CHINA'S EMISSIONS TRADING SYSTEM: STEPS TOWARD ARTICLE 6 LINKAGE

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I. INTRODUCTION

In 2019, climate action around the world has continued to gain momentum. In the United States, Congress has begun discussions of a Green New Deal to take radical action on climate change.[1] Climate activism has become a global phenomenon as citizens around the world have organized mass protests to demand governments take actions to prepare for climate change. The 2015 Paris Agreement, which created binding obligations on all Parties to the Agreement to take climate action,[2] has spurred national governments around the world to think of ways to curb greenhouse gas (GHG) emissions, respond to threats that climate change poses to their populations, and ensure sustainable progress on those climate policies.[3]

An important tool in climate mitigation policy that has emerged is carbon pricing. Carbon pricing attempts to internalize the climate change externality of using fossil fuels to power the economic development of the twentieth century. Carbon pricing emerged in contrast to command-and-control regulation of GHG emissions, which

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1. *See* H.R. Res. 109, 116th Cong. (2019) ("Recognizing the duty of the Federal Government to create a Green New Deal"). *But see* Timothy Cama et al., *Dems Downplay Division over Green New Deal*, THE HILL (Feb. 7, 2019), https://thehill.com/policy/energy-environment/429062-dems-downplay-divisions-over-green-new-deal (outlining divisions within the Democratic party, as well as partisan opposition to action on climate change).

2. U.N. Conference of the Parties, *Adoption of the Paris Agreement*, art. 21, U.N. Doc. FCCC/CP/2015/10/Add.1 (Jan. 29, 2016) [hereinafter Paris Agreement]. For a discussion on the legal character of particular provisions, see Daniel Bodansky, *The Legal Character of the Paris Agreement*, 25 REV. EUR. CMTY. & INT'L ENVTL. L. 142, 145–147 (2016).

3. *See* Gabriela Iacobuta et al., *National Climate Change Mitigation Legislation, Strategy & Targets: A Global Update*, 18 CLIMATE POL'Y 1114, 1130 (2018) (discussing trends in national policies following the Paris Agreement and concluding that an increase in targets coincided with the Paris Agreement).

is a tool often deployed in environmental regulation.[4] Command-and-control regulatory approaches impose fixed limitations on emissions on individual geographic regions or polluters.[5] Market-based regulatory approaches differ from command-and-control regulation of emissions by utilizing economic incentives to achieve regulatory goals.[6] The allure of market-based mechanisms is that greater emissions reductions can be achieved at a lower cost, as a market system will identify lowest cost abatement options and would ideally even out marginal abatement costs for market participants.[7]

Though there are critiques of carbon pricing, including moral arguments against the commodification of pollution[8] and equity concerns about emissions trading exacerbating the unequal distribution of polluting activity,[9] carbon pricing policies continue to garner support and broader implementation. Different variations of carbon pricing have been the primary tool for many countries to incentivize emissions reductions and stimulate low-carbon economic development.[10] One class of carbon pricing is a carbon tax, which seeks to reduce carbon emissions by directly placing a price on emissions through taxation.[11] Another kind of carbon pricing requires emitting

4. *See* David Driesen, *Putting a Price on Carbon: The Metaphor*, 44 ENVTL. L. 695, 700–02 (2014) (comparing other environmental protection economic instruments, such as carbon emissions trading and emissions taxes, with traditional command-and-control regulatory approaches).

5. *Id.* at 700–02. For example, the Clean Air Act sets ambient standards for air quality through the NAAQS and emissions standards under New Source Performance Standards and New Source Review, while the SO_x acid rain program used economic incentives under the same Act. *See generally* U.S. ENVTL. PROT. AGENCY, THE PLAIN ENGLISH GUIDE TO THE CLEAN AIR ACT, EPA-456/K-07-001(2007), https://www.epa.gov/sites/production/files/2015-08/documents/peg.pdf.

6. *See* NAT'L CTR. FOR ENVTL. ECON., U.S. ENVTL. PROT. AGENCY, EPA-240-R-01-001, THE UNITED STATES EXPERIENCE WITH ECONOMIC INCENTIVES FOR PROTECTING THE ENVIRONMENT, at i–iv (2001), https://www.epa.gov/sites/production/files/2017-08/documents/ee-0216b-13.pdf (discussing market incentives as an alternative to command-and-control policies).

7. Michael Mehling & Endre Tvinnereim, *Carbon Pricing and the 1.5 Degree Celsius Target: Near-Term Decarbonisation and the Importance of an Instrument Mix*, 2018 CARBON & CLIMATE L. REV. 50, 51 (2018).

8. *See, e.g.*, Simon Caney & Cameron Hepburn, *Carbon Trading: Unethical, Unjust and Ineffective?*, 69 ROYAL INST. PHIL. SUPPLEMENT 201, 203 (2011) (quoting the argument that "turning pollution into a commodity to be bought and sold removes the moral stigma that is properly associated with it . . . .").

9. *See, e.g.*, Daniel A. Farber, *Pollution Markets and Social Equity: Analyzing the Fairness of Cap and Trade*, 39 ECOLOGY L.Q. 1, 29 (2012) (describing concerns of environmental justice advocates that "emissions allowances might disproportionately end up in the hands of dirtier plants, which may themselves be disproportionately located in disadvantaged communities").

10. WORLD BANK & ECOFYS, STATE AND TRENDS OF CARBON PRICING 2018, at 15 (2018).

11. *Carbon Tax Basics*, CTR. FOR CLIMATE & ENERGY SOLUTIONS,

entities to pay for emissions reductions, leading them to either purchase allowances for their emissions, reduce emissions to avoid the cost of purchasing permits, or reduce emissions to generate surplus permits to sell to other emitters.[12] An emissions trading system (ETS) facilitates such trading of units of emissions between sources of emissions, allowing the price of those emissions to be determined by the supply and demand of the market.[13] Starting in the 1990s, governments began to implement carbon pricing in the form of a carbon tax.[14] In 2005, the first ETS started operation in the European Union (EU ETS).[15] Since then, many more countries have implemented carbon pricing, either via a carbon tax or a market mechanism.[16] The proliferation of carbon pricing policies around the world has led to a considerable amount of research into how best to design and operate such systems, to optimize existing systems, and facilitate future implementation.[17]

In the early days of the U.N. Framework Convention on Climate Change (UNFCCC), signatory Parties contemplated a single international venue for trading emissions reductions. One attempt at realizing this global ETS was the 1997 Kyoto Protocol.[18] The Kyoto Protocol placed obligations on Annex I Parties to reduce GHG emissions through national measures and trading emissions reductions in tandem with the Clean Development Mechanism and Joint Implementation, project-based mechanisms that feed into the carbon market.[19] However, in the years since the ratification of the Kyoto Protocol, climate negotiations have shifted from trying to achieve a

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https://www.c2es.org/content/carbon-tax-basics (last visited Nov. 15, 2019).

12. *Cap and Trade Basics*, CTR. FOR CLIMATE & ENERGY SOLUTIONS, https://www.c2es.org/content/cap-and-trade-basics (last visited Nov. 15, 2019).

13. Mehling & Tvinnereim, *supra* note 7, at 50–51.

14. *See* WORLD BANK & ECOFYS, *supra* note 10, at 20 (showing the earliest carbon pricing initiatives were carbon taxes implemented in Finland (1990), Poland (1990), Norway (1991), Sweden (1991) and Denmark (1992)).

15. *Id.*

16. *See id.* (showing the increase in carbon pricing initiatives over time). As of 2018, there are 45 national and 25 subnational carbon pricing initiatives, with more countries indicating in their Nationally Determined Contributions (NDCs) to the UNFCCC that they plan on using carbon pricing to achieve GHG emissions reductions. *Id.* at 18.

17. *See generally, e.g.*, JOSEPH E. STIGLITZ ET AL., WORLD BANK, REPORT OF THE HIGH LEVEL COMMISSION ON CARBON PRICES (2017) (synthesizing empirical research into carbon pricing policies and mechanisms to reflect available evidence and literature).

18. Kyoto Protocol to the United Nations Framework Convention on Climate Change, Dec. 10, 1997, U.N. Doc FCCC/CP/1997/7/Add.1, 37 I.L.M. 22 (1998) [hereinafter Kyoto Protocol].

