The Participation of NGOs in Technology Policy: The Shaping of Feed-in Tariffs in Korea[1)]

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Abstract

What difference is made by the participation of NGOs (non-governmental organisations, such as citizen movements, pressure groups) in government technology programs? We address this question by investigating the contributions NGOs have made to the Feed-in Tariff (FIT) program in Korea. NGOs have argued for a substantial shift in energy practices. They advocate self-reliant lifestyles, on-site generation and use of energy, and more frugal consumption of energy. NGOs were engaged in the FIT process, and hoped to realize a distributed and self-reliant energy system. They did not, in fact, shape the operation of the FIT in a major way. However, they did play the role of green lead users in one respect through their participation. NGOs influenced the design of the FIT so that it supported small-scale Solar PV power generators. While the capacity of such generators is minimal, there might be the seeds here for a wider transformation of social convention in energy generation and consumptionbehavior. We conclude by drawing wider lessons for NGO participationin technology policy.

Keywords: NGOs, Green Lead User, Self-reliant Lifestyle, Feed-in Tariff, Participation

1. Introduction

Technology policies have typically been regarded as the domain of experts (Guston, 1996). Information asymmetry between citizens, governments, and experts is widely seen to be a legitimate reason behind the delegation of decision making to experts. Citizens are often perceived as being insufficiently knowledgeable to make scientific and technological decisions as described in the 'deficit model' (Wynne, 1991).

Yet the experts also suffer from their own limitations. Modern society has become more sensitive to "risks" associated with science and technology (Beck, 1992). There exists inherent uncertainty in scientific and technological knowledge and in understanding the effects of their application. Politicization of scientists and technological experts make things even more complicated (Nelkin, 1975). The authority of expertise becomes a new political battleground rather than the basis of rational policy.

Public participation in the government decision-making process is thus widely encouraged as a way to address these limitations of experts (Schienstock, 1994). The participatory mechanism aims to enhance not only the democratic legitimacy but also the knowledge pool of a public decision-making process.

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Ideas and visions of the members of a society, including non-governmental organisations[2] (NGOs), may prove to be critical input to new developments in science and technology. NGOs can be expected to be better informed than average citizens, while representing at least some groups of non-experts.

Public participation, however, creates its own complications. First, the opinions of participants can be so varied that it would be very difficult to come to an agreement. Grant-Pearce et al. (1998) find substantial mismatches in priorities for health research between professionals in and users of the National Health Service (NHS) of the U.K. Although the participation and ensuing dialogue would engender greater mutual understanding, it would not eliminate these mismatches. The incommensurability exists. Second, governments themselves can shape the participation process. Pratchett (1999) warns of the possibility that a participation initiative can be used as a government public relations exercise, enhancing the legitimacy of policy decisions by giving the appearance of greater public control. The participation of the public certainly fulfils a democratic principle and can be instrumental in the government policy process by mobilising public support. Yet the exchange of ideas and mutual learning among participants do not necessarily produce a substantive outcome.

Now comes the need to look more closely at the contributions of NGO participation. The heterogeneity of ideas and susceptibility to political influence make the contributions of NGOs problematic. One cannot but ask what new benefit, other than increasing transparency, NGO participation brings to the government policy-making process. It may be good to consult with NGOs, but what difference does it make?

First, the paper reviews broad literature to identify possible contributions NGOs might make. The notion of "user lock-in" is introduced to illuminate the unique contributions of NGOs to technical change. The dynamics of collaboration between experts and NGOs is also discussed to understand the mechanism through which NGOs' contribution is integrated. Second, as a case study, it analyzes the shaping of the Feed-in Tariff system in Korea. The Feed-in Tariff program is identified as a useful policy measures for the diffusion of renewable energy (Lipp, 2007). The government sets the standard price of electricity from renewable energy sources and subsidizes the difference between the standard price and the market price of electricity for a long period, in this case 15 years. Since it directly affects the pattern of use of renewable energy technologies, the shaping of the FIT program would illuminate the unique contributions NGOs may make. The context, activities, and the output of NGO participation are examined.

2. Contributions of NGOs to Technology Development

2.1 NGOs as Lead Users

First of all, a discussion on the role of users in the innovation process would illuminate the contributions from NGOs. Users, whether they are individual consumers or firms, have been recognized as an important source of innovation (Von Hippel, 1988; Lundvall, 1988). Innovation can be defined as a problem-solving process, the basis of which is the interaction between users and producers. Since users not only raise the questions but also bring needed information to the problem, technology development is not the exclusive domain of producers. The manufacture-centric innovation model has often been criticized.

