

**Market Facilitation Organizations:
- A Case Study of the Renewable Energy Project by Ohisama-Shinpo-Energy -**

by

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Abstract

Market facilitation organizations (MFOs) are a new concept developed as private public partnerships for promoting renewable energy markets. These public-private entities support the growth of particular markets through a variety of means, such as partner matching, information dissemination, and market research. Although the concept of MFOs was developed to facilitate renewable energy markets in developing countries, MFOs might also be effective in promoting renewable energy markets in rural communities in Japan. Just as in developing countries, Japanese rural communities are lacking many of the same resources, including know-how, financing, manpower, and policies, for renewable energy markets. In Iida, Japan, renewable energy has been promoted by the MFO called Ohisama-Shinpo-Energy Private Limited Company through a project which includes a photovoltaic (PV) promotion component and an energy-saving business component.

This paper presents an analysis of Ohisama-Shinpo-Energy's project and an evaluation of Ohisama-Shinpo-Energy's accomplishments and effectiveness, based on interviews with the project members. This analysis focuses on the following questions: 1) What kind of functions does the MFO perform in promoting a renewable energy market? 2) What kind of barriers does the MFO face and how does it overcome them when it works on a renewable energy project? 3) Is the MFO successful in terms of its contribution to the promotion of renewable energy and economic sustainability? and 4) What insights can the MFO glean from its experience to improve its effectiveness?

This paper revealed that the MFO, Ohisama-Shinpo-Energy, performs the following functions in its renewable energy project: market research, financing, partner matching, consulting service, information dissemination, awareness raising, training, and policy advice. Also, Ohisama-Shinpo-Energy addresses the following barriers: 1) high cost and low pricing leading to low profitability, 2) lack of a legal framework for independent power producers, 3) lack of credit and financing, 4) lack of manpower and skilled personnel, 5) lack of information about renewable energy among critical players, 6) inadequate business models, 7) lack of an appropriate business developer,

and 8) opposition from existing interest groups. By addressing these barriers and performing the functions above as an MFO, Ohisama-Shinpo-Energy realized some success in facilitating renewable energy by positively influencing the essential sectors for renewable energy markets: business, community (citizens), and policy (governments). In the business sector, Ohisama-Shinpo-Energy has successfully finalized the following projects: the PV project completed the installation of 207.93 kW of PV systems in March 2005, and the energy-saving project completed 15 Energy Service Company (ESCO) contracts, which will save 678,150 kWh of electricity, in March 2007. Both of the projects expect to expand in the future. In addition to its business operation, Ohisama-Shinpo-Energy has operated in the community sector to facilitate renewable energy through a variety of means: 1) raising awareness of citizens about renewable energy and energy conservation, 2) providing training opportunities for renewable energy entrepreneurs; and 3) disseminating information and know-how about Ohisama-Shinpo-Energy's project. Moreover, Ohisama-Shinpo-Energy has contributed to the realization of the policy promoting renewable energy by assisting the local government to develop an innovative renewable energy project plan. Finally, this paper proposes several recommendations for the MFO to improve its effectiveness in the business, community, and policy sectors.

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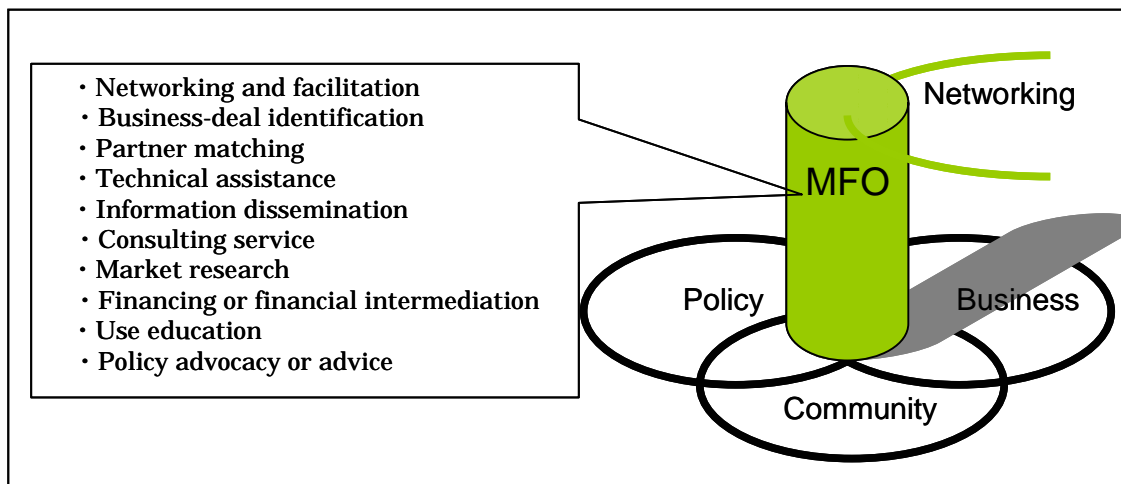
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Chapter 1: Introduction

Market Facilitation Organization (MFO) and its challenges

Market facilitation organizations (MFOs) are a new concept developed as private public partnerships for promoting renewable energy markets (Iida, 2005). These public-private entities support the growth of particular markets through a variety of means. MFOs may provide networking, partner matching, information dissemination, market research, use education, business-deal identification and facilitation, technical assistance, consulting service, financing, and policy advocacy or advice (Martinot, et al., 2002).

Figure 1 : Market Facilitation Organization (MFO) and its function



Source: Iida (2005)

MFOs have been mainly utilized to support renewable energy markets in developing countries. For example, in Sri Lanka, Nepal, Peru, Zimbabwe, and Mozambique, micro-hydro power is developed through MFOs (Martinot, et al., 2002). MFOs are effective for the development of renewable energy markets in developing countries because they can overcome the lack of necessary resources-- such as financing, know-how, policies, and business opportunities-- for renewable energy markets.

Although more and more MFOs have emerged in developing renewable

energy markets and they have effectively acted to promote the markets, their numbers are still few and only a small amount of research about MFOs exists (Martinot, et al., 2002). Therefore, more research on the effectiveness of the current MFOs is necessary to understand their challenges and the opportunities.

Market Facilitation Organization in Japan

Although the concept of MFOs was developed for application in developing countries, MFOs have high potential to effectively function in promoting renewable energy markets in Japan. Just as the developing countries lack the necessary resources for market growth, Japanese renewable energy markets in rural communities also lack important resources, including know-how, financing, manpower, and policies (Iida, 2005). Thus, MFOs can be expected to address the barriers through a variety of functions and successfully promote renewable energy markets in Japan.

In Iida, Japan, a renewable energy project, including photovoltaic and energy-saving businesses, has been developed by the MFO called Ohisama-Shinpo-Energy Private Limited Company. It has operated since 2004 and is considered the first MFO in Japan (Iida, 2005). This paper analyzes the function of the MFO, Ohisama-Shinpo-Energy, explores how it addresses the barriers to the promotion of renewable energy, and evaluates its accomplishments and effectiveness.

Research Questions

This research focuses on the Market Facilitation Organization (MFO), Ohisama-Shinpo-Energy, Iida, Japan, and explores its renewable energy project. The project includes renewable energy, photovoltaic, and energy saving businesses. The research was conducted in order to examine the following main questions:

- What kind of functions does the MFO, Ohisama-Shinpo-Energy, provide in promoting a renewable energy market?

In order to develop a renewable energy market, an MFO could provide a variety of functions, such as networking, partner matching, information dissemination, market research, user education, business-deal identification and facilitation, technical assistance, consulting service, financing, and policy advocacy or advice (Martinot, et al., 2002). This study analyzes how the MFO, Ohisama-Shinpo-Energy, promotes a renewable energy market.

- What kind of barriers does the MFO face and how does it overcome them when it works on a renewable energy project?

A large number of barriers must be addressed to develop a renewable energy market. Prior to my field research at Ohisama-Shinpo-Energy as an intern, three studies identified the barriers: Global Environment Facility (2000), Painuly (2000), and Beck and Martinot (2003). Each of these sources provides comprehensive descriptions of barriers to promoting renewable energy. The general barriers explored through these studies are classified in the following broad categories: barriers of market failure/imperfection/distortions, economic and financial barriers, institutional barriers, technical barriers, and other barriers. The details of these barriers will be presented in Chapter 4. Because the barriers differ in regions, not all the barriers identified in Chapter 4 are faced by Ohisama-Shinpo-Energy's renewable energy project. In Chapter 6, I will identify the specific barriers that Ohisama-Shinpo-Energy faces and explore how they are overcome.

- Is the MFO, Ohisama-Shinpo-Energy, successful?

This study analyzes the effectiveness of the MFO. The MFO provides a variety of functions in promoting a renewable energy market, and these functions are related to business, community, and policy fields, all of which are key sectors for promoting a renewable energy market. In Chapter 6, I describe the indicators involved in these sectors and evaluate the MFO's success.

- What insights can the MFO glean from its experience of the MFO to improve its effectiveness?

Based on the result of the analysis of the MFO through the questions above, I will explore ways for the MFO, Ohisama-Shinpo-Energy, to better function. To help to develop the recommendations for the MFO, I will also analyze the MFOs, energy agencies in the European Union, as examples of successful MFOs. The analysis of the energy agencies is described in Chapter 3. The recommendations for Ohisama Shinpo-Energy are made in Chapter 6.

Methods

From June 2005 to July 2006, as an intern in Ohisama-Shinpo-Energy Private Limited Company in Iida, Nagano, Japan, I conducted interviews with staff members of the business projects undertaken by Ohisama-Shinpo-Energy. The interviewed members belonged to Ohisama-Shinpo-Energy and its business partners, Green Energy.Com Co., Ltd. and Institute for Sustainable Energy Policies.

The interviews are primarily semi-structured with qualitative questions which are listed in Appendix A. Most of the questions were prepared before the period of my internship. Some of them were revised given my experience in the internship and with the feedback from the project members of Ohisama-Shinpo-Energy, Green Energy.Com, and Institute for Sustainable Energy Policies. The interviews were conducted on my own in Japanese.

After the field research, supplementary interviews of the staffs of Ohisama-Shinpo-Energy, Green Energy.Com, and Institute for Sustainable Energy Policy were conducted through telephone and email. In addition, secondary-source documents were examined. Most of the documents were obtained during the period of my internship at Ohisama-Shinpo-Energy.

Report Structure

This research paper consists of seven chapters. The first chapter provides the introduction to the research, including the definition of Market Facilitation Organizations (MFOs). The second chapter gives an overview of renewable energy markets both in the world and in Japan, including the background of Iida, Japan, where the Japanese MFO, Ohisama-Shinpo-Energy Private Limited Company, performs. Chapter 3 describes the activities of MFOs known as energy agencies in the European Union as examples of successful MFOs, which helps to establish a brief evaluation standard for an MFO. Through a literature review, Chapter 4 explores the general barriers to the promotion of renewable energy, which are used in Chapter 6 to identify the specific barriers that challenges the Japanese MFO in its project. Chapter 5 describes the project by the Japanese MFO and its results. Finally, the discussion in

Chapter 6 addresses the research questions above, followed by the conclusion in Chapter 7.

Chapter 2: Background

In this chapter, I will explain renewable energy markets in the world and in Japan. First, the overview of world renewable energy market is described, offering details on energy supply by renewable energy and market growth of renewable energy. Second, I will give the outline of the renewable energy market and policies in Japan. Finally, the general information and policies of Iida-city where the MFO, Ohisama-Shinpo-Energy, operates will be presented.

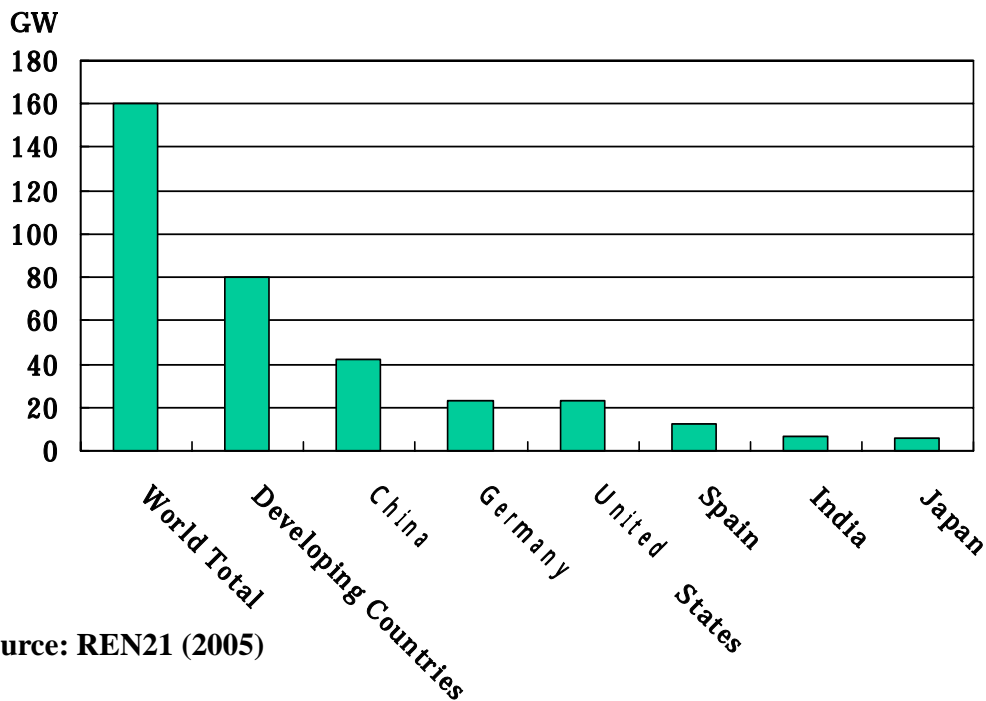
World Renewable Energy Market

Renewable energy was not in the mainstream of energy supply for a long time because of the immaturity of its technology. However, due to advancements in technology and effective policies related to increasing awareness of global warming and scarcity of oil, renewable energy markets have been rapidly growing.

In 2005, renewable energy supplied 17 % of the world's primary energy, 9 % of which is by traditional biomass, 6 % by large hydropower, and 2 % by other renewable sources including small hydropower, modern biomass, wind, solar, geothermal, and biofuels.¹ The world renewable energy capacity increased from 160 GW in 2004 to 182 GW in 2005. The top six users of renewable energy capacity include: China, Germany, the United States, Spain, India, and Japan. Developing countries have the capacity of 80 GW in 2005, which grew from 70 GW in 2004 (REN 21, 2005).

¹ The definition of renewable energy varies depending on countries and organizations. According to the study by REN21 (2005), generally, renewable energy includes small hydropower, modern biomass, wind, solar, geothermal and biofuels. Large hydropower and traditional biomass are excluded from renewable energy. Large hydropower generally means a plant with over 10 MW of capacity. In this paper, the definition given by REN21 is used.

