Asia Society POLICY INSTITUTE

REPORT

Northeast Asia Carbon Markets and Trade Connections

An Asia Society Policy Institute Report produced in collaboration with the International Centre for Trade and Sustainable Development (ICTSD)

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JUNE 2018

AN ASIA SOCIETY POLICY INSTITUTE REPORT PRODUCED IN COLLABORATION WITH THE INTERNATIONAL CENTRE FOR TRADE AND SUSTAINABLE DEVELOPMENT (ICTSD)

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ABBREVIATIONS

AAU	Assigned Allowance Unit
CA	Conformity Assessment
CDM	Clean Development Mechanism
CMA	Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement
COP	Conference of the Parties
CPC	Central Product Classification
CV	Compliance Value
EIP	Eco-Industrial Parks
ERU	Emissions Reduction Unit
ETS	Emissions Trading System
GHG	Greenhouse Gas
$GtCO_2$	Gigatons Carbon Dioxide
GW	Gigawatt
IRENA	International Renewable Energy Agency
ITMO	International Transfers of Mitigation Outcome
JCM	Joint Crediting Mechanism
JVETS	Japanese Voluntary Emissions Trading Scheme
KETS	Korea Emissions Trading Scheme
KP	Kyoto Protocol
kWh	Kilowatt Hour
MAC	Marginal Abatement Cost
MFN	Most-Favored Nation
MRV	Measurement, Reporting, and Verification
$MtCO_2$	Metric Tons of Carbon Dioxide
MV	Mitigation Value
MWh	Megawatt Hour
NCM	Networked Carbon Market
NDC	Nationally Determined Contribution
NTM	Non-Tariff Measures
PA	Paris Agreement
PCA	Plurilateral Cooperative Agreement
tCO_2	Tons of Carbon Dioxide
UNFCCC	United Nations Framework Convention on Climate Change

FIGURES AND TABLES

ACKNOWLEDGEMENTS

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1. INTRODUCTION

CLIMATE CHANGE IS A CRITICAL ISSUE ON THE GLOBAL AGENDA. International work to complete the Paris Agreement (PA) signified that Parties were ready to address climate change. To date, 175 countries have ratified the Agreement. The PA aims to strengthen the international system by seeking to tackle the threat of climate change. It pursues this through the overarching temperature goal in Article 2:

> *Holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change.*

The approach of the PA shifted from the top-down system of its predecessor, the Kyoto Protocol, to a bottom-up system. Nationally determined contributions (NDCs) form the essence of this bottom-up approach. Parties pledged contributions that reflect their efforts to reduce emissions. NDC diversity is also reflective of the ethos of the PA. A significant gap remains between the efforts communicated in NDCs and the efforts needed to meet the 1.5°C or 2°C target. It is important that climate efforts are increased so that this target can be met, which the PA seeks to facilitate through regular review processes that aim to ratchet up ambition across Parties.

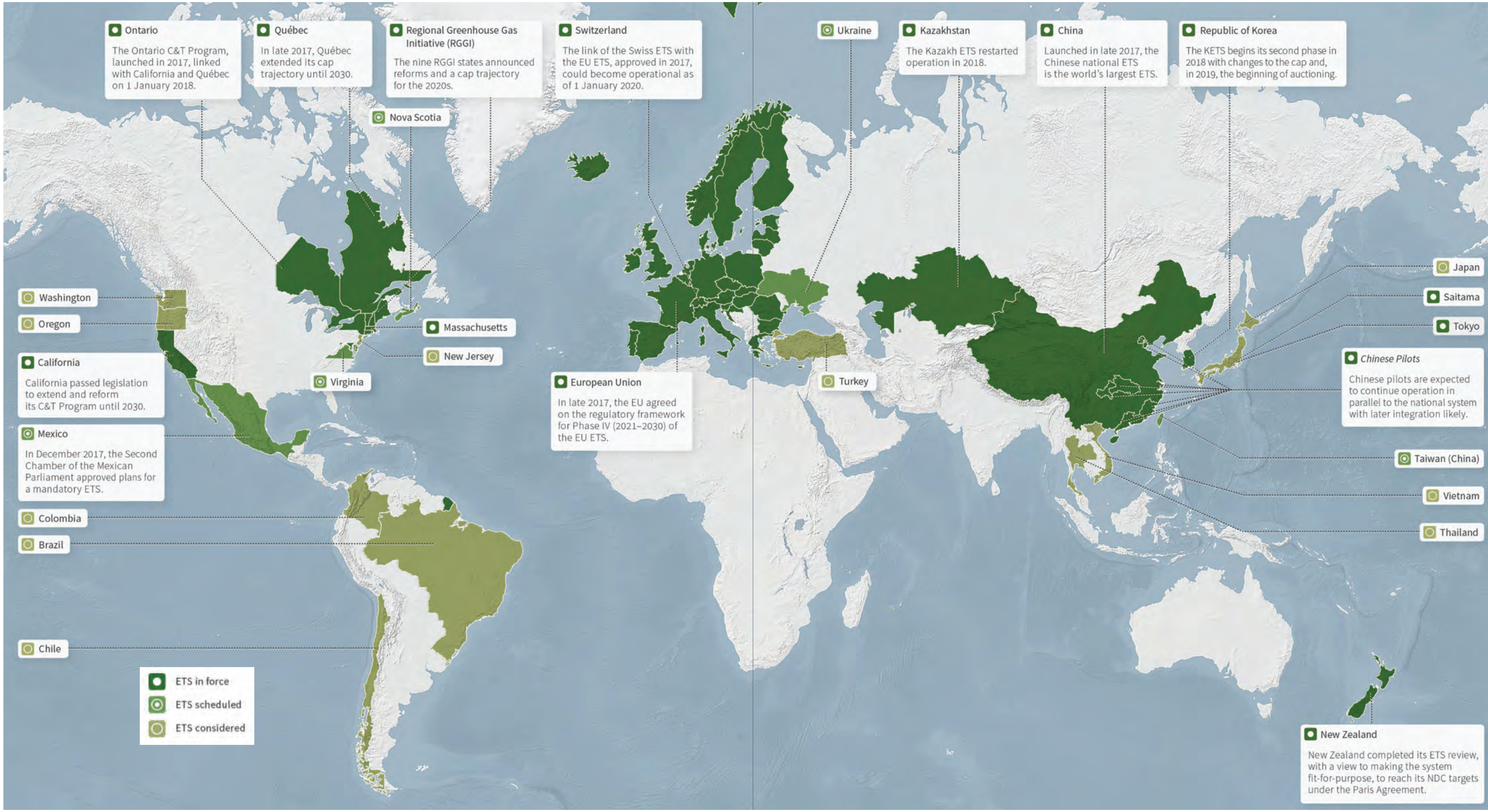
Among the many policy options countries have available to achieve their current and also successive NDCs, carbon pricing is a significant tool and is increasingly becoming a central part of domestic climate policy.[1] Carbon pricing internalizes the cost of greenhouse gas (GHG) emissions in any investment decisions by putting an explicit price on emissions.

However, carbon pricing is not undertaken in a vacuum. It functions in the real world of technology and trade and the interactions between them. Carbon pricing and linking of carbon pricing systems can be a catalyst for increased trade relationships; at the same time, carbon markets and the interest for, and benefits from linking can be heavily impacted by trade relationships and competitiveness concerns.

The trade section of this paper will delve more fully into various options for deepening trade linkages among three economies in the Northeast Asian region, China, Japan, and the Republic of Korea (hereafter, Korea). These options could act as incentives and enablers toward greater carbon market linkage or even for the creation of a unified carbon market initially at a subregional level. The options involve lowering and harmonizing environmental technology and services-related costs of abatement, enlarging the pool of actors and abatement options through deeper economic integration, as well as innovative ways of addressing competitiveness and leakage concerns through the creation of specific "low carbon" industrial export zones.

The interrelationship between trade and carbon pricing is examined in the pages that follow, starting with the current trends in carbon pricing and linking, followed by its interaction with trade aspects in Northeast Asia.