Von Hippel (1986) suggests the notion of "lead users" to elaborate this user-driven innovation activity. Lead users are defined as those who face future needs before the market encounters them and are positioned to benefit significantly by obtaining a solution to those needs. Unlike ordinary users who are stuck in the present and constrained by their familiarity with existing product attributes and uses, lead users have real-life experience with novel products or process concepts and may have insights into new product

2) NGOs are voluntary, non-exclusive, and non-profit organizations that are working for public good (Park, 2006: 149-159).

needs and potential solutions. The identification of lead users and the incorporation of their insights, thus, may prove to be critical in new-product development.

In addition, lead users can be instrumental in the diffusion of a new product by persuading other users to adopt it (Mangematin & Callon, 1995). Firms are keen to find lead users who are representative of a social group and can influence other potential adopters when they launch a new product. Lead users not only can provide needed information and a new product design but also accelerate the diffusion of a new product.

Some also suggest the concept of "interpretative flexibility" as the basis for users' contributions to technical change from a sociological perspective (Pinch & Bijker, 1987; Williams & Edge, 1996). The concept was developed to account for the fact that the use of a technology by ordinary people does not always coincide with the designer's original thinking or purpose. Users can make a "choice" in relation to the form and use of a technology. The meaning of 'use' can be different among users. Technology development is not an autonomous linear process determined by experts, but an interactive social process shaped by the context generated by those individual choices.

What is interesting from this sociological insight, thus, is that "the pattern of use" in addition to the design of a technology can be different among users. For instance, some might prefer using a technology on a large scale, capitalizing on economies of scale, while others may insist on small-scale use. The differences in interpretative flexibility in relation to use may turn out to be the source of critical contribution from NGOs as lead users. A discussion on the principle of self-reliant lifestyle practiced by the "Alternative Technology Movement" would illuminate this.

2.2 NGOs as Green Lead Users

Schumacher's "Small is beautiful"(1974) warned about the economic inefficiency, environmental pollution, and inhumane working conditions of the current economic system and proposed a "smaller-scale" lifestyle. Alternative technology (AT) movements, among many things, followed the rule of "economic restraint" as a positive and deliberate lifestyle and tried to realize the vision that production and consumption need not be confined to the factory and home, but could be fused into the community (Boyle & Harper, 1976). They chose to live differently, practicing a self-reliant lifestyle, with "on-site generation and use of material and energy, and its frugal use." The interpretative flexibility of AT movements enabled technologies to be put into a different pattern of use. The 30-year activities of the AT movement has proved that the principle of local generation and use of material and energy is practicable, if not of widespread use (Smith, 2003). They have invaluably helped to view technical change not just in terms of economic growth but "economic transformation."

The reason that the principle of a self-reliant lifestyle can be one of unique contributions from NGOs is that it directly addresses the structural and institutional constraints of current energy and material systems, which could be called "user lock-in[3]." Two types of user lock-in can be identified.

First, people are locked into the large centralized energy generation and distribution system. The industrial economy's current energy system is so locked into carbon-based technologies that not only increase the level of atmospheric CO_2 inevitable, but make transition to new carbon-saving or non-carbon-based technologies hard (Unruh, 2002). A large centralized electricity generation and distribution system is sustained by a national electricity grid system, a few large suppliers, and distributors. The downside is that the system inertia, or rigidity, prevents society from making a transition to a new energy system with new technologies. For instance, the cost of grid connection sometimes prevented wind power stations from being built in some of the most reliably windy parts of Europe (Street & Miles, 1996).

3) User lock-in can be understood as an extension of the concept of "technological lock-in," which is identified with the emergence of a dominant design (David, 1985; Arthur, 1988).

Second, people are also locked into modern lifestyles based on high levels of energy and material consumption. The shared understanding of consumption objectives such as comfort, cleanness, and convenience influences the level of resource requirements of everyday life such as those associated with wearing fresh clothing or daily showering (Shove, 2003). The level of resource use, thus, is very much conditioned by the social conventions of consumption as well as by individual environmental commitments. In addition, these conventions of consumption are very much intertwined with science and technology. For instance, people often choose their clothes according to the room temperature set within a comfort zone specified by scientific methods. Human beings in modern society live not only in a natural environment but also in a technological world that preconditions the level of resource consumption above a certain level. Applying pressure to halt the further accumulation of resource stock and reducing their flow requires a cultural and political initiative much more than the introduction of new technologies[4] (White, 2002).