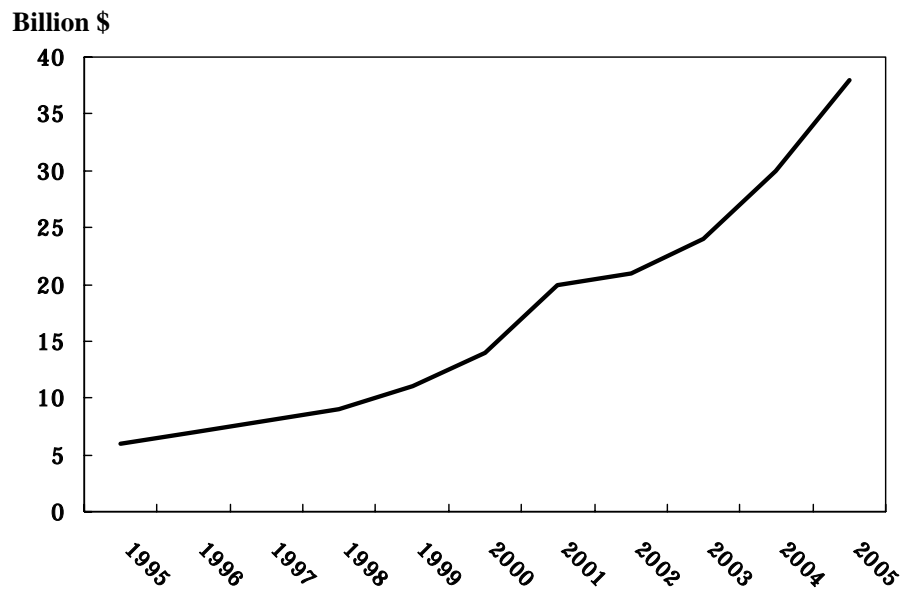
Figure 2: Renewable Power Capacities in the top 6 countries (Excluding large hydropower)



Source: REN21 (2005)

While conventional fuels still account for a large percentage of world energy supply, renewable energy supply has been rapidly increasing. In 2005, investment in renewable energy capacity was 38 billion US dollars, which was an increase of 8 billion US dollars over 2004. It is predicted that 700 billion US dollars will be invested in renewable energy by 2030 within organization for Economic Co-operation and Development (Iida, 2005). Since 1990, photovoltaic power and wind power generation have had the most rapid growth by maintaining over 20 % annual growth (Iida, 2005). To encourage the development of renewable energy, countries around the world set goals to utilize renewable energy (see table 1 below). To achieve the goals, at least 48 countries, 34 developed and transition countries and 14 developing counties, had implemented some policies to promote renewable energy by 2005 (REN 21, 2005). Given the increased investment in renewable energy, the recent growth, and the governmental supports, the world renewable energy market is expected to continue to grow.

Figure 3 : Annual Investment in Renewable Energy



Source: REN 21 (2005)

Table 1 : Renewable Energy Targets

Country	Target(s)
Australia	9.5 TWh of electricity annually by 2010.
Brazil	3.3 GW added by 2006 from wind, biomass, small hydro.
Canada	3.5 % to 15 % of electricity in 4 provinces; other types of targets in 6 provinces.
China	10 % of electric power capacity by 2010 (expected 60 GW); 5 % of primary energy by 2010 and 10 % of primary energy by 2020.
Dominican Republic	500 MW wind power capacity by 2015.
Egypt	3 % of electricity by 2010 and 14 % by 2020.
European Union	21 % of electricity by 2010.
India	10 % of added electric power capacity during 2003 - 2012 (expected 10 GW).
Israel	2 % of electricity by 2007; 5 % of electricity by 2016.
Japan	1.35 % of electricity by 2010, excluding geothermal and large hydro (RPS).
Korea	7 % of electricity by 2010, including large hydro, and 1.3 GW of grid-connected solar PV by 2011, including 100,000 homes (0.3 GW).
Malaysia	5 % of electricity by 2005.
Mali	15 % of energy by 2020.
New Zealand	30 PJ of added capacity (including heat and transport fuels) by 2012.
Norway	7 TWh from heat and wind by 2010.
Philippines	4.7 GW total existing capacity by 2013.
Singapore	50,000 m ² (- 35 MWth) of solar thermal systems by 2012.
South Africa	10 TWh added final energy by 2013.
Switzerland	3.5 TWh from electricity and heat by 2010.
Thailand	8 % of total primary energy by 2011 (excluding traditional rural biomass).
United States	5 % to 30 % of electricity in 20 states (including DC).

Source: REN 21 (2005)

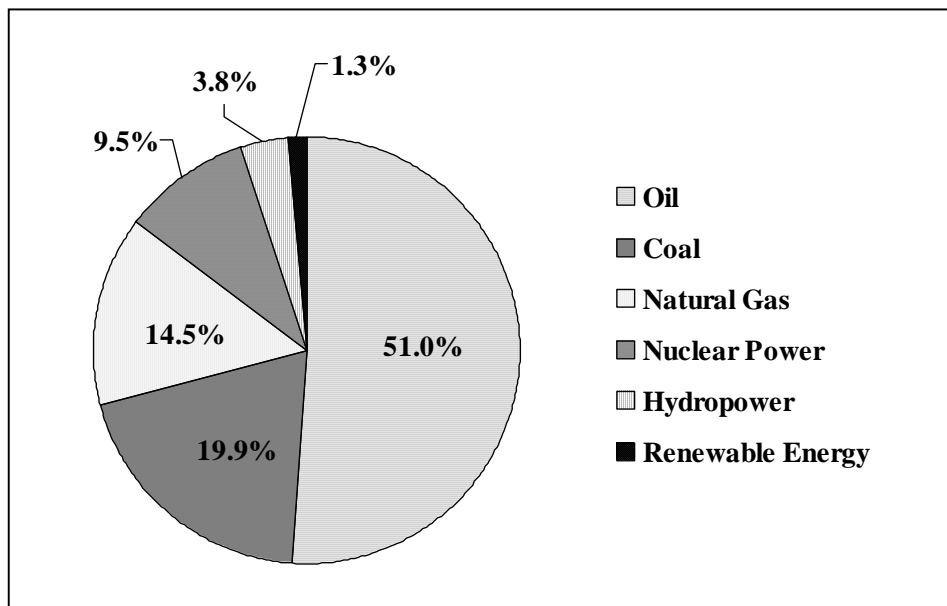
Japanese Renewable Energy Market

Renewable energy sources account for only a small portion of the total energy supply in Japan. In 2003, the share of each energy sources of the total primary energy supply is reported as: 51.1 % of oil, 19.9 % of coal, 14.5 % of natural gases, 9.5 % of nuclear power, 3.8 % of hydropower, and 1.3 % of ‘new energy’ and other sources (NEDO, 2005).² In 2003, the share of each energy source of the total power generation is 25.6 % for nuclear power, 27.9 % for natural gas-fired power generation,

² ‘New Energy’ is a term defined by the Japanese government. New energy involves renewable energy, including solar power, wind power, solar thermal utilization, biomass power, and biomass thermal utilization, as well as other sources including waste power, waste thermal utilization, snow and ice thermal utilization, green electricity cars, cogeneration power plants using natural gases, and fuel cells.

23.9 % for coal fired power generation, 9.5 % for oil-fired power generation, 10.4 % for hydropower generation, and 0.4 % for new energy (METI, 2005). The capacities of typical renewable energies are described in the table 2 below. Among the renewable energy technologies, solar and wind power have a relatively large capacity and have been rapidly growing. Although renewable energy is still rarely used in Japan, most renewable energies have large potential.

Figure 4 : The Share of Each Energy Sources of the Total Primary Energy Supply in 2003



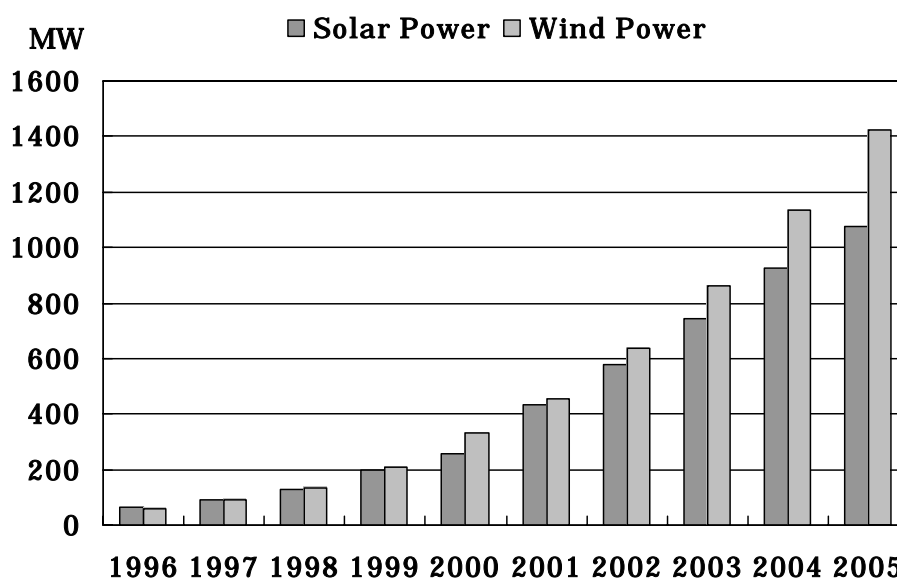
Source: New Energy and Industrial Technology Development Organization (2005)

Table 2 : Renewable Energy Capacity and Potential

	Capacity in 2004 (million kW)	Potential (million kW)
Solar Power	1.131	42 ~ 86
Wind Power	0.7	3.6 ~ 7.2
Biomass Power	0.226 (as of 2002)	-
Geothermal Power	0.52 (as of 2002)	2.47
Large Hydropower	20.22	33.37
Small Hydropower	3.44	
Solar Thermal	0.286	20.92 ~ 41.87

Source: New Energy and Industrial Technology Development Organization (2005)

Figure 5 : Solar and Wind Power Capacity in Japan



Source: New Energy and Industrial Technology Development Organization (2005)

Renewable Energy Policy in Japan

The renewable energy policy in Japan has been supporting the growth of renewable energy use. After the energy crisis happened in 1973, renewable energy policy in Japan moved into high gear. In 1974, the ‘Sunshine project’ was initiated. This project aimed to develop renewable energy technologies, such as solar systems, and put them into practical use. In 1978, the ‘Moon light project’ was established to develop energy-efficient technologies. In 1980, the target number of energy supply from renewable energy technologies and specific strategies for their advancement was developed on a national level. Then, both the ‘Sunshine project’ and the ‘Moon Light project’ were integrated into the ‘New sunshine project’ in 1993, aiming to facilitate research and development of renewable energy technologies among industry, academia and government in order to address environmental problems and realize sustainable development. In addition to these policies focused on research and development, economic support was provided for installments of photovoltaic systems for residences in 1994, and again in 1997 for wind power installments for business. In the initial stage, renewable energy policies were focused on research and development and contributed to the great advancement of renewable energy technologies such as solar and wind power. Especially, solar power capacity rapidly increased and remained the largest in the world until 2004.

In 2003, the ‘New & Renewable Portfolio Standard Law (RPS)’ was established as the first performance based policy with the purpose of enhancing energy security and addressing environmental problems. This has focused on the promotion of five renewable energy technologies: wind power, solar power, geothermal power, small-hydropower, and biomass power.³ Under the policy, electric power utilities are mandated to utilize a certain amount of renewable energy by three possible means: (1) generating the electricity by themselves; (2) purchasing the electricity from renewable energy from new energy providers; (3) purchasing the electricity by renewable energy from other electric power utilities. Electricity generated by renewable energy includes two types: the electricity itself and RPS

³ In addition to these five renewable energy sources, waste power generation is covered by RPS.

credit. RPS credits are traded in the marketplace. The RPS aims to expand the energy supply from renewable energy sources to 12.2 billion kWh per year (1.35% of a total electricity supply) by 2010. The policy expects to expand the renewable energy supply with the least cost by utilizing market mechanisms through the trade of RPS credits.

As described so far, Japan has enforced several policies that promote renewable energy, and they have been working somewhat effectively, resulting in advancement of technologies and growth of renewable energy such as wind and solar power. However, the future perspective of renewable energy facilitation does not look very bright. The most recently established RPS has a low target, only 1.35 % of the total electricity supply by 2010. This target is about one-tenth of the targets of some ambitious European countries, such as Germany and England, which have effective renewable energy policies.⁴ Moreover, RPS has some institutional problems and expects not to effectively promote renewable energy.⁵ Since renewable energy technologies have been more expensive than conventional fuel sources, more supportive policies for renewable energy are needed in Japan.

Table 3 : Renewable Energy Policies in Japan

Year	Policy	Detail
1973	Sunshine Project	Started Research and development on renewable energy technologies
1980	Act for promoting alternative energy to oil	Established the target, the guidance, and the governmental support for alternative energy to oil
1993	New Sunshine Project	Aims to facilitate research and development for renewable energy technologies

⁴ Germany has a target of 12.5 % and England 10 %. To achieve the target, Germany enforced 'Feed-in-Tariff' and England enforced RPS. Feed-in-Tariff and RPS are said to be one of the most effective policies in promoting renewable energy (Iida, 2005).

⁵ Because the target is too low, electric utilities do not need to expand renewable energy generation. Moreover, because RPS covers waste generation which is less costly than other renewable energy sources, it prevents other renewable energy sources from being promoted (Iida, 2005).

1994	Outline for renewable energy promotion ⁶	Aims at accelerating the promotion of renewable energy
1998	Long-term energy supply-demand outlook ⁷	Indicates outline for energy demand and supply by 2010
1998	Act for mitigating global warming ⁸	Develops framework to address global warming at the level of the country, municipalities, business establishments, and citizens
2003	New & Renewable Portfolio Standard Law (RPS)	Mandates electric power suppliers to utilize a certain amount of renewable energy

Source: New Energy and Industrial Technology Development Organization (2005)

Background of Iida, Nagano, Japan

The Iida, Nagano, Japan, where the Japanese MFO operates, is a middle sized city with 107,603 people and covering 658.76km in 2007. It is surrounded by well-known mountain ranges over 2000 meters, and abundant with beautiful forests and nature. Not only has Iida been known as an industrial and commercial center, but also known as home for fruit cultivation and rice cropping.

Iida is one of the cities with the most powerful environmental policies in Japan, identifying itself as being an environmental and cultural city. In 1996, it adopted a plan called “21 Iida environmental plan” and according to the plan, it set a target to reduce greenhouse gas emissions to a level below 10 % of that in 1990.⁹ To achieve the target, a new plan ‘Iida new energy and energy saving plan’ was developed.¹⁰ Under the plan, there will be a reduction of 66,103t-CO₂ of greenhouse gases achieved by new energy and energy saving.

⁶ This was translated into English by author.

⁷ This was translated into English by author.

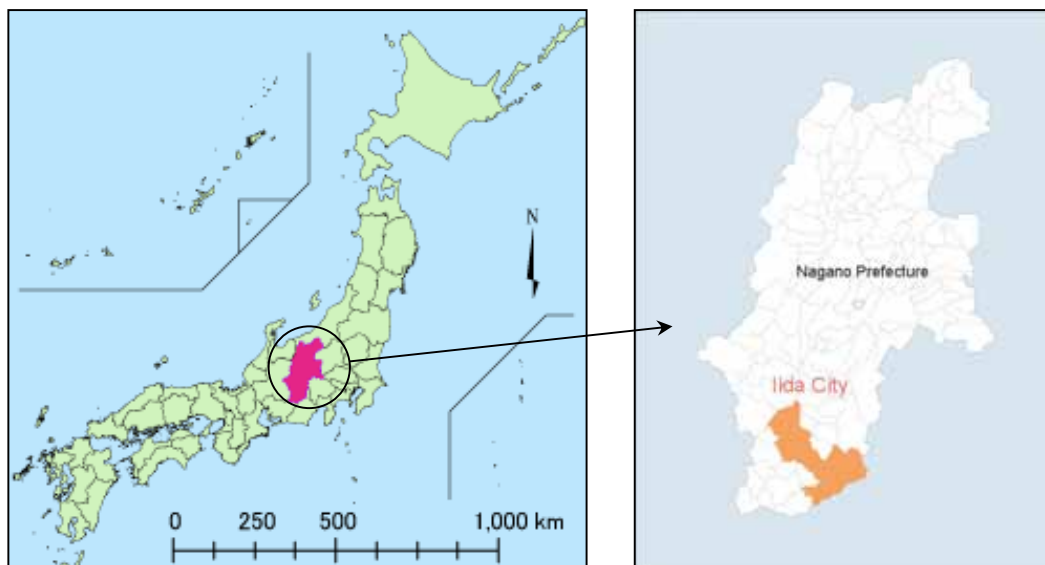
⁸ This was translated into English by author.

