



Article

Feed-in Tariff Pricing and Social Burden in Japan: Evaluating International Learning through a Policy Transfer Approach

Yugo Tanaka ^{1,*} , Andrew Chapman ² , Shigeki Sakurai ¹ and Tetsuo Tezuka ³

¹ Graduate School of Advanced Integrated Studies in human survivability, Kyoto University, 1 Nakaadachi-cho, Yoshida, Sakyo-ku, Kyoto 606-8306, Japan; sakurai.shigeki.2c@kyoto-u.ac.jp

² International Institute for Carbon-Neutral Energy Research, Kyushu University, 744 Motooka, Nishi-ku, Fukuoka 819-0395, Japan; chapman@i2cner.kyushu-u.ac.jp

³ Graduate School of Energy Science, Kyoto University, Yoshida-honmachi, Sakyo-ku, Kyoto 606-8501, Japan; tezuka@energy.kyoto-u.ac.jp

* Correspondence: tanaka.yugo.77x@st.kyoto-u.ac.jp

Received: 25 August 2017; Accepted: 17 October 2017; Published: 20 October 2017

Abstract: Feed-in tariff (FiT) policy approaches for renewable energy (RE) deployment are employed in many nations around the world. Although FiTs are considered effective in boosting RE deployment, the issue of increasing energy bills and social burden is an often-reported negative impact of their use. The FiT has been employed in Japan since 2012, following after many developed countries, and, as was experienced in other nations, led to a social burden imparted on society significantly higher than initial government estimates. Although policy decision making does not necessarily reflect international policy experience, it is still prudent to ask how international policy experiences of social burden increase were considered within the Japanese approach. In this research, we analyzed the transfer process by adapting a conventional model to develop more objective observations than was previously possible, by setting a benchmark for evaluation based on prior international experiences. We identified two streams of policy transfer, each led by different actors; the government and representatives of the National Diet of Japan (Diet). Both actors were exposed to the same experiences, however the interpretation, application to policy development and priority settings employed were vastly different. Although the framework can only assess policy learning processes, we have found that the government undertook a reasonable and rational process toward learning, while, on the other hand, the modified bill developed by the Diet members did not thoroughly derive learnings in the same way, due to cognitive and political reasons, and specifically, the issue of limiting social burden was not addressed.

Keywords: energy policy; feed-in tariff; policy transfer; social burden; international learning

1. Introduction

The feed in tariff (FiT) policy for renewable energy (RE) was introduced in Japan in 2012. Since the introduction of the FiT, the overall share of RE-based generation within the Japanese grid has increased ([Agency for Natural Resources and Energy 2015](#)), as well as the burden imparted on society by the FiT. The burden of the FiT in Japan is passed on to households in terms of a “Renewable Energy Power Promotion Surcharge”—calculated according to yearly RE purchasing quotas for energy suppliers, which are then added to consumer’s monthly bills. The unit price of this surcharge is set every fiscal year, according to the overall amount of RE required to be sourced by providers, according to government regulations ([Tokyo Electric Power Company 2017](#)).

The total societal burden anticipated by the government was stated as a maximum of 0.5 yen additional cost per kilowatt hour (kWh) for electricity by the year 2020 ([The House of Representatives](#)

2011d). However, in reality, this burden had already reached 2.25 yen per kWh by May of 2016 (Agency for Natural Resources and Energy 2016). Taking into account only the current registered applications for new installations of RE, it is expected that under the current policy settings, this burden will be further increased by 2020. The burden which is imparted as a result of the FiT policy above and beyond initial government estimates will be borne by society in the form of increased electricity bills.

Considering the experience of other nations, the FiT policy mechanism was first conceptualized by the German Renewable Energy Promotion Organization in the 1980s (Lauber 2006) and by the year 2000 begun to be implemented, first in Germany, then in France and then throughout the world. Following the broad implementation of the FiT, over time, several issues were identified and in many cases around the world adjustments to policy mechanisms were deemed necessary to alleviate these issues. It is, therefore, prudent to consider what Japan learned from the experience of countries who implemented the FiT before them; that is, what was learned from their experiences, upon which evidence base were Japanese policies built, and why did Japan implement a policy which led to the same increase in social burden as the nations investigated.

The policy-making process has been described as resembling “primeval soup”, with action occurring fitfully as problems become matched with policy ideas considered to be in the political interests of a working majority of the partisans with influence over a policy domain (Kingdon 1984; Lindblom and Woodhouse 1993). Therefore, it shouldn’t be assumed that policy decisions are built strictly upon an evidence base or policy learnings. However, identifying a gap between what was actually learned in the process and what could potentially be learned, and to what extent lessons are reflected in the implemented approach is quite important as a basis for policy decision improvement.

This research adapts Rose’s lesson-drawing model (detailed in Chapter 2) such that it can be used as a qualitative evaluation framework of international policy learnings, identifying what lessons have been drawn around a specific issue within policy approaches, using other nations’ experience as a benchmark. With this framework, we attempt to answer the following questions from a “policy transfer process” point of view; (1) Why did Japan experience the same increase in social burden as other FiT nations? (2) Did Japan learn from the negative outcomes experiences in other nations?

2. Analytical Framework

The first stage of the analysis in this study deals with international policy experience, providing an objective and reliable basis for its evaluation. The second stage of analysis investigates the policy transfer process and provides insight on how international policy learnings were derived in our focus nation. Specifically, we analyze the policy transfer process of the introduction of the Japanese FiT, with a focus on lessons around the social burden issue (social burden in this research refers specifically to the increase in electricity bills for households). We analyze the experiences which could influence the introduction of the FiT in Japan, by examining the cases of leading nations throughout the world (explained in Section 2.1). Following this initial analysis, we then analyze the policy transfer process by augmenting the model presented by Rose (Rose 2005, explained in Section 2.2). We conduct these analyses based on information extracted from reliable documents, as defined in Section 2.3.

Policy transfer is defined as the process in which knowledge about policies, administrative arrangements, institutions and ideas in one political setting (past or present) is used in the development of policies, administrative arrangements, institutions and ideas in another political setting (Dolowitz and Marsh 2000). Although policy transfer has been studied informally by political science researchers, the integrated concept was first delivered by Dolowitz & Marsh in 2000. Most of their work has focused on providing precise descriptions and explanations of illustrative cases. In this context, there has not been much effort to provide policymakers with practical tools to reflect, evaluate, and improve their policy learning activities.

