

## 9. Carbon Pricing in Japan and the Prospects for Northeast Asia Carbon Market Linking

SVEN RUDOLPH

### SUMMARY

**SINCE THE BEGINNING OF THE NEW MILLENNIUM, JAPAN HAS EMERGED** as a major player in carbon pricing. While the Japanese Global Warming Tax (JGWT), the sink-based J-Credit Scheme, and the international Joint Crediting Mechanism (JCM) are currently operational, cap-and-trade has not yet found its way into federal-level climate policy. However, Japan's capital runs the local Tokyo Metropolitan Government Emissions Trading Scheme (TMG ETS), which is directly linked to a prefectural-level ETS in neighboring Saitama.

Against this background, using sustainability criteria as a benchmark, in this chapter I describe and evaluate the design and the results of the JGWT, the JCM, and the TMG ETS with an extension to an earlier federal-level carbon market pilot. Building upon public choice theory and empirical case study data, I then examine the political chances of establishing a full-fledged national carbon market in Japan in the near future. Finally, I explore the chances and barriers of sustainable Northeast Asian carbon market integration.

I mainly argue that Japanese carbon pricing cannot yet be considered sustainable. Also, despite a variety of experiences with carbon trading, the current political climate in Japan does not fuel expectations for a national carbon market. This renders solving technical design issues of Northeast Asian carbon market integration much less challenging than overcoming domestic political barriers in Japan. The most promising candidate for Northeast Asian carbon market linkages at the moment is still the TMG ETS.

### CARBON PRICING IN JAPAN AND THE PROSPECTS FOR NORTHEAST ASIAN CARBON MARKET LINKING

#### From Economic Theory to Climate Policy Practice

Carbon pricing is still the preferable policy option for sustainable climate policy. The Paris Agreement is certainly a diplomatic success, but it must be substantiated by more ambitious targets and convincing policies to achieve its major goal of “[h]olding the increase in the global average temperature to well below 2°C above pre-industrial levels.”<sup>1</sup> So far, domestic climate action in the signatory states falls significantly short of this goal.<sup>2</sup> Article 6 of the agreement explicitly allows the use of internationally transferred mitigation outcomes (ITMOs)<sup>3</sup> or, in economic terms, the trading of greenhouse gas (GHG) emissions rights.

Emissions trading or better cap-and-trade has received almost unanimous support from neoclassical environmental economists on the grounds of environmental effectiveness and economic efficiency.<sup>4</sup> It has been shown that a sustainable design, not only taking into account effectiveness and efficiency but

also considering social justice, is possible.<sup>5</sup> Surprisingly, the resulting design recommendations do not exhibit major contradictions among environmental, economic, and social goals but rather point in the same direction: coverage should be comprehensive in terms of polluters and pollutants, caps should be scarce and based on the 2°C target, the initial allocations should be based on auctioning, revenues should be used mainly for compensating detrimental distributional effects on low-income households, and only truly sustainable offsets should be allowed. Sustainable carbon markets would then even directly answer the Paris Agreement call to “reflect equity.”<sup>6</sup>

In addition, linking domestic schemes can significantly improve the sustainability of carbon markets.<sup>7</sup> This becomes particularly important as domestic schemes have become more widespread, extending not only to several continents and countries but also to all governance levels from local to supranational.<sup>8</sup> Especially in countries with strong political resistance to federal-level carbon markets, subnational policies can be considered an important supplement to international or national action. Nobel laureate Elinor Ostrom has already emphasized the importance of polycentric climate policy,<sup>9</sup> and the New Environmental Federalism now objects to earlier warnings of a “race to the bottom” and underscores the value of subnational regimes as policy laboratories, where policies can be tailored to residents’ preferences and to particular infrastructural needs.<sup>10</sup>

Despite a variety of experiences with carbon trading, the current political climate in Japan does not fuel expectations for a national carbon market.

