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Comparative Analysis of Japan and Korea's Renewable Energy Politics: 2002-2016*

Jennifer Sejin Oh†

Ewha Womans University

This paper examines the political economy of renewable energy policies in Japan and Korea since the early 2000s. Due to favorable domestic and international conditions after 2008, both governments introduced ambitious targets and support measures such as feed-in-tariffs and renewable portfolio standard to promote the emergence of viable renewable energy markets. Japan is currently a global leader in terms of renewable energy investment, capacity and employment, whereas Korea's renewable energy market remains limited in global perspective. More importantly, the strongest growths for Japan's renewable energy occurred in the past five years under the conservative Liberal Democratic Party's government, which had traditionally opposed renewable energy development. Existing literature on East Asian renewable energy politics often stress the similar economic rationale underlying renewable energy policies in Japan and Korea. Building on this observation, this paper examines the variations in the nature of vested interests in Japan and Korea's energy sectors to understand the factors shaping policy choice, sequence, and success in their respective renewable energy sectors.

Keywords: Japan, Korea, Renewable Energy, Energy Politics

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† Corresponding Author : Jennifer Sejin Oh, Graduate School of International Studies, Ewha Womans University, E-mail : jenn.oh@ewha.ac.kr

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1. Introduction

In 2008, domestic and international conditions shifted in favor of renewable energy development in Japan and Korea. In Korea, the newly inaugurated President Lee Myungbak's administration (2008-2012) put forth 'Low Carbon Green Growth' as its key economic and political agenda (Kim, 2016). Likewise, the Japanese Prime Minister Yasuo Fukuda announced his vision of 'Japan as a Low-Carbon Society', stating that the "transition to a low-carbon society was 'a new opportunity for economic growth'" (Prime Minister of Japan and His Cabinet, 2008). Internationally, anticipation of the 15th Conference of Parties (COP15) to the United Nations Framework Convention on Climate Change (UNFCCC) (or the Copenhagen climate summit) provided broader legitimacy to domestic efforts at renewable energy development. Since then, a slew of policies promoting renewable energy such as feed-in-tariffs (FITs) and the renewable portfolio standard (RPS) emerged in Japan and Korea. FITs encourage renewable energy's market expansion by guaranteeing a fixed price for electricity generated from renewable energy sources over a fixed time. The RPS, on the other hand, requires power companies to generate a specified percentage of electricity from renewable energy sources.

A closer examination of Japan and Korea's renewable energy politics from 2008 to the present reveal interesting similarities and differences. Both countries managed to develop their renewable energy sector, especially in the area of solar photovoltaic (PV). Yet, Japan is currently a global leader in terms of renewable energy investment, capacity and employment, whereas Korea's renewable energy market remains limited in global perspective. More importantly, the strongest growths for Japan's renewable energy occurred in the past five years under the conservative Liberal Democratic Party's (LDP) government, which had traditionally allied with vested interests in the energy sector to oppose renewable energy development. In contrast, Korea's renewable energy development lagged behind that of Japan despite the lack of similar levels of opposition from major political parties and societal actors. How do you explain variations in Japan and Korea's renewable energy development experience?

Existing literature on East Asian renewable energy politics often stress the similar economic rationale underlying renewable energy policies. This developmental environmentalism perspective characterizes East Asian governments as using renewable policies as a form of 'industrial policy' aimed at achieving economic growth (Kim & Thurborn, 2015; Kim, 2016; Moe, 2012). Building on this literature, this paper examines variations in the nature of vested interests in Japan and Korea's energy sectors to understand the factors shaping policy choice, sequence, and success. Recent growths in Japan's renewable energy sector was possible precisely because deeply entrenched and institutionalized vested inter-

ests in the energy sector found it in their interest to take part in the development. Vested interests in Korea, on the other hand, were weakly institutionalized compared to that of Japan. As a result, both opposition to and support for renewable energy development was weaker in Korea compared to Japan. Korea lacked actors with sizeable organizational and political resources who could spearhead renewable energy development. Japan's case illustrates how renewable energy development can occur in spite of the presence of strong vested interests the energy sector.

The remaining paper is organized as follows. Section II discusses the literature on East Asian renewable energy politics. Section three offers a comparative analysis of Japan and Korea's renewable energy sectors after overviewing key renewable energy policies, targets and trends. Section four analyzes the political economy of renewable energy politics—specifically the nature of vested interests in the energy sector—to understand the variations in Japan and Korea's renewable energy development experiences. Section five concludes with discussions on future implications for renewable energy development in East Asia.

2. Understanding Renewable Energy Politics in East Asia

A dominant perspective in the literature on East Asian renewable energy politics is the concept of 'developmental environmentalism'. The main argument is that East Asian renewable energy policies (and more broadly climate change or environmental policies) are an extension of these states' developmental objectives. The developmental environmentalism perspective stresses the similarities among East Asian states in pursuing renewable energy policies to achieve economic growth (Kim & Thurborn, 2015; Kim, 2016; Moe, 2012). While the observation correctly identifies an important rationale underlying renewable energy policies in East Asia, the perspective overlooks important variations among East Asian states. For example, Japan has been much more successful in establishing a viable renewable energy market compared to Korea, although the former has traditionally faced stronger domestic opposition to renewable energy development.