19. UNFCCC, *Emissions Trading*, U.N. CLIMATE CHANGE, https://unfccc.int/process/the-kyoto-protocol/mechanisms/emissions-trading (last visited Nov. 15, 2019).

top-down multilateral climate policy to favor bottom-up approaches from a national and even subnational level.[20] This shift is reflective of one of the founding principles of the UNFCCC: "common but differentiated responsibilities and respective capabilities" of the Parties.[21] Rather than trying to achieve a single ETS with participants from all countries, efforts have shifted to supporting carbon pricing policies that reflect Parties' domestic contexts and capacity for emissions reductions. As the number and variety of ETSs at subnational, national, and regional levels have increased, the Paris Agreement explicitly contemplates facilitating cooperative approaches between those climate policies in Article 6.[22] Some have suggested that a central goal of the Paris Agreement was to strike a balance between top-down and bottom-up approaches to climate mitigation, and Article 6 attempts to set the framework for governance in this space, which will be discussed further in Part I.C.[23]

An important development in market-based carbon pricing has been the launch of the Chinese national ETS in December 2017, in accordance with its Intended Nationally Determined Contribution (INDC) as part of the Paris Agreement.[24] Once fully operational, China's new climate policy will be the largest ETS in the world by volume of carbon traded.[25] Since China is the world's largest GHG emitter by country,[26] the roll-out of this program has been highly

20. *Compare* INT'L EMISSIONS TRADING ASS'N, GREENHOUSE GAS MARKET REPORT 2008: PIECING TOGETHER A COMPREHENSIVE INTERNATIONAL AGREEMENT FOR A TRULY GLOBAL CARBON MARKET (2008) (repeatedly referencing a single global carbon market), *with* INT'L EMISSIONS TRADING ASS'N, GREENHOUSE GAS MARKET 2012: NEW MARKETS, NEW MECHANISMS, NEW OPPORTUNITIES (2012) (referencing to many disparate and fragmented developments in carbon pricing).

21. United Nations Framework Convention on Climate Change art. 3.1, May 9, 1992, S. TREATY DOC No. 102-38 (1992), 1771 U.N.T.S. 107.

22. Paris Agreement, *supra* note 2, art. 6.

23. Susan Biniaz, *Analyzing Articles 6.2 and 6.4 of the Paris Agreement Along a "Nationally" and "Internationally" Determined Continuum*, *in* MARKET MECHANISMS AND THE PARIS AGREEMENT 55, 55 (Robert N. Stavins & Robert C. Stowe eds., 2017); *see infra* Part I.C for further discussion of Article 6.

24. *See* DEP'T OF CLIMATE CHANGE, NAT'L DEV. & REFORM COMM'N OF CHINA, ENHANCED ACTIONS ON CLIMATE CHANGE: CHINA'S INTENDED NATIONALLY DETERMINED CONTRIBUTIONS 5, 14 (2015) [hereinafter CHINA'S INDC] (unofficial translation), https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/China/1/China's%20INDC%20-%20on%2030%20June%202015.pdf (including "promoting carbon emission trading market" as part of China's "policies and measures to implement enhanced actions on climate change").

25. Lawrence H. Goulder et al., *China's National Carbon Dioxide Emission Trading System: An Introduction*, 6 ECON. ENERGY & ENVTL. POL'Y 1, 1 (2017).

26. *See China—Country Summary*, CLIMATE ACTION TRACKER,

anticipated and many resources were committed to the planning and development of the institutional infrastructure for national emissions trading prior to the launch. The continued development of this ETS in future phases will play a critical role in climate mitigation. Thus, identifying ways to optimize China's ETS and potential opportunities for cooperation with other countries will ensure success of the program and could catalyze even greater ambition.

One avenue that China can consider in the development of its ETS is future linkage opportunities. The literature on carbon pricing through market measures has shed light on the benefits of linking sub-global carbon markets.[27] These benefits have prompted several jurisdictions to link their ETSs with other jurisdictions to take advantage of a larger market. For example, the EU ETS as a regional scheme has links with Switzerland,[28] Norway, Liechtenstein, and Iceland,[29] while the Western Climate Initiative in the U.S. links California's ETS with Quebec and Ontario[30] (though Ontario pulled out of the agreement in late 2018).[31]

This Note will examine the opportunity for linking China's ETS to other jurisdictions, and Part I will discuss the benefits of linking carbon markets, some examples of existing linkages and the current legal

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https://climateactiontracker.org/countries/china/2019-06-17/sources (Sep. 19, 2019) (depicting historical, current, and projected emissions data that shows China to be the world's largest GHG emitter).

27. *See, e.g.*, Judson Jaffe et al., *Linking Tradable Permit Systems: A Key Element of Emerging International Climate Policy Architecture*, 36 ECOLOGY L.Q. 789, 799–800 (2009) (discussing several benefits of linking).

28. *Swiss Companies Get Green Light to Access EU Carbon Market*, SWISSINFO.CH (Mar. 7, 2019), https://www.swissinfo.ch/eng/co2-emissions_swiss-companies-get-green-light-to-access-eu-carbon-market/44806558.

29. *Emissions Trading: Commission Announces Linkage EU ETS with Norway, Iceland and Liechtenstein*, EUR. COMM'N (Oct. 26, 2007), http://europa.eu/rapid/press-release_IP-07-1617_en.htm.

30. *Québec, Ontario and California Join Forces to Fight Climate Change*, GOV'T OF ONTARIO NEWSROOM (Sept. 22, 2017 10:51AM), https://news.ontario.ca/opo/en/2017/9/quebec-ontario-and-california-join-forces-to-fight-climate-change.html (describing the "agreement to harmonize and integrate emissions cap programs" entered into by the subnational governments); *see also* Agreement on the Harmonization and Integration of Cap-and-Trade Programs for Reducing Greenhouse Gas Emissions, Cal.-Ont.-Que., Sept. 22, 2017 https://ww3.arb.ca.gov/cc/capandtrade/linkage/2017_linkage_agreement_ca-qc-on.pdf (detailing the specific terms of the agreement).

31. Antonella Artuso, *Ontario Formally Pulls Plug on Cap and Trade*, TORONTO SUN (Oct. 31, 2018), https://torontosun.com/news/provincial/ontario-formally-pulls-plug-on-cap-and-trade. This is a particularly interesting link, as these are subnational markets that are linked across national borders.

governance for links across borders.[32] Part II will take a closer look at China's ETS in the broader framework of China's climate policy and its legal institutions, as well as focus on a distinguishing feature of the ETS: the rate-based Tradable Performance Standard. Part III will offer recommendations for China's ETS, given its political and regulatory context, as well as unique challenges posed by its rate-based design. These findings may also be applicable to other developing countries as they consider market-based mitigation policies and intensity-based targets. Part IV will examine future opportunities for linking China's market with other carbon markets and potential barriers to linkage, which China may consider as it develops the national ETS.

I. LINKING CARBON MARKETS

A. The Argument for Linking

Two common concerns about carbon markets are that they are ineffective at producing emissions reductions and inefficient at achieving significant cost savings. An example of the first concern is the potential for 'carbon leakage,' whereby market forces drive carbon-intensive industries out of jurisdictions that put a price on carbon to jurisdictions where there is no price or a lower price on carbon emissions.[33] Carbon pricing can impact the competitiveness of firms or sectors subject to regulation, especially in sectors that have a higher elasticity of demand or sectors which are more exposed to trade.[34] This has led to some ETSs trying to prevent carbon leakage through implementing safeguards, such as free allocation of allowances as opposed to auctions, which subsidizes the upfront cost of compliance to regulated firms to counteract the incentive to move those emissions elsewhere.[35] An example of a free allocation system is when a firm receives free allowances for its emissions which fall within a certain baseline or benchmark set by the regulator, and must purchase any emissions in excess of this benchmark.[36] If a firm's pre-existing emissions are not subject to ETS pricing that actually costs the firm

32. This Note will use the term "carbon markets" as a catch-all to refer to tradable permit systems seeking to reduce GHG emissions, whether cap-and-trade or emissions-reduction-credit, rate-based or mass-based systems.

33. Fitsum G. Tiche et al., *Carbon Leakage, Free Allocation, and Linking Emissions Trading Schemes*, 2014 CARBON & CLIMATE L. REV. 97, 98 (2014).

34. *Id.*

35. *See id.* at 99–101 (comparing the success of using free allocation used to mitigate carbon leakage in the EU ETS and the Australian Carbon Pricing Mechanism).

