shanghai to 10% in Guangdong, Shenzhen and Tianjin.[527]

Compared with European ETS practice and experience in other countries, the carbon emission allowance price intervention mechanism in China is rather imperfect; its feasibility may be confined to the narrow scope of provincial or municipal markets, but will not facilitate any future national emission trading market establishment.

Inadequate compliance mechanisms result in low violation penalties, and cannot provide adequate safeguards and restraints to make enterprises comply with their obligations as required. Currently, pilot areas have stipulated different compliance obligation penalties for emission producers, including, among others, fines, allowance deductions for the next year, social credit exposure, and disqualification for government grants or incentive mechanisms; but overall, the deterrence is not enough.

For example, Tianjin just disqualifies a breaching enterprise from enjoying relevant preferential policies,[528] such as preferential policies of financial service,[529]recycling economy projects, energy saving projects for three years,[530]and Beijing only imposes fines.[531]Where fines are imposed, punishment is quite lenient. For instance, in

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[527] *Supra* note 432, at 10.

[528] Art. 32 *Interim Measures of Tianjin for the Administration of Carbon Emission Trading* (2016), http://www.tjzb.gov.cn/2016/systemsystem/2016/03/30/010001088.shtml, stipulates that, when an enterprise included fails to monitor, report, inspect and comply as specified, the municipal DRC shall demand it to rectify the failure within a specified period and will disqualify it from policies specified in Article 30 and Article 31 for three years.

[529] Art. 30 *Interim Measures of Tianjin for the Administration of Carbon Emission Trading* (2016).

[530] Art. 31 *Interim Measures of Tianjin for the Administration of Carbon Emission Trading* (2016).

[531] According to Item 4 of the *Decision of the Standing Committee of the Municipal People's Congress of Beijing on Piloting Carbon Emission Trading on Condition of Strict Cap and Trade* 2013, when an enterprise fails to submit an emission report or third-party inspection report as required, the municipal department responsible for climate change must order it to rectify the violation within a specified period, and further imposes on it a fine of no

Shanghai, a breaching enterprise will be subject to a fine of RMB 50,000 to RMB 100,000,[532]and in Guangdong, the fine is only RMB 50,000.[533]

Trade capacity building is inadequate to facilitate future establishment of a uniform carbon market. China has promulgated Accounting Methods and Reporting Guidelines for the Greenhouse Gas Emission by the industries for carbon emission monitoring and reporting since 2013, and subjected certificated agencies to registration.[534]

Up to date, three groups of industries are included in the guidelines. The first group of industries included 10 industries in 2013, such as electricity generation enterprises, electric grid enterprises, steel and iron, chemical production industries, electrolytic aluminum, magnesium smelting, plate glass, cement production enterprises, ceramics production enterprises, and aviation enterprises.[535] The second group of 4 industries

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more than RMB 50,000 when it fails to rectify it within the specified period. When emissions by a key enterprise exceed its allowances, the municipal department responsible for climate change must order it to comply with its emission control obligations within a specified period, and may impose a fine of three to five times of average market price upon the excess allowance. *See* http://www.bjrd.gov.cn/zdgz/zyfb/jyjd/201312/t20131230_124249.html.

[532] Art. 39 *Tentative Measures of Shanghai for Carbon Emission Administration* http://qhs.ndrc.gov.cn/qjfzjz/201312/t20131231_697049.html, states that, when an enterprise included in allowance administration fails to surrender allowances in accordance with Article 16, the municipal DRC must order it to comply with its allowance surrender obligations and impose a fine of no less than RMB 50,000 and no more than RMB 100,000.

[533] Art. 37 *Tentative Measures of Guangdong Province for Carbon Emission Administration* provides that, when an enterprise violates Article 18 by not fully surrendering its allowances, the provincial DRC must order it to comply with its allowance surrender obligations, and if it refuses to surrender, in addition to a fine of RMB 50,000, two times of unpaid allowances shall be deducted from its allowances for the next year. http://zwgk.gd.gov.cn/006939748/201401/t20140117_462131.html.

[534] Industry and Business GHG Emissions Accounting Methods Reporting Guidelines NRDC, (March 2, 2016) http://www.ccchina.gov.cn/Detail.aspx?newsId=59197.

[535] *Greenhouse Gas Emission Accounting Methods and Reporting Guidelines*, CHINA.GOV, http://www.ccchina.gov.cn/archiver/ccchinacn/UpFile/Files/Default/20160302093112920636.pdf.

has been included in the guidelines since 2014, including oil and gas production enterprises, petrochemical engineering, coking, and coal production enterprises.[536]Subsequently, the accounting methods and reporting guidelines for GHG emissions for the third group of industries was issued by NDRC in 2015, encompassing paper and its products, nonferrous metals, electric equipment, mechanic equipment, mining, food tobacco alcohol and beverage, public building operating enterprises, land based transportation firms, fluorinated chemical, and other industries.[537]

However, as for the regulation of MRV agencies, there are only general and principle provisions, without specific operational rules. Except for Shanghai, Beijing and Shenzhen, where detailed accounting and reporting guidelines have been promulgated, in pilot areas there are just principle and generalized provisions or no provisions at all and lack detailed implementing rules and consistency among existing rules.[538]Also, pilot areas have set up their own trading platforms, trading systems and registration and settlement mechanisms which vary greatly from place to place. This does not help the establishment of a uniform national carbon market in the future.

Emission trading pilots in various areas are independent from each other, with very laggard exploration of regional carbon markets. So, those pilots that are included in the emission trading system in one area may move out of that area, giving rise to carbon leakage and emission regulation failure. For the moment, emission administration measures promulgated by pilot areas all fail to address the carbon

[536] *Supra* note 535..

[537] *Supra* note 535.

[538] *Supra* note 425, at 10197.

leakage issue, and this has and will restrain the efficacy of emission trading.

However, China's national carbon market measures under discussion would have a positive effect on existing carbon markets as they will likely reduce competitiveness concerns amongst emission intensive and trade exposed industries and large manufacturers in other countries.[539] And as more and more nations are exploring the introduction of carbon emissions trading regimes, the risks of carbon leakage and competitiveness distortions amongst China's major industries also could be reduced.[540]

4.3. Different views for policy choice on an emission trading and a carbon tax

With the development of an international climate negotiation agenda and the unfolding of negative impacts of climate change, countries across the world gradually have come to realize that they must employ proper policy instruments to regulate present and future greenhouse gas emissions so as to prevent the global climate from further disruption. Overall, emission regulation instruments adopted by countries across the world can be divided into three categories, that is, command and control regulation, market-based regulation and informational regulation.

Specifically, nations and international society have been arguing over strengths, weaknesses, choice and applicability of these regulatory instruments, in particular, over comparison and selection of various incentive-based instruments.[541]China is not an exception, and for a long time, decision makers, regulated sectors, the public and

[539] *Supra* note 439, at20.

[540] *Supra* note 439, at 21.

[541] Wenjun Wang et al., *A Study of Comparative on Cost Advantages of Emission Reduction between A Carbon Tax and An Emission Trading*, 1 Advances in Climate Change Research 1, 5 (2016).

the academia have been thinking and discussing conflict and compatibility between a carbon tax and emission trading. Especially, seeing the drawbacks of present emission trading pilots, people are beginning to consider the possibility of introducing other regulatory instruments to control greenhouse gas emission. In short, different stakeholders, with different backgrounds and interest considerations, are likely to choose different regulatory instruments.