The originality of this framework is its attempt to detail two elements as a basis for evaluation; international experience and lesson drawing. Although the concept of lesson drawing in policy transfer is based on the model proposed by Rose, our approach augments his framework to assess

the characteristics of a single policy learning, by using his framework as a normative guideline and identifying the relevant policy experiences in an international context. The result of the assessment of international experience, gathered at the time of policy learning is expected to serve as a benchmark for identifying the specific characteristics of the investigated policy learning. By setting a benchmark, the assessment of the process of lesson drawing will allow us to evaluate the learning process in a more rigorous way. The framework will serve as an analytical framework for academic policy transfer research, in many policy settings not limited only to the FiT. At the same time, the augmented framework has implications for use as a practical tool in policy development.

2.1. International Experiences Assessment

At the time of Japan's implementation of the FiT, nine nations (Germany, France, Italy, USA, UK, Australia, China, Korea and Japan) dominated the international solar PV industry, together accounting for 91% of global PV module production and in excess of 87% of cumulative deployed capacity at the end of 2011 (Table 1, IEA PVPS 2012).

Table 1. Module Production, Cumulative Capacity and Market Share Totals for end 2011.

| Country | Module Production (MWp, %) | | Cumulative Capacity (MWp, %) | |
|--------------|----------------------------|------------|------------------------------|--------------|
| Germany | 2500 MWp | 8% | 28,420 MWp | 39.1% |
| France | - | - | 2831 MWp | 4.5% |
| Italy | - | - | 12,803 MWp | 20.2% |
| USA | 1100 MWp | 4% | 3966 MWp | 6% |
| UK | - | - | 976 MWp | 1.5% |
| Australia | - | - | 1408 MWp | 2.2% |
| China | 20,000 MWp | 67% | 3000 MWp | 4.7% |
| Korea | 1000 MWp | 3% | 812 MWp | 1.3% |
| Japan | 2700 MWp | 9% | 4914 MWp | 7.7% |
| TOTAL | 27,300 MWp | 91% | 59,130 MWp | 87.2% |

Additionally, as Figure 1 shows, most of the RE increase driven by the FiT in Japan was due to solar PV deployment (International Renewable Energy Agency 2017); the focus of this study.

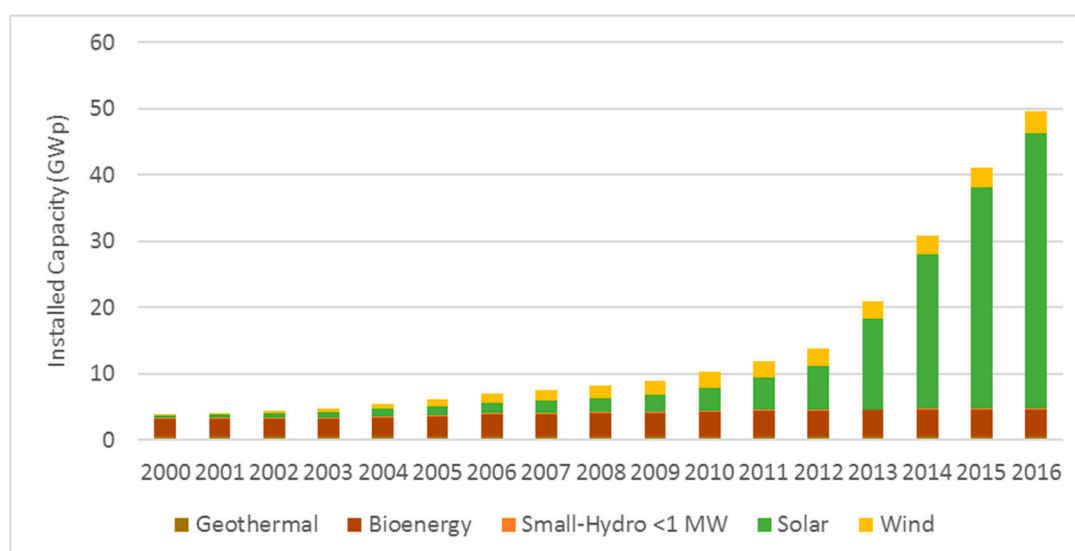


Figure 1. Cumulative Installed Capacity of Renewable Energy in Japan 2000–2016.

In order to provide context for the analysis of the policy transfer process, these major PV deploying and manufacturing nation's policy implementation lessons will be assessed. A "lesson" is described

as any learning which can improve the conceptual management of the policy cycle, incorporating: unexpected outcomes experienced after implementing the FiT, suggested causes of the problem, and the subsequent action taken by the government to rectify any issues. Experiences specifically related to social burden are extracted and applied to the analysis.

2.2. Policy Transfer Assessment

There have been many case studies exploring the characteristics of transfers, and the relationship of policy transfer to the success or failure of policy implementation. An approach labeled “lesson-drawing” focuses on the voluntary act of transfer by rational actors working in specific political contexts, and a model of policy transfer processes has been proposed based on the empirical evidence from lesson-drawing studies. We analyze the Japanese FiT case using the model (Rose 2005; summarized in Table 2), to identify the characteristics of the policy transfer process, and to identify any significant relationships between processes and policy outcomes. Although the lesson drawing model has been criticized for its implicit assumption that the drawing process is both rational and voluntary (Bulmer et al. 2007), for this study, where we assume that policy makers and law makers should rationally learn from available lessons to improve policy making outcomes, it is utilized as a normative guide for evaluation. The summary at Table 2 omits the first two steps of Rose’s model, proposed as a practical guide for policy makers, originally composed of ten steps. Of these ten steps, the first two steps outline a preliminary phase, confirming definitions and conditions of lesson-drawing, while the remaining eight steps explain the step-by-step actions policy makers should undertake in lesson-drawing. Since we adapt this model as a normative standard to assess practical policy learning activities, we omit the preliminary steps in this study.

Table 2. Lesson-drawing Model for Policy Transfer Assessment (Rose 2005).

| | Step | Instruction |
|---|--|--|
| - | Understand the key concepts: what a program is, and what a lesson is and is not | It should be first identified whether or not definitions for key concepts are complete: for example, a program is very different from a vague rhetorical invocation of policy goals. |
| - | Catch the attention of policymakers | It is when dissatisfaction rises and there is a pressure to do something that policymakers become interested in learning from abroad. |
| 1 | Scan alternatives and decide where to look for lessons | Where you look should rationally follow from what you want to learn. |
| 2 | Learn by going abroad | Get an accurate understanding of how a program really works on the ground. |
| 3 | Abstract from what you observe a generalized model of how a foreign program works | Remove the specifics of national context and create a cause-and-effect model which can be used to develop a program for application at home. |
| 4 | Turn the model into a lesson fitting your own national context | A lesson is created by re-contextualizing the generic model, in forms such as adaptation, synthesis, etc. |
| 5 | Decide whether the lesson should be adopted | The veto of a lesson on the grounds of political unacceptability would sometimes be an obstacle. |
| 6 | Decide whether the lesson can be applied | Resources and contexts can be barriers to applying a lesson. |
| 7 | Simplify the means and ends of a lesson to increase its chances of success | The application of lessons is more likely to succeed when; there is a clearly defined objective, there is a single goal, the program has a simple design, etc. |
| 8 | Evaluate a lesson’s outcomes objectively, and, following adoption, as it evolves over time | Foreign evidence puts bounds on speculation for new programs, and policymakers must make adaptations dependent on feedback once a lesson is implemented. |