The policy of on-site generation along with the principle of frugal use of energy and material, however, can break up these user lock-in situations. With renewable energy technologies, people can generate and use electricity on-site without depending on power from more distant region. Namely, they can reconfigure the normal way of doing things, reclaiming control of the resource consumption level, which is tied to the technologically intertwined modern lifestyle. By choosing a small-scale self-reliant lifestyle in association with new technologies, NGOs can spearhead the green transformation of a society.

This unique contribution by NGOs, therefore, indicates that they can become a different kind of lead user. They can bring local information needed for the design, network capacity for the diffusion, and a new lifestyle for a new pattern of use. In other words, they can play the role of "green lead users," which has serious implications for the current energy system as well as social conventions of consumption behavior. It is with this contribution that the participation of NGOs can make a difference in government technology development programs.

2.3 Collaboration and Object Conflicts

The question is then to what extent such contributions of NGOs as green lead users could be integrated into government policy. The susceptibility to political power as well as heterogeneity would impinge on the outcome of the interaction between or among participants. The discussion on collaboration between scientists and non-scientists, and "technology- and product-oriented movements[5] (TPMs)" would illuminate the dynamics of such collaboration.

Bunders and Leydesdorff (1987) suggest two dimensions that affect the collaboration between scientists and non-scientists; the degree of institutional integration and the degree of cognitive framework compatibility. If the relations between two collaborators are based on a high degree of institutional integration and cognitive compatibility, for instance those between universities and industries, in particular science-based industries, it is highly likely that collaboration will occur. Collaboration between scientists and environmentalists, however, may be much less likely to occur due to its low institutional integrity and low cognitive compatibility. For instance, NGOs' cognitive framework regarding the pattern of use may not be compatible with that of other participants.

Bunders and Leydesdorff (1987), however, also suggest that these difficulties can be overcome by two driving forces of collaboration. Resource-based coalition and value-based coalition among scientists and non-scientists form the basis of collaboration and drive the effort to reconcile the differences. Out of

4) Since the efficiency gains from new technologies are translated into a reduction in unit cost of energy and material, users may increase the amount of resource consumption, countervailing efficiency gains at the system level and causing a "rebound effect" (Greenings et al., 2000).

5) Hess (2005) defines TPMs as mobilization of NGOs that are generally linked to the activity of private-sector firms, for which the target of social change is the support of an alternative technology as well as the policies with which it is associated. In general, their mode of action involves more emphasis on building and diffusing alternative forms of material culture and less on the politics of protest (p.516).

collaboration participants can gain material interest and/or realize their visions. The creation of new disciplines such as ecology would be a good example of an outcome that benefited from resource-based coalition and value-based coalition between scientists and environmentalists.

According to Hess (2005), however, the outcome of collaboration between firms and NGOs seems to be bound to partial integration of the original visions and ideas of the participants. His case studies of TPMs show that compromise is inevitable because NGOs need firms or experts to produce technologies or products they want. The compromise sometimes would even involve cooptation. "Object conflicts" are suggested to be an accurate description of the outcome of collaborative activities rather than a product or technology of consensus. That which is not compromised remains in the form of a conflicting object, preparing a next round of technical change. It is thus argued that the success of NGOs collaboration activities ought to be judged not by the extent of compromise but by the emergence and scale of such object conflicts.

Given that the unique contribution NGOs may make is primarily related to the pattern of use, the cognitive framework of NGOs with regard to small-scale use would form the basis of object conflicts. The self-reliant lifestyle, the principle of on-site generation and use, and the frugal consumption of energy may have to be compromised during the collaboration process. The nature and strength of political coalition among the participants would impinge on their interactions and outputs. The characteristics of object conflicts would show the degree of such collaboration—the extent to which NGOs' cognitive framework in relation to the pattern of use has become compatible with that of others.

3. Methodology

This paper aims to illuminate the differences participation by NGOs would make to a government technology program, in addition to increasing transparency. It has been identified that NGOs can play the role of green lead users, breaking up user lock-in and triggering changes in consumption behaviors. The main question of this paper, therefore, is to determine to what extent this contribution as green lead users is integrated into government policy. Three subsidiary research questions are put forward;

- What forces are behind the participation of NGOs in the NRETP? What is the nature of political coalition among participants?
- What kind of interaction has occurred during the collaboration? Has the cognitive framework of NGOs with regard to the pattern of use been an issue of interaction?
- What kind of object conflicts has resulted?

The first question addresses the context where the participation of NGOs has taken place, while the second question examines the interaction among participants. The final question evaluates the differences the participation has made.