To understand the variations between Japan and Korea's renewable energy sectors, this paper examines the nature of vested interests in the energy sector. The energy sector in industrialized countries is a policy area that is often dominated by a small number of experts. Power companies, politicians with electoral ties to the energy industry, and government agencies that formulate and implement energy policies wield large influence over the policymaking process. As a result, the entry barrier to energy policymaking is quite high (DeWit & Tetsunari, 2011; Moe, 2012; Selin & Vandeveer, 2011). These vested

interests in the energy sector enjoy high levels of organizational and political resources, which enable them to access energy policymaking almost at the exclusion of other actors. By dominating the policymaking process, vested interests in the energy sector effectively impede policies that go against their interests and facilitating policy agendas that support their interests.

In Japan, the Ministry of Economy, Trade and Industry (METI), power companies, and LDP politicians have dominated energy policies since post World War II. In particular, these vested actors have collectively worked to promote nuclear energy, while discouraging other forms of non-nuclear alternative energy, since the oil crises of the 1970s (Aldrich, 2012; DeWit & Tetsunari, 2011; Moe, 2012; Wang & Chen, 2012). Nuclear energy promotion resulted in the rise of nuclear energy's share in the total electricity generation from 2.6 percent to 28.6 percent between 1973 and 2010 (METI, 2014a). At the same time, vested interests effectively impeded renewable energy development. For example, in 1999, when members of the Japanese Diet attempted to introduce FITs to promote renewable energy, the LDP, METI and power companies succeeded in blocking the attempt. Instead, METI introduced the RPS, setting very low renewable energy obligations that could be readily met by the power companies (Moe, 2012, p. 269; see section 3 for further details). The introduction of the RPS delayed discussions of more comprehensive and ambitious renewable energy promotion measures. Moe (2012) also argues that vested interests have shaped the type of renewable energy sources that could develop throughout the 2000s. The structure of Japan's vested interests worked in favor of solar PV development while working against wind power development. Clearly, vested interests in Japan's energy sector have wielded strong influence over renewable energy policies. The recent growths in Japan's renewable energy sector should be understood within this context. Significant growths in the renewable energy sector was possible due to the weakening of the vested interests in the energy sector or due to changes in the interests of these vested interests regarding renewable energy. This paper supports the latter view and argues that changing incentives in the aftermath of the Fukushima nuclear disaster propelled vested interests in the energy sector to use their vast organizational and political resources to actively take part in renewable energy development.

In Korea, vested interests in the energy sector are weakly institutionalized compared to that of Japan. While actors that could potentially influence energy policies—such as power companies, industries, non-governmental organizations (NGOs), political parties—are independently well-organized, they lack a cohesive network that bring them together in a stable and cohesive structure. First, unlike in Japan (and other industrialized countries), major political parties are not divided on cli-

mate change issues, including renewable energy policies. For example, when President Lee Myungbak's administration proposed an emission trading scheme, both the President's ruling party and the opposition party supported the scheme (Kim, 2016). Similarly, economic and social actors are divided over various policies related to climate change, including renewable energy. Energy and manufacturing industries have traditionally supported nuclear promotion, while resisting other forms of alternative non-fossil energy (Yoon & Sim, 2015). Although a large number of environmental NGOs have emerged in Korea, they are internally divided in their policy preferences. In the late 2000s environmental NGOs such as Climate Action and the Energy Climate Policy Institute were divided in their preferences for emission trading schemes and carbon taxes (Kim, 2016). Essentially, there is no strong coalition of economic, political, and social actors that systematically support or oppose renewable energy development in Korea. As a result, despite favorable political rhetoric, renewable energy development efforts have not been backed by stable and substantial government support (Yoon & Sim, 2015). In other words, there is no strong political or social pressure to develop the renewable energy sector.

By illustrating the variations in the nature of vested interests in the energy sector in Japan and Korea, this paper hopes to broaden the understanding of renewable energy politics in East Asia. Factors such as oil prices and energy import dependency play important roles in driving overall global trend in renewable energy development (REN21, 2014). High oil prices create stronger incentives for governments to promote renewable energy development and deployment, whereas, low oil prices have the opposite effect. Countries also seek to develop renewable energy as a means to reduce their dependency on imported energy sources. Yet, Japan and Korea both heavily depend on imported energy and face similar pressures from oil price fluctuations.[1] There is a need to take a closer look at how dynamics among domestic actors in the energy sector shape the divergent experiences of renewable energy development in the two countries. Despite decades of resistance to renewable energy, Japan's vested interests in the energy sector actually took part in renewable energy development once their incentives changed in the aftermath of the Fukushima nuclear disaster. Renewable energy development in Japan was possible precisely because their were powerful actors with the resources to spearhead the development efforts. In contrast, Korea lacked the presence of powerful vested interests with the resources to promote renewable energy. As a result, renewable energy development has lagged even with favorable political environment.

1) Korea's import dependence was 97 percent in 2007 (Kim, Shin & Chung, 2011). Japan's import dependence was about 62 percent in 2010 (METI, 2014a, p. 8).

3. Domestic Renewable Energy Policies, Targets and Trends: 2002-2016

The following section examines key renewable energy policies, targets, and trends in Japan and Korea from 2002 to 2016. As countries heavily dependent on imported energy, both Japan and Korea faced similar structural challenges in developing their almost nonexistent renewable energy sources such as solar PV and wind power. Yet, they vary in terms of policy timing, sequencing, and mechanisms in promoting their renewable energy sectors.