2.3. Review of Pertinent Literature

In this study, we also use a literature review approach to collect evidence from publicly available documents to assess and compare the outcomes experienced in FiT deploying nations, as well as assessing the resultant policy transfer process in Japan. To maintain a high level of reliability, government documents such as minutes from parliament or documents which rely on these sources are assessed, either directly from government records or from international institutes. In the case of academic publications, only those which are published in English or Japanese following a peer review process are utilized. Some of the analyses for policy transfer assessment are based on statements from representatives of the National Diet of Japan (Japan's bicameral legislature, composed of the House of Representatives and the House of Councilors), posted on their official websites, newspaper articles, and an open-ended interview to a government executive who oversaw the FiT development process¹.

3. Results and Discussion

This chapter describes the results of the literature review, and provides a discussion of the key facts derived from the analysis.

3.1. International FiT Policy Experience

By the time Japan introduced their FiT policy in 2012, many countries around the world had already implemented a similar policy approach. It is, therefore, reasonable to expect that a significant amount of evidence could have been assessed regarding both the policy making and operational aspects of the FiT. Considering this abundance of available evidence, it is also reasonable to assume that the design of a similar policy would rely upon this evidence base in order to develop the best possible policy. To understand whether or not learning from other nations' experience was applied in the Japanese case, the issues and experience gained with regard to social burden impacts resultant from policy implementation is analyzed for 9 leading solar nations including Japan (detailed in Table 1). A discussion of blocs of nations according to their FiT policy approach and implementation timeline is detailed below.

3.1.1. Germany, France, South Korea and Italy

These four early adopter nations implemented their FiT policies between the year 2000 and 2005. In all cases the deployment of PV exceeded projections, leading to an increased societal burden (in the form of increased electricity bills). As a result, between 2009 and 2012, FiT policies were revised or terminated in each of the early adopter nations.

In the case of Germany, in the year 2000 the German Renewable Energy Sources Act (EEG) was enacted, and a FiT introduced. Prior to the EEG, programs existed to stimulate PV deployment and R&D, however they did not have a significant impact. The German PV industry recognized the risk of losing to international competition, particularly from America and Japan which had introduced comprehensive market support schemes. This recognition, and the 1998 change of government to the Social Democratic Party and Green Party coalition led to the introduction of the FiT (Hoppmann et al. 2014).

Under the EEG, generators who were considered "necessary and economically feasible" were able to connect to the electricity grid and generate electricity, to be purchased by grid operators at the rate of 51 Euro cents per kilowatt hour (kWh) for a contracted period of 20 years (purchase prices were reduced at an annual set rate in order to incentivize generation cost reduction). In order to preclude an

¹ The government executive we interviewed oversaw the FiT policy decision, and therefore had access to all relevant knowledge and official reports.

unlimited increase in financial burden, a 350 MWp deployment cap was set (the cap was increased to 1000 MWp in 2002, and abolished in 2004; [Hoppmann et al. 2014](#)).

Between 2004 and 2008, PV was rapidly deployed throughout Germany, leading to a recognition of the financial burden issue in parliamentary debates. By 2008, the financial burden due of the FiT had grown to 2 billion Euro, a 6-fold increase from 2004. In addition, due to rapid deployment of PV, panel costs reduced much faster than FiT payments leading to windfall profits for PV generators. In response to this issue, from 2009, the previous years' PV installation total was taken into account to automatically adjust the FiT rate. This was known as "dynamic degression", or the "flexible ceiling" approach ([Hoppmann et al. 2014](#)).

In the case of France, as part of the Modernization of the Electricity Public Service Bill of 2000, a FiT for PV generation was introduced in 2002, in response to the European Union (EU) directive of 2001 (1001/77/EC) with similar attributes to the German approach. As the initial FiT rate was much lower than Germany's (15 Euro cents/kWh) little impact was made upon the electricity mix.

In 2006, then Prime Minister de Villepin stated his intent to double the FiT. Mainland France increased the FiT to 30 Euro cents/kWh, and overseas territories' 40 Euro cents/kWh. This change in policy setting was conducted suddenly at the top levels of government and the decision-making process was not clear. In addition, the installation limit was removed and the FiT structure modified so as to increase with inflation, rather than decreasing with reduced panel costs. As a result, applications to the scheme flooded in, leading to a massive administrative burden for grid operators and local administrators. New applications to the scheme were temporarily halted in 2010 and in order to redress the balance between solar deployment and rising electricity prices, a dynamic degression approach similar to Germany was introduced ([Cointe 2014](#)).

For South Korea, the Act for Alternative Energy Increased Uptake and Use was introduced in 2002 including a support mechanism for the price difference between alternative and conventional energy generation sources. This mechanism placed an obligation on conventional electricity generators to purchase RE at a value between the system marginal price of renewable and conventional energy sources, decided by the market. The additional cost of RE was not added to consumer electricity bills but was covered by general government revenue, differentiating it from other FiT schemes. The rapid increase in PV deployment, and reduction of PV equipment prices led to a massive increase in PV company growth, increasing PV based generation levels, and associated financial assistance. As a result, in 2008 the initial support scheme was abolished in preference for a Renewable Portfolio Standard (RPS) approach, to be implemented from 2012 ([Cho and Lee 2014](#)).

In Italy, a Government directive was issued in 2005 (DM28/07/2005) leading to the First Conto Energia policy including a FiT for solar-based generation. The FiT settings for this initial attempt were not sufficiently attractive to engender significant deployment of PV. In 2007, as part of the Second Conto Energia policy, the FiT payment was calculated according to the actual costs required for deploying PV and in the period of 2007 to 2011, the cost of PV systems declined significantly with no subsequent reduction in the FiT. A rapid increase in the amount of PV deployed resulted, along with a significant increase in overall FiT costs. The 2011 Third Conto Energia policy reduced FiT levels to rectify this issue. ([Dio et al. 2015](#)).

3.1.2. USA, Australia, UK and China

In the period 2006 to 2011, the USA, Australia, UK, China and Japan also implemented FiT policies, and to differing degrees experienced similar issues as the early adopter nations.