A case study approach is adopted for this research because it is useful to investigate a contemporary phenomenon within its real-life context (Yin, 2003). It involves in-depth, longitudinal assessments of a case and helps to illuminate underlying driving forces. Since this research aims to uncover the existence and nature of NGO contribution and their integration into government policy, the investigation of an in-depth single case with a thorough theoretical framework would suffice the logical rigor required for analytical generalization[6].

The New & Renewable Energy Technology Program (NRETP) was selected as the case not only because environmental NGOs took part in its decision-making body but also because it implemented Feed-in Tariff (FIT) as its sub-program (MKE, 2009; KNREC & MOCIE, 2006). Since the FIT directly affects the pattern of use of renewable energy technologies, NGOs would be keen to influence the design of the FIT program to promote their vision of frugal and small-scale self-reliant energy generation and consumption

6) Several case studies would certainly illuminate the dynamics and conditions that affect the contribution of NGOs to government programs more extensively, the scale of which requiresyet another project.

behaviour.

The data and information are gathered from various documents such as laws, government notices, guidelines and rules, official publications, and R&D statistics. In-depth interviews with 26 persons were conducted to gain not only information that is not available from the documents but also insight into the evolution of the feed-in tariff system in Korea. Table 1 shows the affiliations of interviewees.

4. Shaping of the Feed-in Tariff Program

4.1 Changes in Policy Regime: Participatory Governance

A strong government that can act as a "developmental state" is recognized as one of the prime managerial institutions that have enabled the rapid industrialization of several latecomers (Amsden, 1989; Chang, 1994; Jenkins, 1994). The mission-oriented efficient government has directed productive investment, disciplined industry and labour, sanctioned grandiose unproductive projects, and set the performance targets for exporting firms. In addition to the experience of Japan, those of several East Asian countries and some Latin American countries are presented as evidence for the "developmental state" model of late industrialization. The authoritarian bureaucracy is noted as one of the unique features of these countries.

The energy system in Korea has been largely built by such strong governments (KEEI, 2006). "Nation-building" was the immediate goal of national policy, and consequently the goal of energy policy was the construction of modern energy infrastructure. Various state-owned energy corporations were established to ensure steady and secure energy supply. This state-driven development of a supply-dominated energy system was crucial to the rapid industrialization.

Table 1 Affiliation of interviewees

Government	University/ GRI*	Industry	NGOs	Total
8	4/4	7	3	26

* GRIs : Government-sponsored Research Institutes

Although after the financial crisis in 1998 the public utility company, Korea Electric Power Company (KOPEC) divided its generation business into six subsidiary electricity generating companies and launched the Korea Electricity Exchange (KPX) as the sole market place for electricity, the electricity industry in Korea is still highly regulated and largely owned by the government.

In recent years, however, some changes have been observed in this authoritarian developmental state. The launch of the "Korea National Commission on Sustainable Development" (KNCSD) in 2000 provided an opportunity for NGOs to integrate their concerns into government energy policy (KEEI, 2006). Representatives from NGOs became members of the commission, which reviewed and made recommendations to the president regarding key government energy policies such as the National Energy Basic Plan, the Electricity Demand & Supply Basic Plan, and the Energy Use Rationalisation Plan. The participation of NGOs in the government policy-making process became more popular during the term of the following government, which called itself a "participatory government." Participation by more than five representatives from NGOs was legally required in the newly created National Energy Committee (NEC), which is the highest decision-making body for energy policy.

Other areas also witnessed the participation of NGOs. The National Science & Technology Council (NSTC), the highest deliberation body for science & technology policy, chaired by the president, opened its membership to NGOs in 2004 (Seong, 2006). A representative from the People's Solidarity for Participatory Democracy (PSPD), an NGO, became an official member of NSTC, joining members from the industry. The goal was not only to increase the transparency of government activity but also to utilize the expertise of the industry and civil society. The participatory government strongly supported the sudden, yet government-wide, participation of NGOs.

The participation of NGOs in the governance structure of the New & Renewable Energy Technology Program (NRETP) took place within this context.

As indicated in Table 2, the Center for Energy Alternatives (CEA) became a member of the New & Renewable Energy Policy Council (NREPC), which was the final deliberation body of the NRETP in 2004 (MKE, 2009). The government at that time strongly encouraged NGOs to take part in the government decision-making process. Since 2004, the CEA has been actively campaigning for the replacement of the mega-scale, centralized energy system based on fossil fuels and nuclear energy with a small and distributed system based on renewable energy (CEA, 2000). Although the CEA has a rather clear vision regarding renewable energy technology, its participation in the NREPC was not an isolated incident[7].