FIGURE 1. GLOBAL EMISSIONS TRADING SCHEMES AS OF MARCH 9, 2018



Source: International Carbon Action Partnership (ICAP), "Emissions Trading Worldwide: Status Report 2018," February 2018, https://icapcarbonaction.com/en/?option=com_attach&task=download&id=547

2. DOMESTIC CARBON PRICING

DOMESTIC CARBON PRICING MECHANISMS continue to increase in number; 81 Parties indicated in their NDCs that they wish to pursue a carbon pricing strategy to help achieve their climate change goals. Countries have chosen to adopt different approaches to carbon pricing. Some seek emissions trading schemes (ETSs), such as the ETS in the European Union (EU), while others such as Chile are currently pursuing a carbon tax. By the end of 2017, there were 47 carbon pricing initiatives implemented or scheduled globally,[2] with 21 ETSs operational, representing more than 15 percent of global emissions.

3. CARBON PRICING IN NORTHEAST ASIA

CHINA, JAPAN, AND THE REPUBLIC OF KOREA[3] represent approximately 20 percent of the global economy[4] and a significant proportion of global GHG emissions, approximately 28 percent.[5] It is therefore imperative that effective regional climate laws and policies are enacted to mitigate climate change. As mentioned, carbon pricing is one such tool that is being used increasingly to mitigate GHG emissions in these countries and across the globe. Both Korea and China note the use of emissions trading in NDCs, while Japan recognized its use of the Joint Crediting Mechanism (JCM). Carbon pricing systems in Northeast Asia are emerging and are at different stages. This section seeks to explore the current status in these countries.

3.1 CHINA

In its NDC, China pledged to reduce its carbon intensity of GDP by 60 to 65 percent below 2005 levels by 2030, and achieve peak emissions by 2030. China acknowledged its own pilot ETSs and stated that it wishes to build on these schemes. Announced in October 2011, the pilot schemes were developed in five cities and two provinces, which allowed for experimentation in design through trial and error, while building knowledge to help the development of a national ETS. In December 2017, China launched its national ETS, which will start in the power sector before extending to other sectors (chemical, petrochemical, iron and steel, nonferrous metal, building materials, papermaking, and aviation). Currently, it covers 1,700 companies from the power sector, reflecting 30 percent of national emissions. Allocation will be based on sub-sector baselines with ex post adjustments for actual production.

The Chinese ETS is composed of three phases:

1. Infrastructure Completion Phase
2. Simulation Trading Phase
3. Deepening and Expanding Phase

3.2 JAPAN

The Japanese NDC pledged a 26 percent emissions reduction by 2030 compared to 2013 levels. Japan faced significant uncertainty in its energy outlook following the Fukushima nuclear disaster, and the government has had to reconsider its energy strategy.

Japan has not yet developed an ETS despite significant experience in international carbon trading through the JCM and under the Kyoto Protocol. Instead, in 2005, Japan launched a voluntary ETS called the Japanese Voluntary ETS (JVETS). It aimed to facilitate the development of a domestic mandatory ETS. In 2012, the Advanced Technologies Promotion Subsidy Scheme with Emission Reduction Targets (ASSET) replaced its predecessor, the JVETS. Despite no mandatory ETS, Japan has put a price on carbon through a carbon tax (Tax for Climate Change Mitigation) in 2012, which is applied to fossil fuels.[6] In 2017, a government advisory body recognized that carbon pricing would be critical to decarbonization. A committee on carbon pricing was subsequently launched.

At the subnational level, both Tokyo and Saitama launched ETSs in 2010 and 2011, respectively. The Tokyo Metropolitan Government (TMG) launched the ETS as a policy to hit the target of reducing GHG emissions by 25 percent by 2020 against the 2000 level. It covers large-scale facilities in the commercial and industrial sectors, with 1,400 facilities in total. The Saitama ETS also covers commercial and industrial sectors. It uses an energy-based threshold that results in 600 facilities being covered. The two subnational ETSs were linked in 2011 with the launch of the Saitama ETS.

At the international level, Japan's development of the JCM allows the country to invest in projects in other countries to reduce emissions and subsequently use part of the issued credits to reach domestic targets and in the future support the achievement of Japan's NDC. This is particularly important given the high marginal abatement cost (MAC) in Japan.

3.3 KOREA

Korea pledged in its NDC to achieve a 37 percent reduction against the business-as-usual scenario by 2030, with 11.3 percent of this achieved via international markets.[7] In attempts to achieve its reduction target, Korea developed an ETS (KETS) that covers approximately 68 percent of national emissions. It is composed of three phases and just completed its first phase at the end of 2017. In the second phase, auctioning of allowances will be introduced for the first time, increasing from 0 percent as in Phase I to 3 percent in Phase II, extending to 10 percent or more in Phase III. Free allocation based on benchmarks will extend to more sectors.

KETS has had some problems. Liquidity has been a major issue, as have known high prices compared to other ETSs. In addition, total trade volume only amounted to 2.3 percent of total allowances, due to government intervention through market stabilization mechanisms and the lack of third-party traders. It is anticipated that in 2018 a measure will be introduced to enhance liquidity and trade activity.

Moving forward, offsets from international credits will be permitted. However, there are limitations. Credits from Clean Development Mechanism (CDM) projects carried out by domestic companies will be permitted for up to 5 percent of each entity's surrendered allowances in Phase II and 10 percent in Phase III, with a limit of 5 percent in Phase III for international offsets.

4. LINKAGE: IMPULSE FOR A GLOBAL CARBON PRICE

NATIONAL CARBON PRICING INITIATIVES ARE DRIVEN TOWARD LINKAGE, which in time may develop a global carbon price, as a result of several political, administrative, and economic benefits. A major political benefit is the strategic impact of a regional common effort toward climate change. Administrative benefits stem from the linkage of national ETSs via increased efficiency, lowering the overall administrative cost of compliance and measurement, reporting, and verification. Economic benefits are often the main focus regarding linkages.

First, some initiatives in smaller countries tend to suffer from liquidity problems due to the limited size of their market with fewer active players and fewer allowances available for trading. Liquidity in a market is an important indicator for its effective functioning. Indeed, a lack of liquidity can hamper price discovery and contributes to volatility.

The linking of carbon pricing systems could help tackle this issue, since it creates a larger market with an increased number of players and a higher number of allowances, increasing liquidity and helping address volatility. Moreover, linking different systems creates a link between their respective MAC curves. Linking different MACs will increase the degree of firms' market activity and thus improve market liquidity.[8]

Second, linkage will enable more cost-effective abatement allocation. The linkage of markets increases the number of mitigation options, allowing for reductions at a lower price.[9]

The third economic driver toward linkage is the possibility of reducing competitiveness concerns caused by different levels of effort resulting in price differentials and associated carbon leakage risks. Indeed, across a region, this can undermine the rapidity of decarbonization efforts and the carbon market. Linking markets will reduce the risk of carbon leakage by taking away the benefit of moving to a new jurisdiction that has lower carbon prices, since prices will inevitably converge.

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Competitiveness issues are important where countries pursue regional integration. If the climate policy (a carbon market) is not integrated into this trade policy, it may undermine or restrict further economic integration due to carbon leakage concerns.

The development of linked carbon pricing initiatives can also pave the way for more regional integration and may support ongoing efforts of cooperation and integration. The Asian Development Bank (ADB) created a strategy for regional cooperation and integration across Asia,[10] which shows that cross-border cooperation can lead to increased connectivity between markets, improved regional public goods, and collective action to tackle common problems more effectively. A final driver for the linkage of domestic carbon pricing mechanisms is to avoid being left out of trade agreements that involve carbon pricing.

5. PARIS AGREEMENT

SUCH LINKAGES COULD BE FACILITATED BY THE PARIS AGREEMENT (PA). The PA's Article 6 is often referred to as the "markets article." However, this inference is too simplistic, as it is more than that. It provides a framework for cooperation in the implementation of NDCs. Article 6 provisions can aid price convergence of domestic pricing systems that will help establish a global carbon price.

Article 6 covers a number of concepts related to carbon pricing:

Paragraph 6.1. This covers the general concept that Parties may choose, on a voluntary basis, to cooperate in the implementation of their NDCs. Article 6 is meant to cover all existing cases of cooperation, and others that may emerge in the future. It is important to mention that cooperation is noted, acknowledged, and recognized, rather than approved, by a body under the Paris Agreement. This reinforces the decentralized and bottom-up nature of Paris Agreement governance.