In Australia, the FiT was implemented at the state level and in each case rapid deployment was experienced leading to significant increases in consumer electricity bills. As a result, in the period of 2008–2010 the FiT was discontinued or significantly reduced, only 2 to 3 years after its introduction ([Chapman et al. 2016](#)).

In the UK, the Energy Act of 2008 paved the way for the introduction of a FiT in 2010. A larger than expected deployment of RE ensued, meeting 2020 deployment goals by 2015 ([Department of](#)

Energy & Climate Change 2015). As a result, the climate change control measures budget is expected to be exceeded by 20% in the 2020–2021 period (Office for Budget Responsibility 2015).

In the USA, there is no single national approach to RE deployment, however 37 states and the District of Columbia have their own RPS requirements or goals in place. (IEA/IRENA 2017). In addition to the RPS, six states (California, Hawaii, Maine, Oregon, Vermont and Washington) have FiTs or similar programs in place. As interest in FiTs grows in the USA, some utilities have introduced voluntary FiTs (National Renewable Energy Laboratory NREL).

Although China is a mass producer of solar modules, its domestic demand has not been as high as the rest of the world. To support domestic level solar installations, the National Development and Reform Commission (NDRC) announced a nationwide feed in tariff in 2011, ranging from 15.5–17.9 US cents per kWh depending on the installation timeframe (Energy Trend 2012). Similar to other FiT operating nations, China also reduced their FiT, with 2017 FiT rates reduced by between 28 to 52% for distributed PV depending on the region of deployment. These reductions were lower than initially expected (from draft proposals to the NDRC) in order to attempt to preserve a reasonable return on investment timeframe for households installing PV (Clean Technica 2016).

3.1.3. Summary

There have been many learnings to deal with social burden resultant from the FiT, as well as attempts for the improvement of FiT-based policies and reduction of social burden by many national governments. These learnings are summarized in Table 3 including the year of FiT introduction and subsequent amendment. These implicate that although high incentives ensure RE deployment, it is extremely difficult to set an appropriate incentive price, based on accurate estimation of RE deployment and social burden, therefore some nations have decided to employ automatic price adjusting system.

Table 3. FiT experience and outcomes in major PV deploying and manufacturing nations.

| Country | Year ² | Experienced Issues Caused by Increased Social Burden | Suggested Facts which Might have Caused the Issues | Government Reaction to the Issue | Amended |
|---------|-------------------|--|--|--|---------|
| Germany | 2000 | <ul style="list-style-type: none"> Industry global competition began to suffer from increasing manufacturing cost | <ul style="list-style-type: none"> Electricity price for industry had risen due to the FiT surcharge | Industry privilege: industries facing global competition were excluded from the surcharge payment obligation | 2003 |
| | | <ul style="list-style-type: none"> High electricity price began to get attention in political debate | <ul style="list-style-type: none"> Rapid deployment of RE was observed and remuneration seemed excessive PV system price declined sharply due to increasing competition from Chinese companies | Dynamic depression: procurement prices were to be adjusted based on the amount of RE installed | 2009 |
| France | 2000 | <ul style="list-style-type: none"> The level of social burden became uncontrollable | <ul style="list-style-type: none"> A higher than expected number of projects applied to the scheme Remuneration decided under Prime Ministerial leadership was attractive to investors | Dynamic depression: procurement prices were to be adjusted based on the amount of RE installed | 2010 |
| Korea | 2002 | <ul style="list-style-type: none"> Government faced difficulty in maintaining the FiT scheme for RE through the public budget | <ul style="list-style-type: none"> FiT supported by public budget RE steadily deployed due to FiT | Abolished: FiT was replaced by RPS ³ | 2012 |

Table 3. Cont.

| Country | Year ² | Experienced Issues Caused by Increased Social Burden | Suggested Facts which Might have Caused the Issues | Government Reaction to the Issue | Amended |
|-------------------|-------------------|--|--|--|-----------|
| Italy | 2005 | <ul style="list-style-type: none"> Government faced the need to limit any further surcharge increase | <ul style="list-style-type: none"> Tariff reduction was not timely, however system prices had declined sharply Large deployment of RE observed | Lower remuneration & static degression: procurement prices were significantly reduced with a further reduction schedule employed | 2010 |
| Australia (State) | 2008~2010 | <ul style="list-style-type: none"> Electricity prices for industry and households increased significantly Increasing burden gap between solar and non-solar households | <ul style="list-style-type: none"> Solar electricity fed into the grid increased rapidly | Abolished or reduced remuneration: some states discontinued the scheme and others significantly reduced tariff levels | 2011~2012 |
| USA | 2006~ | - | - | - | - |
| UK | 2010 | <ul style="list-style-type: none"> Policy cost for supporting RE exceeded projections and was likely to overspend LCF limits | <ul style="list-style-type: none"> RE deployment exceeded expectations | Dynamic degression: tariff rate to be adjusted when installation caps were met in each period | 2015 |
| China | 2011 | - | - | - | - |
| Japan | 2011 | <ul style="list-style-type: none"> Surcharge level had risen beyond projections | <ul style="list-style-type: none"> Unexpectedly large amount of solar projects applied to the scheme | Tender (≥ 10 kWp)/announcement of future tariff (< 10 kWp): larger PV projects were selected through tender, smaller projects through procurement processes, with tariffs set in advance. | 2016 |

Note: Contents drawn from literature review references.

3.2. FiT Policy Transfer in Japan

The result of an analysis on introduction process of FiT in Japan is presented in this section. The background of FiT introduction is overviewed to provide a context for the analysis, firstly describing in Section 3.2.1 that there was an irregular modification onto the government draft in legislative procedure, and in the process, there were two streams of lesson-drawing conducted by different actors (Diet and government members). Then the analysis on the impact of the modification follows in Section 3.2.2. Finally, two forms of lesson-drawing are respectively examined by using the model described in Section 2.2 in order to discuss how they are reflected in the Japanese FiT.

3.2.1. Policy Process of the Japanese FiT

Energy policy in Japan had mainly focused on economic efficiency in producing electricity under the long and dominant regime of the Liberal Democratic Party (LDP) before the FiT was introduced. A Renewable Portfolio Standard (RPS) system had been employed to ensure high flexibility for the selection of power sources along with the use of cost-reducing incentive programs to promote the deployment of RE (Ito 2015). The Democratic Party (DP) took power in the 2009 election, and in their election campaign promised to consider the FiT approach to stimulate RE deployment as a part of their manifesto (The Democratic Party of Japan 2009).

³ The objective of abolishment was due to budget and other issues.