Policy makers still take emission trading as a primary means of regulation up to now; regulated sectors, confined by existing administrative and industrial systems in China, are likely to accept what regulators have selected, but such support is based on their own interest. At present, without fair social cognition of climate change, the public tends to consider climate change as a less urgent environmental issue compared with environmental pollution. In fact, air pollution is correlated to carbon emission. Reduction of many air pollutants results in concomitant reductions of greenhouse gases or their precursors with global warming mitigation potential. The actions to remedy air pollution will also remediate climate change. Thus, the public in China right now prefers to give priority to treat pollution even though it equates with climate change mitigation and adaptation.

4.3.1 Regulators: emission trading is still regarded as a primary means of regulation

For regulators, the choice of incentive-based instruments for greenhouse gas emission reduction can be divided into two phases. In Phase 1 (before 2012), regulators were inclined to choose a carbon tax to control greenhouse gas emissions. In 2006, the Energy Research Institute of the NDRC assessed the effect of relevant taxes in China,

including an energy tax, fuel tax and carbon tax. In 2008, the Ministry of Environmental Protection (MEP) published a report, the Study of Carbon Balance Trade Framework in China, mentioning for the first time the adoption of a carbon tax policy. Later, in 2009, the Energy Research Institute conducted a separate study on a carbon tax and published the report Study of Carbon Tax Policy for China to Address Climate Changes, proposing a tax rate determination principle and implementation plan for a carbon tax in China.[542]Thereafter, the Ministry of Finance, the Ministry of Environmental Protection, the NDRC and the State Administration of Taxation, separately or jointly, began to carry out a series of studies on carbon tax policy. With such extensive research, a carbon tax seemed to be flourishing in China. In 2010, China promulgated the *Carbon Tax Framework Design in China*[543]and "*Carbon Tax Policy Roadmap*,"[544] expecting to impose a carbon tax after 2012. Relevant taskforces also drafted the proposal for the scope, basis and rate of taxation. For this, some experts even predicted that "China will introduce carbon tax before an environmental tax"[545]and "a carbon tax will be introduced in China before an emission trading market."[546]

However, the year 2012 was a turning point, and a carbon tax did not proceed as planned. Instead, in June 2012, a NDRC official openly suggested that a carbon tax is

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[542] Shijie Ye, *Energy Research Institute of the NDRC Proposes Collection of Carbon Tax*, 21ST CENTURY BUSINESS HERALD, at 6 (September 23, 2009).,

[543] *Carbon Tax May be Collected as from 2012, Two Ministries Have Formed a Study Report*, 18 Economic and Trade Update: Academic Edition 52, 52 (2010).

[544] Lei Sun, *Carbon Tax Roadmap: May be put in Place within Five Years*, 21ST CENTURY BUSINESS HERALD, at 2, (September 24, 2009).

[545] Xiaolan Wang, *An Environmental Tax Not to be Introduced Soon*, CHINA ENERGY NEWS, at 1, (December 13, 2010).

[546] Dewen Mei, *A Carbon Tax to be Introduced Ahead of A Carbon Trading Market*, 5 Shanghai Building Materials 7, 7 (2010).

an alternative rather than a must. The choice might be a carbon tax or emission trading. The reasoning for this was mainly that, if allowances are auctioned off, the purchase of the carbon emission permit in itself will have an effect of taxation, and a separate carbon tax would be unnecessary; if allowances are allocated for free, a carbon tax might be an additional choice.[547]Thereafter, the choice of instruments entered into Phase 2; that is, regulators proposed an emission trading system without fully giving up a carbon tax. As a possible means for regulation, a carbon tax would no longer stand alone, and would be incorporated into a broader environmental tax.[548]This provision was postponed until 2020.[549]

Besides, with a consumption tax in China expanding to the goods with high pollution, high energy consumption and luxury items or services, it came to include an element of a carbon tax; and in order to avoid double taxation arising from a separate carbon tax, China decided not to be in a hurry to impose a carbon tax or perhaps choose to incorporate it into environmental tax rather than as a separate item of taxation.

In recent years, China enacted a consumption tax, and overall, the direction is to expand its coverage, especially to items of high energy consumption, high pollution and high-grade consumer goods. Specifically, high energy consumption is closely related to carbon emissions, since carbon dioxide mainly comes from fossil fuel consumption, and high energy consumption usually results in high carbon dioxide emission and high pollution.

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[547] Jialin Liang,, *A Carbon Tax and/or An Emission Trading, Economic Information Daily*, NDRC Official, at 3 (June 11, 2012).

[548] Mengwei Jiang, *Resource Tax to be Expanded Without a Separate Carbon Tax*, BEIJING BUSINESS TODAY, at 2 (March 21 2016).

[549] Jia Yang, *China is Likely to Impose Carbon Tax after 2020*, NANFANG DAILY, at A17. (August 10, 2016).

In August 2013, the NDRC issued a *Notice on Stepping up Efforts to Ensure Accomplishing Energy Efficiency and Emission Reduction Target for 2013*,[550] proposing to adjust the scope and rate structure of a consumption tax to apply to products that are energy-intensive and likely to cause environmental pollution. On 19 November, 2014, the General Office of the State Council issued the *Action Plan for Energy Development Strategy* (2014-2020), explicitly requiring adjustment of the collection and rate of the energy consumption tax and included some products with high energy consumption and high pollution into the scope of collection.[551]

Although international society generally has advised China to impose a carbon tax for greenhouse gas emission control, in March 2016, the Chinese Minister of Finance (MF) openly said, "China will maintain adequate vigilance over a carbon tax, and instead of a separate carbon tax, China may include it into environmental tax or resource tax."[552]

However, a carbon tax has not been included under the *Law of Environmental Tax of PRC 2016*.[553] Therefore, for regulators, the China emission trading system is still the primary market means of emission control, and a uniform national carbon market will be piloted, while a carbon tax might be integrated into a resource or environmental tax and will no longer be considered as a separate regulatory instrument. So, in the short run, legislation and specific trading provisions and measures at national level will be

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[550] *Sec. 9*, ,the *Notice on Stepping Up Efforts to Ensure Accomplishing Energy Efficiency and Emission Reduction Target for 2013* NDRC (2013), *available at* ,http://www.ndrc.gov.cn/zcfb/zcfbtz/201308/t20130827_555124.html.

[551] *Action Plan for Energy Development Strategy 2014-2020*, (Nov. 19 2014) http://www.gov.cn/zhengce/content/2014-11/19/content_9222.htm.

[552] Fafu Liang, *To Maintain Adequate Vigilance over Carbon Tax, China Business*, at A01.(April 4, 2016).

[553] *Law of Environmental Tax of PRC2016*, http://en.pkulaw.cn/display.aspx?cgid=287291&lib=law.

the focus and issues to be resolved.

4.3.2 Regulated sectors: the emission trading system is relatively well accepted

In China, due to its special administrative and industrial system, regulated sectors, including, among others, coal, chemical, power, petrochemical and cement, do not have any direct and final say in the choice of instruments for greenhouse gas emission reduction. However for a regulatory instrument adopted by the government, an enterprise would support the policy affirmatively or relatively, that is, support in an affirmative manner when the policy is favorable for it, and support it only in principle but raise a reservation when the policy is unfavorable to it. Generally, regulated sectors might prefer a carbon trading system instead of environmental taxation, but most of them are cautious about a carbon tax. For instance, prior to introduction of the emission trading system, there was a period of hot and extensive discussions about a carbon tax.

