

10. The Potential of Carbon Market Linkage between Japan and China

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INTRODUCTION

INTERNATIONAL COOPERATION IS ESSENTIAL TO ADDRESS THE CLIMATE CHANGE ISSUE, given its scale and urgency. Northeast Asian countries such as China, Korea, and Japan have great potential to contribute to climate change mitigation because of their technical capacities and scales. First, Japan has long been a global leader in energy efficient technologies. Thus, Japan can help developing economies reduce their greenhouse gas (GHG) emissions by sharing and deploying its established technologies. Korea, similarly, can provide investment and expertise into technological solutions in developing countries. China, as the largest global emitter of GHGs, has great potential to reduce emissions. Cooperation among these countries can potentially lead to the efficient control of GHG emissions from various perspectives.

One strategy to realize this potential is to create an international carbon market by linking the emissions trading systems (ETSs) among Northeast Asian economies. Although Japan lacks a domestic emissions trading system at the national level, there are linked subnational emissions trading schemes in Tokyo and Saitama. Korea implemented a national ETS in 2015. In 2013, China started seven pilot schemes in Beijing and other cities/provinces. In 2017, China announced the introduction of a national-level scheme (see chapter eight of this volume).

Currently, these markets in Northeast Asia operate independently. As economic theory suggests that trading goods among nations increases the nations' welfare, the linkage of carbon markets in the three countries is also expected to improve the nations' welfare and save costs in GHG emissions abatement (see chapter five of this volume). In this chapter, I discuss barriers and benefits to potential carbon market linkage between Japan and China. Focusing on the Japanese context and challenges, I argue that limited carbon market links with China could have advantages for stakeholders in each country, and benefit global climate efforts.

BENEFIT OF CARBON MARKET LINKAGE FOR THE JAPANESE ECONOMY

High Cost of Abatement in Japan

Northeast Asian carbon market linkage is attractive for Japan. The first reason is Japan's nationally determined contribution (NDC) to the Paris Agreement on climate sets an emissions reduction target of 26 percent below 2013 levels by 2030.² Moreover, the government announced an aspirational goal of 80 percent reduction by 2050. Achieving these goals will require both innovation and investment.

Japan is considered to have higher marginal abatement costs among developed economies as shown in many model analyses. For example, Akimoto et al. (2015) show that the marginal abatement cost (MAC)

for the 2030 target is approximately USD 380 per ton of CO₂eq according to a model called DEN+21.³ The model also estimates the MAC for the European Union (EU) and finds that it ranges from USD 60 per ton of CO₂ at the lower cost case to USD 69 at the higher cost case. Japan's MAC levels therefore outstrip those of other developed economies, to say nothing of developing economies where costs are consistently lower.

China is no exception, and its lower MACs could offer opportunities to Japan through market connectivity. For example, Takeda et al. (2015) examine the economic impact of carbon market linkage among major emitters such as the EU, the United States, China, and Japan. These authors find that China becomes a net exporter of permits while Japan becomes a net importer because of its higher MAC. Hübler et al. (2014) also analyze the linkage of the EU ETS and the future Chinese ETS and find that China becomes an importer of permits, which would hold even truer for a link with Japan given its higher MAC than those in the EU.

Carbon market linkage has an important economic implication. Economists use “welfare” to measure economic well-being. Takeda et al. (2015) report that the welfare of the Japanese economy will increase by 0.04 percent with the linkage of its national-level ETS to global carbon markets, in which the EU, the United States, Canada, and China are the major players. Given their fundamental economic and emissions characteristics—embodied through MAC levels—China and Japan can therefore create a symbiotic relationship through linkage.

