Jusen Asuka
Dan Jin *Editors*

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Editors
Jusen Asuka
Center for Northeast Asian Studies
Tohoku University
Sendai, Miyagi, Japan

Dan Jin
Center for Northeast Asian Studies
Tohoku University
Sendai, Miyagi, Japan

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Preface

The "energy transition," which began in Europe and other countries, has now become a global trend. Both governments and citizens are taking the lead in reducing dependence on fossil fuels and making renewable energy the main source of power. This transition is happening in East Asia as well and, needless to say, East Asia's energy policies are attracting global concern, not only from the environmental perspective of global warming and air pollution, but also from the perspective of industrial development through renewable energy and green recovery from the COVID-19 pandemic.

This book is the result of an international joint research based on an interdisciplinary approach of political science, economics, sociology, and other disciplines to identify specific issues related to the energy transition in East Asia. The purpose of the joint research is to clarify what factors are determining the energy transition that is taking place in the East Asian region, how it is likely to develop while influencing each other, how it should develop, and what type of specific institutional design is required to achieve it.

Examining the situation, issues common and unique to each country are also becoming apparent. The uniqueness of this book is to provide down-to-earth information on the type of actions that are being taken by the current administration, local community, business, researchers, and NGOs regarding the energy transition in this region. It gives an updated and comprehensive picture of the energy transition in East Asia.

This book focuses not only on the technological perspective of the energy transition, but also on the relationship between democracy and energy transition.

The specific contents of the book are as follows.

Chapter "Challenging the Transition of Civilization: Theory and Practice of "Energy Democracy"" describes the "energy democracy" concept which represents a framework to consider the possibilities of energy transition democratizing a society, or democratization of a society bringing energy transition. This concept was developed through the movements and practices of energy transitions mainly in Europe, which have further evolved academically in recent years. Some argue that

this concept indicates a prescriptive goal of decarbonization and energy transition, while representing the actual cases of citizens' participation in decentralized bottom-up policy-making of the energy sector. This chapter contemplates what "democratic" energy means, and why energy democracy is desirable, not only from the ethical point of view, but also from a more practical perspective.

Chapter "How to Overcome the Combination of Crises?" introduces and discusses the global, big picture of energy transition. Today, wind and solar power have become mainstream energies. Many entities, from major electric power utilities to mega capital investors, have entered the renewable energy sector, increasingly and rapidly expanding the mass capital investment projects in the world, such as gigantic offshore wind power generation and mega solar projects. At the same time, the recent reversal of the privatization trend means that the conventional method of decision-making participated by local governments and a handful of corporations is no longer appropriate, and there is a rise in mutual understanding that the decision-making and governance method of local communities must be open and distributed horizontally.

Chapter "Energy Democracy for Energy Transition in South Korea?: Focusing on Politicization of Media" describes the situation in South Korea. South Korea has been pursuing energy transition as a national task since 2017 when the first nuclear reactor, Kori-1, was permanently stopped and President Moon Jae-in gave a commemorative speech on June 19, 2017. This chapter discusses how the issue of energy transition has been highly politicized in South Korea. Conservative media have criticized the Moon government's post-nuclear policy as a leverage and have highlighted problems surrounding renewable energy as it is a hotbed of great corruption. Those who oppose locating renewable energy facilities in their community have taken advantage of such press reports to reinforce their positions.

Chapter "China Mainland's Energy Transition: How to Overcome Financial, Societal, and Institutional Challenges in the Long Term" is about China which has made considerable achievements in greening its energy mix in the past decade; the solar power and wind power capacity both ranked top as of 2019. In addition, the current number of Electric Vehicles (EVs) is close to half of the total number of EVs in the world. However, there are conflicting signals from the coal power development plan and the increasing dependence on natural gas. Could China be leading the way to having a stronger role in promoting energy transition in the East Asian region? Could China's Belt and Road Initiative place more emphasis on green infrastructure development? There are many questions like these to be answered in a more reasonable and independent manner.

Chapter "Energy Democracy and Energy Transition in Taiwan" discusses Chinese Taipei (Taiwan) which embarked on energy transitions in 2016 as a key strategy to address the climate change issue as well as to enhance its energy security. This chapter intends to frame the energy transition from a multilevel governance perspective to explore the prime movers, and the changing power relationships between central and local governments in implementing the transition. How has the current energy system been protected by the status quo? By what policy agendas has the energy transition been addressed through the current energy structures? What

are the major obstacles for administrations to achieve more effective energy governance? This chapter contemplates why the political dimension is critical when it comes to post-carbon energy actions and how energy governance adapts to these challenges.

Chapter "Japanese Green New Deal to Bring Happiness and Prosperity" is about Japan. Prime Minister Suga announced in October 2020 a new goal of "carbon neutrality by 2050." However, the 6th Energy Basic Plan issued in July 2021 did not show any structural changes. In June 2021, a research group including the editor published "Report 2030" which includes a concrete roadmap to the year 2030 named the Green Recovery Strategy (GR Strategy), and it clarifies the targets and actions that Japan should realize by 2030 in order to achieve carbon neutrality by 2050. Specifically, the report draws a systematic roadmap for investment, economic benefits, greenhouse gas emission reduction benefits, air pollution control benefits, just transition, and financial resources.

Chapter "Transboundary Cooperative Governance Toward Energy Transition in East Asia: A Review of Historical Development and Future Perspective" describes regional governance on the environment in East Asia. The global landscape in energy and environment has transformed not only to empower on-site experiments and practices by private entrepreneurs, but also to change the conventional mindset and decision-making method among regime actors including regulatory authorities, investors, vendors, and consumers in seeking a renewable, decarbonized, just, and inclusive energy supply in East Asia. This chapter explores how regional cooperative governance can be developed toward a renewable, decarbonized, resilient, just, and inclusive method of energy transition in East Asia by showing specific examples of the regime-building efforts.

It is no exaggeration to say that East Asia will hold the key to whether or not carbon neutrality in 2050, consistent with the Paris Agreement, can be achieved. This can be said not only in terms of GHG emissions, but also in terms of technology and finance. It will also be interesting to see how energy democracy develops in this region. I hope that this book will help readers to understand what the energy transition will look like in East Asia, which is undergoing dynamic changes.

Sendai, Japan Jusen Asuka

Contents

Challenging the Transition of Civilization: Theory and Practice of "Energy Democracy"

Hiroshi Sasaki

Abstract Today, wind powers and solar powers have become the main stream of energies. Everyone, from major electric power utilities to mega capital investors, has entered the renewable energy sector, increasingly and rapidly expanding the mass capital investment projects in the world. It is not rare to find cases of such mega projects developing confrontations with local communities. Since 1990s, the privatization of energy sector has been significant, with Nordic countries and Germany seeing the advancement of privatizations among community-operated energy utilities. Recently, however, there has been the movement to re-review such trend "to revive public utilities". The recent reversal of privatization trend means that the conventional way of decision-making participated by local governments and handful corporations is no longer appropriate, and there is a rise of common understanding that the decision-making and governance method of local communities must be open and distributed horizontally. The rapid progress of ICT in recent years has raised awareness of risks in the governance system dominated by private companies, while raising technical capabilities to realize new and open decision-making and governance in local communities.

Keywords Post Covid 19 · Green new deal · New global trends (electrification, transportation, sharing economy) · Deregulation · Public common · Public participation · Power to the people

1 Introduction: Philosophy of "Unlimitedness Within"

One year after the annexation of Korea in 1910, Kanzo Uchimura (1861–1930) discussed the national image of Japan that was purely contradictory to the colonialism course of external expansion Japan was to pursue later, in reference to the course Denmark, another "small nation," was taking (Uchimura, 1946). Contrary to the power political worldview at that time to pursue exclusively the policies "to enrich

H. Sasaki (✉)
Niigata University of International and Information Studies, Niigata, Japan

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the nation and to strengthen the military," either to become a colony of another nation or to colonize them, Uchimura presented an interesting challenge of what constituted the true "national power" that would determine the rise or fall of a nation.

"The rise or fall of a nation will not depend on the winning or losing of a war, but will solely rest on the peacetime cultivation of its citizens. (. . .) With a solid and strong spirit, a defeat in war will become a good stimulant to bring prosperity to unfortunate citizens. Denmark is a very good example." (Page 92).

From such viewpoint, Uchimura suggested the "external limitedness" of a nation that tried to conquer other nations, and presented the political potential of the "internal unlimitedness" of a nation that relied on internal development, like Denmark. After losing several national territories from defeat in the war, Denmark headed in the direction of "internal unlimitedness," which meant exploring its rich natural environment, natural energy resources, and, most of all, the spiritual potentials of each individual citizen of Denmark. "Prosperity is the rationalization of energy (power). Yet, energy can be found in sunlight. Also, in the waves on the ocean. In the blowing winds. In the erupting volcanoes. If we can utilize such energies, all of them will become the sources of prosperity. There is no need to become the owner of one-sixth of the global land surface, like the United Kingdom. The land area of Denmark is sufficient. Even a smaller area would be sufficient. Rather than expanding toward other nations, we must develop our own land." (Page 93).

What Uchimura noted on the national development of Denmark was how it explored the future of a nation through the development of renewable energy and the education of its citizens, while abandoning colonialism. In the international environment at that time, where powerful nations battled over fossil fuels and markets, it was doubtful that Uchimura's national vision would ever be accepted widely as a "realistic" one. After experiencing the collapse of the Japanese invasion of Asia, atomic bombs, and national defeat in 1945, and even "the second defeat" due to terrible accidents at TEPCO's Fukushima Nuclear Plant No. 1 in 2011 ("3.11"), now may be the time to reflect on the "realism" and foresightedness embraced in Uchimura's statement.[1]

[1] Uchimura described Denmark as having the "greatest per capita wealth in the world" at that time. Today, Denmark is one of those countries having the highest happiness index in the world, with their GDP per capita about 1.5 to 2.0 times higher than that of Japan. After the Oil Crisis, Denmark became one of the quickest countries in Europe to launch its denuclearization policy in 1985, following nationwide debate. Today, Denmark is the most advanced natural energy nation and aims to achieve 100% renewable energy in 2050. On the contrary, Japan did not fully learn from the significance of the "war defeat" in 1945. Instead, it has become "the subcontracting empire" (words of Naoki Sakai) of the United States to enjoy being a "wealthy nation," using Asian countries as its springboard. As the United States weakens, however, Japan seems to be heading toward its downfall. While continuously decreasing its educational budget to the lowest level among OECD countries, but increasing its defense budget, and adopting nuclear power plants as "base load power sources," Japan seems to be going backward in the history of the world, in comparison with the path taken by Denmark.

2 "3.11" as the Disaster of Civilization: Destiny of "Energy Colonialism"

What kind of experiences did we have on "3.11"? To what "depth" can we contemplate this question today? The future will probably determine the destiny of this nation.

Takeshi Umehara (1925–2019) called this "3.11" the "disaster of civilization." Certainly, if there had been no such unprecedented scale of quake and tsunami, and if TEPCO had not failed to introduce countermeasures, and if the past administrations of Japan, an earthquake prone nation, had not actively promoted nuclear power development, so many thousands of people would not have lost their homes. In that sense, "3.11" was a "natural disaster" and a "man-made disaster." As Umehara argued, however, it was possible to contemplate "3.11" from the viewpoint of questioning Japan's modernization in the past 150 years since the Meiji Restoration.[2]

First of all, why were the nuclear power plants to supply electricity to Tokyo built in Fukushima and Niigata? That was the fundamental question. Ever since the Meiji era, the positionings of local communities were to supply labor, food, and energy resources to Tokyo. In view of national "energy security," the national policy to construct nuclear power plants was directed mainly toward local communities, which were forced to remain in a state of under-development. This meant the simple transfer of any "risks" embodied in such policy to local communities and future generations. In other words, the processes to modernize Japan toward becoming a "rich nation" were to create the "structural sufferings," in which the logics of centralism and "maximum happiness of the largest majority" (utilitarianism) pursued by a handful of policy-making elites forced the "peripherals" to bear disadvantages and risks in order to secure the advantages and safety of "centrals".[3]

On the other hand, some people constantly raised counter arguments, stating that the money flow from Tokyo did enrich local communities. Such counter arguments themselves have constituted the core of colonialism ideology. In recent years,

[2] This reminds us how Masao Maruyama (1914–1996) analyzed the power structure of Japan's war defeat and called it the "irresponsible system." Such a fundamentally pathological condition of Japanese society has resurfaced during "3.11," and in various measures taken as the political "treatment" of its aftermath. As the "TEPCO Fukushima Nuclear Power Plant Accident Investigation Committee" (Accident Investigation Committee of the Diet) pointed out, the hotbed of an irresponsible system, or "Nuclear Power mura (village)" still remains strong. From this perspective, the experiences of "3.11" should be remembered as the "second defeat" after the first one in 1945 for Japanese people. As they failed to pursue the "responsibilities of war" before, Japan as a nation let the responsibility of "3.11" fall into obscurity and is about to miss another chance for historical awakening amongst the excitement of the Olympic Games and EXPO.

[3] This type of structure can be found in the US Bases problem in Okinawa, where "civilian security" is threatened for the sake of "national security." This can be called "security colonialism." The same structures represent the common logic connecting "3.11" and other pollution problems in Japan, led by Minamata disease (in Niigata, it is called the "second Minamata disease").

however, the fundamental questions of how much "wealth" and "development" nuclear plants have brought to their localities have been reviewed and verified. For example, a newspaper publisher in Niigata Prefecture, where one of the largest nuclear power plants in the world is located, conducted its own survey of the plant site, and concluded that the economic effects of the nuclear power plants were an unsubstantiated "myth," which was created through the policy-making history since the Meiji Era to determine Niigata as the power source of the metropolitan area (Niigata Nippo Press's Special Report Group to Study the Nuclear Power Plant Issue, 2017).[4]

In the past, nuclear power was the most advanced science and technology, and the symbol of a "prosperous future." However, it has been revealed already that such notion stemmed from President Eisenhower's Declaration of "Atoms for Peace" (1953), and behind such notion was another imperialistic logic for the removal of the Japanese people's "nuclear allergy," and the political use of nuclear weapons (nuclear technologies) in the Cold War world. Until the tragedy of "3.11" occurred, the multi-layered logic of the so-called "energy colonialism" remained consistently at the back of many historical contexts.[5]

3 What Is "Energy Democracy": Frontier of the Theory of Democracy

Energy is like the "blood" of modern civilization. Thus, the way of energy determines the way of society itself. In his book "Carbon Democracy," Timothy Mitchel (1955-) pointed out an interesting argument that, during the time when coal was the basic energy source, coal mine laborers were controlling the coal production volume and demanding collectively for their basic rights. They and their collective demands were the ones that built the very foundation of todays' democracies. Later, however, when the age of petroleum began in the world, the energy supply systems were

[4] Undoubtedly, the finance of the municipality where the nuclear power plant is located has been highly dependent on the nuclear power plant, due to the subsidy system of "3 laws concerning electric power sources" and other systems. For example, in the case of Kariha Village where Kashiwazaki Kariha Nuclear Power Plant is located, about 70% or more of its fiscal revenue is related to nuclear power plants. However, they have begun to review its long-time costs, in consideration of the degree of distortion such subsidies have brought to the municipal finance, and the possible obstruction of its autonomy.

[5] "Energy colonialism" is a new idiom I created to express comprehensively the relationship between ruler and ruled through energy, and it has not been fully developed as a concept. This concept not only signifies the exploitation of energy resources in 'peripherals' by 'centrals,' but also implies the centrals' political ruling of 'peripherals' using energy resources and technologies. In relation to this, I have been thinking for some time that, to understand the relationship between the US and its allies in East Asia regarding nuclear energy, it is necessary to have the viewpoint of comprehensive "Atom-Politics" including nuclear weapons (military use), in addition to the viewpoint of nuclear power generation ("peacetime" use).

transformed, separating production sites and consumption sites by great distances and connecting them with gigantic and long-distance pipelines. Such systems made it extremely difficult for laborers to form united fronts in their movements, which then undermined democracy. According to Mitchell, the development of the oil industry did embrace, from the very beginning, certain political intentions to suppress labor movements, which was quite powerful and strong at that time (Mitchell, 2011).

Such notion of energy systems used in a society having decisive influences over the way of democracy has drawn much attention today. Based on such materialistic understandings of a society, what types of social systems will nuclear energy create?

As Robert Jungk (1913–1994) pointed out in the past, what this gigantic technology called nuclear power generation brings intrinsically is experts' control and secrecy, in other words, anti-democratic society. Especially because nuclear technologies have deep correlations with the history of nuclear weapon development, they can bring, with stealth, not only bureaucracy but also the pathological theory of militarism into a society (Jungk, 1989).

In fact, East Asian countries adopted national policies to introduce nuclear power generation technologies during the Cold War, and the western nations, starting from Japan under multiple authoritarian regimes, did the same, while secretly reviewing the possibility of nuclear weapon development. From such perspectives, it seemed quite natural to find many instances of the nuclear power issue becoming the subject of political confrontations in the processes of democratizing the authoritarian regimes. The above considerations seemed to indicate the possibility of "energy transition" from nuclear energy to renewable energies bringing significant transformations of such a "nuclear power type society" that inevitably accompanied centralization and regional divisions.

The "energy democracy" concept represents a framework to consider the possibilities of energy transformation democratizing a society, or democratization of a society bringing energy transition. The concept was developed through the movements and practices of energy transitions mainly in Europe (Iida, 2000), which further evolved academically in recent years. For example, Kacper Szulecki argued that this concept indicated a prescriptive goal of decarbonization and energy transition, while representing the actual cases of citizens' participation in decentralized bottom-up policy-making of the energy sector. He contemplated what "democratic" energy meant, and why energy democracy would be desirable, not only from the ethical point of view, but also from a more practical perspective (Szulecki, 2018).[6]

Certainly, as exemplified in the case of China that is the world's biggest promoter of natural energies today, energy transition and "democracy" as the governing regime would not necessarily be mutually harmonic. Renewable energies such as

[6]He paid special attention to the concept of "the prosumer-citizen," which is the hybrid of "consumer" and "producer." In the coming democratic energy society, citizens are not only the consumers of energy, but also the active participants in the decision-making processes of energy policies, and become the owners of production methods themselves.

solar, wind, and biomass, however, are more dispersed energies obtainable everywhere on the Earth, in comparison with fossil fuels that are unevenly concentrated in specific areas. Therefore, the production and management of renewable energies have greater affinity with decentralized systems. The assumption that a social system focusing on renewable energies can create a more decentralized system based on autonomies of local communities may need further verification in the future. By introducing a new perspective of "energy," however, the "energy democracy" concept may broaden the horizons of democracy theories, which used to be addressed within the framework of various political institutions, bringing a new democracy concept that incorporates more comprehensive and practical issues, mainly consisting of "technologies and democracy," "economic activities and democracy," and "Nature (or ecology) and democracy".

In order to find effective solutions to salvage liberal democracy in global crises today, we need to reestablish various social conditions that can conform to democracy, in other words "the basic foundation of democracy".[7] And the implementation of such efforts has already started from local communities.

4 Establishment of "Autonomy" for the "Safety" of Local Regions: Gubernatorial Election of Niigata Prefecture in 2016 and Nuclear Power Verification Committee

On October 16, 2016, the "conservative kingdom" of Niigata Prefecture saw the election of a liberal governor for the first time in its history. The biggest issue in this election was the resumption of the operation of TEPCO's Kashiwazaki Kariha Nuclear Power Plants. Back in 1996, the town of Maki in Niigata implemented a referendum on a political issue for the first time in Japan, and rejected the Tohoku Electric Power Companies' plan to construct the Maki Nuclear Power Plant. Just

[7] Many have indicated already, how the footsteps of "fascism" and exclusivism, and militarism are taking hold again in the world, while "the space for citizens' society" has shrunk. At the same time, the global liberal economy has not contained such political disintegration and crises; rather it has surely encouraged them. (Benjamin Paper, "Jihad vs. Mac World – Has the dream of citizens' society finished?" translation by Chikara Suzuki, Mita Publisher Co., 1997) Today, the near-sighted egoistic logic of "now only, money only, and oneself only," like "(something) first!," is prevailing in the world, overwhelming the voice for "global governance" and "global justice." As a result, regional conflicts and economic gaps ignored by the international community, as well as endless destruction of the global environment are creating a hotbed of naked violence, that may lead to the resumption of terrorism, and even embrace the possibility of nuclear war. Against such "worldwide civil war" going on like automatic machines, and the global exacerbating cycle of destruction, how can we respond? Although there have been some attempts to solve issues from more comprehensive viewpoints across the borders of individual issues in recent years, such as "sustainable development goals (SDGs)," the crisis we are facing now seems to be a difficult one to overcome by short-term individualistic responses. It is actually the crisis stemming from the modern world system and has to be contemplated from the viewpoint of "civilization" theory.

20 years later in the gubernatorial election, many voters across "conservative and liberal" political parties voted against the (operation restart of) nuclear power plant.

As seen in the cases of US Base problems in Okinawa, the politics concerning the "safety" of local communities frequently result in confrontation between the logic to "save" lives and livelihoods of residents and the logic of central government. In other words, such issue takes the shape of "local conservatives vs. conservatives of central government."

Especially since "3.11," the residents of nuclear power plant sites have recognized the risks surrounding such plants as the issue concerning the fundamental values of their lives and livelihoods, in other words, as the issue of their "security."[8] Moreover, the thousands of evacuees that evacuated to Niigata Prefecture from the disaster struck areas after "3.11" further made Niigata voters realize the risks of nuclear power accidents.

The independent gubernatorial candidate (Ryuichi Yoneyama), who was almost unknown to Niigata voters at that time, had a landslide victory earning 60,000+ more votes over the opponents, even without the assistance of the most powerful constitutionalism party at that time, called the Democratic Party, as well as the Japanese Trade Union Confederation. Behind his victory was the presence of the "risk politics" mechanism, as well as the strategic effects of the coalition between citizens and opposition parties. While the ruling party stressed the "connection pipe to central government," the opposition parties employed the slogan of "Responsible for the future – not a governor edging toward ruling power, but a governor with more compassion for the residents," as printed on their public election leaflets.

Immediately before the gubernatorial election, the House of Councilors had an election in July of the same year with the main issues being "National Security legislation" and "TPP" membership, and Yuko Mori won the seat with the support of another coalition between citizens and opposition parties. This result and the result of the gubernatorial election of Niigata Prefecture sent strong messages of objections from local governments to the policies of the central government over the issue of "safety.".

Although the newly formed Yoneyama administration of Niigata Prefecture lasted only about one year and a half, his policies continued to be borne by the

[8] Recent studies of national security indicate that there is actually a limit in the traditional assumption of national security, which assumes that "a nation (national government) is to protect national interests and the safety of its nationals using military methods against any military threats from potentially hostile nation(s). Nowadays, the "threats" assumed in national security policies have to include not only military threats like terrorism, but also various subjects including non-military threats like economic crises, diseases, refugees, crimes, and natural disasters. Moreover, it becomes necessary to have fundamental reviews of the purposes, executing entities, and methods of national security, as well as a simple review of the diversification of the threat contents.

Actually, the "3.11" nuclear accidents were a severe crisis threatening the national security of Japan itself, which reminded the world that military methods alone cannot recover "safety" nor provide security. In regards to the new theme of "security of local community," refer to Akio Igarashi/Hiroshi Sasaki / Seizo Fukuyama editors and authors "Security of Local Municipalities" (Akashi Shote, 2010).

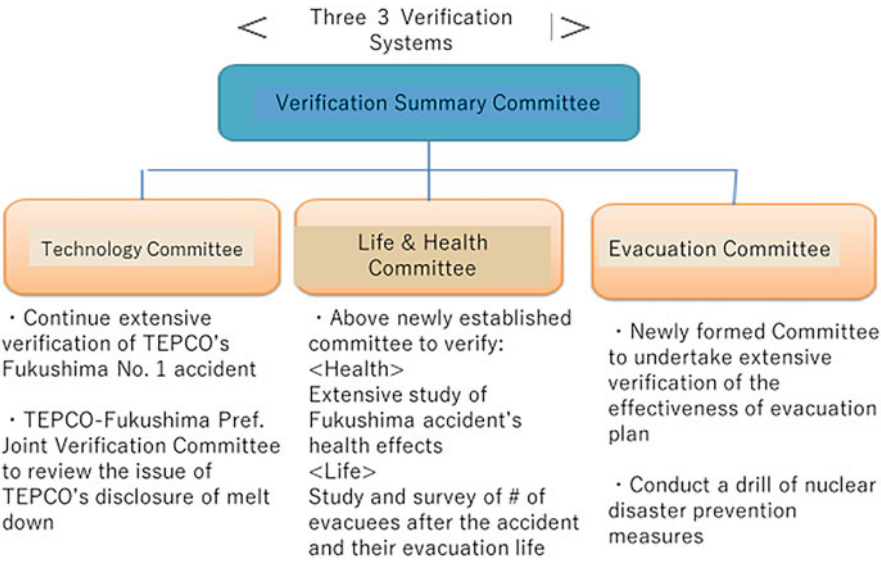

Fig. 1 Diagram of Niigata Prefecture Nuclear Power Plant Verification Committee (Prepared by author)

next conservative governor, who realized the establishment of the "Niigata Prefecture Nuclear Power Verification Committee" (hereinafter called the "Verification Committee"). After the so-called "Governmental Investigation Committee" and "Investigation Committee of the Diet" to investigate the "3.11" accident, Japan did not find any serious efforts to investigate and verify the safety of nuclear power plants. So, Niigata's attempt to verify independently (using their own budget) the nuclear power safety from extremely comprehensive viewpoints was epoch-making in the history of local governments' nuclear power administration.

The Verification Committee undertook three different but comprehensive verifications of nuclear powers, including: "verification of the causes of the Fukushima No. 1 Nuclear Power Plants' accidents"; "verification of the effects of nuclear accidents on human health and life"; and "verification of safe evacuation methods in the case of a nuclear accident." Then the "Verification Summary Committee" (chaired by Satoru Ikeuchi) summarized the results of the verifications (Refer to the Fig. 1 below).

Ultimately, the Verification Committee took on the role of providing the basic reasons for determining whether or not the governor was to permit the resumption of nuclear power plant operation. Moreover, the very processes of cross-cutting multidisciplinary discussion involving many experts and Niigata citizens embraced the true significance of realizing the "democracy of mature discussion" for nuclear power generation, even more so than their "conclusions" (Sasaki, 2017).

The challenge of the Verification Committee was also an attempt to have autonomous understandings of the issues of safety and risks among entities as

comprehensive as possible, including future generations, and to let them participate in policy-making. Such challenge could be called a practical example of a radical democracy (ecological democracy), under which "every entity that is affected by policy risks must be given an opportunity to participate in policy-making" (Echersley, 2010).

5 Challenge of "Community Power": Toward a "Regionally Dispersed Networking Society"

To rebuild the "bottom structure of democracy", greater potential emerging from local communities can be found in "Community Power (local energy)." To explore regional development through renewable energy, more than 300 of such "Community Powers", big and small, exist in Japan already. These "Community Powers" are going beyond the conventional "anti-nuclear" movements and attempting by citizens themselves to create basic economic and social conditions for overcoming global warming, and undertaking "avoid nuclear" and "graduate from nuclear" activities. They are to optimize the use of natural energies in local regions, to pursue local consumption of locally produced products, and to promote the development of "locally owned and locally produced" energy resources, in order to create a circular system to have the funds and jobs that have been flowing from local regions to metropolitan areas flow back to local regions. In Niigata, the "General Incorporated Association Oratte Niigata Citizens Energy Council" was established in 2014.[9] A part of their "Prospectus" is shown below:

> By practicing this "Citizens' Energy," we shall create a new flow of jobs and assets in the region and promote the spontaneous development of the region. Gradually changing the current economic and social structures that tend to converge the flows of human resources, material goods, and monetary funds to the center, we promote the efforts to transform local regions to become a truly independent and autonomous community. This 21st Century is the time when the limit of the centralizing system has surfaced all over the world, and when the voices demanding true decentralism and regional autonomy have been heard. For local regions to regain real energy, not only the central government, but also the locals themselves need to work creatively, and accumulate actual practices for autonomy. Furthermore, by mutually sharing these regional practices, it will become possible to create a resilient and substantial economic and social foundation for this country. (http://www.oratte.org/about/).

The practices of creating a resilient regional economy and real democracy through regional "energy autonomy" can be learned from the advanced experiences in

[9]Local energy group, with myself as Representative Director (http://www.oratte.org/). As of the Year 2019, it operates solar power plants at 40 locations in Niigata Prefecture (overall power generation volume: 2000 kW/h) under its subsidiary companies called "Oratte Civic Energy Co." (established in 2015) and "Oratte Civic Solar Co." (established in 2017). We have entered into partnership agreements with Niigata City and Murakami City to cooperate in their environmental education, and in partnership with the Pal System Consumer Cooperative aiming to realize the merging of food (agriculture) and energy, and local produce and local consumption systems.

Denmark, Germany, and other countries.[10] The origin of "Community Power" is the self-realization of fundamental problems, i.e., how a centralized energy system, led by nuclear power generation, resulted in the outflows of wealth and potentials of regional communities, bringing further division of local regions. The "Community Powers" certainly need to address the risks of nuclear power plants themselves, but they also need to aim for the transformation of such a "nuclear power society" and the realization of a new decentralized society based on regional autonomy.

To practice such "Community Powers," citizens actually need to create a new relationship with local financial institutions and administrations, while establishing their own corporations to supply basic utilities including electricity and thermal energy, and creating new jobs and industries in cooperation with agricultural, forestry, tourism and other sectors.