A typical example is, in 2012, the Director of the CNOOC New Energy Research Center suggested that energy-intensive sectors should make early preparation to find solutions for a possible carbon tax to promote healthy and sustainable development. Specifically, he said that the following measures might be adopted: (1) active study and learning about carbon tax collection provisions promulgated by other countries for energy companies to find out possible responses; (2) active participation in formulating a national policy to promote the formulation of a carbon tax favorable to their development; (3) active carrying out CO_2emission reduction, storage and utilization to seek a policy and fiscal support as well as tax exemption or refund in some projects as a carbon reduction incentive; (4) active development of a new energy

development strategy raising the share of green energy in total energy consumption; (5) active promotion of technical reform and innovation, enabling science and technology to play a more important role in reducing CO_2emissions; (6)

internationally, further publicizing their new CO_2 emission reduction, storage and utilization activities.[554]

Some sectors, such as power, proposed to postpone adoption of a carbon tax so as to avoid losses to their enterprises, but without firm and fundamental opposition to adoption of a carbon tax.[555]In 2013, when the Chinese government turned its attention from a carbon tax to an emission trading system, relevant enterprises, including those in power sector, also turned to study how to deal with an emission trading system.[556]

Regulated sectors were reluctant to choose a carbon tax and called for prudence even if a carbon tax might make it easier for them to predict future behaviors and the principle of taxation neutrality would ensure no significant change of their tax burden. Reasons for caution might include that:

(1) A carbon tax might significantly raise their cost burden, with a possible huge shock to the energy and chemical sectors and considerable impact on the entire

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554 *How Shall Energy Enterprises Take Precautions for Carbon Tax*, CNOOC (March 12, 2012) http://www.boraid.cn/company_news/read_79651.html.

555 Xuerui Zhu, *Coal-fired Power Generation Is Not Yet Ready for Carbon Tax, China Energy News*, at 18. (October 18, 2010).

556 *How Shall Power Generation Enterprises Respond to Carbon Emission Permit Trading?* China Emission Trading (Dec. 30, 2013) http://www.tanpaifang.com/tanguihua/2013/1230/27597.html.

national economy. Take the chemical industry for example: a carbon tax might be tolerable if it was charged at RMB 10.00 per ton, but at RMB 100.00 per ton chemical products would see a sharp fall in profitability, and some might lose competitiveness.[557]So, some experts even thought that, if China were to adopt a carbon tax now, it might easily fall into a trap advantaging western countries, and the process and efficiency of its environmental governance might be affected.

(2) Unlike developed countries, where greenhouse gas emission reduction is the priority, China has very serious about reducing conventional environmental pollution, and smog control was seen to be more imperative than carbon control. Although air pollutants and greenhouse gases are from the same sources: combustion of fossil fuels, even with de-sulphurization dioxide and de-nitrogen processing was thought to be cheaper and easier than de-carbonization from taxation. Imposition of a carbon tax was thought to increase the economic burden for industrial sectors. Furthermore, the reduction of air pollutants also has an effect to mitigate greenhouse gases emission simultaneously.

(3) Some climate skeptics and deniers mistakenly maintained that the causation between greenhouse gas emission and climate change and human health was still unclear, and the assumption that anthropogenic greenhouse gases emissions cause global warming was questionable.[558]

(4) Currently, the consumption tax has contained measures that include the results of a

[557] Hongmei Han, Zongqin Gu et al., *An analysis of the Impact of A Carbon Tax on Chemical Industry in China*, 1 Chemical Industry 1,10 (2014).

[558] Jijun Chen, *The Industry is Calling for Prudence in Carbon Tax*, China Chemical Industry News, at 6. (November 25, 2013).

carbon tax, and a separate carbon tax might lead to double taxation and aggravate enterprises' tax burden;[559]

After 2013, as China began to pilot emission trading and quicken the establishment of a national carbon market, the petrochemical and other sectors all turned to be actively involved in creation of a domestic carbon market. Three reasons may explain this: in the first place, with previous experience from international project-based CDM, they were more ready to accept an emission trading system; in the second place, when an emission trading system represented a general trend, it was a necessary and rational choice for relevant enterprises since early participation might bring more benefits (mainly including an exemption period and free allowances) and avoid having a disadvantaged market position; in the third place, state-owned enterprises have actively participated in and played an exemplary role.

For example, the three largest oil companies CNPC, Sinopec and CNOOC have carried out a "Carbon Asset Management practice" for participation in emission trading system.[560] According to estimates, Sinopec, CNPC and CNOOC respectively have 26, 8 and 8 enterprises being included in carbon trading pilots. Sinopec has the largest number of enterprises included, and so has attached great importance to carbon trading. In May 2014, Sinopec printed and distributed the *Measures of Sinopec for Carbon Asset Management* (Trial), with a purpose to strengthen carbon asset management, realize the value of carbon assets and promote the green development

[559] *Is Carbon Tax the Only Choice for Energy Saving and Emission Reduction?* China Energy Saving Industry (May 4, 2016) http://www.china-esi.com/pat/61754.html.

[560] *Carbon Asset Management refers to activities relating to carbon monitoring, disclosure, mitigation, trade, avoidance of risks, seizing opportunities and improving competitiveness in the low-carbon era.* Tan Pai Fang http://www.tanpaifang.com/tanzichanguanli/.

strategy. The *Measures* have defined in detail the responsibility and division of duties for functional departments, branches and subsidiaries under Sinopec, and forcefully promoted Sinopec's carbon asset management.

As was estimated, in the two compliance periods alone, i.e. 2013 and 2014, 26 pilot enterprises under Sinopec traded up to 3.89 million tons, amounting to RMB 140 million and accounting for 8% of the total volume in China. The extent of Sinopec's participation in emission trading, in terms of scale as well as depth, is one of the greatest among state-owned enterprises. Moreover, it has participated in the China Beijing Environment Exchange and Shanghai Environment and Energy Exchange, becoming the only central enterprise that has participated in two carbon exchanges.

Besides, Sinopec has been planning and responding to the national carbon markets for the future, and at Sinopec's Energy Saving and Environmental Protection Conference 2016, Sinopec Chairman Yupu Wang proposed to manage carbon assets with reference to foreign experience, and subject carbon assets to centralized management, unify emission trading operations, maximize carbon asset values, and strengthen the tracking and study of uniform national carbon market rules. Meanwhile, the largest central enterprises in the petrochemical sector, such as CNPC, CNOOC and CHEMCHINA, have actively taken inventory of carbon emissions and built their capacity to prepare for a national carbon market.[561]

However, the power sector raised opinions and suggestions on an emission trading system, including the following: (1) with stricter allowances and rising of paid

[561] Rui Jia, Lei Meng, *Carbon Asset Management Practice and Recommendations for Chinese Oil Companies*, 12 Commercial Accounting 7, 9 (2015).

allowances, enterprises would be under growing operation pressures; (2) due to a recent economic downturn, annual load rates would be decreasing, renovation would not result in effective emission reduction, and compliance would be affected; (3) the benchmark for Combined Heat and Power (CHP) installations was not reasonable, and there were a lot of loopholes of the current policies from the industrial dimension.[562]

4.3.3 The public has not formed any specific preference in instrument choice

In a democratic society, the principle of accountability requires decision makers to be responsible to the electorate, and so, their policy agenda and choice of regulatory instruments all should take into account the public interest; that is, policy makers have to prioritize various policy issues and choose proper regulatory instruments for them on the basis of analyzing and considering public interests and needs. Therefore, at least theoretically, public attention to a certain issue directly relates to whether the government will take it as something important to be resolved immediately, and public reaction to a regulatory instrument adopted by the government for a certain issue also serves as a basis for the government to insist on or improve or even give up this instrument.