Participation by NGOs, however, suffers from limitations. First, it was largely driven by the government. While two consecutive governments, those of Kim Dae-Jung and Roh Moo-Hyun, had promoted the participation of civil society in government policy making, the following government, that of Lee Myung-Bak, has not paid much attention to the voice of civil society but been more concerned with the control of them and hence been criticized for lack of communication with NGOs (Park, 2010). The basis of participation by NGOs was in fact very vulnerable.

Second, the fundamental problem of participation activity is pointed out; it was used just as a public relations exercise (Cho, 2005; Chang, 2005). Even though NGOs have campaigned for transparency of the government policy-making process and so that their participation could be understood as progress in the broad context of democratization of an authoritarian developmental state, it was driven by the government. More often than not, the participation was requested after a problem had already occurred and appeared to be used only to lend legitimacy to the government's action. The "growth-first" goal of the government also persisted. For instance, policy priorities given to the construction of large buildings, industrial complexes, and infrastructure obstructed the integration of NGOs' visions of more environmentally sustainable regional development (Lee, 2004).

Third, the personalization[8] of the participation is criticized (Chang, 2005; Park & Lee, 2007). They argue that some NGO activists became "environmental aristocrats," who were more attuned to the social clubs of politicians, business persons, and experts than to NGOs. Personal connections and reputation sometimes became more important criteria for participation. This elite-centered participation raised serious questions over the identity of NGOs. These limitations on NGO participation were also witnessed in the NREPC. The member from Center for Energy Alternatives (CEA) formally resigned after three years participation. The Korean Federation for Environmental Movement (KFEM) took its place in 2007 (MKE, 2009). Interview records reveal that limitations on participation, both the dominance of a government agenda and the personalization of participation, were the reasons behind the resignation of the CEA. It was not, however, an isolated incident, because other NGOs walked out of various government committees (Lee, 2005).

Table 2 Membership of New & Renewable Energy Policy Council

	2004	2005	2006	2007
Government	8	8	8	8
Industry	3	3	3	3
GRIs	2	2	2	2
University	2	2	2	2
NGOs	3	3	3	3*

* 'Centre for Energy Alternative' resigned and 'Korean Federation for Environmental Movement' became a new member.

7) The Korea Consumer Education Center and the Korea Consumer Affairs Institute were also appointed as members of the council, yet their involvement is more related to the realization of democratic values than environmental values, according to several interviewees. The CEA changed its name to Energy Vision in 2006.

8) You & Wang (2006) argue that the personalization of participation is due not only to individual decisions but also to a characteristic of Korean society: the high density of the human network. There is a strong inclination to use the personal network where the high density of the human network plays a very instrumental role in everyday life. There exists a social context within which this personalization is encouraged.

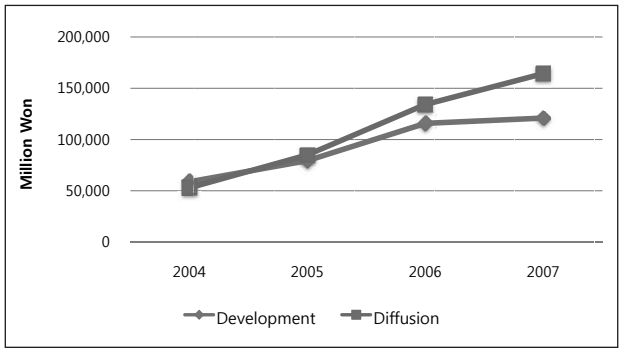
4.2 Evolution of a New & Renewable Energy Technology Program (NRETP)

The New and Renewable Energy Technology Program (NRETP) was launched in 1988 to develop, use, and disseminate new and renewable energy technologies (MOTIE, 1996). The consecutive oil crises in the 1970s exposed the vulnerability of the Korean energy system and encouraged the government to seek ways not only to diversify its sources of imported energy but also to reduce the country's dependence on oil. The NRETP has instituted various measures to support both the development and the diffusionof new and renewable energy technologies (KEMCO & KNREC, 2006).

"The 2nd 10 Year Basic Plan for New & Renewable Energy Technology Development, Use, and Dissemination (2003~2013)", which is announced in 2003, marked a critical point in the evolution of the NRETP (MOCIE, 2003). The plan set a new goal for the new-and renewable-energy supply: in terms of total energy consumption, 3% in 2006 and 5% in 2011; in terms of electricity supply, 2.4% in 2003 and 7% in 2011. The budget had to be increased dramatically to meet these goals. Between 2004 and 2007, expenditures on technology development programs almost doubled while those on technology diffusion programs more than tripled, as indicated in Figure 1.