1) Korea's Renewable Energy Targets and Policies

Korea's national policies and targets for renewable energy have become more ambitious overtime, undergoing the most drastic change in the late 2000s during President Lee Myungbak's administration <Table 1>. The First and Second Basic Plans for New and Renewable Energy Technology Development and Deployment set relatively modest targets for renewable energy's share in the total primary energy supply (TPES) and electricity generation.[2] For example, in the Second Basic Plan for New and Renewable Energy Technology Development and Deployment, renewable energy's share in the TPES and electricity generation was expected to reach 5 percent and 7 percent respectively by 2011. Specifically for electricity generation, the expected target for non-hydro renewable energy was 1.1 percent for 2006 and 5.6 percent for 2011 (MOCIE, 2003). In 2008 and 2009, the First National Energy Basic Plan and the Third Basic Plan for New and Renewable Energy Technology Development and Deployment drastically increased these targets. The ratio of renewable energy in the TPES was raised to 11 percent by 2030. In addition, thirteen power companies were expected to raise the share of renewable energy in total electricity generation to 10 percent by 2022. More recent energy and renewable energy plans have maintained the target rate for renewable energy's share in the TPES but have increased the target for renewable energy's share in total electricity generation to 13.4 percent by 2035. Moreover, the Korean government has emphasized growths in solar PV and wind power relative to waste power throughout the 2000s until the present (MOCIE, 2003; MOTIE, 2014a).

Key policies aimed at reaching these targets have been the FIT system and the RPS. The

2) The Ministry of Trade, Industry, and Economy (MOTIE) drafts the National Energy Basic Plan every five years, which includes national policies and programs for renewable energy. Based on the National Energy Basic Plan, the MOTIE drafts a more detailed Basic Plan for New and Renewable Energy Technology Development and Deployment every five years. This latter plan seeks to promote "technological development, use and distribution of new and renewable energy, and the activation of the new energy industry" (Yoon & Sim, 2015, p. 371).

<Table 1> Key Renewable Energy Policies and Targets in Korea

2002-2011	1st Basic Plan for New and Renewable Energy Technology Development and Deployment	Raise share of renewable energy in TPES to 3% by 2006.
2003-2012	2nd Basic Plan for New and Renewable Energy Technology Development and Deployment	1) Raise share of renewable energy in TPES to 3% by 2006 and 5% by 2011 from 1.4%; 2) Raise share of renewable energy (including hydro) in electricity generation to 2.4% by 2006 and 7% by 2011; 3) Increase usage of renewable energy for electricity generation relative to heating.
2008-2030	1st National Energy Basic Plan	1) Raise share of renewable energy in TPES to 11% by 2030; 2) Implement RPS for public energy utlities; 3) Introduce 1 million green homes program.
2009-2030	3rd Basic Plan for New and Renewable Energy Technology Development and Deployment	1) Targets same as 1st National Energy Basic Plan; 2) Introduce 1 million green home project and establish 200 green villages by 2020; 3) Introduce RPS in 2012: power facilities should generate 2% and 10% of total electricity generation from renewable energy sources by 2012 and 2022 respectively; 4) Introduce renewable energy criteria for public building construction.
2014-2035	2nd National Energy Basic Plan	1) Raise share of renewable energy in TPES to 11% by 2035; 2) Introduce renewable heat obligation and renewable fuel standard.
2014-2035	4th Basic Plan for New and Renewable Energy Technology Development and Deployment	1) Targets same as 2nd National Energy Basic Plan; 2) Raise share of renewable energy in total electricity generation to 13.4% by 2035; 3) Reduce share of waste in total renewable energy production to 29.2% and raise share of solar PV and wind to respectively 14.1% and 18.2% by 2035.

Source: "2nd Basic Plan for New and Renewable Energy Technology Development and Deployment," by MOCIE, 2003; "3rd Basic Plan for New and Renewable Energy Technology Development and Deployment," by MKE, 2008; "2nd Energy Basic Plan," by MOTIE, 2014b; "4th Basic Plan for New and Renewable Energy Technology Development and Deployment," by MOTIE, 2014c; "Why is South Korea's Renewable Energy Policy Failing? A Qualitative Evaluation," by J-H. Yoon and K-h. Sim, 2015, *Energy Policy*, 86.

Korean government introduced FITs in 2002[3], and then later replaced them with the RPS in 2012 largely due to the former's heavy financial burden on the government. Unlike in other industrialized countries that have adopted FITs, the Korean government burdened the cost of Korea's FIT system. In 2012, government subsidies for FITs amounted to about 40 percent of the total budget for renewable energy development and deployment and quickly exceeded the budget set for FITs (Chen, Kim & Yamaguchi, 2014; Kwon, 2015).

3) FITs introduced for small-scale generation from hydro, bio, waste, fuel cells, and solar PV.