36. *Id.* at 102.

money, it may prevent those emissions from 'leaking' to another jurisdiction by the firm moving its operations to avoid costs.[37] In the absence of a global ETS, some proponents of linkage have argued that linking different ETSs could be one pillar of a strategy to minimize carbon leakage globally by equalizing carbon prices across connected jurisdictions.[38]

Another important issue related to the overall effectiveness of ETSs is ensuring the integrity of emissions reductions through proper regulation and governance. Many ETSs allow for the use of offsets for firms to comply with their emissions reduction obligations.[39] Offsets allow flexibility in ETS compliance, as a firm may opt to finance a project that results in equivalent emissions reductions instead of reducing its actual operational emissions.[40] A problem arises if the accounting associated with the use of carbon credits or offsets is not robust, as a firm or the ETS as a whole can claim emissions reductions that have not been realized in mitigation efforts.[41] This problem can be exacerbated by linking different systems because of the risk of double counting.[42] Double counting can arise in a situation where a particular jurisdiction in which an emissions reduction takes place claims credit for that reduction, then transfers it for some consideration to another jurisdiction, which then claims the same reduction again.[43] This can

37. *See id.* (explaining how free allocation may reduce the incentive to move emissions from a regulated area to an unregulated area).

38. *Id.* at 101–03; Andreas T rk, *The Challenge of the European Carbon Market: Emission Trading, Carbon Leakage and Instruments to Stabilise the CO2 Price: Implications of Linking on Leakage* 9 (WIFO, Working Paper No. 410, 2011) (discussing research into how linking ETSs could reduce carbon price differentials in those systems which could minimize leakage across borders). For a hypothetical discussion of regulatory linkages minimizing this kind of leakage between U.S. states, see Daniel A. Farber, *Climate Policy and the United States System of Divided Powers: Dealing with Carbon Leakage and Regulatory Linkage*, 3 TRANSNAT'L ENVTL. L. 31 (2014) (discussing efforts by state governments and the executive branch to avoid leakage and create linkage).

39. *See, e.g.*, INT'L EMISSIONS TRADING ASS'N, USE OF OFFSET CREDITS ACROSS EMISSIONS TRADING SYSTEMS AND CARBON PRICING MECHANISMS 1–2 (May 2014) (describing how different ETSs allow for the use of offsets by regulated entities).

40. *Offsets*, CARBON TAX CTR., https://www.carbontax.org/carbon-tax-vs-the-alternatives/offsets (last visited Nov. 15, 2019).

41. Lambert Schneider, Anja Kollmuss, & Michael Lazarus, *Addressing the Risk of Double Counting Emissions Reductions Under the UNFCCC* 11 (Stockholm Env't Inst., Working Paper 2014-02, 2014), https://mediamanager.sei.org/documents/Publications/Climate/SEI-WP-2014-02-Double-counting-risks-UNFCCC.pdf.

42. WOLFGANG STERK, WUPPERTAL INST. FOR CLIMATE, ENV'T & ENERGY FROM CLEAN DEVELOPMENT MECHANISM TO SECTORAL CREDITING APPROACHES—WAY FORWARD OR WRONG TURN? 17 (2008).

43. *Id.* There were concerns about this kind of double counting in the implementation of

lead to inflated emissions reduction data across ETSs or jurisdictions.[44] The issue of double counting is of such great concern when contemplating international cooperation on climate mitigation that Article 6 of the Paris Agreement explicitly mentions double counting as something to be avoided by Parties when implementing accounting standards for transfers of mitigation outcomes.[45] Poorly designed linkage could exacerbate concerns about the environmental effectiveness of carbon pricing. However, well-designed linkages can mitigate some of these concerns and ensure that these systems do enhance pricing policies to ensure environmental integrity and cost savings.

The economic concern about carbon markets is that market inefficiencies will prevent the mitigation goal or cost savings from being realized. For example, an ETS limited by sector or geographic region may be inefficient due to a limited choice of abatement strategies. There can also be market power concerns where a regulated sector may be dominated by a limited number of actors, making a market for trading between entities illiquid.[46] These kinds of market inefficiencies defeat the purpose of trading systems designed to reduce the aggregate cost of emissions reductions.[47]

Linkage of carbon markets has long been proposed as a response to these issues raised about the effectiveness of carbon markets.[48] Some of the main advantages of linking systems are greater liquidity, reduced price volatility, and increased stability, leading to lower aggregate costs of mitigation.[49] Some studies have suggested that international

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Clean Development Mechanism (CDM) projects that were bought by compliance entities in ETS such as the EU ETS. The host government may have counted part of the credits produced by the project in its mitigation and sustainable development strategy, yet the same credits would be used for compliance under the EU ETS. For further discussion of additionality of CDM offsets, see LAMBERT SCHNEIDER, ÖKO-INST., IS THE CDM FULFILLING ITS ENVIRONMENTAL AND SUSTAINABLE DEVELOPMENT OBJECTIVES? AN EVALUATION OF THE CDM AND OPTIONS FOR IMPROVEMENT 7–10 (2007) (discussing findings that demonstrate the problematic assessment of additionality in the past three years and proposing measures of improvement).

44. Schneider et al., *supra* note 41, at 4.

45. Paris Agreement, *supra* note 2, art. 6.2 ("Parties . . . shall apply robust accounting to ensure, inter alia, the avoidance of double counting.").

46. Christian Flachsland et al., *To Link or Not to Link: Benefits and Disadvantages of Linking Cap-and-Trade Systems*, 9 CLIMATE POL'Y 358, 360 (2009).

47. *See* Brittany Harris, *Repeating the Failures of Carbon Trading,* 23 PAC. RIM L & POL'Y J. 755, 766 (2014) (arguing that issues like administrative costs and unreliable monitoring "undermine the efficiency claims of emissions trading proponents").

48. *See* Jaffe et al., *supra* note 27, at 800 ("[L]inking can improve market liquidity, reduce price volatility, and lessen market power concerns.").

49. N. Keohane et al., *Toward A Club of Carbon Markets*, 144 CLIMATIC CHANGE 81, 87–

cooperation by linking programs will also result in global cost savings.[50] Linkage is beneficial when there are variable levels of ambition and variable marginal abatement costs in the proposed linked jurisdictions.[51]

In addition to these economic benefits gained through linkage, there may also be political and administrative benefits to linkage. For example, linkage can create a reliance interest for compliance entities, making termination of links more difficult for governments, thus protecting mitigation action from being rolled back by a change in policy or administration.[52] Most political opposition to aggressive climate mitigation action is due to concerns about the costs associated with emissions control policies.[53] By bringing down aggregate costs of emissions control, countries can be more ambitious in their climate mitigation plans if it costs less to their economies to achieve the same emissions reductions. Additionally, designing a linkage-ready national ETS can yield administrative benefits, as policymakers may choose to incorporate certain design elements from other established systems they hope to link with and can learn from best practices of those systems.[54]

B. Paris Agreement Article 6

Article 6 of the Paris Agreement is the main legal guidance for linking carbon markets across national borders. Since carbon pricing

88 (2017); Michael A. Mehling, Gilbert E. Metcalf & Robert N. Stavins, *Linking Heterogeneous Climate Policies (Consistent with the Paris Agreement)*, 48 ENVTL. L. 647, 652 (2018).

50. *See, e.g.*, Baran Doda et al., *Linking Permit Markets Multilaterally* 2 (Ctr. for Climate Change Econ. & Policy, Working Paper No. 311, 2019), www.lse.ac.uk/Grantham Institute/publication/a-theory-of-gains-from-trade-in-multilaterally-linked-etss/ ("If these ETSs can be integrated through linking, substantial cost savings can in principle become available due to increased efficiency and stability."); WORLD BANK & ECOFYS, STATE AND TRENDS OF CARBON PRICING 2016, at 86 (2016) (estimating that international cooperation on ETS could cause a 54% reduction in global costs of climate mitigation).

51. Doda et al., *supra* note 50, at 2.

52. William A. Pizer & Andrew Yates, *Terminating Links Between Emissions Trading Programs*, 71 J. ENVTL. ECON. & MGMT. 142, 145 (2015). However, there have been instances of this happening, such as Australia pulling out of a planned link with the EU ETS and Ontario pulling out of the Western Climate Initiative after elections in those jurisdictions, discussed in Part I.C.