However, the implementation of sustainable cap-and-trade faces a series of political barriers. Public choice, the economic theory of politics, argues that rational, self-interested political actors would not support ambitious market-based approaches to environmental protection: voters fear higher energy costs and producers higher production costs, environmental bureaucrats fear the devaluation of their idiosyncratic knowledge and skills as well as costs of transition from traditional to new policy approaches, politicians cannot signal a high activity level as well as in the case of traditional command-and-control regulations and fear voters’ and industry’s opposition, and only politically weak environmental groups would be respond favorably.<sup>11</sup> It concludes that there is a “market tendency for the political process to resist market mechanisms for rationing scarce environmental resources.”<sup>12</sup> In sum, while linked carbon markets are promising, the political barriers appear almost insurmountable.

### Carbon Pricing in Japan

Japan has been applying carbon pricing since the beginning of the new millennium with ambiguous results. Economic theory predicts carbon markets to be economically efficient and environmentally effective and, if designed well, even socially just. In Japan, the Ministry of the Environment (MOE) implemented the experimental Japan Voluntary Emission Trading Scheme (JVETS) with a particular design in 2005.<sup>13</sup> While participation was voluntary, incentives to participate arose from subsidies being granted to facilities to partly cover their compliance costs. JVETS covered carbon dioxide (CO<sub>2</sub>) emissions from combustion only. Targets were fixed bottom up by companies in absolute volume terms at a level at least one percentage point lower than status quo emissions of the preceding year. Allowances were handed out free of charge according to individual company targets. Also, Kyoto Protocol credits could be used for compliance. Borrowing of allowances was not permitted, while banking was unlimited. Trading was carried out via a trading

platform administered by the ministry. Monitoring followed Kyoto Protocol guidelines, with penalties for noncompliance, including the reimbursement of subsidies as well as the publication of company names in a “name-and-shame” scheme. However, the results of JVETS were mixed: all participants met their individual targets in every compliance period and participants’ total emissions were reduced by 29 percent below base-year levels, thus even exceeding commitments. Also, a functioning monitoring and trading system was established. Nevertheless, participants’ total reductions summed to only 0.03 percent of total 1990 GHG emissions in Japan, mainly because major emitters such as utilities and energy-intensive industries did not participate. The average price for allowances was JPY 1,200, and trading has not been very active throughout the program.

Intense and productive follow-up discussions on a national carbon market in working groups and political committees continued until 2010. But eventually, despite explicitly announcing the introduction of a federal carbon market in the campaign leading up to the 2009 general election and an intensified internal discussion on the design specifics, the Democratic Party of Japan (DPJ) deliberately ended the respective discussion in December 2010, an outcome that would have resulted anyway from the loss of government to the Liberal Party in 2012.<sup>14</sup> In sum, early experiences with national carbon markets in Japan were ambiguous. The only operational program, JVETS, cannot be considered a sustainable solution—for example, due to voluntary participation, the lack of a top-down cap, and free initial allocation. Still, it cannot be emphasized enough that the process helped establish a market and monitoring infrastructure, upon which future programs could still build, particularly if combined with the vast knowledge produced in working groups and committees now waiting to be dug out.

Instead of a national carbon market, Japan implemented the Japanese Global Warming Tax (JGWT) in 2012 as part of its post-Kyoto climate strategy to reduce GHG emissions by 26 percent by 2030 compared to 2013 levels.<sup>15</sup> It is imposed on fossil fuel consumption by using CO<sub>2</sub> emission factors for each fuel. The tax rate per quantity unit was set so that the tax burden equals JPY 289 per ton of CO<sub>2</sub> emissions. Hence, tax rates vary for each type of fuel. They are added on the preexisting Petroleum and Coal Tax. The tax rates were to be raised gradually over three and a half years to their final level in April 2016; since 2016 the tax rate has been frozen and there is no plan for further increases. Exemptions and refunds are provided for certain fuels and measures. Revenues are to be used for energy-related CO<sub>2</sub> emissions reductions measures such as energy savings, the promotion of renewable energy, and the clean and efficient use of fossil fuels. A ministry study estimated the emissions reductions of the JGWT to be between 0.5 percent and 2.2 percent in 2020 compared to 1990 levels or about 6 million to 24 million tons of CO<sub>2</sub>. An additional study estimated CO<sub>2</sub> emissions reductions for 2030 compared to 2013 to be around 7.3 percent, which are almost entirely achieved by revenue spending, not the price incentive. Negative impacts on the gross domestic product (GDP) have been negligible, as have detrimental impacts on low-income households. Still, mainly due to low tax rates, the JGWT cannot be considered sustainable.