In other words, citizens need to depart from the position of being mere consumers, and to become real producers of the local community. If numerous "Community Powers" deploy such comprehensive practices, and promote autonomy and independence of local regions, that will bring the opportunities to internally break free from the conventional so-called "centralized society dividing local communities" or "energy colonialism." Citizens will not only remain as actors in the public and political sphere to confront central (national) government, but will also become the actors and drivers of (civilization) transformation to create a new social system in more comprehensive areas, in cooperation with various other actors of wide-ranging sectors, including existing local administration, businesses and economies, finances, and the natural environment. In short, they will become the true bearers of civilization transformation.

In modern society, the basic elements essential for people's lives and livelihoods, such as Safety, Food (agriculture), Energy, Care (welfare), and Education, are presumed to be provided by people's nations, in general, and such presumption seemed to have worked to a certain extent.

However, such dependency on nations for people's lives and livelihoods (actually derived from the wars of modern days) can provide a hotbed of excessive nationalism and totalitarian regimes (Arendt, 1981), and may no longer function as an actual presumption in this age of globalization with weakening of the governance structure.

A new society of "Community Powers" is a "regionally dispersed networking society," which will not deny the existing political communities themselves, such as nations, but realize bottom-up type decision-making processes to be incorporated into the existing political structures, through the networks where local communities self-govern at will.[11] In fact, centralized systems frequently show their

[10] For details of the energy transition (Energiewende) in Germany and the roles of citizens, refer to: Craig Morris & Arne Jungjohann, Energy Democracy: Germany's ENERGIEWENDE to Renewables, Palgrave Macmillan, 2016.

[11] This is a society based on the principle of subsidiarity. This principle originated from Aristotle and Catholicism. It is an organizational principle, and upon the referendum in Denmark and others, it is clearly incorporated into the EU's Treaty of Maastricht. This principle is based on the concept that various social problems should be addressed at local levels that are the most appropriate for

vulnerabilities in crises and disasters, as seen in the case of mass black-outs. In the age of a "Global Risk Society" (Ulrich Beck), the realistic option to protect people's lives and livelihoods and to make them more sustainable can be one of taking the path toward a "regionally dispersed network society," in which numerous empowered communities will form the foundation of multi-dimensional, multi-layered, and mutually assisted networks.

6 Conclusion: Toward "East Asian Natural Energy Communities"

The path toward decolonization proposed by Uchimura in the past was the path toward internal development by the use of natural energies. On reflection, however, East Asia where Japan is located has become a "Nuclear Region" where nuclear weapons and nuclear power plants have concentrated ever since the time of the Cold War. And behind such situation lays the history of "colonialism" piled up in many layers. Since the 1960s East Asian countries have profited by unprecedented growths of economies, which are sometimes called a "miracle." At the same time, there are still remnants of negative legacies arisen from the authoritarian regimes that nest in the politics to emphasize development.

On the other hand, such historical facts may indicate the possibilities for the regional political structures to undergo major transformation through energy transition.[12]

Lastly, I would like to talk about the dream of the "East Asian Natural Energy Community." It is a scheme of cosmopolitan energy transition to be realized across the borders for future generations.

In Taiwan and Korea, which have an advanced "energy democracy," their new administrations have already implemented various practices to promote energy transitions through cooperation between governments and citizens. Moreover, the mutual exchanges of such experiences are deepening further across national borders. The world's largest nation to promote renewable energy, China, also places energy transition as their highest priority, in view of the ever-exacerbating air pollution. In addition to such "realistic" needs in the energy policies of various countries, there is another definite reality that countries like those in East Asia have to face as a "risk-share community," for any severe accidents occurring in any nuclear power plants of

finding solutions and are closest to such problems. In other words, the issues for upper organizations (such as nations) to address should be limited to those issues, which individuals or local communities cannot address.

[12] In this context, the abolition of nuclear weapons, which is probably the most ardent wish in East Asia needs to coordinate with the movement of "energy transition" in East Asia. Further dialogue between the so-called "anti-nuclear movements" and "denuclearization movements" is required.

any country can cause serious damage to neighboring countries depending on the wind direction.

At present, East Asian countries seem to find historical problems and trade disputes obstructing the efforts to improve their relationships through negotiation. What is required now is to seek a path that explores the necessary conditions to generate the "co-existence" of East Asian countries, by sharing common awareness in safety and risks. (Sasaki, 2006) It is necessary to develop flexible international schemes, by accumulating multi-track efforts for mutual cooperation and trust building on common themes, such as pollution measures and joint development of energies, rather than the more contentious subjects of military security and territorial disputes.

The origin of the European Commission was the European Coal and Steel Community (ECSC). If we are to establish an East Asian Peace Community in the future, it can start from some type of energy community. The concept of civil societies building an "East Asian Natural Energy Community" across national borders from the very bottom in the "nuclear region" of East Asia is also the concept for building permanent peace in East Asia.

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How to Overcome the Combination of Crises?

Tetsunari Iida

Abstract Today, wind power and solar power have become the main stream of energy sources; from major electric power utilities to mega capital investors, many have entered the renewable energy sector. Mass-capital investment projects are also increasingly and rapidly expanding globally. It is not rare to find cases of such mega projects facing confrontations with local communities. Since the 1990s, the privatization of the energy sector has been significant, with Nordic countries and Germany seeing the advancement of privatization among community-operated energy utilities. Recently, however, there has been a movement to re-review this trend in order to revive public utilities. The recent reversal of the privatization trend means that the conventional way of decision-making with the participation of local governments and a few corporations is no longer appropriate, and there is a rise in the common understanding that the decision-making and governance method of local communities must be open and horizontally distributed. The rapid progress of ICT in recent years has raised awareness of risks in a governance system dominated by private companies, while raising technical capabilities to realize new and open decision-making and governance in local communities.

Keywords Post-Covid-19 · Green new deal · New global trends (electrification, transportation, sharing economy) · Deregulation · Public commons

1 Introduction

The explosive global spread of the COVID-19 pandemic has expanded even further. In Japan, a state of emergency was declared in April 2020, in which people and businesses were requested to self-quarantine to the extent that was close to the lockdowns in other countries. Despite the declaration and its lifting being repeated again

T. Iida (✉)
Institute for Sustainable Energy Policy (ISEP), Tokyo, Japan
e-mail: tetsu@isep.or.jp

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and again to date, it is still uncertain and unpredictable how the pandemic and social conditions will unfold.

The COVID-19 crisis inevitably reminds us of another crisis that happened immediately after the Fukushima No. 1 Nuclear Plant incident a decade ago. At that time, ordinary daily routine or "normal days" were suddenly shattered and "out-of-ordinary" became the new normal. For several years after the Fukushima incident, all fixed order and customs, as well as conventional ideas of Japanese society, underwent drastic changes, like seeing the world upside down. After the "3.11 quake, tsunami, and Fukushima," an entirely different reality, society, and politics are the common experience.

Now, after the global experience of the COVID-19 pandemic, or post-COVID-19, what kind of society do we need to reconstruct? To develop a plausible and acceptable scheme for a post-COVID-19 society, it would be meaningful to observe and consider the latest trend of the Green New Deal.

2 A Green New Deal Arising in Europe and USA

In the USA, Democratic congresswoman Alexandria Ocasio-Cortez and Senator Ed Markey drafted a "Green New Deal" resolution in November 2018. On February 7, 2019, US Congress announced the related resolution that aimed for zero carbon emissions within 10 years, and 100% renewable energy. Even during the currently ongoing US presidential election, the Green New Deal has become a focal issue.

In Europe, under a new regime of the EU launched in December 2019 with Ursula von der Leyen as its chair, the "European Green Deal" aiming for carbon neutrality by 2050 has been set as the first priority on the agenda.

The background to this trend is the sense of climate change crisis. The EU's opinion polls taken in the fall of 2019 indicated that concerns about climate change have grown year by year, becoming the second most important issue following the issue of immigration, surpassing economic and terrorism concerns (with concerns about the inflow of immigrants diminishing). In the US, about 90% of Democrat supporters expressed concerns about climate change (while less than half of Republican supporters worry about climate change, indicating a division of opinion). The symbol of the sense of climate crisis is Greta Thunberg of Sweden who started demonstrating alone holding a "school strike for climate" signboard in August 2018 at the age of 15. Later, those mainly young people inspired by, and supporting, her action launched the "Fridays for Future" movement, resulting in a social broad-ranging phenomenon with several million people participating in worldwide demonstrations at the same time.

When deciding on the postponement of the Glasgow Conference of Parties for the UN Framework Convention on Climate Change (COP26) to be held by the end of 2020, Patricia Espinosa, UNFCCC's executive secretary, said in the UN News: "COVID-19 is the most immediate threat to today's humans, but we must remember that climate change is still the biggest threat humans have faced for a long time".

In 2018, the atmospheric concentration of carbon dioxide (CO_2), the main factor in climate change, recorded 415 ppm (at Mauna Loa Observatory in Hawaii), which was the highest figure in its history. The World Meteorological Organization (WMO) reported that the world's average temperature for the last 5 years was the highest and the last year was the second hottest year, due to greenhouse gas effects. The pictures of many kangaroos and koalas suffering burns from wildfires spreading to an unprecedented extent in the entire Australian continent caused heartache worldwide. In Japan, more than 80 percent of citizens have felt the effects of climate change, especially because of several strong typhoons hitting the metropolitan area in recent years.

Nevertheless, anticipation of a Green New Deal is rising in Europe and the USA, not only because of the strong sense of climate change crisis. Here, I reflect on the changes in the last 10 years that have been at the heart of such anticipation.

3 Brief History of the Green New Deal

The origin of the Green New Deal was the UK group's report announced on July 20, 2008, which recommended countermeasures to respond to the financial crisis (Lehman shock) ongoing at that time along with a rapid rise in oil prices, while simultaneously implementing measures for climate change. Needless to say, the phrase "Green New Deal" was taken from the New Deal policies launched by the late US president Franklin Roosevelt to overcome the Great Depression after the Great Wall Street Crash.

Right after the UK group's announcement, the Green New Deal brought a kind of "boom" in a world that sustained damage from the Lehman shock, with the United Nations Environmental Plan (UNEP) launching a "global green new deal," followed by the newly elected US president Barack Obama, and the leaders of other countries, such as China and later Japan.

The boom of the Green New Deal at that time, however, soon disappeared without manifesting any real effects, as the financial system stabilized and oil prices decreased. This was because it was too early to have a boom. This reminds us of the difference in the outcome between the Copenhagen Climate Summit (COP15) in 2009 and the Paris Climate Summit (COP21) in 2015.

Right before the opening of COP15, the US presidency transferred from the George W. Bush administration with close connections to the fossil fuel industry to the Barack Obama administration that had high motivation to adopt climate change measures. In Japan, also, there was the change of power from the Liberal Democratic Party administration with close associations with the Keidanren to the Yukio Hatoyama administration of the (then) Democratic Party with greater eagerness to adopt climate change measures. With the political power changes in two major countries most reluctant in climate change measures, there were high expectations of COP15 hosted by Denmark, an environmentally developed country, to result in an

agreement for the next framework to succeed the Kyoto Protocol. The result was a betrayal of these expectations.

COP21, on the other hand, succeeded in adopting the epoch-making Paris Agreement, despite being held under the lame-duck Obama administration in the US and climate change-passive Shinzo Abe's LDP administration in Japan. The main factor of its success was the reality of renewable energy presenting a realistic solution. In 2009, the year of COP15, renewable energy was only one of many options available as climate change and energy measures, and the climate change regime fell into confrontation of "environment versus economy." In 2015, when COP21 was held later, the structure of the climate regime had been transformed to "environment plus economy plus energy" due to the dissemination of the viewpoint that more realistic climate change measures would be the shift to renewable energy. One proof of such trend would be the start of the "RE100" movement in 2014, which many global corporations have been joining.

4 Great Transformation in the Last Decade

Looking back on the past decade, it is evident that we have been in the middle of a great transformation. Here, three major sectors directly related to the Green New Deal, i.e., electricity and energy, transportation, and shared economy are overviewed.

4.1 Electricity and Energy Sector

In the electric power sector, the most notable trends include the dissemination and expansion of wind power and solar power as well as their cost reduction. For 10 years since 2010, the total wind power generation in the world quadrupled from 198 GW (giga watts = 1 million watts) to 743 GW, while its cost decreased by 70% (Fig. 1). Solar power generation increased almost 20 times from 40 GW to 760 GW, with its cost decreasing by 90%. Both wind power and solar power costs less than coal thermal power in many countries and regions in the world, and will continue to decrease in the future. In addition to the accumulation of cost reduction efforts exerted in the past, the most influential factor may be the rapid dissemination of the feed-in-tariff (FiT) system in many countries in the world including China. Introduced by Germany in 2000, FiT is a measure to promote marketization of renewable energies by guaranteeing the purchase price of power generation. FiT has brought market expansion, leading to a beneficial spiral of technology learnings, performance improvement, and costs reduction.

The "mainstream" experts of governments and corporations used to consider fossil fuels and nuclear energy to be the core of the energy mix, and regarded solar power and wind power as clean but high-cost impractical energy sources

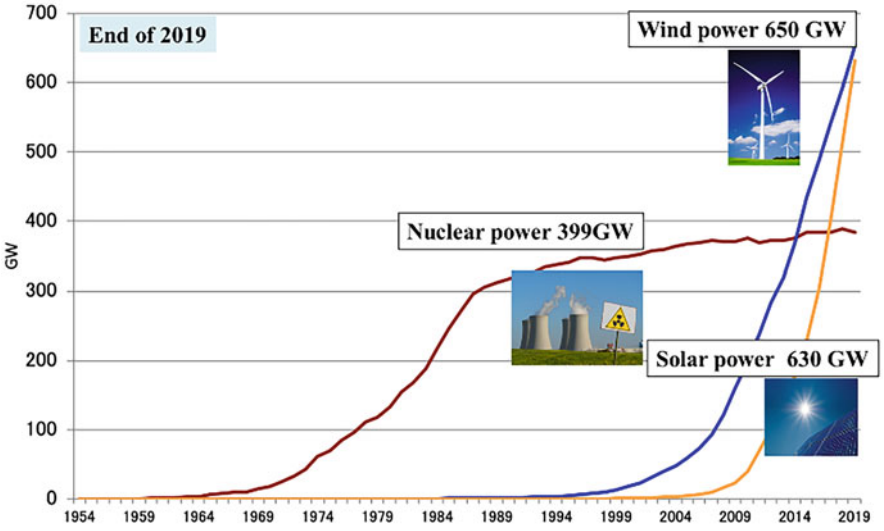

Fig. 1 Global installed capacity of wind, solar, and nuclear power generation. *Note*: Source: Prepared by ISEP based on the REN21 *Global Status Report 2019*, IAEA, etc

10 years ago. Now, many of these mainstream experts have realized that these energies are clean, domestically available, inexhaustible, and least-cost energy sources.

Now, even the collapse of fossil fuel industries has been forecast. In September 2019, one financial expert think-tank in the UK reported that "the fossil fuel market of the several-hundred-trillion-yen scale will collapse within ten years or so." The report also indicated that "continuous cost reduction of solar, wind, and batteries will enable them to cost less than existing fossil fuel power by the mid-2030s, making most of these fossil fuel power plants "'stranded assets,'" i.e., having unrecoverable expenses (Fig. 2). Moreover, from the perspective of environmental social governance (ESG), the moves toward divestment from fossil fuels and nuclear power generation are expanding its scope, indicating the end of the fossil fuel era.

Furthermore, the industrial structures themselves are changing. ABB sold its divisions of nuclear and thermal power generations as early as in 1999, while Siemens sold its nuclear power division in 2011, and spun off its thermal power division as a listed company in September of 2019. GE and Hitachi still maintain their joint nuclear power division, although they have shifted their core businesses to wind and solar power. To sustain their survival, Germany's energy giants, E.ON and RWE, established a new joint corporation in 2018 with renewables as core businesses, while promoting further industrial reorganization through M&A.

As the cost reductions of solar and wind power generation are reaching an astounding level, matters unforeseeable 10 years ago are transpiring. It is called "sector coupling," which enables various sectors such as heating, transportation, industry, and agriculture to take advantage of the benefits created by "cheaper

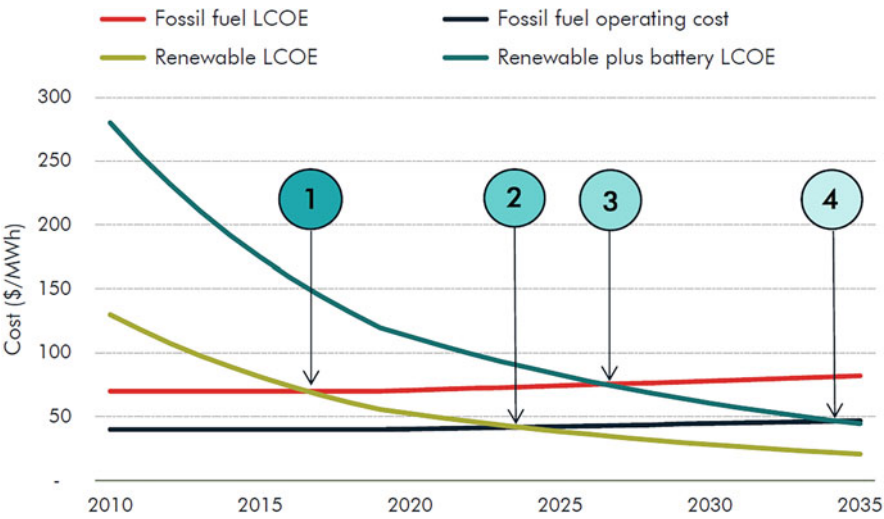

Fig. 2 Cost per MWh and the renewable tipping points. *Note:* Source: Carbon Tracker (2019)

electric power" generated by solar and wind. The typical aspect of such sector coupling is the use of electric power from electric cars. In Denmark, which is the most developed country in regional heat supply, any excess electricity generated from wind power stations is used for "thermal storage" in the form of water heating, while developing a concrete plan to produce "wind gas (methane gas)" via hydrogen to replace fossil-origin natural gas.

4.2 Transportation Sector

The annual sales of electric vehicles (EV) have increased a thousand-fold from approximately two thousand vehicles in 2008 to two million in 2018, which, in turn, decreased the costs of lithium ion batteries to one-fourth (Fig. 3). The performance and costs reduction of these three power sector technologies—solar, wind, and batteries—will be likely to continue improving through technology learning processes, so that these technologies taking a central role in the great transformation of the electric power and energy sectors in the future is the most ensured vision.

The transportation sector will not only move toward electrification. In 2017, A Stanford University report sent a shock wave to the world by reporting that, within the next 10 years, no gasoline engine cars and diesel engine cars will be sold in the world. This report predicted that the world would advance toward "mobility as a service (MaaS)," no longer requiring the ownership of automobiles, due to the advancement of self-driving vehicles and dissemination of ride-share services, in addition to the electrification of automobiles. Ride-share is a "mobility service" using vehicles during spare time, such as those represented by Uber and Lyft.

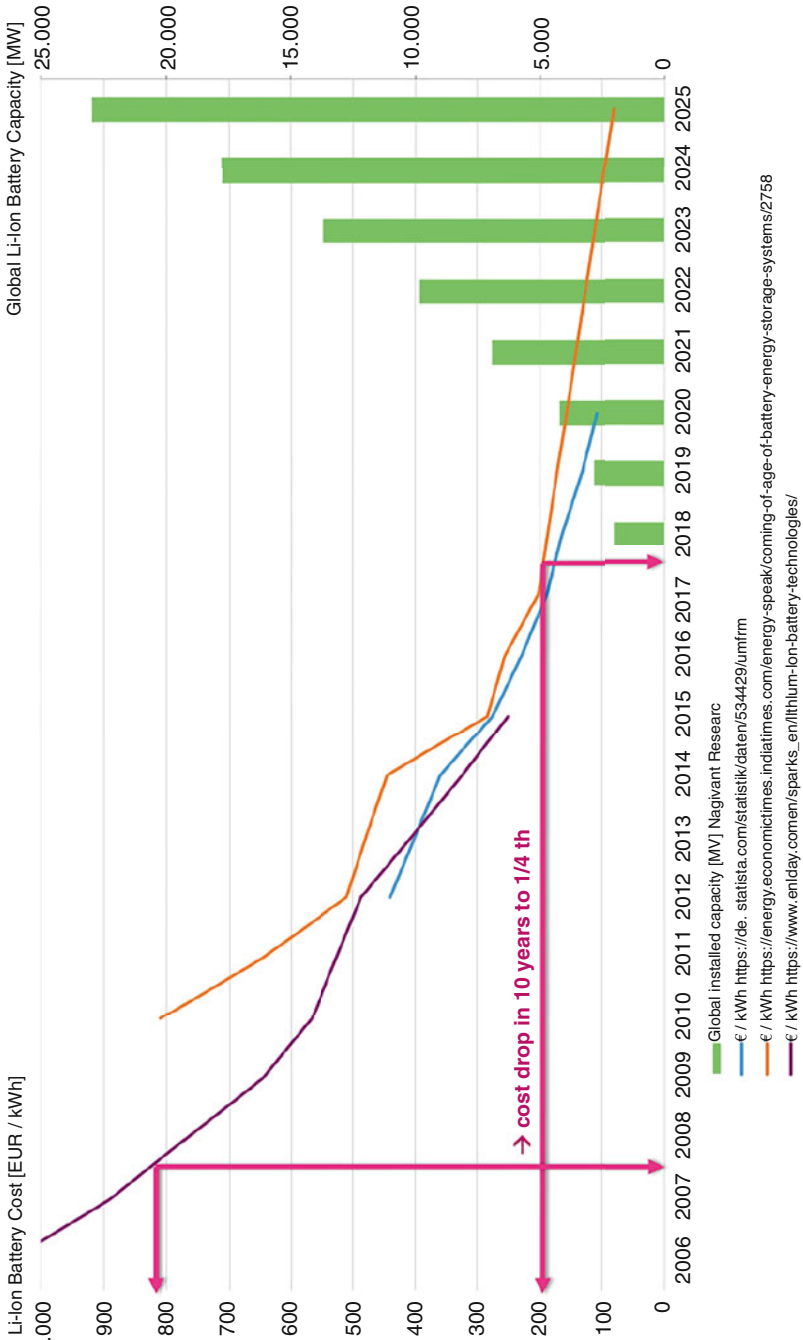

Fig. 3 Li-ion battery cell cost drop (since 2007) and global capacity forecast (from 2018 to 2025). Note: Source: Bucher et al. (2017)

By combining electrification, self-driving vehicles, and ride-sharing, the mobility cost decrease by one digit, when compared with the case of fossil-fueled car ownership. Thus, people will be motivated to adopt MaaS. When assuming the shift toward MaaS, today's vehicle operation ratio of several percent on average will increase by one digit. There will be no more traffic congestion in cities, and no need of urban parking lots.

The report also indicated that there would be a possibility of a major collapse of the big automobile industry, in which each major automobile company has been practicing the "sell out" of several to ten million cars per year. Such major collapse of an industry is also possible in the oil industry, in which automobile fuels have had the share of 30% in crude oil demand. These trends would likely require each government to make fundamental reviews of their policies, including tax revenues, urban planning, etc.

4.3 Share Economy Sector

Continuing to show significant advancements are the information and communication technologies (ICT) sector including the internet, artificial intelligence (AI), internet of things (IoT), big data, etc. Since 2007, when Apple announced their milestone innovation of iPhone (so-called smartphone), not only the ways of industry and economy but also our life style has been transformed in the past 10 years, including the worldwide spread of social media and YouTube, online map applications, and other applications.

The advancements in these fields have improved the efficiency of production and distribution of assets and services to an extreme extent, while drastically reducing the marginal costs. Thus, a new phenomenon called the "sharing economy" has arisen, in which not only assets and services are shared, such as the aforementioned Uber as well as Airbnb to utilize the "unoccupied time" of homes, but also information and knowledge, such as the case of Wikipedia, college lectures, and know-how, such as cooking methods, for free.

Solar and wind power generation also have zero marginal costs. The Sun will not present a bill for the use of its energy. Selling of power generated can bring revenues. We find gradual development and dissemination of concepts such as demand response (DR) and virtual power plants (VPP), which use ICT to aggregate the distributed energy sources of solar power and batteries to create one virtual power station.

The sharing of services, knowledge, know-how, etc. among tangible and nontangible assets and services with no marginal costs will become essential factors of the Green New Deal, which is an open, resource-saving type with a lower environmental burden. Moreover, such sharing economy is to bring a fundamental change to the way of conventional capitalism.

4.4 Major Progress in Other Related Sectors

In addition to the above, I briefly discuss other major progress related to the Green New Deal: the resurrection of the regional heat supply system in the thermal heat supply sector including heating systems and water heaters. Denmark has led the world in the theories and practices of this sector by systematically developing the concept of "fourth-generation district heating" in 2014 and becoming the central force in the EU's research group to develop Heat Road Map Europe (starting from 2016), which aims for a 80% carbon reduction in the air-conditioning sector by 2050. This fourth-generation district heating is a regional heat supply system that provides higher thermal efficiency and lower carbon emissions, by combining renewable energy, such as solar heat and wind power generation, and the use of industrial waste heat.

Another important factor is the improvement of demand-side efficiency. In the US, total energy efficiency improved five-fold from 2.5% in 1900 to 14% in 2010. Still, 86% of energy was lost. IoT would be able to improve this demand-side efficiency to 60%.

The residential sector is an important element in demand-side efficiency improvement. In the EU, the Energy Performance of Buildings Directive (EPBD) has been implemented, which requires all new houses and buildings to become "zero-energy buildings (ZEB)" by 2021. In the US, the state of California has introduced a "zero net energy (ZNE)" regulation, which includes the obligation to install solar panels by 2020, with the goal of achieving zero net energy in 50% of existing residential buildings by 2030. In particular, the retrofitting of existing residential buildings to improve heat insulation and air-tightness would not only improve the residential environment and overall efficiency of a society, but also attract a significant amount of investment as well as employment.

5 Power to the People

"Power to the People" is a song John Lennon released in March 1971. In that age of "hippy culture" (political culture of resistance) symbolized by the Beatles, an anti-nuclear movement as well as an anti-war and world peace movement arose globally. Natural energy, such as wind power generation and solar power generation, were the dream and symbol of the anti-nuclear movement: the "energy of hippies."

Today, however, wind power and solar power have become the main stream of energy sources. The major electric power utilities and mega capital investors are participating in the renewable energy sector, Moreover, mass-capital investment projects, such as gigantic off-shore wind power generation and mega solar projects, are advancing globally at a rapid pace. Disputes with local communities about these mega projects are not uncommon.

As time passes another round, “Power to the People” has regained its importance. The English word “power” has two meanings: authority and electricity (energy). Renewable energy is fundamentally a regional distribution-type energy, and has a long history of development, including the bottom-up development efforts by the Danish Wind Industry Association and others since the 1970s. For this, it has been essential to have a robust governance system in the local community, to manage local resources (such as land, landscape, and natural environment), and to build consensus in the use of local resources. In Denmark, local communities still have an obligation to bear at least 15% of investments for wind power generation. In view of these ongoing trends, the World Wind Energy Association drafted the “three principles of community power” (local ownership, local consensus building, and the return of benefits to local communities) in 2010, as social policy recommendation.

Since the 1990s, there have been a general trend of deregulation, privatization, and marketization. In particular, the privatization of energy sector has been significant, with Nordic countries and Germany seeing the advancement of privatization among community-operated energy utilities. Recently, however, there has been the movement to re-review such trend so as “to revive public utilities.” The forerunner of this movement has been the Schönau Electric Power Corporation in the southern part of Germany, which was established in 1997 by the citizens purchasing the power transmission network. Later, 287 out of 900 local electric power companies in Germany were “to revive the status of public utilities,” including the Hamburg Electric Power Company (which regained public utility status in 2014).

The recent reversal of the privatization trend means that conventional decision-making processed with the participation local governments and a few corporations is no longer suitable, and the common understanding that the decision-making and governance method of local communities must be open and distributed horizontally is increasing. The rapid progress of ICT in recent years has raised awareness of risks in a governance system dominated by private companies, while raising technical capabilities to realize new and open decision-making and governance in local communities.

Electric power projects, in particular, used to be executed by dominantly local stakeholders centered around the power grid. Renewable energy projects, on the other hand, are distribution types not only in their structure but also in their ownership. With such renewable energy projects spreading rapidly, what is required now is how to develop and maintain clarity, fairness, and transparency in the ownership and governance of power transmission and distribution networks, as well as the applicable regulations and rules, and their operation.

6 Directing Toward the Green New Deal in an "After COVID-19" World

Returning to the discussion of the COVID-19 pandemic at the beginning of this paper, this pandemic is one occurring simultaneously all over the world, and unwittingly exposing the inadequacy of responses taken by Japanese political and administrative systems, which can be described as malfunctioning. COVID-19 is highly contagious, with the number of cases doubling within several days, and thus spreading explosively in a very short period.

To counteract such rapid spread of infections, various countries, including Korea, Taiwan, and Germany, took immediate measures to develop appropriate testing and medical treatment systems, while providing adequate economic aid to citizens directly. Contrarily, Japanese governmental measures were clearly too late and too small. The Japanese regime fell into malfunction due to bureaucratic inertia and excessive formalism, as well as political distortion and inaction.

Despite the difference in time scale, this may be fundamentally connected to the states of Japanese politics, administration, and social system that failed to respond appropriately to the rapid dissemination of renewable energy and the change of their roles in the past 10 years. We must remember how Japanese politics and administration could not make use of the latest knowledge and technologies about COVID-19 unfolding day by day, in addition to considerable rigidity of existing organizational structures. Moreover, we need to remember the current political posture of the Japanese government that do not seem to make efforts to protect the lives and health of its nationals, let alone their livelihoods. These politics and administration that cannot address the immediate crisis will not be able to respond properly to the long-term crisis of climate change, nor to nuclear accident, which has happened before, and its post treatment.