53. *See, e.g.*, *Cap-And-Trade Is Over, Ontario PCs Say As New Legislation Unveiled*, CBC NEWS (July 25, 2018 3:54PM), https://www.cbc.ca/news/canada/toronto/ontario-pc-legislation-kills-cap-and-trade-1.4761398 (explaining that the cap-and-trade system costed Ontario families $260 per year).

54. *Cf.* Mehling et al., *supra* note 49, at 653 (explaining the "administrative economies of scale" whereby countries can learn from each other when designing and operating emissions reduction policies).

and emissions trading schemes were gaining traction, there was growing consensus in the years leading up to the Paris Agreement that linkages between carbon pricing policies could enhance global emissions reduction.[55] Article 6 of the Paris Agreement was born out of certain Parties' desire for some degree of UNFCCC oversight of transfers of different types of emissions reductions or other mitigation outcomes between Parties.[56]

Article 6.1 recognizes that Parties choose to cooperate to achieve "higher ambition in their mitigation and adaptation actions."[57] Article 6.2 places legal obligations on Parties that choose to use "internationally transferred mitigation outcomes" (ITMOs) to count towards their Nationally Determined Contributions (NDCs) to: (1) "promote sustainable development," (2) "ensure environmental integrity and transparency," and (3) "apply robust accounting . . . consistent with guidance adopted by the Conference of Parties serving as the meeting of the Parties to [the Paris] Agreement" (CMA).[58] Article 6.4 establishes a mechanism "to contribute to the mitigation of greenhouse gas emissions and support sustainable development" overseen by the CMA to fulfil the objectives of Article 6, though a detailed description of what the mechanism will do is missing.[59]

Importantly, the CMA has yet to issue guidance pursuant to Article 6.2 on issues related to ITMOs, as COP negotiations in December 2018 in Katowice, Poland failed to bring about consensus between the Parties.[60] Thus, Parties may be reluctant or otherwise struggle to move forward with linking ETSs when necessary principles to guide cooperative approaches have yet to be established. At the same time, Parties are wary of the CMA being too prescriptive in its guidance, as such guidance would be legally binding on the Parties and may reduce the flexibility for Parties which is the goal of the Paris Agreement.[61] Given this, a review of currently linked programs might suggest pathways forward for countries that may want to consider

55. *See, e.g.*, DANIEL BODANSKY ET AL., HARV. PROJECT ON CLIMATE AGREEMENTS, FACILITATING LINKAGE OF HETEROGENEOUS REGIONAL, NATIONAL, AND SUB-NATIONAL CLIMATE POLICIES THROUGH A FUTURE INTERNATIONAL AGREEMENT 2 (2014).

56. BENITO MULLER ET AL., EUROPEAN CAPACITY BLDG. INITIATIVE, ARTICLE 6: MARKET APPROACHES UNDER THE PARIS AGREEMENT 5 (2018), https://ecbi.org/sites/default/files/Article%20_0.pdf.

57. Paris Agreement, *supra* note 2, art. 6.1.

58. *Id.* art. 6.2.

59. *Id.* art. 6.4.

60. Mehling et al., *supra* note 49, at 651.

61. *Id.* at 687.

linkage in the future.

C. Types of Existing Linkage

There are three methods for linking ETSs. First, countries can purchase or otherwise transfer a mitigation outcome from another jurisdiction to fulfill their NDCs as described under Article 6.2.[62] Secondly, two jurisdictions can enter into a unilateral or bilateral agreements recognizing emissions reductions in the other jurisdiction for compliance with domestic mitigation requirements.[63] Thirdly, regulated entities in different jurisdictions can directly exchange emissions reductions credits across borders through a shared inventory between those jurisdictions.[64]

There have been fewer unilateral linkages—where one ETS accepts credits from another ETS without reciprocity—than other types of linkage, but there are a few notable examples. One of the largest unilateral links is the CDM under the Kyoto Protocol and the Certified Emissions Reductions (CERs) created through the program.[65] Some ETSs allow participants to use CERs for their compliance obligations, such as the EU ETS.[66] CERs have also been used by countries to fulfil their obligations under the Kyoto Protocol, an example of the first kind of linkage.[67] Australia announced a link between its proposed cap-and-trade system and the EU ETS, with the former accepting credits purchased from the latter but not vice versa;[68] however, this ended when Australia rescinded its carbon tax and cap-and-trade system.[69] The Regional Greenhouse Gas Initiative (RGGI) in the Northeastern U.S.—a linked market between states—considered amending its Memorandum of Understanding (MoU) to allow participants to use foreign-sourced allowances if allowance prices

62. *Id.* at 651.

63. *Id.*

64. *Id.*

65. *See* Kyoto Protocol, *supra* note 18, art. 12 (setting out the Clean Development Mechanism which allows CERs to be used for to contribute to compliance by Annex I countries with their emissions reduction commitments).

66. STERK, *supra* note 42, at 3.

67. *Id.*

68. *Australia and European Commission Agree on Pathway Towards Fully Linking Emissions Trading Systems*, EUR. COMM'N (Aug. 28, 2012), https://ec.europa.eu/clima/news/articles/news_2012082801_en.

69. ENVTL. DEFENSE FUND, AUSTRALIA: AN EMISSIONS TRADING CASE STUDY 2 (May 2015), https://www.edf.org/sites/default/files/australia-case-study-may2015.pdf. (noting that the repeal of the Clean Energy Act cancelled plans of a proposed link of the Australian ETS to the EU system).

exceeded a trigger, but the provision was never exercised since the clearing price never exceeded the trigger.[70]

There are more examples of bilateral linkages, where two ETSs decide to link their systems so that allowances can be traded across systems. A notable example of bilateral linkage is the Western Climate Initiative between California and Québec, which have ETSs with harmonized features and jointly administer some aspects of the systems. The link became multilateral when Ontario joined the WCI, but after a change of government, the province pulled out of the link. The links between Norway's ETS and Switzerland's ETS with the EU ETS seem similar to bilateral linkage but are an example of the third kind of linkage. They operate separate domestic caps and cover different sectors, but covered entities under the Norwegian and Swiss systems utilize the EU ETS inventory and trade in the same market as EU participants.[71]

These examples show the potential for different kinds of linkage, but this does not mean linking is always attractive. Linkage between ETSs can be very difficult when the systems have fundamentally different design features.[72] Early attitudes towards linking were not as concerned with differences in design of ETSs because of the excitement over the economic benefits of linkage.[73] This may have been due to less diversity among systems in early carbon pricing experiments. However, in an environment where national and subnational ETSs differ in their targets, accounting provisions and scope, linkage between heterogeneous systems can prove to be quite difficult on a technical level.[74] Furthermore, despite the economic benefits derived from linkage, there can be political barriers to linkage. For example, a less ambitious jurisdiction in a linked system may end up being a net buyer of permits. The subsequent result is a continuous flow of cash to the selling jurisdiction for those purchased permits, effectively subsidizing the emissions reductions and co-benefits in the

70. Erik Haites & Michael Mehling, *Linking Existing and Proposed GHG ETS in North America*, 9 CLIMATE POL'Y 373, 377 (2009).

71. *See* SONJA HAWKINS & INGRID JEGOU, INT'L CTR. TRADE & SUSTAINABLE DEV., LINKING EMISSIONS TRADING SCHEMES: CONSIDERATIONS FOR A JOINT EU-KOREAN CARBON MARKET, ISSUE PAPER NO. 3, at 29–35 (2014) (describing the Norwegian and Swiss schemes).

72. *See* Gilbert E. Metcalf & David Weisbach, *Linking Policies When Tastes Differ: Global Climate Policy in a Heterogeneous World*, 6 REV. ENVTL. ECON. & POL'Y, Winter 2012, at 110, 127 (concluding that linking "heterogeneous systems" would be difficult).

73. Dmitry Fedosov, *Linking Carbon Markets: Development and Implications*, 10 CARBON & CLIMATE L. REV. 202, 204 (2016).

74. Mehling et al., *supra* note 49, at 658–59.

selling jurisdiction, which may not be politically palatable in the selling jurisdiction.[75] The subsequent sections will focus on the Chinese ETS, ways to prime the national ETS for linkage, taking into account such barriers as the rate-based target, and examine potential opportunities for links.