More promising is a local initiative, the TMG ETS.<sup>16</sup> Tokyo launched its uniquely designed scheme in 2010 as part of its strategy to reduce GHG emissions by 20 percent by 2020 compared to 2000 levels. Due to commercial activities’ big share in emissions, the mandatory program focuses on CO<sub>2</sub> emissions from the end use of energy in large office buildings, thus covering around 1,200 facilities and a share of 21 percent of Tokyo’s total CO<sub>2</sub> emissions. The caps were set at a level of 8 percent/6 percent and 17 percent/15 percent below base-year emissions for office buildings/factories in the first (2010–2014) and second (2015–2019) phases. Participants can choose the base period by using average emissions of three consecutive years between

2002 and 2007. The total absolute volume cap then results from adding up individual facility targets. Instead of distributing emission allowances, the Tokyo program defines reduction obligations and only issues excess reduction credits (ERC) if these obligations are exceeded. Hence, the TMG ETS follows the cap-and-trade approach but limits trading to excess allowances and offsets. Four types of offsets are accepted from small and midsize companies, from renewable energy projects, from installations outside of Tokyo but inside Japan, and from the neighboring linked Saitama Prefecture. Banking of credits is allowed, while borrowing is prohibited. Since 2011, bilateral trading of credits has been allowed, while no stock exchange is used. But the Tokyo government supports facilities—for example, with supply-demand-matching fairs. Noncompliance is penalized by a fine of up to JPY 500,000, a 1.3 times ex post shortage coverage, and the publication of facilities' names. At first glance, the TMG ETS seems to be well designed, especially considering its innovative character. While the design still cannot be called truly sustainable—for example, due to a lack of ambitions concerning the targets, limited coverage, and free initial allocation, actual results are compelling. By 2016, covered facilities had reduced emissions by 26 percent, significantly overachieving the targets. Trading activities have steadily increased while allowance prices have dropped from estimated USD 100 in 2011 to below USD 30 in 2016.

Since 2013, Japan has also been running the Joint Crediting Mechanism (JCM).<sup>17</sup> Already in the first commitment period of the Kyoto Protocol, Japan made extensive use of the Flexible Kyoto Mechanisms. Japan's 2008 Kyoto Protocol Target Achievement Plan aimed at a 6 percent GHG reduction, of which 1.6 percent was supposed to be covered by Flexible Kyoto Mechanism credits. In the end, 97,493,000 tons of CO<sub>2</sub> were retired.<sup>18</sup> Still, Japan was not satisfied with the UN procedures and as a consequence developed its own crediting program, the JCM, with a goal of generating credits worth 50–100 million tons of CO<sub>2</sub>e by 2030. The major aim of the JCM is to contribute to Japan's GHG reduction obligation under the Paris Agreement by diffusing low carbon technology to developing countries and thus achieving low cost reductions. A Joint Committee of government officials from both Japan and the project host country develops guidelines bilaterally. Currently Japan collaborates with 17 countries, mainly from Southeast Asia but also from Africa and Latin America. Projects are proposed by the project partners or governments and then approved by the Joint Committee. Project partners develop the Project Design Document, which is then validated by a third-party entity before being registered by the Joint Committee. Project partners monitor performance, and third-party entities verify emissions reductions prior to the Joint Committee's issuance of credits. Emissions reductions are calculated based on a comparison of conventional and low carbon technology use over the entire project cycle; thus, the JCM basically follows a baseline-and-credit-approach. By the end of 2017, based on 40 methodologies in the areas of renewable energy, energy efficiency, transport, and waste management, 20 projects had been registered worth 10,000 tons of CO<sub>2</sub>e with more than 100 waiting to enter the process. Still, the baseline-and-credit design alone creates reasonable doubts about the JCM's sustainability, and the current practice substantiates the suspicion that the JCM acts as a foreign investment tool rather than as a climate policy instrument.

