



# A Tale of Two Cities: Governing Renewable and Low-Carbon Transitions in Tokyo and Nagano, Japan

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## 10.1 INTRODUCTION

Throughout much of the world, cities are playing an expanding role in climate change policy. From land use planning to public transport financing, cities make a wide range of decisions affecting greenhouse gas (GHG) emissions. Increasingly these decisions directly and indirectly influence low-carbon transitions. These decisions and the subsequent transitions do

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Singapore Pte Ltd. 2021

N. Janardhanan, V. Chaturvedi (eds.), *Renewable Energy Transition  
in Asia*, [https://doi.org/10.1007/978-981-15-8905-8\\_10](https://doi.org/10.1007/978-981-15-8905-8_10)

not occur in a vacuum, however. Efforts to steer cities down low-carbon paths are made with the broader goal in mind of boosting economic competitiveness, attracting industries, generating jobs and building sustainable communities (Bulkeley and Betsill 2003; Yi 2013; Cheng and Yi 2017). They are also often occurring against the backdrop of a mounting international pressure to respond to a climate crisis. Finally, they are unfolding with a recognition that subnational governments are well-positioned and uniquely qualified to govern transitions that generate and spread low-carbon innovations.

To a significant degree, the above characterization applies to Japanese cities. As the home of the Kyoto Protocol, Japanese cities have been adopting subnational responses to climate change since the 1990s. Following the accident at Tokyo Electric Power Corporation's (TEPCO) Fukushima Daiichi Nuclear Power Plant in Fukushima prefecture in 2011, both the depth and breadth of those responses has increased considerably. The accident exposed vulnerabilities in Japan's then highly centralized energy system. The recognition of these weaknesses resulted in both national and policy reforms that have advanced energy savings and renewable energy policies at the subnational level. Among the highest profile reforms was the post-2012 deregulation of the retail electricity market. For almost a decade, Japanese cities have been encouraged to offer grants to households and small-medium enterprises that lower the costs and facilitate the spread of energy efficient and renewable technologies as part of deregulatory reforms. This particular example is emblematic of a more general shift in urban energy policy in Japan. It is also broadly consistent with literature on multi-level sustainable transitions and multi-level governance. That literature emphasizes responses to climate change often take root locally and can grow from interactions when the interests of a number of stakeholders are aligned at different levels (Corfee-Morlot et al. 2009).

While there is both a growing number of empirical and theoretical reasons to examine how cities in Japan have governed clean energy transitions, there have been few studies to outline the similarities and differences in how cities responded to this challenge. This paper aims to fill this gap in understanding. Its primary purpose is to review some of the key institutional and policy changes that subnational governments have taken to shape their energy futures in Japan. The focus of this review is on the well-known mega-city of Tokyo and mid-sized city of Nagano. These cities are selected not only because they diverge in their approach to energy savings but exhibit parallels despite notably different contexts.

Overall the chapter finds that local governments can indeed be policy innovators for renewable energy. The support for innovation is especially likely if an exogenous shock such as the Fukushima nuclear crisis creates broader changes to the policy environment. However, the willingness to lead and the degree to which innovations grow may be contingent on underlying conditions in the city. Having sufficient capacity within the government and industry appear to be particularly important set of underlying factors. In instances where those capacities are lacking, the amount and type of support from national governments may be increasingly important. Another potentially critical factor is how effectively cities can work with industries to create this virtuous cycle of learning can drive a transition. While much of the analysis focuses on the interactions between national and local policy, developments at the international level (such as reforms that led to the pledge and review of nationally determined contributions (NDCs) appear to be a potentially useful enabler of change.

The remainder of the paper is divided into three sections. The next section reviews literature on sustainable transitions and multilevel governance. Section 10.3 presents the case studies of Tokyo and Nagano. A concluding section provides recommendations on how other large and mid-sized cities could govern similar transitions in and beyond Japan.

## 10.2 POLICY AND INSTITUTIONAL DRIVERS OF RENEWABLE AND LOW-CARBON TRANSITIONS

Over the past two decades, cities have played increasingly important roles in formulating and implementing clean energy and low-carbon policies. One of the chief explanations for the rise in locally driven climate actions comes from work on multi-level governance. These studies noted that cities were often moving more quickly than national governments on climate policy. Importantly, these locally driven responses spread when there is effective coordination across government agencies with different portfolios and between lower and higher levels of government (Corfee-Morlot et al. 2009).