II. THE CHINESE NATIONAL ETS

The national ETS in China set ambitious goals for carbon trading, covering many polluting sectors and aiming to catalyze widespread efficiency improvements across the country.[76] The volume of carbon that will be covered at full implementation dwarfs any other ETS, so the Chinese system holds a lot of potential for linking carbon markets in the region and beyond. China's INDC commits it to peaking GHG emissions by 2030 and lowering CO_2 emissions per unit of GDP by 60–65% relative to 2005 levels.[77] It also plans to increase non-fossil fuels in energy consumption to 20%. Emissions trading and further investment into renewable energy sources will be key in achieving the goals of the INDC.[78] As early as 2006, Chinese policymakers began to consider a shift from traditional command-and-control environmental regulation to market-based regulation at the sixth National Environmental Protection Conference.[79] In 2007, the National Development and Reform Commission (NDRC) included market mechanisms as a path forward for GHG mitigation strategy in China to incentivize emissions reductions within industry.[80] Before a national ETS was on the table, China participated in global market mechanisms as a source of CDM offset projects for ETS compliance markets.[81] Over time, expanding GHG mitigation beyond the offsets industry became a national priority and in 2010, China's Twelfth Five-Year Plan included the launch of a nationwide ETS.[82] This led to the creation of seven regional pilot

75. Fedosov, *supra* note 73, at 211.

76. William A. Pizer & Xiliang Zhang, *China's New National Carbon Market*, 108 AM. ECON. ASS'N PAPERS & PROC. 463, 463 (2018).

77. CHINA'S INDC, *supra* note 24, at 5.

78. *See* Jie Wu et al., *How Can China Achieve Its Nationally Determined Contribution Targets Combining Emissions Trading Scheme and Renewable Energy Policies?*, 10 ENERGIES, Aug. 2017, at 1, 1 ("Addressing climate change and promoting low-carbon development are the two key goals of energy policy in China.").

79. JACKSON EWING & MINYOUNG SHIN, NORTHEAST ASIA AND THE NEXT GENERATION OF CARBON MARKET COOPERATION 19 (June 2017).

80. NAT'L DEV. & REFORM COMM'N, CHINA'S NATIONAL CLIMATE CHANGE PROGRAM 31 (June 2007).

81. *Id.* at 33.

82. GOVERNMENT OF CHINA, TWELFTH FIVE YEAR PLAN 2011–2015 (2011) (unofficial

programs to experiment with different designs and to build up knowledge and expertise of administering ETSs domestically.[83] In 2014, the government announced a plan to develop a nationwide ETS and had plans to link the existing pilot programs to the new ETS once it began.[84] The NDRC oversaw the implementation of these pilot programs and the early stages of preparing for the national ETS, but that authority has now been transferred to the newly-created Ministry of Ecology and Environment (MEE).[85]

In November of 2011, the Chinese government launched ETS pilot programs in seven regions: Shenzhen, Beijing, Shanghai, Guangdong, Tianjin, Hubei, and Chongqing.[86] These pilot programs, which were operational by 2014, cover 1.2 billion tons of carbon dioxide per year, or 11.4 percent of national emissions in 2014. These ETSs are not identical in their design but share certain characteristics. For example, each ETS has the same kinds of allowances distinguishing between existing and new entrants to the market, has price stability mechanisms to address supply-demand inefficiencies, and allows Chinese Certified Emissions Reduction (CCER) offsets.[87] One important similarity is that the allowances traded in all the ETSs are Tradable Performance Standards (TPS), which are intensity standards rather than absolute standards.[88] This is also the design for the national ETS and poses certain challenges for the operation of the markets and the potential for future linkages of China's ETS to other carbon markets.

A. Defining the ETS Target: Mass-based vs. Rate-based

Emissions trading systems can set different kinds of targets, such as mass-based or rate-based targets. A mass-based ETS, or cap-and-trade system, sets a cap on total emissions for the sector or region it covers, and either allocates allowances within that cap to regulated

translation), https://cbi.typepad.com/china_direct/2011/05/chinas-twelfth-five-new-plan-the-full-english-version.html.

83. Goulder et al., *supra* note 25, at 3.

84. Xi Liang, *Developing a Linkage-Ready Carbon Market: A View from China*, *in* ASIA SOC'Y POL'Y INST., CARBON MARKET COOPERATION IN NORTHEAST ASIA 82, 83 (Jackson Ewing ed., 2018).

85. *China ETS under New Ministry of Ecology and Environment*, INT'L CARBON ACTION P'SHIP (Mar. 19, 2018), https://icapcarbonaction.com/en/news-archive/532-china-ets-under-new-ministry-of-ecological-environment.

86. Liang, *supra* note 84, at 83.

87. EWING & SHIN, *supra* note 79 , at 20–21.

88. *Id.* at 21.

entities or requires them to purchase allowances for emissions in a certain compliance period.[89] This is commonly viewed as yielding more aggressive action on climate change compared to other pricing policies as it places a hard cap on the amount of emissions a certain sector or geographic area will emit during a period. For example, the mitigation outcome of implementing a carbon tax is uncertain. Depending on the rate, a tax may incentivize actual emissions reductions or may just add an additional cost to business-as-usual without catalyzing low-carbon innovation or actual emissions reductions.[90] In a mass-based ETS, the hard cap and increasing stringency over time means the total emissions reductions the system will achieve can be calculated.[91] Some examples of mass-based ETSs are the EU ETS and RGGI.

An intensity-, or rate-based, ETS allocates allowances based on emissions reductions per unit of output or on energy efficiency. Emissions reductions can take place either by switching from a fossil fuel energy source like coal or oil to a cleaner source like solar or wind energy, or by increasing energy efficiency of the process that requires energy.[92] Energy efficiency plays an important role in reducing carbon emissions and has been a key element of many climate action plans.[93] To incentivize greater emissions reductions through energy efficiency, some ETSs have focused on trading efficiency standards. This approach is particularly attractive in developing countries that are concerned that strict emissions controls will overburden economic development.[94] In a mass-based ETS, firms' compliance costs include both the cost of abatement through investment in efficiency technologies and the cost of purchasing or surrendering allowances for actual emissions.[95] In a rate-based ETS, the firm receives rebates on

89. A. Denny Ellerman & Ian Sue Wing, *Absolute vs. Intensity-Based Emissions Caps* 2–3 (MIT Joint Program on the Science and Policy of Global Change Rep. 100, 2003).

90. Jane Andrew et al*., Carbon Tax: Challenging Neoliberal Solutions to Climate Change*, 21 CRITICAL PERSPECTIVES ON ACCOUNTING 611, 616 (2010).

91. *See* Ellerman & Wing, *supra* note 89, at 8–9 (explaining how a series of absolute caps allows a government to know and plan its emissions reduction trajectory).

92. *See* Keith Regan, *The Rise of the Energy Efficiency Trading Scheme*, *in* IETA GREENHOUSE GAS MARKET 2012: NEW MARKETS, NEW MECHANISMS, NEW OPPORTUNITIES 104, 104–05 (Anthony Mansell ed., 2012) (explaining how energy efficiency is an important mechanism to reduce emissions).

93. Noah M. Sachs, *Should the United States Create Trading Markets for Energy Efficiency?* 46 ENVTL. L. REP. 10466, 10466 (2016).

94. *See, e.g.*, Regan, *supra* note 92, at 104 (describing India's "Performance, Achieve and Trade" (PAT) energy efficiency program for the industrial sector).

95. Jan-Tjeerd Boom & Bouwe R. Dijkstra, *Permit Trading and Credit Trading: A Comparison of Cap-Based and Rate-Based Emissions Trading Under Perfect and Imperfect Competition*, 44 ENVTL. & RESOURCE ECON. 107, 107–08 (2009).

costs associated with abatement strategies based on the established benchmark ratio.[96] This kind of design is attractive because it accommodates continued economic growth and the lower net cost of compliance has a lower impact on final product prices.[97]

A prominent example of a successful rate-based market mechanism was the U.S. lead phasedown in gasoline through the 1980s. This program pre-dated the sulfur dioxide tradable permit system set up to address acid rain and interstate pollution in the 1990 Clean Air Act Amendments, so it was the first large-scale use of tradable permits in environmental policy.[98] Due to rising concerns about the human health effects of lead in the atmosphere due to leaded gasoline, the U.S. Environmental Protection Agency (EPA) decided to implement regulations to stop the addition of lead to gasoline.[99] The program set standards for lead additive concentration in gasoline for individual refineries based on their overall gasoline output.[100] Because some larger refineries were already capable of producing unleaded gasoline and smaller refineries producing leaded gasoline would struggle to meet the new stringent lead standards, EPA used a market mechanism to allow for inter-refinery trading.[101] Furthermore, because the standard was a performance-based one, the refineries could continue to add the same amount of lead to their gasoline or even increase it, if they concurrently increased the amount of unleaded gasoline they produced in the compliance period.[102] By allowing the refineries to trade with one another and bank allowances for the future, the industry as a whole was able to comply with an outright ban on lead additives in gasoline by 1996.[103] The U.S. lead phasedown is seen as an effective environmental policy that produced results with low overall costs.[104]

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96. Pizer & Zhang, *supra* note 76, at 465.