Transfers of mitigation outcomes (paragraphs 6.2–6.3). These paragraphs cover the concept that when Parties are involved in the specific case of cooperative approaches that involve mitigation outcomes being transferred internationally, they need to observe PA guidance on accounting. The paragraphs are not about markets, but about a framework on how to account for transfers between Parties. It is important to note that these are international transfers of mitigation outcomes (ITMOs), which can be produced from any mitigation approach (mechanism, procedure, or protocol), without any reference to the fact that the mechanism, procedure, or protocol needs to operate under the authority of the Conference of the Parties (COP). No limitation is introduced in these paragraphs in the Paris Agreement as to what constitutes an ITMO, and this broad scope is supported by the "institutional memory" of the Paris Agreement negotiations. Should limitations be introduced, they would essentially be an additional "boundary" that Parties to the Paris Agreement agree to in the operationalization of Article 6 (which is being negotiated at the time of this writing), but they presently have no "hook" in the current text.

Mechanism to contribute to mitigation and support sustainable development (paragraphs 6.4–6.7). These paragraphs refer to the establishment of a mechanism to produce mitigation outcomes and support sustainable development, which operates under the authority of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement (CMA). It produces mitigation outcomes that can then be used to fulfill the NDC of another Party. One of the key issues under debate is the scope of these paragraphs. A broad scope seems to receive support from the historical evolution of the text, submissions made pursuant to Article 6 through the Subsidiary Body for Scientific and Technological Advice (SBSTA), and positions expressed in formal and informal discussions.

Article 6 provides for cooperation among Parties, where the nature, the outcomes, as well as the governance of "cooperation" can vary. Cooperation with non-multilateral governance, as detailed in paragraphs 6.2–6.3, was always possible and took place, but outside internal agreements. However, it is new that this cooperation, and its associated ITMOs, can be used toward NDC implementation. What is also important is that this opens the door to cooperation toward NDC implementation between a smaller number of countries that can focus their efforts in areas of cooperation that are of interest to them, within the guidelines of the CMA, but under their own governance. This can be referred to as "plurilateral cooperative agreements" or PCAs. Some call these arrangements "carbon clubs," but the name carries negative connotations by seeming to encourage non-inclusive arrangements that can be detrimental to developing countries.

6. THE PA AND PLURILATERAL COOPERATIVE AGREEMENTS

Articles 6.2 and 6.3 have provided impetus to the discussion on plurilateral cooperative agreements, where a small group of Parties can cooperate in areas where their interests lie and where they can make a difference.

ARTICLES 6.2 AND 6.3 HAVE PROVIDED IMPETUS TO THE DISCUSSION ON PCAs, where a small group of Parties can cooperate in areas where their interests lie and where they can make a difference. These groups can move in a more decisive and nimble way; while they may not necessarily be transformational, they can, through this approach, help with the implementation of NDCs, as well as offer proof of the concept and show the way for others to follow. Several groups have emerged, which can be separated in two ways. The first is in the form of dialogue versus implementation, while the second differentiates between more political and more technical characteristics. Examples of PCAs include the Measurement, Reporting, and Verification (MRV) Partnership; the Renewable Energy and Energy Efficiency Partnership (REEEP); and the Reduced Emissions from Deforestation and Forest Degradation (REDD+) partnership, as well as the Global Green Growth Institute (GGGI), an implementation group.

7. ARTICLE 6 AS A CATALYST

ARTICLE 6 HAS BROUGHT NEW IDEAS AND NEW OPPORTUNITIES, where plurilateral cooperative agreements (PCAs) can play a very positive and powerful role. Articles 6.2 and 6.3 provide the framework for Parties to cooperate through PCAs and ensure that the ITMOs they transfer are an option to be used in NDC implementation. These PCAs can be formed bilaterally or by a number of Parties working together, under governance that they define, and with limited oversight from the CMA. However, the PA articles also include a number of "shall" clauses, which in United Nations Framework Convention on Climate Change (UNFCCC) language denote an obligation. These clauses, which define the level of CMA oversight, must be developed and operationalized if these ITMOs are to be used toward NDCs.

To cooperate through ITMOs under Article 6 in general, and Articles 6.2 and 6.3 in particular, Parties will have to address at least two issues. One is of a technical nature and involves developing standards, protocols, and the necessary infrastructure. The second is the effort to bring countries around the table for the common purpose of international cooperation toward NDCs. In itself, this is a laborious and politically intensive process that will need to ensure that those countries that may come together have common interests and will see benefits.

In this context, it is important to remember that PCAs are nimble and can reach agreements faster than the 180 Parties to the CMA. It is also important to highlight that these topics permeate the whole of Article 6 and are the glue that provides the consistency between the elements of Article 6. PCAs may come together for different reasons. They have come together as a result of a special event, such as an anniversary or a conference, or a set of negotiations. In many cases, this has been driven by politics.

8. EMERGING LINKAGES

INTERNATIONALLY LINKED CARBON PRICING MECHANISMS have had a number of ways to emerge.

8.1 GLOBAL CARBON MARKET UNDER UNFCCC

The Kyoto Protocol (KP) created the framework that catalyzed the creation of carbon markets at two levels: domestic (e.g., EU ETS) and international (trades in Assigned Allowance Units [AAUs], Emissions Reduction Units [ERUs], and Certified Emissions Reductions [CERs]). Article 17 of the KP led to the creation of a market for AAUs and provided the possible facilitation of linkage in jurisdictions under the KP. Two international mechanisms (the CDM and Joint Implementation [JI]) were also developed, which have allowed for the entry into the marketplace of developing countries without caps and budgets under the KP, as well as providing an indirect link (CERs and ERUs) for cap-and-trade markets.

Article 6 is now the next step in global carbon markets. It creates a provision for the use of cooperative approaches whereby Parties can use ITMOs toward NDC implementation. It also creates a mechanism that produces mitigation outcomes and supports sustainable development.[11]

8.2 DOCKING STATION

While the global governance regime under the UNFCCC is well founded, climate policy is still subject to multilevel governance, with a multiplicity of actors at varying scales. As a result, the broadening and adopting of global and regional climate architecture for emissions trading could be integrated and supported through docking stations. The idea behind this approach is that docking stations are embedded within carbon trading schemes through provisions that allow participants to dock into the market and adopt emissions caps, while the system provides support to facilitate the connection.[12] Docking station provisions can develop in global or regional agreements. The importance of such stations is that they allow easier linkage for nations and avoid substantive or procedural requirements such as those Parties were obliged to adopt under Kyoto Protocol trading.

8.3 LINKING REGIONAL CENTERS

Linked carbon markets imply that a linking agreement has been negotiated between jurisdictions, which then creates fungibility between the units of the two jurisdictions. As the units are fungible, it follows that both Regulators accept that the Mitigation Value (MV) in both jurisdictions is equal and sets the same Compliance Value (CV). Therefore, for linked domestic ETSs, MV1=MV2=CV1=CV2. In this case, the two parties to the linking agreement set the standard. If either or both MVs change to maintain the equation, the Regulator needs to make adjustments to the CV. This may be simple, and doable, in a bilateral linking agreement, but it could get very complicated when a large number of jurisdictions get involved.

This is the case of ETSs linked outside an international agreement, currently exemplified by the linked ETS in California and Québec. In the case of linked carbon markets under an international agreement, the situation is not dissimilar, except that the international Regulator sets the standard, which cannot be changed as it represents the international compliance unit. Another feature of regional linkage may be including carbon pricing linking along already existing or developing trade lines.

8.4 NETWORKED CARBON MARKETS

Carbon markets form a heterogeneous world, where many market instruments will be used, and different units will be issued. The climate change impact of a ton of GHG reduced cannot differ from jurisdiction to jurisdiction. The environmental impact is the same and will stay the same. However, the probability that a unit of reduction represents a ton, and the effort that it takes to reduce a ton, will differ from jurisdiction to jurisdiction.

While at any time stakeholders/market actors can decide to determine the MV of a unit, the networked carbon market (NCM) is characterized by the use of the MV and CV. Those jurisdictions that agree to be NCM participants de facto accept the idea that the market will assign a relative value to units from each jurisdiction. In currency markets, the marketplace sets the value of a unit of currency internationally. Similarly, NCM allows the "market" (where stakeholders are market players) to set the MV, which can be used by Regulators as an input to decisions about compliance value. Regulators could also designate the institutions that set MVs.