### Japanese Climate Politics

The power balance in Japanese climate politics does not fuel hopes for a national carbon market in the near future. Public choice, the economic theory of politics, expects sustainable carbon markets to be politically unfeasible. In Japan, climate politics support this notion to a large extent.<sup>19</sup> While surveys show general support of climate policy, issues such as jobs, security, and the aging population dominate the Japanese public's political interests. Climate policy instrument choice is of minor interest, as it is seen as a genuine

task of the government, but fears of higher energy prices persist, trading of pollution rights is still seen as immoral, and incentives are deemed dispensable as morality-based collective action is considered sufficient. However, the political influence of the Japanese public is rather low. Votes in general elections are usually not cast based on environmental considerations, and generating pressure by anti-government political protest is still deemed illegitimate.

Japanese environmental non-governmental organizations (NGOs), such as World Wide Fund for Nature (WWF) or Kiko-network, naturally strongly support climate action and the Paris Agreement. At the policy instrument level, NGOs in Japan support carbon pricing. While the JGWT is thought to be a step forward after years of only voluntary industry action, it is considered insufficient, and a stringent national cap-and-trade scheme is still preferred due to the absolute limit to total emissions induced by the cap. However, despite the homogeneity of interests, Japanese NGOs' political influence is very low. Mainly due to the still believed illegitimacy of anti-government movements, many groups lack membership, financial support, and highly skilled personnel for intensively engaging in climate action campaigning and lobbying. Not least, networks with like-minded actors in political parties, ministries, companies, or research institutions are underdeveloped, due to the general distrust of protest movements.

Japanese NGOs' opponents in industry, mainly gathered in the major industry organization Keidanren, however, command a well-established network with the now ruling, conservative, and industry-friendly Liberal-Democratic Party (LDP) and the mighty Ministry of the Economy, Industry, and Trade (METI). This "Iron Triangle" has been partly responsible for Japan's economic rise after World War II and is thus considered almost untouchable. Climate policy interests in Keidanren are dominated by energy-intensive industries and power generators, which command an abundance of financial and human resources. Support by labor unions, which fear job loss due to stringent climate policies, adds to industry's political power. In terms of interest, apart from less influential proactive sectors such as financial services, insurance, or renewable energy, most Japanese industries are still strongly opposed to stringent climate policy and carbon pricing, because they mainly fear competitive disadvantages. Industry favors voluntary action and only agreed to the JGWT in 2011 to prevent an even more feared federal cap-and-trade scheme. And industry's opposition continues to be the primary barrier to ambitious carbon pricing in Japan.

Ministries traditionally dominate policy making in Japan. They are responsible not only for implementing programs but also for preparing and drafting laws, which are then only officially legitimized by the Japanese Diet. Japan's public administration is supplied with significant financial and personnel resources, making them Japan's original think tanks. Ministry officials' interests are strongly influenced by their academic training and the specific institutions they work for. Ministry officials are exclusively and purposefully trained to be civil servants at Tokyo University; after being hired, they show utmost loyalty to the ministries they are working for. This often leads to intense competition and interministerial tension, in the case of climate policy mainly between MOE and METI. While MOE has been supportive of ambitious climate action and carbon pricing, METI's interests are closely aligned with those of Keidanren, and the ministry has only supported win-win or no-regret solutions for industry such as the Keidanren Voluntary Action Plan, Japanese industries' main approach to climate protection. Support of the JGWT was only granted to prevent a national cap-and-trade scheme. The power balance between the two ministries is clearly tilted in favor of METI, mainly because it has long been part of the Iron Triangle. METI is also the biggest ministry in Japan in terms of personnel and is officially responsible for energy policy. MOE, on the other hand, shares some responsibility for climate policy with METI and was only elevated from agency to