A "post-COVID-19" society to be reached after passing through the current pandemic will be one to be rebuilt from largely devastated livelihoods and economies, unfortunately. To rebuild and revitalize human society, the Green New Deal can play an important role. In the US, like-minded experts in economics and environment publicized an open letter addressed to the US Congress at the end of March 2020, titled "Green Stimulus to Rebuild our Economy Recovery" after COVID-19, in which they recommended immediate measures for economic recovery from the "great depression" caused by the pandemic, for the imminent threat of climate crisis, and for extreme economic disparity.

The Green New Deal requires fundamental updating of social infrastructures, and the reviewing of ownership, ruling, and the way of governance. In his article, Tanaka (2020) points out the adverse effects of Japanese administration's organizational logic adopting partial optimization, and the LDP and business associations supporting such logic. This logic could be the essence of the current Japanese political and administrative failure in responding to the COVID-19 crisis, which we are facing today. Another example of such failure could be another Green New Deal that became a simple subsidy program of the Environmental Ministry.

Conventional energy policies of Japan have been developed mostly through the processes of finding partial optimization and balancing of benefits and losses among stakeholders, bringing significant adverse effects.

In the future, it is necessary to rebuild and redevelop policies and decision-making processes that can overcome the logic of partial optimization for various stakeholders, the vertical divisions of ministries and agencies, and bureaucratic inertia, in order to find "total optimization" with the goal of realizing "people's happiness."

The Green New Deal, which has been proposed in alignment with a great energy transformation in the history of civilization, requires the utilization of distributional-type technologies as an axis, and a deepened understanding of democracy that enables more open, horizontal, and participating ruling.

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Energy Democracy for Energy Transition in South Korea?: Focusing on Politicization of Media

Sun-Jin Yun, Seunghyeok Ahn, and Regina Yoonmie Soh

Abstract South Korea has been pursuing energy transition as a national task since 2017 when the first nuclear reactor, Kori-1, was permanently stopped and President Moon Jae-in gave a commemorative speech on June 19, 2017. This study aims to identify who the main speakers of the conventional electricity system are and how they resist the movement of such changes. This study focused on the role of the media and found that the issue of energy transition has been highly politicized. Conservative media have criticized the Moon government's post-nuclear policy as a leverage and have highlighted problems surrounding renewable energy as it is a hotbed of great corruption. Those who oppose locating renewable energy facilities to their community have taken advantage of such press reports. Energy transition requires more energy citizens who recognize not only their right to enjoy basic energy needs, but also their responsibility for the socio-economic and environmental impacts of their energy use. The realization of energy democracy pursuing energy and climate justice will take time but social dialogue based on scientific evidence and deliberation will open the way toward energy transition while identifying fake news and opposing interests adhering to the conventional electricity system.

Keywords Energy democracy · Energy transition · Politicization · Media analysis · South Korea

1 Introduction

Energy transition to deal with the climate crisis has now become a task of the times for all countries in the world. The Moon Jae-in government is the first government in Korean history to formalize the 'energy transition' as a national task. The abolition of the construction of a new nuclear power plant, on-time closure of Kori Unit 1, the first reactor of South Korea, without lifetime extension, the early closure of Wolsong

S.-J. Yun (✉) · S. Ahn · R. Y. Soh
Seoul National University, Seoul, South Korea
e-mail: ecodemo@snu.ac.kr; ash4@snu.ac.kr; reginasoh@snu.ac.kr

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Unit 1, and closure of aging coal-fired power plants were representative promises of Moon Jae-in at the time of the presidential election (Yun, 2018).

In spite of the presidential pledge of no more construction of new nuclear power plants, the construction of Shin-Kori Units 5 and 6 was decided through public debate after inauguration of the Moon government. Anti-nuclear activist groups opposed the public debate on whether to continue construction of Shin-Kori Units 5 and 6, but stopping the reactor construction with an approximate 30% completion rate was too politically burdensome to the Moon government. In the end, the construction was resumed based on the decision of the people's participation group designed and operated by the public opinion committee for Shin-Kori Units 5 and 6. Right after this event, the Moon government declared a roadmap for nuclear phase-out in Oct. 2020.

The Moon government went beyond simple slogans to implement energy transition in more detail. The Renewable Energy 3020 Implementation Plan was announced in Dec. 2017 to expand renewable energy to 20% of electricity generation by 2030. This target was almost doubled compared with the previous target of 11% by 2030. As of 2020, the Moon government declared the Green New Deal (hereafter GND) as a part of the Korean version of the Green Deal, and promoted energy transition as a core of the GND toward changes for a sustainable society by simultaneously overcoming the economic, climate, and social inequality crises.

Although the current Moon government has struggled with the expansion of renewable energy, the share of renewable energy in South Korea is still lowest among OECD member countries. In the large-scale centralized conventional energy system, the conflict over the location of energy-related facilities was limited to a small number of regions, while conflicts surrounding locating renewable energy facilities were rather nationalized due to the property of decentralized energy. Even though renewable energy is relatively more environmentally-friendly, conflicts over renewable energy have reached a point where they can no longer be ignored. The decentralized energy system was expected to be more democratic through the participation of local residents by following the way local residents determine by themselves how to use energy on their own. However, in South Korea, the phenomenon of Not In My Back Yard (NIMBY) targeting coal and nuclear facilities is also prominent in the case of renewable energy.

This study aims to explore the current status of energy transition in South Korea from the perspective of energy democracy. First, it deals with the evaluation of civil society on the Moon Jae-in government's renewable energy policy. Then, the concept of energy democracy is discussed. South Korea's energy transition policy is examined and social conflicts over renewable energy are explored. South Korea's renewable energy conflicts have been deepened because of fake news by the media. Thus, this study examines news about renewable energy and analyzes renewable energy discourses shaped by the media. And then, regulation of local governments is explored as a representative barrier blocking expansion of PVs. Fake news stimulates oppositions to locating renewable energy facilities or justifies such oppositions.

2 Moon Government's Renewable Energy Policy and Evaluation of Civil Society

For the first time in Korean history, the Moon government has made energy transition a national agenda. After taking office in May 2017, the Moon government announced the Renewable Energy 3020 Implementation Plan in Dec., and has continued to promote the energy transition policy to increase the share of renewable electricity to 20% by 2030. The goal is to secure 28.8 GW of large-scale projects, to supply 10.0 GW of solar power for farms, 7.5 GW for small businesses such as cooperatives, and 2.4 GW for individuals such as houses and buildings by 2030. And on October 28, 2020, President Moon Jae-in declared "2050 carbon neutral" in his administration address. Then, in early December, the 2050 Carbon Neutral Promotion Strategy was presented, and at the end of December, the 2050 Long-term Low Greenhouse Gas Emissions Development Strategy (LEDS) was submitted to the UN Climate Change Convention Secretariat. In order to reduce the energy sector, which accounts for about 86.9% of total greenhouse gas emissions as of 2018, reduction of the proportion of fossil fuels and expansion of renewable energy were suggested as key measures to respond to the climate crisis (Greenhouse Gas Inventory and Research Center, 2020).

The Moon government rapidly expanded renewable energy facilities through large-scale projects and public participatory power generation projects. In particular, policies focused on large-scale projects were implemented (Lee, Kim, et al., 2020). In terms of installed capacity, solar power plants in Korea increased more than 5 times from 4502 MW in 2016 to 21,308 MW in 2020, and wind power plants also nearly doubled from about 1035 MW in 2016 to 2072 M in 2020. In the first half of 2020, the share of renewable energy generation in Korea was 6.5%, an increase from 3.9% in 2018, but it is still the lowest among OECD countries. The Moon government introduced a conflict management mechanism from 2019 to improve problems through communication with residents as civil complaints and local conflicts arose in the process of expanding renewable energy. In the expansion of renewable energy, policies are being supplemented and improved in the direction of sharing profits and strengthening communication between project operators and residents, away from the one-sided development method.

Civil society points out that although the Moon government's renewable energy policy has made progress compared to the past, there are still problems to be solved (Korea Federation for Environmental Movements, 2021). On August 24, 2021, the Korea Federation for Environmental Movement and the Green Energy Strategy Institute held a debate forum to evaluate the Moon government's renewable energy policy. The presenters and panelists evaluated that the Moon government has strengthened the renewable energy supply target compared to the past, but the current renewable energy supply target is insufficient to achieve the 2050 carbon neutrality target. As obstacles to the process of expanding the supply of renewable energy, problems such as residents' acceptability, environmental impact, location regulation, and electricity market system remain, and they agreed that system

improvement is necessary to solve these problems. In order to achieve the carbon-neutral goal, about 460–510 GW of renewable energy must be accumulated by 2050, and at least 11–12 GW of solar power and 4–5 GW of wind power should be supplied annually. The Moon government was criticized for being insufficient in terms of the separation distance regulation of solar power and insufficient environmental impact assessment system for onshore and offshore wind power. Also, there was a problem raised that the targets for the energy self-sufficiency rate and the proportion of renewable energy generation in metropolitan cities were insufficient. In terms of democracy and publicity, civil society actors emphasized the need for resident participation in the site selection and profit-sharing design process, and support for small-scale community energy, including cooperatives.

3 Energy Transition, Energy Democracy and Media Coverage

Energy constitutes a socio-technical system in which not only technological elements, but also the social structures, institutions, and social relations surrounding it are intricately connected (Yun et al., 2011). Transition is a change from one socio-technical system to another through the co-evolution of actors and technologies based on social learning and innovation (Yun & Sim, 2015). Energy transition in the era of climate change means securing the sustainability of the energy system by converting the existing large-scale centralized energy system to a small-scale distributed energy system through energy saving, efficiency improvement, and expansion of renewable energy (Yun, 2008). The key to sustainable energy transition is the expansion of renewable energy, and the socio-technical system of renewable energy is composed of technologies, organizations, institutional structures, finance, and political systems interacting with each other (Markard, 2018).

As this energy transition is based on regionally distributed renewable energy sources, it implies the possibility of a transition from a centralized decision-making method to a more democratic method in which local residents participate to make decisions and also participate in the construction, maintenance, and operation of energy facilities. According to Gunderson and Yun (2021), "the organizing aims of the energy democracy movement are to destabilize, resist, and move beyond conventional energy systems and transition to renewable and just systems democratically controlled by informed citizens who control and own the means of energy production." The issues are, to what extent are local residents of renewable energy sites informed and interested in democratic ownership and control of the means of energy production, and what is the extent of their awareness and acceptance of renewable energy. Social acceptance of renewable energy is divided into three dimensions: sociopolitical acceptance, market acceptance, and local community acceptance (REN21, 2020). Although sociopolitical acceptability is high, community acceptability is low, so unlike theoretical possibilities, the realization of energy

democracy shows an unfavorable trend. In South Korea, it was found that local residents' acceptance of renewable energy installations was lower than that of the general public (Lee, Huh, et al., 2020). As a result of the 2018 survey, residents in areas where renewable energy systems were built or scheduled to be built had low satisfaction with the renewable energy project, and residents in areas near the power plant were equally satisfied and dissatisfied with the construction of renewable energy power plants for reasons of landscape, ecosystem, and environment (Chung & Lee, 2018). On the other hand, in the National Environmental Awareness Survey, air quality improvement (46.5%) is the most urgent environmental problem that citizens think needs to be resolved, and climate change damage and response (21.9%) rank second (Jeon et al., 2020). This means that the general acceptance of the whole society for the expansion of renewable energy is high. It can be seen that the negative attitude toward the installation of renewable energy facilities near one's house is strong, and the responsibility as an energy citizen for the overall situation of society increases. This low community acceptance manifests the NIMBY phenomenon, leading to conflicts and regulatory disputes over renewable energy, which will be discussed in this article.

Media coverage plays a certain role in this value conflict situation. Discourse analysis of energy transition in terms of the knowledge co-production process in science and policy, influence of human factors, and ecological democracy has been conducted (Komendantova & Neumueller, 2020). According to the discourse approach, energy transitions are socially constructed at specific times and places and can be interpreted through media coverage analysis (Antal & Rhunmaa, 2018). Media coverage can disseminate or conceal information about the energy transition, motivate or hinder the selection of new energy technologies, and play an important role in the energy transition, influencing citizens and policies (Lyytimäki et al., 2018).

The media selectively reports various social phenomena, reporting certain phenomena or events and no other phenomena or events. In this process, phenomena or events that should be socially circulated and communicated are sometimes excluded and not revealed. In addition, framing is performed on the phenomenon or event to be reported. The framework of "framing" is a mental structure that forms a way of looking at the world, and determines the goals and plans pursued, the way of acting, and the good or bad of actions (Lakkoff, 2004). Through that framework, problems are identified and defined, and methods or strategies to solve the problems are clearly established (Pidgeona et al., 2008; Poortinga et al., 2006). Frameworks are the basis for organizing fragments of the everyday world with the organizing principles that govern events and our subjective engagement with them. The process of creating such a framework can be called framing (Kim & Yun, 2010), and it is the task of organizing, classifying, and interpreting an experience on a daily basis in order to understand it (Choi, 2009). Framing implies the creation of an epistemological perspective, worldview, or implicit assumption that allows for a common interpretation and definition of a particular issue (Miller, 2000).

According to the framing theory, people follow the way information is presented unless they have a strong prior opinion (Lee, 2003). As a result, if there is a slight

change in the way risk is expressed or if the risk is structured in a framework different from that which has been understood, risk perception and decisions are significantly affected. As new information is input, belief systems and knowledge structures change, and judgment and reasoning change accordingly. That is, when new information is added, some or all of the knowledge representation structure (belief) is appropriately changed and reconstructed (Lee, 2003). You can try to change the way people see the world by changing or reconfiguring the framing, and this attempt is made with the effect of framing in mind. Therefore, it can be said that media reports have a significant impact on the shaping of ordinary citizens.

4 Renewable Energy Discourse and the Politicization of the Media

4.1 Renewable Energy-Related Media Reports

The media plays a role in publicizing socially important environmental issues. It influences citizens' policy understanding and social acceptance by mediating experts, policymakers, and citizens. Media have different tones depending on their political ideology. Not all events and phenomena are written in articles, and selection and exclusion are made by reporters and newsdesks. News articles are structured through frames, defining problems, offering solutions, and shaping public opinion. Journalists need to present data-based scientific evidence on controversial issues and to communicate objective facts in plain language that ordinary citizens can understand. However, depending on the tendencies of the media, there are cases in which incorrect or exaggerated information is reported as true as the issue of renewable energy is interpreted based on a specific position. Considering the political characteristics of the media, the obstacles to energy transition can be identified by examining the media reports on renewable energy in South Korea.

As a result of the Media Users in South Korea 2020, the news usage rate of citizens was 85.0% for TV, 78.7% for the Internet, and 10.2% for newspapers (Korea Press Foundation, 2020). The results of the 2019 National Environmental Awareness Survey are similar, with the main media through which citizens access environmental information being Internet portal sites (51.5%) and TV (35.1%), and newspapers account for only 2.4% (Jeon et al., 2020). Articles related to renewable energy were analyzed on the BIG Kinds website, which provides big data services by integrating the article DBs of central, economic, regional, broadcasting, and specialized magazines that can be accessed through Internet portal sites. For the period from January 1, 2016 to May 31, 2021, we searched news containing at least one word from among renewable energy/solar power/wind power for 54 media companies. As a result of the search, a total of 14,742 articles were found, and the number of articles per month is shown in (Fig. 1).

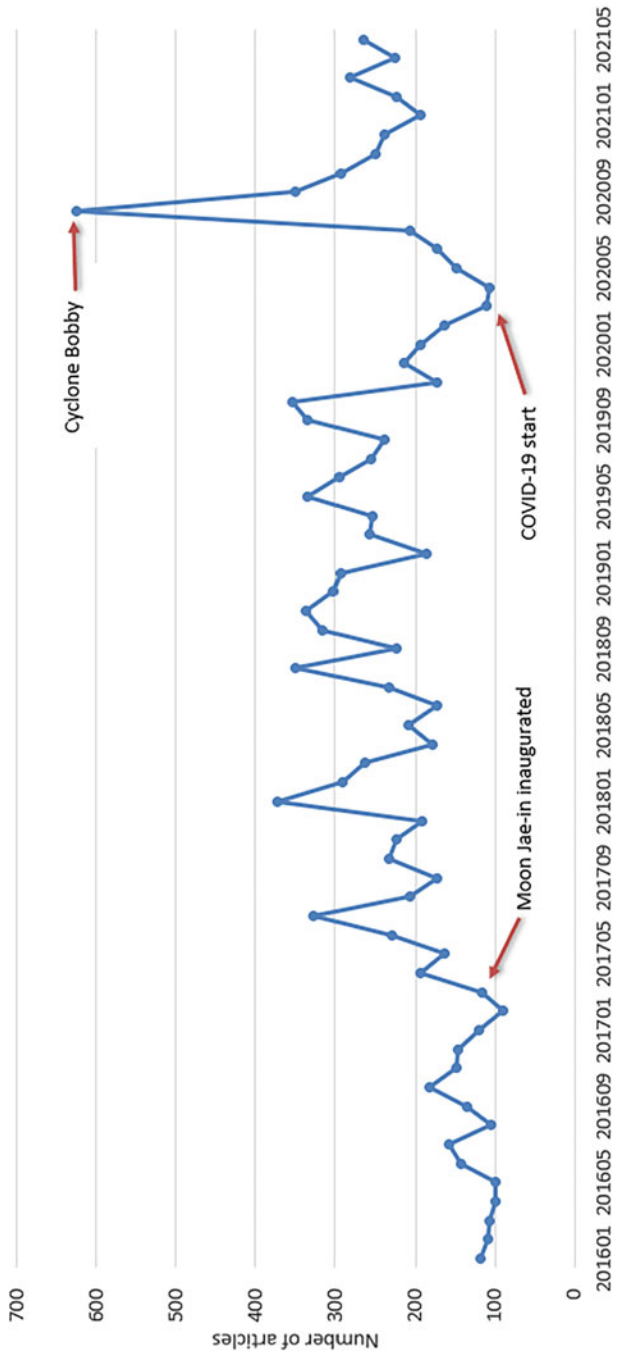

Fig. 1 Renewable energy media reporting trends

It can be seen that related articles have increased rapidly since President Moon Jae-in took office in May 2017. Since the beginning of his inauguration, the Moon Jae-in administration has been promoting a policy of expanding renewable energy by setting nuclear phase-out as a top priority. In the first half of 2020, as the COVID-19 epidemic began, the proportion of articles related to COVID-19 increased, and articles related to renewable energy decreased relatively. The reason why the article in August 2020 is about double that of other periods is because there were many articles mentioning concerns about damage to solar panels and wind turbines under the influence of powerful Cyclone Bobby. As the cyclone moved differently from the expected route, the impact of the cyclone was not greater than expected, so there were few articles reporting the damage to renewable energy facilities.

According to the results of a study analyzing articles related to rural solar power in the Korean media from 2010 to 2019, out of 1067 articles, there were 334 positive articles and 148 negative articles, indicating that negative discourses about solar power accounted for a considerable proportion (Ki & Ahn, 2020). In articles that positively describe solar power, the main topics are government support and farmhouse profit, policy briefing sessions, plan for renewable energy expansion, National Agricultural Cooperatives Federation, electricity generation by resident participation, information on participation policy, participation in cooperatives, cases of rural solar power projects, agrophotovoltaic demonstration on projects, etc. Articles that wrote negatively about solar power dealt with impacts by panel installation, development by outsiders, residents' opposition, problems of government support, damage of farmland and forest, damage to agriculture, farmland encroachment, separation distance, grid connection, etc. as main topics. While positive articles tend to mainly introduce government policies and their effects from the perspective of resident participation and profit creation, negative articles cover various problems in the process of expanding solar power, environmental damage, and difficulties experienced by solar power operators. Regarding the renewable energy expansion policy, the Moon Jae-in government has been implementing the farmhouse solar power project since 2017 to support residents to install solar power.

4.2 Characteristics of Renewable Energy Articles in Conservative and Progressive Media

To examine the framing difference between the conservative and progressive media, BIG Kinds' TopicRank algorithm service was used. The TopicRank algorithm ranks the words appearing in the article in such a way that a higher weight is given to the words whose distance is closer to those words within the vicinity of the search keyword. News containing at least one word from renewable energy/solar power/wind power from January 1, 2018 to May 31, 2021 for the Chosunilbo and Korea JoongAng Daily as representative conservative media in South Korea, and the Kyunghyang Shinmun and the Hankyoreh as progressive media was searched on

Table 1 Topic rank of articles on renewable energy in conservative and progressive media

Rank	Chosunilbo	JoongAng	Hankyoreh	Kyunghyang
1	ESS	New and renewable	Safeguard	New and renewable
2	New and renewable	China	China	Nuclear
3	Nuclear phase-out	Landslide	Fossil fuel	Energy transition
4	Nuclear	Safeguard	Nuclear	Greenhouse gas
5	Moon Jae-in government	ESS	Energy transition	Climate change
6	Germany	Nuclear	Washing machine	ESS
7	Landslide	Nuclear phase-out	Electric car	Job
8	China	Washing machine	Germany	Fossil fuel
9	Late night electricity	Energy source	New and renewable	Germany
10	Power generation	Electric car	Energy storage device	Safeguard

BIG Kinds.[1] The number of articles was 532 in the Chosunilbo, 479 in the Korea JoongAng Daily, 247 in the Hankyoreh, and 352 in the Kyunghyang Shinmun.

Renewable energy is commonly used as an alternative to nuclear energy. If you look at the articles, there are many articles in the conservative media criticizing the current government's nuclear phase-out policy while pointing out the limitations of renewable energy (Table.1). Progressive media have tended to move away from fossil-fuel or nuclear-centric regimes and treat renewable energy as a major means of energy transition. And the distinct difference between the conservative and progressive media is that in the former case, the possibility of landslides increases due to solar power, and articles that state landslides lead to damage to solar power facilities are reported as important. In the case of the Kyunghyang Shinmun, the economic benefit framing that jobs are created through renewable energy is characteristic. On the other hand, the reason 'safeguard' and 'washing machine' rank high is because there are many articles that appear alongside solar power as a product of emergency import restriction measures (safeguards) in the United States.

Searching for energy transition as a keyword for the same period resulted in 184 in the Chosunilbo, 291 in the Korea JoongAng Daily, 214 in the Hankyoreh, and 228 in the Kyunghyang Shinmun. Compared to the number of articles when searching for renewable energy/solar power/wind power, it can be seen that the energy transition is relatively more important in the progressive media than in the conservative media. As a result of applying the TopicRank algorithm of BIG Kinds, the first and second place words with high weight because they are located close to the energy transition in the article were nuclear phase-out and new and renewable in the Chosunilbo, new and renewable and nuclear phase-out in the Korea JoongAng

[1] Among the news data of 54 media companies provided by Big Kinds, only the Chosunilbo is provided with data from 2018, so the period for analyzing conservative/progressive press reports is set from 2018.

Daily, climate crisis and nuclear phase-out in the Hankyoreh, and solar power and greenhouse gas in the Kyunghyang Shinmun. Each media has a different direction in which they want to communicate to citizens through articles in connection with energy transition. The Chosunilbo delivers critiques of nuclear phase-out and the limitations of renewable energy, and the Korea JoongAng Daily conveys the pros and cons of new and renewable energy and the problems of nuclear phase-out. The Hankyoreh delivers nuclear phase-out as a strategy to overcome the climate crisis, and the Kyunghyang Shinmun presents a discourse on expanding solar power to reduce greenhouse gas emissions.

Since citizens have the highest rate of use of television when accessing news, from January 1, 2018 to May 31, 2021, for KBS, MBC, YTN, and SBS broadcasters, 590 news items including one or more words of renewable energy/solar power/wind power were analyzed using the TopicRank algorithm service of BIG Kinds. The word rankings were landslide, ESS, residents, fire, property damage, renewable energy, casualties, power plant, fire department, and Jeju. In the case of television media, the frequency of reporting on renewable energy in connection with disasters was higher than that of newspaper articles. Television's approach could have an impact on citizens' negative perceptions of renewable energy. On the other hand, the progressive media, Kyunghyang Shinmun, presented an analysis based on data through an article titled <"[Fact Check] Expert opinion on the 'Relationship of heavy rain damage' of the four rivers VS solar power">. A total of 1079 landslides occurred in South Korea during the rainy season in 2020, 12 of which occurred at solar power facilities, accounting for 1.1%, and compared to the 12,721 mountain solar power generation facilities installed nationwide, the rate of landslides at solar power facilities was less than 0.1% (Kyunghyang Shinmun, 2020). And Yonhap News, which can be seen as a moderate media, explained through various data that there is no statistical basis for the claim that solar power facilities in mountainous areas are the main culprit of the increase in landslides (Yonhap News, 2020a).

4.3 Conservative Media's Distortion of Articles and Criticism of Nuclear Phase-Out

Conservative media selects and publishes articles that may cause citizens to have negative perceptions about energy transition, while progressive media supports energy transition and emphasizes content that can form a positive attitude. According to the research results of the analysis of the Chosunilbo and the Hankyoreh's report on nuclear phase-out, the Chosun Ilbo produces a discourse that the nuclear phase-out policy destroys the industrial and economic base, threatens the operation of nuclear power plants, wastes taxes, and destroys the environment, and the Hankyoreh showed a tendency to form a discourse that nuclear power is not safe and that nuclear phase-out policies will revitalize the industrial and economic foundations (Kang, 2020).

The two newspapers also differ in the way they introduce the contents of nuclear phase-out and energy transition in other countries. For example, the Chosunilbo and the Korea Economic Daily wrote articles on the report by Der Spiegel magazine, framed by Germany regretting the phase out of nuclear power. In an article titled <"Nuclear phase-out costing 200 trillion won, an expensive failure, Germany's regrets.">, <"Nuclear phase-out is an expensive failure" ... "Voices of Criticism from Germany">, they listed the problems of the energy transition projects, indirectly criticized the Korean government's nuclear phase-out policy, and suggested that the nuclear phase-out should be stopped (Chosunilbo, 2019b; Korea Economic Daily, 2019). The Chosunilbo tried to form a negative public opinion on the energy transition by writing two related articles, one editorial, and one column. In response, the Ministry of Trade, Industry and Energy distributed a media release stating that the core of Der Spiegel's report was criticizing the fact that Germany's nuclear phase-out and energy transition policy is the largest project since unification, which must be achieved, but it is not being implemented properly (Ministry of Trade, Industry and Energy, 2019). In addition, the Hankyoreh, a progressive media, criticized the Chosunilbo report for being trapped in the debate about the pros and cons of nuclear power generation, and emphasized that the central point was that the government should actively promote energy transition in all sectors, citing Der Spiegel's report (Hankyoreh, 2019).

Another example that focuses on framing the pros and cons of the energy transition is the controversy surrounding the Seoul Economic Daily's interview with three German energy experts. An issue was raised about the article of Seoul Economic Daily, <[Energy mix, learn from overseas] "Excessive subsidies for renewable energy are 'inefficient'... We should not completely rule out nuclear power"> (Seoul Economic Daily, 2019). It is said that the context of the remarks of the Wuppertal Institute's vice president Fischedick, one of the energy experts, was distorted or omitted, highlighting only the inefficiency and cost burden of renewable energy subsidies (Citizens' Coalition for the Democratic Media, 2019). As a result of hearing the explanation from vice president Fischedick after the report, it was confirmed that the article was not balanced and he emphasized the socio-economic benefits of energy transition and the possibility of energy transition in South Korea, but such parts were excluded in the process of summarizing the interview (Citizens' Coalition for Democratic Media, 2019). On the other hand, prior to these debates, the Kyunghyang Shinmun published a series of articles on [Energy Transition, Necessary, Not Optional], detailing the success stories of wind power in Feldheim, Germany and solar power in Gelsenkirchen, and as part of the series, talks by vice president Fischedick were reported and in that article, the necessary parts for energy transition, such as the importance of changing citizens' perceptions, creation of jobs in renewable energy, the necessity of government policy decisions, the risk of nuclear accidents, and citizen participation in renewable energy projects were highlighted (Kyunghyang Shinmun, 2018).

In addition, the Chosunilbo published an editorial in support of the opposition leader's remark that the policy to phase out nuclear power plants is a major cause of new construction of fossil fuel plants and fine dust. In response to this claim, media

such as Yonhap News and KBS reported a fact-check article that, based on statistical data and expert opinions, fine dust is greatly influenced by foreign and seasonal factors, and that the rate of increase in bituminous coal power generation has decreased significantly due to the nuclear phase-out policy (KBS, 2019; Yonhap News, 2019). Subsequently, the Chosunilbo published an article stating that ultrafine dust, greenhouse gas, and social costs will surge in 2029 as the amount of LNG (liquefied natural gas) power generation increases instead of nuclear power plants that do not emit fine dust and greenhouse gases (Chosunilbo, 2019a). In the article, the Chosunilbo specified the source of the information as the National Assembly Legislative Investigation Agency. However, according to the response report by said agency, fine dust increases due to the increase in LNG supply and demand in the new plan compared to the existing LNG plan, but overall fine dust decreases because LNG replaces coal-fired power (Media Today, 2019). It can be confirmed that the Chosunilbo intentionally distorted the information to reinforce the framing that nuclear phase-out leads to an increase in fine dust.

Fake news related to the Moon Jae-in government's nuclear phase-out policy is mainly produced by conservative newspapers based on its firm belief in the nuclear-based energy system, and it can be said that fake news is used for the purpose of criticizing the current ideologically different government. The discourse on energy transition in South Korea is highly politicized. The Chosun Ilbo reinforces its anti-communist ideology by defining nuclear denuclearization as an ideological movement of the left based on irrational superstition, while the Hankyoreh presented a discourse that the public debate committee for Shin-Kori Units 5 and 6 that decides the policy direction for the reduction of nuclear power should be respected as the will of the people, and that the nuclear phase-out will succeed the candlelight revolution that judged the established powers (Kang, 2020).