Emission Reduction Targets and Energy Policy in Japan

Japanese energy policy also reinforces the case for carbon market linkage. Current trends suggest that Japan will face difficulties in achieving these emissions reductions in both 2030 and 2050. First, the 2030 target is based on the Japanese energy mix policy, which assumes that 20 to 22 percent of all electricity will be generated from nuclear power in 2030.⁴ Japan experienced the Great East Earthquake in 2011, which was followed by the nuclear accident in Fukushima. In response to this accident, the government tightened the safety standards for nuclear power plants. Consequently, power companies have had to invest in safety technologies to comply with new standards. In some cases, the power companies decided to decommission power plants such as Mihama or Tsuruga⁵ because of technical difficulties or additional costs to clear the new safety standards. Even if the power companies were to invest to meet the safety standard, they would often face opposition from the local communities. In fact, several lawsuits are pending against power companies to shut down nuclear power plants even if they cleared the new safety standards. Indeed, in several cases local courts have ordered nuclear power plants to stop operation, and power companies must obey. For example, in May 2014, “Fukui District Court issued a judgment that suspended reactors No. 3 and No. 4 of KEPCO's Ōi Nuclear Power Station” (Kamikawa, 2017, 137). Consequently, in 2016, nuclear power accounted for only 1.6 percent of all electric power generation in Japan.⁶ Thus, the achievement of a 20 percent reduction by 2030 is made more difficult by the reversal to nuclear growth trends in the wake of the Fukushima crisis.⁷

Japan must therefore rely more heavily on other energy sources for power generation. Despite the generous feed-in tariff policy⁸ after the earthquake, renewable energy such as solar and wind, excluding hydrogen, accounted for only 7.8 percent in 2016. The majority of power generation was fossil fuel based in 2016; 40.4 percent came from natural gas, and 33.3 percent came from coal. There are also numerous plans for new coal power plant construction, particularly since the deregulation of the electricity sector.⁹

One way to overcome this difficulty is to make use of overseas abatement opportunities. Japan made substantial use of the Clean Development Mechanism (CDM) under the Kyoto Protocol, including through investment from power and steel companies (Arimura et al., 2017). However, the Japanese government has left the Kyoto Protocol since 2013 because the biggest emitters of GHG such as China and the United States were not part of the protocol. Consequently, Japan is not allowed to use CDMs, which only the Kyoto Protocol permits.

Partly out of frustration with the CDM, Japan created its own offset system, the Joint Crediting Mechanism (JCM) (Arimura et al., 2012). Under the JCM, Japan collaborates with host countries on the creation and operationalization of clean energy projects, from which both obtain emissions reduction credits (Sugino et al., 2017). The JCM is financed by the Japanese government and has historically had a limited budget and a rather small amount of associated emissions credits. This may change, however, with Japan exploring increases to the JCM and expanding carbon pricing in part as ways to solve the emissions reduction challenges outlined in the previous section.¹⁰ Still, further efforts will likely be needed beyond offsetting for Japan to reach its climate targets in a cost-effective manner.

However, Japan's current lack of a national market leaves the Tokyo and Saitama linked markets as the current candidates for further linkage abroad—including with China.

TOKYO ETS AND CARBON MARKET LINKAGE: OPPORTUNITIES AND CHALLENGES

As mentioned in the introduction of this chapter, Japan can benefit from obtaining emissions credits from China at prices below its domestic MAC levels. However, Japan's current lack of a national market leaves the Tokyo and Saitama linked markets as the current candidates for further linkage abroad—including with China.

Tokyo ETS for Carbon Market Linkage?

The Tokyo ETS was first announced in 2007. As of 2018, the Tokyo Metropolitan Government is scheduled to continue this scheme until 2019. It consists of two phases. Phase I ran from 2010 to 2014, and Phase II is planned to continue from 2015 to 2019. During Phase I, mandatory CO₂ reductions of 8 percent and 6 percent from a base-year level were imposed on office buildings and manufacturing facilities, respectively. A facility that could not attain this goal faced fines unless it acquired enough credits for compliance.

The Tokyo ETS aims to mitigate the CO₂ emissions from large-scale facilities, which are defined as facilities that consume 1,500 kilolitres or more of oil equivalents energy per year. In 2013, a total of 1,392 facilities had to comply with the Tokyo ETS. Emissions allowances are given freely to each facility. The amounts are an 8 percent (6 percent) reduction from the baseline emissions for commercial (manufacturing) facilities. In determining the baseline, facility managers can choose three consecutive years from 2002 to 2007 (Nishida and Hua, 2011).