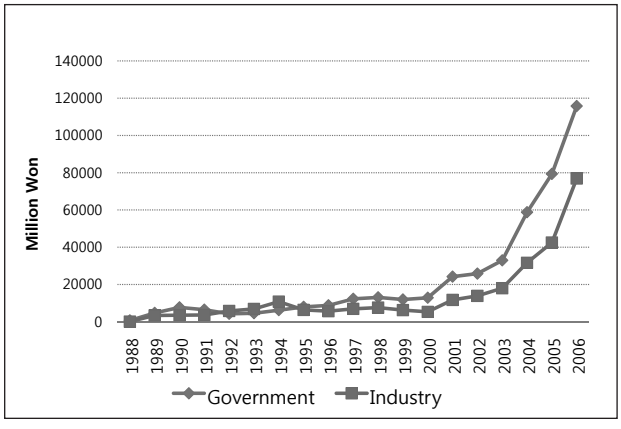
The sudden raising of goals and rise in expenditures reflects domestic industrial dynamics. Industry as well as the government had been looking for a new "growth" opportunity and found new- and renewable-energy technologies to be an appropriate candidate. The "Fuel Cell" technology program under the NRETP had already been selected as one of the "10 Next-Generation Growth Engine Projects," the flagship R&D program of the government (MOFE, 2003). The corresponding dramatic increase in industrial matching funds provided to the NRETP as shown in Figure 2 indicates the interest of industry in the development of new- and renewable-energy technologies. In addition, more than 75% of the principal investigators of the technology development projects commissioned under the NRETP between 2004 and 2006 were large firms (Lim & Kim, 2011). The investment in renewable energy technologies also contributed positively to the environmental credentials of those participating firms. Since the NRETP was the right place to develop and test this new opportunity, the raising of the goals as well as the increase in expenditures of the NRETP was sudden, yet not surprising.

This evolution of the NRETP after the 2nd Basic Plan in 2003 also involves a change in the governance structure. NGOs began to participate in the governance structure of the NRETP in 2004, as illustrated in the previous section. What is interesting to note is that NGO participation in the NRETP was not driven by NGOs themselves as much as it was by the government, industry, and the research community. In the broad context of democratization, the government opened up the window of opportunity



Source: KNREC (2008) and MKE et al. (2008)

Figure 1 NRETP expenditure by sub-program



Source: MOCIE et al (2007)

Figure 2 Expenditure on technology development: Government and industry

for NGOs to lend their voices to public affairs. The research community needed support from NGOs to maintain the level of research funding. Industry saw the potential for new businesses and environmental credentials. In other words, the symbiosis of the government, research community, industry, and NGOs within the NREPC and DOs was very much attributed to the resource-based coalition rather than the value-based coalition[9]. The evolution of the Feed-in Tariff Program also reflects this primacy of resource interest among participants, while demonstrating small but important differences.

4.3 The Development of the Feed-in Tariff Program

The origin of the Feed-in Tariff (FIT) program can be traced back to the Electricity Business Act in 2000 where priority purchase of electricity generated from alternative energy sources is stated (KERI, 2006). The law did not, however, mention any specific tariffs for electricity. It is Article 11.6 in the Act on the Promotion of Alternative Energy Development, Use, and Diffusion that requires public notice of standard prices for electricity from various new-and renewable-energy sources. In March 2002, by MOCIE Notice 2002-108[10], the FIT came into being as one of the principle diffusion measures of the NRETP.

What is interesting to note is that the introduction of the FIT was initiated not by a campaign by environmental NGOs but by demand from industry. According to interviewees, one local wind farm company lobbied the government regarding the need for an FIT to support the development of the renewable energy industry in Korea, which was one of the recommendations from the report produced by the German consulting company it had commissioned[11]. Environmental NGOs joined forces in this initiative by industry by contributing to the consultation report and lobbying the members of the National Assembly for amendments to Article 11.6 (MOCIE, 2001). While NGOs took the back seat during the introduction of the FIT, their participation in the NREPC gave them a direct opportunity to influence the evolution of the FIT.