International linkages of carbon pricing initiatives are developing based on trade flows as a driver. Many examples provide demonstrable evidence that economic and political cooperation is effective for linkage.

In NCM, for jurisdictions outside an international agreement, the Regulator can either not set a CV and accept the determined MV or, in the long term, set the CV equal to the determined MV. NCM creates fungibility between two or more jurisdictions as part of a dynamic process, determined by market forces and set by stakeholders. NCM recognizes that these domestic carbon pricing systems could benefit from an overarching, coordinating framework that establishes common language, concepts, and general principles; methodologies to organize the collection and interpretation of data; and tools to help guide users in receiving the information.

NCM allows for differences to be accepted and recognized through the MV, avoiding the complex and politically loaded effort to negotiate differences. The idea is that mitigation efforts by jurisdictions have a mitigation value, which will translate into the rate of exchange, or the price, or the ratio, at which a carbon asset generated by the trading scheme in that jurisdiction will be exchanged or purchased.

8.5 LINKAGES BASED ON TRADE FLOWS

Currently, international linkages of carbon pricing initiatives are developing based on trade flows as a driver. Many examples provide demonstrable evidence that economic and political cooperation is effective for linkage.

The Western Climate Initiative (WCI) is a North American agreement of subnational entities to cooperate in the development of a joint emissions trading scheme. Several states of the United States and Canada were involved in the initiative. They enjoyed familiar and deep economic and political relationships prior to linkage.

The Pacific Alliance is a trade bloc involving Peru, Colombia, Chile, and Mexico. This trading relationship has been extended to climate policy through the sharing of technical knowledge on measurement, reporting, and verification (MRV); standards; and registries. The Paris Declaration on Carbon Pricing in the Americas includes the Pacific Alliance, Canada, and governors of Canadian provinces and and specific U.S. states. The aim has been to collaborate on strengthening MRV for potential future linkage.

In Europe, political and economic integration was well developed prior to ETS linkage. Norway developed an ETS with potential linkage to the EU ETS in mind. It linked with the EU ETS in 2007. Additionally, talks were concluded between the EU and Switzerland on linkage between their respective schemes. The EU is Switzerland's main trading partner and the benefit of linkage can help address domestic competitiveness issues associated with any price divergence. These two linkages took place with countries already economically linked in the European Free Trade Association context.

Future ETS linkage is tracking political and economic integration within Europe. Ukraine and the EU have developed a political and economic association through the Ukraine-EU Association Agreement, which entered into force in September 2017. As part of this linkage, Ukraine will begin ETS implementation and is currently developing MRV supported by the Partnership for Market Readiness (PMR), the European Bank for Reconstruction and Development, and the German Government. Turkey is also seeking EU accession and would be required to develop an ETS as part of accession obligations.

9. NORTHEAST ASIA

CHINA, JAPAN, AND KOREA HAVE HELD PRELIMINARY DISCUSSIONS on the development of linked carbon pricing. There are strong trade links between these countries, and they share some diplomatic familiarity; despite some fractious times, this could aid potential linkage efforts. Early dialogue is important, and it has proven to be effective for market linkage elsewhere in the world. These countries have begun exchanging experiences and possible cooperation through the Forum on Carbon Pricing with the second workshop in Korea in December 2017.

Yet, despite the discourse on potential linkage, it is important to acknowledge that these linkages take time to develop. The linkage status remains preliminary due to several barriers.

The lack of linkage-ready domestic markets is a major barrier. China, Korea, and Japan are focused on designing and ensuring effective operation of their national ETSs prior to linkage. In this respect, the lack of a Japanese national ETS is a major barrier to any linkage, as is Korea's illiquid market. Given the status of the domestic markets, cost has not yet become an important factor and is thus not driving linkage.

Furthermore, given differing political, economic, and social priorities and structures and strategies, the design and the status of carbon pricing and linkage cannot be expected to progress in parallel or in an integrated manner.[13] Increased dialogue would improve the coordination between systems and ensure that any ETS design suits potential linkage. However, linkage could increase the complexity of the market, adding design and operational issues.

Strategic barriers may also need to be faced. While regional familiarity can aid linkage, it must be recognized that historical ties and conflicts could complicate any future linkage. This is especially true given that climate and energy policy is a strategically important policy area, and countries may not be willing to lose control of such policies that can affect competitiveness and economic strategy.

10. TRADE AND TRADE-PLUS POLICY PILLARS AS ENABLERS FOR DEEPER CARBON MARKET LINKAGES

IT COULD BE ARGUED THAT TO SOME DEGREE, the economic prerequisites for a deeper linkage among carbon markets in Northeast Asia already exist. High levels of trade flows and economic interdependence characterize the three countries. Together with Hong Kong (China), these countries account for more than 60 percent of total trade of the Asia-Pacific region. Of this, trade among the three countries and Hong Kong (China) comprises more than 30 percent of total trade flows within the region.[14] This trade is also characterized by a great degree of intermediate and intra-firm trade flows with parts and components being imported for use as inputs in finished goods that are then re-exported to one another and the rest of the world.

China, Korea, and Japan are focused on designing and ensuring effective operation of their national ETSs prior to linkage. In this respect, the lack of a Japanese national ETS is a major barrier to any linkage, as is Korea's illiquid market.

According to studies carried out by researchers at MIT and Tsinghua University, exports accounted for 22 percent of China's CO_2 emissions, now the world's largest emitter. Japan together with the United States and the EU were among the largest net recipients of trade-embodied CO_2 emissions from China in 2007, with the production of machinery and equipment as the main source of such emissions.[15]

However, a more recent paper points to a decline in Chinese exported emissions from 2007 to 2012 of 229 $MtCO_2$ and attributes this to a number of factors including a decline in export volume growth, improvements in CO_2 intensity, and changes in production structure and the mix of exported products.[16]

An earlier study revealed that even in 2007 when Chinese trade-embodied export emissions were higher, bilateral trade between China and Japan resulted in an overall environmental benefit leading to a saving of 26.58 million tons of CO_2.[17]

Analyzing trade between China and Korea, a study found that textile and leather, chemical manufacturing, and metal manufacturing industries were the three main sectors contributing to imported and exported carbon emissions.[18] These are the sectors likely to be most at risk from border carbon measures that may be imposed to prevent leakage.

Despite the positive environmental findings from the study analyzing Sino-Japanese trade, the actual effects of trade opening can be complex and depend on the interplay of various factors. Trade opening may well lead to increased CO_2 emissions due to a larger enabled scale of economic activity (*scale effect*). However, it can also result in better resource efficiencies through the reallocation of resources through trade (*composition effect*) and environmental improvements through easier cross-border flows of environmental technologies (*technology effect*). Trade opening, if accompanied by sound environmental regulations, such as putting the right price on carbon and enabling emissions trading schemes, can further tilt the balance of economic and trade integration in a positive environmental direction.

Trade opening, if accompanied by sound environmental regulations, such as putting the right price on carbon and enabling emissions trading schemes, can further tilt the balance of economic and trade integration in a positive environmental direction.

Additionally, stronger carbon market linkages, in turn, could be could be helped by enabling deeper integration of economic and energy markets among the three countries through trade. Competitiveness concerns and fears of carbon leakage could also be addressed by narrowing differences in the use of low carbon energy sources and technologies as well as increased energy efficiency among the three countries that freer trade can help bring about.

This section of the paper will explore how trade policy can play an important role in enabling such an outcome. As an alternative to trade policy as a "stick" to penalize countries and industries through the imposition of border taxes on imports, this paper proposes that trade policy in Northeast Asia act in combination with additional measures as an incentive or "carrot" to facilitate broader decarbonization efforts in Northeast Asia and enable cooperation and progress toward a deeper linking of regional carbon markets.

Toward this end, four specific pathways are proposed, under two broad pillars, trade and trade-plus. This section will identify possible institutions and arrangements for pursuing trade and trade-plus cooperation for Northeast Asia and conclude by discussing how these pathways connect to the carbon market linkage possibilities under the Paris Agreement discussed earlier in the paper.

10.1 THE TRADE PILLAR

(i) Optimizing clean-energy and energy-efficiency value chains through lowering of tariffs and non tariff barriers to climate-friendly environmental goods

There are economic as well as environmental gains from lowering trade barriers to environmental goods and services. Value chains for clean-energy technologies such as solar, wind, and energy-efficient appliances are global in nature. Import tariffs and non-tariff measures such as conformity assessment measures and local content requirements raise costs for clean-energy producers and create inefficiencies in the supply chain.