A unique feature of the Tokyo ETS is that it was the first cap-and-trade program to regulate commercial buildings (Nishida & Hua, 2011). Commercial facilities account for approximately 80 percent of regulated facilities. This point is quite different from the existing ETSs implemented at that time in other countries. For example, the EU ETS regulates emissions from manufacturing facilities and power plants. In another case, the Regional Greenhouse Gas Initiative is a scheme targeted for power plants in the U.S. northeast.

There are four types of emission credits in the Tokyo ETS. The first is *excess emissions reduction credit*. Facilities can earn this type of credit when they achieve their annual obligation, that is, 8 percent or 6 percent emissions reduction for commercial and manufacturing facilities, respectively.

In addition to excess emissions reduction credits, to mitigate the burden for facilities, the Tokyo government provides three types of domestic offset credits. The first offset credit is *small- and medium-sized installation credits within the Tokyo area*. Entities can earn this credit by investing in small- and medium-sized facilities that are not regulated by the Tokyo ETS. The second type of offset credit is *outside Tokyo credit*. An organization can earn this type of credit by reducing GHG emissions in facilities outside Tokyo. The third type of offset credit is *renewable energy credit*.

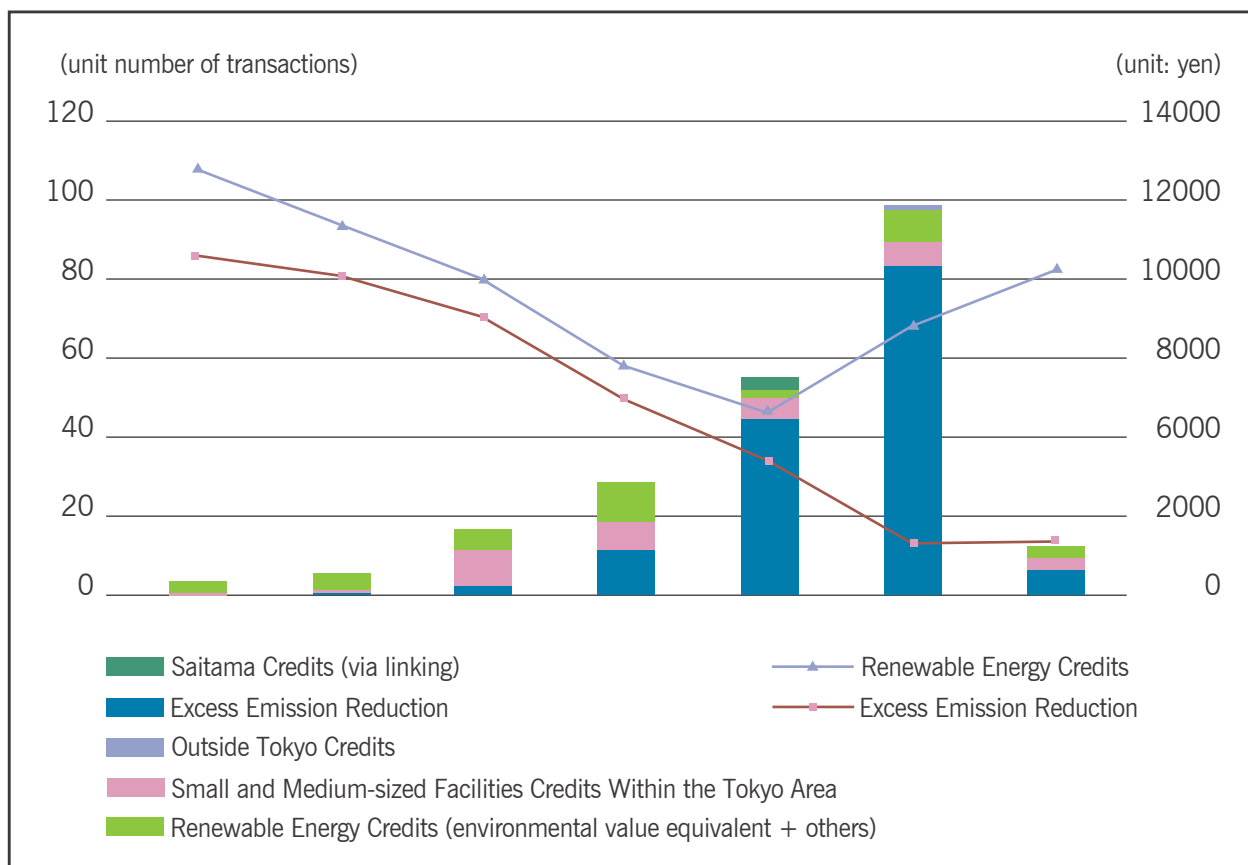
Finally, facilities in Tokyo can use credits from Saitama, a prefecture next to Tokyo. Saitama implemented an ETS in 2011. This ETS also has two phases. Phase I was from 2011 to 2014. Phase II started in 2015 and will continue until 2019. Saitama followed Tokyo in developing the design of its ETS. The difference is that the emissions target is voluntary, not mandatory. Another difference is that the majority of facilities are within the manufacturing sector. Saitama has also successfully reduced emissions from the baseline by 22 percent.