97. *Id.*

98. Richard G. Newell & Kristian Rogers, *The Market-Based Lead Phasedown*, *in* MOVING TO MARKETS IN ENVIRONMENTAL REGULATION: LESSONS FROM TWENTY YEARS OF EXPERIENCE 171, 171 (Jody Freeman & Charles D. Kolstad eds., 2006).

99. *Id.* at 175.

100. *See id.* at 178–79 (explaining the mechanics of lead allowances, trading, and banking under the lead phasedown program).

101. Richard Newell & Kristian Rogers, Res. for the Future, The U.S. Experience with the Phasedown of Lead in Gasoline 6–7 (June 2003) (discussion paper).

102. *Id.* at 4.

103. *See id.* at 26 (showing lead additives in gasoline were prohibited in 1996).

104. *See* Richard D. Morgenstern, *China's National CO_2 Emissions Trading Program: A New Application of Tradable Performance Standards*, *in* HARV. PROJECT ON CLIMATE AGREEMENTS, MARKET MECHANISMS AND THE PARIS AGREEMENT 87, 88 (Robert N. Stavins & Robert C. Stowe eds., 2017) ("The lead phasedown is widely seen as an effective and efficient means of

Intensity-based targets are attractive because of their flexibility to adapt to economic conditions, as the number of allowances is dependent on output.[105] However, this same feature is criticized as some argue that it subsidizes total emissions compared to command-and-control or cap-and-trade approaches.[106] Furthermore, the flexibility afforded by these systems requires more data to maintain the integrity of the system, as information on both emissions and output are required. For example, a study of the U.S. lead phasedown revealed that there were more unintentional and intentional violations of the program by net buyers of permits who took advantage of the EPA having incomplete information on emissions and output.[107]

B. China's Rate-Based Strategy

Because of these advantages of a rate-based strategy, Chinese policymakers chose a rate-based design for its national ETS. The emissions units used are Tradable Performance Standards (TPS), representing firms' emissions intensity based on their output.[108] This means that permits are issued based on historical emissions levels relative to an individual firm's output. The MEE collects data on emissions for each sector and sets a benchmark emissions-output ratio, such as *x* tons of carbon dioxide per kWh for the power sector.[109] Based on this ratio and historical data for each firm's recorded emissions and output, the provincial government allocates allowances to firms.[110] At the beginning of the compliance period, a firm receives emissions allowances based on projected output and the benchmark emissions-output ratio.[111] At the end of the compliance period, the firm's allowances will be adjusted based on actual output. If a firm's actual rate of emissions to output exceeded the benchmark ratio, it must purchase allowances for those additional emissions during the compliance period.[112] If a firm's emissions rate was lower than the

reducing the lead content of gasoline.").

105. Lawrence H. Goulder & Richard D. Morgenstern, *China's Rate-Based Approach to Reducing CO2 Emissions: Strengths, Limitations, and Alternatives*, 108 AEA PAPERS AND PROCEEDINGS 458, 459 (2018).

106. Morgenstern, *supra* note 104, at 88.

107. Newell & Rogers, *supra* note 98, at 189.

108. *See* Pizer & Zhang, *supra* note 76, at 464 (explaining how the output-based allocation system used in China's ETS is a tradable performance standard, or rate-based standard).

109. Goulder & Morgenstern, *supra* note 105, at 3–4.

110. *See* Pizer & Zhang, *supra* note 76, at 465 (describing the formula used in allowance allocation based on the benchmark ratio and firm output).

111. *Id.*

112. Morgenstern, *supra* note 104, at 89.

benchmark ratio, then it receives surplus allowances which it can choose to either bank for future compliance periods, or sell them to other compliance entities.[113]

There are several reasons why Chinese policymakers chose this route for the ETS. Firstly, TPS reconciles China's appetite for continued economic growth with emissions mitigation. The number of total allowances available with TPS is not limited in a rate-based system, as increasing output increases the number of allowances available, potentially decreasing the aggregate costs of compliance.[114] By allowing the total amount of emissions to vary based on economic output, the rate-based approach is not as burdensome on the Chinese end-consumers as a cap-and-trade approach might be.[115] Secondly, the central government controls the price of electricity.[116] Thus, if a power generator is required to purchase extra allowances for underperforming during the compliance period, it cannot increase the price at which it sells electricity, so the cost of compliance will fall to the generator.[117] By adjusting the allowances a compliance entity receives based on its output during the compliance period, the rate-based target eases the individual burden of the regulation. This is especially important for certain sectors and regions whose economic potential the central government wants to protect.[118]

However, as the next section will discuss, this distinctive feature of China's ETS poses certain challenges for the policy's success, warranting extra care in developing the legal and regulatory infrastructure that will govern the system. This will be important for the environmental integrity of the ETS which in turn is critical for future linkages to other carbon markets. The next two sections will consider steps China can take towards linkage-readiness.

III. LEGAL INSTITUTIONS AND REGULATORY INFRASTRUCTURE

Any regulatory policy's effectiveness and success is predicated upon the ability of the governing entity to enforce that policy among regulated actors. Emissions trading in China is no different, and the

113. *Id.*

114. *See* Goulder & Morgenstern, *supra* note 105, at 459 (explaining how the flexibility of a TPS system can prevent high allowance prices).

115. *Id.*

116. Pizer & Zhang, *supra* note 76, at 464.

117. Alex Y. Lo, *Challenges to the Development of Carbon Markets in China*, 16 CLIMATE POL'Y 109, 119 (2016).

118. *Id.*

success of the national ETS in achieving emissions reductions will depend on its ability to create and regulate the market for TPS among entities covered by the program. Coordinated, effective enforcement by the governmental entities that will administer the program and the accuracy of data submitted by firms to effectuate compliance will be critical to the program actually incentivizing emissions reductions by those entities.

A. Decentralized Enforcement by Local Governments

The administration and enforcement of China's ETS is decentralized among different levels of government. The MEE, an agency of the central government, is responsible for determining benchmark ratios and allocation methodologies, but the actual allocation and enforcement of the program will be administrated by provincial governments.[119] The NDRC began, and the MEE continues, a considerable effort to develop regulatory infrastructure to determine the scope of coverage, design the monitoring, reporting and verification (MRV) system at a national level, coordinate the provincial government's collection of data from thousands of entities, and quantify benchmark ratios for allowance allocation.[120] These institutions are necessary to the efficient functioning of the ETS in its limited operation for the power sector and in future expansion to other sectors.[121]

This decentralized enforcement structure may pose a challenge for the effectiveness of the ETS. The integrity of a rate-based ETS relies on accurate, complete data on both the emissions of a facility as well as whatever its output is.[122] The quality of data is not only important for ensuring compliance for entities, but it is also important ex-ante when setting performance standards for the sector.[123] Here, the provincial governments will be responsible for collecting data from the firms in their jurisdictions, but it is the central MEE that will set the benchmark ratio for all sectors.[124] The dialogue between the MEE and local governments will be complicated, as local governments will need to

119. Morgenstern, *supra* note 104, at 90.

120. EWING & SHIN, *supra* note 79, at 23.

121. *See* Valerie Karplus, *Institutions and Emissions Trading in China*, 108 AM. ECON. ASS'N PAPERS & PROC. 468, 468 (2018) (giving examples where institutions influence the operation and success of ETSs, such as preexisting economic regulation or transaction costs).

122. *Id.* at 471.

123. Goulder et al., *supra* note 25, at 10.

124. *Id.*

provide accurate prior emissions data to the MEE to set benchmark ratios for each compliance period, administer the allowances during the compliance period, and report back to the central MEE after output for that period has been quantified. Thus, the central government will need to be able to rely on timely, accurate data from provincial governments for standard setting.