Removing or at least reducing import tariffs and non-tariff barriers can lower and optimize costs associated with the deployment of clean-energy and energy-efficiency technologies and would make carbon reduction measures more economical. This would facilitate carbon market linkages by enlarging the number of abatement options (driven by technology cost reduction), in addition to lowering differentials between the marginal cost of carbon abatement (attributable to differing environmental technology prices) among the three countries.

China, a carbon-intensive economy, as well as Korea would particularly benefit from reducing their own import duties on select goods, which are much higher in both of these countries as compared to Japan. In addition, all three countries are world leaders in the production and export of various environmental technologies[19] and (particularly in the case of China) represent growing markets for carbon abatement opportunities. For electric vehicles, the market is growing in China, whereas electric battery technology leadership technology lies with Japan. Similarly, demand for solar panels in Japan could be met by lower-priced imports from China, which could help displace some Japanese fossil fuel imports used for power generation. This makes opening up remaining trade barriers among the three countries a logical step to pursue.

Removing or at least reducing import tariffs and non-tariff barriers can lower and optimize costs associated with the deployment of clean-energy and energy-efficiency technologies and would make carbon reduction measures more economical.

An analysis of applied most favored nation (MFN) tariffs (i.e., the rates applying to all World Trade Organization [WTO] members that are not free trade agreement [FTA] trading partners) for the three countries for selected environmental goods clearly reveals that Japan already applies zero tariffs on several types of environmental goods, as illustrated in Table 1, whereas the applied tariffs in China and Korea are much higher. There is clearly scope for further reduction in tariffs. The products listed in Table 1 include some such as solar PV panels and wind turbines that can be clearly identified by customs at the border as environmental goods.

In certain cases, as is the situation for energy-efficient motors, it may be more difficult to physically distinguish between energy efficient and inefficient motors. However, there may be merit in permanently maintaining a zero applied import duty at least on the most energy-efficient classes of motors.[20]

In terms of specific process-related equipment, motor-driven equipment accounts for about 54 percent of electricity use in manufacturing. In addition, it also has applications in agriculture, energy supply (including clean energy), as well as the residential and commercial buildings sector. According to an International Energy Agency (IEA) study, the use of more efficient motors and drives is estimated to save 20 to 30 percent of global electric motor demand (i.e., 10 percent of all global electricity consumption).[21]

Similarly, in manufacturing, new technologies and practices involving heat pumps have increased efficiency. A heat pump manufactured by Kansai Electric enabled a 70 percent annual energy use saving as compared to a conventional heavy oil system, amounting to about 450 tons of CO_2 of annual emissions reduction.[22]

TABLE 1. APPLIED MOST-FAVORED NATION (MFN) TARIFFS ON SELECT CLEAN-ENERGY AND ENERGY-EFFICIENCY GOODS IN CHINA, JAPAN, AND KOREA

PRODUCTS AND HS CODES/ COUNTRY	CHINA (2017 REPORTING)	JAPAN (2017 REPORTING)	KOREA (2017 REPORTING)
HS-854041 (Solar PV Cells and LEDs)	No: of tariff lines (TLs)-3 Minimum applied tariff: 0 percent Maximum applied tariff: 0 percent Average applied MFN tariff: 0 percent	No: of tariff lines (TLs)-3 Minimum applied tariff: 0 percent Maximum applied tariff: 0 percent Average applied MFN tariff: 0 percent	No: of tariff lines (TLs)-9 Minimum applied tariff: 0 percent Maximum applied tariff: 0 percent Average applied MFN tariff: 0 percent
HS-850231 (Wind-powered turbines)	No: of tariff lines (TLs)-1 Average applied MFN tariff: 8 percent	No: of tariff lines (TLs)-1 Average applied MFN tariff: 0 percent	No: of tariff lines (TLs)-3 Minimum applied tariff: 5 percent Maximum applied tariff: 5 percent Average applied MFN tariff: 0 percent
HS-841290 (Hubs and blades for wind turbines)	No: of tariff lines (TLs)-2 Minimum applied tariff: 2 percent Maximum applied tariff: 8 percent Average applied MFN tariff: 5 percent	No: of tariff lines (TLs)-3 Minimum applied tariff: 0 percent Maximum applied tariff: 0 percent Average applied MFN tariff: 0 percent	No: of tariff lines (TLs)-5 Minimum applied tariff: 0 percent Maximum applied tariff: 8 percent Average applied MFN tariff: 4.6 percent
HS 850164 (AC generators exceeding 750kwA)	No: of tariff lines (TLs)-3 Minimum applied tariff: 5.8 percent Maximum applied tariff: 10 percent Average applied MFN tariff: 7.3 percent	No: of tariff lines (TLs)-1 Average applied MFN tariff: 0 percent	No: of tariff lines (TLs)-1 Average applied MFN tariff: 0 percent

PRODUCTS AND HS CODES/ COUNTRY	CHINA (2017 REPORTING)	JAPAN (2017 REPORTING)	KOREA (2017 REPORTING)
HS 850300 (Parts for electric motors and generators and rotary sets)	No: of tariff lines (TLs)-4 Minimum applied tariff: 3 percent Maximum applied tariff: 12 percent Average applied MFN tariff: 6.5 percent	No: of tariff lines (TLs)-1 Average applied MFN tariff: 0 percent	No: of tariff lines (TLs)-5 Minimum applied tariff: 5 percent Maximum applied tariff: 8 percent Average applied MFN tariff: 6.8 percent
HS 700800 (Multiple-walled insulating units of glass)	No: of tariff lines (TLs)-2 Minimum applied tariff: 14 percent Maximum applied tariff: 14 percent Average applied MFN tariff: 14 percent	No: of tariff lines (TLs)-1 Average applied MFN tariff: 0 percent	No: of tariff lines (TLs)-1 Average applied MFN tariff: 8 percent
HS 841861 (Heat pumps other than air conditioning machines of heading 84.15)	No: of tariff lines (TLs)-2 Minimum applied tariff: 10 percent Maximum applied tariff: 15 percent Average applied MFN tariff: 12.5 percent	No: of tariff lines (TLs)-2 Average applied MFN tariff: 0 percent	No: of tariff lines (TLs)-1 Average applied MFN tariff: 8 percent

Source: Created by author from publicly available information: World Trade Organization (WTO), "Tariff Download Facility: WTO Tariff Database," http://tariffdata.wto.org/ReportersAndProducts.aspx.

Table 1 shows that for heat pumps, import tariffs in China and Korea are higher; hence, both countries would stand to benefit in terms of energy savings from the elimination of import duties on such goods and making such technologies, including energy-efficient Japanese ones cheaper, in the Chinese and Korean markets. Similarly, for various categories of electric motors (not shown in the table), only Japan imports all of them duty free. China applies import tariffs ranging rom 5 to 24.5 percent, whereas Korean tariffs range from zero (for two types of motors in the range of >375 kVa to >750kVA) to 8 percent for other categories.

Free trade agreements represent a scenario where levels of liberalization are much higher than MFN-applied tariffs (whose benefits are extended to all WTO members). One of the major free trade agreements (FTAs) in the region is the one between China and Korea signed in 2015.

This FTA, however, has been criticized by experts as not being ambitious enough despite an eightfold increase in China-Korea trade from USD 31.2 billion to USD 234.5 billion from 2000 to 2014. This is largely due to product exclusions and the delayed phase out of tariffs for many products over periods stretching from 5 to 20 years during which Korea is to eliminate tariffs on 92 percent of products (USD 73.6 billion of import value), and China will eliminate tariffs on 91 percent (USD 141.7 billion of import value).

The trade coverage in the near term (5 to 10 years) is much less ambitious than other FTAs signed by Korea, for example, with the United States that eliminates 98.3 percent of South Korean and 99.2 percent of U.S. tariffs, and the South Korea–EU FTA that removes 98.1 percent of South Korean tariffs and 99.6 percent of EU tariffs within 10 years.[23]

In addition, the services and investment commitments are weak. Recognizing this, both sides agreed to expand coverage through talks launched in early 2018.[24] However, China and Korea have agreed to a certain degree of liberalization under the existing FTA in designated sectors such as engineering and environmental services.[25]

Solar PV panels, a heavily traded product and one critical for the expansion of solar energy, have already been covered for duty-free treatment together with LEDs under the WTO's Information Technology Agreement and are therefore not listed within the China-Korea FTA.