According to the result of the Media Users in Korea 2020, conservative or progressive citizens tend to give positive reviews to the media because they tend to look for media that match their political orientation, and those with neutral political orientation tend to withhold positive reviews (Korea Press Foundation, 2020). In other words, it can have the effect that conservative citizens read the reports of the conservative media and reinforce negative perceptions about the energy transition, and progressive citizens think more positively about the energy transition through articles in the progressive media. In energy democracy, it is important to provide an opportunity to reflect on issues based on sufficient information. The stronger the political belief, the greater the confirmation bias, and the media reports will inevitably fail to fulfill the role of the public sphere. Media reports that verify and describe renewable energy issues through scientific data should be established as a practice, and a mature civic awareness to trust and look for these media reports is required.

4.4 Conflicts Related to Solar and Wind Power and the Role of the Media

According to the results of a study on media reports that investigated solar power, civil complaints, and conflict as keywords from 2006 to 2018, as the supply of solar power facilities increased after 2014, the number of conflict-related articles also increased (Park et al., 2019). In 91 related articles, the reasons for opposing solar power are reckless development 21 times, landscape damage 19 times, forest damage 15 times, environmental damage 14 times, electromagnetic waves 13 times, ignoring residents' opinions 12 times, speculation 11 times, light reflection 11 times, crop damage 11 times, livestock 9 times, soil spills and landslides 9 times, temperature rise 9 times, land price drop (property infringement) 8 times, outsiders taking profits 6 times, permission process conflicts 6 times, etc. (Park et al., 2019). Many articles reporting residents' objection to the solar power project include the voices of local residents who are concerned about environmental damage, but they do not include information on whether renewable energy facilities actually cause damage to the surrounding area and how to prevent damage. The principle of neutral reporting, which delivers information in a balanced way, tends to be overlooked.

For energy transition, citizens need to take responsibility for energy issues and consider alternatives based on balanced information. The media that provides biased or distorted information to spread discourse against the energy transition is a social problem. In some media reports, articles that correct misinformation circulating in society are reported. For example, Aju Business Daily's article titled <"Renewable energy expansion policy needs to be applied flexibly... Incorrect facts about 'solar power' must be corrected"> creates a highly readable image explaining that there are no problems related to water pollution, landscape damage, electromagnetic waves, glare, and radiant heat (Aju Business Daily, 2018). Today Energy's article titled < "[New Year Feature] Misconceptions and Truths about Solar Energy"> is based on data from the Korea Environmental Institute, National Radio Research Agency, Korea Energy Technology Evaluation and Planning, Korea Testing and Research Institute, and Solar Power Industry Association, and fact-checking in detail is conducted (Today Energy, 2019a). However, since these fact-check articles account for only a small proportion of all renewable energy-related articles, it is difficult for citizens to deliberate energy issues.

As for wind power, there are fewer articles that verify the authenticity of such issues through data compared to articles that convey complaints and criticisms from residents, such as media reports about solar power. For example, the Maeil Business News Korea's article titled <"It is certain that the fishing industry will be ruined..." Fishermen are angry at the ruling party's push for a wind power generation permit> only emphasized the negative stance on the bill exempting and simplifying the environmental evaluation of offshore wind power projects promoted by the ruling party. The article introduces the opinions of fishermen and fishermen who oppose deregulation because wind power is likely to have a negative impact on marine ecosystems (Maeil Business News Korea, 2021). An article highlighting the

opposition voices of the fishery industry may create a negative perception of wind power among citizens. In addition, the Korean Economy's article of <"A 'hate tax' should be imposed on wind power generation facilities"> defined solar and wind power generation facilities as hate facilities, and cited the report by the Korea Institute of Local Finance as a basis for that. In the actual report, the expression of hate facilities or hate tax did not appear, and research results were presented such that a local resource facility tax for wind power was required, and solar power was not a subject of study (Newstop, 2021). By changing the nuance while delivering professional information, a framework in which renewable energy facilities are hated is created.

The Korea JoongAng Daily wrote fact-check articles on wind power through the series <[Clean Energy Paradox, Solve with Facts]>. The results of the Korea Transportation University's domestic wind power generation complex noise impact study were introduced in the article. The six wind farms in Jeollanam-do and Jeju exceeded the frequency-specific standards in 5 out of 6 locations based on a separation distance of 250 m and 2 out of 4 locations based on a distance of 1 km, and 7 out of 15 private houses within 1 km of the power plant complex (Korea JoongAng Daily, 2020a). It can be seen that the serial articles were intended to provide balanced and professional information. According to the report by the Legislative Research Institute included in the article, vibrations and floating debris during offshore wind power construction may have some influence, but it is difficult to state that it has a serious impact on the entire marine ecosystem. The article included comments from an expert that new fishing could be formed in offshore wind farms, and the contents of an article from the Korean Society for Noise and Vibration Engineering that offshore wind power produces less noise than onshore wind power (Korea JoongAng Daily, 2020b). In addition, an alternative to energy democracy was suggested through an article covering a case of profit sharing with high satisfaction among residents by subsidizing electricity bills with profits from the operation of the Gasiri wind power plant on Jeju Island, and using the site rent for scholarships and welfare funds for the elderly (Korea JoongAng Daily, 2020c). The JoongAng Ilbo, despite being a conservative newspaper, strongly criticized the current government's nuclear phase-out policy, emphasizing the necessity of maintaining nuclear power, and at the same time provided balanced information on the strengths and weaknesses of renewable energy. Progressive media tend to report mainly on the positive aspects of renewable energy, but the Korea JoongAng Daily's fact-checking approach contributes to energy democracy in terms of providing information from various perspectives.

It acts as an obstacle to energy democracy by playing the role of representing the position of the existing energy system while highlighting only the conflicts in the energy transition process in the media. Currently, the biggest obstacle to the expansion of renewable energy in Korean society is the debate over separation distance regulations. From January 1, 2016 to May 31, 2021, 152 articles were searched for articles including separation distance and at least one of renewable energy/solar power/wind power. The word ranking according to the TopicRank algorithm provided by BIG Kinds was in the order of renewable energy, local government,

residents, Ministry of Trade, Industry and Energy, residential area, local government, ordinance revision, restart, ESS, and firewall installation. ESS, firewall, and separation distance are words that appear in articles related to solar or wind energy storage devices and are distinguished from other articles. A number of articles contained contents that local governments enacted separation distance regulation ordinances due to resident complaints or residents' opposition to the separation distance relaxation ordinance, in contrast to the Ministry of Trade, Industry and Energy's abolition of separation distance regulations for solar facilities. Because of concerns about safety, there are many cases where residents feel reluctant to install solar power facilities near roads and residential areas and file complaints.

5 Energy Complaint and Separation Distance Regulation

5.1 Current Status and Problems of Separation Distance Regulation

In the Renewable Energy 3020 Implementation Plan, out of the 63.8 GW capacity of newly expanded facilities, which aims to supply 20% of power generation with renewable energy by 2030, 36.5 GW (57%) will be solar power. Of this, 17.5 GW, which is half the amount, is from small businesses such as farms and cooperatives, so the acceptance of local residents will be the most important key. However, as the number of local governments that place separation distance clauses on solar power installations is gradually increasing according to resident complaints, it is acting as a major obstacle to the expansion of small and medium-sized solar power generation. This is because residents feel reluctance to install solar power generation facilities near roads and residential areas for safety reasons and file complaints. As of October 2020, the number of local governments that introduced solar power separation distance regulations as an ordinance increased from 8 to 128 compared to 2016, which is 57% of the total 226 local governments nationwide (Yonhap News, 2020b).

The ordinance stipulates that photovoltaic power generation facilities should be installed at a distance of at least 50 m to 1 km (average 331 m) for roads and 50 to 600 m (average 332 m) for residential facilities. Small and medium-sized solar power projects under 1 MW are most affected by these regulations, accounting for 81% of the total solar power supply capacity. According to Hanwha Q Cells, a solar power manufacturer, the number of inquiries about installing a 1 MW or less solar power plant has significantly decreased due to the separation distance issue (Bae, 2020). In South Korea, rents are high due to the high land prices, so it is difficult for energy cooperatives as well as business operators to find a site to build a small-scale solar power plant. To solve this problem, the government introduced the Small Solar Power Fixed Price Contract System (Korean-style FIT) to purchase electricity from photovoltaic power generation companies with less than 30 kW, farmer/livestock raiser/fishermen and cooperatives with less than 100 kW, at a fixed price for

20 years. It compensates for some of the losses. On the one hand, the government is supporting the activation of small and medium-sized solar power, but on the other hand, local governments are putting the brakes on the ordinance.

The reason why the separation distance regulation is particularly problematic is that each local government has different standards, which aggravates the difficulties of operators. The type of regulation by local government has a wide variation, ranging from 100 m at the shortest to 500 m at the maximum, and is set based on roads or residential areas. In fact, even though it is a suitable location for solar power generation, there are increasing cases of difficulties in development because it does not meet the separation distance standard. Reflecting this situation, the Ministry of Trade, Industry and Energy prepared the Guidelines for Location of Solar Power Generation Facilities in 2017 and presented the basic principle of "The head of a local government does not set and operate separation distance standards for solar power facilities." In the case of densely populated residential areas where more than 10 households live and there are other facilities such as roads and cultural assets, there is an exception that allows a maximum separation distance of 100 m. However, since the guidelines of the Ministry of Commerce, Industry and Energy are simple recommendations, they are not legally binding. In 2018, after the guidelines were announced, 68 local governments introduced regulations, the highest number ever. In addition to this, the Ministry of Commerce, Industry and Energy introduced a standard for giving points according to the degree of separation distance regulation in the evaluation of local governments to select targets for solar power generation projects from 2018 to 2019. In the case of the convergence support project, if the separation distance exceeds 200 m, a maximum of 3 points will be deducted. Considering that the average separation distance from roads in 128 local governments is 331 m and the average separation distance from residential areas is 332 m, most of them will receive a three-point deduction (Yonhap News, 2020b).

There are also frequent legal disputes between local governments and solar power companies over the separation distance regulation ordinance. In 2016, photovoltaic companies in Cheongsong, North Gyeongsang Province, filed a lawsuit when Cheongsong county office rejected the application for permission for a development activity for photovoltaic construction. In 2017, the Daegu District Court ruled in favor of the solar power company as illegal because the ordinance set excessive separation distance restrictions (Road 1000 m, residential and tourist attractions, etc. 500 m). However, in October 2019, the Supreme Court reversed and returned the lower court, saying, "As long as the legitimacy and necessity of regulating the separation distance of solar power generation facilities in Cheongsong county is recognized, it cannot be considered to be contrary to the purpose of the entrustment of the Act or contrary to equity." The Supreme Court held that the level of the restriction was not excessive and was within the discretion of the local government to form an ordinance that could be set autonomously according to local conditions. On the other hand, the city of Yeosu, South Jeolla Province, allowed the development of a 1800 m^2 solar power generation project on a site 200 m away even though the distance between houses was set at 300 m. As a result, the residents have filed an administrative appeal and are in dispute. As such, it can be seen that conflicts are

intensifying amid conflicting views and interpretations of ordinances related to separation distance restrictions between local governments, power generation companies, and local residents related to renewable energy separation distances, increasing the possibility of serious social waste (Kim, 2020).

5.2 Reasons for Introducing Separation Distance by Local Governments

According to the Ministry of Commerce, Industry and Energy, complaints from local residents are caused by concerns about light reflection from solar power generation facilities, increase in ambient temperature, and electromagnetic waves, but it was confirmed that there were no problems as a result of technical verification. In addition, there have been many cases where residents in the vicinity felt rejected and filed complaints due to problems in aesthetics and scenery when installing solar power (Ministry of Trade, Industry and Energy, 2017). In the past 5 years, a total of 2118 complaints related to renewable energy were received from 17 cities and provinces.

Complaints about noise, low frequency, and violation of the right to sunlight and views from renewable energy facilities accounted for the largest number with 1265 cases (35.3% of the total), followed by forest damage and environmental destruction with 844 cases (23.6%), land price drop and crop damage with 652 cases (18.2%), flood and soil leakage with 508 cases (14.2%) and preservation of cultural properties 314 cases (8.7%) (Chosunilbo, 2020). In the past 5 years, there were 498 solar and wind power complaints, accounting for 24% of the total complaints, 414 solar power and 84 wind power complaints, most of which were related to solar power. Regarding complaints, environmental destruction such as forest damage (271 cases) accounted for the highest proportion, followed by violations of the right to life and health (131 cases), land price decline and crop damage (84 cases), and concerns about disasters such as floods and soil leakage (53 cases), and other (63 cases) such as requests for preservation and compensation of cultural properties (Kwangjuilbo, 2021).

According to the results of a survey conducted for 82 local governments through a request for information disclosure on the reasons for setting separation distance regulations on the agenda, they were the prevention of reckless development and landscape damage (75, 91%), civil complaints (33, 40%), damage to mountains (16, 20%), land price increase and economic benefits of outsiders (4, 5%), concentration of licenses and permits (3, 4%), and environmental conservation from environmental damage from solar power (2, 2%) as a total of 6 types (Lim & Yun, 2019).

Local governments are sensitive to local complaints because the head of the local government is decided by elections. Therefore, there are cases where the head of a local government blocks the solar power plant project by putting in place various

ordinances and deliberation systems (Today Energy, 2019b). In order to start a solar power business, after permission for a power generation business (Article 7 of the Electricity Business Act), consultation with relevant ministries and local governments, and environmental impact assessment are conducted, followed by permission for development activities (Article 56 of the National Land Planning and Use Act). Even in the case of a project that has already secured a power plant license, it is impossible to proceed with the project if it does not receive permission from the underlying local government at the development activity permission stage (Kwon et al., 2020). In order to obtain a permit, it is necessary to obtain a permit at the discretion of the local government head or to persuade local residents with monetary compensation to obtain their consent. Even if the business operator has already compensated for the development activity, it causes loss of business profits or the cancellation of the plan because additional compensation is required to silence civil complaints. From 2016 to 2020, it was counted that only public enterprise projects that were canceled due to protests from residents amounted to KRW 1.586 trillion (8 projects, 278.5 MW capacity). In April 2020, the 563 billion won wind power project that Korea Southern Power had been promoting for over 10 years ran aground due to opposition from residents (Chosunilbo., 2020).

One of the reasons for these complaints is that the residents have the perception that most of the solar power projects are carried out by foreigners, and that all the big profits generated go out of the area and only the locals suffer damage. Haenam-gun county in Jeollanam-do was actively developing so that about 1% of the area applied for a solar power license. Due to the sudden increase in the solar power project, reckless development and damage to the landscape occurred, and most of the business operators were foreigners which caused land prices to rise, making it difficult for residents to secure farmland. Thus an amendment bill to strengthen the separation distance was proposed. Muan-gun county abolished the guidelines, which had been in operation since 2013, in 2017 at the recommendation of the government, but since then, the number of applications for solar power generation has surged to about 1000, so that the land price more than doubled and the side effects of complaints occurred, leaving them 100 m apart. The street ordinance was re-enacted (Lim & Yun, 2019).

In addition, due to fake news related to solar power, local residents take the separation distance regulation as a natural regulation (Environment Daily, 2020). Heavy metals such as lead, arsenic, chromium, and cadmium are not used in solar panels, and electromagnetic waves are less than microwave ovens used at home. However, residents still believe that heavy metal leaks and electromagnetic waves pose a threat to safety. There is also a concern about the light reflection of the solar panel. Since the solar module uses light to generate electricity, a special coating to absorb light is applied. Many residents have been affected by false information and exaggerated claims spread by the camp that links solar power supply with nuclear-free policies (Hankyoreh, 2020). According to an interview with a broadcasting company and the president of the Seoul Energy Corporation, in the process of promoting a photovoltaic power generation facility in the parking lot of Seoul Grand Park in Gwacheon, opposition from residents was met, and the city of

Gwacheon refused to allow it. A solar power plant with a capacity of 10 MW was planned by installing a roof like a shade curtain in a parking lot with a site area of about 165,289 m^2 and a parking lot that can accommodate about 6000 cars, but it was canceled because residents objected for reasons such as heavy metals, light reflection, and cleaning agents (TBS News, 2019). As such, complaints about fake news have a direct negative impact on the expansion of renewable energy nationwide.

6 Conclusions

Energy transition is a hotly debated social agenda in South Korea. If you look at the media coverage of renewable energy, which is a key factor in the energy transition, you can see that scientific and political factors interact. The number of renewable energy articles produced by major Korean media began to surge in June 2017 after President Moon Jae-in took office, reflecting the importance of the nuclear phase-out agenda in the government's policy stance. However, there were not only positive reports about renewable energy, and the media was also an actor playing the role of a medium through which negative discourses were delivered to citizens. According to a study that analyzed media reports on solar power in rural areas actively promoted by the government, negative articles accounted for a significant proportion, although were fewer than positive articles. In the positive articles, a lot of content related to resident participation in renewable energy projects, which is important in terms of energy democracy, was discussed, while in the negative articles, problems such as residents' opposition, environmental damage, and separation distance were raised.

The characteristics of positive and negative reports on renewable energy can be seen in more detail by comparing conservative and progressive media. Conservative media in South Korea produced a number of articles stating that nuclear phase-out is the wrong policy direction causing many problems, while progressive media tended to treat renewable energy as an important means of breaking away from the nuclear power system. In addition, the conservative media highlighted the occurrence of landslides caused by solar power or the damage to solar power caused by landslides, while the progressive media emphasized renewable energy and job creation as alternatives to fossil fuels to overcome the climate crisis. And in the case of television, the medium with the highest rate of use of news by citizens in South Korea, there were many articles linking renewable energy with negative images such as landslides and property damage. Some media have produced articles that provide statistically verified information that there is little correlation between solar power and landslides, but considering the overall volume of articles, it is difficult for citizens to access balanced information.

Conservative media produce contents that induce citizens to think negatively about nuclear phase out and energy transition, in the process of which information is distorted or deliberately excluded. As a representative example, the conservative media introduced the German media reports and presented the framework where

Germany acknowledged the failure of its nuclear phase-out policy through the article, and excluded the context in which the active energy transition was emphasized. In the article that interviewed a German expert, the limitations of renewable energy and the problem of nuclear phase-out were highlighted, and the benefits of energy transition and the possibility of South Korea were excluded. In addition, the conservative media circulated intentionally distorted information that nuclear phase-out is the cause of fine dust. And while citing the research report, a framework of hate facilities, an expression not used in the report, was given to renewable energy. Articles have been produced to spread negative perceptions about the energy transition. Some media have tried to correct the false information of the conservative media based on objective data through fact-checking reports, but there are far more cases of biased information than those providing balanced information.

Conflicting information about renewable energy has been circulating in society, and the political inclinations of citizens can influence how much such information can be trusted. Conservative citizens form or reinforce the position that the expansion of renewable energy and the nuclear phase-out are realistically problematic based on the reports of conservative media. Progressive citizens can become more sympathetic to the need for energy transitions to renewable energy as a solution to the climate crisis, as highlighted by the progressive media. In such a situation, in order to make a measured decision on the energy transition, it is necessary to have a mature civic awareness to verify the debate over renewable energy through data rather than accepting it according to a political position. Energy democracy can be realized when citizens trust and support the media that provides balanced information of energy issues.

It is an obstacle to energy democracy for the media to play a role in supporting the traditional energy system while highlighting only the conflicts in the energy transition process. Currently, the biggest obstacle to the expansion of renewable energy in South Korea is the debate over separation distance regulations. More than half of South Korea's population is concentrated in Seoul and Gyeonggi-do, and most renewable energy power plants are located in rural areas due to narrow spaces and high rents. However, local governments are going in the opposite direction to the government's policy stance by introducing various regulations related to separation distance. Of course, it is also true that many side effects are occurring due to the rapid expansion of solar power generation as the target is pursued without detailed legal guidelines related to the location of renewable energy power plants. While the location is regulated by citing the case where a solar power plant built in a mountainous area due to poor construction collapsed in heavy rain, these regulations sometimes force operators who could not find an installation site to build in a mountainous area. In addition, as most of the profits from large-scale renewable energy power plants went abroad, only local residents suffered inconvenience and did not receive great benefits.

The types of complaints from residents include noise, low frequency, violation of the right to sunlight and views, forest damage and environmental destruction, land price drop, crop damage, flooding, soil leakage, and preservation of cultural properties. Most local governments appeared to have referenced the policies of other

local governments, so they set separation distance regulations without knowledge and in-depth consideration of the characteristics of solar power generation facilities. In addition, since the head of local government is elected by voters, he is sensitive to local civil complaints. Non-standardized separation distance regulations can be broadly classified into four categories: distance regulation, location restriction regulation, and qualitative regulation. When all regulations and areas where installation is prohibited under the law are applied, the area that can be installed in some local governments is less than 1%. This shows that it is virtually impossible to install new solar power facilities, so it may be difficult not only to achieve the government's solar power supply target, but also to reduce greenhouse gas emissions for carbon neutrality in 2050.

Opposition to the location of solar power facilities has various reasons, such as concern for the environment, property damage, and economic and political interest. In order to expand solar power facilities, it is necessary to include various stakeholders in the development planning stage to improve social acceptance by resolving concerns about health and landscape and providing appropriate compensation (Park & Yun, 2018). The pathway for citizens to obtain information on issues surrounding renewable energy is primarily through media reports, but if the media provides distorted information, it can undermine the energy democracy required in the energy transition. Residents affected by biased reports about solar power or fake news about heavy metal leaks will file a complaint against the construction of a solar power or wind power plant near their residence.

However, in the case of renewable energy power generation projects, plans are frequently changed or stranded due to friction with local residents during the site selection stage. In 2016, 37.5% of all solar and wind power projects had their permits rejected or withheld due to protests from residents in South Korea (Chung, 2017). Improving local acceptance is an important issue in achieving the government's 2050 carbon neutral goal. Energy is closely related to domestic and foreign environmental issues such as climate change, and is intertwined with various interests throughout society and the economy. Since the existing producer-centered commercialization method can cause considerable social costs, project promotion based on communication between various stakeholders is required. In the process of promoting renewable energy projects such as solar and wind power, social conflicts are frequent due to misunderstanding and lack of understanding of renewable energy, unreasonable distribution of profits, and limited opportunities for participation. In such a situation, media reporting of facts is becoming increasingly important to improve social acceptance. It is encouraging that some media have recently created a team dedicated to climate crisis and are actively reporting on it. Energy transition and energy democracy can be realized more meaningfully when more forward-looking news reports on energy transition that can prevent the serious progress of the climate crisis are produced.

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China Mainland's Energy Transition: How to Overcome Financial, Societal, and Institutional Challenges in the Long Term

Jiaqiao Lin and Ang Zhao

Abstract The 2060 carbon neutrality goal announced by President Xi in 2020 sets the tone for the long-term Chinese climate policy. China has made considerable achievements in greening its energy mix in the past decade; solar power and wind power capacity both ranked top as of 2019. The current number of electric vehicles are, moreover, close to half of the total number of EVs in the world. However, there are conflicting signals from the coal power development plan and the increasing dependence on natural gas. There are many questions like these to be answered in a more reasonable and independent way. Discussion of China's energy transition will start with the energy mix and energy governance structure, supplemented by the interaction of energy transition with climate change and air pollution issues. In particular, the institutional setting for national energy and climate policy will be discussed in this chapter, followed by inclusion of key elements that impact the interaction between energy democracy and energy transition process. Civil society organizations and industrial associations have been playing an important role in achieving a decentralized renewable energy system and accordingly promoting energy democracy. Special focus will be placed on the renewable energy corporates' involvement in the transition.

Keywords Public participation · Carbon neutrality · Energy governance

The authors are contributing to this book chapter as independent energy and climate policy researchers.

J. Lin · A. Zhao (✉)
Beijing, China
e-mail: jiaqiao.lin@gmail.com; iambook.ang@gmail.com

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1 Energy Transition: Status and Sustainability

1.1 Energy System Profiles

China's coal dependence in the energy mix has been eased in the past ten years. In 2019, coal contributed to about 58% of China's total energy consumption (down from around 70% in 2000), followed by oil (20%), natural gas (8%), hydro power (8%), non-hydro renewables (7%), and nuclear energy (2%) (BP, 2020). China has put considerable efforts into diversifying its energy supplies in recent years, and the trend shows a clear pattern of depending less on coal while developing more shares of renewable energy; in 2011, the primary energy mix was a quite different picture, with 69% of coal, 18% of oil, 4% of gas, 6% of hydro power, 1% of nuclear power, and 1% of non-hydro renewable according to the *BP Statistical Review of World Energy* (2020). It is evident that non-hydro renewables, particularly wind power and solar energy, have increased their share from 1% to 7% in only eight years. The diversification of the energy system in China is attributed to a range of causes, such as energy security, tackling urban air pollution, and renewable energy technology development.

The enactment of the Renewable Energy Law (National People's Congress Standing Committee, 2021) in 2006 is the inception of energy transition of China. Effective wind power and solar energy technology dissemination from industrialized countries, the feed-in tariff (FiT), rapid economic growth and increasing energy consumption, colossal manufacturing scale and bases, and booming of renewable energy define the energy transition in the past fifteen years. There is no doubt that climate change is one of the concerns for China in embracing an energy transition strategy. Since the Paris Agreement reached in 2015, China has put climate change mitigation as one of its top priorities in a decarbonizing energy system.

China has quickly become the world leader in renewables investment and development. Energy transition, in the Chinese context, could therefore be seen as the process of transforming the coal-based energy system into a clean, low-carbon energy system. Oil, natural gas, nuclear, and renewable energy are all playing specific roles and positions in the transition process, and their shares in the energy mix may vary during the long transition pathway. China aims to achieve a low-carbon economy by transforming its energy system especially when President Xi made the announcement of carbon neutrality before 2060 at the United Nations General Assembly in September 2020.

China's coal power development has been in parallel with renewable energy due to the increasingly high energy demand from Chinese industrialization and urbanization. From 2000 to 2013, China's coal consumption nearly tripled, although a decline, which largely resulted from a government-dominated national campaign of fighting air pollution by limiting the use of coal in some most developed regions, followed after 2013. The air pollution in Beijing and other big metropolitan areas in 2011 and 2012 became a huge both environmental topic and policy issue. The Chinese leadership and the public recognized that the vast health cost of using a

coal-dominated energy system had to be addressed in order to pursue healthy economic growth in the long run. An urgent clean air policy was introduced, championed by the Law on Prevention and Control of Atmospheric Pollution and Air Pollution Prevention Action Plan (2013–2017), shedding light on a nationwide "coal cut" campaign. The action plan accelerated the energy transition pace and provided room for the renewables sector to penetrate further.

The energy transition policies remain strong in the 13th Five-Year Energy Development Plan (2021–2025) (National Development and Reform Commission and National Energy Administration, 2016). China would focus on several areas, including: limiting the consumption of fossil fuels; improving energy efficiency; promoting renewables and reforming the electricity system; promoting green manufacturing; raising energy efficiency standards in construction; promoting low-carbon transport; encouraging innovation of low-carbon technologies; strengthening "dual control" of energy (energy consumption and energy intensity); accelerating carbon emissions trading; developing green finance; promoting more environmentally responsible behavior; and so on.

The Belt and Road Initiative (BRI) was launched in 2013, aiming to support China's economic growth in the long term via various expanded and deeper trading and investing activities in foreign countries. This international strategy had channeled massive investments in infrastructure projects, many of which are relevant to fossil fuel power and transport construction and have significant climate impacts. These economic collaborations may bring growth and alleviate poverty in BRI countries while they could also result in the increase of CO_2 emissions, especially as the majority of BRI projects are carbon intensive. According to a research center affiliated with the Central University of Finance and Economics in China, the investment share in the energy and transport sectors under the BRI portfolio ranges from 57% to 73% in 2013–2020 (BRI, 2020–2021).

In 2020, the total energy investments along the BRI were about $20 billion, compared to $40 billion in investments in 2016; the majority of energy investments went into hydropower (35%), followed by coal (27%) and solar (23%) (BRI, 2021). The energy investment portfolio has changed after President Xi's pledge at the 2021 Leaders' Climate Summit, namely to prioritize "green" projects in infrastructure, energy, and transportation (GT staff reporters, 2021). Before the UNFCCC Climate Conference in 2021 (COP26), China pledged to stop building and financing overseas coal power projects, which was considered to be a "firehose turn-off" action of international public financing for coal (WRI STATEMENT, 2021). The policy move is attributed to not only China's growing climate ambition under the Paris Agreement but also the growing cost of coal power financing and the risks of coal becoming a stranded asset.

1.2 Lessons of Energy Transition During 2006–2020

Energy transition in China is a policy-driven process, especially from 2006 through to 2020 that spanned three Five-Year Plan periods. Every five years, energy-related polices were revisited and evaluated, and this process allowed policy makers to adjust their thoughts or propose new policy measures. The interactions of energy, air pollution, and climate policies are complicated. A rational, economically efficient, and socially just energy transition requires an open, long-term, and constructive policy dialogue.

Weathering the Massive Job Loss in the Coal Mining Sector

With the increasing share of renewable energy in the Chinese energy mix, there were several major challenges faced by the fossil fuel industry, especially the coal mining and coal power sectors. The declining demand for coal put huge pressure on local economies in the major coal bases; China's fourteen large coal mining bases and nine coal electricity bases are mainly located in the north and northwest (Strategic Action Plan, 2014), the less developed regions. Employment loss became a big issue for the local governments. Creating new jobs for the coal workers is crucial to the stability of the local economy and the social welfare of the affected coal communities. It has been especially difficult for the low-skilled labor force in the coal mining industry, as the transition from the previous mining skill-sets to other sectors is challenging.

A significant change of employment in China's coal sector was the large-scale "personnel diversion" plan in 2015 from the Heilongjiang Coal Group, the biggest of its kind in Northeast China, affecting over 100,000 workers. In early 2016, the State Council released a guidance policy on resolving excess capacity in the coal industry (State Council, 2015a), indicating that the employment issues in the coal sector require a plan at the national level. Indeed, in the following years, provincial government plans for resolving job loss were made and implemented accordingly. Since then, the size of the coal-related working force affected in 2015–2019 is between 1 and 2 million people.