⁹ The name of policy is translated into English by the author.

¹⁰ The name of policy is translated into English by the author.

Iida has high potential for renewable energy business, especially for solar and biomass energy, because Iida has relatively long periods of sunlight and has plentiful biomass from surrounding mountains and forests. Iida is well known to have a high installation rate of photovoltaic (PV) systems in Japan, due to the ambitious government incentive.¹¹ Also, the government put its efforts into attracting PV industries, and in 1998 the production plant of Mitsubishi Electric Corporation started its operation for producing PV systems.¹² Its existence has also contributed to the promotion of PV systems' installation.

Figure 6 : The Map of Iida, Nagano, Japan



¹¹ The government of Iida has the target to promote PV systems for 30 % of all the households in Iida by 2010. To achieve the target, the government has been supporting the promotion of PV systems by providing incentives in two ways. First, from 1997 to 2003, the government mediated loans limited to 2 million yen from banking institutions for the installment of PV systems and assumed the interest payments for these loans. Second, since 2004, the government has been granting a subsidy of 30,000 yen/kW, which is limited to 100,000 yen, for PV system installments. In 2005, 772 households in Iida installed PV systems, which was 2.08 % of all the households in Iida.

¹² According to Mitsubishi Electric Corporation, in 2004, the plant had the capacity to produce 90 MW of PV systems.

Chapter 3: Review of Market Facilitation Organizations in the European Union

In this chapter, I explore functions and roles of the market facilitation organizations (MFOs) known as energy agencies in the European Union (EU) (Iida, 2005). These agencies promote renewable energy use through a variety of functions particular to MFOs, including networking, partner matching, information dissemination, market research, user education, business-deal identification and facilitation, technical assistance, consulting service, financing, and policy advocacy or advice. This chapter involves an analysis of a successful energy agency which helps to establish a brief evaluation standard for an MFO and contributes to the development of recommendations for the Japanese MFO, Ohisma-Shinpo-Energy, in chapter 6.

Energy Agency: its Background and Purpose

Energy agencies aim to promote sustainable activities of individuals, households, companies, and organizations through a variety of means, such as disseminating information about sustainable energy use, networking stakeholders, establishing renewable and energy saving projects, and offering policy advice.¹³

Energy Agencies were developed from a concept of the Energy and Environment Office, an organization established by citizen's group in Denmark opposing nuclear energy. In its early phase, its main activities were to educate people about energy and regional issues, and technical works were later added to its activities, including technical support for solar and wind power. In 1980, after Denmark abandoned policies promoting nuclear power, the role of the Energy and Environment Office was transformed to involve promoting a partnership of local people, authorities, and companies to cope with environmental issues. The Energy and Environment Office was successful in promoting renewable energy such as wind power in Denmark (Iida, 2005).

Based on the experience of the Energy and Environment Office, the European Union recognized the importance of partnerships among stakeholders and

¹³ See details at Managenergy Web: <http://www.managenergy.net/energyagencies.html>.

activities at the local level to promote renewable energy use. Energy agencies were then created in communities of the European Union under the Specific Action for Vigorous Energy Efficiency Program (SAVE II Program) between 1998 and 2002.¹⁴ To be designated as an energy agency, candidates need to meet the condition stated in the Energy Agencies' Charter of Cork (See table 4 below).

Table 4 : Energy Agencies' Charter of Cork

<ul style="list-style-type: none"> • Its principal aim is to promote energy efficiency and renewable energy sources. • Its area of operations corresponds to a subnational administrative and policy level. • It has political support from the regional and/or local authority or authorities within its area of operations. • Its constitution confers upon it genuine autonomy in relation to existing bodies. In particular it has its own budget and administrative board. • Its administrative board includes representatives of a variety of players involved in energy management, and in particular local elected representatives and representatives of consumers and local companies. • It has an operations team with at least two permanent members, together with the necessary logistical facilities (headquarters, premises, etc. ...) needed for its tasks and for maintaining its image as an impartial body in terms of energy options. • Its strategy is first and foremost directed towards energy demand from consumers, meaning households, public authorities and SMEs. • Its activities are diverse and concern, in particular, energy planning, consumer information and advice, assistance with setting up, funding, monitoring and evaluating energy management projects, and disseminating the results obtained. • It has sufficient will and means for forging cooperation with other European agencies.

Source: Managenergy

Energy Agencies' Activities

Activities of energy agencies vary, due to their conditions and circumstances such as location, economic resources, and existing needs in a community. The main services that they provide are: 1) information, advice and training on sustainable energy use, 2) energy audits, advice, and certification of public and private buildings,

¹⁴ SAVE Program was adopted in October 1991 and lasted until 1995. Its successor Program SAVE was adopted with a budget of 45 million European Currency Units in December 1996 for a period of five years. It was a non-technical program and aimed at promoting energy efficiency and encouraging energy-saving behavior through policy measures, information, studies and pilot actions.

3) development of renewable energy source projects (action planning, feasibility studies, design, work supervision, tender document drafting, or supply of service and energy), 4) raising awareness on energy efficiency, renewable energy sources and transport issues, and 5) organizing conferences and other events.¹⁵

These activities are comprised of technical operations, such as developing renewable energy projects, and information and communication activities. This mixture of activities requiring technical and communications expertise provides an unique characteristic to energy agencies, differentiating them from other existing organizations such as consulting engineering companies and pure communications agencies (Directorate-General for Energy and Transport, European Commission, 2004).

According to energy agencies' activities and range of works, energy agencies are categorized into several types: local agencies for local municipalities, regional agencies for regional governments, and national agencies for nations. Currently, more than 380 energy agencies are in operation all over the European Union (See table 5 below).

Table 5 : The Number of Energy Agencies

Local Agency	145
Regional Agency	183
National Agency	37
Associations	16
Total	381

Source: Directorate-General for Energy and Transport (2004)

Energy agencies operate as independent organizations of municipalities, although their heads are appointed by municipalities. Most national and regional

¹⁵ See details at Managenergy Web: <http://www.managenergy.net/energyagencies.html>.

energy agencies have been set up by municipalities, while a large number of local energy agencies have been transformed from local organizations, such as non-profit organizations and business establishments. According to Directorate-General for Energy and Transport, European Commission (2004), in the first stage of their establishment, the financial resources of an energy agency include: a subsidy granted by the European Union for the first three year, a subsidy by municipalities, and contribution from citizen groups. A few years after their establishment, most of them become independent and can finance themselves by profits gained by their own activities. In 2004, most of energy agencies were more than four years old, which suggest that they established economic independence after they consumed a three-year subsidy from the European Union. In 2004, the average number of employees was eight to nine full-time and one to two part-time. Half of the energy agencies earned 75,000 to 500,000 pound/year (150,000 to 1,000,000 US dollars/year) and 25% earned over 500,000 pound/year (1,000,000 US dollars/year) in 2004.¹⁶

The networks of energy agencies have strengthened the effectiveness of their activities. Several regional, national, and international networks have been established. Through the networks, energy agencies receive a variety of benefits, such as technical support, exchanges of experiences, and opportunities for lobbying the central administrations.

Furthermore, an initiative, Managenergy, has been contributing to enhancing energy agencies' functions. Managenergy was created in 2001 under an initiative of the European Commission Directorate-General for Energy and Transport, in order to support efficiency and renewable energy's work at the local and regional levels. Managenergy provides opportunities through training workshops and online events as well as information about case studies and good practice of energy agencies, European legislation, and projects and funding.¹⁷

¹⁶ A British Pound exchange rate of 2 US dollar / pound is assumed in this paper.

¹⁷ See details at Managenergy Web : <http://www.managenergy.net/>.

Table 6 : The Networks for Energy Agencies

Name of network	Detail
Energie-Cités	Established in 1990, and focuses on energy management in urban areas. More than 150 members of local authorities and energy agencies in 24 countries.
European Federation of Regional Energy and Environmental Agencies (FEDARENE)	Established in 1990, and focuses on energy and environment agencies working and regional or provincial level. It has 65 member regions over fifteen countries.
European Islands Network on Energy and Environment (IsleNet)	Established in 1990, and focuses on sustainable and efficient energy and environmental management. 20 energy agencies joined the network in 2005.
National Associations of EAs	Newly established in each European county. It aims at lobbying at the national level, providing services and opportunities for information exchange, and streamlining information to energy agencies.

Source: Directorate-General for Energy and Transport (2004)

Specific Activities of Energy Agencies: Severn Wye Energy Agency

Severn Wye Energy Agency Ltd (SWEA) is a not-for-profit company established in 1999 and a local Energy Agency in Gloucestershire, a county in England with a population of about 80,000 people in 2006.

SWEA's main objectives and activities are: (1) the advancement of education for the public benefit in relation to energy conservation, (2) the efficient use of energy and the utilization of renewable energy sources, (3) the relief of poverty and the preservation and protection of health by promoting the efficient use of energy (including energy for heating purpose) and utilization of renewable energy sources. In 2006, SWEA had 12 full-time and 3 part-time staff members, and it had 94,333 pounds (188,666 US dollars) of net incoming resource (SWEA, 2006). Their specific activities are summarized in Table 7 below

Table 7 : Activities of Severn Energy Agency

Activity	Detail
Projects for efficient use of energy and renewable energy sources	<ul style="list-style-type: none"> • Business planning • Feasibility Studies • Helping with funding source and making applications • Coordinating projects • Developing and facilitating partnerships and strategic development groups
Dissemination activities for sustainable energy use	<ul style="list-style-type: none"> • Free advice for energy efficiency in homes • Events for efficient use of energy and renewable energy at workplace and home • Training sessions for technologies and policy • Campaign for energy awareness
Policy support	<ul style="list-style-type: none"> • Advising local authorities about renewable energy strategies

Source: Severn Wye Energy Agency

Brief Evaluation of Energy Agencies as MFOs

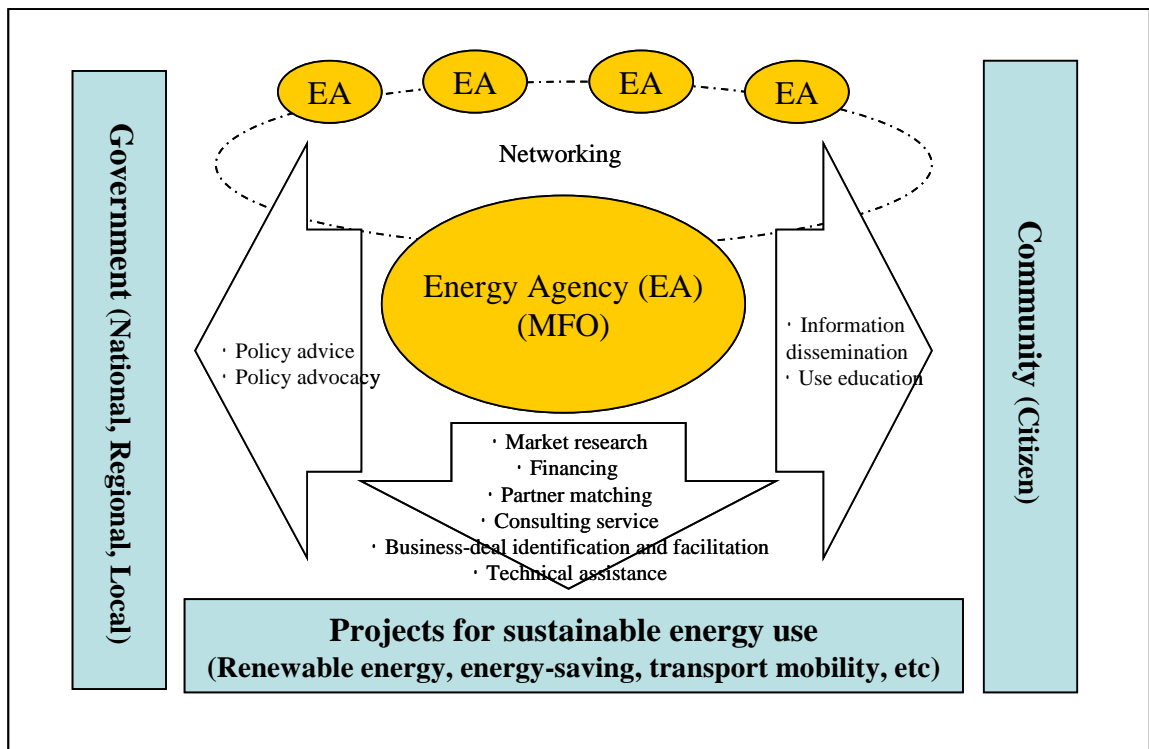
As described so far, energy agencies have been working to promote a renewable energy market through their unique characteristics. These characteristics enable energy agencies to be considered as MFOs because they provide a variety of functions of MFOs, such as consulting service and information dissemination, between the business, community, and policy field, all of which are critical sectors in promoting renewable energy.

Although energy agencies' effectiveness in terms of cost-benefit analysis is not explored in this paper, energy agencies can be considered somewhat effective in promoting renewable energy markets because most of them have become independent of governmental aid in providing their service with adequate financial resources and manpower.¹⁸ Therefore, as MFOs, energy agencies have successfully

¹⁸ According to Directorate-General for Energy and Transport, European Commission (2004), 47 % of 159 energy agencies' earning in 2003 comes from service contracts, 22 % from partner contributions, 10 % from private bodies and charitable trusts, 15 % from co-finance from European Union projects, and 7 % from other sources.

operated in promoting renewable energy.

Figure 7 : Energy Agencies as MFOs



Chapter 4: Renewable Energy Barriers

In this chapter, I will identify general barriers to the promotion of renewable energy by reviewing the literature: Global Environment Facility (2000), Painuly (2000), and Beck and Martinot (2003). These barriers will be used in chapter 6 to identify the specific barriers that the MFO, Ohisama-Shinpo-Energy, faces in Japan.

Although some of the renewable energy projects, such as large-scale wind power projects, have become profitable and more numerous, many applications of renewable energy have achieved only a small fraction of their potential. This is because of the existence of a variety of barriers in promoting renewable energy. These barriers often result in the disadvantage of renewable energy in terms of economic, regulatory, and institutional aspects, compared to other forms of energy supply. Although barriers differ depending on specific circumstances such as countries and regions, this section summarizes general barriers in the following broad categories: barriers of market failure/imperfection/distortions, economic and financial barriers, institutional barriers, technical barriers, and other barriers.