In China, there is not a public preference as to which regulatory instrument should be employed to curb greenhouse gas emission. A main reason is that, currently, climate change, as a social issue, is not a top public priority among environmental issues. The public is unaware of the importance of climate change and thus does not consider

[562] Yuping Wei, *An Interview with Zhixuan Wang, the Vice Secretary General of the China Electricity Council: Power Companies all to be included into National Carbon Market and Allowances to be Reformed*, 21ST CENTURY BUSINESS HERALD, at 20 (February 18, 2016).

climate change as an important issue, let alone thinking about the choice of regulatory instruments.

According to an authoritative survey of the public's knowledge of and reaction to climate change, only 5.5% of respondents consider environmental issue being the most important, and of them, only 5.7% think climate change as the most important environmental issue for China, while the top ones are chemical and fertilizer pollution (10.1%), household waste disposal (17.7%), water pollution (20%) and air pollution (34.7%).[563]As for the environmental issue that has the greatest impact on individuals and households, the Chinese are even more inattentive to the impact of climate change, choosing air pollution (25.6%) and household waste disposal (20.9%) and water pollution (18.6%), with climate change in the 7th place with only (3.8%).[564]

Certainly, there is one thing not to be overlooked. In the future, with climate change study rapidly developing in China and elsewhere and the impact of climate change increasingly prominent, public knowledge of and reaction to climate change will have a significant change, and the public will turn to think about which instrument is the best choice for greenhouse gas emission reduction. For the public, as consumers, their interests are naturally separated from or to some extent even opposed to various emitters of greenhouse gas (enterprises want to reduce production cost and raise price, while consumers wish them to raise quality and reduce the selling price).

In thinking about the choice of regulatory instruments, the Chinese may have the

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563 Dayong Hong, Yechao Fan, *An International Comparison of the Public's Knowledge of and Behaviors toward Climate Change*, 4 Sociological Review of China 1,6 (2013).

564 *Supra* note 563; *see* Dayong Hong, et. al, at 8.

following inclinations: (1) consumers seldom pay attention to enterprises' production cost, and just care about product quality and the customer's unit price. So, extra cost pressure incurred by enterprises due to greenhouse gas emissions reduction is not the focus of public attention. On the contrary, they might be concerned about the regulatory efficiency of the chosen instrument;

(2) Command and control instruments, backed by public authority, are the most efficient. Regarding incentive-based instruments, a carbon trade would lead to leveling the ground for competition among companies; with the innovation of state of art low carbon technology, the top companies would provide cheaper commodities for consumers. Thus, a carbon trade system would be more attractive than a carbon tax to consumers. With a relative preference for efficiency, the public might choose a command and control instrument in the first place, then a carbon trade, and last carbon tax;

(3) The public might choose a carbon trade, not only because it would offer a cheaper price for consumers, but also because individuals would be allowed to participate in the emission trading system;[565] and

(4) In the future, when the public might have a better knowledge of climate change, instruments for informational regulation are expected to play a better role; for example, low-carbon product certification may be employed to promote public participation in combating climate change.

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[565] Art. 19, *Interim Administrative Measures on Carbon Emission Trading*, NRDC (2014),http://www.tanpaifang.com/zhengcefagui/2014/121340808_3.html; *see* Art. 17, *Regulations for Carbon Emission Trading Administration*, *available at* http://www.tanpaifang.com/zhengcefagui/2016/032951731_2.html.

4.3.4 Academia: combines emission trading with carbon tax instruments

The academic circle has had the most heated and detailed debate over the choice between emission trading and a carbon tax. Relevant discussions are based on a basic assumption: the hypothesis of perfect competition and zero transaction cost is hard to be satisfied. Thus, carbon tax and emission trading, as two regulatory instruments, often have different effects.[566]As previously stated, a tax increases the price of emissions in the market but has no assured emission reduction. It is much simpler. It requires a measure to relieve the burden of higher prices on the poor. Cap and Trade by contrast assures the quantity of emission reduction, but does not directly affect the price. Ideally, it permits emission reductions that can be made at least cost while relieving a reduction obligation from polluters for whom reduction is more expensive, thus reducing the overall cost of emission reduction. However, the high cost producer which purchases emission trading rights may cause severe health and pollution damages; and the system can be more easily gamed.

Despite varying opinions in the academia, there is a basic consensus that carbon taxes and cap and trade need not be an "either-or" proposition. Instead, they can be supplementary and made compatible with each other.[567]

In summary, at present, emission trading and carbon tax are both candidate choices for greenhouse gas emission regulation in China, and there are the following three opinions in general:

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[566] Minjun Shi et al., *Carbon Emission Policy: A Carbon Tax, Emission Trading or Both*? 9 Journal of Management Sciences in China 1, 9 (2013).

[567] Qingpo Wei, *Study on the Pathway of China to Mitigate Emissions Based on the Compatibility of Carbon Tax and ETS*, 5 China Population Resources and Environment 35, 43 (2015).

(1) The first theory proposes to make a choice between a carbon tax and emission trading in both the short run and long run. Given their characteristics and national conditions, in the short run, China may introduce a carbon tax to induce enterprises to update technology and adjust industrial structure. But in the long run, carbon emission trading would be a better means for regulation.[568] It is reported that, a carbon tax pilot may be launched in 2019, and in 2020 when a national uniform carbon emission trading market has achieved a stable operation, China can formally turn to a mix of a carbon tax and carbon emission trading to subject carbon emissions to price as well as quantity control.[569]In this viewpoint, based on marginal analysis, introducing a carbon tax in the short run, carrying out emission control, monitoring and verification and establishing a relevant legal system and regulatory measures are required first, and then an emission trading system can be adopted when conditions are more mature.[570]

(2) The second theory proposes to employ a carbon tax and an emission trading by categories of the regulated enterprises. For example, the author of one paper has suggested applying emission trading to large emitters, and a carbon tax to the multitude of small and medium enterprises.[571]Another author has proposed to subject large pollution sources to online monitoring and a carbon emission trading system, and using a carbon tax to regulate dispersed sources of emission outside the carbon

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[568] Xiaomei Yang, *Response to Climate Change: A Comparative Analysis of Carbon Tax and Emission Trading*, 6 Qinghai Social Sciences 36, 39 (2010).

[569] Juan Ni, *A Study of Carbon Tax and Carbon Emission Permit Trading Mechanisms*, 4 Taxation Research 46, 46 (2016).

[570] Yekui Yu, *A Comparative Study of Emission Reduction Policy Applicability in China: Carbon Tax and Carbon Trading*, 5 Ecological Economy 81, 81 (2014).