² The year of legislation.

The new government organized an expert committee to examine the FiT approach. Based on this examination, the original FiT draft bill was authorized within the government (Cabinet Office 2011). The expert committee visited Germany, Italy, England and Spain and interviewed policy makers to learn from their experiences in the early stages of policy development (Ministry of Economy, Trade and Industry 2010a). Following internal debate, it was concluded that finding the balance between incentives and social burden would be of primary importance (Ministry of Economy, Trade and Industry 2010c). Therefore, various options for designing incentives, as well as the future burden estimate for each approach were assessed, including public engagement (Ministry of Economy, Trade and Industry 2010b). Finally, the option which forecasted a future burden of 0.5 yen per kWh was employed in the government draft (Ministry of Economy, Trade and Industry 2011).

However, the proposed draft was significantly modified through the legislative process in the Diet (The House of Representatives 2011a). The modified FiT approach was proposed by the LDP, and agreed to by the governing DP (Nishimura 2011b). In this modification, the Committee on Economy, Trade and Industry, who was in charge of this bill, visited Germany, Spain and France and interviewed policy makers to learn from their experiences (Nishimura 2011a; The House of Representatives 2011b).

Thus, it can be understood that FiT was introduced to Japan with regard to other nations' experience, and there were multiple chances for learning from abroad, by both the expert committee for policy making and the lawmakers' committee. In the next section, we conduct a comparison between the original bill which was firstly submitted by the government and the modified bill which was proposed and agreed by lawmakers, in order to identify how this modification changed policy priorities. Then we can discuss afterwards the nature of the policy transfer of the FiT; what policymakers and lawmakers learned from abroad, how they were implemented into each draft as lessons, and why Japan failed to avoid experiencing the same increase of social burden as other nations did by introducing FiT.

3.2.2. Comparison between Original and Revised Bill

The parliamentary amendment introduced an alternative methodology to the one agreed upon through expert committee feedback and public engagement. The final characteristics of the negotiated FiT bill are significantly different and in some cases in opposition to what was initially debated within the DP, as shown in Table 4.

Table 4. Concepts Revised in the Legislative Procedure and Consequential Impacts.

| Before (Government Draft) | After (Passed Bill) | Potential Impact |
|--|---|--|
| The FiT level for PV should be set carefully and the amount of RE deployed should be taken into consideration to enable flexible tariff adjustment over time by the Ministry of Economy, Trade and Industry. | RE business' profitability should be prioritized for 3 years following enforcement of the FiT legislation, and the FiT level should be set by a Calculating Committee, independent of the Ministry. | <ul style="list-style-type: none"> • Remuneration is more likely to be ensured for generators • Social burden is likely to be higher. • Timely tariff adjustment is less likely to be possible. |
| All types of RE, except solar PV should be rewarded with a uniform tariff in order to stimulate market competition. | Generation sources other than PV should also be rewarded for generation according to their cost of generation. | <ul style="list-style-type: none"> • Various RE sources are more likely to be deployed. • Social burden is likely to be higher. |
| Burden is to be shared equally by everyone based on their level of electricity consumption. | Large corporations which consume a large amount of electricity should receive exemptions or reductions on the burden associated with the FiT. | <ul style="list-style-type: none"> • Industry is less likely to incur a burden. • Surcharge collected from others is likely to increase. |

We can understand that one of the reasons which triggered an increase in social burden was this significant change in policy structure. As explained below, the finally agreed bill didn't estimate future burden level nor consider any effective system to control it within a permissible range.

Firstly, the revised bill apparently allows RE business to receive more remuneration than the original bill, which increases probability for higher social burden and more deployment of RE. When the revised bill was proposed, the Minister of Economy, Trade and Industry expressed his concern about the possibility of an increase in social burden level over time, however a detailed examination and estimation of the potential burden level was not conducted at this stage ([The House of Councilors 2011](#)).

Secondly, the revised bill is less likely to control the burden imparted on society according to the situation. Although at the inception of the FiT where a future estimate of burden was considered difficult, it is reasonable to assume that ongoing modification of the FiT could have kept the experienced level of social burden under control over time. This could have been achieved through an evaluation of burden levels over time, and the adjustment of FiT parameters, prudent to the situation. In the original government draft formulated through expert debate, input from experts tried to ensure burden controllability by allowing the Minister of Economy, Trade and Industry to directly manage timely adjustment of tariff levels. The level of future burden and renewable deployment estimates were agreed through public engagement, and the price settings were thought of as key to achieve the balance between RE deployment and other policy targets. However, the law enacted did not have a specific RE deployment target of ideal for the future social burden level, nor did it contain a feedback mechanism to control uncertainties.

On one hand, in order to evaluate the future social burden due to the FiT, there is a need to establish standards as to the level of burden that society is willing to accept. For example, the establishment of policy goals with regard to the level of RE to be deployed and the relationship between deployment rates and societal burden are necessary. In the case of Japan, following the wholesale revision of the initial FiT policy proposal, a deployment target was not set, nor was it discussed at any public negotiation of policy parameters. Based on events of the time, the authors assume that the timing of a parallel review of the Japanese energy policy approach was one of the reasons for this oversight. In order to set a target for the deployment of RE as a portion of the electricity generation mix for Japan, a future estimate of nuclear generation levels was required. However, as a result of the March 2011 Fukushima reactor accident, the consideration of nuclear generation levels was not palatable for government and was not brought to debate in the parliament. Because of this indecision, only vague targets were set, and priority was given to the implementation of the FiT policy.

On the other hand, in order to adjust the FiT parameters, prudent to the situation, there is a need to establish a feedback mechanism. In the original FiT draft, it was assumed that according to policy system outputs (increased deployment, increasing costs etc.), a feedback mechanism was in place so as to adjust policy system inputs (purchase obligations, procurement pricing etc.) which affect FiT settings, as summarized in Figure 2. However, since the setting of the FiT price in the enacted law was calculated and entered into legislation based on the cost of RE generation for the producer including a provision for "appropriate remuneration" (such that the generation of RE was a profitable enterprise), it did not allow input factors to be decided based on outputs, which loosened the feedback control, reducing the likelihood of burden level control. On the other hand, the enacted law increased the attractiveness immediate investment in RE deployment.

Actually, experts who were responsible to calculate the procurement prices based on the enacted law have considered feedback factors and their input on procurement price for discussion. However, as no officially legislated deployment target of RE, FiT price or payment period adjustment mechanism were defined, a response in the form of modified legislation was the agreed approach by experts, should deployment exceed expectations ([Calculation Committee for Procurement Price, etc. 2012](#)).