However, large-scale change could also encounter difficulties. One potential obstacle is politically powerful vested interests. Companies that could lose from clean energy reforms could stand in the way of major changes to energy, transport and urban systems at one level and halt reforms at others (Jaglin 2014). Building coalitions around green

industrial policies and gradually rewarding industries in those coalitions can help push through barriers (Meckling et al. 2015). Transnational city networks such as ICLEI or C40 can help capitalize on their flexibility to work across and between different levels and bring low-carbon solutions to cities (Bulkeley and Betsill 2003).

A related set of explanations for the emergence and spread of innovative climate responses comes from research on multi-level transitions. These studies emphasize wide-ranging collections of forces (policies, institutions, markets, ideas) that give rise to and spread environmentally sustainable innovations changes at multiple levels. (Smith et al. 2005; Frantzeskaki and Loorbach 2010). Among the different approaches to transition, the one that has arguably generated the greatest interest is the multi-level perspective. The multi-level perspective maintains that a transition involves creating a “niche” or space where innovations emerge (Rotmans et al. 2001; Kemp et al. 1998, 2007; Smith et al. 2005; Loorbach 2007; Frantzeskaki and Loorbach 2010). These innovations achieve changes at greater scales when shifts in regime level institutions and infrastructures as well as breakthroughs in wider landscapes of cultural values and economic markets (Geels and Schot 2007; Lachman 2013).

A similar insight from work on transitions is large changes are not easy. Established interests and outdated sociotechnical systems may lock in resource-intensive patterns and prevent far-reaching changes (Sandén and Azar 2005; Frantzeskaki and Loorbach 2010). Fortunately, these barriers are surmountable. For example, networks that promote “experimentation and pilot projects, the exchange of experiences, [and] training and competence building” can help build partnerships that drive change (Kemp et al. 2007; Nevens et al. 2013). Further “reflexive forms of governance” can help overcome resistance by aligning the shared interests of ecological and social movements, local communities and energy sector workers.

To some extent, the multi-level transitions and multi-level governance work share similar views on the drivers and challenges to innovative clean energy innovations and initiatives. Both suggest that big changes often begin at lower level and gain ground with supportive higher-level changes. They also recognize that existing interests and institutions can block progress but that these can be overcome due to well-designed policies, carefully crafted governance strategies, and coalitions of diverse stakeholders (both within and beyond the city). The two approaches also differ in some respect: most notably, the multi-level governance focuses more concretely on policies and institutions, whereas transitions theories emphasizing a

wider range of factors that includes but goes beyond policies and institutions such as shifts in markets or changes to the surrounding ideational environment.

The next section will draw upon the shared insights from these theories to identify some of the key clean energy institutional and policy changes that helped advance clean energy policy in two subnational governments in Japan: Tokyo and Nagano.

### 10.3 CASE STUDIES

This section offers a comparison between the two cities of Tokyo and Nagano and the striking similarities in the approach taken to develop their unique system for promoting clean energy innovations.

#### 10.3.1 *Setting the Context*

In 1994, Japan's central governments began officially working on climate change. That year Japan's government adopted a national climate change law; a climate change headquarters as well as renewables law followed three years later. Around the same period, local governments were required to submit climate change action plans, opening opportunities for cities to influence an energy policy that the national government theretofore dominated. To some extent, reforms following the national response to the Kyoto Protocol created space or a niche at the subnational level for clean energy innovations.

That niche would expand considerably in the wake of the 2011 Great East Japan Earthquake. The earthquake and subsequent Fukushima crisis left the country paralyzed by energy shortfalls. The sense of insecurity from these shortfalls provided the impetus for the reorganization of Japan's vertically integrated energy system. Those reforms have moved forward since 2011 with more authority delegated from the central to regional and local governments. Some local governments have since been moving quickly to promote and scale the use of renewables in the region. Table 10.1 provides a summary of some of the key enablers of change in Tokyo and Nagano's policies.

**Table 10.1** Key elements of the local enabling environment for innovative reforms

<i>Tokyo</i>	<i>Nagano</i>
	Reporting system
	Easy to use tools
	Coalition building
	Consultation and feedback
Third party verification	Awards
Peer pressure	Means for job creation to gather support from local industries
Institutional governance requirement	

Source: Derived from Tokyo Metropolitan Government and Nagano Prefectural Government websites and compiled by the authors

### 10.3.2 *The Case of Tokyo*

This section explores how Tokyo's skilled technocrats were able to bring in other stakeholders to create a collective push that reduced energy consumption in buildings.