ministry status in 2001, making it one of the youngest ministries in Japan. Not least, collaboration with NGOs and other environmentally minded forces is at best underdeveloped.

As climate policy does not represent a decisive voting issue for Japanese citizens, politicians aiming at being (re)elected also do not put an emphasis on this issue. On the party level, the major opposition party, the moderate left-wing Constitutional Democratic Party of Japan (CDP), leans more toward environmental topics than the now ruling conservative and industry-friendly LDP. But even the CDP's predecessor, the DPJ, was not capable of implementing sustainable carbon pricing during its last term of office from 2009 to 2012. The LDP has been dominating Japanese politics since World War II. Part of the reason is its collaboration with industry and METI. A similar "green" counterforce coalition—for example, of the DPJ, MOE, and environmental organizations, does not exist. In any case, parliamentarians' political power is strictly limited by the dominance of the Japanese bureaucracy.

In sum, the most influential political forces in Japan still openly oppose a national carbon market or are at least skeptical.

### The Prospects of Northeast Asian Carbon Market Cooperation

While technical design issues can be solved, political barriers in Japan limit the prospects for Northeast Asian carbon market integration. The merits of and the technical requirements for linking have been studied extensively in the literature.<sup>20</sup> It has also been shown that linking domestic carbon markets does not only improve economic and environmental performance of carbon markets, but it additionally increases social justice and hence makes climate policy more sustainable.<sup>21</sup>

In addition to theoretical insights, both the EU and North American subnational jurisdictions have gathered experiences with linking, most of which have been positive. While the EU negotiated linking agreements (e.g., with Australia), which failed, and Switzerland, which succeeded, after the EU ETS had already been running for some time, North American jurisdictions from the beginning aimed at linking. While the Regional Greenhouse Gas Initiative (RGGI) was constructed as a linkage between basically independent U.S. northeast states' program guided by a Model Rule, California and its partners in Canada negotiated a Model Rule under the umbrella of the Western Climate Initiative (WCI). When California implemented the first domestic scheme with the WCI in 2013, it adhered to the guidelines and was later followed by Québec and more recently Ontario. And even the now pending U.S. Clean Power Plan (CPP) offers a similar carbon market Model Rule to states wanting to comply with federal standards by using domestic and possibly linked cap-and-trade programs. Not least, there is a broad landscape of supporting international institutions such as the International Carbon Action Partnership (ICAP) and the World Bank's Partnership for Market Readiness (PMR), which would be eager to help in advancing Northeast Asian carbon market linkages.

However, the biggest challenges are political rather than technical. First, historically, political relations between China, Japan, and Korea have been tense. Adding to this, political and economic systems and current performances differ a great deal, which make international collaboration on climate and energy policy challenging. Second, climate policy ambition differs. While all targets have to be considered "highly insufficient"<sup>22</sup> with respect to the 2°C target, only Japan has an absolute volume cap (–26 percent/–18 percent by 2030 base 2013/1990), while China promised to peak its CO<sub>2</sub> emissions by 2030 at the latest

and lower the carbon intensity of its GDP by 60 to 65 percent below 2005 levels by the same time, and Korea intends to reduce GHG emissions by 37 percent below business-as-usual (BAU) emissions (+100 percent base 1990). Price reactions to linking ambitious to less ambitious schemes would be significant with the respective economic and political consequences. Third, carbon market design differs greatly. Korea is the only country with a full-fledged operational national cap-and-trade program, while China has several