Barriers of Market Failure, Imperfection, and Distortions

High transaction cost

Renewable energy projects require high transaction costs. Transaction costs include a variety of necessary actions, such as resource assessment, permitting, planning, developing project proposals, assembling financing packages, and negotiating power-purchase contracts with utilities. The high transaction costs may result in a higher energy price for renewable energy projects, which are typically smaller than conventional energy projects.

Lack of information about renewable energy among critical players

Because renewable energy is a new technology and its market is immature, adequate information about it is not provided. For example, necessary information such as economic and financial costs and benefits, energy savings potentials, operating experiences, geographical resources for renewable energy, sources of

finance, and potential partners and their financial health, is lacking among critical players, such as consumers, project developers, engineers, architects, lenders, and planners. Without appropriate information, renewable energy technologies may not be successfully utilized or their projects may not be effectively developed.

Limited access to technology

In some regions, renewable energy technologies are not available. For instance, in developing countries, manufacturers which produce renewable energy technologies are hardly even found because of the immaturity of their markets. Also, even in developed countries, not all the renewable energy technologies are produced within the countries; they sometimes need to be imported.

Subsidized treatment for conventional energy sources

Conventional energy sources are subsidized in most countries at a higher rate than renewable energy sources. Subsidies take several forms: Research & Development, direct investment, and tax credits. In 2004, 150 to 250 billion dollars were provided to fossil fuels as subsidies in Europe, United States, and other developed countries, while 10 billion dollars went to renewable energy sources (REN21, 2005). Because such subsidies lower the final energy price, consumers pay below marginal cost for electricity generated by conventional energy sources. Therefore, large subsidies on conventional energy sources give a competitive disadvantage to renewable energy sources.

Non-consideration of externalities

Conventional energy sources, fossil fuels and nuclear power, put negative externalities on society. External effects of fossil fuels and nuclear power include contributions to pollution through carbon dioxide, sulfur dioxide, nitrogen oxide and other emissions and pollutants, or nuclear waste generation and radioactive contamination. These pollutants cause negative impacts: degradation of human health, damage to infrastructure from acid rain, environmental degradation of ecosystems

such as forests and fisheries, and global warming by carbon dioxide. Also, dependence on oil imported from other countries increases the risk associated with energy security. Because the costs of negative externalities of conventional energy sources are difficult to assess and a standard for the assessment is difficult to establish, the positive impacts of renewable energy sources are rarely considered in pricing.

Economic and Financial Barriers

High initial capital cost

With lower fuel and operating costs, renewable energy may become cost-competitive. However, because renewable energy entails high initial capital costs, renewable energy projects result in the small installed capacity of renewable energy per initial capital costs. Therefore, a high amount of financing is required for renewable energy investments.

Lack of credit and financing

Due to low creditworthiness, lack of collateral, or distorted capital markets, renewable energy projects may face difficulty in obtaining credit to invest in or purchase renewable energy technologies. Also, project developers rarely gain financing from banking institutions because renewable energy projects require long pay-back periods and banking institutions are concerned about whether the projects can sustain a long-term power purchase agreement with electric utilities to sell electricity.

Institutional Barriers

Lack of a legal framework for independent power producer

Independent power producers may have difficulty in obtaining power purchase agreements from electric utilities because large utilities often have control over production and distribution and independent power producers lack a legal framework. If a project developer were individually to need to negotiate power purchase agreements, he would face difficulty in planning and financing projects on

the basis of known and consistent rules.

Lack of institutions and mechanisms

Renewable energy markets can be effectively developed through public or private institutions, such as specialized agencies to help with project planning and operation of renewable energy technologies and to disseminate information about renewable energy technologies. However, in some regions, such as developing countries, few of these public or private agencies exist.

Restrictions associated with construction and siting criteria

Because renewable energy technologies, such as wind turbines, rooftop solar hot-water heaters, and biomass combustion facilities, have characteristics of their height, aesthetics, noise, or safety issues, they may have difficulty with adapting themselves to building restrictions. For instance, wind power projects often face opposition to their constructions because people are concerned that they may cause bird mortality and destroy favorable scenery. Moreover, because the technologies are so new, a standard procedure for permitting and installing renewable energy technologies may not be established in some areas. Thus local restrictions may require additional negotiations on the part of renewable energy projects. Also, project developers may face competition for land use with agricultural, recreational, scenic, or developing interests.

Limited transmission access

Renewable energy projects, such as wind power projects, need transmission access because they often are located far from areas where people live. However, existing utilities might not be willing to provide transmission access for remote renewable energy projects or they might charge high fee for use of transmission access.

Liability insurance requirements

Excessive liability insurance on some renewable energy technologies, such as home photovoltaic systems feeding into utility grids under net metering provisions, may be required because some technologies might endanger utility repair crews.

Technical Barriers

Lack of manpower with technical or commercial skills

Renewable energy projects require skilled personnel with technical, financial, and business development skills. For example, renewable energy technologies need to be maintained by capable engineers. However, some regions, especially rural areas, lack people with those skills.

Other Barriers

Difficulty in assessing future-fuel-price risk

Renewable energy could reduce future-fuel-price risks because it provides an infinite energy source. However, it does not receive the premium compared to conventional energy sources because it is difficult to correctly assess these risks. If these risks are explicitly and quantitatively included in economic analysis and technology assessment before decisions about new generation capacity, renewable energy could be more cost-competitive compared to conventional energy source

Lack of utility acceptance due to unfamiliarity of technology performance

Renewable energy technologies are new and unfamiliar in some regions, and they might be considered risky. For example, existing electric power utilities often consider renewable energy technologies risky because they seem unfamiliar and uncertain. Utilities may not be willing to develop and cope with unfamiliar renewable energy technologies.

Bad image from failed experiences of past performance

There have been some unsuccessful utilizations of renewable energy

technologies, and such experiences have given people a negative image of renewable technologies. Therefore, consumers might not be willing to utilize renewable energy technologies.

Utility interconnection requirements

Renewable energy technologies installed in individual homes or commercial systems may face difficulty associated with utility interconnection requirements when they are connected to existing utility grids. To meet the requirements, project developers may need to hire legal and technical experts, and this hiring may impose additional high transaction costs.

Opposition from existing interest group

Renewable energy projects may face opposition from existing interest groups that benefit economically and politically from circumstances in which conventional energy is the main energy source. These interest groups may try to block efforts to promote renewable energy through political lobbying.

Chapter 5: Outline of the project

by the Market Facilitation Organization (MFO), Ohisama-Shinpo-Energy

This chapter offers the outline of the renewable energy project by the MFO, Ohisama-Shinpo-Energy Private Limited Company, a private business establishment dealing with renewable energy, in Iida, Nagano, Japan.¹⁹ First, this chapter provides the outline of the project that Ohisama-Shinpo-Energy has undertaken. Second, this chapter describes the general outcome of the project.

An MFO, Ohisama-Shinpo-Energy

Ohisama-Shinpo-Energy Private Limited Company is a private business establishment established in 2004 in Iida, Nagano, Japan, and it is considered the first MFO in Japan (Iida, 2005). The MFO, Ohisama-Shinpo-Energy, aims to create sustainable community by promoting sustainable energy use, including photovoltaic, solar thermal, biomass, and energy saving.

Renewable energy is especially meaningful for rural communities in Japan because it brings a variety of benefits to communities. Most of the rural communities in Japan have faced serious troubles, such as depopulation and economic stagnation. To address such problems, renewable energy can be helpful by providing a variety of solutions, including generating employment opportunities, utilizing regional resources, and developing new industries. Iida, where Ohisama-Shinpo-Energy operates, entails the problems mentioned above, and Ohisama-Shinpo-Energy aims at not only creating an environmentally sound community, but also providing opportunities to solve such problems by promoting the use of renewable energy.

In order to promote renewable energy, Ohisama-Shinpo-Energy started a renewable energy project, including photovoltaic and energy-saving businesses, in December 2004 and expects to complete the project by 2007.

¹⁹ I collected the information about the project in this chapter through my internship in Ohisama-Shinpo-Energy from May 2005 to August 2006.

Table 8: Outline of Ohisama-Shinpo-Energy Private Limited Company

Name of Company	Ohisama-Shinpo-Energy Private Limited Company
Location	Iida, Nagano, Japan
Date of Establishment	Dec-04
Capital	3 million yen (27, 272 US dollars) from the private sector.
Number of Employees	Six employees as of February 2007 (Two full-timers, two dispatched employees from Green Energy.Com Co.,Ltd, two part-timers)
History of Company	The company was established to implement the renewable energy project with a partnership with the government of Iida. The project was consigned by the government of Iida to Ohisama-Shinpo-Energy as joint effort of the public and private sectors.
Description of Business	<ul style="list-style-type: none">• Supply of electricity, heat, and fuel by renewable energy such as photovoltaic and biomass• Installation and lease service of energy-efficient utilities• Consulting service for renewable energy technologies and energy saving• Organizing seminars and workshops for renewable energy and energy saving

Outline of Renewable Energy Project by Ohisama-Shinpo-Energy

An MFO, Ohisama-Shinpo-Energy Limited Private Company in Iida, Japan, launched a renewable energy project in 2004. This project was started with cooperation from the government of Iida as a joint effort of the public and private sectors.

In 2004, the government of Iida applied for a subsidy from the Ministry of Environment with a plan for renewable energy project including photovoltaic and

energy saving, and it was successfully approved.²⁰

After the government of Iida was granted the subsidy, in order to discuss, develop, and decide who implements the project plan, it set up the special committee with a variety of stakeholders, including a local electric power company, banking establishments, securities corporations, non-profit organizations, and other business establishments. Also, the Institute for Sustainable Energy Policies, a non-profit organization in Tokyo, and Green Energy.Com Co.,Ltd, a business consulting company specializing in renewable energy in Tokyo, joined a meeting of the committee.²¹ They wanted to join the meeting even though they were not a local organization because they were assisting the government of Iida to develop the project application plan for the subsidy.

Minami-Shinsyu-Ohisama-Shinpo, one of the stakeholders, took a leadership in the committee meetings because it had been working on renewable energy projects and had the best know-how among all the stakeholders to develop photovoltaic (PV) business.²² With meetings held twice a month for several months, Ohisama-Shinpo-Energy, comprised of staff members of Minami-Shinsyu-Ohisama-Shinpo, was established to implement the project plan in 2004. Ohisama-Shinpo-Energy started the project in partnerships with Green Energy.Com and the Institute for Sustainable Energy Policies.

The project includes a photovoltaic and energy conservation component called Energy Service Company (ESCO).²³ Each project must be finished in a

²⁰ The Subsidy is aimed to create a more sustainable community and balance between economic and environmental goals through renewable energy and energy saving. In 2004, 10 municipalities, including Iida, received the subsidies.

²¹ Green Energy.Com Co.,Ltd. is a consulting company for renewable energies, consisting of renewable energy and business experts. It also operates as a business intermediary of green electricity certificates. The detail of green electricity certificates is explained later in this chapter. Institute for Sustainable Energy Policies is a non-profit independent research organization, founded in 2000 by energy experts and climate change campaigners, with the aim of providing resources to realize sustainable energy policies.

²² Minami-Shinsyu-Ohisama-Shinpo is a non-profit organization in Iida, Nagano, Japan, locally acting for creating sustainable community through a variety of activities. Its main activities are renewable energy projects and environmental education.

²³ Energy Service Company (ESCO) is the business model which offers an energy consulting service to increase energy efficiency. ESCO makes a long-term contract with its clients and

specific time period to be subsidized. PV project was mandated to be started in 2004 and finished by March 2005 while ESCO was to be initiated in April 2005 and to be finalized by March 2007.

Detail of the Project: 1) Photovoltaic Business

One of the two business projects that Ohisama-Shinpo-Energy undertakes is a PV business. In March 2005, Ohisama-Shinpo-Energy installed a total of 207.93kW PV systems on the roofs of 38 public buildings, kindergartens and local community centers in Iida. The electricity generated by the PV systems is sold to the buildings. Total project cost is 132 million yen (1.2 million US dollars), 60 million (545,454 US dollars) raised from citizens and 72 million yen (654,545 US dollars) from a subsidy. With the installed PV systems, the project expected to generate 230,000 kWh/year with a sales price of 22 yen/kWh (0.2 US dollar/kWh). Also, 140,000 kWh/year of green electricity is expected to be generated at a sales price of 5 yen/kWh (0.068 US dollars/kWh).²⁴

In addition to the economic benefit and the environmental benefit, the project entails social benefits. The entrances to each building with a PV system have an electric board indicating the amount of power generated so that people who visit the building can see the benefits of the PV systems. Moreover, events for environmental education about global warming and seminars to promote energy saving activities are held in the public buildings with the installed PV systems.

provides energy saving service to them.

²⁴ 'Green electricity' is environmental value added in reducing environmental degradation such as carbon dioxide emissions. Green electricity is sold separately from the electricity generated as 'Green electricity certificate' which represents the monetary value of environmental benefits of renewable energy generated.

Table 9 Outline of the PV project

Project purpose	<ul style="list-style-type: none"> · Supplying electricity generated by PV systems · Selling green electricity generated by PV systems 	Project location	Iida, Nagano, Japan
		Start of commercial operation	April 2005
		Contract period	From April 2005 to March 2025
Purchaser of electricity	38 buildings in Iida: public community centers and, public and private kindergartens	Purchaser of green electricity	Green Energy.Com
Contract detail for electricity sales	22 yen / kWh for 20 years	Contract detail for a sales of green electricity	5 yen / kWh for 20 years
Expected electricity generation	228,000 kWh / year	Expected green electricity generation	140,000 kWh / year
Project cost (Including development and installment cost)	132 million yen (60 million yen from investments from citizens and 72 million yen from subsidy from the Ministry of the Environment)		
Ancillary information	<ul style="list-style-type: none"> · Ohisama-Shinpo-Energy has an ownership of the installed PV systems and their ancillary equipments · Ohisama-Shinpo-Energy has no rental fee for installation locations · Collecting information of production of electricity through a centralized control system · Contracting the city of Iida for the public kindergartens and community centers in Iida, and individually contracting other private kindergartens 		