There are two types of subsidy measures for the diffusion of new- and renewable-energy technologies; installation subsidy or operation subsidy. The Korean government has been subsidising installation in the range of 60% to 80% through the diffusion program since 1994. It also launched its "100,000 Solar PV House" program subsidising up to 60% of the installation cost of 3kW roof-top solar PV facilities in residential houses in 2004 (MKE et al., 2009). Since these programs support only self-consuming power generating facilities, which usually have to be small and roof-top based, they are able to demonstrate that energy can be generated and consumed on-site. They, however, do not provide any incentive to encourage behavioral change to frugal consumption, because the extra electricity the facilities might produce cannot be sold to others, nor stored. In fact, the rebound effect, an increase in electricity consumption, has been observed among people using these facilities under the installation subsidy scheme (Yun, 2008).

The FIT, however, presents a different incentive system; subsidizing the operation of facilities, not the installation. By paying the difference between the standard price and market price for electricity, the government procures electricity from those new- and renewable-energy facilities. The FIT not only creates a market for electricity from new- and renewable-energy sources but also an incentive system for a behavioral change to frugal consumption. It might even strengthen the performance of power stationsthrough increased competition, because people would like to have more efficient power stations (Lee, 2004).

9) Lim & Kim (2011) argue that the emergence of the renewable energy industry in Korea, a latecomer, was driven by this coalition led by industry, experts, and government while NGOs played a leading rolein first-mover countries such as Denmark or Germany. The resource-basis of the coalition precedes the value-basis in latecomer countries.

10) The Ministry of Commerce, Industry and Energy (MOCIE) was in charge of the NRETP. The Ministry of Knowledge and Economy (MKE) has took over the program in 2008.

11) Interviewees from NGOs, the government, and industry all acknowledged that the introduction of the FIT was initiated by industry.

The FIT, however, generated conflicts among participants with regard to cost and scale. While the government tried to meet the goal of renewable-energy supply with least cost, the CEA aimed to promote the self-reliant lifestyle, on-site generation, and frugal use of energy. The replacement of FIT and support for small-scale power generators were the battle lines over which the differences in the cognitive frames of government and the CEA were manifested.

As far as the government is concerned, cost burden is the problem with the FIT caused by policy measures. In 2007, it cost around 27 billion KRW. According to the 2nd 10 Year Basic Plan, this will rise to more than 700 billion KRW in 2013, consuming around 50% of all expenditures of the NRETP. The criticism is that the FIT would merely shift fuel imports to equipment imports. The government thus attempted to replace it with the "Renewable Portfolio Standard" (RPS) system. The RPS system requires the electric power utilities to supply a certain amount of electricity from new- and renewable-energy sources; the target needs to be agreed upon with the government, but the methods to achieve it are up to the utilities' discretion. Since the RPS utilizes market mechanisms and no longer requires the compulsory government procurement of electricity, the issue of cost burden can be resolved.

The CEA, however, successfully resisted the government's attempts. First, it argued that the RPS was highly likely to obstruct the development of currently expensive renewable energy technologies such as solar PV. Second, it also argued that the RPS would favor the development of large-scale renewable energy facilities such as wave power, which would cause the conventional environmental problem of the destruction of natural habitats. Interview records[12] show that NGOs and the newly emerging renewable energy industry were strongly opposed to the introduction of RPS and were able to sustain the FIT program. Although the phasing-out of FIT and the introduction of RPS were announced by the Lee Myung-Bak government (MKE Notice 2008-296), the participation of the CEA in the NREPC contributed to the continuation of the FIT program for about another four years.

In relation to the scale of renewable energy facilities, the CEA was actively promoting small-scale power generators. Since the FIT presents a business opportunity, some might want to build a large-scale facility capitalizing on economies of scale. A large-scale power station, however, can cause classical environmental concerns such as the destruction of ecologically sensitive areas (Nam, 2005). Furthermore, a change to frugal consumption behaviour may not be on the agenda of those operating large-scale power stations. The capacity of 10kW was suggested by NGOs as a dividing line between small-scale and large-scale Solar PV power stations in terms of standard price (Lee, 2006) as well as administration approval requirements such as compulsory safety managers (CEA, 2006).

The government decided in 2006 on the capacity of 30kW as a dividing line because it was considered to be the maximum capacity that could be installed on the roof-top of a building (MOCIE Notice 2006-89). The standard price of electricity generated from Solar PV power stations below the capacity of 30kW was 711.25 KRW/kWh, while that abovethe capacity of 30kW was 677.38 KRW/kWh[13]. Since the standard price of electricity from solar PV above the capacity of 3kW had been 716.40 KRW/kWh (MOCIE Notice 2003-61), the differentiation in standard prices in terms of the capacity would mean a further reduction in the cost. Administrative burdens such as the requirement of having safety managers were also exempted from small-scale power generators. The visions of NGOs regarding the scale of use were thus integrated into the government policy. Table 3 summarizes the evolution of the FIT (KNREC and MOCIE, 2007).