Most of the coal mining and power bases are also the centers of China's renewable energy development. For those skilled technicians and professionals in the coal power sector, transition to jobs in the renewable energy industries may be relatively smooth. However, for the low-skilled workforce, finding new jobs is challenging. The outcome depends on whether local governments are better prepared for the incoming challenges and are training workers early on through skill promotion centers. Some fast-moving and open-minded governments have attracted new investments of the renewable energy industry as well as providing attractive policies for other non-energy-related businesses such as tourism (Lin et al., 2018). Looking into the "Just Transition" experience in other parts of the world, in the future, China

will need more consideration in achieving a dynamic, effective, inclusive energy transition.

The Ups and Downs of Renewable Energy Development in China

The FiT as an essential scheme to support renewable energy was enacted in 2006 after the Renewable Energy Law took effect, and lasted till 2018. This subsidy filled the gap of the cost between renewable and coal power and subsequently brought rapid installations of renewable power plants, which worked very effectively in the early-stage development of the renewable energy industry (Yang et al., 2021). However, as the costs of wind and solar power have been declining rapidly and the renewable energy subsidies increasing exponentially, China's government has gradually cut the rate of the FiT. A market-oriented auction or bidding mechanism has been introduced to finance new renewable energy projects since 2019.

In reality, the generosity of the subsidy level affects the pace of renewable energy installations. A "boom and bust" cycle can be observed. When a high FiT rate is expected, renewable booms take place and may cause a deficit of the funds used to pay for the FiT (Hove, 2020). When no subsidies are available or payments are delayed for a couple of years, busts appear before another cycle to come.

The logic of the FiT is that this subsidy scheme can nurture a new renewable energy market and be phased out when renewable power becomes competitive in cost compared to coal power. In 2020, wind power (onshore) and solar photovoltaic (PV) became competitive with coal power in terms of levelized cost of electricity (LCOE) (Bloomberg New Energy Finance, 2020). From the years of heavy subsidizing to an era of grid parity, China's renewable power development has experienced a steep learning curve.

Major Experiences from China's Energy Transition

China has gained great benefits in policy learning and technology dissemination of wind power and solar PV from European countries, especially Germany and Denmark, since China enacted its first renewable energy law in 2006. China plays a significant role in cutting the renewable technology cost especially wind and solar power, due to its vast industrial scale of manufacturing and cheap labor. Therefore, China's lessons in supporting renewable energy development may offer a meaningful roadmap for late-comers of pursuing renewable energy development.

Co-Benefits of Energy Transition Would Help to Build a Healthy and Low-Carbon Energy System

The policy measures to reduce coal consumption have huge co-benefits in abatement of carbon emission and reduction of other airborne pollutants. The rise of air

pollution mitigation-oriented policies in China since the early 2010s influenced energy reform and accelerated the energy transition process by burning less coal, using more natural gas, and raising the renewable power share. The energy transition has brought down the air pollution levels in big cities across the country and massive gains from a public health perspective.

Furthermore, the mitigations of climate change could bring a wide range of co-benefits from the social, economic, and technological perspectives. China's efforts to combat climate change has set a good example of aligning climate change mitigations with economic growth and public health in the long term. In the future, emphasizing the co-benefits of energy transition will continue to be one of the focuses for climate, air pollution, and health policies in China. China's experiences can encourage other developing countries to take more positive measures to build a low-carbon, healthy energy system.

Subsidy-Driven Policies Boosted the Renewable Energy Industry: Is It Switch-Off Time Now?

Before 2018, China mainly promoted renewable energy through the FiT by supporting renewable power projects through filling the cost gap with coal power. Since 2019, China has gradually been phasing out the subsidy levels according to the market development and technology maturity of renewables. This FiT policy, despite the drawbacks of funds deficit and fluctuating development mode, helped the build-up of China's fast-growing "new energy" industry in terms of the installed capacity of renewable power plants, the manufacturing capacity of wind turbines and solar PV, as well as related industries such as electric vehicles (EVs). China already has the world's largest renewable power installations, including wind power, solar PV, EVs, and energy storage capacity.

In 2019, China began to use the subsidy bidding model. The bidding results in 2019 show that PV tariffs have fallen by 30% compared to 2018s, while the 2020 results have fallen further by 20% on a 2019 basis (Cao et al., 2021). The cost of solar PV power generation in most regions is able to compete with new coal-fired power projects. Onshore wind power will soon get close; if the external cost of coal use is taken into account, the real cost of solar and wind power should be already competitive with coal power. These stunning achievements show that renewable power technology is gaining competitiveness in cost compared to fossil fuel power. The shift from the FiT to a market bidding scheme echoes the energy transition moving into a new stage.

Could Multi-Party Dialogues Promote a Quicker Energy Transition? Yes, But Not 100% Sure

Establishing the world's earliest carbon market in 2005, the European Union (EU) is without doubt the leading region in promoting climate action and energy transition.

The EU has been supporting China in carbon market pilots and the set-up of China's national carbon market since 2017. The EU announced the 2050 climate neutrality target in 2019 and was seen as the driving force of the carbon neutrality or net zero emissions plan worldwide, including the one China made in 2020 at the United Nations General Assembly, where President Xi of China announced the goal to reach carbon neutrality by 2060 (Froggatt & Quiggin, 2021). The energy transition in China is considered to move more quickly under this long-term climate target.

As for climate cooperation between China and the United States, a "honeymoon" period was seen after the two countries signed the joint climate declaration in November 2014; specifically, China pledged to peak CO_2 emissions around 2030. The bilateral agreement was widely considered as a catalyst to the deals of Paris Agreement in 2015 (Green Policy Platform, 2014). But the China-US cooperation in climate actions was disrupted by the Trump administration, who led the withdrawal of the United States from the Paris Agreement, while China's commitment was not changed and even became ambitious. These ups and downs of China-US relations in climate and trade had led to the judgment that China might want to take a leading role in climate change. China has been consistent in climate actions despite American presidential changes. Under the new economic, social, and geopolitical context, the climate collaboration of the two biggest carbon emitters in the world has become more uncertain if not vulnerable even though the Biden administration has taken a more engaging approach in the arena. The dynamics of the bilateral negotiations before the COP26 Glasgow exactly illustrated the inconvenient and challenging reality.

While the United States is considering the role of international trading in climate policy, the EU has been advancing the Carbon Border Adjustment Mechanism (CBAM) in the policy-making process. The EU is aiming to use CBAM as a competitive and pressing way to leverage the climate actions of its trade counterparts. However, China thinks the approach is apart from the cooperative mechanisms under the Paris Agreement. The future multi-party policy interactions among the three biggest economies will affect the global pace of decarbonization. The compromised outcomes from the COP26 might imply the future winding journey of climate cooperation among the three parties.

2 Challenges and Opportunities of China's Energy Transition Under the Carbon Neutrality 2060 Strategy

2.1 Transitional Models: China vs. Germany

Since 2006, China has established an industrial manufacturing foundation and energy policy for seeking energy transition in the long run. China's energy system has changed significantly during this period of time and the case of renewable energy growth is largely accepted around the world. In fact, China has mobilized a partly

successful energy transition with a top-down approach, which indicates the dominant role of government and state-owned energy companies.

Unlike China, Germany's energy transition follows a different pathway in terms of policy-making institutions and mechanism and citizens' participation in financing renewable energy projects. Germany's pioneering and successful legislations under renewables law in 1990 and 2000 are attributed to the dynamics of policy making related to a multi-party political system, general election, policy entrepreneurship, public opinion on climate change mitigation, and competition of various lobbying and interest groups (Stefes, 2016). The German energy transition experience, which harnessed great social, economic, and environmental benefits until the early 2000s, inspired China's actions in legislation and investment on renewables around 2005. Germany's experience in energy policy making is based on parliamentary legislation, which has successfully upheld the Renewable Energy Act 2020. This legislative process cannot be reproduced in China due to the difference of political and institutional settings. For result-oriented Chinese policy makers, democratizing a public participating in energy policy making, or energy democracy in Europe's and the U.S.'s experiences, has never been considered. A survey shows that the public awareness of climate change impacts, climate policy, and citizens' responsibilities for carbon emissions reduction is evident and the general public overwhelmingly support what the Chinese government has done in addressing climate change (Wang et al., 2017). There had been concerns among the Chinese public that taking a lead in international climate governance and actions may constrain China's economic growth. China's commitment to carbon neutrality by 2060 has largely marginalized that view because the pledge was from the top leadership. Public opinion plays a very limited role in China's climate and energy transition policy making. China's renewable energy policy making was mostly confined to a small circle of governmental agencies, government-affiliated think tanks, and leading companies in the field.

The other important lesson from Germany's energy transition is how energy cooperatives have financed a vast number of renewable energy projects, particularly wind farms and solar PV plants. In 2016, the total installed renewable power capacity in Germany was 100.3 GW_{el}, of which private persons and farmers owned 42% (Wettengel, 2018). In other words, private citizens are playing a central role during the progress of Germany's energy transition. Contrarily, a study (IEA, 2018) suggests that, in terms of ownership of undertakings (%) in the power sector, state-owned companies play a dominant role in China's power sector, from nuclear (100%) and power supply (95%) to wind power (78%) and thermal power (66%) in 2015. Private holdings play significant part only in solar power (44%) and hydropower (34%). Collective holdings only play a marginal role in the power sector ownership breakdown, from the highest in hydropower (6%) to the lowest in solar (1%). There is huge potential to attract private investments into renewable power development in order to finance energy transition in the long term.

Since 2015, China has entered into a new round of power sector reforms focused on market-oriented electricity pricing (State Council, 2015b). The reform aims to improve the economic efficiency of the power system and provides bigger space for

renewable energy development. This strategic reform also plays a role in addressing climate change and protecting the environment and public health. However, this round of power sector reforms has not demonstrated significant results so far due to the gap between the reform plan and its implementation, as well as the underdevelopment of market-based trading and pricing mechanisms (Alva & Li, 2018).

In the near future, there is low possibility that China will empower energy transition by opening political participation in decision making. But the ongoing power sector reform has the potential to make the sector more efficient, less carbon intensive, and more open to private and international investors. As China has set up a long-term climate policy target, structural changes in all social and economic sectors have to take place in order to transform the economic development model into a new model, in which economic activities are powered by zero- or low-carbon-emission energy resources. Obviously, it has become a very urgent issue to seek a much bigger scale of financial resources to sustain the energy transition towards 2060.

2.2 Where Is the Money Coming From?

The biggest challenge in energy transition facing China is how to raise sufficient investments in the decades to come. According to a study by the Institute of Climate Change and Sustainable Development at Tsinghua University, to meet the global 1.5-degree scenario by 2050, China's total primary energy consumption will be 5 billion TCE (tons of coal equivalent), with non-fossil fuels accounting for 85% and coal for less than 5%. In this scenario, the accumulated investment in the energy system from 2020 to 2050 is 138 trillion Chinese yuan; under the 2.0-degree scenario, the accumulated investment is 100 trillion Chinese yuan (Liu, 2020).

Apart from decarbonization of the power sector, the electrification of energy uses in the building, industry, and transportation sectors is the pathway of energy transition. The technologies of hydrogen and carbon capture, utilization and storage (CCUS) may play a supporting role in realizing carbon neutrality across the economy, especially in the industry sector. The future energy investment will largely focus on the power sector, including more distributed renewable power, and smart power grid. As shown in Table 1, there is a big gap in power sector annual investment between what has been accomplished and what must be done.

There are two methods to raise the funding. Firstly, based on German energy cooperatives model, the Chinese government may create a friendly policy and financial mechanism to encourage citizens' investments in distributed or decentralized renewable energy projects. Secondly, the power sector reform has to secure a fully functioning market-based trading and pricing power system. In addition, policy makers have to put carbon emission as a fundamental factor in the formation of the electricity tariff. Furthermore, Chinese consumers must pay higher electricity bills in the near and medium term in order to finance the mainstreaming of renewable energy including the power infrastructure to accommodate a higher ratio

Table 1 Power sector investment and share of GDP, 2011–2020 (Unit: billion Chinese yuan)

	Accumulated	Annual investment/share of GDP on average
1.5-degree scenario, 2021–2050	138,000	4600/over 2.5%[a]
2.0-degree scenario, 2021–2050	100,000	3300/1.5–2.0%[a]
2011–2015	3912	782/1.37%
2016–2020	4425	885/0.99%

Source: Calculated by the authors based on the data from the China Electricity Council, National Bureau of Statistics of China

[a]China has suspended issue the annual GDP growth targets in the newly published 14th Five-Year Plan (2021–2025). It is expected that China will experience much lower GDP growth than in the coming years. Thus, the share of GDP on average under the 1.5-degree and 2.0-degree Celsius scenarios could be higher than the numbers from the study

of renewables. In the long term, energy users may pay less in the middle of this century than in 2020 thanks to the renewable energy-dominated system.

2.3 *"Just Transition" for China's Energy System: Social Engagement and Workforce Livelihood of the Fossil Fuel Sector*

"Just Transition," focusing on developing greater clean power capacity in the energy systems while providing livelihood alternatives for the workforce of the coal power and coal mining sectors (Australian Council of Trade Union, 2016), has been a great and obvious challenge for China. China began to shut down the outdated, small, and inefficient coal mines since 2016, enacting a three-year ban on new coal mine projects, closing more than 4000 coal mines (Wang et al., 2016), and relocating around a sixth of the workforce employed in the coal industry (National Bureau of Statistics of China, 2015). China's energy transition, however, is very different from those of developed countries. Firstly, the Chinese coal industry is largely dominated by state-owned corporations. Secondly, the successful "Just Transition" cases in developed countries tend to be on a smaller scale and in longer process (Rock Environment and Energy Institute, 2017). Thus, it will be a rather complicated and difficult task for China to pursue a "Just" approach that can be scaled up and achieved over a relatively short time period.

China's employment diversion plan for the over-capacity coal sector started from 2016; financial aid, entrepreneur funds, and retraining programs were provided as diversion measures for the affected coal workers. For instance, according to different age groups, retraining is suitable for younger workers, while for those at 50 years old or above, early retirement arrangements were offered to alleviate the risk of unemployment.

Also, there are regional differences in the implementation of the resettlement policies. For example, some coal production bases in the eastern coastal areas have small production scales, and the local economy is relatively developed with a high

proportion of tertiary industry, making it easier for those coal sector-related workers to seek alternative jobs. However, for some resource-based cities in the north, northwest, and northeast of China, due to a less diverse and dynamic industrial and economic structure, it is difficult to shift jobs, which could be the instability factor of mass protests (Natural Resource Defense Council, 2017).

Some "Just Transition" measures could be implemented for retraining coal workers, especially those who have just started their careers. New public programs such as eco-restoration requiring the set of skills that those coal workers already have could receive funding from a tax on pollution and carbon emissions (He et al., 2020). To maintain fairness to the coal workers, financial support should be given to workers directly or through third-party organizations.

In the long run, the transition in China could be more challenging. On the one hand, carbon peaking before 2030 and carbon neutrality by 2060 may generate urgency for policy makers to take more ambitious measures to phase out coal sooner. In the U.S.-China joint climate agreement to cut emissions during the COP26 Glasgow, China plans to phase down coal consumption from 2026 onwards ("China and the U.S.," 2021a), which was actually stated first in China's energy sector Five-Year-Plan (2021–2026). This new bilateral effort may speed up China's actions in reducing coal reliance. On the other hand, the nation-wide power outages due to energy supply disruptive episodes in summer and autumn 2021 forced the policy makers to add more coal into the energy system to avoid a worse scenario in the winter of 2021 ("China Hurries to Burn More Coal," 2021b). Looking ahead to 2025, China's energy and climate policy makers may continuously face the dilemma of how to strike a balance between securing energy supply in the short term and achieving climate goals in the long term. A study on China's energy sector net zero roadmap by the International Energy Agency (IEA) suggests that China is capable of peaking its carbon emissions by 2025 largely by decreasing its coal use faster (IEA, 2021). The IEA's scenario on China is crucial for the global 1.5 degrees Celsius climate goal. To make this happen, it is more significant to ensure a "Just Energy" transition.

2.4 Best Practices at the Local Level (Hangzhou): Peer Pressure to Stimulate More Actions

Hangzhou, the capital city of Zhejiang Province on the eastern coast of China, is a rather developed city famous for its IT and manufacturing sectors. The demand for energy has been increasing in the past decade, but the annual energy intensity reduction was around 4.5%, and annual reduction of coal consumption around 870,000 tons during the 13th Five-Year Plan (2016–2020). There are some practices that Hangzhou can share with other Chinese cities, especially for energy efficiency improvement and the development of a new energy vehicles industry.

According to the research on Hangzhou's performance of the energy policy design, Hangzhou's energy efficiency policy measures are more mature and comprehensive than renewable energy; also, there is increasing evidence to show that Hangzhou is clearly shifting away from command-and-control to more market-based instruments (Guan & Delman, 2019). The energy efficiency improvement measures, from demand-side management, mainly include the re-structuring of industries, for example, to allocate the energy quota for tertiary industries by shutting down highly energy-intensive industries such as the pulp and paper industry, printing industry, and leather manufacturing industry. From the energy regulation side, Hangzhou has a good policy design and strong enforcement power, mainly through the energy quota system, process control, and energy auditing of enterprises. In the future, the focus of energy conservation in Hangzhou will shift from the industrial sector to the whole society, tapping more energy-saving potential of the building and transportation sectors.

Regarding the transportation sector, from 2016 to 2020, Hangzhou attracted the investment of more than 40 billion yuan in the new energy vehicles industry, including EV manufacturing, charging piles, batteries, and others ("Inventory of key construction projects," 2017). These developments in EVs are in line with the Hangzhou 2022 Asian Games; the major facilities for the Games are located in Xiaoshan district, which released the ambitious goal of achieving "zero emission" for transportation through using renewable energy-powered EVs and hydrogen fuel cell vehicles.

In terms of renewable energy development, although Hangzhou has limited space to develop solar PV or wind power, Zhejiang Province as a whole is moving forward quickly. By the end of 2020, the number of provincial grid-connected decentralized PV projects exceeded 230,000, with a total capacity of over 10 GW ("Zhejiang's economy is in good shape," 2021).

3 Conclusion

China's energy system is transitioning from being heavily coal dependent to being renewable energy driven. The strategy was endorsed by the central government in mid-March 2021 ("Xi Jinping pushes," 2021). The evidence in the past decade shows that non-hydro renewables, particularly wind power and solar energy, has increased its share by over six-fold, and coal's share in the primary energy mix dropped from around 70% in 2000 to less than 60% in 2019. The transition was initiated by climate policies focusing on providing incentives to renewable energy development, and then supplemented by clean air policies and actions. State-owned energy groups are the backbone of the transition, as they have contributed to the large-scale solar PV and wind power development. Under China's unique political economy, the command-and-control mode of energy policy proved effective in China's energy transition process. Renewable energy manufacturing, energy efficiency services, the downstream electric vehicles, and power storage industries are

subsequently nurtured. However, China's energy transition still faces a variety of challenges such as financial resources, livelihood of work in the coal and other fossil fuel industries, and limited room for public participation in policy making.

Germany's energy transition has inspired China's early actions in legislation and investment in renewables power. Despite less public involvement and more state-financed renewable projects, China has produced remarkable outcomes in terms of the renewable energy installation and manufacturing capacity. The development model of China's energy system under the long-term carbon neutrality goal will take shape soon while a massive number of opportunities are seen in the energy transition process. Other challenges are also obvious such as the financing mode of the transition, the coal phase-out process, and power market reform. Even though public participation in Chinese energy transition remains limited, more market-based electricity pricing resulting from the ongoing power sector reform will create some opportunities for private business and individuals to become more involved. Some leading cities and regions in China have moved forward at a quicker pace. Local open-mind governmental agencies, active business sectors, and the more responsible public may stimulate China's energy transition in the decades to come.

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Energy Democracy and Energy Transition in Taiwan

Tze-Luen Lin and Fang-Ting Cheng

Abstract The issue of post-carbon energy transition has received growing attention worldwide for several decades. Being one of the top 20 CO2 emitters in the world, Taiwan embarked on energy transitions in 2016 as a key strategy to address the climate change issue as well as to enhance its energy security. Moreover, it also plans to phase out nuclear power by 2025. The overall policy goal focuses not only on the energy technology shift, but also industrial structure transformation and environmental benefit improvement. This chapter outlines the energy transition from a multilevel governance perspective to explore prime movers, and the changing power relationships between central and local governments in implementing the transition in Taiwan. How has the current energy system been protected by the status quo? In what policy agendas has the energy transition been addressed through the current energy structures? What are the major obstacles for governments to achieve more effective energy governance? What institutional transitions might be required? This Chapter discusses why the political dimension is critical when it comes to post-carbon energy actions and how energy governance adapts to these challenges.

Keywords Energy transition · Climate change · Multilevel governance · Energy governance · Energy democracy

T.-L. Lin
National Taiwan University, Taipei, Taiwan
e-mail: tllin@ntu.edu.tw

F.-T. Cheng (✉)
Institute of Developing Economies, JETRO, Chiba, Japan
e-mail: fangting_cheng@ide.go.jp

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1 Introduction: The Paris Agreement Revealed Trends of Energy Transition

The historic Paris Agreement was finally adopted at the end of 2015, thanks to the joint efforts of the United States, China, and France. The Paris Agreement will replace the 1997 Kyoto Protocol as the legal instrument for addressing global climate change. The Paris Agreement is a typical product of international political compromise on climate change, which declares that the issue of climate change is no longer just a scientific warning, but has become a political reality that governs the global environmental regime.

One of the important consequences of the Paris Agreement is that it is the first global agreement that requires both industrialized and developing countries to reduce their greenhouse gas emissions. Its goal is to limit global warming to well below 2, preferably to 1.5 degrees Celsius, compared to pre-industrial levels by the end of this century (UNFCCC, 2015). In addition, each country is required to conduct a review and propose new carbon reduction commitments every 5 years to accelerate the pace of carbon reduction.

Notably, there is a key message implied by the Paris Agreement: in order to achieve the greenhouse gas reduction target, the current energy structure with high carbon emissions must be fundamentally restructured. Energy transition has become the most important keyword of the Paris Climate Conference and a key issue in global climate governance. Energy transition aims to change the energy production and supply model, which is dominated by nuclear energy and fossil fuels such as coal and shale gas, and to reduce the reliance on fossil fuels by increasing the proportion of renewable energy, enhancing energy conservation, improving energy efficiency, and adjusting the industrial structure.

However, energy transition involves the reconfiguration of the energy production, transportation, and distribution system, which should not be purely a technical issue. Instead, energy production and policy directions should be considered within the framework of the local social structure and ecological environment. Given that fossil fuels and nuclear power are controversial energy sources, only through the practice of energy democracy can we bring about economic and social transformation through energy transition. In this way, our goal of developing a clean energy supply and energy democratization can be achieved on the basis of energy justice (Lin, 2016).

2 Implication of Energy Democracy

The concept of “energy democracy” that underlies this chapter was first conceived during the Climate Justice Movement and is based on the fundamental reflections of democratic politics, which emphasizes that the public affected by decisions should have the right to participate in collective decision-making (Kunze & Becker, 2014).

By definition, energy democracy means "ensuring that everyone has access to sufficient energy. However, the energy must be produced in such a way that it neither harms nor endangers the environment or people. Concretely, this means leaving fossil fuels in the ground, socializing and democratizing the means of production, and changing our attitude towards energy consumption." (Camp for Climate Action in Lausitz, 2012). This discussion highlights that the process of energy transition should be democratic in practice, incorporating the concerns and interests of all parties from the beginning stage of energy transition, in an attempt to achieve a state of "common good."

Kunze and Becker (2014) break down the concept of energy democracy from the perspectives of democratization, ownership, surplus-value production, and ecology. First, the process of energy transition focuses on the right to broader public participation. This direct democracy initiative emphasizes not only political participation opportunities and procedures, but also democratic practices from the economic aspect. Unlike traditional fossil fuel energy systems, which are often dominated by top-down authoritarian governance, the decentralized nature of renewable energy technologies requires the practical impetus of energy democracy to support their operation. The selection of renewable energy sites and electricity price levels require the participation of consumers and local residents, as well as the consent of neighborhoods. The public or cooperative members can also share decision-making power to ensure that the interests and concerns of all stakeholders are taken into account. For example, in the face of energy poverty, the democratic model is more likely to account for income inequality by adopting an ability-to-pay pricing strategy such that basic energy needs are met.

Secondly, in terms of ownership, energy democracy emphasizes the shift from the production to the consumption side, from the individualistic, depoliticized, and privatized form of the past to the cooperative, political, and public form of control. However, this is not an attempt towards statism. Many public power utilities have had problems in the past, such as the conflict between the will of the local population and the privatization, distribution, and development of power supply. Moreover, energy production is not always in line with ecological benefits. In recent years, many innovative models have been developed in Western Europe and East Asia, attempting to overcome these shortcomings with new forms of ownership and operation, mostly in the form of energy cooperatives and public utilities (e.g., city power companies), and semi-public organizations.

Thirdly, the proximity of energy democracy and renewable energy is also generating positive impacts such as value creation and employment. It is pointed out that, compared with fossil fuel energy production, the free cost of renewable energy materials (e.g., solar energy, wind power) can reduce capital outflows. Accordingly, the surplus can be fed back to local public facilities or other industrial investments and facilitates local sustainable development. At the same time, the expansion of renewable energy will, directly and indirectly, promote related employment opportunities without imposing negative effects on the environment and ecology.

Finally, in questioning and reflecting on the traditional view of economic development, energy democracy criticizes capitalism's focus on profit maximization,

which has created a growth model of mass production and encouraged mass consumption, resulting in a long history of rising negative effects on the environment, ecology, and social life. Energy democracy echoes the concept of a "post-growth society." It advocates reflecting on the pace of growth, prioritizing ecology and the well-being of the people, and promoting the spirit of reducing pollution and consumption, as well as self-sufficiency. This concept further advocates care for environmental sustainability and energy transition, actively promoting renewable energy to replace highly polluting fossil fuels, and even using the surplus to support the development of ecological diversity and organic agriculture or to consider the coexistence of energy production processes and local ecological protection. At the same time, through public participation, local residents can organize and manage their own energy demand, which can lead to a self-sufficient electricity production mode and change the traditional mode of encouraging unlimited growth of energy use. Through the diffusion of energy democracy practice, our society can address the challenges of fossil fuel and nuclear energy use and deepen the goals of the energy transition.

3 Three Levels of Energy Democracy: From Central, Local to Community

As the above concepts suggest, the most important aspect of the energy democracy practice is the attention to decentralization and how to implement this model. As Sweeney argues, energy democracy creates fair and just energy that meets contemporary needs, which means that labor, community, and public input must be included in the decision-making process (Sweeney, 2012). From the perspective of energy democracy, this chapter argues that energy transition can be analyzed in terms of decentralization processes at three levels: central government, local self-government units, and communities (Lin, 2018).

At the central level, energy transition should be free from excessive entanglement of interests between political parties, politicians, and corporate consortia in the process of energy policy formulation. For example, in the energy transition decision-making process, multiple stakeholders should be included, and various voices should be valued as the basis for the final decision through a deliberation process. This policy design, which embodies energy democracy, allows energy policy to move away from a top-down government planning approach and instead provide momentum for government planning through the participation of private enterprises and citizens, making the transition process smoother.

At the local level, the energy system has been transformed from the previous centralized system to a decentralized one. A decentralized energy system avoids excessive energy consumption by replacing the mass-production mode of centralized power plants with decentralized and interconnected small-scale power generation units. In addition, to avoid large financial groups' domination over large power

plants and to stress the importance of renewable energy, local governments can also propose different incentive mechanisms to allow the public to participate in the energy transition. For example, in terms of energy utility property rights, local governments (e.g., provinces, counties, cities) could be entitled to use and control the power grid as a public utility, or establish a platform to coordinate conflicting interests and actively address the role of labor unions.

At the community level, energy transition is gradually taking place in the context of the global climate crisis. Although the backgrounds and operational practices of energy transformation may differ among communities or local residents, what can be seen in common are the diverse participation patterns of local residents, the active pursuit of energy autonomy, and the social innovation of collaborative efforts to echo the development direction of energy democracy. Specifically, community-based small-scale energy organizations, including energy cooperatives and publicly owned local energy companies, can be good examples.

The new wave of energy transition in Taiwan in recent years can also be examined at each of the three levels in terms of the implementation of energy democracy. It cannot be denied that alongside energy transition, Taiwan still faces different degrees of conflict and discomfort between the central government, local self-government units, various interest groups, local residents, environmental NGOs, and other stakeholders. Just like other countries, Taiwan's energy transition is still a work in progress, which takes time to improve.

The following chapter focuses on the practical implications of energy democracy, and reviews the specific policies and practical highlights of energy transition in Taiwan in recent years at the central, local, and community levels, as well as identifies the current difficulties, challenges, and possible ways to address them.

4 Practice of Energy Democracy from Three Levels in Taiwan

4.1 Key Central Energy Transition Policies and Legislations

Although Taiwan is not a member of the Paris Agreement, it has voluntarily submitted its own commitment targets to the United Nations Secretariat, demonstrating to the world that it is actively working to reduce greenhouse gas emissions (Cheng, 2019). In 2009, under the former government of Ma Ying-jeou, a feed-in tariff (FIT) system was introduced to promote renewable energy through the amendment of the Energy Management Act and the enactment of the Renewable Energy Development Act. FIT is a system under which the government guarantees that electricity generated by power companies and other private facilities using only renewable energy sources will be purchased at the same price during a certain period of time. In 2015, the Greenhouse Gas Emissions Reduction and Management Act was passed, and in the same year, following the adoption of the Paris Agreement, the

country began taking actions submitting to the United Nations its 2030 emissions target, which was to reduce emissions by about 20% from the 2005 levels.