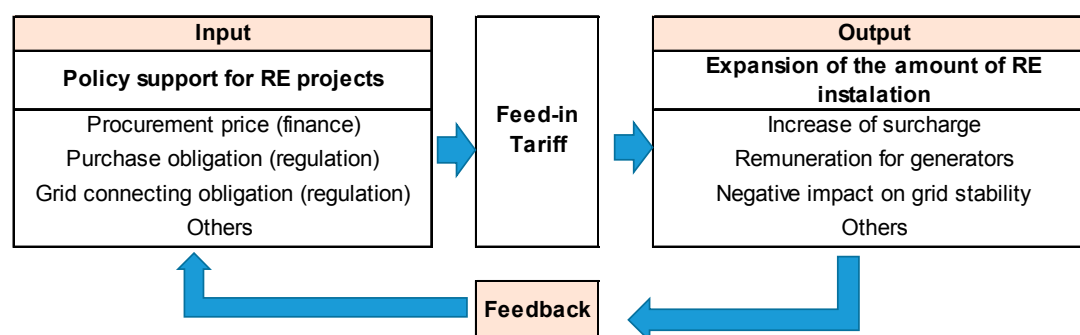


Figure 2. Conceptual Feedback Control for the FiT.

3.2.3. Policy Transfer Process of the Japanese FiT

This study has described so far that the government original draft was significantly modified through the legislative procedure, into a bill based on different concepts of social burden. In addition, both of the original draft and the revised one were formulated more or less referring to other nations' experiences. In this section, two streams of lesson-drawing are respectively examined. Through an analysis of the essence of the learnings, we can begin to derive a clear picture of how these were reflected in the development of the Japanese FiT policy.

Using the model first described in Table 2, the essence of the actual learnings derived by the expert committee members who visited European nations on two occasions in 2010 (4~10 and 17~23 January) are analyzed as described in Table 5. Building on this analysis, the subsequent visit to Europe by Diet members representing the Committee on Economy, Trade and Industry (16~20 July 2011), and its relation to the modification of the proposed law is also discussed below.

Table 5. An Assessment of the Policy Transfer by the Government.

| Step | | Policy Transfer in the Original Draft (Conducted by an Expert Committee) |
|------|--|---|
| 1 | Scan alternatives and decide where to look for lessons | Germany, Spain, Italy and England |
| 2 | Learn by going abroad | Hearings by government officials, power system operators, industrial associations and private companies; On-the-spot studies at a solar park and wind farm |
| 3 | Abstract from what you observe a generalized model of how a foreign program works | Settings of the procurement price affect renewable energy deployment, and a significant increase in deployment poses social burden increase risks and limitations of the acceptable amount of electricity exported to the grid due to its capacity restrictions |
| 4 | Turn the model into a lesson fitting your own national context | Consideration for well-balanced design incorporating renewable energy deployment, social burden, and power grid stabilization is necessary |
| 5 | Decide whether the lesson should be adopted | Through stakeholder hearings and public debate, it was decided to adopt the lesson |
| 6 | Decide whether the lesson can be applied | Through quantitative simulation, it was decided to adopt the lesson |
| 7 | Simplify the means and ends of a lesson to increase its chances of success | <ul style="list-style-type: none"> Timely adjustment of the tariff by the Minister of Economy, Trade and Industry Cost-reduction through market competition |
| 8 | Evaluate a lesson's outcome prospectively and, if it is adopted, as it evolves over time | Renewable energy deployment and social burden estimates were quantitatively presented, and the procurement price was to be adjusted according to feedback |

Note: Contents drawn from literature review references.

Based on the results of the analysis, we can understand that the expert committee learned from other nations' experience and attempted to develop a balanced policy that would both increase the amount of RE deployed, while limiting the social burden on households. As demonstrated in the international FiT experience assessment in the previous section, each of the FiT implementing nations experienced a rapid deployment and social burden increase, leading to a revision of their policies. The initial government proposal built on learnings from these experiences, eventuating in a rational system design process.

In contrast, the Diet member investigative committee derived vastly different conclusions, while they were exposed to the same experiences as the expert committee. Although the learnings and how they were considered in order to develop the alternative bill have not been made clear, so, based on available documentation surrounding the policy proposal development, the analysis result can be summarized as Table 6.

Table 6. An Assessment of the Policy Transfer by the Diet.

| Step | | Policy Transfer in the Revised Draft (Conducted by Lawmakers) |
|------|---|--|
| 1 | <i>Scan alternatives and decide where to look for lessons</i> | France, Spain and Germany |
| 2 | <i>Learn by going abroad</i> | Hearing from government officials, ambassadors of Japan, industrial associations and private companies; On-the-spot study at a solar park and a wind farm |
| 3 | <i>Abstract from what you observe a generalized model of how a foreign program works</i> | Settings of procurement price affect renewable energy deployment, and significant increase poses social burden increase |
| 4 | <i>Turn the model into a lesson fitting your own national context</i> | Consideration for well-balanced design incorporating renewable energy deployment and social burden is necessary |
| 5 | <i>Decide whether the lesson should be adopted</i> | - |
| 6 | <i>Decide whether the lesson can be applied</i> | - |
| 7 | <i>Simplify the means and ends of a lesson to increase its chances of success</i> | <ul style="list-style-type: none"> Evidence-based tariff setting by independent expert committee Cost-based procurement to ensure appropriate remuneration |
| 8 | <i>Evaluate a lesson's outcome prospectively and, if it is adopted, as it evolves over time</i> | Renewable energy deployment and social burden estimate was not presented, and feedback control was less available |

Note: Contents drawn from literature review references.

The result shows that both the government and the Diet were exposed to the similar policy experience as is described in the former assessment (Section 3.2), however, that there is a logical gap between the lesson learned and the means finally taken in the transfer process of the Diet. The nature of the transfer process and its reflection on the policy can be understood by analyzing the background of this gap.

Firstly, there is a high probability that the interpretation of lessons in the Committee on Economy, Trade and Industry's investigation was different from the government's expert committee, while learning almost the same lessons. In support of this assertion, a Diet member of the opposition LDP, upon his return from the investigative excursion said "If the tariff for purchasing RE is set too high, the impact on consumer electricity bills becomes large, while at the same time industry makes disproportionately large profits. However, if the tariff is set too low, investment in RE is stifled" (Nishimura 2011d). Further, he said "if the overall burden on the citizens is not made clear, the debate (on Japan's FiT) cannot be undertaken" (Nishimura 2011d). However, the same member made the following comment about the government's initial bill proposal, "the Ministry of Economy, Trade and Industry has the sole say on FiT settings, reducing the possibility for fairness and transparency", indicating that this decision would be better if removed from the Ministry of Economy, Trade and

Industry's purview. He suggested that the bill required modification and that an institution under the purview of the Diet would be a better choice for FiT price setting (Nishimura 2011d).