In particular, the dramatic rise in FIT subsidies for solar PVs contributed the most to the switch to the RPS. The solar PV sector experienced strong growths under both support systems, its capacity increasing from 0 megawatt (mW) to 359.4 mW under the FIT system (2002-2011) and then increasing to 727.1 mW (2011-2013) under the RPS system (Kwon, 2015). Other programs seeking to develop the renewable energy sector include the One Million Green Homes Program, the 200 Green Villages Program, and the introduction of renewable energy requirements for public buildings <Table 1>.[4)]

It is important to note that the Korean government uses a unique category of 'new and renewable energy' which consists of energy from solar (solar PV and solar heat), wind, hydro, ocean, geothermal, bio, waste, fuel cell, and the integrated gasification combined cycle (IGCC) (KESIS, 2018). The latter two are classified as 'new' energy and are wastes from fossil fuels. As a result, the international energy agency and other industrialized countries do not categorize fuel cell and IGCC as renewable energy (Yoon & Sim, 2015). In other words, the renewable energy targets are much weaker than they appear since these targets can be met through not so renewable 'new' energy.

2) Key Trends in Korean Renewable Energy Sector

In 2002, Korea's renewable energy sector was negligible, accounting for a mere 1.4 percent of the TPES (KESIS, 2018). A breakdown of the renewable energy production mix in 2002 reveal that 93.5 percent came from waste power, while bio power, solar power (solar thermal and solar PV), wind power, and small hydro power accounted for the remaining 6.5 percent. Solar PV and wind power was nearly nonexistent, collectively contributing to less than 0.5 percent of the total renewable energy production (MOCIE, 2003, p. 3). More importantly, renewable energy was used almost entirely for heating rather than electricity generation. Renewable energy's share of total electricity generation was less than 0.1 percent (KEEI, 2017, p. 180).

Since then, favorable government policies such as the FIT system and RPS have spurred growths in Korea's renewable energy sector. The share of renewable energy in the TPES increased by more than threefold to 4.6 percent in 2016, with stronger growths in the latter half of the period (KESIS, 2018). The renewable energy production mix also changed marginally, with the ratio of waste power, bio power, and hydro power reducing to 85.5 per-

4) The One Million Green Homes Program supports the installation of a wide range of renewable energy facilities in one million homes by 2020. The 200 Green Villages Program expands the One Million Green Homes Program to larger units such as apartments, schools, army, and smaller villages (MKE, 2008, p. 42).

cent and the ratio of solar PV and wind power increasing to 10.2 percent in 2016. In particular, in the short time between 2012 and 2016, the share of solar PV in the renewable energy mix increased from 2.7 to 7.7 percent, whereas the share of wind power remained largely constant (KESIS, 2018). The share of renewable energy in total electricity generation also increased to 4.2 percent in 2016, rising from a meager 0.3 percent in 2008 (KEEI, 2017, p. 180). Much of this growth is largely due to growths in the solar PV sector, which benefited the most from the introduction of the FIT system in 2002 and the RPS in 2012.

Growths in renewable energy capacity is also reflected in commensurate growths in the renewable energy industry. Between 2007 and 2016, the number of companies in the renewable energy sector increased from 100 to 405; the number of employees grew from 3,532 to 14,412; and revenue rose from 1.2 trillion to 10.1 trillion Korean won. And as noted previously, solar PV accounted for a large share of this expansion. In 2016, solar PV accounted for 56 percent of employees, 70 percent of revenues, 81 percent of investment, and 26 percent of companies in the renewable energy sector (KESIS, 2017; MOTIE, 2014c, p. 3).

3) Japan's Renewable Energy Targets and Policies

Renewable energy targets were introduced relatively late in Japan's energy basic plan, which was first formulated in 2003 after the enactment of the 2002 Basic Plan on Energy Act.[5] Neither the First and Second Energy Basic Plans (or Strategic Energy Plans), nor the 2006 New National Energy Strategy included renewable energy targets <Table 2>.[6] These plans set targets mainly for oil (dependence, production, and consumption), energy security and efficiency, and nuclear energy (Duffield & Woodall, 2011, p. 3745). The Third Energy Basic Plan of 2010 deviated from its predecessors by placing greater emphasis on climate change issues (i.e., carbon emission reduction) and including clear renewable energy targets. Renewable energy's (including hydro) share in the energy mix was set to rise from 6 to 13 percent, its share in total electricity generation was to increase from 8 to 19 percent, and non-hydro renewable energy's generating capacity was expected to more than double by 2030 <Table 2>. These targets increased somewhat in the 2015 Long Term Energy Supply and Demand Outlook,

5) In 2002, the Japanese government enacted the Basic Plan on Energy Act to set the "general direction for Japan's future energy policy" (IEA, 2008, p. 58). This Act required the government to formulate an Energy Basic Plan to implement specific measures to achieve the three goals of the Basic Plan on Energy Act (energy security, environmental suitability, and utilization of market mechanisms).

6) Although renewable energy targets were established quite recently in the Energy Basic Plans, technology specific targets for 2010 were already present in the early 2000s (IEA, 2008, p. 153). When combining these technology specific targets, renewable energy's share in the TPES was expected to reach 3 percent of the TPES by 2010.

which details specific measures to achieve the various agenda of the Fourth Energy Basic Plan. Renewable energy's share in total electricity generation is set to increase to 22 to 24 percent by 2030 while the share in TPES remains constant at about 13 to 14 percent.[7] Similar to Korea, Japan's national targets and policies for renewable energy became markedly more ambitious in the late 2000s.