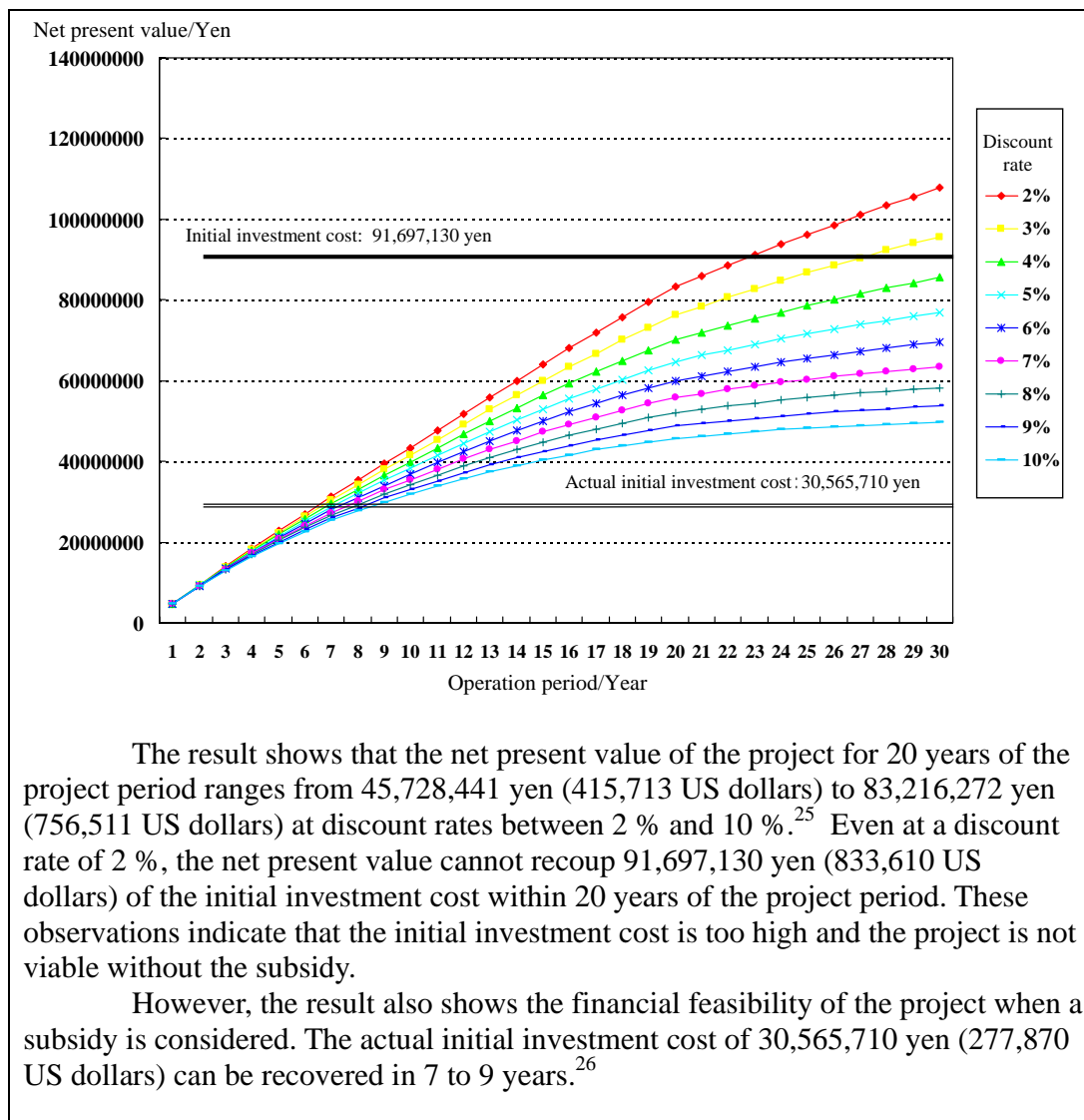
**The analysis of the financial feasibility of the PV project
- the payback period of the PV's initial investment cost -**

The purpose of this analysis is to verify the financial feasibility of the PV project.

The method of the analysis is:

- Examining if the PV project can recoup the initial investment costs for the installment of the PV systems, using present value method. The data and the computation method used in this analysis are described Appendix D.

The result of the analysis is summarized below.



The result shows that the net present value of the project for 20 years of the project period ranges from 45,728,441 yen (415,713 US dollars) to 83,216,272 yen (756,511 US dollars) at discount rates between 2 % and 10 %.²⁵ Even at a discount rate of 2 %, the net present value cannot recoup 91,697,130 yen (833,610 US dollars) of the initial investment cost within 20 years of the project period. These observations indicate that the initial investment cost is too high and the project is not viable without the subsidy.

However, the result also shows the financial feasibility of the project when a subsidy is considered. The actual initial investment cost of 30,565,710 yen (277,870 US dollars) can be recovered in 7 to 9 years.²⁶

Detail of the Project: 2) Energy Service Company (ESCO)

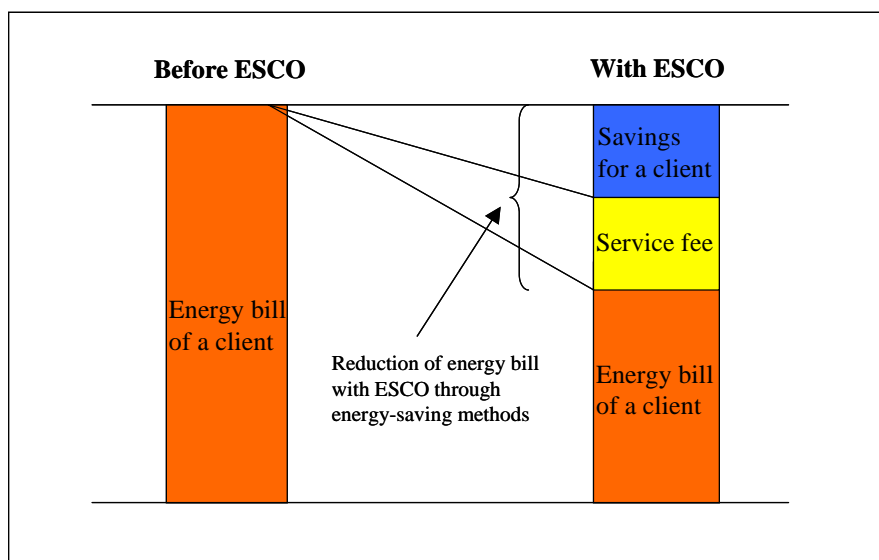
Another business project that Ohisama-Shinpo-Energy undertakes is the Energy Service Company (ESCO), which services local shops and small or middle sized business establishments in Iida. ESCO consults with business establishments,

²⁵ Due to a lack of information, this analysis does not consider some of the expenses, such as the cost of a system to meter electricity, insurance and maintenance cost of the PV systems. Therefore, it is necessary to note that the analysis is optimistic.

²⁶ Actual investment cost = the initial investment cost of the PV systems – the subsidy
According to the staff of the Ohisama-Shinpo-Energy, the project will be break-even. Thus, if the same analysis is done with the complete data, the analysis would indicate that the project would recover the initial investment cost in 20 years of the project period.

such as shops and plants, to improve energy efficiency. Based on the result of the consultations, energy efficient technologies are installed to reduce the cost of energy use with a fixed price contract for ten years.²⁷ Ohisama-Shinpo-Energy receives a fixed service fee from an ESCO client every month. ESCO is characteristic of the project that Ohisama-Shinpo-Energy undertakes in that it services small or middle business establishments.²⁸

Figure 8 : The detail of ESCO



ESCO was expected to contract with 100 local business establishments between 2005 and 2007 in Iida. The total project cost is 283 million yen (2.57 million US dollars), 142 million yen (1.29 million US dollars) of which is raised from citizens, 120 million yen (1.09 million US dollars) from a subsidy, and 21 million yen

²⁷ The clients can have a first tentative consultation with ESCO for free. If the result of the consultation is beneficial, a client can choose whether to take a full consultation. The procedure of ESCO up to a contract is described in Appendix B.

²⁸ According to the Energy Conservation center, Japan, in Japan, ESCO is a rapidly growing business. The total order amount by performance contract for energy conservation was 35.3 billion yen in 2003, and potential size of capital investment is 2.4715 trillion yen (22.46 billion US dollars). Most current ESCO clients are large or medium-scale establishments. Because small-scale establishments accounts for a large percentage of carbon dioxide emissions, ESCO for small-scale business is expected to be promoted.

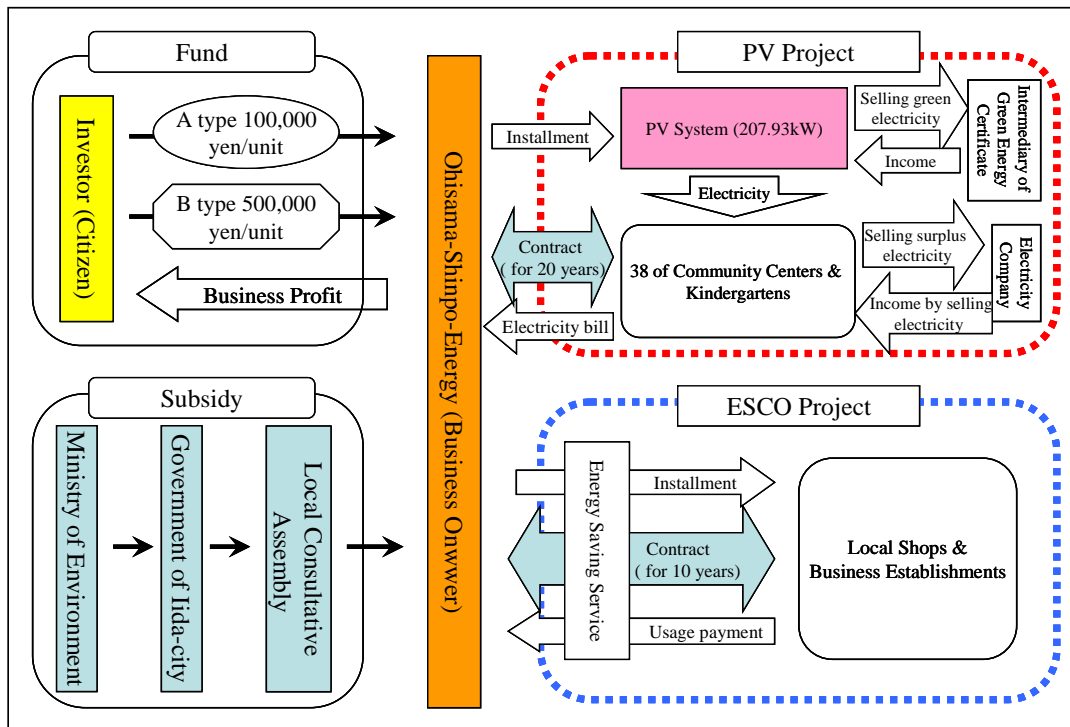
(0.19 million US dollars) from an owned resource. Under the project, ESCO expects to save two million kWh.

Like the PV project, this ESCO project does not only create economic and environmental benefits, but also provides social benefits to the community. The project aims at renovation and development of the community by supporting local small shops with energy savings. Under the project, Ohisama-Shinpo-Energy provides ESCO clients with the certification for environmentally friendly management and plans to show their environmental management on the homepage of Ohisama-Shinpo-Energy. For example, the certifications enable local small shops to market to consumers as environmentally friendly businesses.

Table 10 : Outline of the ESCO project

Project purpose	Servicing energy-saving methods to small or mid-sized buildings of business establishments by installing energy-saving equipment	Project location	Iida, Nagano, Japan
		Period for installing equipment	From March 2005 to March 2007
		Start of service	From April 2007
Client	Small or mid-sized business establishments in Iida	Expected result	A total of 100 clients
Contract detail	Fixed price contract for a contract period (10 years)	Project period	10 years after start of a service
Project cost	283 million yen (142 million yen from investments from citizens, 120 million yen from the subsidy from the Ministry of the Environment, and 21 million yen from an owned resource)		
Ancillary information	<ul style="list-style-type: none"> · Ohisama-Shinpo-Energy purchases energy-efficient and energy-saving equipment as assets, and installs them for clients. · Ohisama-Shinpo-Energy retains ownership of equipment during contract period. After the contract period, ownership can be transferred to the clients. 		

Figure 9 : Project Scheme



Detail of the Project: Finance Scheme

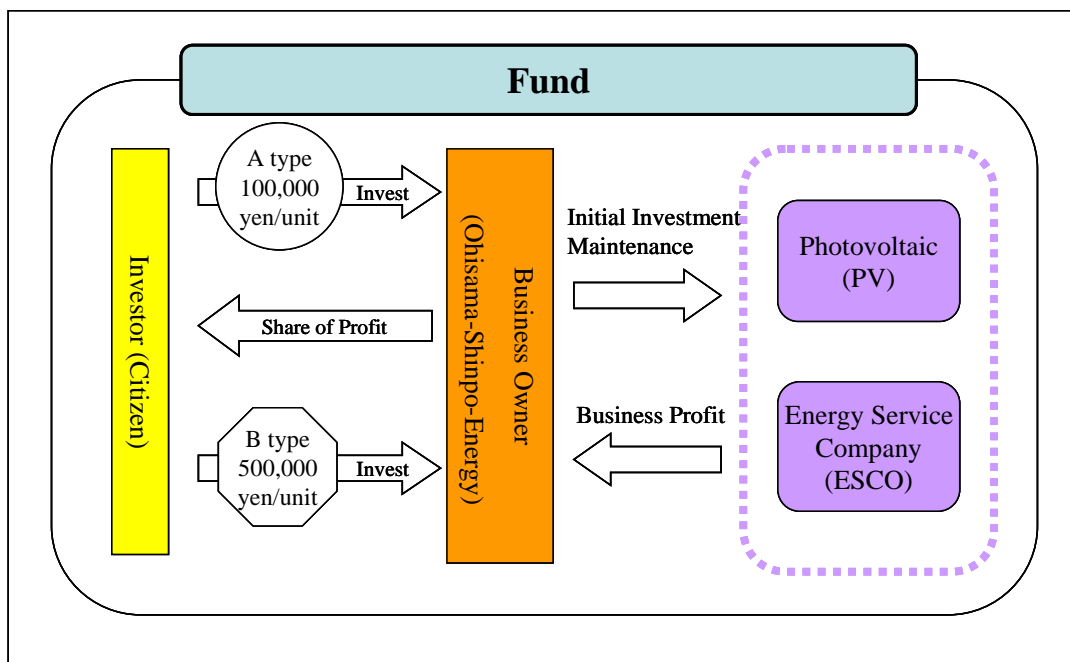
Ohisama-Shinpo-Energy, then, undertakes two businesses, PV and ESCO. Both businesses are financed by two sources, a subsidy by the Ministry of Environment and investment from citizens. The subsidy is 192 million yen (1.74 million US dollars) and the investment is 201.5 million yen (1.83 million US dollars). To collect 201.5 million yen from citizens, Ohisama-Shinpo-Energy utilized the particular finance scheme by outsourcing fund-raising to Japan Green Fund Co.,Ltd, a consultant for wind power project.²⁹ In the finance scheme, investors have two choices, type A investments of 100,000 yen (909 US dollars) and type B investments of 500,000 yen (4,545 US dollars). Type A provides investors with a 2 % of rate

²⁹ Japan Green Fund Co.,Ltd. was established in 2003 to support the wind power project through outsource service for fund-raising, business planning, and financial planning. Through these outsources, more than 1,900 million yen (17.27 million US dollars) were raised from 2001 to 2006 to establish 14,140 kW of wind power (10 plants) and 208 kW of PV systems.

return for 10 years, and type B with a 3.3 % for 15 years (The detail of the fund scheme is described in Appendix C).³⁰

Besides a share of the profit, investors receive newsletters about the status of the project, have their names inscribe on a memorial monument of the project, and may take special visitation tours of Iida to see how the business works.

Figure 10 : Finance Scheme



³⁰ Investors risk losing their original investments, but the rate of return of the investment is much higher than low risk financial instruments such as banking deposits, banking savings, and government bonds in Japan. The details of the investment and its risk are described in Appendix C.