Secondly, since reliable information about future burden level was not shared, intentionally or unintentionally, as a basis for the policy decision, there was no discussion about controlling it. With regard to the social burden increase following the Diet member's modification, the Committee on Economy, Trade and Industry did not undertake an estimate on this quantum. The mechanism to control increases in social burden were described by the committee thus: "As we and our chairperson have considered other nations approaches, we believe that the modified bill contains the appropriate measures" (The House of Representatives 2011c). This issue was not discussed further. Also, according to a newspaper article, the pre-revision Ministry of Economy, Trade and Industry burden estimate of 0.5 yen per kWh by 2020, or approximately 150 yen per household per month was referred to as the prospective future burden under the revised policy (Asahi-Shinbun 2011).

Thirdly, in finalizing of the Diet members' revised bill, there is a high probability that some negotiation of the bill according to individual member's interests took place. The Diet member who tabled the bill described the finalization process as a time of vigorous debate between regional members who were anti-nuclear, those seeking a rapid increase in renewable energy deployment, and, others who were proponents of an increase in the use of nuclear power (Nishimura 2011c). In addition, a Ministry executive stated that at the time, Diet members were unwilling to entertain discussions about social burden levels, or even about the electrical grid (Yoshino 2016).

From the above, we can understand that although the diet members lesson learning process went as far as listening to the experience of foreign nations, their implementation of these learnings differed from that of the previous committee of experts. Additionally, at the point of bill finalization, the horse-trading between Diet member factions precluded a complete application of the learnings to the final bill. In the final Diet deliberations, it was stated (without evidence) that the revised bill incorporated overseas learnings, suggesting that policy decisions were taken without a full understanding of all of the stated important issues, including a control mechanism for social burden, instead prioritizing the increased deployment of RE. In other words, at least in public, there was no justification given for the fact that the modified draft was actually not based on international policy experience, and future social burden was likely to increase.

Although we still need more evidence, the apparent lack in deliberation on the social burden issue of the FiT seems to have been rooted in the political situation following the Great East Japan Earthquake, where lawmakers rushed to reach agreement for the legislation with little consideration of long term impacts on society. Since this literature focuses on the process of international policy learning, other analytical approaches for policy decision processes should be undertaken to understand the decision making background more comprehensively than addressed here.

4. Conclusions

This research augmented the lesson-drawing framework, in applying to the Japanese FiT case as an example, in order to assess both the policy transfer process as originally intended by Rose, and in addition deliver a detailed identification of lessons learned internationally, and their specific impact upon policy development and its outcomes in the target nation. The framework can be used to qualitatively evaluate learning processes about a specific issue entailed in a policy approach, using other nations' experiences, including corrective policy actions as a benchmark in order to deliver policy which is evidence based and cognizant of international experience.

Based on the investigation of the FiT policy development and implementation process, explored through the policy transfer framework, we attempted to answer the questions; (1) Why did Japan experience the same increase in social burden as other FiT nations?; and (2) Did Japan learn from the negative outcomes experiences in these nations?

In response to the first question, Japan experienced a similar increase in social burden as the other nations because the FiT approach taken was unlikely to be able to maintain the level of burden

at the initially agreed level, and lacked both a specific RE deployment target and timely feedback mechanisms for the control of social burden level.

With regard to the second question, Japan learned lessons from other nations' experience through officially dispatched fact-finding delegations. Both the government and the Diet led delegations found that in many nations' FiTs tend to cause unexpected increases in both RE deployment levels and social burden in order to support the scheme. They learned that the approach taken in Japan should consider the balance between incentives and social burden. Although the original government draft was designed to realize this concept, it was not accepted in the Diet and an alternative FiT approach was employed.

This research identified that although the government undertook a reasonable and rational process toward learning, the modified bill developed by the Diet members did not thoroughly derive learnings in the same way. This research has also identified the possibility that political compromises and the need to hide policy decisions led to the misuse of policy learning in achieving policy implementation goals.

The methodology employed in this study entails limitations which should be considered. Since the evidence base depends on a literature survey, which may be less effective in analyzing policy processes, most of which are closed processes. Therefore, further analysis on the politics behind the decision for Japanese FiT policy modification, for example by interviewing policy makers, could complement our research. Also, the evaluation framework developed in this research could be improved through its application to other cases, particularly FiT policy development processes of other nations and other energy policy issues. This body of work is a future goal of this framework development research.

Acknowledgments: The authors would like to thank the anonymous reviewers for their valuable comments and suggestions to improve the quality of the paper.

Author Contributions: All authors designed the research. Yugo Tanaka and Andrew Chapman conducted data collection, analyses and drafting the manuscript. Shigeki Sakurai and Tetsuo Tezuka helped to analyze the data and approved the manuscript.

Conflicts of Interest: The authors declare no conflict of interest.

References

- Agency for Natural Resources and Energy. 2015. Current situation and challenges of renewable energy supporting scheme. Ministry of Economy, Trade and Industry, June 24. Available online: http://www.meti.go.jp/committee/sougouenergy/shoene_shinene/shinene/pdf/012_02_00.pdf (accessed on 23 December 2016).
- Agency for Natural Resources and Energy. 2016. Procurement price and surcharge for renewable energy were decided for FY 2016. Agency for Natural Resources and Energy, March 18. Available online: <http://www.meti.go.jp/press/2015/03/20160318003/20160318003.html> (accessed on 26 December 2016).
- Asahi-Shinbun. 2011. Mitigation of surcharge add-on for major customers: Modification draft for renewable energy bill. *Asahi Shinbun*, morning ed. August 13, p. 1.
- Bulmer, Simon, David Dolowitz, Peter Humphreys, and Stephen Padgett. 2007. *Policy Transfer in the European Union*. Abingdon-on-Thames: Routledge.
- Cabinet Office. 2011. *The Cabinet Meeting*; Tokyo: Cabinet Office, March 11. Available online: <http://www.kantei.go.jp/jp/kakugi/2011/kakugi-2011031101.html> (accessed on 1 December 2016).
- Calculation Committee for Procurement Price, etc. 2012. Minutes #01, 6 March 2012. Paper presented at the Calculation Committee for Procurement Price, etc. 1st Meeting, Tokyo, Japan, March 6.
- Chapman, Andrew J., Benjamin C. McLellan, and Tetsuo Tezuka. 2016. Residential solar PV policy: An analysis of impacts, successes and failures in the Australian case. *Renewable Energy* 86: 1265–79. [CrossRef]
- Cho, Yongsung, and Soo-cheol Lee. 2014. The achievement in transformation of renewable energy policy in Korea and Japan. *The Meijo Review* 13: 61–76.
- Clean Technica. 2016. China's 2017 Solar Feed-in Tariff Rates Higher Than Anticipated. Available online: <https://cleantechnica.com/2016/12/08/chinas-2017-solar-feed-tariff-rates-higher-anticipated/> (accessed on 16 February 2017).