[571] Mingde Cao, *Legislation Stance and Strategy for China to Participate in International Climate Governance: from the Perspective of Climate Justice*, 1 China Legal Science 29, 47 (2016).

emission trading system, enabling both of them to fully play their roles.[572]

(3)The third theory proposes to connect emission trading to a carbon tax. For example, one expert has proposed to adopt an inclusive approach to deal with their connection; that is, enterprises that are subject to carbon tax and have joined the ETS may be entitled to a lower carbon tax.[573] For instance, Switzerland has introduced a carbon tax and carbon trade subsequently, and allowed firms making choice between the two options by their discretion. If a firm signed carbon emission reduction agreement, it will be exempted from a carbon tax.[574] UK has also implemented a carbon tax and carbon trading at the same time. British government allows firms to sign carbon emission reduction agreement. According to the agreement, energy intensive enterprises may receive 80 percent climate change levy reduction if they achieve their carbon reduction targets.[575]

Chapter 5 Policy and Legislation Recommendations for National Carbon Trading System in China

As mentioned above, for regulators, in the future, emission trading is still a primary means of regulation, and would be combined with carbon tax when political and policy environment is proper. So, for future establishment of a national carbon market,

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[572] *Supra* note 569, at 47.

[573] Haifeng Deng, *A Study of Legal Safeguard Mechanisms for Carbon Tax Implementation*, 4 Global Law Review 104, 113-15 (2014).

[574] *Id.*

[575] *Ministry of Energy and Climate Change of the UK, Green Taxes, Reliefs and Systems for Business*, Gov.uk http://www.gov.uk/green-taxes-and-reliefs/climate-change-levy.

a focal point is whether and how to effectively solve problems found during the emission trading pilot, and whether a carbon tax and emission trading are compatible.

The EU ETS was launched in 2005 and has made extraordinary institutional achievements in the past decade. An analysis and diagnosis of the evolution of the EU ETS, problems identified up to now and relevant factors may provide meaningful information to help China to develop and improve its carbon market and to avoid detours and exploit its advantages as a late comer in establishing a uniform national carbon market.

Similar to the evolution of the EU ETS, emission trading in China is also found to have a number of systematic and structural deficiencies. Undoubtedly, the expansion of emission trading market will contribute to market stability on the one hand and have a scale effect on the other hand, and thus reduce transaction costs, minimize emission reduction costs and realize the policy objective of greenhouse gas emission reduction.

But, when the market expands, its unresolved systematic deficiencies are likely to escalate and to disrupt the orderly and healthy development of the emission trading market; it may even affect economic development and greenhouse gas emission reduction efforts in other countries. As a result, China should be prudent in establishing a national emission trading market, removing possible structural deficiencies in connection with present emission trading and resolving them through policy and legislation on the basis of national conditions and with reference to experience in other countries, so as to build a more scientific and reasonable emission

trading system. Hence, this chapter has two recommendations for future development of the ETS in China: 1) to consistently establish and improve a Chinese characteristic legal system for emission trading, and 2) to design a hybrid governance framework that integrates various regulatory instruments for carbon emissions.

5.1 Build a sound legal system for emission trading in China

5.1.1. Upgrade and improve laws and regulations on emission trading

Emission trading involves cap determination, allocation and trading of carbon emission allowances and relevant market control and regulation mechanisms. While making decisions on the determination and allocation of carbon emission allowances, the government imposes corresponding obligations upon greenhouse gases emitters covered by the emission trading system, including surrendering allowances within a specified time.

Pursuant to the *Legislation Law of PRC*, imposing a regulated entity's or individual's obligation shall be specified by laws or administrative regulations.[576] China now is drafting the *Law on Dealing with Climate Change*, under which emission trading legislation should be established.[577] China can set forth a special clause or section to provide for principles in connection with emission trading, and formulate administrative regulations to define specific rules of law for emission trading, for example, in drafting regulations for the Carbon Emission Trading Administration.[578]

[576] *Supra* note 488, art. 80.2 PRC.

[577] Law of the People's Republic of China on Coping with Climate Change, News China, (March 18, 2012), http://news.china.com.cn/txt/2012-03/18/content_24923504.htm.

[578] Carbon Emissions Trading Regulations. Tan Pai Fang, (March 29, 2016),

No doubt, future new regulations should combine the present *Interim Measures for the Carbon Emission Trading Administration,*[579] and *Interim Measures for the Administration of Transactions in Voluntary Emission Reduction of Greenhouse Gas*.[580]The regulations should set forth specific, explicitly required and harmonized emission trading rules on the basis of relevant policy and legislative experience in other countries and pilot practices at provincial and municipal levels.

Besides, implementing rules and technical measures should be formulated within relevant legal frameworks, including operational guidelines, technical standards, rules and measures in connection with greenhouse gas emission monitoring, reporting and verification, certification and the like. For this purpose, a national emission trading law or regulation is necessary to authorize emission trading at the national level, providing uniform guidelines and methodologies on ETS design and operation, with enforcement of MRV and penalties for non-compliance at the minimum, ascribing allowances as financial assets, and so forth.[581]

5.1.2. Modify and improve rules for the primary emission trading market

To meet the obligations of its Nationally Determined Contributions (NDCs) for emission reductions under the Paris Agreement of the UNFCCC, in light of the economic impact in China of the cap and trade program emission caps, China caps

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http://www.tanpaifang.com/zhengcefagui/2016/032951731.html.

[579] *Interim Measures for Carbon Emission Trading Administration* NDRC, (2014). http://qhs.ndrc.gov.cn/zcfg/201412/t20141212_652007.html.

[580] *Interim Measures for the Administration of Transactions in Voluntary Emission Reduction of Greenhouse Gas*, NDRC, (2012), http://qhs.ndrc.gov.cn/zcfg/201206/t20120621_487133.html.

[581] *Supra* note 432, at 25.

should be calibrated in accordance with their intensity reduction, rather than a quantitative reduction requirement as adopted in the EU ETS. This is more flexible, and can be proportionally connected to greenhouse gas emission through other factors, such as output, taxation, etc. In this way emission reduction would perhaps not have a significant impact on economic growth.

However, since the climate problem comes from ongoing accumulation of total greenhouse gas emissions, a relative target, without assuring reduction of total emissions, is often criticized. Because an intensity target does not necessarily require firms to decrease overall production emissions, the allocations under intensity targets could be adjusted ex-post, and this could lead to over allocation of allowances.[582] However, unlike developed countries, developing countries have to face the double challenges of reducing emissions and maintaining economic growth and improvement of peoples' livelihoods. Thus, in the short or medium term, it is more practical for China to choose a relative target.

In short, "a carbon intensity cap, is less controversial within China, because it is seen as less likely to conflict with rapid GDP growth",[583]though an absolute carbon cap has the advantage of making emission reductions predictable.[584]Unlike most existing cap and trade systems, China's carbon market should allow for additional emission growth, just less than would be expected without a carbon trading system.[585]

Currently, the seven pilot areas all have proposed their own emission control targets

[582] *Supra* note 439, at18.

[583] *Supra* note 420, at 18.

[584] *Supra* note 420, at 44.

[585] *Supra* note 420, at86.

(cutting down CO_2emissions per unit of gross output value) on the basis of a period from 2010 to 2015, with intensity reduction targets of 18 percent in Beijing, 19 percent in Shanghai, 15 percent in Tianjin, 17 percent in Chongqing, 15 percent in Shenzhen, 19.5 percent in Guangdong and 17 percent in Hubei.[586]

Also, the proposed draft Law on Dealing with Climate Change of the PRC or the draft Regulations on Carbon Emission Trading Administration should explicitly provide for the legal nature of emission allowances or certified emission reductions (CERs) as a new sort of property right to avoid the drawbacks of taking allowances as a permit and to provide the market with stable expectations.