Table 11 : Detail of the Fund

Type	Type A	Type B
Price / Unit	100,000 yen (\$ 909)	500,000 yen (\$4545)
Raised Units	1500 units	103 units
(Total Amount)	(150 million yen (\$1.36 million))	(51.5 million yen (\$0.46 million))
Share of Profit / Year	2%	3.3%
Contract Period	10 years	15 years (possibly extended)
Service preferences in Share of Profits over Types	Prioritized over Type B and business owner	Prioritized over business owner
First Division of Profits	Start in June 2007 and divided every year	
Limit for Application	N/A	
Order of Priority for Application	First-come and first-served basis (Based on contract day)	
Business Owner	Ohisama-Shinpo-Energy Limited Private Company	

Other Activities

In addition to the business activities, Ohisama-Shinpo-Energy provides opportunities in promoting renewable energy through the following not-for-profit activities: organizing workshops for entrepreneurs of renewable and energy-saving businesses, and holding seminars and lectures to raise awareness for energy-saving and renewable energy. Most of these activities were implemented in cooperation with Minani-Shinsyu-Ohisama-Shinpo, a non-profit organization in Iida.

Table 12 : Relationship and Roles of the Key Stakeholders

	Ohisama-Shinpo-Energy	Green Energy.COM	Institute for Sustainable Energy Policies	The government of Iida	Japan Green Fund	Minami-Shinsyu-Ohisama-Shinpo
Plan						
Operation	Installation					
	Owning					
	Management					
	Financing					
Other Activities	Awareness raising, User education, Training		Planning and Strategy Advice	Support for the project (Publicity, Purchase of electricity, etc)		Awareness raising, User education, Training

Results of the Project

Fund-Raising

Soon after Ohisama-Shinpo-Energy was established in 2004, fund-raising was opened through the Japan Green Fund in March 2005 and finished in May 2005. The expected amount, 201.5 million yen (1.83 million US dollars), which is one third of the total project cost, was successfully raised from 460 people.

Photovoltaic Business

After the operation started in April 2005, with 207.93kW of PV systems installed at 38 public and private buildings, a total of 414,986 kWh of electricity was generated and 9,129,692 yen (82,997.2 US dollars) were earned through sales of electricity with 22 yen/kWh (0.2 US dollars/kWh) by December 2006, substituting carbon dioxide by 156,864 kg-CO₂.³¹ Also, a total of 248,704 kWh of green electricity were generated, and 1,243,520 yen (11,304 US dollars) were earned through sale of green electricity with 5 yen / kWh.

The total number of PV systems was successfully installed as expected in the initial business plan and expected income has been generated.

ESCO Business

The ESCO business was initiated in 2005 and is expected to be finalized in 2007 with a total project cost of 283 million yen (2.57 million US dollars). By March 2007, 15 contracts had been finalized, and it is expected that an income of 338 million yen (3.07 million US dollars) is going to be generated over 10 years with a expected reduction of 678,150 kWh and 256.340 t-CO₂.³² The ESCO clients are five small shops, four elder care facilities, two restaurants, a bar, a nursing-care facility, a city office, and a museum.

³¹ Assuming that PV systems do not emit CO₂, the amount of CO₂ substitution is calculated based on a conversion rate of 0.378 kg-CO₂/kWh. (Ministry of the Environment, Japan, 2005)

³² CO₂ reduction is calculated based on a conversion rate of 0.378 kg-CO₂/kWh. (Ministry of the Environment, Japan, 2005)

Although the business was expected to finalize 100 contracts with small and middle scale business establishments, the smaller actual number of contracts does not necessarily indicate that the ESCO business has not been successful. The income per client has been much higher than expected in the initial business phase.

Table 13 : Outcome of the Project

Business	Outcome
Photovoltaic	Installed PV systems: 207.93 kW
	Generated electricity (From April 2005 to December 2006): 414,986 kWh
	Generated green electricity (From April 2005 to December 2006): 248,704 kWh
	Sales of electricity (From April 2005 to December 2006): 9,129,692 yen (82,997.2 US dollars)
	Sales of green electricity (From April 2005 to December 2006): 1,243,520 yen (11,304 US dollars)
Energy Service Company	The number of contracts (as of April 2007): Fifteen
	Income for 10 years: 338 million yen (3.07 million US dollars)
	Expected energy-saving: 678,150 kWh
	Expected CO2 reduction: 256.340 t-CO2

Other Activities

As a non-profit which promotes sustainable energy use, Ohisama-Shinpo-Energy provides a variety of opportunities to citizens in cooperation with Minami-Shinsyu-Ohisama-Shinpo.

First, seminars for entrepreneurs in the renewable energy sector were held by the joint effort of Minami-Shinsyu-Ohisama-Shinpo and Ohisama-Shinpo-Energy in February 2006 and March 2007. More than 30 people attended the seminar from all over Japan and learned from previous experiences in the renewable energy business through a field trip into an Ohisama-Shinpo-Energy's renewable energy project site and lectures by experts on renewable energy business and policy.

Second, seminars and events for environmental education have been held to teach people in the community about global warming and the importance of renewable energy. By 2006, 30 seminars were held and a total of 1182 people attended them.

Moreover, Ohisama-Shinpo-Energy organized lectures to educate children

about global warming, renewable energy, and energy saving in the kindergartens' classes. In 2006, the lectures were held 26 times with a total attendance of more than 2160 children and their parents. In 2007, an additional 30 lectures are scheduled.

Future Projects

After Ohisama-Shinpo-Energy completes the existing project in March 2007, it will begin a new project to install a total of 1000 kW PV systems in public and private buildings. This new project will also be subsidized by the Ministry of Environment, Japan, and will be in operation from April 2007 to March 2009. Also, ESCO business is expected to be continued without a subsidy.

Ohisama-Shinpo-Energy expects to gain more ESCO clients by using the experiences of the completed ESCO projects. Moreover, Ohisama-Shinpo-Energy is planning to start a heat supply business by leasing biomass boilers which use wood pellets as fuel.

Chapter 6: Discussion

In this chapter, the activities of the Market Facilitation Organization (MFO), Ohisama-Shinpo-Energy Private Limited Company, is investigated in terms of two research questions: 1) Which barriers does the MFO face and how are they overcome by the MFO when it works on a renewable energy project ? 2) Is the MFO successful? I collected the information in this chapter through personal interviews with the staff of Ohisama-Shinpo-Energy.

First, this chapter explores the specific barriers that Ohisama-Shinpo-Energy faces in its project and how it addressed the barriers. Next, I will evaluate the accomplishments of Ohisma-Shinpo-Energy. Then, I will propose the recommendations for Ohisama-Shinpo-Energy to improve its effectiveness.

Barriers to Promote Renewable Energy in Japanese Rural Communities

Promotion of renewable energy has been hindered by a large number of barriers, described in chapter 4, and these barriers need to be overcome to further facilitate renewable energy.

First, this section, referring to the barriers in chapter 4, is focused on the specific barriers that could have been faced or actually faced by the MFO, Ohisama-Shinpo-Energy, in promoting a renewable energy market in Japan. Note that the barriers described in this section are particular to the circumstance in which Ohisama-Shinpo-Energy undertakes its photovoltaic and ESCO project and therefore, not all the existing barriers in Japan are described. The specific identified barriers include: 1) high cost and low pricing leading to low profitability, 2) lack of a legal framework for independent power producers, 3) lack of credit and financing, 4) lack of manpower and skilled personnel, 5) lack of information about renewable energy among critical players, 6) inadequate business models, 7) lack of an appropriate business developer, and 8) opposition from existing interest groups. Second, I will analyze how these barriers are addressed by the MFO, Ohisama-Shinpo-Energy.

1) High cost and low pricing leading to low profitability

High cost and low pricing of renewable energy often leads to its low profitability, which is a significant barrier to the promotion of renewable energy. The identified barriers leading to low profitability include the following: high initial capital cost, high transaction costs, and non-consideration of externalities.

First, the high initial capital cost required for renewable energy business may result in less installed capacity than do conventional generation sources, resulting in low competitiveness of renewable energy. In the case of the project by Ohisama-Shinpo-Energy, the capital cost of the PV system is really high.³³

In addition, transaction costs of renewable energy projects are significant,

³³ The analysis of the financial feasibility of the PV project by Ohisama-Shinpo-Energy in page 40 shows the project cannot recoup the initial investment cost of the PV systems without the subsidy, indicating the high initial investment cost is a serious problem.

because they requires a variety of costly activities such as identifying renewable energy resources, planning and developing project proposals, conducting environmental assessment, assembling financing packages, negotiating power-purchase contracts with utilities as well as installing, operating, and maintaining equipment. These transactions are part of the photovoltaic and ESCO business that Ohisama-Shinpo-Energy undertakes.

Moreover, a lack of fair assessment of renewable energy underestimates its value, leading to lower pricing of renewable energy to conventional fossil fuel. If there was a legal mechanism to convert social and environmental values of renewable energy to monetary value in Japan, renewable energy could be more feasible than conventional energy sources.

2) Lack of a legal framework for independent power producers

An independent power producer often faces difficulty in contracting with a large electric utility to sell electricity. In the case of the PV business by Ohisama-Shinpo-Energy, a power purchase agreement needs to be contracted between Ohisama-Shinpo-Energy and the large utility. Since power purchase agreements depend on voluntary programs by large electricity companies in Japan, Ohisama-Shinpo-Energy might not be able to reach agreement. This uncertainty can create a large risk for developers that are taking on renewable energy projects. Because of this, projects developers have difficulty in planning and financing.

3) Lack of credit and financing

Lack of credit and financing is a major barrier to promoting renewable energy projects. This is true of the project that Ohisama-Shinpo-Energy has undertaken because its business is not attractive for banking institutions for the following reasons. First, Ohisama-Shinpo-Energy lacks credit capability because its renewable energy business has low profitability and is a newly established small company. Second, banking institution does not prefer long pay-back periods for its business, such as 10 to 20 years which is typical for a renewable energy business.

This long pay-back period is more likely to face not only risk of business itself, but also a risk of obsolescence of its equipments and a change of policies supporting those businesses.

4) Lack of manpower and skilled personnel

In a rural community, skilled personnel may not exist, such as people who can maintain renewable-energy technologies as well as business specialists who possess appropriate technical, financial, and business development skills. Moreover, rural communities lack several necessary characteristics such as capable manpower with innovative ways of thinking, people open to new ideas, and an ability to adapt to unfamiliar situations. This situation is true of the community, Iida, where Ohisama-Shinpo-Energy operates. For example, young talented people graduating from a university tend to leave for a big city because attractive employment opportunities do not exist in the community. Also, people with appropriate business and technical skills are hard to find because of the small size of economy in the community.

5) Lack of information about renewable energy among critical players

Because renewable energy involves new technologies and the market is immature, information about it is not available in rural communities such as Iida in Japan. For example, information on the most advanced renewable energy technologies is almost unavailable to a rural community. Also, people in the communities have little chance to learn about the importance of renewable energy, because organizations providing such opportunities rarely exist in a rural community. Raising awareness for renewable energy is important because it is closely related to the demand for renewable energy. Without the availability of necessary information, renewable energy may not be appropriately utilized or its projects may not be effectively developed.

6) Inadequate business model

Generally, in Japan, business models for renewable energy have been inadequately developed, and with such limited business models, the businesses have not been able to generate much profit. There have been a large number of renewable energy businesses that purchase and sell renewable energy utilities in Japan. Companies might purchase and sell some stoves for biomass pellets. Because demand for such stoves is inherently low, however, these companies are not able to sell many stoves. Selling only a limited number of utilities does not generate profits for these companies to further expand their businesses. Also, because such a business model lacks a scale impact, the business owner does not benefit from the scale.

7) Lack of an appropriate business developer

The renewable energy sector in Japan lacks a sufficient number of appropriate developers for renewable energy business. Very few existing organizations, including large, mid-size, or small companies, and non-profit organizations, show great promise for success in the renewable energy sector. If a large-scale company not specializing in renewable energy businesses plans to start an electric power selling business by renewable energy sources, a low rate of return of investment might cause it to give up the business. A small or middle scale business establishment might not smoothly undergo a renewable energy business because, especially in rural communities, it does not have capable manpower, including young manpower and skilled personnel. Although a large number of non-profit organizations have been working on the promotion of renewable energy, they are not powerful enough to promote it at a large scale because of their lack of manpower and their poor financial ability. Renewable energy markets need appropriate business developers that can challenge businesses despite the low profits and possess necessary resources, including capable and skilled manpower.

8) Opposition from existing interest group

When a company from outside a community initiates a renewable energy business inside that community, it is likely to face an opposition from stakeholders. In

the case of Ohisama-Shinpo-Energy, the members of the committee prefer that the subsidized project is implemented by a company within the community. Because some renewable energy businesses, such as a heat supply business with biomass fuels, necessitate collaborative relationships with various stakeholders, a lack of cooperation with stakeholders may be a serious problem.

Overcoming the barriers

Low Profitability

To improve profitability of businesses, PV and ESCO business, Ohisama-Shinpo-Energy utilizes the following means.

1. Bulk purchase and installation

To further overcome the disadvantage of high initial cost of PV systems, Ohisama-Shinpo-Energy used a blanket order in purchasing and installing the PV systems.³⁴ Due to the blanket order, installation cost per kW was reduced to 441,000 yen (4,009 US dollars), which was much lower than the standard installment cost of 661,000 yen (6,009 US dollars).³⁵

2. Utilizing green electricity certification

Often, the sale of generated electricity from PV systems is the only source of income in an electric power selling business by PV systems. In the project of Ohisama-Shinpo-Energy, in addition to income through sales of the generated electricity with PV systems, green electricity is offered for sale at the sales price of 5 yen/kWh to Green Energy.Com which is a business intermediary of green electricity certifications.³⁶ Since the PV systems were installed in 2004, 248,704 kWh of green

³⁴ The blanket order was based on competitive bidding among the three companies installing PV systems, requiring to estimate the installation cost per kWh generated from installed PV systems for each installation site.

³⁵ The standard installment cost was 667,000 yen as of 2005, according to New Energy Foundation, Japan.

³⁶ 'Green Energy certificate' represents the monetary value of environmental benefits of electricity generated by renewable energy. The certificates can be traded separately from the energy produced. Purchasing a green energy certificate enables to utilize renewable energy by adding the environmental value of renewable energy to electricity supplied by electric power

electricity was generated by December 2006 with sale of 1,243,520 yen (11,304 US dollars).³⁷

3. A new system to meter electricity

To measure the amount of electricity and green electricity generated by a PV system is time consuming and costly. To meter them, Ohisama-Shinpo-Energy utilizes the system developed by Sanyo Electric Co., Ltd, which cooperated with the Institute Sustainable Energy Policies and Green Energy.Com. The system, which automatically measures a generated amount of green electricity through its computer network, provides several benefits to improve business profitability. First, it reduces manpower cost to meter an amount of generated electricity. Second, the system enables Ohisama-Shinpo-Energy to easily compute electricity bills.

4. Partnership with the government of Iida-city

Because Ohisama-Shinpo-Energy has a partnership with the government of Iida and represents a joint effort of the public and private sectors, it receives several privileges that improve its business profitability. First, the government granted Ohisama-Shinpo-Energy the right to install PV systems in its public buildings for 20 years. Because 35 out of the 38 buildings on which it installed the PV systems are public buildings, Ohisama-Shinpo-Energy did not have to advertise. Moreover, Ohisama-Shinpo-Energy was provided with the opportunity to sell all the electricity generated by PV systems to the government. The government contracted to purchase the generated electricity at 22 yen/kWh (0.2 US dollars/kWh) for 20 years.³⁸ The

companies. In Japan, green energy certificates are certified by the non-governmental organization, Green Power Certification Council, Japan (GPCCJ). According to GPCCJ, to be certified as green electricity, 0.03 yen / kWh (0.00027 US dollars/kWh) of electricity, 10 yen / kW (0.09 US dollars/kW) of renewable energy capacity, and 100,000 yen / year (909 US dollars/year) registration fee need to be paid by the generator (as of 2006). The market price of the certificate differs depending on the companies issuing it, the size of the contract for purchasing it, and renewable energy sources of green certificates. For example, the price of green certificates for biomass power generation by the leading company, Japan Natural Energy Company Limited accounting, is 6.5 yen/kWh (0.059 US dollars/kWh) for a 5-years contract for consumers which use less than 100,000 kWh/year while the price for a 1-year contract for the same size of consumer is 10 yen/kWh (0.09 US dollars/kWh).