#### 10.3.2.1 *Background*

For much of Japan's modern history, Tokyo has gained the well-deserved reputation for creating growth opportunities through innovation. Its status as an innovation hub continues today; the more than 63,000 offices and factories (or 10 percent of the national total) located in the greater Tokyo region regularly churn out new ideas and products. This concentration of building and people explains why over 70 percent of energy demand originates from buildings. It also accounts for why Tokyo places a premium on saving energy in the building sector. The fact that innovation does not only apply to product development but also policy formulation helps to understand why Tokyo has been at the cutting edge of saving energy from buildings and is increasingly pushing the envelope on renewable energy.

#### 10.3.2.2 *Promoting Energy Savings in Buildings*

One of the clearest indications of Tokyo's innovative approach to saving energy in buildings is the three programs supporting sustainable building policy (Tokyo Metropolitan Government 2019). The programs are so-named because one regulation apply to new buildings and two apply to

existing buildings. The two programs targeting *existing* buildings—and that will be featured here—were the “Carbon Reduction Planning for Energy Efficiency” and the “Cap and Trade Program.” Building owners and tenants participated in these programs and reported efforts to cut energy and CO<sub>2</sub> emissions using government provided guidelines on institutional organization; reporting methods results; and technical suggestions per building type. Easy-to-use tools to calculate energy consumption and GHG emissions from electricity, gas and water bills were also available. Tokyo government officials in the Environmental Bureau, Energy and Climate Section were instrumental in making these programs work; they possessed technical skills and data to make recommendations and offer feedback on the energy efficiency efforts to building owners.

Tokyo has not only been able to leverage the expertise of its own staff to drive change. It has also been successful in bringing other stakeholders into the collective push for energy savings. This was evident in a subtle but important shift. In 2002, the Tokyo government asked buildings to voluntarily report on their targets and actions for cutting energy and CO<sub>2</sub>. Three years later the Tokyo Metropolitan Government introduced a scheme that harnessed peer pressure by making the results open for evaluation and publicly available. A group of external technocrats were involved in the making of the scheme through the employment of *Coolnet*, Tokyo’s external arm for technical outreach to citizens, businesses and other entities.

The “Tokyo Carbon Reduction Reporting Programme” was initially started in 2002 as a learning process for building owners to understand what was in their power in terms of climate change measures, their level of GHG emissions, and to develop the skills to develop targets and plans to achieve those targets. In 2005, the energy efficiency measures that had been conducted voluntarily was officially consolidated into a set menu of 213 measures for which buildings would be evaluated every year. Emissions levels were calculated either from past records of energy consumption, or using emission intensity standards (kg-CO<sub>2</sub>/m<sup>2</sup>/year) that would differ by building type (e.g. Data centers are allowed larger emission intensity than parking lots).

In 2008, it would then draw upon market forces and a broader collection of stakeholders to build upon past successes by introducing a “Cap and Trade Program” which is now covered by over 1300 selected buildings. Modelled along the lines of California’s emissions trading program, Tokyo’s “Cap and Trade Program” was gradually developed through two

phases (phase 1: 2010–2014, phase 2: 2015–2019) during which the compliance levels for emission reductions were enhanced, allowing for building owners, tenants to get used to the system. To induce building owners and tenants to reduce energy consumption, Tokyo has enacted local laws that have promoted the use of new reporting methods to engage both building owners and tenants in an effort to improve energy efficiency using an energy benchmarking system. Furthermore, as the system was being developed it became clear that the top management’s commitment was critical and therefore it now requires the involvement of the chief executive officer, the facility manager, and the equipment manufacturer in the making of the energy reports. The involvement of the equipment manager is hoped to trigger development of new low- or zero-carbon-related business opportunities. A third party verified carbon reductions for each building and registered those reductions in a carbon registry to facilitate trading. It also continued to employ information and public pressure as a tool to drive change. Participating buildings would be ranked on a fifteen-point scale that would show if the buildings are above average or not on energy consumption by showing their compliance levels for the 213 energy efficiency measures. Buildings with high compliance levels were encouraged to apply for either “top level” or “near top level” status by Tokyo to enjoy the privilege of being publicly known for their efforts that would enhance their asset value. Labels with the rank are presented at the building entrance. In violation of their compliance to their designated compliance factors, penalties and monetary fines have also been introduced but have never been administered.