Figure 10.1 illustrates the number of transaction in the Tokyo ETS by credit type for each year. One can observe that the number of transactions has increased over the years. In particular, in 2016, the number of transactions was close to 100. This increase was due to the compliance of the Phase I period, which ended in 2015. There was, however, a grace period until 2016. Therefore, facility managers did not have to submit the required credits for compliance until the middle of 2016. Consequently, we observed somewhat “more” transactions in 2016.

One can argue, however, that the number of transactions has been quite limited, given the number of facilities under the Tokyo ETS. More than 1,300 facilities have the obligation of emissions reduction and thus are eligible for permit trading. The market is “thin” for the Tokyo ETS. If this carbon market can be linked to markets in China, one can expect an increase in the number of transactions, which will help establish a stable price signal. This factor is an important reason why carbon market linkage in Northeast Asia is desirable from the Japanese perspective.

Issues to be Addressed for the Tokyo ETS Before Carbon Market Linkage

It is possible that the linkage of carbon markets in Northeast Asia can stimulate the Tokyo ETS. However, some issues must be solved before the Tokyo ETS can become part of the linked carbon market.

FIGURE 10.1. PERMIT PRICE AND THE NUMBER OF CREDIT TRANSCATIONS IN THE TOKYO ETS

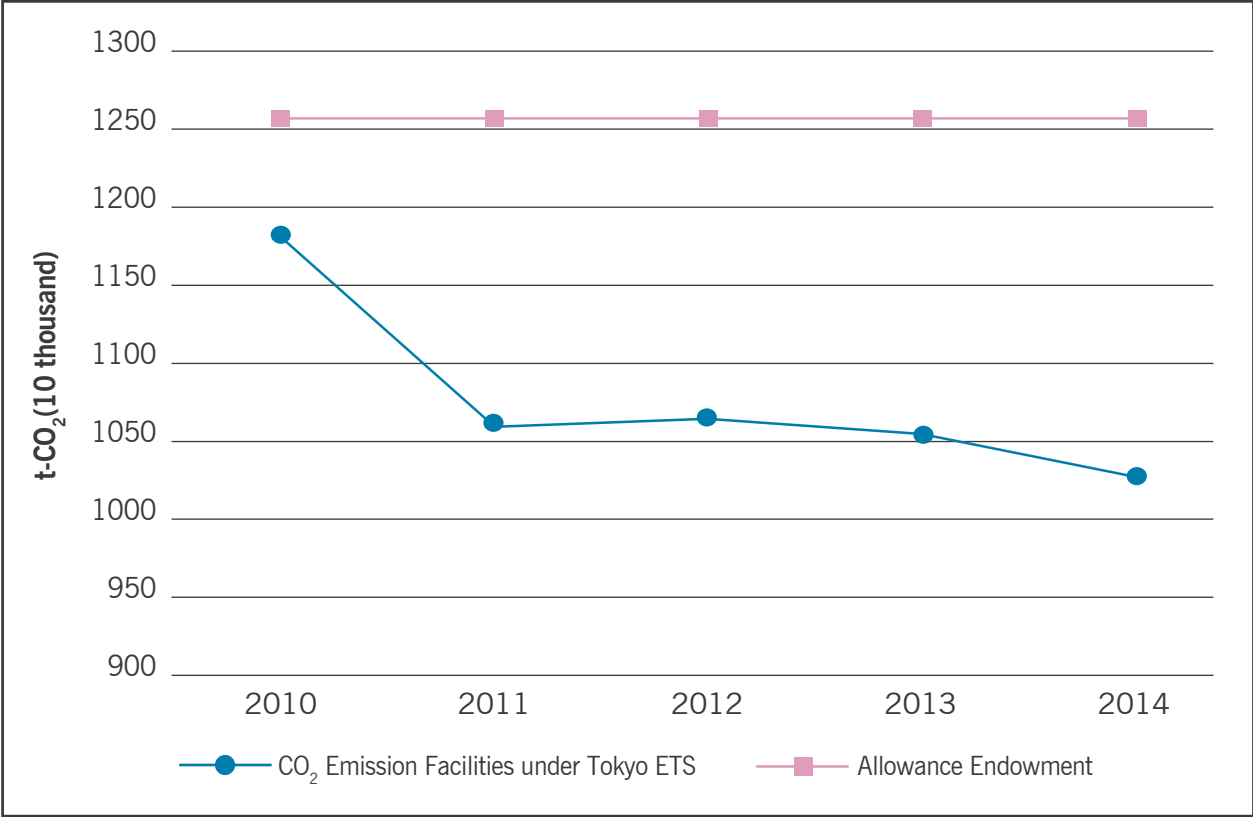
Source: Created by author from publicly available information: Bureau of Environment of the Tokyo Metropolitan Government, "The Results of Emissions Trading and the Intentions of Businesses Regarding Emissions Trading," December 2017, http://www.kankyo.metro.tokyo.jp/climate/large_scale/trade/index.files/siryou2-1_jisseki-ikou201712.pdf.

Banked Permits

There are some challenges in linking the Tokyo ETS to foreign ETSs. Figure 10.2 shows the transition of CO₂ emissions from facilities under the Tokyo ETS during Phase I and the 8 percent reduction from the baseline emissions, which approximately captures the total allowance permits. One can observe that CO₂ emissions are reduced more than required in Phase I. Sizable permits are banked for usage during Phase II. The baseline emission for