Korea's tariff concessions schedule under the China-Korea FTA, for instance, provide for base rates to remain for some of the climate-mitigation relevant goods listed in Table 1, such as multiple-walled insulating units of glass (HS 700800), but eliminates import tariffs on most categories of wind turbines (HS 850231). For certain products such as AC generators (HS 850164), the FTA is much more selective and liberalizes only one or two subtypes while retaining applied tariffs on other types. For certain other products such as parts for electric motors including for wind turbines (HS 850300), Korea applies a phased tariff elimination over a period of 5 years while for various types of electric motors, this period is increased to 10 or 15 years. China's schedule of tariff concessions excludes products such as glass insulating units and includes others such as wind turbines, wind turbine hubs and blades, AC generators, and other electric motors for tariff elimination over a period ranging from 5 to 20 years. It does, however, provide for immediate tariff elimination for parts of electric motors (HS 850300).[26]

In addition, non-tariff measures (NTMs) that include technical standards and associated conformity assessment (CA) procedures are often more important as obstacles to trade. While they are often introduced for legitimate public policy reasons such as safety, product performance, and environmental protection, they may also be designed and administered in a manner that serves domestic protectionist purposes. Provisions on non-tariff measures in the China-Korea FTA largely reiterate WTO provisions that prohibit some of the more obvious NTMs, such as quantitative restrictions on export and import and import licensing. The WTO provides for the establishment of a working group on NTMs under the auspices of the Committee on Trade in Goods, composed of relevant and competent officials of each Party, to conduct consultations on matters related to non-tariff measures.

It further only "encourages" competent authorities to have discussions on the mutual recognition of the testing results by designating testing laboratories in the other Party in the fields of foods and cosmetics.[27] For environmental goods, a more useful provision might have been specific recognition of accreditation bodies and procedures in either country specifically for environmental goods such as climate-friendly technologies.[28] This may be something to be considered in a future trade agreement involving China, Japan, and Korea.

(ii) Addressing barriers to climate-friendly services

Similar to environmental goods, removing trade barriers to services that help in decarbonization could facilitate carbon market linkages by reducing abatement costs and thereby enlarging the market for abatement options. It would also contribute to lowering differentials between the marginal cost of carbon abatement (attributable to differing prices for the same type of climate-friendly service) among the three countries.

Services relevant to clean-energy generation and energy efficiency cut across multiple key mitigation sectors identified by the Inter-Governmental Panel on Climate Change (IPCC). They are energy supply, buildings, transport, and industry. These services often fall into various groups identified under the Central Product Classification (CPC) used for reference by trade negotiators, such as other professional, technical, and business services; construction services; and other environmental protection services. From a trade negotiator's point of view, such classification, as well as the crosscutting sectoral nature of climate-friendly services, can make it challenging to be selective and precise while making binding market access concessions affecting environmental services.

Trade in services normally takes place through four modes:

- **Mode 1:** Cross-border supply without the movement of service producers or consumers across borders—e.g., through the Internet.
- **Mode 2:** Consumption abroad by movement of consumers to the country where the service is delivered—e.g., tourism-related services.
- **Mode 3:** Commercial presence involving the establishment of a foreign service provider in a host country to provide services—e.g., foreign direct investment by a Japanese solid-waste management services firm in China to deliver waste management services.
- **Mode 4:** The temporary movement of natural persons abroad to deliver a service—e.g., movement of Chinese energy-efficiency consultants to Korea to provide energy-efficiency retrofit services for commercial buildings.

Many countries consider the CPC-based classification to be outdated, making it difficult to more precisely include new environmental service sectors that have emerged since the classification was created. In a 2012 note to the Secretariat, the WTO suggests several ways in which clean-energy services can be classified and proposes new types of services such as carbon capture services, which had hitherto been hidden under other categories such as business and transport services.

There are proposals that "smart grids" deserve consideration as an emerging power sector technology for CPC classification. Under present services classification schemes, smart grids are likely to cut across several services such as telecommunications and computer services and perhaps services incidental to energy distribution.[29] One thing to bear in mind is that there is no restriction on countries to propose their own classification schemes as long as the services indicated under various sector and sub-sector headings are mutually exclusive.[30]

The pace of binding liberalization in the climate-relevant services sector, however, has been slow and cautious, particularly at the WTO multilateral level. Table 2 shows the latest status of binding commitments by China, Korea, and Japan under the WTO's General Agreement on Trade in Services (GATS). The binding commitments date back to the late 1990s given the lack of progress in the Doha round of trade negotiations since then, as well as the plurilateral Trade in Services Agreement (TiSA) negotiations being negotiated by 23 WTO members constituting 70 percent of services trade (the TiSA includes Japan and Korea but not China).

Full commitments as indicated in Table 2 refer to commitments made in the first three modes of delivery—namely, Modes 1, 2, and 3 other than Mode 4 (movement of natural persons across borders), where countries usually do have some restrictions or qualifications in place.

Table 2 shows a greater degree of binding liberalization in services sectors relevant to climate change mitigation, such as construction and engineering by Korea and Japan as compared to China. A future trilateral trade agreement involving China, Japan, and Korea, difficult though it may be to achieve, should aim at liberalized market access for these critical services that will lower costs and better facilitate delivery of clean energy and energy-efficiency services in the region.

The China-Korea bilateral FTA presently excludes services, although talks are underway to expand the scope of the agreement to cover services and investment.[31] Autonomously, China, Japan, and Korea have, over the years, progressively relaxed certain conditions of access to their services markets, although such "autonomous liberalization" has not been made formally binding within each country's WTO GATS schedules.[32]

10.2 THE TRADE-PLUS PILLAR: ADDITIONAL ELEMENTS OF A COOPERATION PACKAGE TO ENABLE CARBON MARKETS INTEGRATION

(i) Technical and financial assistance toward the development of low-carbon industrial export zones

In addition to lowering trade barriers to clean-energy goods and services to facilitate decarbonization efforts, another avenue for cooperation that could act as an incentive as well as an enabler to move toward a unified carbon market would be the setting up of low-carbon industrial export zones or parks. Industries account for nearly one-third of the world's direct and indirect global greenhouse gas emissions, and emissions reduction within industries will be playing an increasingly important role in achieving the global GHG mitigation goals. Cement (5 percent), chemicals (7 percent), and iron and steel (7 percent) sectors account for nearly one-fifth of all global GHG emissions, with significant potential to reduce emissions.[33]

Eco-industrial parks (EIPs) have been set up in a number of countries including China, Korea, and Japan; depending on their goals and priorities, they can be categorized into various types.[34] Most industrial parks that convert to EIPs are driven by the goals of climate change mitigation and energy security, greening the supply chains, and minimizing operating costs and improving productivity, all of which are relevant to the major sustainable development goals (SDGs) as well.[35]

TABLE 2: SNAPSHOT OF GATS COMMITMENTS BY CHINA, KOREA AND JAPAN IN SELECTED SERVICES RELEVANT TO CLEAN ENERGY GENERATION

SERVICES SECTOR AND SUB-SECTOR/COUNTRY	CHINA	JAPAN	KOREA
Professional Services: (d)Architectural Services	O	O	O
Professional Services: (e)Engineering Services	O	√	√
Professional Services: (f)Integrated Engineering Services	O	√	√
Construction and Related Engineering Services	O	O	O
Other Business Services: (c) Management Consulting Services	O	√	√
Other Business Services: (e) Technical Testing and Analysis Services	O	O	X
Other Business Services: (j) Services incidental to Energy Distribution	X	X	X
Other Business Services (m) Related Scientific, Technical, and Consulting Services	O	√	√

√=Full commitments **X=No commitments** **O=Partial commitments**

Source: World Trade Organization, "Services Commitments: Schedules of Commitments and Lists of Article II Exemptions," https://www.wto.org/english/tratop_e/serv_e/serv_commitments_e.htm

Korea has progressively integrated EIPs into its industrial complex framework with EIPs employing 2 million people and responsible for USD 45 billion in exports. The EIP model has prompted firms to invest more than USD 520 million (623.71 billion won) in energy efficiency, industrial symbiosis, waste management, and other eco-friendly investments. As of 2016, this has helped firms save more than USD 554 million and generated USD 91.5 billion (1,102.42 billion won) in new revenue.[36]

Low carbon industrial zones for export are particularly promising as an enabler for a unified carbon market because they could represent zones where carbon and trade-intensive sectors could set up and operate in conditions that may obviate concerns around competitiveness or carbon leakage. It would be easier, particularly for countries such as China, to implement more stringent climate regulations within such zones as compared to applying them nationwide.