To prevent local protectionism from causing similar oversupply of allowances as in early stages of the EU ETS, China should adopt a centralized allocation approach. It is up to central government to decide a national cap and allocate it as per specific principles to various provinces and municipalities, with due consideration of "waterbed effect"[587]associated with centralized allocations.[588] Regarding this national distribution of carbon allowances, carbon reduction from one area should not be allowed to be offset by the increases in another area, because of lax regulation or oversupply of allowances. The proposed law or regulation should ensure that this phenomenon is avoided.

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[586] Qian Wang, Junhe Hao, Xiaotian Gao, *The Prerequisites for A Carbon Trading System and the Choice for China*, 4 Contemporary Economic Research 35, 35-41 (2013).

[587] The Waterbed Effect, Ecofys (2016) https://www.ecofys.com/en/publications/the-waterbed-effect-and-the-eu-ets/, Waterbed Effect means a phenomenon similar to waterbed, water decreased in one place will cause its increase in other place.

[588] *Supra* note 206, at 21-22.

With reference to policy and legislation practice in the EU, China should gradually raise the share of auctioning until free allocation is totally revoked and grant different transition periods and decreased free allowances to different sectors in accordance with their specific circumstances. It also should harmonize rules for new entrants and those that opt out to avoid adverse selection or misplaced incentives, and allocate free allowances on the basis of a "benchmark rule", i.e. the average performance of the 10 percent most efficient installations in a sector or subsector, instead of a "grandfather clause." Moreover, to resolve information asymmetry between government and businesses, misstatements of installation output should be subject to ex post accountability.[589]

China should gradually expand the scope of emission control, including greenhouse gas categories and sectors covered by the ETS, and exclude small installations that may not easily absorb administrative costs.

To avoid of unfair competition and carbon leakage, China should establish a "carbon leakage list" for the emissions of intensive and trade exposed industries, such as aluminum or steel, such as what the EU has already done.[590]

5.1.3. Enhance the efficacy of secondary emission trading market regulation

After four decades of market economy oriented reform, China is "closer than ever to a real market economy", but "it still differs from a mature free market economy in several substantial ways, including heavy government control and intervention, the

[589] *Supra* note 220, at 339-340.

[590] *Supra*, note 439, at 17.

significant share of state-owned enterprises, as well as a non-liberalized price control system and distortions within the financial sector".[591]

China's pilot ETS programs experienced low carbon prices accompanied by low trading volumes. The liquidity of carbon credits is extremely low in comparison with the total emissions cap.[592]In order to facilitate more efficient and healthy development of the secondary emission trading market, China should consistently improve its emission trading market liquidity and activity.

China should diversify market participants. Currently, not only enterprises but also individuals are allowed to participate in the ETS pilots as voluntary participants. This initiative has been explicitly regulated in the implementation plans of Shenzhen, Tianjin, Hubei and Chongqing.[593] The purpose of the design for allowing individuals to participate in the pilot ETS programs is to promote the trading activity, and absorb more social funds and investments to combat climate change. In addition, policymakers expect that the involvement of individuals in the ETS might also raise their awareness of social responsibility.[594] However, individuals' involvement in carbon trading market is similar to futures trading in the pilot ETS programs, and it could cause carbon price deviation from the exact abatement costs. The money collected from individuals is likely not to be available for carbon emissions' reduction.[595] In this regard, incentives for enterprises participation and restrictions on

[591] *Supra* note 420, at 23.

[592] *Supra* note 511, at 34.

[593] *Supra* note 511, at 26.

[594] *Id.*

[595] *Id.*

individual trading are necessary.[596]

China should also promote active participation of market players. On the one hand, regulators should insist on a long-term emission reduction policy so that market participants may anticipate the future and properly arrange their emission reductions. On the other hand, non-compliance penalties should be increased enough so as to restrain or deter the potential violations from the participants in the carbon market.

Orderly participation of various market players should be promoted. China should improve and harmonize provisions on allowances and CER credit trading as soon as possible, and use a format contract to stipulate rights and obligations of various market players.

Legal tools to regulate allowance monopolies identified in the process of carbon trading pilots should be adopted to enhance market liquidity and activity, and to formulate anti-unfair competition and anti-monopoly rules for emission allowance and CER credit trading. Stakeholders of the ETS programs, particularly policymakers and those who are able to access the information of policymaking and allowances allocation should be prohibited from participating in emissions trading, from the perspective of risk prevention.[597]

China should identify synergies between the ETS and other climate and energy

[596] *Id.*

[597] *Supra* note 511, at 26.

policies.[598] Industrial energy efficiency is regarded as crucial to reduce energy demand and GHG emissions. The significance of policy coherence between the energy saving programs and the national carbon market cannot be overlooked as industry is the main contributor to China's carbon emissions. For China to achieve a peak in its carbon emissions by 2030 or earlier, industry emissions will have to peak in 2020.[599]

China is exploring energy markets through energy saving credit transactions. Thus, corporations participating in energy efficiency and conservation could have quotas for energy use, and the credits from energy saving and conservation program could be allowed to trade in the energy credit market. These policies could have offsetting effects to each other, and thus lead to less effectiveness of the carbon market under construction. Thus, how to synergize these intertwining policies is a tough question for the carbon market.

5.1.4. Improve emission trading market control and regulation mechanisms

China should rationalize the emission trading administration system and clarify competent authorities and specific departments in charge of emission trading and their respective powers and duties.

In addition to creating provisions for an allowance reserve, inter-period usage and government buyback, and allowances for banking and borrowing, China should further improve an emission offset mechanism in pilot areas and introduce a pricing mechanism to form a sounder carbon price intervention mechanism.

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[598] *Supra* note 417, at 25.

[599] *Id.*

While the pilots reserve some allowances for cost containment purposes, the difficulty lies in setting aside an appropriate level of allowances for this end. The triggering conditions for a cost containment mechanism have not yet been determined for most of the seven pilot programs.[600] Though the Beijing pilot program has already set the triggering conditions based on the average price of allowances over ten consecutive trading days, it's unclear whether the size of reserved allowances is sufficient at a given triggering price.[601]

A price ceiling and a price floor in the market has been suggested. A price floor will remove downside risks for investors while delivering its objective of cutting carbon emissions efficiently.[602] As for a price ceiling, it would be very helpful to limit the potential market power of a few of given larger players in a small, fragmented market.[603]A price floor should be set to be higher than the lowest abatement cost projected for the trading sectors, but no less than carbon tax levels to be introduced.[604] Moreover, for the purpose of reducing the number of allowances in circulation and increasing the price, further incentivizing other parties to reduce carbon emissions by allowing non-emitting parties to purchase allowances should be allowed.[605]

It is necessary to establish a strong compliance and enforcement regime, and build a uniform national compliance mechanism on the basis of the penalty provisions

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600 *Supra* note 432, at 26.