the regulated emissions is 13.6 million tons. By 2014, the emissions decreased to 12.5 million, which is approximately an 8 percent reduction from the baseline. The surplus is banked for use during Phase II. Therefore, the demand to purchase permits from overseas carbon markets during Phase II of the Tokyo ETS does not seem to be strong largely because of the successful reduction in Phase I and of reduction targets that lack strong ambition.¹¹

The Tokyo Metropolitan Government is ready to design Phase III of the Tokyo ETS. If it chooses a more stringent target, then there may be a demand for permits from the Chinese market, making targeted links more desirable.

FIGURE 10.2. CO₂ EMISSIONS AND ALLOWANCES ENDOWMENT IN THE TOKYO ETS



Source: Created by author from publicly available information: Bureau of Environment of the Tokyo Metropolitan Government, “Tokyo’s Cap-and-Trade System: All Target Companies Achieved CO₂ Reduction Obligations of Phase I,” November 4, 2016, http://www.kankyo.metro.tokyo.jp/climate/large_scale/data/index.files/candtpuresusiryouhonnun.pdf.

Limitation of Usage of Foreign Permits

At the present time, the Tokyo ETS does not allow the use of international credits. The market was intentionally designed as “semi-closed” and shielded from international markets to reduce price volatility (Nishida and Hua, 2011). The Tokyo government intentionally chose this design to deflect criticism about capital flow to foreign countries. Japanese industry had to spend a large amount of money to purchase CDM credits to achieve the emissions target under the Voluntary Action Program (VAP) (Arimura et al. 2016). VAP consists of voluntary emission target and commitments by each industry association. Japanese industry associations criticized this spending, claiming that it was a waste of money. In response to this criticism, the Tokyo government prepared the variety of offset mechanisms noted earlier. These concerns would also pertain to potential future linkages in Northeast Asia. In response, the Tokyo Metropolitan Government must set some limits on the number of permits accepted from foreign counties (see chapter six of this volume).¹² Such policy designs would reduce but not remove the efficiency gains of linkage while making it more politically and commercially palatable.