Such zones could form the main or one of the main constituents of a subregional carbon market operating across all three countries, where trade-exposed, carbon-intensive industries could be located and regulated in a harmonized manner. It would also increase the pool of players and abatement options for players within this single enlarged subregional carbon market.

In addition, such zones could serve as "laboratories" for showcasing the energy-saving and GHG mitigation potential of best available technologies (BATs) within a specific industrial sector. To the extent feasible, they could also be powered largely or significantly through renewable or lower carbon fuels with the aim of becoming greener than the average national energy mix.

The setting-up of low carbon industrial zones or parks would also involve technical and financial assistance packages. As a technology leader, Japan could also consider providing bilateral assistance and technology support for the setting-up of such zones, for example, in China, and relevant assistance could also be channeled through the WTO's Aid for Trade Package and the UNFCCC's Green Fund.

A concrete example would be the adoption of the latest climate-friendly and energy-efficient technologies for those carbon-intensive sectors, particularly steel, cement, and aluminum, that would avoid competitiveness issues involving the three countries. A comprehensive package of cooperation including necessary regulatory frameworks, technology, training, and skills could be considered. A roadmap prepared by the World Bank for Low Carbon Growth for the Chittagong Export Processing Zone in Bangladesh, for example, provides some guidance to the various elements and preparatory steps to be considered (see Figure 2).

Indeed, similar to low carbon export zones, broader low carbon development zones could become a focal point for international cooperation and assistance toward the establishment of deeper regional carbon market linkages.[37] Such assistance could also be viewed as a "club-type" benefit inducement for countries willing to link their carbon markets.

(ii) Technical and financial assistance to promote cross-border trade in clean electricity as a win for trade, environment, and development

China, Japan, and Korea account for about one-third of global energy consumption, and their primary energy consumption is projected to exceed that of Europe and North America by 2030. The region is also highly dependent on fossil fuel imports for its energy security with imported energy making up more than 80 percent of total primary energy supply in Korea and Japan.[38] In addition, China, Japan, and Korea are seeking to cut down on greenhouse gas emissions and shift the energy mix of their economies, with Japan particularly exploring alternatives to nuclear energy in the wake of the 2011 Fukushima nuclear disaster. While liquefied natural gas (LNG) imports soared following the disaster, there is an expectation that nuclear energy will continue to play a role given Japan's prioritization of energy independence. Solar and other renewables currently make up only 5 to 7 percent of electricity generation sources in Japan.[39]

Given these diverse and often competing needs for climate change mitigation, energy security, and energy independence, one promising avenue for strengthening cooperation could be scaling up the prospects of cross-border, clean-electricity trade among countries in the Northeast Asian region, broadening it beyond China, Japan, and Korea to include other nations such as Mongolia, North Korea, and Russia.[40]

FIGURE 2. ELEMENTS FOR CONSIDERATION FOR A ROADMAP FOR A LOW-CARBON EXPORT PROCESSING ZONE: EXAMPLE OF CHITTAGONG EPZ IN BANGLADESH

Low carbon growth potential for CEPZ and design an optimal policy framework and facilitate and promote these opportunities

Preparatory diagnosics: Study of GHG inventorization report by KICOX

1 Low Carbon Green CEPZ Technical Diagnostic

a Energy Audit

Energy audit planning & selection of firms

Company specific energy audit

Project boundary/ Baseline setting

Identification of plausible measures of energy efficiency/ retrofit measures

ENERGY AUDIT REPORT

b Key mitigation opportunities

Utility level
- Power source diversification (RE)
- EE in generation/distrubution

Company level
- EE in manufacturing/ building/ independent power generation

Industrial symbiosis (KICOX)

Prioritization matrix MACC analysis

KEY MITIGATION PROJECTS

c Specific projects and financing mechanism

Detailed pre-feasibility plan for some discrite projects with focus on power generation, EE & CETP

Financial analysis /ratios

Financing mechanisms
- Source of financing
- Financing terms
- Possibility of carbon finance

2 Regulatory Framework and Implementation Support

a Existing policy review and barrier analysis and develop low carbon refulatory proposals
- Relevant BEPZA regulations/ guidelines FDI related policies and subsidy scheme
- Other relevant policies/ regulations in Bangladesh

KEY BARRIORS/ POSSIBLE SOLUTIONS

b Benchmark good practices

Selected country: India, Korea
- Low Carbon Green SEZ vision
- Regulatory/Institutional framework
- Technology transfer
- Incentive and tax scheme
- Access to finance

BEST PRACTICES

c Recommend institutional support options
- Low Carbon Green SEZ vision
- Regulatory/Institutional framework
- Technology transfer
- Incentive and tax scheme
- Access to finance

INSTITUTIONAL ARRANGEMENTS FOR LOW CARBON GROWTH OF CEPZ

Source: Etienne Kechichian and Mi Hoon Jeong, "Mainstreaming Eco-Industrial Parks, The World Bank and Korea Industrial Complex Corporation, July 2016, https://openknowledge.worldbank.org/bitstream/handle/10986/24921/Mainstreaming00020150event0in0Seoul.pdf?sequence=5.

Such trade links could lead to further integration of the electricity markets of China, Japan, and Korea and create more options for carbon abatement by a larger number of players. It would also make renewable electricity sources more easily available for entities required to reduce their carbon emissions, particularly in countries such as Korea and Japan that currently rely on imported shipments of fossil fuels. All of these factors would specifically encourage the creation of a single cross-border carbon market. The initiative will also have other broader benefits such as enabling China, Korea, and Japan to meet and exceed their climate-related NDCs and reduce their fossil fuel imports. The inclusion of North Korea in a super grid could also help establish cooperative partnerships and strengthen long-term peace prospects in the region in addition to providing cleaner power for North Korean economic growth.

Mongolia has been identified as particularly rich in wind energy resources and Russia (the region near Irkutsk) for hydropower, and clean-energy exports could help create jobs and diversify the economy (particularly in Mongolia).

The inclusion of North Korea would be particularly important for land-based electricity grid interconnections given Korea's isolated geography as a peninsula. A 2014 study by the Energy Charter Secretariat and other institutions carried out a preliminary examination of the techno-economic feasibility and benefits of two proposed cross-border regional super grid initiatives, namely, Gobitec and the Asian Super-Grid. Among other benefits, the study estimates a total of 187 gigatons of CO_2 per year for the region composed of China, Japan, Korea, and Mongolia with a large share of reductions in China (as shown in Table 3) owing to 85 percent of the electricity generated from the projects going to China.[41]

A 2016 study by the Economic Research Institute for ASEAN and East Asia (ERIA) found that large-scale grid interconnections between China, Russia, and Mongolia were feasible under all scenarios leading to savings in system costs of about USD 500 billion over 30 years for all three countries compared to the scenario of no grid interconnection and no electricity trade. This represents 10 percent of system costs for all three countries. In addition, about 4 billion tons of CO_2 emissions (about 10 percent of total carbon emissions in the case of no interconnection) could also be reduced over the same period. [42]

The challenges of implementing such super grids are well recognized. Costs will be significant. A planned installed capacity of roughly 100 GW under the Gobitec project is estimated to cost around USD 293 billion with a yearly maintenance and system cost of USD 7.3 billion. There are also political challenges, as well as challenges of implementing an adequate legal and regulatory system that could incentivize investors.[43]

Given the economic and environmental benefits of such a project, however, it could be given priority attention for multilateral funding through various channels such as the UNFCCC, International Renewable Energy Agency (IRENA), the Green Climate Fund (GCF), the Asian Infrastructure Investment Bank (AIIB), the World Bank, and the Asian Development Bank (ADB), while also attracting private sector investment including through sovereign risk guarantees. Financing and cooperation on small incremental steps (such as establishing an undersea high-voltage power link between China, Korea, and Japan and establishing power interconnections between China and Mongolia) may be a more feasible approach rather than attempting to tackle it as a single mega-project. Feasibility studies by power companies and other initiatives supported by the governments of Northeast Asian countries are already underway in this regard.[44]

11. POSSIBLE INSTITUTIONS AND ARRANGEMENTS FOR PURSUING TRADE AND TRADE-PLUS COOPERATION FOR NORTHEAST ASIA

THIS PAPER HAS PROPOSED FOUR TRADE AND TRADE-PLUS RELATED PATHWAYS that could be helpful as building blocks to enable broader cooperation to link carbon markets in the region, namely:

- Lowering tariff and non-tariff barriers to climate-friendly environmental goods
- Addressing barriers to climate-friendly environmental services
- Technical and financial assistance to facilitate the development of low carbon industrial export zones
- Technical and financial assistance to promote cross-border trade in clean electricity.