Key policies promoting renewable energy development in Japan has been the RPS and the FIT system. Reversing the policy implementation order in Korea, the Japanese government first established the RPS in 2002 and then later implemented the FIT system in 2012. The RPS served as a key means to achieve technology specific targets that were established in the early 2000s (see footnote 5) since renewables obligation gradually increased from 3.28 billion kilowatt-hours (kWh) in 2003 to 16 billion kWh in 2014 (IEA, 2008, p. 155). This obligation amounted to about 0.39 percent of total electricity generation in 2003 and 1.29 percent in 2010 (Takase & Suzuki, 2011, p. 6736). Given the low levels of obligations, power companies easily exceeded the obligation amount even in the first year of implementation (IEA, 2008, p. 155). As a result, the RPS was not a strong impetus for renewable energy development. In 2012, the Japanese government introduced a comprehensive FIT system, setting tariffs at nearly double the rate of those in European countries (Harlan, 2013). In contrast to Korea, the cost of Japan's FIT system was passed on to consumers in the form of "renewable energy power promotion surcharge" (Tanaka, Chapman, Sakurai & Tezuka, 2017, p. 1). This comprehensive FIT system for renewable energy was in fact preceded by a similar surplus electricity purchase system for solar power in 2009.[8] The 2012 FIT system is a clear departure from Japan's previous renewable energy policies that mainly concentrated on support for research and development (Chowdhury, Sumita, Islam & Bedja, 2014, p. 288). In 2016, the government revised the FIT system to address emerging problems such as the rising financial burden on consumers, the growing number of non-implemented solar power projects, and the heavy concentration on solar PV development (METI, 2017a, p. 17). As part of the revision, the government introduced an auction system for large-scale solar PV capacities, which had a dampening effect on the solar PV market.[9]

7) Both the 2014 Energy Basic Plan and the 2015 Long Term Energy Supply and Demand Outlook were drafted in response to Japan's changed energy sector in the aftermath of the Fukushima nuclear disaster of 2011.

8) Power companies were required to purchase surplus electricity in residential households from solar PV installations under 10 kilowatt (kW) (Chen et al., 2014, p. 320).

9) For large-scale PV capacities, companies have to submit a bid in an auction to obtain the right to provide a fixed amount of power to power companies. The auction system is intended to bring down tariffs.

<Table 2> Key Renewable Energy Policies and Targets in Japan

	Plans	Targets and Goals
2003	1st Energy Basic Plan	No targets on renewable energy.
2006	New National Energy Strategy	No targets on renewable energy.
2007	2nd Energy Basic Plan	No targets on renewable energy (revised 1st Energy Basic Plan to reflect content of the New National Energy Strategy).
2010	3rd Energy Basic Plan	1) Increase share of renewable energy in TPES to 13% by 2030; 2) Increase share of renewable energy sources (including hydro) in total electricity generation from 8% to 19% by 2030.; 3) Increase non-hydro renewable energy generating capacity (50GW to 117.5 GW) by 2030; 4) Expand FITs to include wind, geothermal, biomass, and small and medium scale hydroelectric plants; 5) Introduce tax reductions, subsidies and support for research and development.
2014	4th Energy Basic Plan	1) Acceleration of renewable energy promotion for three years 2) Further promote FITs; 3) Deregulation of energy sector. No specific targets.
2015	Long Term Energy Supply and Demand Outlook	1) Raise share of renewable energy in TPES to 13-14% to increase self-sufficiency rate; 2) increase share of renewable energy to 22-24% of total electricity generation.

Source: "Japan's New Basic Energy Plan," J. S. Duffield and B. Woodall, 2011, *Energy Policy*, 39; *Energy Policies of IEA Countries: Japan, 2008 Review*, by IEA, 2008, Paris: IEA; "Strategic Energy Plan," by METI, 2014b; "Long-term Energy Supply and Demand Outlook," by METI, 2015.

4) Key Trends in Japan's Renewable Energy Sector

Japan's renewable energy sector in the early 2000s was underdeveloped and mainly consisted of hydro and biomass power. Renewable energy's share of the TPES had remained fairly constant since 1990 and was 3.1 percent in 2002. Hydro and biomass accounted for nearly 80 percent of the renewable energy production mix in 2006, while the share of solar PV and wind power was less than 5 percent. Renewable energy's share in total electricity generation was 9.5 percent in 2002. However, when excluding hydro, this figure drops to about 1.65 percent. Solar PV and wind power's share in total electricity generation was close to zero percent in 2002 (IEA, 2008, pp. 147-151).

Since then, Japan's renewable energy sector has grown at a dramatic rate, with most of the growth occurring after the implementation of the FIT system in 2012.[10] Not only did the share of renewable energy in the TPES increase to 5.7 percent in 2015, but the renewable energy production mix also changed. The