#### *10.3.2.3 Promoting Renewables*

In terms of clean energy, many of Tokyo’s reforms have moved from the bottom-up to place pressure on the central government to catalyze change. Tokyo depended on Tokyo Electric Power Company (TEPCO) for a significant share of its electricity prior to the 2011 Great Earthquake. In its wake, Tokyo’s Governor Inomata submitted a letter to the national government requesting deregulatory reforms to the energy sector. The deregulatory reforms would allow new utilities that relied on renewables into the energy market; and it would enable Tokyo to meet 30 percent of its energy demand with new utilities and outside Tokyo’s jurisdiction. In the years that followed, Tokyo continued to submit policy requests to the national government calling for deregulation of the energy market. It has also expressed enthusiasm for a feed-in-tariff (FIT) in the hopes wind



power generated in the Hokkaido and Tohoku region could be used in Tokyo. Tokyo aims to turn 30 percent of its energy mix into renewables (Tokyo 2018).

Tokyo has also been active in engaging local businesses and other stakeholders locally to advance its clean energy plans. In this connection, it has concentrated in developing renewables in hospitals; water and wastewater facilities; railroads; evacuation centers. In parallel, Tokyo's public apartments have become a source for decentralized energy. New real estate developments such as those planned for the Tokyo Bay area (2020 Olympic Games) became a location that could develop an energy supply and demand network (electricity and heat) operate independently from the grid during disasters (Funazaki 2012).

In recent years, Tokyo has reached out to an expanding pool of potentially interested parties to spread renewables. It is currently working with *Coolnet* toward these ends; *Coolnet* is an information portal that provides advice on the installation and operation of renewables, and information for return in investments for both businesses and households. It has also combined the support for renewables with other programs. For example, renewables became one of the criteria when Tokyo evaluated buildings under the Cap and Trade Program. Meanwhile, green minded households are able to purchase green energy certificates based on the electricity generated by solar power and heat on Tokyo's facilities that entitled them to cuts in inheritance tax. Tokyo has declared it will realize a Zero Emission Tokyo that will contribute to efforts towards achieving net zero CO<sub>2</sub> emissions by around 2050 (Tokyo Metropolitan Government 2019).

### 10.3.3 *The Case of Nagano*

This section introduces Nagano's approach of using peer pressure with the private sector for promoting energy savings in buildings, and villages for renewables.

#### 10.3.3.1 *Background*

Nagano prefecture adopted its first set of climate change measures in 2001—four years before the national government required local governments to register local climate change action plans. Preceding Tokyo and many other cities, Nagano saw an opportunity to lead on climate change. The chief reason for moving early was nonetheless slightly different than Tokyo; it was mainly to develop low-carbon industries in the face of poor

economic prospects. This motivation grew from continued lags in economic development in 2001 ten years after the economic bubble burst in Japan. These problems worsened because much public infrastructure related investment in the rural prefectures fell due to lower national fiscal transfers and local revenue streams. A depressed economy then created the opportunity for a proactive response to climate. That proactive response consists of two policy pillars: climate change and sustainable energy. To work on these two pillars, Nagano has been promoting (1) an energy saving and (2) renewables policy package (UNFCCC 2018).

#### *10.3.3.2 Promoting Energy Savings*

For the energy savings package, many of Nagano's targeted reductions took a page from reporting scheme that existed for environmental actions for businesses. The program in question mandated businesses with significant energy demand of over 1500 kl/year or with vehicle ownership of over 200 cars to submit annual reports on their energy use targets and plans for energy efficiency and savings to the prefectural government (i.e. the countermeasure planning for global warming). The prefectural government possessed sufficient capacity and expertise to evaluate, grade, offer technical advice, and award businesses with significant reductions in energy demand for their efforts.

These programs also leveraged information (and implicit peer pressure) to encourage energy savings. The use of simple and universal benchmarks allowed businesses to identify how they measured up relative to other businesses, which led to a healthy competitive environment that would promote and increase the number of reports submitted to the prefectural government. Energy intensity and CO<sub>2</sub> intensity gauged progress because they were easy to calculate and compare. A set of examples on the return of investments for major emission reduction countermeasures allowed new entrants to choose effective and efficient measures and curbed unforeseeable risks.