³⁷ Twenty-two clients purchased or were granted the green electricity certificates by Ohisama-Shinpo-Energy's PV project by April 2007.

³⁸ Twenty-two yen was almost the same to the market price. Ohisama-Shinpo-Energy determined

contract enables Ohisama-Shipo-Energy to reduce a business risk related to uncertainty in gaining power purchase agreement.

As well as the PV business, the partnership with the government of Iida provides significant benefits to Ohisama-Energy in improving profitability of ESCO business. First, the government provides a chance to Ohisama-Energy to find clients. For example, some public buildings, such as libraries and museums, are introduced to Ohisama-Energy as possible ESCO clients by the government. Thus, the partnership reduces its business transaction costs for marketing

5. Integration of the Business Models

To improve low profitability of a renewable energy business, Ohisama-Shinpo-Energy integrates several business models, such as converting environmental benefits of electricity generated by PV systems into monetary value through green electricity certificates, lowering high up-front cost of PV systems through a blanket order, reducing transaction costs through the new systems for electricity metering, and raising investment from citizens through a special finance scheme. The integration of such unique business models enables Ohisama-Shinpo-Energy's project to be more profitable than most of the existing renewable energy businesses with a simple business model.

Lack of credit and financing

To overcome a difficulty in financing of renewable energy projects, Ohisama-Shinpo-Energy receives a subsidy and utilizes a particular finance model for raising funds from citizens. The finance scheme is developed by Japan Green Fund Co.,Ltd. and Ohisama-Shinpo-Energy outsourced the fund-raising to Japan Green Fund. Outsourcing the fund-raising enabled Ohisama-Shinpo-Energy to collect the significant amount of 201.5 million yen (1.83 million US dollars), which could not have been obtained by financing from a banking establishment.

Lack of Manpower and Skilled Personnel

this by referring to the market price.

Ohisama-Shinpo-Energy does not possess appropriate manpower and business skills to complete the renewable energy and energy-saving project, because Ohisama-Shinpo-Energy is a newly established small company without professional renewable energy business skills.³⁹ To overcome a lack of know-how and manpower, Ohisama-Energy has a partnership with and outsources to several organizations that have necessary abilities, including general business, technical, and engineering skills.

1. Partnership with Green Energy.Com

Green Energy.Com has been playing a critical role for Ohisama-Energy to complete the project. The main role of the company is to provide principal business skills such as business planning with Ohisama-Shinpo-Energy. For instance, when the government of Iida applied for a subsidy, Green Energy.Com assisted it in an application process. Without this assistance, the project plan might not have been practical and, moreover, Ohisama-Shinpo-Energy might not have been established.

To complete the project plan, Ohisama-Energy has an umbrella commitment with Green Energy.Com for 3 years. Under the commitment, Ohisama-Energy and Green Energy.Com share a profit from the business project. To implement the project, three employees of Green Energy.Com from Tokyo work in Ohisama-Shinpo-Energy and other employees take a business trip from Tokyo when it is necessary.⁴⁰

2. Partnership with Institute for Sustainable Energy Policies

Another partner, the Institute for Sustainable Energy Policies, has been providing insight and ideas about renewable energy business to Ohisama-Shinpo-Energy.⁴¹ For example, the idea of the new system to meter electricity generation has been developed with help from the Institute for Sustainable Energy Policies.

3. Partnership with companies to complete ESCO

To complete the ESCO business project, Ohisama-Energy has a contract with

³⁹ When the project was started in 2004, Ohisama-Shinpo-Energy had one full-timer and one part-timer. Both of them did not have much experience in renewable energy projects.

⁴⁰ The number of employees of Ohisama-Energy is four, two full-timers and two part-timers in 2006.

the company specializing in ESCO because Ohisama-Shinpo-Energy and Green Energy.Com do not possess the know-how of ESCO. Under a contract, the profit from ESCO is shared with the company, and the contract can be renewed each year. Also, Ohisama-Shinpo-Energy has consignment contracts with several local companies for engineering works. By working with companies possessing the necessary skills, Ohisama-Shinpo-Energy plans to learn the know-how and will proceed to work on ESCO business by itself in the future.

Opposition from existing interest groups

Opposition from existing groups was an especially serious barrier in the initial stage of the project. In 2004, the government of Iida was developing the project plan in a project committee with a variety of stakeholders. Although the project was supposed to be developed by the new company with some board members from Green Energy.Com, some members of the committee did not approve that. Because the project plan was complicated and unfamiliar to all the committee members, they worried about whether the project would be successful. Especially, the members considered that the finance scheme was too audacious because 201.5 million yens (1.83 million US dollars) of investments would be raised from citizens. Furthermore, some of the members were opposed to the idea that the project would be implemented through a partnership with Green Energy.Com in Tokyo because they did not prefer that a large amount of profits from the project would be paid to a company outside their community, Iida.

To have the project plan approved by the committee, Minami-Shinsyu-Ohisama-Shinpo and Green Energy.Com made a great effort to explain details of the project to the members. With their persistence, most of the members gave their approval to the project plan, and finally it was successfully approved in the committee.

In addition, although Minami-Shinsyu-Ohisama-Shinpo's and Green Energy.Com's tenacity to convince the opposing members was necessary, it seemed more important and effective that a local organization,

Minami-Shinsyu-Ohisama-Shinpo, was chosen as a main project developer. If Green Energy.Com had been the project developer, the opposition could have been even more substantial. Establishing a project developer from a local organization was an important action.

Lack of an appropriate business developer

Ohisama-Shinpo-Energy is willing to undertake a low profitability renewable energy project that other companies might not want to undertake. Ohisama-Shinpo-Energy would do so because it has the basic belief of maximizing its contributions to society over that of profits. In other words, if this business generates enough profits to enable Ohisama-Shinpo-Energy to pay back to banking loans, give a return to its investors, and produce at least enough to operate independently, Ohisama-Shinpo-Energy thinks it is worth doing.

Lack of information among critical players

For renewable energy markets to be effectively promoted, adequate information about renewable energy, including economic and social benefits, needs to be provided to the critical players. To disseminate the information, Ohisama-Shinpo-Energy has taken the following actions:

1. Raising awareness about renewable energy and energy conservation

Ohisama-Shinpo-Energy provides opportunities for raising awareness among citizens about renewable energy through a variety of activities. First, the 38 buildings on which Ohisama-Shinpo-Energy installed PV systems are ideal places to begin raising awareness. Each of the 38 buildings has a display board showing the amount of electricity generated by the installed PV systems, enabling people visiting the building to easily notice efficacy of the PV systems.

Furthermore, the seminars have been held in the public buildings where Ohisama-Shinpo-Energy installed the PV systems. The seminars were targeted at the local community and intended to raise awareness about global warming and

importance of renewable energy. By 2006, 1182 people, or 1 % of a total population in Iida, had attended the seminars.

Moreover, Ohisama-Shinpo-Energy held twenty-six 30-minute lectures in local kindergartens to educate children about global warming and importance of renewable energy and energy conservation. Including children and their parents, 2160 people attended the lectures. Because energy conservation behavior takes its roots in childhood, the lectures are meaningful. After children attended the lectures, they became aware of energy-saving activities, not only doing energy-saving activities themselves but also urging their parents to do so in their homes.

2. Raising awareness and disseminating information by raising investments from citizen

To finance a project, Ohisama-Shinpo-Energy utilizes the particular fund scheme in which funds are raised from citizens. This scheme benefits business as well as society because it provides citizens with an opportunity for energy selection and raises awareness for environmental concerns.

Through the scheme, 460 people invested in Ohisama-Shinpo-Energy's project. Although receiving a share of the profit from the investment was one of their main purposes, many of them found a different reason for the investment: a contribution to society by supporting the promotion of renewable energy. According to the research conducted on the investors, people are motivated to the investment for economic benefits as well as social benefits, such as prevention of global warming and promotion of renewable energy (Furuya, 2007). The scheme gives a great opportunity to join an environmental activity to people who have environmental consciousness but do not know what to do as well as to people who have environmental consciousness but do not want to pay for environmental activities.

In addition, people gain an opportunity to be more interested in and deepen their knowledge about renewable energy and environmental concerns through investments in the projects that Ohisama-Shinpo-Energy undertakes. As an optional service, investors receive a news letter about progress of the project few times a year.

Moreover, a virtual community of over 5000 people who invested in renewable energy projects through the fund scheme managed by Japan Green Fund is planned; people in this community will exchange information about renewable energy and will communicate each other.⁴² Therefore, the finance scheme can effectively raise awareness about renewable energy and environmental issues in a large number of people.⁴³

3. Diffusing information of the project for duplication

Ohisama-Shinpo-Energy has been willing to spread the information and the know-how about its renewable energy project because it expects that its project will be duplicated. By 2006, Ohisama-Shinpo-Energy received 14 visitations from a variety of organizations, including research organizations, university faculties and students, city governments, and non-profit organizations. These visiting organization were especially interested in Ohisama-Shinpo-Energy's joint effort of the public and private sectors and its unique business models. Moreover, Ohisama-Shinpo-Energy has been invited to several conferences and meetings to show and talk about the progress of its project, and has been frequently announcing updates of its project through its webpage and local and national newspaper.

4. Providing training for renewable energy entrepreneurs

Seminars for entrepreneurs of the renewable energy business were held by the joint effort of Minami-Shinsyu-Ohisama-Shinpo and Ohisama-Shinpo-Energy in February 2006 and 2007. More than 30 people attended the seminars from all over Japan and learned about renewable energy businesses through a field trip to Ohisama-Shinpo-Energy's renewable energy projects and lectures by experts on renewable energy businesses and policy. In the seminar, participators developed

⁴² The community is for the people who invest through the finance scheme managed by Japan Green Fund. By 2007, more than four thousands of people have invested in renewable energy projects through the finance scheme.

⁴³ The renewable energy projects financed citizens can bring other benefits, such as stimulating the local community (Maruyama, et al., 2007).

business plans and expressed their ideas. One of the business plans developed in the 2006 seminar will begin operation in 2007.⁴⁴

Table 14: How Ohisama-Shinpo-Energy overcame the barriers

Barrier	How to overcome
Low profitability	<ul style="list-style-type: none"> · Bulk Purchase and installation for PV systems · Utilizing green electricity certificates · Utilizing a new system to meter electricity generation for PV · Partnership with the government of Iida to reduce transaction costs and business risks for the project · Integration of business models
Lack of legal framework for independent power producers	<ul style="list-style-type: none"> · Partnership with the government of Iida to sell the electricity generated by PV systems
Lack of credit and financing	<ul style="list-style-type: none"> · Collecting investments from citizens · Subsidy from the Ministry of the Environment
Lack of manpower and skilled personnel	<ul style="list-style-type: none"> · Partnership with Green Energy.COM, ISEP, and a company specializing in ESCO · Outsourcing financing to Japan Green Fund
Opposition from existing interest groups	<ul style="list-style-type: none"> · Establish a business developer from an organization familiar to the community
Lack of an appropriate business developer	<ul style="list-style-type: none"> · Starting the business despite low profits · Borrowing capable manpower from other companies
Lack of information about renewable energy among critical players	<ul style="list-style-type: none"> · Diffusing information and know-how about the project · Raising awareness about sustainable energy use through seminars and events · Organizing seminars for entrepreneurs

⁴⁴ This plan includes a heat supply by a biomass boiler which uses biomass pellets.

Evaluation of the Market Facilitation Organization, Ohisama-Shinpo-Energy

In this section, I will explore the effectiveness of the Market Facilitation Organization (MFO), Ohisama-Shinpo-Energy. First, I review what functions Ohisama-Shinpo-Energy performs as an MFO. Second, I will assess the effectiveness of Ohisama-Shinpo-Energy through the accomplishments in business, community, and policy sectors to which the MFO provides services.

The Functions of the MFO

Working on the renewable energy project, Ohisama-Shinpo-Energy has performed a variety of functions as an MFO. These functions are categorized into three critical sectors to promote renewable energy: business, community, and policy (See the figure 11).

- For business: market research, financing, partner matching, and consulting service.
- For communities: information dissemination, awareness raising, and training.
- For policy: policy advice.

The details of each function are summarized in the table 15 below.

Figure 11 : MFO and its Functions

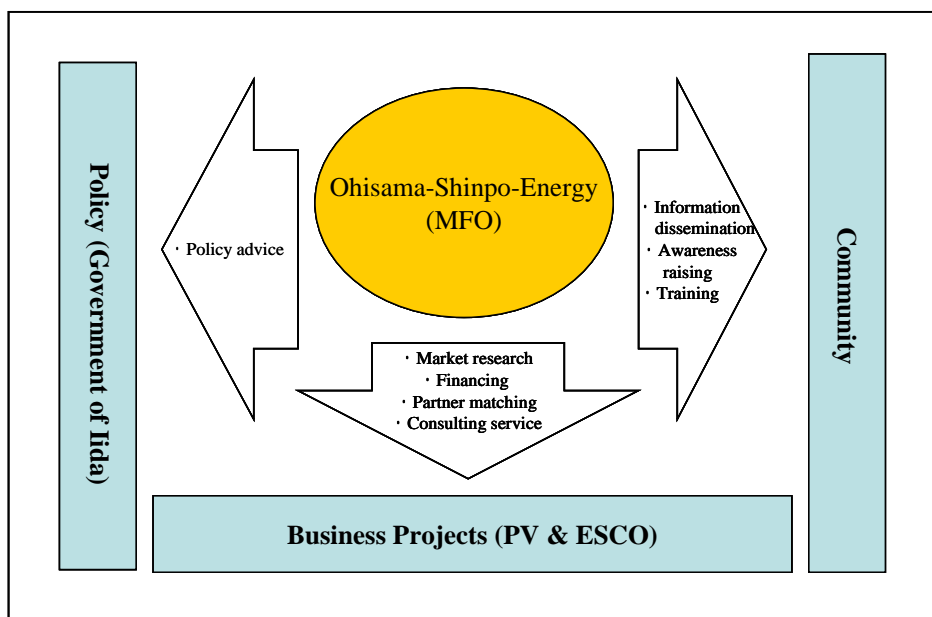


Table 15 : Functions of the MFO

Field	Functions	Detail
Business (ESCO & PV)	Market Research	<ul style="list-style-type: none"> • Exploring business opportunities • Searching for the most suitable renewable energy technologies
	Partner Matching	<ul style="list-style-type: none"> • Finding the business partners and coordinating them to implement the project
	Consulting Service	<ul style="list-style-type: none"> • Providing consulting service for ESCO
	Financing	<ul style="list-style-type: none"> • Financing the renewable energy business through the subsidy and investments from citizens
Community (Citizens)	Information Dissemination	<ul style="list-style-type: none"> • Raising Awareness by seminars, events, and investment from citizens • Diffusing the information and know-how of the project through conferences and site visitations
	Training	<ul style="list-style-type: none"> • Providing training through seminars for entrepreneurs
Policy (Government)	Policy Advice	<ul style="list-style-type: none"> • Providing advice to the government of Iida for planning the subsidized project