601 *Id.*

602 *Id.*

603 *Id.*

604 *Id.*

605 Susan Vermillion, *Lessons from China's Carbon Markets for U.S. Climate Change Policy,* 39 WM.& Mary Environmental Law & Policy Review 457, 471 (2015).

adopted in some of the pilots. Compared with the penalty of EUR 100 for 1 ton CO2e imposed by the EU, in China, incentives, disincentives and penalties in connection with carbon trading pilots are inadequate or missing, and as a result, in the area of environmental legislation, it is frequently mentioned that compliance is expensive and violation is cheap.[606]

China is confronting a serious challenge in reducing its overall carbon emissions and aiming to peak its emissions by 2030 with the possibility of peaking them by 2025. Having a binding emission reduction goal, with an ambitious cap supported by rule of law, will enable the national carbon market to be an effective climate policy instrument.[607] Thus, a carrot-and-stick approach should be employed by the national market, in which there are rewards for effective compliance and implementation, but

[606] With respect to provisions promulgated by various pilot provinces and municipalities, Shanghai and Shenzhen have provided for detailed penalties. Specifically, in Shanghai, a fine of RMB 10,000 to RMB 30,000 will be imposed when an enterprise fails to comply with its reporting obligations, RMB 10,000 to RMB 30,000 when it provides false documents, conceals important information or fails to accept inspection as required, RMB 30,000 to RMB 50,000 when it resists or impedes without reason the third-party inspection, and RMB 50,000 to RMB 100,000 when it fails to comply with its allowance surrender obligations. In Shenzhen, when an enterprise fails to file an inspection report in due time, a fine of RMB 10,000 to RMB 50,000 will be imposed if it does not rectify within the specified period, or RMB 50,000 to RMB 100,000 if the case is serious; when it fails to submit adequate allowances or CCER, compulsory deduction will be made, with any shortfall to be directly deducted from the allowances for the next year and fined at three times of the average carbon price over six consecutive months prior to current month; and when it fails to comply with its obligations prior to moving-out, dissolution or bankruptcy liquidation, compulsory deduction will be made, with any shortfall to be fined at three times of the average carbon price over six consecutive months prior to current month. *See* Art. 39, *Tentative Measures of Shanghai for Carbon Emission Administration* states that, when an enterprise included in allowance administration fails to surrender allowances in accordance with Art. 16, the municipal DRC should order it to comply with its allowance surrender obligations and impose a fine of no less than RMB 50,000 and no more than RMB 100,000. http://qhs.ndrc.gov.cn/qjfzjz/201312/t20131231_697049.html.; *See* Art. 70, 71,72,73,74,75, *Tentative Measures of Shenzhen for Carbon Emission Administration* (2014). http://www.sz.gov.cn/zfgb/2014/gb876/201404/t20140402_2335498.htm.

[607] *Supra* note 439, at 24.

negative legal consequences if a regulated entity is non-compliant.[608]

Harmonized and more stringent national MRV rules are indispensable, and the regulation of third-party emission trading service providers should also be strengthened so at to ensure high quality, truthfulness and consistency of emission data and information.

Some have already expressed their concern about the over allocation of allowances.[609]This over-allocation problem is caused by the markets' over reliance on self-reported data from companies and industries.[610] This creates "perverse incentives" for firms to exaggerate data to ensure they get as many allowances as possible.[611] Over allocation will result in an artificially low allowance price and lead to no motivation for companies and industries to innovate or invest in more low-carbon technologies.[612]One authority holds that, "given allowances ascribed as financial assets, this is even crucial to ensure each unit of emissions reduction reliable and comparable among sectors and across pilots and regions,"[613]also attributing the significant variations in consistency and reliability of the emissions data measured, reported and verified on the basis of their local MRV guidelines across the seven pilots to the lack of a national uniform MRV standard.[614]

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608 *Id.*

609 *China's Carbon Markets "to Face Surplus", Climate Spectator,* REUTERS, (Jan. 20, 2014), http://perma.cc/YB5T-BYMJ.

610 *Supra* note 605, at 474.

611 *Supra* note 609.

612 *Supra* note 605, at 474.

613 *Supra* note 432, at 19.

614 *Id.*

A national uniform registry system should be established as a centralized platform to trade, surrender and cancel emission allowances or CERs credits.

A mechanism to monitor, prevent and address carbon leakage should be provided, in order to ensure that emission reduction is truthful and effective, and the ETS will not cause unfair institutional consequences.

Although the national carbon market under design likely does not connect to other international, national or regional carbon markets in the short run, the issue of

market linkage with other nations and regions in the future should be taken into account.[615]

Article 6 of the Paris Agreement provides a multilateral hook for carbon market cooperation between groups of countries by recognizing their ability to engage in international transfers of mitigation outcomes.[616]In light of article 6 of the Paris Agreement, a cooperative, voluntary approach, including the international transfer of mitigation measures to achieve independent national contributions is encouraged. Parties should not only promote sustainable development but also ensure environmental integrity and transparency, including governance. Prudent accounting methods should be used, in particular to ensure that double counting is avoided, consistent with guidance adopted by the Agreement of the Conference of the Parties

[615] *Supra* note 420, at 47.

[616] *Supra* note 439, at 8.

(COP).[617]

The prospects for the linkage with other existing and future international carbon trading market remain unclear.[618] However, China could participate in carbon market cooperation through a multilateral carbon market club. Eighteen countries led by New Zealand signed a ministerial declaration on carbon markets at COP 21.[619]These countries would likely form a multilateral carbon market club, and develop standards and norms for carbon markets in the future, so as to achieve their GHG reduction targets set in their NDCs respectively in light of the Paris Agreement. This club approach makes it easier to agree on provisions for accounting, offset use, and allowance transfers outside of the UNFCCC process rather than within it.[620]These provisions could then feed into the UNFCCC process on similar rules for international cooperation under article 6 of the Paris Agreement.[621]

For the long run, China should explore forward trading of carbon allowances as it gains some experience from the uniform national carbon market.[622] The seven pilots only probed spot trading for carbon allowances[623] during the experimental period, and building a national market will allow spot trading at the early stage. Other carbon

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[617] *Supra* note 417, at 18.

[618] *Supra* note 420, at 18.

[619] *Supra* note 439, at 22.

[620] *Supra* note 439, at 18.

[621] *Supra* note 439, at 22.

[622] *Supra* note 432, at 27.

[623] Emissions allowances: spotlight on spot trading, Lexology (2011) https://www.lexology.com/library/detail.aspx?g=a0b77621-3b70-42d3-aa1a-2a95e65cb92d, Spot trading for carbon allowances refers to the transactions of allowances for immediate delivery, as opposed to at a set date. Spot trading for carbon allowances needs to deliver a certain amount of carbon allowances from a seller's account to a buyer's account within a certain period of time, for instance, one day, similar to the transaction of a stock market.

trading options, such as futures,[624] forwards[625] for carbon allowances, etc. are also important tools for robust liquidity and market stability.[626] The more trading products available for the carbon market, the greater the liquidity is.[627]Given that carbon futures and forwards are necessary to determine the proper value of the carbon credits that are traded, and that corporations need forward price disclosure to make future investment decisions, a carbon market without forward price disclosure cannot be effective to timely trace market price trends and take preventative measures to avoid the risk from the market.[628]

5.2. Integrate various carbon emission regulation instruments

The choice of regulatory instruments for greenhouse gas emission reduction is always a hot issue for national governments, regulated sectors, the public and the academia. Countries will choose different regulatory instruments in accordance with national conditions. As policy and legislation practice across the world indicates, different countries, even though they have chosen the same regulatory instrument, are inclined to design their unique institutions.

In recent years, the academic circle and regulators have begun to show an interest in integrating various regulatory instruments, and some countries have begun to introduce a variety of regulatory instruments to curb greenhouse gas emissions. For

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[624] Futures for carbon allowances refers to financial contracts obligating the buyers to purchase carbon allowances or sellers in order to sell them at a predetermined future date and price. Futures contracts could be settled either by physical delivery or by cash. *Supra* note 623.