President Tsai Ing-wen of the Democratic Progressive Party (DPP) has announced a "sustainable energy policy" that encompasses energy transformation, mainly through the elimination of nuclear power, improvement of power generation efficiency, and promotion of renewable energy, as well as energy conservation, power generation and storage, and other energy technology innovations. The President has also consistently emphasized the promotion of a nuclear power-free policy since taking office. Immediately after coming to power in 2016, the government declared that it would always participate in actions to address climate change under the provisions of the Paris Agreement, and its own measures are being considered at various levels, from central government to local governments (Tsai, 2016). The government also established the Office of Energy and Carbon Reduction (OECR) under the Executive Yuan to coordinate between related ministries and agencies, and revised the Electricity Act in January of the same year. This amendment to the law, which stipulates that all nuclear power plants must be shut down by 2025 (Article 95), is an attempt to eliminate nuclear power. Although the Article 95 amendment was abolished due to the result of the November 2018 referendum, the Tsai administration's goal of denuclearization has not changed.

On the other hand, in accordance with the Energy Management Act, the government promulgated the Guidelines of Energy Development in 2017 and formulated the Energy Transition White Paper to set out specific policy goals and objectives. The Energy Transition White Paper was developed in a deliberative manner, creating a collaborative atmosphere between government, localities, and citizens through a citizen participation model. The main objective is to develop an action plan for building a non-nuclear country and achieving energy transition by 2025. The White Paper on Energy Transition was developed through a three-step community participation process, including the first stage "Preparation Meetings," the second stage "Collaboration," and the third stage "Citizen Dialogue." The participants include experts from various fields such as industry, government, academia, research, and civil organizations, as well as the general public. After 3 years of deliberation, the White Paper on Energy Transition was released by the government in November 2020, which set out the key promotion plans for each area of energy transition (The Executive Yuan, 2020).

With regard to the elimination of nuclear power, at present, renewable energy sources account for a very small percentage of the total power generation, and thus cannot possibly provide sufficient power generation to replace nuclear power, forcing Taiwan to rely on fossil fuels. Therefore, Taiwan has been increasing the ratio of natural gas, a low-carbon fossil fuel with an electricity emission factor for carbon dioxide (kgCO2/kWh) about one half that of coal. In recent years, Japan and Germany, which have also made a commitment to phasing out nuclear power, have been switching to natural gas, but they are facing problems such as destruction of the ecological environment, trade balance, and security concerns. Taiwan is no exception to this trend, and is faced with the need to take effective measures.

On the other hand, the goal for renewable energy by 2025 is to increase the share of renewable energy in the country's power generation equipment from 9.5% in 2016

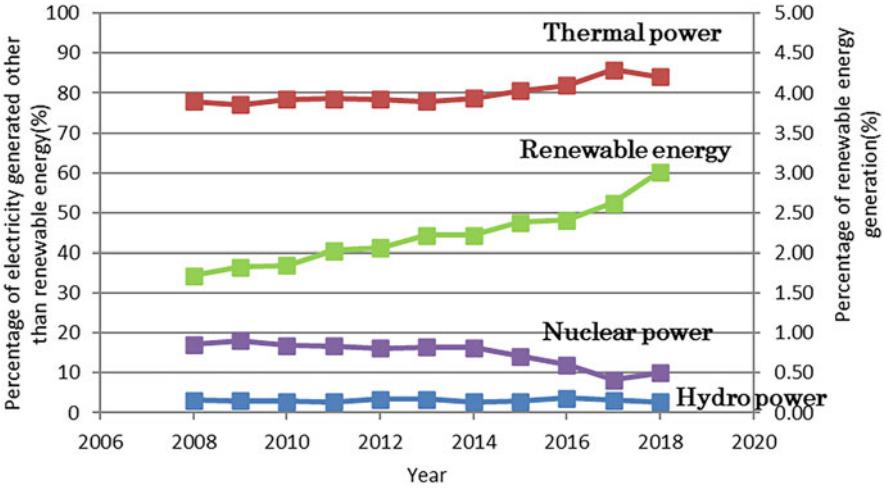

Fig. 1 Change in the Ratio of each Power Generation to the Total Power Generation in Taiwan. Source: Data was retrieved from the Bureau of Energy, Ministry of Economic Affairs. Figure was compiled by the authors

to 20%, while reducing the share of nuclear power to zero. In the most recent decade, we can see that nuclear power has actually been reduced and renewable energy has been increased (Fig. 1).

As for solar power, the Renewable Energy Development Act was amended in 2019 to set a very ambitious target of 20 GW of solar power by 2025. This 20 GW will consist of 3 GW of the rooftop type and 17 GW of the ground-mounted type (hereafter referred to as the "ground type").

Under the Tsai administration, the solar power capacity targets that have been set out so far are gradually being met, with a total of 4.3 GW as of the end of 2019. However, due to land use problems, the target after 2020 has not yet been met, and we need to see future development to achieve the target of 20 GW by 2025.

As for offshore wind power generation, the first Taiwanese offshore wind farm, Formosa I, was completed in October 2019 and began commercial operation at the end of the same year in the waters about 2 to 6 km off Miaoli County in northwestern Taiwan. Offshore wind power is currently being developed with strong government backing, and a total of 5.5 GW of offshore wind power is planned to connect to the grid by 2025, of which 3.8 GW will be reviewed by the government for eligibility. The remaining 1.7 GW will qualify for development based on a bidding system. The government's enthusiasm for offshore wind seems to be very high, as it has announced that it will increase its installed wind power capacity by another 10 GW over the next 10 years, from 2026 to 2035.

As we continue to vigorously promote renewable energy policies that have a good image, we must not forget that there are various risks involved in reality. In addition to the risk of trade deficits due to increased imports of natural gas, a substitute for coal, and the destabilization of energy supplies due to the dependence on resource

imports, there are also concerns about the impact on the natural environment and ecosystems. Taiwan is going through a major debate over natural gas power generation and ecological environmental protection, resorting to a referendum on it in 2021. Also, the overexploitation of forest and agricultural land for the purpose of developing ground-type solar power generation, and the negative impact of water-based solar power generation facilities installed in reservoirs on aquaculture and fisheries have been pointed out. Furthermore, offshore wind turbines are no exception to this rule, and are strongly opposed by environmental groups because of the noise generated during construction and operation, and the loss of habitats for marine life (e.g., bottlenose dolphins) due to frequent shipping traffic.

4.2 Local Governments and Supply-Chain Build-Up

Various local governments have welcomed the current energy conversion policy, expecting it to have a ripple effect on local development and create jobs (Cheng, 2020a). New Taipei City and Taoyuan City, for example, have made energy transition and climate change a high policy priority, and have developed region-specific programs to save electricity, conserve energy, and deal with flooding and torrential rains. However, there are challenges, namely concerns about the impact on the ecological environment and existing stakeholders, and governance. For the latter, a permanent full-time organization, recurring budget, and full-time staff are essential, and in recent years, each city has been implementing organizational reforms such as the establishment of specialized departments.

New Taipei City, which has the largest resident population, established a new department called the Green Industry Division under the city's Economic Development Bureau in 2014, and has been trying new initiatives involving NGOs, civic groups, and industries. For example, since 2015, the city has been promoting an annual "Energy Conservation Award," aiming to educate citizens and raise awareness in a competitive manner.

In addition, in 2018, Taoyuan City established a dedicated organization, the Green Energy Promotion Office, which is taking advantage of its strength as Taiwan's largest industrial city to promote electricity and energy conservation in large-scale factories, develop megawatt solar power generation including floating solar power generation, and introduce rooftop solar power generation. These efforts require the cooperation not only of the factories, office buildings, and commercial facilities where the panels will be installed, but also of various organizations such as certification bodies and electric power companies, and the local government needs to act as a coordinator to facilitate coordination among the various stakeholders.

On the other hand, the industrial world is positively viewing the energy transition as a business opportunity. Thanks to policy backing, solar and wind power have made remarkable progress in recent years, and by 2019 the installed capacity of these renewable energies will be about 13 times that of 10 years ago, accounting for 8.9% of the total (Fig. 2). In particular, ground-type and rooftop-type solar power

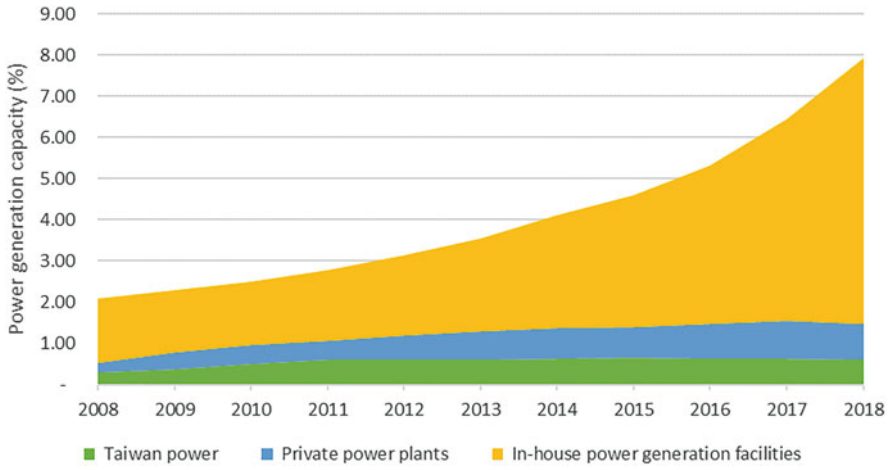

Fig. 2 Renewable Energy Power Generation Capacity (2008–2018). Source: Data was retrieved from the Bureau of Energy, Ministry of Economic Affairs. Figure was compiled by the authors

generations are being heavily promoted. In addition, the Taiwan Strait has one of the world's highest offshore wind power generation potentials, and it is estimated that the scale of investment in offshore wind power alone will reach 900 billion Taiwan dollars (about 30 billion US dollars) by 2025.

However, the investment in offshore wind power shows that foreign companies, including those from Denmark and Canada, are expanding their investments, highlighting the reliance on foreign experience and technology. This issue has been attracting attention within the Taiwanese government, and the "domestic industrial effect" of wind power, which requires that construction projects be ordered from domestic suppliers and that components be procured domestically for the development, has become a necessary condition for the government's selection process (Cheng, 2020b). While domestic demand is expected to grow in the future, we cannot deny the concern that this domestic industrial effect will create new tensions between the government and domestic and foreign companies.

4.3 Community Practices: Energy Cooperatives, Business Innovation, and Green Energy for the Common Good Model

In recent years, Taiwan has been promoting an energy cooperative, which is a typical example of energy democracy in action. An energy cooperative is a power plant that is built and operated by the local government and community, which take the lead in investing resources, including people and money, and acquire a certain level of ownership. In Japan, it is also called "community power," but this "power" does not

only refer to electricity, but also possibly to the "power" of the people, in the sense that they aim to become independent in their energy consumption by relying on local natural resources instead of relying on electricity generated by the mass production and mass consumption of fossil fuels.

The term "energy cooperative" encompasses a wide range of stakeholders (e.g., solar power system builders, developers such as associations and NGOs, residents and communities, local governments, banks, and lenders, etc.) and business models (Chou et al., 2019). In this chapter, three cases are discussed. The first is the Green Advocated Energy Cooperative, which was established by the NGO Homemakers Union Consumers Co-op (similar to Japan's consumer cooperatives) and the Homemakers Union Foundation (Cheng, 2020c). The Green Advocated Energy Cooperative is developing an electricity sales business using the rooftop space of its members' homes. All you need to do to provide a rooftop space is to become a member of the Cooperative with an initial investment of 10,000 Taiwan dollars (approximately US$ 350) per unit and up to 100 units (Chen & Huang, 2018). Once the use of the rooftop space is decided, the Cooperative will receive revenue from the sale of electricity for 20 years, handling the contract with the power generation company and all administrative procedures with the local government and the national Taiwan Electric Power Company, which owns the power transmission and distribution network. On the other hand, the residents who provide the rooftop space earn rental income from the Cooperative, but there are other benefits such as lowering the temperature of the building by installing solar panels and preventing the deterioration of the rooftop due to direct sunlight.

The Homemakers Union Consumers Co-op and the Cooperative are popular because they directly interact with the residents and owners who provide the rooftop space, and the residents' awareness of environmental protection and renewable energy is further enhanced through their own power generation experience. However, the number of residents who are willing to actively contribute to the environment is limited, and the scale of the project (power generation) is not large.

The second, in contrast, is the "Sunny Founder," which encourages the general public to participate in renewable energy generation projects. Sunny Founder has created a new business model, providing a platform where ordinary citizens can purchase solar panels for as little as 15,000 yuan (approximately US$535) each (Sunny Founder, 2020). If funds are raised, they can rent rooftop space from landlords to generate electricity and earn profits, from which they can pay rent for the space and give back to investors. In addition, donations are accepted to help companies promote their social responsibility (CSR).

The business has received a widespread response due to the ease of participation and profit collection, and in less than five years since its launch in 2016, it has accumulated nearly 250 operation cases. According to the official website, as of January 2021, the transaction amount has exceeded 510 million Taiwan dollars (about 1.9 billion yen) and the number of participants has reached more than 20,000. Therefore, it has been widely covered in the media as a success story and is expected to grow in the future. Nevertheless, since the investors do not have to be the owners of the solar panel installation sites, it remains to be seen whether Sunny

Founder will be able to raise people's environmental and energy awareness at the community level and deepen their attachment to the region.

In addition to the two models of citizen power plants mentioned above, the "energy welfare" perspective, which aims to ameliorate energy poverty, has been gaining attention in recent years. For example, the One Less Nuclear Power Plant (OLNPP) project in Seoul, Korea in 2012 emphasized the basic right of citizens to use energy and listed alleviating energy poverty as one of the policy objectives. In Taiwan, GRINNODOT, a company established in 2015 to protect the energy disadvantaged, has proposed an innovative approach of energy public interest based on the social enterprise model. Their plan is to combine corporate and general public donations to raise funds for building solar power systems for disadvantaged groups (e.g., nursing homes, childcare centers, social welfare organizations, etc.), and to provide them with amplified and stable assistance for up to 20 years through a renewable energy power purchase system. At the same time, during system construction and subsequent maintenance, GRINNODOT will also enhance local employment opportunities, introduce energy and environmental education practices, and derive more value from Green Empowerment (Lin, 2016).

Importantly, the Green Empowerment model can produce mutual benefits in four ways. First, the donor companies/individuals will not only save on tax, but also have their resources amplified to 1.6 to 1.8 times through the solar energy sales mechanism; second, the doner will receive stable assistance that is amplified and lasts for 20 years (via a renewable energy billing contract); moreover, on the environmental side, the installation of renewable energy systems can help expand the carbon reduction benefits of green energy and mitigate greenhouse gas emissions; finally, the green energy industry itself can be accompanied by applied markets. Lastly, the green energy industry itself can grow steadily with the market. In conclusion, GRINNODOT not only provides an alternative channel for solar power development, but also strengthens the collaboration between the private and corporate sectors and creates a green energy sharing economy, which can be considered as an innovative business model with a focus on energy welfare.

5 Conclusion

The purpose of energy democracy is to ensure that the public has access to sufficient energy, to solve the problem of energy poverty, to emphasize the potential harm of energy production to the environment, ecology, and human beings, and to change public attitudes toward energy consumption.

The significance of the energy transition is not only the change from fossil fuels to renewable energy, but also the shift of the energy system's ownership from the private sector to a collective, public, or democratic control. The decentralization of renewable energy resources and production methods in communities provides the basis for energy democratization and decentralized resource development.

In this chapter, the development and practical experience of energy transformation in Taiwan is analyzed at three levels from the perspective of energy democracy. To summarize, Taiwan has been refraining from fossil fuels and nuclear power and actively developing renewable energy and natural gas in recent years. This practice involves not only the adjustment of energy types, but also the transformation of industrial structure, the legal system, lifestyle, and even the change of exemplary values. At the central, local, and community levels, it is observed that various actors are attempting to achieve decentralized goals and practices, including reforms in the way the central government makes energy policy decisions, local governments taking the initiative to propose energy transformation goals and governance practices, and innovative energy development models for communities and local residents.

In particular, Taiwan has invested a significant amount of money and effort in the construction of renewable energy systems from the central government, local governments, and even the private sector. In addition to joining in the global trend of decarbonization, Taiwan has focused on replacing fossil fuels with renewable energy sources such as solar and wind power and has also promoted a sustainable energy economy based on local, community, and even residents, with a more equitable distribution of wealth and power. Such a renewable energy model offers a more ecologically friendly, community-economic, and local job-creating alternative to current energy sources.

However, as discussed in this chapter, there are still many human and ecological issues and bottlenecks in the energy transition. More models and approaches need to be developed to incorporate the views of various stakeholders and to enhance communication and understanding between them. Particularly, the signing of the Paris Agreement mirrors a global revolution centered on low-carbon development in the face of the climate crisis and energy security challenges; meanwhile, energy must be seen as a public good and a basic right. The energy transition should be a comprehensive review of energy production, consumption, distribution patterns, and energy values. Constructing a political framework for a green energy transition, creating legal norms, social and ecological checks, financial incentives, and infrastructure that is conducive to a decentralized energy structure will be the key challenges in implementing a democratic energy system.

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Japanese Green New Deal to Bring Happiness and Prosperity

Jusen Asuka

Abstract In Japan, Prime Minister Suga announced in October 2020 a new goal of "carbon neutrality by 2050." However, the energy/climate policy issued by the government after the announcement did not show any major changes in the current targets or policies. At this rate, there is a very high possibility that "carbon neutral by 2050" and the current "46% reduction by 2030 compared with 2013" pledge will become nothing but a mere political slogan. In February 2021, the "Energy Conversion for the Future Research Group" published "Report 2030: A Roadmap to 2030 for Green Recovery and Carbon Neutrality in 2050" as a Japanese version of the Green New Deal. This is an alternative to the government's current energy/climate policies. This report presents a roadmap to the year 2030 which clarifies Japan's essential aims and actions to be realized by 2030 in order to achieve carbon neutrality by 2050. Specifically, the report draws a systematic roadmap for investment, economic benefits, greenhouse gas emission reduction benefits, air pollution control benefits, unemployment measures, and financial resources by 2030. This chapter provides a concrete picture of Japan's ideal green recovery by conveying the essence of the report as well as global trends.

Keywords Green new deal · Green recovery · Energy mix proposal for 2030 · Investment · Creation of employment · Economic impacts · Net-economic benefits · Barrier to the transition · Power generation by local citizens

1 COVID Pandemic and Climate Change

The coronavirus pandemic has become the subject of many discussions and debates. Its cause is almost certainly the viral infection of humans through vector animals, such as bats, as in the cases of Ebola and Severe Acute Respiratory Syndrome (SARS). Moreover, human active economic activities and the resulting climate

J. Asuka (✉)
Tohoku University, Sendai, Japan

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change have almost certainly increased the opportunities for jungle viruses to have contact with humans.

The reason that the COVID-19 pandemic has spread to such an extent is largely due to the combined effects of population increase and globalization, which have enabled humans to expand their sphere of movement. In the past, many viruses used to be constrained within a limited space of the human habitat. The situation has changed entirely due to major transformations of the human community.

Moreover, in view of the relationship between climate change and the coronavirus pandemic, their similarities in political and social aspects suggest the enormity of the problems involved.

Firstly, there is the problem of politicizing the science. In many countries, such problem involves opinions such as "politicians do not listen to the opinions of scientists," "as politicians do not listen to them, their citizens do not listen either," and "the scientists with different opinions are those with political bias, so should be ignored."

Secondly, there is the perception of risks. If any uncertainties are involved in the possibilities of health damage from coronavirus infection, people may perceive more of the uncertainties and less of the coronavirus infection possibilities, thereby ignoring the enormity of risks. In other words, they do not perceive coronavirus infection as a risk. This is the same as many people's perception of climate change risks.

Thirdly, what I consider to be the greatest problem is the lack of awareness as an infection causer and no sense of responsibility. Many people do not think they can become coronavirus transmitters to cause a pandemic, and feel no sense of responsibility. The same can be said of climate change problems. Many people do not consider that the carbon dioxide (CO_2) they emit as well as other greenhouse gases are sufficient to cause significant damage to other people and future generations.

As history shows, it is possible to overcome the current critical situation of the COVID-19 pandemic by developing collective herd immunity with vaccinations. Climate change, on the other hand, incurs an inherently longer term of criticality.

Stated below is the list of climate related news reported in the world media for 2 months of July and August, 2021, immediately before the time of writing this report.

- In mid-July of 2021, torrential rainstorms lashed Europe, causing many rivers to overflow, and dikes collapsed. There were more than 100 casualties in Germany, and more than 20 in Belgium. The damaged areas included the Netherlands, Luxemburg, and Switzerland (BBC, July 17, 2021).
- In mid-July of 2021, record-breaking rains of a "once in 1,000 years downpour" type struck China. The City of Zhengzhou in Henan Province had an amount of rainfall equivalent to their annual precipitation in a mere 3 days. The local government announced 302 deaths and 50 missing (Yomiuri Shimbun, August 2, 2021).
- Early August, 2021, Turkey, Greece, and the Western United States had outbreaks of large-scale wildfires. Greece also had the most severe heat waves it had

ever experienced in the past 30 years, hitting temperatures of 45 degrees C (BBC, Aug. 9, 2021).
- In the case of Haiti, they had a major earthquake on August 14, 2021, followed by a direct strike from tropical storm "Grace" on August 16, which further aggravated the difficulties of securing water supply and evacuation sites. The occurrences of floods and landslides have worsened the situation of evacuees and victims, making humanitarian aid even more difficult (CNN, Aug. 18, 2021).

In Japan, an avalanche of rocks and soil struck Atami City in Shizuoka on July 3, 2021, which is, according to a media report, adversely affecting many lives and livelihoods in the area even in August.

2 Green New Deal as Today's Global Trend

Today, many countries are trying to realize the Green New Deal or Green Recovery with the aim of building a resilient society, which makes it possible to achieve job creation and economic recovery, prevent the rebound of greenhouse gas emissions, and resist crises such as climate change and pandemics.

Former Vice President Biden assumed the office of the 46th President of the United States. Even before winning the election, President Biden presented the plan for the Green New Deal centered on renewables and energy saving. (In the United States, the term Green New Deal is more popular than the term Green Recovery. As both terms have almost the same contents, they are used synonymously in this report.)

As many people would deduce, the term "Green New Deal" is derived from the "New Deal" policy implemented by then President Franklin D. Roosevelt to overcome the Great Depression of 1929. It is a new phrase created by linking Green and New Deal. For these concepts, various people have presented various proposals. The fundamental pillar of such proposals embraces economic recovery (job increases) and global warming prevention through expanding the introduction of renewables and energy saving, as discussed above. Still, each proposal places different weights on economy, employment, and warming prevention, adopts different methods in procuring funds, and has a variety of political and economic concepts in the background. The introduction of renewables is given a dominant role in these proposals, which is interesting in a way, considering the historical coincidence of Roosevelt's New Deal having the electrification of villages as its main pillar.

In the following paragraphs, I reflect on the history of the Green New Deal, in reference to the paper by Prof. Park Seung-Joon et al. of Kwansei Gakuin University (Park et al., 2020).

Green New Deal had two waves in its development period. The first wave was around the year 2008, when the so-called Lehman Shock (or the financial crisis of 2007–2008) struck the world. In July of 2008, the Green New Deal Group of the UK, an organization consisting of researchers and practitioners, published a document

titled "A Green New Deal" as the collection of policies "to return the world from the melt-down of the economy and environment." Later, the UN Environment Program (UNEP) published the "Global Green New Deal" in March 2009, suggesting the importance of investing 1% of global GDP, or 750 billion US$ (about 75 trillion Yen) into the following 5 fields: to improve energy efficiency of buildings; renewable energies; sustainable transportation; ecological infrastructures including water and forests; and sustainable agriculture such as organic farming. At that time, President Obama's energy and global warming policies were also referred to as "Obama's Green New Deal." Unfortunately, these policies were not fully implemented. With the break-up of Copenhagen's COP15 in December, 2009, the interests in global warming issues had started to weaken gradually by 2010. Afterwards, this first boom of the Green New Deal receded for a while.

3 Second Wave of Green New Deal

The second wave of the Green New Deal, however, has been entirely different from the first wave. The world situation has undergone significant changes, and the aspect of justice has become extremely important. The background to this second wave concerns seven facets of reality as follows: (1) widening gaps and rising unemployment; (2) more severe effects of climate change; (3) climate change widening the gaps; (4) widening of gaps by the climate change measures; (5) COVID pandemic; (6) resistance movements against various discrimination, such as the Black Lives Matter (BLM) movement; and (7) rapid decreases in the power generation costs of renewables.

Reality 1) widening gaps and rising unemployment require no explanation. In this world, the gap between the haves and have-nots is widening further, with the unemployment rate of youths remaining at a high level. Reality 2) requires no explanation either, as the extreme weather is no longer being so extreme.

Reality 3) widening gaps due to climate change and reality 4) widening gaps from climate change measures may require some explanation. Galvin and Healy (2020) have indicated the following reasons why the problem of widening gaps relates to, or has a synergy with, climate change measures and the Green New Deal: (i) the wider the gap between rich and poor, the greater the carbon dioxide emissions (the study indicated that a country with a greater difference between rich and poor tends to have more CO_2 emissions per capita, and raising taxes on the rich and redistributing wealth to the poor can decrease the national gross total of CO_2 emissions); (ii) big companies, especially those of higher energy consumption industries, emit more CO_2, and hold bigger political sway with large vested interests; (iii) many of the climate change measures bring benefits to lower income people; (iv) however, one of the measures—carbon pricing (example: carbon tax)—can have a regressive effect, so it may have an adverse effect on low income people, if inappropriately introduced, and may instigate insurrection, such as the case of the Yellow Vest Movement in France; (v) unemployment and job losses among women, youth, non-whites, and

indigenous people are quite severe, so the Green New Deal can contribute to the resolution of such problems. In other words, shrinking the gaps and diminishing the control of big companies will result in the reduction of emissions, but any climate change measures will likely fail, if these gaps are not addressed. (There are many ways to resolve any regressive effects of carbon pricing, such as across-the-board refunds of carbon tax revenues to lower income people.)

Needless to say, reality 5) the COVID-19 pandemic further widened gaps and increased job losses. Therefore, the Green New Deal may need to incorporate measures to redistribute wealth and to resolve poverty, including employment security programs and the concept of Basic Income (BI).

Reality 6) discrimination against gender, indigenous people, and LGBTQI+, as well as BLM will strengthen solidarity with climate change actions, as they share a common factor of justice. In other words, those taking actions to fight climate change start to participate in the actions to fight discrimination, such as BLM, while those acting for BLM and other movements start to join the actions to fight climate change. As the Green New Deal can broaden the scope of its effects, it is not a mere policy but the governing agenda to provide guidelines for public policy-making. It can be described as a philosophical framework to give new purpose to life for many people, while eliminating various hardships in life.

Reality 7) drastic cost-down of renewables, especially of solar and wind power generating costs, has transformed the Green New Deal from a "simple philosophy" to "economically rational industry policies."

Analyzing such vast difference between the first wave and the second wave of the Green New Deal from the political and philosophical viewpoint, some describe the first wave as "(conservative) Keynesianism, eco-modernism, prioritizing corporations, technocratic, reformism, and green capitalism," while defining the second wave as "radical, revolutionary, anti-imperialism, and socialistic," arguing that the latter would be more preferable as global warming measures for our society. Of course, such argument has been subjected to strong attacks and criticisms from the conservatives and right-wing constituents, as "a dream," "socialism hated by Americans," and "the rejection of the American lifestyle."

In August 2019, Senator Sanders published the details of his Green New Deal proposal on his own website. It proposed an extremely ambitious target to achieve 100% renewables for power and transport sectors by 2030, and full decarbonization of the economy by 2050 at the latest. One of the most notable features of Senator Sanders' proposal was its gigantic scale of budget, which was 16.3 trillion dollars over 10 years (1770 trillion Yen: 177 trillion Yen per year).

As stated below, the Green New Deal requires a massive amount of investment, so the funding is always the problem. Sanders' Green New Deal was to achieve the balance of income and expenditure within 15 years, and clearly indicated the actual financial resources and procurement amount. They included: (1) 3 trillion and 855 billion dollars from the abolishing of fossil fuel subsidies, imposing taxes on fossil fuel corporations, and enforcing penalties and lawsuits against polluters; (2) 1 trillion and 215.5 billion dollars from the reduction in military spending to protect oil transport routes; (3) 6 trillion and 400 billion dollars from the sales of electricity

generated by renewables; (4) 2 trillion and 300 billion dollars in income taxes of 20 million new employees; (5) saving 1.31 trillion dollars in unemployment support programs with 20 million people getting new jobs from the expansion of renewable businesses; and (6) 2 trillion dollars by additional taxes on the rich and big companies.

The critics said such gigantic fiscal expenditures would likely result in hyper-inflation. However, Galvin and Healy (2020) indicated the economic rationale of Senator Sanders' proposal, arguing that: (1) the possibility of hyper-inflation is rather small, considering the taxation amount and the scale of national bonds issued during wartime; and (2) taxation of the rich is likely to invite strong resistance, but their tax burden is at the same level as that of the rich in the 1960s and 1970s.

4 Japanese Version of Green New Deal

In Japan, then Prime Minister Suga announced on October 26, 2020, the new target of "carbon neutral by 2050" (net zero GHG emission). However, the "Green Growth Strategy accompanying carbon neutral by 2050" issued by the Japanese government on December 25, 2020, did not show any major changes from the existing target and policies, but rather contained an open indication to postpone measures required for "carbon neutral by 2050."

Pressed by the Biden Administration of the US, Prime Minister Suga finally announced on April 22, 2021, a new target of "GHG emission reduction of 46% from the 2013 level by 2030." According to a media report, the Japanese government has been reviewing an energy mix (scenario) to conform with this new target, including: to maintain the existing target of 20–22% for nuclear power; and to increase the share of renewables from the existing target of 22–24% to 36–38% (Sankei Shimbun, May 16, 2021). However, the groups of people who have been objecting to the introduction of renewables and energy saving and hoping to maintain nuclear power and coal thermals still have strong influential power. So the discussion on the energy mix is actually veering off track.