10) Solar PV received government support for research and development since the 1970s through policies such as the 1974 Sunshine Project. In 1995, the government also introduced subsidies for

share of solar PV and wind power in the renewable energy production mix grew to 15.7 percent from less than five percent in 2006. Moreover, renewable energy's share of total electricity generation reached 16.9 percent in 2015, nearly entirely due to the rapid growth in the share of non-hydro renewable energy in total electricity generation. Non-hydro renewable energy's share of total electricity generation remained at low levels between 1 to 2 percent until 2009, after which it jumped to 8.5 percent by 2015. In particular, solar PV's share of total electricity generation grew dramatically, rising from zero percent in 2002 to 3.6 percent in 2015. The figures for renewable energy's generating capacity reveal the extent of the growth for solar PV since the implementation of the FIT system. Between 2009 and 2012, solar PV's generating capacity grew from 2627 mW to 6632 mW in 2012. After the introduction of the FIT system in 2012, solar PV's generating capacity grew to exceed 34,000 mW in 2015. Compared to solar PV, the generating capacities for hydro, municipal waste, and geothermal power remained fairly stable between 2000 and 2015. Wind power's generating capacity also experienced strong growths—albeit much weaker compared to solar PV—rising from 84 mW in 2000 to 2753 mW in 2015 (IEA, 2016, pp. 119-120, 125; REN21, 2016, p. 60).

Japan's renewable energy industry expanded rapidly until 2015, and then experienced a setback in 2016 due to grid access problems, tariff cuts after the revision of the FIT system in 2016, and declining unit prices of Japanese solar PV (Frankfurt School-UNEP Collaborating Centre, 2017, p. 26). Japan's employment in the non-hydro-renewable energy sector reached a peak in 2014. Out of a total 388,000 employment, 377,000 were employed in the solar PV sector (IRENA, 2017, p. 17, 21). Japan's investment in the renewable energy sector (excluding research and development) reached 36.2 billion US dollars (USD) in 2015, and 88 percent of its investment was concentrated in small-scale solar PV projects (REN21, 2016, p. 102). In 2016, however, total employment dropped to 313,000, of which 302,000 were in the solar PV sector (IRENA, 2017, p. 17, 21). Also, total investment in the renewable energy sector declined by 56 percent in Japan (Frankfurt School-UNEP Collaborating Centre, 2017, p. 23).

5) Comparative Perspective

The previous sections illustrate that while the renewable energy sectors in both countries have undergone growths between 2002 and 2016, Japan has experienced much stron-

solar PV installations in residential sites, leading to short-lived rise in solar PV manufacturing. Japan lost its lead position as solar PV manufacturer once the subsidy ended in 2005 (Moe, 2012, p. 264). Earlier renewable energy policies primarily focused on research and development support and market creation, and were also narrow in scope.

ger growths in 1) the share of renewable energy in the TPES; 2) the share of renewable energy out of total electricity generation; and 3) the share of solar PV and wind power in the renewable energy production mix. In fact, Japan's renewable energy sector, especially its solar PV sector, has grown from almost nonexistent to one of the largest in the world. A comparative perspective better illustrates the dramatic growth in Japan's renewable energy sector. Japan is a global leader in terms of renewable energy investment, capacity and employment even after a bad year in 2016. Despite a 56 percent decline in its investment in 2016, Japan's total renewable energy investment was fourth largest in the world at 14.4 billion USD compared to 1.4 billion in Korea (Frankfurt School-UNEP Collaborating Centre, 2017, p. 26). Japan also accounted for over 50 percent of the investment in the Pacific region (excluding China and India) (Ibid., p. 22). When comparing Japan and Korea in small distributed capacity (i.e., small-scale solar PV), which is the predominant area of investment in both countries, Japan globally ranked second at 8.5 billion USD and Korea ranked sixth at 1 billion USD (ibid., p. 60). Second, Japan's employment in the renewable energy sector was sixth largest globally and over 20 times larger than that of Korea in 2016. Third, Japan globally ranked in the top five in terms of renewable energy capacity, while Korea lagged far behind. Specifically for solar PV capacity, Japan stood at 34.4 gW in 2015 compared to 3.4 gW in Korea (REN21, 2016, p. 33, 60). Given the fact that Japan's economy (as measured in gross domestic product) is 3.5 times larger than that of Korea, a strict comparison in the two countries' renewable energy sectors is not entirely appropriate. Yet, the comparison between Japan and Korea's renewable energy sectors serves the purpose of illustrating that although Japan and Korea started off in similar starting conditions, Japan's renewable energy sector has grown rapidly from both a domestic and global perspective since the introduction of FITs in 2012. On a similar note, the comparison reveals that while Korea's renewable energy sector has grown overtime, it is still small from a global perspective.

4. Vested Interests in Japan and Korea's Renewable Energy Politics

The following section analyzes renewable energy politics in Japan and Korea since the late 2000s. In Japan, vested interests staunchly opposed renewable energy promotion measures under the DPJ government (2009-2012). The Fukushima nuclear disaster of 2011, however, altered the incentives of the vested interests who needed to secure their dominant position in the energy sector. Vested interests worked with the new LDP government (2013-present) to take advantage of the growing renewable energy market. In contrast, despite strong political rhetoric

in favor of renewable energy policies, no actors enjoyed the political clout and organizational resources to propel renewable energy development. Renewable energy market has suffered from declining government subsidies, lack of political will, and lagging participation from the private sector.

1) Japan: Renewable Energy Development under LDP Government

In the late 2000s, Japan's major political parties were divided over the issue of renewable energy development. In contrast to the LDP, the DPJ strongly endorsed climate change issues in its 2009 lower house election manifesto, one of which was establishing a comprehensive FIT system for all renewable energy sources (Tanaka et al., 2017, p. 8). Once elected, the DPJ followed through on its election pledges. At the United Nations Climate Summit in 2009, Prime Minister Yukio Hatoyama pledged a 25 percent reduction in its greenhouse gas emissions (GHG) from its 1990 level by 2020 (Prime Minister of Japan and His Cabinet, 2009). This pledge was more ambitious than those of the United States or the European Union. Prime Minister Yukio Hatoyama also promised to introduce a FIT system.