While freer trade holds benefits for both exporting as well as importing countries, it is possible that trade incentives by themselves may not be a sufficient inducement for countries to cooperate on linking carbon markets. For example, Japan already has very low or zero tariff barriers on a number of environmental goods and may not offer sufficient inducement for China and Korea, which have higher average applied tariffs. What may be considered, therefore, is to include both trade and trade-plus elements (such as technical and financial assistance toward low carbon industrial zones or regional grid interconnection projects) as part of a "package deal" to provide sufficient incentive for China, Korea, and Japan to strengthen carbon market linkages. A club-type approach with trade benefits that exclude members based on the strength of their respective emissions trading schemes could be controversial as well as potentially clashing with WTO rules. A better approach to encourage cooperation may be taking an incentive-led approach based not only on trade but also on other longer-term economic, environmental, and social benefits. This is the approach underlying the package deal involving the four trade and trade-plus pathways described earlier.

Where could such trade and trade-plus pathways be pursued? The best options for China, Japan, and Korea may lie in utilizing existing regional mechanisms and institutions for cooperation. On trade, this could mean pursuing accelerated liberalization of climate-friendly goods and services as part of the ongoing Japan-Korea-China trilateral free trade agreement, perhaps even aiming at an earlier conclusion and implementation of this part of the trade deal. The challenge for achieving such liberalization in climate-friendly goods is, therefore, wrapped up in the wider difficulties facing trilateral trade negotiations in Northeast Asia. These are myriad and complex and relate to diverging strategic priorities and development phases in the region.[45] While trade initiatives such as the Regional Comprehensive Economic Partnership (RCEP) and the Asia-Pacific Economic Cooperation (APEC) (where members have already agreed to voluntarily reduce applied tariffs on environmental goods under 43 HS subheadings to no more than 5 percent) are also an option, this would involve acting in concert with a much larger group of countries, thereby lowering flexibility and the degree of ambition. (APEC, for example, is limited to voluntary initiatives.)

Cooperation on low carbon industrial export zones as well as cross-border electricity grids, while being spearheaded by governments (particularly Ministries of Industry and Energy), would necessitate the involvement of a larger group of stakeholders, including private companies, banks, sovereign wealth funds, as well as international donors and institutions such as the UNFCCC (likely involving the Green Fund and Technology Mechanism), the World Bank, the ADB, IRENA, the United Nations Industrial Development

TABLE 3. PROJECTED CO_2 EMISSION REDUCTIONS FROM THE GOBITEC/ASG PROJECTS

	UNIT	KOREA	CHINA	JAPAN	MONGOLIA	TOTAL
CO_2 Emissions per kWh from Electricity Generation (2010)	tCO_2/MWh	0.533	0.766	0.510*	1.492	-
Emission Reduction	$GtCO_2$	21	149	13	4	187

* Emission factor of 2011. Source: The Federation of Electric Power Companies of Japan

Source: Mano et al., “Gobitec and Asian Super-Grid for Renewable Energies in Northeast Asia,” Energy Charter Secretariat (ECS), Energy Economics Institute of the Republic of Korea (KEEI), Energy Systems Institute of the Russian Federation (ESI), Ministry of Energy of Mongolia (MOE) and Japan Renewable Energy Foundation (JREF), January 2014, https://energycharter.org/fileadmin/DocumentsMedia/Thematic/Gobitec_and_the_Asian_Supergrid_2014_en.pdf.

FIGURE 3. GOBITEC AND ASIAN SUPER GRID CONCEPTS

Source: Mano et al., “Gobitec and Asian Super-Grid for Renewable Energies in Northeast Asia,” Energy Charter Secretariat (ECS), Energy Economics Institute of the Republic of Korea (KEEI), Energy Systems Institute of the Russian Federation (ESI), Ministry of Energy of Mongolia (MOE) and Japan Renewable Energy Foundation (JREF), January 2014, https://energycharter.org/fileadmin/DocumentsMedia/Thematic/Gobitec_and_the_Asian_Supergrid_2014_en.pdf.

Organization (UNIDO), the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), and others. The WTO's Aid for Trade initiative could also be relevant (particularly for low carbon export zones). Country donor agencies such as the Japan International Co-operation Agency (JICA) and banks such as Softbank and China Development Bank could also play an important role for specific projects.

Liberalization of trade in climate-friendly environmental goods and services makes available the tools for decarbonization to governments, households, and the private sector at a lower cost.

Given the diverse nature of ministries and agencies involved in operationalizing the four pathways, the ideal institution that could play an overall coordinating role (including liaison with the various ministries and actors involved) is the China-Japan-Korea trilateral cooperation secretariat with its various established departments handling issues such as trade and investment, energy, and environmental protection.

Finally, in addition to measures pursued through trilateral trade- or non-trade–led cooperation initiatives, China, Japan, and Korea can always autonomously undertake trade policy and investment reform (such as voluntarily eliminating tariffs or easing restrictions on foreign investment in clean energy) as well as domestic legislation and regulatory reforms required. All of these steps will accelerate both decarbonization efforts as well as integration of goods, services, and energy markets of Northeast Asia, in turn facilitating deeper carbon market linkages.

12. CONNECTING THE TRADE AND TRADE-PLUS PATHWAYS TO OPTIONS FOR CARBON MARKETS LINKAGE

THE FOUR PATHWAYS ALSO FIT WELL INTO THE POSSIBILITIES FOR A DEEPER LINKAGE of carbon markets under various options provided in the Paris Agreement discussed earlier in the paper. Liberalization of trade in climate-friendly environmental goods and services makes available the tools for decarbonization to governments, households, and the private sector at a lower cost. It also leads to abatement options that involve lower and more optimal environmental technology and services costs across all three markets once trade barriers are removed. This, arguably, would facilitate the move toward a carbon market that faces similar technology-related abatement costs across all three markets as well as create a bigger pool of abatement opportunities due to lower costs of accessing the technologies and services required.

Together with cross-border trade in clean energy, they further deepen the process of economic and energy integration in Northeast Asia, creating a wider market pool for mitigation options and internationally transferred mitigation outcomes provided by Articles 6.4–6.7 of the Paris Agreement (e.g., through Chinese, Korean, and Japanese companies investing in renewable energy projects in Mongolia).

The creation of low carbon industrial export zones reduces the possibility of carbon leakage risks as well as competitiveness concerns by allowing for a certain level of consistency of environmental standards for all GHG-intensive and trade-exposed industries located in such zones, whether in China, Korea, or Japan and enabling a bigger pool of actors and mitigation options. Most significantly, such zones operating within the three countries could be linked under a single subregional carbon market as part of initial phases of linkage.

While being similar to other subregional ETS linkages such as that between California and Québec, boundaries of these low carbon zones may or may not correspond with specific provinces or a group of provinces or regions within each country. Further, the zones could represent a cross-border "high-ambition ETS scheme" that could operate in parallel with existing national ETS schemes operating outside these zones such as the China or Korea ETS. The aim eventually would be to dock individual national ETS schemes with this high-ambition cross-border ETS scheme with provisions on eventual docking built into it.

An initial deeper linkage involving such specific zones within China, Japan, and Korea may be more feasible in the short to medium term as a subregional plurilateral cooperative agreement under Article 6 of the Paris Agreement, as discussed earlier in the paper, that could expand through eventual docking into a single carbon market covering the entire territory of these countries.

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