On Feb. 25, 2021, the "Energy Transformation Study Group for the Future," in which I have been involved, issued "Report 2030: Green Recovery and a Roadmap to 2050 for Realizing Carbon Neutrality by 2030" (hereinafter referred to as Report 2030), as a Japanese Green New Deal (Study Group for the Future Energy Transformation, 2021). This Report 2030 contained the "Green Recovery Strategy (GR Strategy)" as a concrete scenario. The sections below describe the essence of the Report 2030 and GR Strategy, as an alternative to the existing energy and global warming policies of the Japanese Government. (Report 2030 itself is available for download at the following url: https://green-recovery-japan.org/).

The GR Strategy set the following as quantity targets.

4.1 Overall Energy Consumption

Energy savings to reduce end energy consumption by 40% in 2030 from the 2010 level, and by 62% in 2050 from the 2010 level (38% and 60% from the 2013 level, respectively).

4.2 Fossil Fuels and Nuclear

Year 2030: Reduce fossil fuels (primary energy) by about 60% from the 2010 level, and zero nuclear.

Year 2050: Reduce fossil fuels to zero (primary power sources are 100% renewables; about 80% of them using existing technologies, and about 20% using new technologies).

4.3 Electric Power

Year 2030: Energy savings to reduce power consumption by 30% from the 2010 level (zero coal thermal, zero nuclear, and 44% renewables) (28% reduction from the 2013 level).

Year 2050: Energy savings to reduce power consumption by approx. 40% from the 2010 level (100% renewables) (38% reduction from the 2013 level) Note: Power storage and other losses will necessitate greater power generation capacity.

By implementing these policies to meet the above targets, the following effects are expected:

- **Investment:** Accumulated total of ≃202 Trillion Yen (TY) by 2030 (Private sector ≃151 TY, public sector ≃51 TY), and ≃340 TY by 2050
- **Economic effects:** 205 TY by 2030 (Increases from official GDP estimates)
- **Job creation:** ≃25.44 million jobs-year by 2030 (Maintain 2.54 million jobs/yr. for 10 years)
- **Energy cost reduction:**≃358 TY (accumulated) by 2030 (Accum. 500 TY by 2050)
- **Fossil fuel import reduction:**≃51.7 TY accumulated by 2030
- **CO_2 emissions:** 55% reduction from the 1990 level by 2030 (61% from the 2013 level), and 93% reduction from the 1990 level by 2050 (only with existing technologies; 100% reduction assuming the commercialization of new technologies)
- **Air pollution deaths avoided:** Total of 2920 deaths from exposure to $PM_{2.5}$ avoided by 2030

As far as the afore-mentioned "Green Growth Strategy accompanying carbon neutral by 2050," which the Japanese Government announced in December 2020, is concerned, the Government merely commends the need for new technologies, which have not been commercially available, or whose applicability has been unclear, and indicates the possibility of providing subsidies for research and development. It seems almost certain that they will postpone the introduction of any concrete and effective measures. As a result, Japan will likely find significant increases in electric power consumption, energy consumption, fossil fuel imports, energy expenditures of corporations and homes, and energy source CO_2 emissions, while an enormous amount of national revenues will flow out to overseas.

The GR Strategy, on the other hand, is to stop the operation of coal thermal power in 2030 (abolishment in 2035). Regarding nuclear power, it assumes zero nuclear by 2030. To achieve the target of "Carbon Neutral by 2050," it is to use existing technologies to realize 93% of 100% emission reduction in energy source CO_2 and the remaining 7% to be achieved by technologies that have not been commercially available today (mainly concerning these emissions from four sectors: airplanes, ships, long-distance ground transportation, and iron and steel/cement industry). Renewables and energy savings will make it possible to reduce fossil fuel imports and energy expenditures, thereby preventing the national revenues from flowing out to other countries.

The comparison between the accumulated amount of renewables and energy saving by 2030 and the amount of energy expenditure reductions (accumulated) for the period when investments continue to take effect indicates the latter will be far greater than the former. This means that the GR Strategy has significant economic rationality. Moreover, the investment amount discussed here is not the fund that will flow out to other countries, but the fund to be invested to activate the domestic economy in Japan (Table 1).

In addition, the comparison of value-added (GDP) between the case of implementing the GR Strategy by 2030 and the case of not implementing it indicates that the economic effects in terms of national value-added (GDP) will increase by 205 trillion Yen (accumulated) by 2030 when the GR Strategy is implemented by 2030.

The GR Strategy estimates that the existing technologies of energy savings and renewables alone can reduce emissions by 55% from the 1990 level by 2030 (61% reduction from the 2013 level), and 93% reduction from 1990 by 2050 (the reduction quantity in 2030 will be 714 million tons of CO_2). For those areas with difficulty in reducing emissions by existing technologies alone (such as aviation fuels and marine fuels, high heat usage in raw material industries, like iron and steel), it is possible to attain 100% reduction (zero emission) if assuming the commercialization of new technologies (hydrogen reduction steel-making, hydrogen jet fuels, etc.), which are not applicable at present. Note that BAU here indicates the case in which activity volume, with fixed intensity, is increased corresponding to the Government's long-term forecast for energy supply/demand.

This "93% emission reduction from the 1990 level in 2050 using only existing technologies of energy savings and renewables" is an extremely important number

Table 1 Investment amount, economic effects, and CO_2 emission reduction effects, etc. by 2030 under the GR Strategy

SEC	Categories	Investment by 2030 [T Yen]	Ratio of private fund/fiscal expenditure	Accum. energy expenditure reduced by 2050 [Trillion Yen]	# of jobs created by 2030 [10,000-year]	Jobs created per investment amount [jobs-year/100 M Yen]	CO_2 reductions in 2030 [Mt-CO_2]
PWR/H	1. Renewable power plants	29.3	Mostly private	86.3	285	9.7	360
	2. Power grid and distribution network	16.0	Mostly fiscal		287	17.9	
	3. Heat supply network	6.0	Mostly fiscal		108	18.0	32
Ind	4. Power and heat use for raw material industry	18.5	Mostly private	23.1	179	9.7	58
	5. Power and heat use for other industries	7.3	Mostly private	14.6	62	8.5	21
Ofc	6. Power, mainly mechanical equipment	17.8	Mostly private	35.6	128	7.2	45
	7. Heat, mainly insulation, zero emission buildings	16.8	Mostly private	42.1	275	16.3	28
Homes	8. Power, mainly home app. and machines	13.3	Mostly private	26.7	96	7.2	20
	9a. Heat, mainly insulation, zero emission houses	15.2	Mostly private	30.3	267	17.6	28
	9b. Heat, mainly insulation, zero emission public housings	1.7	Mostly fiscal	3.4	30	17.6	
Trnspt	10. Electrification and improved fuel eff. of cars, taxis, buses	20.4	Mostly private	57.6	183	9.0	81

(continued)

Table 1 (continued)

SEC	Categories	Investment by 2030 [T Yen]	Ratio of private fund/fiscal expenditure	Accum. energy expenditure reduced by 2050 [Trillion Yen]	# of jobs created by 2030 [10,000-year]	Jobs created per investment amount [jobs-year/100 M Yen]	CO_2 reductions in 2030 [Mt-CO_2]
	11. Electrification and improved fuel eff. of trucks	11.2	Mostly private	35.5	119	10.6	38
	12. High efficiency rail-road, ships, and airplanes	1.5	Mostly private	3.0	10	6.7	3
	13. Infrastructure for transportation	9.4	Mostly fiscal		167	17.8	3
Sbttl		185		358	2196	11.9	714
	Incl. fiscal expenditure	33			562	17.0	
	14. Support experts, develop human resource	13	Mostly fiscal		251	19.0	
	15. Smooth transfer of labor forces	5	Mostly fiscal		97	20.6	
Sub		18			348	39.7	
Ttl		202		358	2544	12.6	714
	Incl. fiscal expenditure	51			910	17.8	

and a true statement. This is because what the government and industry leaders are advocating is a story of "innovative technologies being essential for Carbon Neutral by 2050. So far, the government has failed to quantify the extent of essentiality, and is unlikely to indicate the details even for the future. By keeping their statement ambiguous, they can easily use convenient excuses, such as "the research and development of innovative technologies did not go well," or "research and development of technologies are difficult in the first place." In this sense, the government is trying to create a new "myth," and is strengthening their efforts to make innovative technologies their scapegoat.

5 Avoidance of Early Deaths Due to Air Pollution

In Report 2030, the accumulated number of early deaths from PM2.5 (micro particles that cause air pollution-based health damage) that would be avoidable by 2030 was calculated, in the case of implementing the GR Strategy. Here, the number of early deaths is the absolute number of deaths added to, or increased over, the number of deaths in the case of no air pollution. This can be called additional deaths or excess deaths. The number can be calculated using the death rate increase due to specific diseases caused by the exposure to air pollutants (for example: in the case of $PM_{2.5}$, strokes, heart attacks, pulmonary cancer, etc.).

In Japan and throughout the world, scientific facts indicate that health damage from air pollutants is not a thing of the past. Rather, they have brought considerable damage in reality, and have become a threat that will inflict major damage in the future. For example, Cohen et al. (2017) estimated the number of early deaths from air pollutants such as $PM_{2.5}$ emitted from coal power plants and automobiles in Japan as 61,000/year. The "Lancet Count-down" project of the UK's medical journal the Lancet surveyed the health effects of global warming and identified the number of early deaths due to $PM_{2.5}$ emitted from coal thermal power plants in each country. According to this project, Japan has 9.74 deaths/year per 1 million people due to $PM_{2.5}$ emitted from coal thermal power plants (Watts et al., 2018). Assuming Japan's population as 120 million, this is equivalent to about 1170 deaths per year.

Furthermore, the environmental standard of $PM_{2.5}$ in Japan is an annual average of 15 μg/m^3, which is more lenient than the one in the US (annual average of 12 μg/m^3) and the one recommended by the World Health Organization (WHO) (annual average of 5 μg/m^3). In other words, Japan's current situation is that, despite its environmental standard being more lenient than other countries, there are a number of air pollutant measuring stations that are unable to meet the standard.

One study indicated that, if Japan is to build 40 coal power plants planned for various sites after 2012 and to start their operations under such situation, there would be an additional 1175 early deaths (Green Peace Japan Climate Network, 2018).

Moreover, there are some papers published that estimated the diffused density of $PM_{2.5}$ from specific coal thermal power plants in Italy (estimated for a shorter

distance of 1 to 50 km), and calculated the number of deaths occurring among local residents.

Based on the above, the GR Strategy estimated the number of early deaths avoided, by using the number of early deaths due to $PM_{2.5}$ emitted from coal thermal power plants in Japan, indicated in the Lancet (9.74 per year per 1 million people). Specifically, the accumulated number of early deaths by 2030 upon the implementation of the GR Strategy was calculated as 2920 deaths, based on the above number and the following two assumptions: (1) linear halving of $PM_{2.5}$ emissions from coal thermal power plants in 2030 under governmental measures; and (2) linear zeroing under the GR Strategy.

In addition, our Report 2030 indicated quantitative and substantial facts about how the implementation of the GR Strategy "would not raise power costs when compared with government scenarios, and rather decreases after 2030," and "would not cause any electric power deficiency in each power district." Please refer to Report 2030 for details.

6 Job Transfers

Figure 1 illustrates the overall image of job transfers caused by energy transformation in Japan. First of all, the industrial statistics indicate that the number of laborers employed by 6 major CO_2 emitting industries (power, iron and steel, cement, chemicals, oil refinery, and paper manufacturing and paper pulp industry) is about 150,000 people that would be affected by energy transformation. Adding about 50,000 employees of nuclear power plants (Japan Atomic Industrial Forum), the number of jobs to be affected by energy transformation of non-nuclear and de-fossil-fuels will be about 200,000 in total. On the other hand, there will be new jobs created, which future estimates calculated by applying the investment amount for energy transformation to an industrial input-output table indicate about 2.54 million jobs per year maintained for 10 years by 2030.

Moreover, the International Renewable Energy Agency (IRENA) indicates that the number of employees in renewable industries globally is about 11.5 million as of 2019 (50% or more increase over the number in 2012), which includes about 270,000 employees in the Japanese renewable industry in 2019. These numbers are systematically shown in Fig. 1.

Nonetheless, one can argue that the simple comparison of current jobs and future estimates is problematic. However, Fig. 1 allows us to grasp the image and sense of scale regarding how energy transformation and "Carbon Neutral by 2050" will affect the job situation. Actually, the Green Recovery Report (IRENA, 2020) of the International Renewable Energy Agency (IRENA) contains a graph similar to this Fig. 1. In their graph, it is indicated that, under IRENA's energy transformation scenario to conform with the achievement of the 2 degrees C target, 5.49 million new jobs will be created worldwide in 2023 by the energy sector alone, mainly in

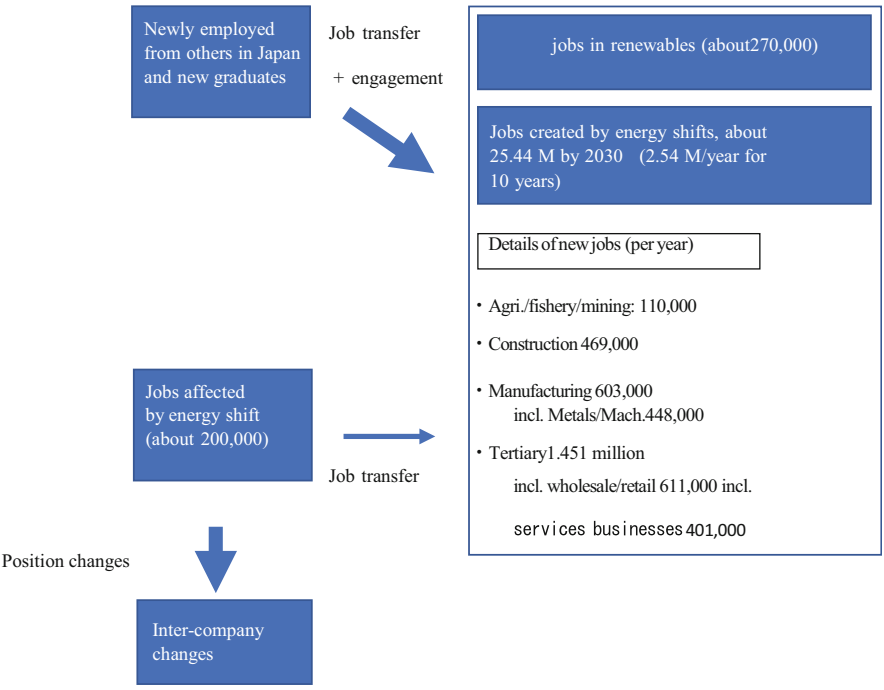

Fig. 1 Illustration of job transfers caused by energy transformation in Japan

renewables and energy savings, while 1.07 million workers in fossil fuels and nuclear industries will need to change their jobs.

In the case of the United States, a think-tank called E2 has indicated that in 2019 about 3.35 million workers in total are employed in five clean energy sectors of energy efficiency improvement, renewables, grid control and power storage, clean automobiles, and clean fuels (E2, 2020), which far exceeds the number of employees in fossil fuels and nuclear industries (approximately, 1.19 million and 70,000, respectively) (NASEO and Energy Future Initiative, 2019). As a whole, the number of jobs in clean energy sectors is on the increase, while that in fossil fuels and nuclear power generation industries is on the decrease. This means that the situation illustrated in Fig. 1 is becoming a reality.

Even if the overall number of jobs in a country as a whole increases, how to proceed with a smooth and "fair" transfer of jobs accompanying the energy transformation can be a common challenge for all those nations. Especially for the US, Canada, Russia, EU, China, Australia, and others, which are fossil fuel producers and have many domestic laborers working for the fossil fuel industry, it is an extremely serious issue. (For that reason, many studies suggest that Japan may become a relative "winner" in global warming measures.)

As concrete measures for "fair job transfers," possible options include unemployment measures (social security, employment services, vocational trainings, and

financial compensation), housing and education measures, creation of new localized jobs, and special measures for low-income people (for example, energy check program, which is to pay out energy subsidies uniformly to low-income people and local residents who inevitably use automobiles etc.). A simple monetary compensation for unemployed is insufficient. What is required is not a passive measure, but more active reach-out measures. To determine the most appropriate measures, it is necessary to consider various factors such as: regional differences between the locations of job creation and job losses; age groups of laborers; and the skills of laborers. Another possibility is to provide preferential treatment to those who start working for jobs related to renewables and energy savings. In short, extremely considerate measures are required.

Note that renewables, especially solar sharing and biomass power generation using local resources, have special features to supply stable localized jobs in villages and to contribute to the revitalization of local economies. Indeed, there is quantitative proof that the introduction of renewables will expand employment in the region. For example, Kuriyama et al. of the Institute for Global Environmental Strategies (IGES) indicated quantitatively that the introduction of renewables, especially in the Hokkaido and Tohoku regions, increases employment. Moreover, according to the empirical research works in Miyazaki Prefecture conducted by Hitachi Kyoto University Laboratory, which was established between Kyoto University and Hitachi Ltd., the economic circulation rate of regional society would be improved by 7.7 times, when comparing the case of regional renewables providing a 95% power self-sufficiency rate with the case of power supplies from existing power generation facilities.

Actually, about 90% of local communities in Japan have revenue/expenditure deficiency in energy utility payments (electric power, gas, gasoline, etc.). Moreover, according to the Ministry of Environment, 70% of local communities find their funds equivalent to 5% of regional gross products being flown out to other regions, and in the case of 151 local communities, the fund flow-out rate is 10% or higher. These situations will be greatly improved by the implementation of the GR Strategy.

From the late 1950s to the early 1960s, Japan experienced a period of significant energy transformation. At that time, the shifting of energy resources from coal to petroleum caused the closure of many coal mines and over 200,000 laborers lost their jobs. Japan overcame such a difficult time of energy transformation through extensive cooperation among governments, laborers, and employers. Specifically, the government enacted the “Act of temporary measures” and the “Act of employment measures” in response to the unemployment of coal mine workers, promoted the economy of coal mine regions, and implemented various measures including employment promotion housings and vocational trainings, pay-outs of allowances, and raising pensions. Still, many problems arose from the closures of coal mines.

It is difficult to make a simple comparison of job transfers from the energy transformation in the past with job transfers associated with current energy transformation, as the current case may affect much broader ranges. In terms of the number of totally unemployed and its scale, the job transfers associated with current energy transformation may be less than the job transfers from coal mine closures in Japan.

On the other hand, it is undeniable that the current energy transformation is progressing at an unexpectedly fast pace, including the global movements to ban the manufacturing and sales of gasoline cars. With the business environment invariably changing, companies must respond to secure their survival. In Japan, however, governments and companies tend to avoid the discussion of job transfers associated with energy transformation. If this continues, then it will not be possible for Japan to make a soft-landing for Carbon Neutral by 2050.

Note that our Report 2030 clearly and quantitatively proves that the implementation of the GR Strategy "does not raise the utility price of electric power in comparison with that of the government's scenario and rather decreases after 2030," and "does not cause electric power deficiency for any of the electric power districts." Report 2030 aims to have careful and meticulous discussion on the possibility of realizing both "environment and economy," rather than the simple choice of "environment or economy." We take pride in preparing this Report 2030, for the first time in Japan, which discusses the wide-ranging factors in detail, including the investment amount, the number of jobs created, economic effects, relevant policies, electric power prices, supply/demand balance of power, employment issues, financial resource issues, etc. We hope that this Report 2030 will provide a good opportunity to deepen the discussions on energy and global warming issues in Japan.

7 Future Prospects

As discussed here, the Japanese government's proposals for the Basic Plan of Energies and the Plan of Global Warming Measures contain regressive measures to prolong the use of nuclear power plants and fossil fuels, while incorporating the use of hydrogen, methane, and ammonia for fuels, Carbon Capture/Use/Storage (CCUS), and overseas carbon offsetting. In view of energy efficiencies and energy costs, however, the future of methane, ammonia, and CCUS is unclear, and overseas offsetting has problems in the acquisition of international certification.

In contrast to the governmental plans, our GR Strategy demonstrates how non-nuclear and no coal power policies have greater economic rationales in terms of employment, GDP, electric power cost, energy cost, effects of reducing air pollutants, etc., and even increase the reduction quantity of CO_2 emissions. Unfortunately, however, today's Japan does not have a suitable policy-making system to promptly accept such proposals.

Today, the business environment is rapidly changing far beyond what many people expected, especially necessitating companies to implement an urgent response and judgement in corporate management. A good example of such cases is electric vehicles.

As everyone knows, many countries have already decided, or been reviewing, the measures to prohibit the sales of gasoline-diesel cars, including hybrid cars, with Norway taking the lead to start in 2025, and the Netherlands, France, UK, Sweden,

Spain, and others following suit to start the same during the period of 2025–2040. On July 15, 2021, the EU decided to ban the sales of gasoline-engine cars from 2035, and on July 22, 2021, Mercedes Benz announced that they would make every class of vehicle electric vehicles (EV). On August 5, 2021, US President Biden signed the Presidential Order to make the ratio of EV in new car sales 50%. In Germany, the automobile workers' union, fearful of deteriorating international competitiveness in the future, requested to its government that "the investment on EVs should be expanded."

Certainly, Japanese automobile manufacturers have overwhelming powers in competing in today's automobile market. When the number of cars sold (in 2019) is divided into each automobile manufacturer, three out of the top 10 companies are Japanese companies. In the EV market, however, Japanese companies are doing poorer, with none of them reaching the top 10 of manufacturers. Moreover, Toyota Motors have drawn criticism in the US for "making donations to Republican members of the Congress to oppose the strengthening of CO_2 regulations, in order to sell more hybrids" (New York Times, July 25, 2021).

It is difficult to decide how long they should continue implementing such strategy. First of all, EU and American manufacturers may accelerate their shift toward EV faster than expected. In addition, China, which is seen as the main battleground of the EV market in the future, is promoting the introduction of hybrid cars today, but may change their policy. The criticisms of hybrid cars may further escalate in the international community.

Actually, the regressive measures of Japanese companies and the Japanese Government are not the result of a careful and serious review process, nor the reason for the economic rationale. Japanese companies are dependent on governmental subsidies to promote research and development and demonstration tests of EVs. The purpose of governmental proposals is to maintain, for the moment, the existing structures and jobs of the energy and industry sectors, in consideration of Keidanren companies, which are the fundamental supporters of the government. There are no long-term prospects or strategies involved in their proposal. In that sense, it is like the regressive scenario of former US President Trump returning to the White House and everything going back to the drawing board.

The strategy of Japanese automobile manufacturers seems to raise as much profit as possible from the sales of hybrid cars, and uses them for research and development to respond to the rising EV market.

Remaining in the business-as-usual scenario, Japan will not be able to obtain the benefits of job increases and energy cost decrease from the investment in renewables and energy savings. Continuing to maintain coal thermal power plants is likely to invite rising criticism from the international community, while stalling the transformation of industrial structures, and companies losing their international competitiveness. If automobile manufacturers fail to grasp the best timing to shift toward EVs, the scenario of their decline may become more realistic. That may be the ultimate destination of the energy and climate change policies of today's government.

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Transboundary Cooperative Governance Toward Energy Transition in East Asia

A Review of Historical Development and Future Perspective

Kenji Otsuka

Abstract The last decade has witnessed several events that had a serious impact on people's attitudes toward environmental sustainability regionally and globally. This chapter depicts how transboundary cooperative initiatives by states and nonstate actors tackle transboundary air pollution and climate change in East Asia. It also examines the opportunities and challenges we face in the very recent landscape shift toward carbon neutrality and the deepening concerns for climate emergencies. Multilateral cooperative institutions in East Asia have focused on the monitoring of air pollutants and information sharing of related policies and measures among member countries. It should also be noted that there are some transboundary coalitions of independent scholars and research-type NGOs in Northeast Asia who conduct joint research on the decarbonization of energy systems and disseminate up-to-date knowledge and information on decentralized nature-based renewable energy. For further development of transboundary cooperation in East Asia, opportunities exist as an increasing potential for multilateral policy dialogue beyond the borders and broadening partnerships for local and transboundary coalitions with global alliances on the one hand; and challenges in just and safe transition, decarbonization of overseas financing, and seeking energy resilience on the other.

Keywords Energy transition · Carbon neutrality · Climate emergence · Environmental governance · Cooperative governance · Nonstate actors · East Asia · Northeast Asia

K. Otsuka (✉)
Institute of Developing Economies (IDE-JETRO), Chiba, Japan
e-mail: Kenji_Otsuka@ide.go.jp

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1 Introduction

Since the last century, the people of East Asia have experienced rapid economic growth alongside regional economic integration, while facing common human security risks in terms of environmental sustainability. It should be noted that there were several events—both regional and global—in the last decade, which had a serious impact on people's attitudes toward environmental sustainability for a cleaner and safer energy system in the region. They include the frequent occurrence of toxic smog in many cities in China in the 2010s, the Fukushima-Daiichi nuclear power plant accident in Japan in 2011, and the Paris Agreement adopted at the Conference of the Parties (COP) 21 of the United Nations Framework Convention on Climate Change (UNFCCC) in 2015. Although the first two cases occurred within their respective countries, they caused serious concerns for the neighboring countries and were considered as transboundary environmental problems in the region.

In response to the common environmental sustainability risks, each country has developed a series of public policies (Terao & Otsuka, 2007), and bilateral and multilateral cooperation in the region and beyond (Mori, 2013a). However, it has been criticized that transboundary cooperative institutions for sustainable development in East Asia are weaker than those in the West because they are non-binding, overlapping without any synergy, and closed to civil society (Elliott, 2017; Komori, 2010; Matsuoka, 2014; Mori, 2013b; Reimann, 2014; Takahashi, 2017). In addition to these shortcomings in the regional institutions, there has been persistent and strong exercise of sovereignty by nation states, asymmetries in geography (upwind-downwind), economic development, political divides (liberal democracy vs. communist), and continuous tensions surrounding national security based on historical legacies from World War II and the Cold War (Cross-strait relations, the Korean peninsula, and the East China Sea) in the region (Pekkanen et al., 2014). Although these institutional and structural factors seem relentless so far, both opportunities and challenges could be found for the further development of transboundary cooperative governance under the changing landscape of energy and environment issues.

This chapter explores how transboundary cooperative governance has developed under increasing energy and environmental security concerns in East Asia and the types of opportunities and challenges that are found in the further development of transboundary cooperation on energy transition among four major economies in the region, namely, Japan, China, South Korea, and Taiwan, under the recent landscape shift toward carbon neutrality and the deepening concerns for climate emergencies.[1]

[1] The second through fifth sections are based on Otsuka (2018) and Otsuka and Cheng (2020).

2 Development of Regional Environmental Governance in East Asia

Even before building multilateral environmental cooperation in East Asia, efforts have been made to promote bilateral cooperation between Japan and China. In 1979, Japan began to provide official development aid (ODA) to China. Before the termination of the new Yen Loan Program to China in 2008, Japan had been a top donor to China in terms of bilateral economic cooperation in the world. In 2007, just 1 year before terminating the said program, the amount of ODA from Japan to China was $435.66 million USD, which was 32.6% of the total amount of ODAs given to China. Germany was China's second largest donor in 2007, providing $289.28 USD in aid, comprising 21.6% of the total aid given to the country.[2]

It is also noted that Japanese ODA to China started to focus on environmental issues from the 1990s in response to the mounting environmental problems in the country and their potential impact on Japan. According to data from 2000 to 2007 on countries in the Development Assistance Committee (DAC), Japan had been a top donor for China in terms of the contract-based amount of environmental ODA that accounted for about 40%–60% of the DAC countries (Takehara, 2014, pp. 424–425). China watched Japan grappling with environmental issues such as pollution and disease, and learned from the country's efforts to improve technology and regulations (Qu, 1997, pp. 9–13; Wang, 1999, p. 180). Furthermore, Japan's bureaucratic culture originated in ancient China. While the two countries have different political systems today, the governments can communicate more easily because they share some bureaucratic practices.[3] Moreover, Japan was visited not only by governmental officials, but also Chinese scholars and researchers in the field of environmental sciences and technologies to share mutual interests and exchange information and results with their Japanese counterparts (Bianweihui, 1994, pp. 226–337). China has enjoyed a beneficial relationship with Japan, learning from Japanese environmental protection experiences, and benefiting from a large amount of financial aid. In 2018, however, both the governments agreed to terminate all the ODA projects, including technical assistance and grant aid, after several years, when China's GDP overtook that of Japan.

Formal regional institutions for environmental cooperation across countries go back about 20 years to the 1990s when the UN Conference on the Environment and Development was held in Rio de Janeiro. Since this event, a series of regional environmental institutions, in addition to bilateral agreements, have been developed in East Asia and beyond, such as Eco Asia, which began in 1991; the Northeast Asian Conference on Environmental Cooperation (NEAC), 1992; the Northeast

[2] Ministry of Foreign Affairs of Japan, "Date book of ODA 2010," http://www.mofa.go.jp/mofaj/gaiko/oda/shiryo/kuni/10_databook/index.html#I.

[3] Such stories were recounted by many Chinese counterparts in several joint research projects. It is also true, however, that there are a few gaps between us and them in terms of political sensitivities in some issues.