## Overcoming political barriers to Northeast Asian carbon market linking appears to be far more challenging than solving technical design issues.

subnational schemes in place with the national ETS still remaining in its pilot phase, and Japan only operates a baseline-and-credit offsetting scheme on the national level and the comparatively well-designed TMG ETS on the local level. And worse, there is no intention to establish a national cap-and-trade scheme in Japan for the time being, although the MOE is funding scoping studies on its implementation. Particularly linking cap-and-trade to baseline-and-credits schemes generates a set of nontrivial issues.

In sum, overcoming political barriers to Northeast Asian carbon market linking appears to be far more challenging than solving technical design issues. This is especially true for Japan in the current political climate. Still, with increasing pressure on domestic climate action from the Paris Agreement and the nationally determined contributions (NDCs), expected compliance cost increases, and the maturing of domestic carbon markets in China and Korea (and some possible outreach of the EU or subnational North American jurisdictions), chances for a linked Northeast Asian carbon market could increase. For preparation and even facilitation, the following steps could be taken:

- (1) promote, establish, and reform (toward more sustainable solutions) domestic carbon cap-and-trade schemes with the explicit intention to link,
- (2) develop a Northeast Asian carbon market model rulebook as a guideline for countries willing to join a linked market, and
- (3) start with a coalition of the willing, a club of carbon markets,<sup>23</sup> with Korea and Tokyo being the most immediate candidates.

Hope remains that “[i]f it is feasible to establish a market to implement a policy, no policy-maker can afford to do without one,”<sup>24</sup> and that Northeast Asia becomes a leading force in the development of an international, sustainable, market-based policy approach to achieving the Paris Agreement’s 2°C target.