The structure of the political system in China and incentives for different actors within it may present challenges for effective enforcement of ETS compliance. The party cadre system which organizes local government officials in the centralized political system creates interesting political incentives for those leaders.[125] In China, the central government appoints local leaders to their provincial posts for short terms and transfers them from province to province, in part to prevent constituents' allegiance to local personalities rather than the central government.[126] These local party officials seek promotion to a higher position within the Party-state to the central government, and are primarily assessed by economic performance of the jurisdiction under their control.[127] This lack of accountability to the local community has caused the political agenda at the local level to typically focus on short-term economic policies at the expense of other policies which may take longer to execute, like public health or infrastructure.[128]

One example of this is environmental law, particularly laws aimed at improving air quality, which is a serious issue in almost all major Chinese cities.[129] The Chinese government has responded to public outcry over extreme air pollution from industry by requiring local governments to increase energy efficiency, encourage fuel-switching, and install pollution control equipment such as SO_2 and NO_x scrubbers at polluting facilities.[130] However, despite this mandate from the central government, there has been evidence of widespread manipulation of

125. See generally Cai (Vera) Zuo, *Promoting City Leaders: The Structure of Political Incentives in China*, 224 CHINA Q. 955 (2015) for an interesting study into political incentives in Chinese local governments providing a theory for why local leaders respond to their constituencies' concerns, despite not being democratically elected.

126. Roderick M. Hills, Jr. & Shitong Qiao, *Binding Leviathan: Credible Commitment in an Authoritarian Regime*, 102 MINN. L. REV. 1591, 1596–97 (2018).

127. Alex Wang, *The Search for Sustainable Legitimacy: Environmental Law and Bureaucracy in China*, 37 HARV. ENVTL. L. REV. 365, 379–80 (2013).

128. Hills & Qiao, *supra* note 126, at 1601–02.

129. *See* Wang, *supra* note 127, at 386–87 (introducing the connection between poor environmental protection and local government incentives in the Chinese central government).

130. VALERIE J. KARPLUS, DOUBLE IMPACT: WHY CHINA NEEDS COORDINATED AIR QUALITY AND CLIMATE STRATEGIES 4 (2015).

air pollution data by local governments and slack enforcement of polluters' noncompliance.[131] The political incentives for local leaders in the party cadre system offer an explanation for the lack of credible commitment by local government to tackle environmental issues. In some cities with particularly acute air quality problems, the central government has begun evaluating local leaders' performance not solely based on economic performance but on improvements in air quality.[132] Unfortunately, the exaggeration of environmental outcomes has been worse under this model, as local officials seek to improve their perceived performance in evaluations by the central government.[133]

Chinese local governments' negligent enforcement of environmental laws bears a warning for localized enforcement of ETS compliance. The integrity of local institutions executing the program will be critical to the success of the national ETS. In order to ensure incentives are properly aligned for the effectiveness of the ETS, the MEE can impose checks on local leaders charged with administrating the program, similar to the discipline of local leaders for poor air quality outcomes. The State Council could include ETS development and enforcement as a metric of success for those leaders' promotion. The MEE could require local leaders to regularly report on the effectiveness of the program, as indicated by volume of trading or surplus allowances generated by firms in that region. It could also require local government to commit to training and capacity building for covered entities to ensure they understand their data and accounting obligations under the new ETS.

This issue will be even more important where local leaders may also have conflicts of interest with their involvement with state-owned enterprises (SOEs). Power generation throughout China is dominated by SOEs, and many of the largest state-owned power generation companies in the world are located in China.[134] Chinese SOEs are

131. *See* Dalia Ghanem & Junjie Zhang, *'Effortless Perfection:' Do Chinese Cities Manipulate Air Pollution Data?*, 68 J. ENVTL. ECON. MGMT. 203, 203 (2014) ("Some cities are allegedly under-reporting their air pollution levels."); *see also* Alice Yan, *Thousands of Polluters in Northern China Fake Emissions Data, Resist Checks*, S. CHINA MORNING POST (Mar. 31, 2017, 2:29 PM), https://www.scmp.com/news/china/policies-politics/article/2083780/thousands-polluters-northern-china-fake-emissions-data ("Thousands of polluters have faked emissions data and resisted checks from environmental inspectors . . . .").

132. Valerie J. Karplus & Xiliang Zhang, *Incentivizing Firm Compliance with China's National Emissions Trading System*, 6 ECON. ENERGY & ENVTL. POL'Y 73, 77 (2017).

133. *See* Ghanem & Zhang, *supra* note 131, at 206 (discussing how the incentive structure for improved environmental conditions encourages local officials to alter their reports).

134. *See* Andrew Prag et al., *State-Owned Enterprises and the Low-Carbon Transition* 15 tbl.1 (Org. for Econ. Co-operation & Dev., Working Paper No. 129, 2018) (listing the fifty largest

interesting as they are not purely profit-maximizing entities, rather, they often are utilized to implement public policies on behalf of the Chinese government.[135] Though this could mean that the SOEs will be able to cooperate with the local government on compliance with the ETS, there may also be incentives to be more lenient in enforcement for SOEs whose performance is important for local government revenues, and SOEs often enjoy certain advantages due to preferential treatment by regulators.[136] In addition, these conflicts of interest could pose problems for linkages with other countries whose economies are less dominated by state ownership.

B. Accounting Principles

The gradual reduction of the ETS scope from eight heavy industry sectors to four sectors to just the electric power generation sector for the soft launch was disappointing to some actors anticipating the national launch.[137] However, despite the initial phases covering a much smaller total number of emissions, this decision may be more beneficial for the ETS in the long run. The power generation sector has relatively complete emissions data, so the data required to implement the other aspects of the program were already in place.[138] This decision signals a desire to lay a solid foundation for the ETS that will be of historic proportions once it expands to other sectors.

Any ETS relies on the quality of data that is submitted for compliance to be effective. However, the TPS feature of China's ETS introduces some complexity to the process, because both emissions data and data on the output of each regulated entity is required to determine the final allowance allocation before any trading can begin. Requiring firms to submit output data could be problematic as this may be commercially sensitive information that firms may be unwilling to fully disclose.

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electricity generating companies in the world, eleven of which are Chinese and 100% state-owned).

135. *See id.* at 21 ("SOEs often differ from privately held companies by being mandated to pursue public policy objectives determined by the government, broadening the goals of the company beyond profit maximisation." (internal citation omitted)).

136. *See id.* at 25 (describing some advantages enjoyed by incumbent SOE electricity companies).

137. *See* Zhongjue Yu et al., *A General Equilibrium Analysis on the Impacts of Regional and Sectoral Emission Allowance Allocation at Carbon Trading Market*, 192 J. CLEANER PRODUCTION 421, 430 (2018) (describing how the Chinese government reduced the scope due to poor historical emissions data in other sectors).

138. *Id.*

China must develop institutional strategies to ensure that submitted data are high quality. It can do this by investing into capacity building and training for firms, as well as organizational understanding of the data requirements that ETS compliance will warrant.[139] It should also establish accounting principles that ensure the integrity of data submitted by compliance entities. It has already done so by requiring third-party verification of emissions data.[140] This third-party process could be strengthened further if the MEE funds the verifiers rather than the compliance entities, as was demonstrated by the Beijing ETS.[141]

Robust accounting in the domestic ETS is also of critical importance to future linkage as any cross-border transfers of allowances between China's ETS and other ETSs will be governed by Article 6.2 and guidance issued by the CMA. The Paris Agreement's language of "Parties . . . shall apply robust accounting to ensure, inter alia, the avoidance of double counting" is currently the extent of legally binding principles on this matter. However, by strengthening accounting principles in the early phases of the program, the Chinese ETS will not only benefit at a domestic level to ensure the integrity of the system, but will also be linkage-ready for future cooperation with other jurisdictions.

IV. LINKAGE OPPORTUNITIES AND LINKAGE READINESS

Following from the general consensus that linking carbon markets can enhance beneficial trades between different systems, linkage between China's national ETS and other markets may yield benefits for cooperation on climate mitigation. As ETSs are developed and implemented throughout Asia, discussions around linkage between those jurisdictions have increased. Within China, the discussion of linking began at a domestic level as the existing pilot programs had to be incorporated into the new national ETS.[142] However, there have also been proposals of a linked market in Northeast Asia with national and subnational ETSs in Japan and Korea.[143]

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139. Karplus & Zhang, *supra* note 132, at 83.