The DPJ government quickly faced opposition from vested interests in the energy sector. The Federation of Electric Power Companies (FEPC), Japan's main power company lobby group, described Japan's GHG emission reduction targets as "very harsh" and argued that in order to ensure energy security, efficiency and environmental sustainability, the "key is nuclear energy" (FEPC, 2009). The FEPC also "stated that it would do anything to restrict FIT, meaning no smart-grids and keeping renewables beyond solar out" (Moe, 2012, p. 269). Likewise, the Japan Business Federation (Keidanren) expressed 'grave concerns' on the DPJ's government's plan to introduce FITs, emission trading scheme, and global warming tax measures. The group warned of the FITs negative impact on "major energy-consuming industries and the economy as a whole" (Nippon Keidanren, 2010).

Ironically, the DPJ's proposal to introduce FITs was an expansion of the surplus electricity purchase system that the LDP had introduced in 2009 prior to the DPJ government. The main difference between the two schemes is 1) the DPJ's FIT scheme cover all renewable energy sources while the latter only covers solar PV; and 2) the DPJ's FIT scheme applies to gross power while the latter applies to surplus power (Moe, 2012, p. 269). DeWit and Tetsunari (2011) further note that the 2009 scheme was "clearly designed as a pre-emptive means to allow vested interests in the bureaucracy and the power sector to retain control over policy-making as well as energy options in this strategic area" (7).

The Fukushima nuclear disaster in March 2011, however, altered the incentives of

vested interests in the energy sector. Vested interests in the energy sector could not insist on nuclear energy expansion, at least in the short run. In fact, vested interests were publicly criticized for creating conditions that led to regulatory oversight, which in turn was responsible for the Fukushima nuclear disaster (The National Diet of Japan, 2012, p. 44). Faced with the prospects of weakened positions in energy policymaking, vested interests in the energy sector turned to reassert their dominant position in the renewable energy sector.

First, power companies actively took advantage of the FIT system by investing in renewable energy. Power companies built mega solar power plants in nine locations and expressed plans to further expand on mega solar power plants (FEPC, 2016). As a result, power companies have increased their installed renewable energy capacity by 2.7 times since the introduction of FITs in 2012 (FEPC, 2017). Second, power companies were further aided by government plans to liberalize the electricity market in 2016 and the gas market in 2017. Previously, Japan's energy sector was highly regulated. Ten power companies monopolized services in their respective regional areas, but were barred from entering into other service areas or the gas market.[11] With liberalization of the energy markets, new business opportunities and markets opened up for power companies. Third, power companies managed to become a dominant actor in the renewable energy sector through their control over electricity distribution. Due to the lack of infrastructure allowing transmission from one region to another, new renewable energy suppliers are regionally limited in their choice of electricity distributors (McNeil, 2013). In other words, power companies dominate the distribution of renewable energy in their regions, thereby exercising huge influence over the renewable energy market.

Similarly, METI has played a dominant role not only in renewable energy policymaking, but also in aiding power companies to maintain their dominant position in the energy sector. As discussed previously, METI established stronger targets and support measures in its 2014 Fourth Energy Basic Plan and 2015 Long Term Energy Supply and Demand Outlook (Table 2). Policies introduced by METI such as the FIT system and electricity market liberalization, however, have worked in favor of power companies since they do not incur the costs of these policies. Moreover, between 2012 and 2018, METI's budget request for renewable energy quadrupled, increasing from 207.6 billion yen to 813.7 billion yen (METI, 2010, 2017b). In

11) Hokkaido Electric Power Company, Tohoku Electric Power Company, Tokyo Electric Power Company, Chubu Electric Power Company, Hokuriki Electric Power Company, Kansai Electric Power Company, Chugoku Electric Power Company, Shikoku Electric Power Company, Kyushu Electric Power Company, and Okinawa Electric Power Company.

sum, vested interests in Japan's energy sector have assumed a dominant position in the emerging renewable energy market. Close coordination between power companies and the government was only possible given the long history of collaboration between them in making energy policies.

2) Korea

In Korea, President Lee Myungbak brought renewable energy development into the public agenda through his slogan of 'Low Carbon Green Growth'. In other words, the government was the main driver behind the renewable energy development efforts. Yet, actual government efforts in institutionalizing renewable energy promotion measures have been weak (Yoon & Sim, 2015, p. 373). For example, President Lee Myungbak's administration followed previous administrations' practice of not passing the cost of renewable energy support measures to consumers. As a result, Korea's FIT system is unusual in that the government finances the cost of FIT subsidies. Public financing of FITs constrains the extent to which the renewable energy sector can develop since the government coffer is limited. More importantly, the Korean government has artificially depressed electricity prices, which makes it even more difficult to pass on the costs of FIT subsidies to consumers. In 2011, Korea's electricity price was about half of the average electricity price for OECD members and a third of the electricity price in Japan (Chen et al., 2014, p. 325). Eventually, the FIT system was not sustainable in Korea and was replaced by the RPS in 2012 (see section III). More importantly, the decrease in government budget for renewable energy development reflects the lack of government commitment. The budget decreased by 20 percent between 2011 and 2014, which covers both Lee Myungbak's administration (2008-2012) and the subsequent Park Geunhye's administration. The budget declined from 1003.4 billion Korean won in 2011 to 802.7 billion Korean won in 2014 (Yoon & Sim, 2015, p. 375).