## ENDNOTES

- <sup>1</sup> United Nations (UN), *Paris Agreement* (New York: United Nations, 2015), Art. 2.
- <sup>2</sup> United Nations Framework Convention on Climate Change, *Aggregate Effect of the Intended Nationally Determined Contributions* (synthesis report by the secretariat) (Bonn: United Nations Framework Convention on Climate Change Secretariat, 2016).
- <sup>3</sup> UN, *Paris Agreement*, Art. 6.
- <sup>4</sup> Alfred Endres, *Environmental Economics: Theory and Policy* (Cambridge: Cambridge University Press, 2011).
- <sup>5</sup> Sven Rudolph et al., “Towards Sustainable Carbon Markets,” in *Carbon Pricing, Growth and the Environment—Critical Issues in Environmental Taxation*, Vol. XI, eds. L. Kreiser et al. (Cheltenham, UK/Northampton, US: Edward Elgar, 2012), 167–183.
- <sup>6</sup> UN, *Paris Agreement*, Art. 3.
- <sup>7</sup> Sven Rudolph et al., “Developing the North American Carbon Market—Prospects for Sustainable Linking,” in *The Green Market Transition: Carbon Taxes, Energy Subsidies and Smart Instrument Mixes—Critical Issues in Environmental Taxation*, Vol. XIX, eds. Stefan Weishaar et al. (Cheltenham, UK/Northampton, US: Edward Elgar, 2017), 209–230.
- <sup>8</sup> International Carbon Action Partnership (ICAP), “Emissions Trading Worldwide: Status Report 2018” (Berlin: ICAP, 2018).
- <sup>9</sup> E. Ostrom, “A Polycentric Approach for Coping with Climate Change” (Washington, DC: World Bank, 2009) (Background Paper to the 2010 World Development Report).
- <sup>10</sup> W. E. Oates, “A Reconsideration of Environmental Federalism,” in *Environmental Policy and Fiscal Federalism*, ed. W. E. Oates (Cheltenham, UK/Northampton, USA: Edward Elgar, 2004), 1–32.
- <sup>11</sup> G. Kirchgässner and F. Schneider, “On the Political Economy of Environmental Policy,” *Public Choice* 115, no. 3 (2003): 369–396. In addition to barriers emphasized by actor-based public choice arguments, the multitude and complexity of indirect effects of carbon markets, (environmental) justice implications, and possible financial flows across jurisdiction borders might create additional political barriers to carbon markets.
- <sup>12</sup> R. W. Hahn, “Jobs and Environmental Quality—Some Implications for Instrument Choice,” *Policy Sciences* 20, no. 4 (1987): 289–306, at 289.
- <sup>13</sup> Junko Mochizuki, “Assessing the Designs and Effectiveness of Japan’s Emissions Trading Scheme,” *Climate Policy* 11 (2011): 1337–1349. See also Sven Rudolph and Seung-Joon Park, “Lost in Translation? The Political Economy of Market-Based Climate Policy in Japan,” in *Critical Issues in Environmental Taxation*, Vol. VIII—International and Comparative Perspectives, eds. Claudia Dias Soares et al. (Oxford: Oxford University Press, 2010), 163–184.
- <sup>14</sup> Sven Rudolph and Friedrich Schneider, “Political Barriers of Implementing Carbon Markets in Japan—A Public Choice Analysis and the Empirical Evidence before and after the Fukushima Nuclear Disaster,” *Environmental Economics and Policy Studies* 15, no. 2 (2013): 211–235.
- <sup>15</sup> Takeshi Kawakatsu, Soo-cheol Lee, and Sven Rudolph, “The Japanese Carbon Tax and the Challenges to Low-carbon Policy Cooperation in East Asia,” in *Tax and the Environment*, eds. Roberta Mann and Tracey Roberts (Lanham, MD: Rowman & Littlefield, forthcoming).
- <sup>16</sup> Sven Rudolph and Toru Morotomi, “Acting Local! An Evaluation of the First Compliance Period of Tokyo’s Carbon Market,” *Carbon and Climate Law Review* 10, no. 1 (2016): 75–78.

<sup>17</sup> [www.carbon-markets.go.jp/eng/jcm/index.html](http://www.carbon-markets.go.jp/eng/jcm/index.html); <https://www.jcm.go.jp/about>.

<sup>18</sup> Ministry of Economy, Trade and Industry of Japan, “Kyoto Mechanisms Credit Acquisition Program in FY2013, April 2014, [www.meti.go.jp/english/press/2014/0401\\_02.html](http://www.meti.go.jp/english/press/2014/0401_02.html).

<sup>19</sup> Rudolph and Schneider, “Political Barriers of Implementing Carbon Markets in Japan.”

<sup>20</sup> M. Ranson, and R. N. Stavins, “Linkage of Greenhouse Gas Emissions Trading Systems,” *Climate Policy* 16, no. 3 (2015): 284–300, <https://doi.org/10.1080/14693062.2014.997658>.

<sup>21</sup> Sven Rudolph, Achim Lerch, and Takeshi Kawakatsu, “Developing the North American Carbon Market—Prospects for Sustainable Linking,” in *The Green Market Transition: Carbon Taxes, Energy Subsidies and Smart instrument Mixes—Critical Issues in Environmental Taxation*, Vol. XIX, eds. Stefan Weishaar et al. (Cheltenham, UK/Northampton, US: Edward Elgar, 2017), 209–230.

<sup>22</sup> Climate Action Tracker (CAT), <http://climateactiontracker.org/>.

<sup>23</sup> Ned Keohane, Annie Petsonk, and Alex Hanafi, “Toward a Club of Carbon Markets,” *Climatic Change* 144, no. 1 (2017): 81–95.

<sup>24</sup> John H. Dales, *Pollution, Property & Prices—An Essay in Policy-making and Economics* (Cheltenham, UK/ Northampton, MA: Edward Elgar, 1968), 100.