140. *Id.* In the Beijing pilot ETS, the city government committed resources to fund the third-party verifiers of emissions data for the MRV system, rather than requiring the compliance entities to pay for it themselves, avoiding potential conflicts of interest. *Id.*

141. *Id.*

142. Yu Liu et al., *Carbon Emission Trading System of China: A Linked Market vs. Separated Markets*, 7 FRONTIERS EARTH SCI. 465, 465 (2013).

143. *See, e.g.*, EWING & SHIN, *supra* note 79, at 12–13 (laying out a potential pathway to linkages between Northeast Asian carbon markets).

A. Potential Linkages for China's ETS

Linking China's ETS to other carbon markets could bring about mutual benefits for the linked partners, such as price convergence and greater liquidity. Models of hypothetical linkage have shown that China will likely be a net exporter of permits in a linked market with developed countries, due to a lower marginal abatement cost.[144] Thus, linkage becomes a potential source of revenue for China, but more importantly, will contribute to a more efficient market.

The two markets that come to mind immediately as potential partners for China are the Republic of Korea and Japan. Korea began an economy-wide national ETS in 2015, marking the first national carbon market in Asia. However, reviews on its performance have been mixed, as the market struggles with price volatility, low liquidity and regulatory uncertainty.[145] As the Korean system enters later phases of development, linkage with other ETSs could be an attractive option to increase liquidity in its market and to access markets with a lower marginal abatement cost.[146] China could potentially be a beneficial ETS linkage partner for Korea if they decide to pursue linkage. One concern may be that Korea's ETS is economy-wide, while China's will be limited to certain sectors. To ensure this kind of link results in actual emissions reductions in each sector domestically, trades between Chinese and Korean regulated entities could be limited to same-sector trades rather than allowing dirtier facilities in Korea to just purchase credits from sectors with lower abatement costs in China.

Although Japan does not have a national ETS, subnational emissions trading in Tokyo and Saitama Prefecture as well as a voluntary emissions credit program for businesses has been operational for a long time in the region.[147] Japan has a high marginal abatement cost compared to other developed economies.[148] As a result, in order to meet its ambitious mitigation goals in its INDC, Japan will need to seek out more cost-effective climate policies.[149] One particular struggle for Japan is its energy mix after the nuclear accident in

144. *See* Shiro Takeda et al., *Labor Market Distortions and Welfare-Decreasing International Emissions Trading* 20 tbl.3 (Waseda Inst. of Political Econ., Working Paper No. E1422, 2015) (modelling analyses showing how, under different scenarios of international emissions trading, China will be a net exporter of permits).

145. EWING & SHIN, *supra* note 79, at 11.

146. Hawkins & Jegou, *supra* note 71, at 23.

147. Toshi H. Arimura, *The Potential of Carbon Market Linkage Between Japan and China*, *in* CARBON MARKET COOPERATION IN NORTHEAST ASIA, *supra* note 84, at 103.

148. *Id.*

149. *Id.*

Fukushima in 2011.[150] Nuclear was an important source of energy in the country before the accident, but Japan has had to lean on fossil fuel imports in the wake of Fukushima, hampering its progress towards a clean energy grid.[151] A unilateral link between the existing schemes in Japan could improve the efficiency of the market and could catalyze greater ambition in Japan.[152]

In addition to these more developed carbon markets, proposed and early-phase ETSs in Thailand, Vietnam and Indonesia could be potential partners in Asia. For example, since 2014 Thailand has run a voluntary ETS limited to energy generation and petrochemical industry, developing MRV capacity in anticipation of future emissions trading across multiple sectors.[153] Vietnam has also been working to develop MRV and institutional capacity to contemplate emissions trading in the steel sector and solid waste sectors.[154] By the time China expands the national ETS to include more domestic sectors, it could form links with these other early-stage ETSs. However, these ETSs may be less of a priority as there is considerably more uncertainty compared to the slightly more developed markets in Japan and Korea.

B. Challenges of Linkage in Asia

There are significant challenges to linking carbon markets in Asia that range from technical issues of compatibility of the different systems to the political economy of linkage in a region that has not historically been inclined to cooperation.[155] The proposition of cooperation on carbon markets and climate will need to garner significant political momentum to be a real possibility in the future.

Linkage with China's ETS presents other governments with the questions of distributional justice and the co-benefits of emissions reductions. By pursuing linkage as a way to reduce the regulatory

150. Sophie Yeo, *The Legacy of the Fukushima Nuclear Disaster*, CARBON BRIEF (Mar. 10, 2016, 5:12 PM), https://www.carbonbrief.org/analysis-the-legacy-of-the-fukushima-nuclear-disaster.

151. *Id.*

152. Arimura, *supra* note 147, at 104.

153. Marissa Santikarn, *Strong Competences for Emissions Trading in Thailand,* ADELPHI, https://www.adelphi.de/en/project/strong-competences-emissions-trading-thailand (last visited Nov. 15, 2019).

154. P'SHIP FOR MKT. READINESS, PROJECT IMPLEMENTATION STATUS REPORT 4–7 (Apr. 4, 2018), https://www.thepmr.org/system/files/documents/Vietnam_PMR%20Project%20Implementation%20Status%20Report_April%202018.pdf.

155. For a more detailed discussion, see Suh-Yong Chung, *Political Economy of Carbon Market Cooperation in Northeast Asia*, *in* CARBON MARKET COOPERATION IN NORTHEAST ASIA, *supra* note 84, at 72.

burden on industry by importing permits from China, other jurisdictions forfeit domestic emissions reductions and the co-benefits of those reductions. Furthermore, the trades that these linkages would cause a kind of transfer of wealth from those countries to China. In an environment in which developed countries have repeatedly called on China to have higher GHG mitigation ambition, these kinds of transfers could look like a subsidy of China's climate policy. Notwithstanding, transboundary air pollution from China to Japan and Korea is an important issue in this region, and emissions reductions in China could also translate into air quality and human health co-benefits in both Japan and Korea.[156]

Regardless of the jurisdiction(s) China chooses to link with, TPS will make those linkages more challenging. Firstly, most ETSs operate based on an absolute cap on GHG emissions. Some scholars have suggested that the rate-based emissions targets in China's ETS preclude it from participating in Article 6.2 transfers.[157] However, recent scholarship has suggested it is not impossible to link ETSs with different targets, such as China's rate-based ETS with an absolute cap ETS, but it will be more complex than a linkage between cap-and-trade systems.[158] Mehling et al. suggest that China's TPS allowances could be translated into mass-based allowances for trading with an absolute cap ETS by utilizing the benchmark emissions-output ratio for that compliance period.[159] The staggered allocation of TPS and associated delay of allowances into the market may be a barrier for future linkage with other systems which have a single allocation period, but this study also suggests that banked allowances using the same translation to a mass-based allowance could foster trades between ETS.[160] Thus, while it may be possible to facilitate linkage between China's ETS and other systems with absolute caps on carbon, it will be more complicated and may have significant delays than under a scenario with less heterogeneous systems.

156. *External Sources Account for 75 pct of S. Korea's Fine Dust Pollution*, YONHA NEWS AGENCY (Feb. 6, 2019, 2:17 PM), https://en.yna.co.kr/view/AEN20190206003300315. Granted, this is a tenuous link, but other countries may benefit from significant improvements to air pollution in China because of the extent of transboundary air pollution in the region.

157. Robert C. Stowe, *The Paris Agreement's Article 6 and Cooperation in Northeast Asia to Address Climate Change*, *in* CARBON MARKET COOPERATION IN NORTHEAST ASIA, *supra* note 84, at 41, 42–43.

158. Mehling et al., *supra* note 49, at 671.

159. *Id.* at 673.

160. *Id.* at 673, 683.

V. CONCLUSION

Linkage of national ETSs is a desirable policy choice in the world of bottom-up emissions reduction measures, as it can reduce the global economic cost of climate mitigation. As China continues to develop its national ETS, it should consider design choices that make the market ready for links with other ETSs and continue its commitment to cooperation to address climate change. Chinese policymakers should prioritize investing into the institutions involved in setting ambition for the ETS, administering the allowances, inventory and trading, and enforcing noncompliance during the single-sector phase of the ETS. The lessons learned at this stage will be critical for the development of institutional capacity and success of the program in later phases. Accounting standards for the firms will also be a critical piece of the puzzle, not only to ensure effective administration at the national level, but to garner trust from the international community. These principles will also bring the ETS closer to linkage-readiness, as robust accounting and strong institutions are necessary prerequisites to ETS linkage and required by Article 6.2 of the Paris Agreement.