Money Game Criticism and Limitation of Participants

When designing its carbon market, the Tokyo Metropolitan Government also had to address “money game criticism” (Roppongi, 2016). ETS sceptics claim that carbon markets are susceptible to speculation by investors and suffer from volatile prices. They claim that the volatility hurts the effectiveness of the ETS as environmental policy because it does not promote investing in low carbon technology with weak price signals. A similar criticism was an important element of ETS discussions in Korea and Europe as well (Kim, 2014).

To address this concern, only bilateral trades among emitters are allowed in the Tokyo ETS. Separate financial players cannot enter. Moreover, trading is possible only after the emissions reduction is confirmed. This feature resembles the design of Phase I in the Korean ETS (Kim, 2014).¹³ Consequently, the trading of permits is not as active as that in other markets, as shown in Figure 10.1.

PROSPECTS FOR A NATIONAL ETS IN JAPAN AND ISSUES TO BE SOLVED

The most severe barrier for carbon market linkage in Northeast Asia is the lack of a national-level ETS in Japan. In 2010, the Japanese Ministry of the Environment (MOE) invited stakeholders and academics to discuss the possible design. Facing opposition from energy-intensive industries, the cabinet led by the Democratic Party of Japan decided not to introduce the ETS, at least not immediately. The heated discussion on climate policy in 2010 ended with the introduction of a feed-in tariff and a low level carbon tax of JPY 289 per ton of CO₂.

The discussion about the ETS revived when the Paris Agreement was adopted in 2015. In 2017, the MOE held public committee meetings on carbon pricing by inviting experts on the issue. After nine public meetings, the MOE presented two possible options for carbon pricing. One is a carbon tax. The second is to introduce the ETS for large emitters and the carbon tax for the rest of the economy such as households, transportation, and small- and medium-sized emitters.

If an ETS is introduced nationwide in Japan, the energy-intensive trade industry (EITE) is expected to express concerns on the competitiveness issue and the associated carbon leakage. Several options can address these issues, including free allowance allocation to the EITE (Sugino et al., 2013), border adjustment (Takeda et al., 2012), or output-based allocation of permits (Takeda et al., 2014). In addition to these options, the national government can use credits from overseas markets. If this becomes an option to address the competitiveness issue, then the link to the Chinese ETS may be a possibility.

Even if an ETS is introduced at the national level in Japan, several issues must be solved before linking carbon markets in Northeast Asia. The first issue is related to equity in NDCs as Takeda and Arimura (2017) suggest. Japan is likely to gain economic benefits when participating in an international carbon market if the emissions target is fixed. However, in Japan, there is strong opposition to purchasing emissions allowances that are considered “hot air,”¹⁴ that is, not verifiable and robust. Moreover, even if it is not hot air, emissions trading across countries is likely to be regarded as unfair unless equity in the NDCs across different countries is secured to some extent. Specifically, a situation where regions with significantly lower NDC targets than other regions sell emissions allowances is regarded as unfair. The pattern of trading of emissions allowances depends strongly on the level of NDCs. Therefore, if some convertible equity is not secured in the determination of NDCs, the trading of emissions allowances is not considered fair, and as a result, international cooperation is suppressed.

Another important issue is the quality of measurement, reporting, and verification (MRV), which form essential parts of the governance of an ETS. Therefore, any national or local government exerts effort to have high-quality ETSs. MRV is essential to exchange emissions internationally. Japanese industry has strong confidence in quality control in general. This confidence applies to the quality of MRV of carbon emissions. Unfortunately, the MRV quality seems to differ across countries. Japanese firms are skeptical of foreign MRV, especially those in developing countries. To promote carbon market linkage, it is necessary to establish a mechanism that ensures a certain level of MRV quality.