Other vested interests in the energy sector also did not play a huge role in either limiting or promoting renewable energy development. First, major power companies and private companies have not entered into the renewable energy sector. Korea's largest power company and public company, the Korean Electric Power Corporation, was split into "generation, distribution, and transmission components" in the early 2000s (Kim et al., 2011, p. 6888). This split was intended to prevent KEPCO from monopolizing Korea's electricity sector. However, due to Korea's Electric Utility Act, KEPCO had been barred from participating in renewable energy generation. Last year, the newly elected Moon Jae-in's administration announced plans to enable KEPCO to engage in renewable energy generation in order to boost Korea's renewable energy production. The shift in government position is due to years

of failed attempts at encouraging private companies and KEPCO subsidiaries to promote renewable energy (Lee, 2017). Second, large conglomerates in Korea such as Samsung and LG have been reluctant to take part in Korea's remerging renwebale energy market (Kim, 2016, p. 462). Instead, small and medium sized companies comprise renewable energy businesses in Korea and they have been vulnerable to changes in the global renewable energy market.

3) Discussion

The previous discussion illustrates two important points. First, Japan's vested interests in the energy sector are more cohesive and well-organized in their approach to renewable energy than their counterparts in Korea. To put it differently, Japan's vested interests in the energy sector act in unison, collectively opposing or supporting renewable energy development. In Korea, various actors with an interest in the energy sector are either indifferent or fragmented in their positions on renewable energy and more broadly on climate change issues. As a result, there has been no concerted efforts to drive renewable energy development. One important factor to consider in this analysis is the role of the Fukushima nuclear disaster. The Fukushima nuclear disaster altered the incentives of Japan's vested interests in the energy sector by removing nuclear energy as a viable source of power. Korea did not experience similar kinds of external catalyst that altered the incentives of its vested interests in the energy sector. However, incentive change alone is not sufficient to drive renewable energy development. Actors with powerful resources are needed to drive renewable energy development and deployment. Korea lacks such actors. In sum, Korea lacks a necessary condition for renewable energy development irrespective of the absence or presence of an external catalyst.

5. Conclusion

In the past decade, Japan and Korea's renewable energy sectors have grown substantially. Much of the growth has been concentrated in their solar PV sectors, which have benefited the most from favorable government policies. Yet, while Japan has emerged as a global leader in terms of renewable energy production, investment and employment, Korea lags far behind in global perspective. Ironically, traditional vested interests in the energy sector—specifically power companies, METI, and the LDP—have played key roles in driving Japan's renewable energy development. The changed energy structure after the Fukushima nuclear disaster threatened the dominant position of vested interests in the energy sector as they were politically and publicly blamed for the nuclear disaster. Participation in the renewable energy sector gave vested interests an

opportunity to secure their dominant position in the energy sector and also in the emerging renewable energy sector. Korea, however, suffered from weakening political will and the lack of participation from important actors in the energy sector that can spearhead renewable energy development. As a result, Korea's renewable energy market remains limited. What this implies is that sustainable renewable energy development is difficult without the support and participation of traditional actors in the energy sector. The Korean government's recent decision to allow KEPCO to enter the renewable energy sector may bring about changes in future renewable energy production. While Japan's renewable energy has boomed in the past decade, the future is still precarious. The poor performance of Japan's renewable energy market in 2016 indicate how susceptible the sector is to changes in government policies and trends in the global renewable energy market.

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한국과 일본의 신재생에너지 정치의 비교분석: 2002-2016

오제니퍼세진

이화여자대학교

본 논문은 2002년 이후 한국과 일본의 신재생에너지 정책 관련 정치경제를 분석하는 논문이다. 국내외의 우호적인 환경에 힘입어 양국 정부는 발전차액지원제도(feed-in-tariffs) 및 신재생에너지 공급의무화제도(renewable energy portfolio standard) 등과 같은 적극적인 목표와 지원방안을 도입했다. 일본은 현재 신재생에너지 투자의 선도국가로 올라선 반면, 한국의 신재생에너지 시장은 세계적으로 여전히 제한적인 시장으로 남아있다. 더 중요한 점은, 전통적으로 신재생에너지 개발을 반대해온 자민당 보수정권하에서 지난 5년간 일본의 신재생에너지 성장이 가장 빨랐다는 것이다. 동아시아의 신재생에너지 정치를 다룬 기존 연구는, 한국과 일본의 신재생에너지 정책의 근저에 있는 경제논리의 유사성에 초점을 맞추고 있다. 본 논문은 이와 같은 시사점을 바탕으로, 한국과 일본 에너지산업내 기득권층이 가진 본질의 다양성을 살펴보고, 한국과 일본 각국 신재생에너지의 정책적 선택, 순서 및 성공을 결정하는 요소를 이해하고자 한다.

주요어: 일본, 한국, 신재생가능에너지, 에너지정책