- Cointe, Beatrice. 2014. The emergence of photovoltaics in France in the light of feed-in tariffs: Exploring the markets and politics of a modular technology. In *Sociology*. English: EHESS, Available online: <https://tel.archives-ouvertes.fr/tel-01096977> (accessed on 20 October 2017).
- Department of Energy & Climate Change. 2015. *Consultation on a Review of the Feed-in Tariffs Scheme*; London: Department of Energy & Climate Change.
- Dio, V. Di, S. Favuzza, D. La Cascia, F. Massaro, and G. Zizzo. 2015. Critical assessment of support for the evolution of photovoltaics and feed-in tariff in Italy. *Sustainable Energy Technologies and Assessments* 9: 95–104. [CrossRef]
- Dolowitz, David P., and David Marsh. 2000. Learning from Abroad: The Role of Policy Transfer in Contemporary Policy-Making. *Governance: An International Journal of Policy and Administration* 13: 5–23. [CrossRef]
- Energy Trend. 2012. China Implements a National Feed-in Tariff Rate. Available online: http://pv.energytrend.com/research/China_FIT_08122011.html (accessed on 16 February 2017).
- Hoppmann, Joern, Joern Huenteler, and Bastien Girod. 2014. Compulsive policy-making—The evolution of the German feed-in tariff system for solar photovoltaic power. *Research Policy* 43: 1422–41. [CrossRef]
- IEA PVPS. 2012. *Trends 2012 in Photovoltaic Applications*. St. Ursen: IEA PVPS.
- IEA/IRENA. 2017. State-level Renewable Portfolio Standards (RPS). *Joint Policies and Measures Database*. Available online: <http://www.iea.org/policiesandmeasures/pams/unitedstates/> (accessed on 16 February 2017).
- International Renewable Energy Agency. 2017. Data and Statistics: Renewable Energy Topic: Capacity and Generation. 7. Available online: <http://resourceirena.irena.org/gateway/dashboard/?topic=4&subTopic=54> (accessed on 5 July 2017).
- Ito, Yoko. 2015. *A Brief History of Measures to Support Renewable Energy*. Tokyo: The Institute of Energy Economics, Japan.
- Kingdon, John W. 1984. *Agendas, Alternatives, and Public Policies*. New York: Little Brown.
- Lauber, Jacobsson. 2006. The politics and policy of energy system transformation—Explaining the German diffusion of renewable energy technology. *Energy Policy* 34: 256–76.
- Lindblom, Charles E., and Edward J. Woodhouse. 1993. *The Policy Making Process*, 3rd ed. Upper Saddle River: Prentice Hall.
- Ministry of Economy, Trade and Industry. 2010a. Results of the overseas case studies. January 28. Available online: <http://www.meti.go.jp/committee/materials2/downloadfiles/g100128a04j.pdf> (accessed on 17 February 2017).
- Ministry of Economy, Trade and Industry. 2010b. Results of the public opinion about applicable options in the scheme. June 9. Available online: <http://www.meti.go.jp/committee/materials2/downloadfiles/g100609a02j.pdf> (accessed on 17 February 2017).
- Ministry of Economy, Trade and Industry. 2010c. Toward the implementation of Feed-in Tariff. Ministry of Economy, Trade and Industry, July 23. Available online: <http://www.meti.go.jp/committee/materials2/downloadfiles/g100723a01j.pdf> (accessed on 17 February 2017).
- Ministry of Economy, Trade and Industry. 2011. The final report from the Feed-in Tariff subcommittee for designing the scheme. February 18. Available online: http://www.meti.go.jp/committee/summary/0004601/houkokusho_110218_01.pdf (accessed on 17 February 2017).
- National Renewable Energy Laboratory (NREL). 2017. Technology Deployment, State & Local Governments: Feed-In Tariffs. Available online: http://www.nrel.gov/tech_deployment/state_local_governments/basics_tariffs.html (accessed on 16 February 2017).
- Nishimura, Yasutoshi. 2011a. A report of visiting Europe and energy policy in Japan. *Journal of Japan Wind Energy Association* 35: 47–51.
- Nishimura, Yasutoshi. 2011b. Nissy Blog, 17 August. Available online: <http://www.yasutoshi.jp/blog/?y=2011&m=08> (accessed on 5 July 2017).
- Nishimura, Yasutoshi. 2011c. Nissy Blog, 26 August. Available online: <http://www.yasutoshi.jp/blog/?y=2011&m=08> (accessed on 27 July 2017).
- Nishimura, Yasutoshi. 2011d. Nissy Blog, 29 July. Available online: <http://www.yasutoshi.jp/blog/?y=2011&m=7> (accessed on 27 July 2017).
- Office for Budget Responsibility. 2015. *Economic and Fiscal Outlook*. London: Office for Budget Responsibility.
- Rose, Richard. 2005. *Learning from Comparative Public Policy: A Practical Guide*. New York: Routledge.

- The Democratic Party of Japan. 2009. The Election Manifesto 2009. August 18. Available online: https://www.dpj.or.jp/special/manifesto2009/pdf/manifesto_2009.pdf (accessed on 17 February 2017).
- The House of Councilors. 2011. Minutes of the House of Councilors (#35). Paper presented at the 177th Session, Tokyo, Japan, August 23.
- The House of Representatives. 2011a. Feed-in Tariff Law (Accepted). Paper presented at the 177th Session, Tokyo, Japan, August 23.
- The House of Representatives. 2011b. *Minutes of the Committee on Economy, Trade and Industry*; Tokyo: The Committee on Economy, Trade and Industry, July 27.
- The House of Representatives. 2011c. Minutes of the committee for economy, trade and industry (#19). Paper presented at the 177th Session, Tokyo, Japan, August 23.
- The House of Representatives. 2011d. Minutes of the House of Representatives (#32). Paper presented at the 177th Session, Tokyo, Japan, July 14.
- Tokyo Electric Power Company. 2017. Customer Communication: Rate Calculation. Available online: <http://www.tepco.co.jp/en/customer/guide/ratecalc-e.html> (accessed on 24 September 2017).
- Yoshino, Kyoji, and interview by Yugo Tanaka. 2016. Open-ended Interview, Tokyo, July 14.



© 2017 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).