Asian Subregional Programme of Environmental Cooperation (NEASPEC), 1993; the North-West Pacific Action Plan (NOWPAP), 1994; the Acid Deposition Monitoring Network in East Asia (EANET), 1998; the Tripartite Environment Ministers Meeting (TEMM), 1999; the Joint Research Project on Long-Range Transboundary Air Pollutants in Northeast Asia (LTP), 2000; the ASEAN+3 Environment Ministers Meeting, 2002; and the East Asia Summit Environment Ministers Meeting (EAS EMM), 2007 (Matsuoka, 2013, 2014; Otsuka, 2018). Further, in terms of energy and environmental issues, the Asia-Pacific Economic Cooperation (APEC) launched in 1989 is an important international organization that has been discussing sustainable development as a cross-cutting issue among member economies since 1997.[4]

Meanwhile, various nonstate actors, such as nongovernmental organizations (NGOs) (also known as civil society organizations), researchers, and volunteers continue to contribute to education, advocacy, and research on these issues, both within and between countries in the region. It is assumed that transnational civil society (TCS) networks (that is, transboundary networks organized by NGOs) in Asia are "steadily increasing" based partly on the evidence that the number of NGO networks within Asia has increased to over 10,000, as of 2010 (Igarashi, 2013, pp. 272–274). Although there are no statistics regarding the number of TCS networks working on issues of environmental sustainability in East Asia, some transboundary networks led by NGOs and researchers independent of the government have been observed and reported (Teranishi & East Asia Environmental Information Center (EAEIC), 2006; Igarashi, 2013, pp. 248–267). Moreover, the recent emergence of new forms of private environmental governance initiated by nonstate actors in East Asia should be examined (Otsuka & Cheng, 2020). The Asia Pacific Clean Air Partnership (APCAP)[5] with the new institutional building, initiated by scientists on transboundary air pollution, was launched under the UN Environment in 2015 and consists of a science panel that will help create a scientific community for atmospheric science and a joint forum, which will assist policymakers in setting targets to improve air quality in the region. Several research-type NGOs in Northeast Asia organize various activities including research, information disclosure, and advocacy on environment and energy issues in the region, including the Institute of Public and Environmental Affairs (IPE),[6] the East Asia Climate Network (EACN), and the research group on Energy Transition and Democracy in East Asia (ETDEA). In particular, the last two groups focus on energy transition in Northeast Asia and will be described in detail later in this chapter.

[4] https://www.apec.org/Groups/Other-Groups/Sustainable-Development.

[5] https://www.unenvironment.org/asia-and-pacific/asia-pacific-clean-air-partnership.

[6] http://wwwen.ipe.org.cn/.

3 Early Cooperative Initiatives for Transboundary Air Pollution in Northeast Asia

Northeast Asia has been facing serious air pollution problems as a result of rapid regional economic growth. Therefore, in the 1970s and 1980s, research institutes in each country conducted numerous studies on acid rain issues. This was the starting point for promoting regional cooperation on transboundary air pollution issues in East Asia. In Japan, increasing public concern about air pollution in China, which featured the largest amount of sulfur dioxide (SO_2) emissions from the combustion of large amounts of coal in the region, forced the government to cooperate with China through ODAs and other joint projects to ensure air quality improvement during the 1990s. In 1993, the Ministry of the Environment of Japan organized the first round of expert meetings on acid rain issues, with a special focus on building a monitoring network across countries in the region, including China, Indonesia, South Korea, Malaysia, Mongolia, the Philippines, Singapore, Russia, Thailand, and some international organizations in Toyama Prefecture. After several rounds of expert meetings and negotiations between these countries, the first round of intergovernmental meetings of the EANET was held in Yokohama City with the generous support of the Japanese government in 1998. This inaugurated a tentative cooperation by nine countries, including Vietnam, but China was just an observer at that time.

China participated in the second round of intergovernmental meetings as a member country in 2000. At this round of meetings, it was decided that the EANET secretariat should be headquartered at the Regional Center for Asia and the Pacific, which was jointly established by the United Nations Environment Programme (UNEP) and the Asian Institute of Technology.[7] The network center was established in Niigata, Japan, which is now called the Asia Center for Air Pollution Research (ACAP).[8] The EANET has 13 member countries, including Cambodia, Laos, and Myanmar (Suzuki, 2009, pp. 77–80; Takahashi, 2017, pp. 238–273).

For over a decade, the EANET has contributed to data monitoring of the deposition of acid pollutants in rain and snow; and capacity-building, monitoring, and analysis in developing countries in the region. Especially for China, Japan provided technical assistance to train staff in EANET cities through the Japan-China Friendship Center for Environmental Protection. Through a series of monitoring and analysis exercises, acid rain was observed in some cities, but no critical damage to the ecosystem by acid rain was observed in the region (Suzuki, 2009, pp. 77–83). The recent review on impacts on the ecosystem by acidification points out: "Although the impact of acid deposition is less clearly understood, the adverse impact on forests, inland waters, and materials has been reported in one or

[7] http://www.rrcap.ait.asia/.

[8] https://www.acap.asia/en/.

more countries in the East Asia regions. Therefore, continuous efforts toward impact assessment of acid deposition are necessary for the decades to come." (TFRC, SAC, and EANET, 2015, pp. 183–184).

Meanwhile, South Korea is positive about leading a cooperative project on transboundary air pollution in the region, because it suffers directly from the air pollutants generated in China without the benefit of a sea between the two countries, such as in the case of China and Japan. In 2000, LTP was launched as a joint research project between South Korea, Japan, and China under the initiative of the South Korean government. The main objectives of the project included contributing to foundational research on LTP, improving the scientific understanding of LTP, and providing science-based information to policymakers in Northeast Asia. Since 2000, the LTP project has monitored transboundary pollutants, including acid rain pollutants and atmospheric particulate matter less than 2.5 micrometers ($PM_{2.5}$), and modeled the spatial distribution of pollutants across member countries. Although the three countries—South Korea, Japan, and China—are members of both the EANET and the LTP project, the scope and methodologies of the latter are wider than those of the former, which focuses only on acid rain pollutants (Lyu, 2017).

The Tripartite Environment Ministers Meeting (TEMM) is the highest-level intergovernmental platform launched jointly by Japan, China, and South Korea in 1999 for the purpose of sharing policies and experience with various environmental issues such as air pollution, dust and sandstorms, biodiversity, chemical management, industrial accidents, waste management, climate change, fresh water, the marine environment, and others. Air pollution mitigation has been a high priority on the TEMM agenda for two decades. Recently, each country has targeted acid pollutants as well as ozone, volatile organic compounds, and $PM_{2.5}$, for monitoring and research, and for information sharing of analysis technology (Chu, 2018). It should be noted, however, that no treaty on transboundary air pollution, such as the Convention on Long-Range Transboundary Air Pollution, which was established in 1979 by the UN Economic Commission for Europe, exists in East Asia (Akimoto, 2018).

4 Development of Cooperative Initiatives for Air Pollution and Climate Change

Since the Kyoto Protocol was adopted at COP3 of the UNFCCC in 1997, which requires major industrialized countries to reduce CO_2 emissions, climate change has come to the attention of policymakers, as well as scholars and civil societies worldwide, as an environment-energy nexus issue (Cui, 2018). In the TEMM, climate change has been addressed as an important common issue for three countries since 2001. The Tripartite Joint Action Plan (TJAP) adopted at TEMM 12 in 2010 regards climate change as one of the main priority cooperation areas between the three countries (Japan, China, and South Korea). It states that the three countries

reaffirm their commitment to the objectives and principles of the UNFCCC and its Kyoto Protocol—in particular, the principle of common but differentiated responsibilities—and will work together to promote the full, effective, and sustained implementation of the UNFCCC and its Kyoto Protocol. Under the TJAP framework, some joint activities, such as the Tripartite Green Economic Policy Seminar in 2010, and joint research on the "green growth and low-carbon society" have been organized by focal institutes in the three participating countries. However, no practical progress in multilateral cooperation on climate change issues in the region has been made (CAECC, IGES, and KEI, 2015).

Besides these intergovernmental platforms, scholarly issue-specific and research-oriented dialogue has been active in the region since the Paris Agreement was discussed and adopted at COP 21 of the UNFCCC in 2015. It should be noted that China, as an emerging economy, has played an important role because of its increasing significance in the Paris Agreement, which requires all developed and developing countries to submit nationally determined contributions (NDCs), including mitigations of and adaptations to climate change (Cheng, 2014). This is a visible shift in the method of global environmental governance from the regulatory-based to goal-setting method (Kanie & Biermann, 2017; Sachs, 2015; Young, 2017). Moreover, a shift in China's commitment to regional environmental governance has been observed (Otsuka, 2018). First, China pledged in its NDC to limit CO_2 emissions around 2030, the reason being the increasing pressure from developed countries, to show its commitment to environmental sustainability and its growing economic and technological capacity as the world's largest source of CO_2 emissions. Second, China has been suffering from persistent heavy smog, mainly consisting of $PM_{2.5}$. Lastly, the government has decided to reduce coal usage and undertake industrial restructuring to address their over-consumption of coal, which has been criticized by developed countries.

One prominent example is a series of climate change-related dialogues among scholars and other stakeholders organized by the Institute of Global Environmental Strategies (IGES), a semi-governmental environmental think tank established with the support of the Ministry of the Environment in Japan. At its annual conference, the International Forum for Sustainable Asia and the Pacific (ISAP)—a two-day forum to discuss various aspects of sustainable development in Asia and the Pacific involving officials, scholars, businesses, and other stakeholders in the region—held dialogue sessions between experts from Japan, China, and South Korea, focusing on climate change in 2015 and 2017. At the first session in 2015, the launch of the Japan-China-South Korea Tripartite Climate Policy Research Forum was announced as an effort to promote joint research activities on "science-based climate policies" by core institutions in each country.[9] The session at ISAP 2017 focused on carbon pricing in China, South Korea, and Japan. In addition to the ISAP sessions, the Tripartite Carbon Pricing Forum has been held annually by the IGES and its counterparts in China and South Korea since 2016 (Liu, 2018). Thus, except for

[9] https://isap.iges.or.jp/2015/en/day1/p_3.html.

the TEMM as the highest-level intergovernmental meeting, the platform initiated by the IGES plays an important role in the sharing of knowledge and information about climate change mitigation among the three major countries in the region.

In addition, scholars and researchers have been active in joint research projects in Northeast Asia, especially between Japan and China. Such joint research projects are expected to provide a basis for nurturing a science-based network on atmospheric science in the region (Akimoto, 2016). Meanwhile, many have called for the need to build a platform for addressing the increasing seriousness of air pollution and to coordinate several intergovernmental institutions and other transboundary networks, since no international treaty exists in Asia. In 2014, the UN Environment Assembly adopted Resolution 1/7 of the first assembly, which stated its purpose as "[s]trengthening the role of the United Nations Environment Programme in promoting air quality." Following this resolution, in 2015, the Asia Pacific Clean Air Partnership (APCAP) was established under the UNEP "as a mechanism and platform to promote coordination and collaboration among various clean air initiatives in Asia Pacific" (UNEP, n.d.).

APCAP consists of a science panel that will help create a scientific community in atmospheric science and a joint forum that will assist policymakers in setting targets to improve air quality in the region. Dr. Hajime Akimoto, then-Director General of ACAP in the EANET, and now a visiting scientist at the National Institute for Environmental Studies (NIES) in Japan, is one of the founders of this new initiative. He explained the role of the APCAP Science Panel: "[i]n Asia [,] there is no international framework for the scientific discussion of air pollution to be reflected to policymakers [. . .]" therefore, "[t]here is a strong need to give a clear message and suggestions from the scientific community to policymakers to take proper actions by a single voice" (Akimoto, 2018). This policy recommendation was the output of a five-year joint research project on transboundary air pollution issues in Asia funded by the Japanese Ministry of the Environment (Akimoto, personal interview, June Akimoto, 2018).

As of 2018, the science panel comprised 12 scientists: three from China, two from Japan, two from India, and one each from Singapore, South Korea, Thailand, Nepal, and Austria.[10] One of its Chinese members, Prof. Jiming Hao of Tsinghua University, has been designated the Chair, and Dr. Akimoto has been nominated as the vice chair (Akimoto, personal interview, June Akimoto, 2018).

In 2019, the UNEP, APCAP, and the Climate and Clean Air Coalition (CCAC, https://ccacoalition.org/)[11] jointly published the first regional assessment report, *Air Pollution in Asia and the Pacific: Science-Based Solutions*, to establish a science and policy interface. This was a response to the 2017 Resolution 3/8 of the third UN

[10] Dr. Markus Amann, Program Director of the Air Quality and Greenhouse Gases, International Institute for Applied Systems Analysis (IIASA) joined the panel. He is expected to advise the panel as a European expert.

[11] The CCAC is a global partnership supported by the UNEP and established in 2012 to address the impacts of the short-lived climate pollutants (SLCPs) such as black carbon.

Environment Assembly on "Preventing and reducing air pollution to improve air quality globally" (UNEP, n.d.). The report identified a solution package with 25 cost-benefit measures for the Asia-Pacific region, with multiple benefits in terms of the World Health Organization's (WHO's) Air Quality Guidelines and sustainable development goals (SDGs) while assessing key pollutants in the region, including $PM_{2.5}$, carbon dioxide (CO_2), methane (CH_4), and black carbon (UNEP, APCAP, and CCAC, 2019).

It should also be noted that there were over 100 contributors from the Asia-Pacific region who were involved beyond authoring this report. According to the summary presented by the UNEP, APCAP, and the CCAC (2019), the report was coordinated by four co-chairs from South Korea, China, Austria, and the WHO; and was written by 96 authors. It was technically reviewed by four teams and 47 individuals from Asia, and a number of international organizations and those from other regions of the world.[12] The writers of the report were reported to be volunteers organized by members of the science panel and through other bodies (Akimoto, personal interview, April Akimoto, 2019).

In addition to this science-based solution report, Dr. Akimoto, as the vice chair of the APCAP Science Panel, published the *Clean Air Brief 2019* in January 2019 to emphasize the need to co-control $PM_{2.5}$ and ozone in Asia (Akimoto, 2019), based on his and other relevant science-based studies. Although the necessity of monitoring multiple pollutants has been addressed in intergovernmental efforts, there has been no consensus among intergovernmental initiatives on how to control them (Akimoto, 2018; Lyu, 2017). Thus, the APCAP Science Panel acts as an entrepreneur to innovate a transboundary science network that aims to disseminate clear messages regarding science-based solutions to transboundary air pollution problems together with climate change issues to the stakeholders including scholars, policymakers, and other practitioners in the region.

5 Emergence of Nonstate Actors' Initiatives Toward Energy Transition

It should be noted that civil society has taken much longer to develop a network addressing climate change and energy transition in Northeast Asia. In 2010, the East Asia Climate Network (EACN) was established between NGOs in three countries and has since organized the East Asia Citizen Conference on Climate Change bi-annually (Aikawa, 2011). At the COP 24 of the UNFCCC held in Poland in December 2018, NGOs from three countries—the Rock Environment and Energy Institute (REEI, China), the Kiko Network (Japan), and the Korean Federation of Environmental Movements—jointly published a policy report, "Coal Power Sector

[12] Four teams as technical reviewers came from the Pollution Control Department of Thailand, the UN Environment China Office, the Ministry of Ecology and Environment of China, and the WHO.

in China, Japan, and South Korea: Current Status and the Way Forward for a Cleaner Energy System." This report focused on issues related to coal-fired plants in these countries, advocating that governments and businesses take action to ensure a transition to cleaner energy in the region (Lin et al., 2018).

Moreover, since the accident at the Fukushima Dai-ichi Nuclear Power Plant of Tokyo Electric Power Company Holdings in 2011, several forums on energy transition have been held in this region, specifically focusing on denuclearization and a shift toward renewable energy. The 2017 Asia Democracy Forum was organized by the Democratic Progressive Party of Taiwan and the Taiwan Environmental Protection Union as an environmental NGO at the National Taiwan University on September 2 and 3, 2017. "Environment, Energy and Sustainable Development" was the main theme under the rising momentum for denuclearization in Taiwan, and experts on renewable energy policy from Japan and South Korea were invited. In addition, a symposium on energy transition was held at the National Taiwan University just before the 6th International Symposium on Environmental Sociology in East Asia on October 18, 2017. Experts from Japan and South Korea were invited to discuss the "Fukushima Effect" (Kim & Chung, 2018; Suzuki, 2017), and how to build the momentum of nonstate actors' energy transition networks.[13]

The research group "Energy Transition and Democracy in East Asia" (ETDEA) is a recent initiative hosted by the Institute for Sustainable Energy Policies (ISEP) with generous support by a research project in Tohoku University, a private think tank based in Tokyo that was invited to the Asia Democracy Forum in Taipei to organize researchers and scholars from Japan, South Korea, and Taiwan. In February 2019, they held the first workshop in Tokyo to discuss the experiences of policy success and failure at and after the Fukushima nuclear power plant accident with members from Japan, South Korea, and Taiwan; and of some former policymakers and advisors of the Democratic Party of Japan who were serving when the disaster occurred in 2011. In June 2019, they held a second workshop in Taipei hosted by the National Taiwan University to invite Japanese and South Korean members to discuss the progress and challenges of energy transition in each country. The members of this network have a clear mission to promote renewable and decentralized energy not only in each country, but also in Northeast Asia, while sharing the urgent need to mitigate climate change and air pollution as well as the bitter lessons from the severe accident that occurred in Japan in 2011, as mentioned often in their presentations and personal conversations.[14]

It is worth mentioning that the ETDEA acts as an entrepreneur that aims to reform energy policy in a more renewable and decentralized way in each country, as well as in the region that has been politically sensitive in terms of energy security. As a network initiated by a private independent think tank NGO in Northeast Asia, the

[13] My participatory observations at the forum in Taipei, September and October 2017.

[14] My participatory observations in the Tokyo workshop, February 2019 and the Taipei workshop, June 2019.

ETDEA group cooperated with other institutes to promote the transition from fossil fuels and nuclear power to cleaner renewable energy.

In June 2019, the Industrial Technology Research Institute (ITRI), a semi-governmental research institute in Taiwan, collaborated with the members of the ETDEA group to hold a workshop in Taipei. This workshop aimed to share Japan's and South Korea's renewable energy practices with the local participants.[15] The workshop had 96 participants, including stakeholders such as the central government (4 persons), local and municipal governments (16), universities (4), academic institutes (16), private consulting companies (9), foundations (4), civil society organizations (17), politicians (2), media houses (1), interpreters (2), and foreign participants from Japan (8) and South Korea (2) (ITRI, 2019). It was observed through discussions between foreign experts and the local participants that this *ad hoc* open forum attracted the latter who desired to gain knowledge and up-to-date information on energy transitions achieved in neighboring countries.

It should be noted that the knowledge and information the ETDEA group disseminates is synthesized with the global trends followed by local governments and businesses in the region after the Paris Agreement of the UNFCCC. In particular, local governments and businesses in the region are now aware of the need to develop renewable energy. "Community power," which is a community-based practice to locally produce renewable energy, is a common hot topic in East Asia. This is because it is garnering increased attention from not only the relevant experts, but also local governments, farmers, banks, and other businesses under the landscape transformation of the energy-environment nexus that occurred after the Paris Agreement of the UNFCCC. Thus, the ETDEA group is functioning as a private authority (Green, 2014) by broadening their networks regionally and domestically.

6 Opportunities and Challenges for Further Development of Transboundary Governance Toward Energy Transition

6.1 Landscape Shift for Climate Policy

The Paris Agreement adopted at COP 21 of the UNFCCC came into force in 2016. It requires all parties to undertake ambitious efforts to hold the increase in the global average temperature to well below 2 °C, and to pursue efforts to limit the temperature increase by 1.5 °C above pre-industrial levels (UN, 2015). To achieve this goal, all nations need to put their best efforts into their NDCs and revise them every 5 years. The synthesis report of intentional NDCs by April 2016, however, suggests that their aggregate efforts were not enough to reduce greenhouse gas emissions to adhere to the temperature increase limit set by the agreement, rather allowing its

[15] My participatory observation, June 2019.

continuous increase (UN, 2016). In addition, as of January 2021, only 50 countries have updated their NDCs (since the outbreak of the COVID-19 pandemic).[16] Although there is uncertainty in achieving the climate goal, it should be noted that an increasing number of countries have been setting carbon neutrality—balancing carbon emissions and sinks—as a long-term target recently. The race to net-zero emissions was launched in Western Europe[17] after the Paris Agreement of 2015, and has now been sparked in East Asia since China's announcement in September 2020 (2060 as the target year), followed by Japan in October 2020 and South Korea in December 2020 (2050 as the target year in both countries).[18]

In addition to those national governmental commitments, the race to net-zero emissions has been spreading among various actors in the world. The Climate Ambition Alliance led by the governments of Chile and the United Kingdom together with the support from UN organizations are mobilizing a wide range of nonstate actors including business, cities, companies, investors, universities, and other organizations to join the global campaign, "Race to Zero." There are 7877 participants registered on the website, including those from Japan (180 participants), China (120), South Korea (37), and other Asian countries.[19]

Besides such an ambitious shift for climate response by the state and nonstate actors, various actors across the world have shared wide concerns regarding the looming climate crises. According to the global campaign "Climate Emergency Declaration and Mobilisation In Action," launched from a local city council in Australia in December 2016,[20] 1854 jurisdictions in 33 countries have declared a Climate Emergency by December 2020, most of which (1807) are local governments, but others include 32 subnational or state governments, 14 national governments, and the EU.[21] In East Asia, the declaration has been adopted in Japan (the National Parliament, Tokyo Metropolitan Government, Nagano Prefecture, Kanagawa Prefecture, and 42 local governments), South Korea (the National Assembly, National Association of Mayors, and Chungcheongnam-do Province), the Philippines (Bacolod City, Cebu City, and Tolosa Municipal Council), and Taiwan (New Taipei City and Taitung County).[22]

Recently, an increasing number of people have experienced real climate crises through frequent extreme weather events. The Global Risks Perception Survey on an extensive network of the World Economic Forum (WEF) including more than

[16] https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement/nationally-determined-contrinutions-ndcs/NDC-submissions.

[17] https://www.weforum.org/agenda/2019/07/the-growing-list-of-countries-committing-to-a-net-zero-emissions-goal/.

[18] https://news.un.org/en/story/2020/12/1078612.

[19] https://racetozero.unfccc.int/join-the-race/whos-in/ (Accessed on November 1, 2021).

[20] https://www.cedamia.org/news/four-years-of-climate-emergency-declarations/.

[21] https://www.cedamia.org/news/four-years-of-climate-emergency-declarations/.

[22] https://www.cedamia.org/global/.

600 leaders from business, government, civil society, and others tells us that extreme weather has been recognized in the last 5 years as a top priority risk "likely to occur in the next 10 years" from the time of the survey (WEF, 2021). It is pointed out that recent extreme weather events observed in many parts of the world such as heat waves, heavy precipitation, droughts, and cyclones are likely influenced by human activities (IPCC, 2021, pp. 8–9). These events have not just made people feel fearful regarding the future, but have also had great impacts on the vulnerability of the existing energy system. For example, Japan has been experiencing widespread blackout accidents due to extremely intense typhoons in the Kansai area (Osaka Prefecture and surrounds) in 2018 and the Kanto area (Chiba Prefecture) in 2019. In response to the increasing natural and manmade disasters in the region, APEC member economies have been discussing "energy resilience" since 2015 and endorsed the APEC Energy Resiliency Principle in August 2020.[23]

6.2 *Opportunities for Transboundary Cooperation Toward Energy Transition*

These recent landscape transformations around climate and energy issues could provide both opportunities and challenges for further development of transboundary governance toward energy transition in East Asia. As for opportunities, first, there is the same long-term goal of carbon neutrality among three major countries in East Asia—Japan, China, and South Korea—although the target years are different (2060 for China and 2050 for Japan and South Korea). To achieve this goal, it is expected to accelerate decarbonization of energy supply and consumption, which are still dependent largely on fossil fuels, through further development of renewable energy systems. In terms of renewable energy development, the Taiwanese government is also heading in the same direction (see the relevant Chapter in this book). In this sense, decarbonization of energy sources can be an important opportunity for joint climate actions by governments, businesses, and various nonstate actors in this region. According to an analysis of transboundary economic integration and water-energy-food interdependence in this region (White et al., 2018), China is the largest exporter of water, energy, and food to Japan and South Korea. Thus, it is important to seek the interests of not only a single country, but also regional common beneficiaries toward planetary sound energy transition by mutual learning and cooperation regarding emerging integrated policies of economy, environment, and energy including "green growth," "green new deal," and "green recovery from COVID-19." This may be done under an existing institution such as the TEMM or APEC or a new relevant platform built for all concerned economies. In addition to policy learning and coordination, there could be a potential to monitor and evaluate climate policy progress by monitoring air pollutants with climate impacts by

[23] http://mddb.apec.org/Documents/2020/EWG/EWG59/20_ewg59_023.pdf.

updating transboundary monitoring and scientific networks that have been developed over these decades in the region.

Second, the recent rapid landscape transformation provides an important opportunity for the various nonstate actors to introduce and disseminate new technology and policy for cleaner and safer energy systems. Especially in terms of decentralized and nature-based renewable energy systems such as solar and wind power, there could be an advantage for nonstate actors including venture businesses, research institutions, and expert-led NGOs to learn, analyze, and disseminate up-to-date knowledge and knowhow. For example, "community power" (community-based renewable energy system) and "solar sharing agriculture" (agriculture farming under the solar system) are initiated by a coalition of multi-stakeholders, including local communities, local governments, NGO/NPOs, universities, social businesses, local banks, and so forth (see the relevant Chapter in this book). As a private authority in the region, nonstate actors who can afford to act both internationally and locally could have the potential to develop and proliferate such local practices when they connect with national, regional, and global networks (Otsuka & Cheng, 2020), including the global alliance of the race to net-zero mentioned above.

6.3 Challenges Toward Energy Transition

However, there are several challenges to be addressed. First, it needs to mitigate the socio-economic impacts of the rapid transition of the energy system, and secure technological and social safety during the transition. According to one scenario of renewable energy development to meet the Paris Agreement target by the mid-century, it is estimated that 3034 thousand jobs will be lost in the conventional energy sector, including nuclear power and fossil fuels; and 4257 thousand jobs will be created in transition-related sectors including renewable energy, energy efficiency, and power grids and energy flexibility from 2017 to 2050 in Japan, China, Korea,[24] and Mongolia (IRENA, 2020). Although it is estimated that 1223 thousand jobs will be created in these countries by 2050, securing job losses in old sectors while training personnel in new sectors is a major challenge (IRENA, 2020). In terms of human resource allocation in transition, caution should also be exercised regarding how to secure skilled personnel to manage nuclear power technology, including reactor decompression during the transition toward denuclearization. In addition to these personnel factors, conflicts with local communities should be carefully avoided while constructing a renewable energy system, especially large-scale facilities of solar power, wind power, and hydropower. These challenges encourage us to work together toward a just and safe transition regionally and globally.

[24] It includes both North and South Korea.

Second, the way toward decarbonization of overseas investment by public banks in the three major countries in East Asia should be considered, although their national leaders have pledged net-zero emissions in 2020. According to Greenpeace, public banks in China, Japan, and South Korea invested 78.9 billion USD in coal and gas, while investing 9.1 billion USD in solar and wind power from 2009 to 2019. Moreover, some of the top financiers of fossil fuels globally are found in these countries (Greenpeace, 2020, p. 3). Although both public and private financiers in Japan and South Korea have announced their commitment to the decarbonization of overseas projects in 2020, it has been revealed that there is a gap between their willingness and decision, as seen in the case of a coal-fired generation project in Vietnam to be financed by the Japan Bank for International Cooperation with major Japanese private financiers, Korea Electric Power Corporation, and the Export-Import Bank of Korea.[25] It is time for all financiers in East Asia to shift their investment from fossil fuels to renewable energy, such as solar and wind power, which has large demands in Southeast Asia and other developing countries (Greenpeace, 2020, pp. 5–9).

Third, building a resilient energy system against frequent natural disasters should be included as an important agenda of energy transition projects in this region. Except for individual efforts in each country and the energy resilience principle adopted in APEC, joint actions and cooperation on energy resilience are lacking both regionally and globally. Major challenges toward a resilient energy system would be how to decentralize energy sources and how to control grid networks flexibly (METI, 2020). In this sense, decentralized renewable energy such as solar power has an advantage in terms of energy resilience. For example, in the case of Typhoon Faxai that struck Chiba Prefecture in 2019, 79.8% of the households that installed photovoltaic at their rooftops utilized their self-sustained operation during the blackout.[26] It should be noted, however, that there are no comprehensive data about the types and scales of energy system that could be resilient against natural and manmade disasters. It needs to conduct a systematic survey in each country as well as in the region and beyond.

7 Conclusion

This chapter depicts how regional cooperative initiatives by states and nonstate actors to tackle with transboundary air pollution and climate change. Multilateral cooperative institutions in East Asia have focused on monitoring of air pollutants or information sharing of related policy and measures among member countries. It should also be noted that there are some transboundary coalitions of independent scholars and research-type NGOs in Northeast Asia conduct joint research on the

[25] https://www.kikonet.org/eng/press-release-en/2020-12-29/VA2-JBIC.

[26] The sample size was 486 households in the area (https://pps-net.org/column/79250).

potential and challenges of decarbonization of energy systems and disseminate up-to-date knowledge and information on decentralized nature-based renewable energy under the landscape change toward cleaner and safer energy in the region. In addition, a very recent landscape shift toward carbon neutrality and the deepening concerns for climate emergencies provide both opportunities and challenges to the further development of transboundary cooperative governance toward energy transition. On the one hand, there are opportunities as an increasing potential for multilateral policy dialogue beyond the borders and broadening partnerships for local and regional coalitions with global alliances. On the other hand, there are challenges to a just and safe transition, greening overseas financing, and seeking energy resilience. In addition to these opportunities and challenges, we should consider technological, economic, and social uncertainties in deeper decarbonization, introducing new energy such as hydrogen, earth engineering, and carbon capture and storage with a long-term perspective. The first and most important thing is to move toward a better future through mutual learning and cooperation while enjoying fair competition in seeking an art of a cleaner, safer, just, and resilient energy transition locally, regionally, and globally.

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