Spreading the movement: Other programs sought to bring businesses more directly into the energy savings efforts. Toward these ends, Nagano prefecture sought the contribution of large enterprises to serve as role models. Hence, a mechanism was created to enhance information sharing between businesses through seminars and distribution of case studies. Further, what was learnt from the initial phase was transformed into guidelines for small to medium businesses. This strategy proved effective as many small and medium sized offices and factories became enthusiastic

to submit the same reports as the large enterprises counterparts while using the same evaluation and award schemes even without legislative mandates to participate. The benefits for such small entities was their exposure to new information on energy efficiency from the prefectural government with the submission of their reports. To sustain the interest among large enterprises to continue exceeding their efforts, Nagano chose to conclude an agreement with innovative companies on advanced targets and plans. The agreement is renewed every three years to keep up the momentum.

The historical background: Nagano's approach to energy savings in building employs similar design features as more general approach to energy savings. A reporting scheme for green buildings requires owners of new constructions of substantial floor size (over 2000 m<sup>2</sup>) to report to Nagano prefecture on three areas: (1) the energy efficiency level; (2) installation of renewable technology; and (3) use of excessive heat (i.e. heat pumps, district heating). After building construction is complete, the reports are made publicly available on a voluntary basis. Building owners are also equipped with a set of tools to help them to calculate their energy efficiency levels, several energy efficiency indicators (i.e. Comprehensive Assessment System for Built Environment Efficiency (CASBEE), Energy Pass) were designated for the performance review requiring building designers to acquire skills to use at least one of them. National regulations were employed for setting energy efficiency levels; guidelines were made available for planning installation of energy efficiency equipment, renewables and heat.

There were also institutional changes undertaken to support these and likeminded reforms. A Council to Facilitate Housing Structures in Nagano was created with representatives from Nagano prefecture and major local business associations to provide advice on energy demand reduction using government funded audits. This was further supported by building certification systems that were shared through training sessions with local contractors over several stages. This multistage effort gradually prepared the building industry for stronger regulations in the use of new insulation and energy savings equipment in both new construction and renovations.

Information and implied peer pressure were also used to reinforce the above efforts and even appeal to households to conserve energy. Energy peak shifts were promoted through informational campaigns during the summer and winter seasons when energy demand peaked. The Shinshu energy conservation campaign combined energy saving seminars, a

distribution of case studies, and outreach through business council channels during these peak seasons. Industrial energy demand as well as those from the green building reports, and mandatory reports for energy suppliers (utilities and retailers) on their global warming measures and the level of renewables within the energy mix allowed for a systematic way for utilities to collaborate with households and businesses to shift peaks.

#### *10.3.3.3 Promoting Renewable Energy*

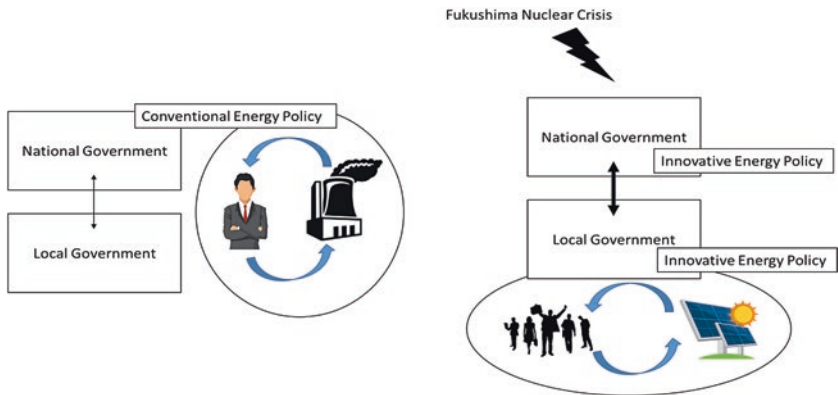
The Nagano energy strategy was developed with the input from consultations with 35 different groups, town meetings, and public comments. Renewable potential was calculated; targets for energy self-sufficiency rates within the prefecture were developed; job creation, decoupling economic growth from emissions were placed at the center of the strategy (The Asian Cobenefits Partnership 2017).

When the potential for different renewables was surveyed and calculated based on nationally available guidelines, it showed Nagano had abundant renewable resources: solar, biomass and hydro. Due to this diversity, Nagano prefecture asked each district to register and promote one renewable project based on the renewable that was most available; the “One Village One Renewable Project” encouraged the development and expansion of projects unique to that village. Villages with successful case studies were then introduced to the novice “learning” villages, and experts were sent to assess and fill needs. The local government decided to use these models as a basis for streamlining project implementation processes and tailoring them to different renewables. To illustrate, support for local social businesses for solar roof installations; incubation of a new business model for the local timber industry to use biomass power generation; support from the river bureau for residential consent on micro and pico-hydroelectric plant development.