12) Opposition from industry was quite fierce and fundamental. For instance, one government official could not understand the insistence of NGOs on the principle of on-site generation and use of energy as a democratic right, which seemed to demonstrate one of the differences in the cognitive frames of each party.

13) The Market Price (SMP: System Marginal Price) was 61.55 ₩/kWh in 2005.

Table 3 The evolution of Feed-in Tariff program

Year	Policy	Contents
2000	Electricity Business Act	• Priority purchase of electricity generated from alternative energy sources
2002.3	Act on the Promotion of Alternative Energy Development, Use and Diffusion, Article 11.6	• Determination of Standard Price • Subsidizing the differences
2002.5	MOCIE Notice 2002-108	• Standard Price by Energy Type • Application Rules and Duration • Alteration Rules on Standard Price • Installation Capacity Limit (by Oct. 2006) Solar PV : 20MW, Wind Power: 250MW
2003. 10	MOCIE Notice 2003-61	• Duration of Feed-in Tariff - from 5 y ears to 15 years for Solar PV& Wind P
2005. 2	MOCIE Notice 2005-14	• Small Scale Electricity Generators (<200kW) - Direct contract with KEPCO through 'Power Purchase Agreement(PPA), not via KPX • Net metering scheme up to 50kW
2006.8	MOCIE Notice 2006-89	• Changes of Standard Price - Differentiation of Standard Price by Capacity (30kW for Solar PV) - Application of Reducing Rate on Solar, Wind and Fuel Cell • Installation Capacity Limit - Solar PV : 100MW - Wind Power: 1000MW - Fuel Cell: 50MW

Source: Adapted from various government notices and reports

4.4 Small-scale Power Generators: Green Lead Users

As indicated in Table 4, the number of Solar PV power stations has exhibited a dramatic increase in recent years. In terms of number, they rose from 1 in 2004 to 119 in 2007. Around 44% of newly installed solar power stations, 82 out of 185, are those with a capacity no greater than 30kW. In terms of total generation capacity, however, they only amount to less than 1MW, a lot smaller than the 38MW of the 103 power generators with a capacity of more than 300kW (KEMCO, 2008).

Solar PV power generators with a capacity of less than 30 kW can be regarded as green lead users.

Table 4 Number of solar PV power stations supported by FIT

	2004	2005	2006	2007	Total
<30kW	0	10	15	57	82
30kW<	1	4	36	62	103
Total	1	14	51	119	185

Source: Adapted from KEMCO (2008)

Since they are roof-top-based power stations, their operation is highly likely to be based on the principle of on-site generation and consumption and frugal use of electricity. The CEA itself has successfully launched three roof-top-based "citizen's power stations" with a capacity of around 3kW (CEA, 2008). Several energy co-operatives also run citizen's power stations breaking up user lock-in of current electricity consumption behavior. Although they are very marginal in terms of electricity generation capacity, they might be able to trigger a change in the long-established social convention of energy generation and consumption. In spite of the planned phasing out of the FIT, the existing incarnation may play the role of green lead users. It is the institutionalization of these small-scale power generators that the participation of NGOs has contributed to, in addition to making a difference in the NRETP.

5. Conclusion

New & renewable energy technologies have

the potential to tackle global warming. The implementation of Feed-in Tariff programs would certainly accelerate their diffusion. The scale implication of the technologies, however, raises questions about this potential. The user lock-in situations of the current energy system, namely the centralized generation and distribution of energy and the high resource intensity of the modern lifestyle, would not be disrupted by the introduction of technologies alone. What is needed is behavioral change to frugal small-scale energy use.

Examination of the evolution of the FIT in Korea clearly shows that the participation of NGOs has contributed to the institutionalization of measures that would nurture small-scale Solar PV power generators, potential green lead users such as "citizen's power stations" or other energy co-operatives. Although the capacity is very marginal, the frugal small-scale self-reliant lifestyle has been publically acknowledged and funded through the participation of NGOs in the NRETP.

The participation of NGOs, therefore, could form a crucial ingredient of demand management policies for the transformation of the energy system. NGOs as green lead users can facilitate changes in energy generation and consumption behaviors, increasing eco-efficiency at a society level. Furthermore, industry would benefit from collaboration with NGOs, since the small-scale self-reliant lifestyle can drive the development of new technologies. The participation of NGOs not only provides democratic legitimacy, but also initiates radically different technological trajectories, which would be a good area of future research.

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