[625] Forwards for carbon allowances refers to a future physical delivery of carbon allowances at a set date. It needs a physical delivery of carbon allowances from sellers to buyers when the time is due. *Supra* note 623.

[626] *Supra* note 439, at 18.

[627] *Supra* note 439, at 25.

[628] *Supra* note 439, at 28.

instance, in Sweden and the Great Britain, in addition to a mix of carbon tax and emission trading, informational regulation is also attempted. While in the United States and some developing countries, in addition to command and control regulation, incentive-based regulatory instruments are available as well. But in China, regulators still take emission trading policy as a primary regulatory instrument to date, with little progress on a carbon tax, low-carbon product certification and other regulatory instruments. In light of synergies of various instruments and existing policy and legislation experience in various countries, this paper concludes that, the national emission trading market to be established in China will not be stand-alone, and instead, will work with and employ a mix of regulatory instruments. Specifically, such a mix of instruments may include the following:

5. 2.1 Integrate incentive-based instruments with other regulatory tools

With cost and benefit advantages over command and control regulation, incentive-based instruments have been the favorite choice for policy makers and academic circle in various countries.[629]

However, such comparison might have three drawbacks: first, it fails to take into account the impact of political and diplomatic factors on emission reduction mechanisms and the uncertainty of different means of emission reduction; second, it overlooks specific social background, categories of pollutants, institutional and technical levels, all of which will have an impact on emission reduction; third, it does not account for the different impact on emission producers' environmental

awareness.[630]Therefore, it is suggested that economists might have exaggerated their differences, and carbon emission trading should be within the command and control framework.[631]

According to some authorities, command and control regulation should be the institutional basis for incentive-based instruments: the latter decides its indicators on the basis of the former, such as subsidy caps and allowances, carbon tax rate, trading allowance caps, etc., while the former is an institutional safeguard for the latter's effective implementation. Take emission trading for example, its normal operation often requires using administrative means to ensure and supervise truthfulness and reliability of emission data provided by enterprises, or else there might arise the "effect of the lemon's market"[632] and "bad money drives out good".

To produce the proper level of carbon emission permits, it is necessary to use environmental impact assessment to ensure predictable decreases in emission caps.[633]Meanwhile, the development of informational regulation has brought new changes to greenhouse gas emission reduction regulation, and in particular, low-carbon product certification will help involve the public into greenhouse gas

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[630] Yan Wang, *Is a Market-Incentive-Based Emission Mechanism Always Better Than a Command-Based One?* 1 Journal of China University of Geosciences (Social Sciences Edition) 22, 22-23 (2014).

[631] D.M. Driesen, A. Sinden, *The Missing Instrument: Dirty Input Limits*, 33 Harvard Environmental Law Review 65, 116 (2008).

[632] George Akerlof, *The Market for Lemons: Quality Uncertainty and the Market Mechanism*, 84 (3) Quarterly Journal of Economics 488, 488-500 (1970), MIT Press. George Akerlof, Nobel laureate of Economic Sciences, created the Lemons Market theory, which means good commodities are forced out by bad ones under the circumstance of asymmetric information. The commodities with the lower quality gradually occupy the whole market replacing the commodities with high quality. As a result, lower quality commodities dominate the whole market.

[633] Ruoying Chen, *The Choice between Sensibility and Rationality: A Review of Justice of Climate Change and Emission Regulation Means*, 2 Tribune of Political Science and Law 127, 129 (2013).

emission reduction efforts. For instance, a lesson that could be learned from Shanghai's pilot program is its practice of including non-compliance in the credit record of non-complying entities and making it public to financial institutions and the general public.[634]While the penalty for non-complying entities in Shanghai's pilot program is not the strictest in comparison with other pilots, it achieved 100 percent compliance, due to this informational tool.

From 2007, the Ministry of Environmental Protection has worked with the People's Bank of China on a new credit-evaluation system under which corporations' environmental compliance records are incorporated into the bank's credit-evaluation system.[635] In the same year, the Ministry announced a "green credit" policy jointly with the People's Bank of China and China Banking Regulation Commission under which offending corporations will be barred from receiving credits.[636] Thus, this informational instrument would be another avenue to increase the rate of compliance in the undertaking national emission trading market.[637]In brief, China should develop and improve tools for informational regulation, while continuing to introduce other incentive-based tools.

5.2.2. Integrate various incentive-based regulatory instruments

China can integrate emission trading with energy efficiency subsidies; the purpose of the latter is to encourage emission producers to take diverse measures to accomplish energy efficiency and emission reduction targets assigned by the government.

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634 *Supra* note 432, at 22.

635 *Id.*

636 *Supra* note 432, at 2.

637 *Id.*

In addition, China may need to consider imposing carbon taxes to level the playing field.[638]Carbon taxes to level the playing ground between the sectors covered and those sectors not covered in the regions operating, and those without the operation of carbon emission trading.[639]As such, carbon taxes could integrate sectors and regions not covered by carbon emission trading systems.[640]

The newly enacted *Environmental Taxation Law of PRC* 2016 does not provide carbon taxes, but article 43 of the revised *Environmental Law of PRC* 2014 has already provided a legal basis for carbon taxes.

Conclusion

From CDM-based carbon trading to transactions in Voluntary Emission Reduction of greenhouse gases to allowance-based emission trading piloted in seven provinces and municipalities, emission trading in China is in an evolution from single project-based trading to a dualistic mix of allowance-based and project-based patterns. In the post-Kyoto period, international negotiation on climate change has made breakthrough since the COP 21 Paris climate summit.

In 2012 the NDRC promulgated the *Interim Measures for the Administration of Transactions in Voluntary Emission Reduction of Greenhouse Gas* for the purpose of promoting project-based emission trading; but without a compulsory emission reduction mechanism, and with inadequate provisions for internal motivation, its effect was very limited.

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638 *Supra* note 432, at 28.

639 *Id.*

640 *Id.*

In 2013, China began to pilot carbon trading in seven places. China formally introduced an allowance-based trading system that provided a positive incentive for emission reductions. By June 2016, emission trading in China had maintained a fair momentum of growth, and provided valuable institutional experience for establishing a national carbon market, and effectively curbed the rise of greenhouse gas emissions. However, like the EU ETS, the pilot programs have revealed a number of institutional deficiencies in emission trading as mentioned above.

Given these problems, regulators, the public, regulated sectors and the academic circle in China turned to reconsider the fitness and rationality of this emission trading system as an optimal instrument for greenhouse gas regulation. Based on their own interests, various parties have different policy viewpoints. For regulators, emission trading is still a primary instrument, and the focus in the short run is the establishment and improvement of a national carbon emission trading market starting immediately 2017. However, it cannot be denied that, arguments and debates will help further clarify future policy development in connection with national carbon trading system.

Among the most developed emission trading markets in the world, the EU ETS is the world's largest carbon market in terms of participating countries and trade volume, and so far has undergone three phases. The problems arising and revisions thus made at EU level may be a valuable reference for China to establish a national carbon trading system (CTS). Based on national circumstances in China and the evolution of the EU ETS, this paper has raised relevant recommendations to address problems identified in the course of the carbon trading pilots, proposing the development

direction of the future emission trading market in China. The recommendation is to consistently improve the legal system for emission trading market on the one hand, and actively integrate various regulatory instruments on the other hand, so as to systematically regulate greenhouse gas emission reduction.