However, if these barriers can be overcome, there is promise in Japan expanding its international efforts to reduce emissions. Lower-cost domestic options are likely to continue to be difficult to attain, and mutually beneficial cooperation with China through limited carbon market linkage offers a valuable potential tool for climate change progress.

ENDNOTES

1 For example, see Systems Analysis Group, Research Institute of Innovative Technology for the Earth (RITE), “International Comparisons of Energy Efficiency (Sectors of Electricity Generation, Iron and Steel, Cement),” January 11, 2008, www.rite.or.jp/system/en/global-warming-ouyou/download-data/E-Comparison_EnergyEfficiency.pdf.

2 United Nations Framework Convention on Climate Change (UNFCCC), “Submission of Japan’s Intended Nationally Determined Contribution (INDC),” July 17, 2015, www4.unfccc.int/submissions/INDC/Published/percent20Documents/Japan/1/20150717_Japan_percent27s_percent20INDC.pdf

3 DEN+21 is a technology choice model built by the RITE. See details in Akimoto (2015).

4 Agency for Natural Resources and Energy, Ministry of Economy, Trade and Industry of Japan 資源エネルギー庁, “2030-Nen enerugi mikkusu hittatsu no tame no taisaku ~ shene, sai ene-ti ~” 2030年エネルギーミックス必達のための対策 ~省エネ、再エネ等~ [Measures for Achieving 2030’s Energy Mix—Energy Conservation, Renewable Energy, etc.], November 28, 2017, www.enecho.meti.go.jp/committee/council/basic_policy_subcommittee/022/pdf/022_006.pdf.

5 “Mihama Tsuruga no hai-ro kettei kei 3-ki, saisan awazu” 美浜・敦賀の廃炉決定 計3基、採算合わず [Mihama and Tsuruga’s Decision to Decommission 3 Nuclear Facilities Is Unprofitable], *Nihon Keizai Shinbun* 日本経済新聞, March 17, 2015, www.nikkei.com/article/DGXLASDZ17H5W_X10C15A3MM0000/.

6 Ibid.

7 For further analysis on how Japan’s nuclear rollback is creating problems for its climate change goals, see Jackson Ewing and Minyoung Shin, “Northeast Asia and the Next Generation of Carbon Market Cooperation,” Asia Society Policy Institute, December 2017, https://asiasociety.org/sites/default/files/2017-12/NextGen_percent20Report_percent20FINAL_percent20WEB.pdf.

8 For the value of the tariff, see Arimura (2015).

9 For example, see Yuka Obayashi and Ami Miyazaki, “New Coal Power Plants May Block Japan’s Carbon Emissions Goal: Minister,” Reuters, June 29, 2017, www.reuters.com/article/us-japan-environment-analysis/new-coal-power-plants-may-block-japans-carbon-emissions-goal-minister-idUSKBN19K15Z; or Nikkei Asian Review Staff, “Japan to Allow New Coal Power Plant But Demand Cuts Elsewhere,” *Nikkei Asian Review*, January 12, 2018, <https://asia.nikkei.com/Politics-Economy/Policy-Politics/Japan-to-allow-new-coal-power-plant-but-demand-cuts-elsewhere>.

10 “‘Sign of Change?’: Japan’s Environment Ministry to Draw Up Carbon Pricing Proposal,” *Carbon Pulse*, March 19, 2018, <https://carbon-pulse.com/49198/>.

11 For further evidence of the lack of ambition in the Tokyo ETS, see Ewing and Shin, “Northeast Asia and the Next Generation of Carbon Market Cooperation.”

12 Also see Jackson Ewing, “Roadmap to a Northeast Asian Carbon Market,” Asia Society Policy Institute, September 2016, https://asiasociety.org/sites/default/files/RoadmapNortheastern-final-online_percent2B.pdf.

13 Participation of third-party business, that is, financial business, is banned until 2021 in the Korean ETS (Kim, 2014).

14 “Hot air” in ETS refers to surplus allowances that can be sold by polluters without the extra cost of abatement. It often refers to allowances that Russia obtained under the Kyoto Protocol.

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