Coalitions for renewable energy: Similar to the *Coolnet*, Nagano also created a *Shinshunet* which served as the information platform with working groups for each renewable source. Experts were made readily available. The municipality offered their support in terms of policies using finance and regulations. The use of the national model zones subject for deregulation was also available for incubation of new models. A model for each renewable was also shared with the public.

## 10.4 CONCLUSIONS AND WAY FORWARD

Both cases shed revealing light on the application of multi-level governance and transition theories (see Fig. 10.1 for a simplified illustration of some of the drivers of the transition highlighted in the article). They clearly demonstrate that local governments can take the lead on climate change. Arguably more so than central governments, local governments possess the knowledge and flexibility to pursue innovative strategies that open new niche opportunities to save energy or spread clean energy. Further, they can also work across multiple agencies and different actors—particularly business—to inject momentum into these efforts. The more visible reforms described herein were shaped by the collective inputs of multiple agencies and actors. They also show evidence of working not only horizontally across but vertically with national governments—albeit on a more limited basis than suggested in the multi-level governance theories. Finally, they also underline that broader changes to national markets and norms in the landscape levels that were evident in the aftermath of Fukushima as well as the post-bubble economy open opportunities for niche innovations to spread and place pressure for changes in existing policies and programs in the regime levels. Finally, frontrunner cities such as the ones featured in this chapter are often held up as trendsetters by the national government; in some cases, local experiences are incorporated



**Fig. 10.1** The factors contributing to a transition in Japan. (Source: Created by the authors)

into national policies, action plans and programs that can be disseminated from the national level.

The cases of Tokyo and Nagano also suggest some differences with the theoretical expectations. One of the main differences is an approach that draws upon a combination of peer pressure and information dissemination to drive change. In both Tokyo and Nagano, well-staffed and technically skilled agencies began the reform efforts but made deliberate attempts to encourage broader changes by learning and sharing information from and with businesses. As noted above, the central government helped guide this process—for instance, through setting energy efficiency standards—but much of the dynamism pushing these reforms forward came from within: the local government working with leading local businesses and residents helped generate healthy completion that took on a life of its own. To some extent, this pattern matches a strand of transitions literature that highlights the potential for combining and packaging different policy instruments to build support for more transformative changes.

The cases of Tokyo and Nagano also differ with regard to each other. Arguably due to the differences in their energy structure and resource endowments, Tokyo decided to set up a “Cap and Trade Program” focusing on buildings, whereas Nagano opted to harness large concentrations of renewables with “One Village One Renewable Project.” Further, perhaps reflecting its status as a national capital and strong sentiments of post-Fukushima energy insecurity, Tokyo pushed from the bottom-up on the national government to change the entire country’s energy policy. Nagano engagement with the national government was a more limited use of guidance from the top-down. Perhaps most strikingly is that these two very different localities employed a similar approach to climate and energy policy that involved the skilled use of government resources, private sector knowledge, and peer pressure to animate reform efforts. Despite large differences in contexts, the approaches were very similar. These approaches alone might have worked in Japan, but financial incentives in the form of installation grants and/or penalties for non-compliance might also serve as a trigger to cities in other cultures and social norms.

From this review, a few conclusions can be distilled and questions asked about the drivers and enablers of low-carbon transitions. First, local governments are indeed well-positioned to initiate these reforms. In locations where there are already sufficient staffing and resources local governments can spearhead reforms. However, not all governments may possess the initial capacities to take the lead. In these cases, additional support from

national governments may be needed. More research is hence needed on a broader collection of locales in and beyond Japan. Second, the combination of working with, learning from, and then sharing business experience has considerable potential in many contexts. From a theoretical perspective, there is a greater need for how this virtuous cycle of learning can drive a transition. From a policy perspective, there is a greater need to recognize how this combination of policies, platforms, and learning can be embedded in low-carbon policies and plans. This includes the Nationally Determined Contributions that countries have pledged to the United Nations Framework Convention on Climate Change. In many ways, the NDCs were supposed to create this learning dynamic at the national and international levels; integrating it into the NDCs would hence be in line with the spirit of the pledge and review architecture that is part of the climate regime.

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