Table 16 : Indicators to Evaluate the Success of the MFO

Indicator		Achievement (As of April 2007)	
Business	PV	Installed capacity	207.93 kW
		Generated electricity	414,984 kWh (04/2005 to 12/2006)
		Generated green electricity	248,704 kWh (04/2005 to 12/2006)
	ESCO	Income	10,373,212 yen (94,301 US dollars): 9,129,692 yen (82,997 US dollars) from a sales of electricity and 1,243,520 yen (11,305 US dollars) from a sales of green electricity between 04/2005 and 12/2006
		Number of contract	Fifteen
		Income	338 million yen with 15 clients (From April 2007 for 10 years)
Community	Sustainability of business	Expected energy saving	678,150 kWh with reduction of 256.340 t-CO ₂ (with 15 clients from April 2007 for 10 years)
		Sustainability of business	· PV business has not become independent without subsidies · ESCO business is expected to expand without subsidies
	Job creation	Job creation	· 2 full-timer, 2 part-timers of OSE · Jobs related to installment and maintenance of the utilities for PV and ESCO
		Awareness raising about renewable energy and energy-saving	· Seminar (30 times, 1182 participants) · Lecture in kindergartens (26times, 2160 participants) · Awareness raising through investment from citizens (460 investors)
Policy	Policy advice	Training	· Seminars for entrepreneur (2 times, 60 participants)
		Information dissemination	· Diffusing the information and know-how of the project through conferences and visitations
			· Providing policy advice to the government of Iida to develop the project plan

Accomplishments in Businesses Field

Ohisama-Shinpo-Energy has been working on a renewable energy project that includes PV and ESCO. In the PV business, after operations started in April 2005, with 207.93kW of PV systems, a total of 414,986 kWh of electricity was generated, substituting carbon dioxide by 156.864 t-CO₂, and 9,129,692 yen (82,997 US dollars)

were earned through sales of electricity at 22 yen/kWh (0.2 dollars/kWh) by December 2006. Also, a total of 248,704 kWh of green electricity were generated, and 1,243,520 yen (11,304 US dollars) were earned through sale of green electricity with 5 yen / kWh. The expected capacity of PV systems was successfully installed as expected in the initial business plan and the expected income has been gained. The other business project, ESCO, has also been going well. Since ESCO was initiated in 2005, 15 10-year contracts were finalized as of April 2007 and these contracts will provide Ohisama-Shinpo-Energy with 338 million yen (3.07 million US dollars) of income. Because both PV and ESCO businesses were finalized as expected in the project plan, Ohisama-Shinpo-Energy expects to start the distribution of the profits from the project to the 460 investors in June 2007. Therefore, the project, including the PV and ESCO businesses, can be considered successfully finished.

Given the success of the subsidized project, it is expected that Ohisama-Shinpo-Energy further expand its business by being independent of the subsidy.

Although the project was finished according to plan, Ohisama-Shinpo-Energy considers that the PV business is still not feasible without subsidies because the high cost of PV systems remains a serious problem. However, considering that electric power selling projects based on PV systems have rarely established even with subsidies in Japan, Ohisama-Shinpo-Energy's accomplishment is valuable lesson because 1) the project established its innovative business model and 2) the project demonstrated the possibility of an electric power selling project based on PV systems. Since Ohisama-Shinpo-Energy will initiate another PV business project subsidized by the Ministry of the Environment from April 2007 to March 2009, it expects to improve its skills and know-how to eventually make the PV business marketable.⁴⁵

While Ohisama-Shinpo-Energy successfully finalized the subsidized project, ESCO can be considered unsuccessful in that it could not accomplish a particular

⁴⁵ Ohisama-Shinpo-Energy will install a total of 1000 kW of PV systems by 2009. The business scheme will be similar to the PV project that Ohisama-Shinpo-Energy finalized.

result for small- or middle-scale clients. The original project aimed 100 contracts with small-scale business establishments, such as local shops and restaurants. But the project turned out only 15 contracts. The number of small-scale contracts is relatively small because: 1) 10-year ESCO contracts are too risky for small-scale clients. 2) ESCO has difficulty generating much profit for small-scale clients. 3) Ohisama-Shinpo-Energy did not have much time to focus on small-scale clients.

First, small-scale business establishment contracts were not positive for ESCO because some of them had bad business conditions and therefore were not sure if they could make a 10-year commitment. In rural communities, such as Iida, small local shops generally have hard time. They may need to compete with large shops such as large supermarkets which provide cheaper services to consumers than small shops. Also, the number of consumers has been decreasing due to economic depression and depopulation in rural communities. Furthermore, some of them might not be able to continue their business for 10 years because they may not be able to find a successor for their business. Thus, small-scale business establishments were negative for ESCO contracts.

Second, ESCO could not generate much profit for small-scale clients because many energy-saving utilities ineffectively work on them. For example, ESCO could implement small-scale energy-saving measurements with good cost-benefit performance for small-scale clients, such as exchanging incandescent bulbs for fluorescent bulbs and installing energy-saving technologies on fluorescent tubes. However, because such means could reduce only a small amount of energy use for the small-scale client, they cannot generate enough profit to be attractive for clients. In addition, the utilities which greatly save energy also cannot do much for small-scale business establishments, because of their bad cost-benefit performance. For example, 'a technology adjusting voltage', which greatly saves energy, cannot produce much profit. Because it is much more expensive than small-scale energy-saving utilities, it cannot generate much profit; the energy saved by the technology is small due to the low energy use of small-scale clients.

Third, the time limit for Ohisama-Shinpo-Energy to finish its project

prevented it from focusing on small-scale clients. For its ESCO project, Ohisama-Shinpo-Energy received a subsidy from the Ministry of the Environment in Japan, and it needed to implement the ESCO project by March 2007 to be subsidized. Because an ESCO contract for a small-scale client could consume only a small portion of the subsidy, Ohisama-Shinpo-Energy could not help focusing on larger-scale business establishments to consume the whole subsidy. If Ohisama-Shinpo-Energy had had more time, it could have won more contracts with small-scale clients.

Although Ohisama-Shinpo-Energy could not finalize many ESCO contracts with small-scale clients, it plans to continue to approach them, as well as middle-scale or large-scale clients. Through the subsidized project, Ohisama-Shinpo-Energy consulted over 50 small-scale clients. Although most of the consultations did not result in a contract, they allowed Ohisama-Shinpo-Energy to accumulate some know-how for small-scale clients. Therefore, Ohisama-Shinpo-Energy expects to further expand services for the small-scale clients.

Recommendations in Business Field

First, I recommend that Ohisama-Shinpo-Energy keep working with the government of Iida. In the project, the government of Iida played an important role, such as contracting with Ohisama-Shinpo-Energy to purchase electricity in the PV business and supporting Ohisama-Shinpo-Energy in marketing ESCO clients. When Ohisama-Shinpo-Energy further expands the renewable energy business, such support from the government would be of significant help. To continue the relationship with the government, Ohisama-Shinpo-Energy could propose a new project to be implemented in partnership with the government through the 'Iida environmental consultative assembly'.⁴⁶ For example, Ohisama-Shinpo-Energy could propose a

⁴⁶ Ohisama-Shinpo-Energy is a member of 'Iida environmental consultative assembly', which was transformed in 2005 from the committee established to develop the plan of the subsidized project that Ohisama-Shinpo-Energy undertook. The assembly expects to independently work to realize the environmental policy of the government of Iida. The assembly consists of a variety of stakeholders, administrative officers, business establishments, non-profit organizations.

business project related to energy-saving to the government. It is reasonable for Ohisama-Shinpo-Energy to propose the energy-saving project, because Ohisama-Shinpo-Energy could develop a feasible and promising plan through the know-how gained through the ESCO business. Such an energy-saving project would be attractive to the government of Iida which has been facilitating energy-saving through ambitious governmental targets and plans.

Second, I recommend that Ohisama-Shinpo-Energy utilize and join the network of renewable energy players to gain and exchange information about the renewable energy projects. Ohisama-Shinpo-Energy expects to start other renewable energy businesses such as supplying heat with biomass pellets. As energy agencies in European Union exchange know-how and their experience with the networks' energy agencies, the network could bring new business insights to Ohisama-Shinpo-Energy. Ohisama-Shinpo-Energy might join the existing renewable energy networks in Japan, or international renewable energy networks for renewable energy developments because the company has employees with English communication skills.

Finally, I recommend that Ohisama-Shinpo-Energy build up its own business skills. In the project, Ohisama-Shinpo-Energy borrowed the necessary business skills and manpower from other companies, such as Green Energy.Com. Currently, the significant manpower of Ohisama-Shinpo-Energy is dependent on the staff of Green Energy.Com. If Ohisama-Shinpo-Energy did not have the partnership with Green Energy.Com, it would have difficulty in further developing its business.⁴⁷ Therefore, it is desirable that Ohisama-Shinpo-Energy develops its own technical expertise and become independent from Green Energy.Com. Also, this technical independency is preferable so that all the profits from future projects benefit the local economy. To develop their own work force, Ohisama-Shinpo-Energy might put more effort into training and recruiting local people. Capable young manpower is especially desired if the company wishes to operate and expand the scale of its activity for many years to

⁴⁷ The partnership with Green Energy.Com was supposed to be finished after Ohisama-Shinpo-Energy finished the subsidized project in March 2007. But, Ohisama-Shinpo-Energy extended its partnership with Green Energy.Com.

come. To help meet this goal, Ohisama-Shinpo-Energy may offer internship opportunities targeted to local secondary and tertiary educational institutions.

**Analysis of the possibility for the PV project to be successful without subsidy
~ How can the PV project be viable without subsidy? ~**

Although the PV project would not have been possible without the subsidy, it is worth exploring the possibility for the PV project to be viable without the subsidy.

The method of the analysis is:

- Looking at if the project can be successful by substituting the subsidy, 72 million yen, with the investments from citizens.⁴⁸ That is, if the investment from citizens can be repaid, the project could be successful. The amount of investment which is necessary to be repaid is 83,998,547 yen (the original investment, 72,000,000 yen, + interest payments to investors, 11,998,547 yen).⁴⁹

The analysis assumes that two ways are possible to repay the investment: increasing the income or decreasing the cost. To increase the income, RPS credits or green electricity (GE) are considered to be offered for sale, assuming that all RPS credits and GE are sold at a fixed price for the project period.⁵⁰ To decrease the cost, the reduction of the PV installment cost is considered.⁵¹

- Sales of RPS credits or GE⁵²

Assume that 228,000 kWh of RPS or GE is produced per year and their market price ranges from 1.5 to 11 yen/kWh.⁵³ The income produced by their sales is calculated by:

(produced RPS credits or GE for the project period)*(their market price)

Therefore, when the market price is 1.5 yen/kWh, the income is: (228,000 kWh/year)*(1.5 yen/kWh)*20 years = 6,840,000 yen.

Likewise, when the market price is 11 yen/kWh, the income by their sales is: (228,000 kWh/year)*(11 yen/kWh)*20 years = 50,160,000 yen

Therefore, the income ranges up to 50,160,000 yen.

⁴⁸ Assume that investments from citizens are raised.

⁴⁹ The amount of repayments is calculated at the same rate of return as the PV project.

⁵⁰ Other possible ways to increase income includes: sales of carbon credits and increase of the sales price of electricity. However, because Japan does not have a carbon market yet and price increase of sales of electricity is difficult to estimate, these ways are not considered in this analysis.

Both the GE and RPS credits represent the environmental value of renewable energy. Therefore, this analysis assumes that their market prices are the same, and either of them is offered for sale.

⁵¹ Other ways to decrease the cost, such as decreasing labor charge and maintenance cost, are not considered here, because it is difficult to estimate them.

According to

⁵² The detail about RPS is explained in Chapter 2.

⁵³ From 2004 to 2007, in Japan, the range of the market price of RPS credits has been 1.5 ~ 11 yen/kWh. Therefore, these numbers are applied in this analysis.

- Reduction of installment cost

Assume that the installment cost of PV systems will be decreased up to by 1/4 from the installment cost of the PV project, 441,000 yen/kW.

The reduction of installment cost is calculated by:

(reduction in installment cost / kW)*(the total amount of installed PV systems).

For example, when the installment cost, 441,000 yen, is decreased by 1/2, the cost reduction is:

$(220,500 \text{ yen/kW}) \times (207.93 \text{ kW}) = 45,848,565 \text{ yen}$.

Likewise, when the installment cost is decreased by 1/4, the cost reduction is:

$(330,750 \text{ yen/kW}) \times (207.93 \text{ kW}) = 68,772,847 \text{ yen}$.

Therefore, the range of the contribution to decreasing cost of the project by the reduction in installment cost up to by 1/4 is 0 yen ~ 68,772,847 yen.

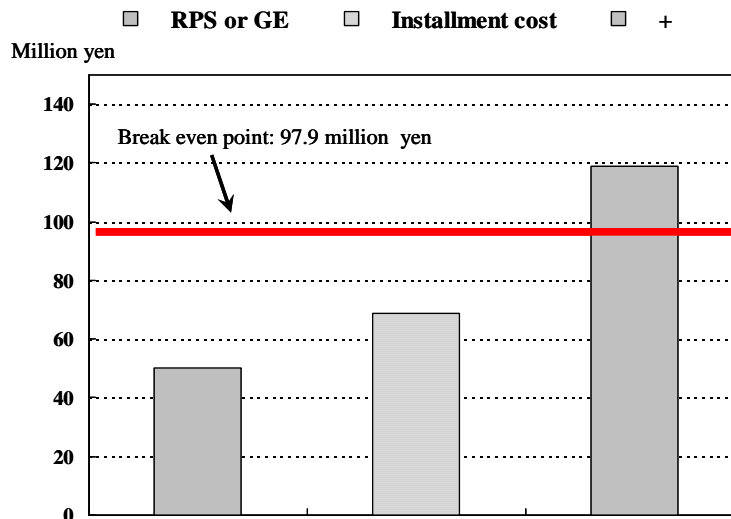
Then, the project could be successful, if the repayment for investments from citizens, 83,998,547, is achieved by (1) sale of RPS credits or GE, or (2) reduction in the installment cost. This number, 83,998,547, is defined as 'break even point' in this analysis.

However, it is necessary to note that because the original project plan has income of 700,000 yen/year through the sales of GE, 140,000 kWh/year, the analysis cannot assume that 228,000 kWh of RPS credits and GE are sold per year. To solve this problem, the analysis increases the break even point by adding the income from the sales of GE in the original project plan so that the analysis can consider the full contribution from the income through the sale of RPS credits or GE.

Therefore, the break even point is calculated by: (the repayment for the investments from citizens) + (the income through the sales of 140,000 kWh of GE) = 83,998,547 yen + (700,000 yen/year)*(20 years) = 97,998,546 yen

Thus 'break even point' is 97,998,546 yen.

The result of the analysis is summarized in the figure below.



The result shows that either of (1) sale of RPS credits or GE, or (2) reduction in the installment cost cannot independently exceed the break even point. Only the combination of them could exceed it. For example, with the sales of RPS credits at the sales price of 11 yen/kWh and the

reduction in installment cost by 1/2, the project achieve 96,008,565 yen of the repayments for the investments from citizens. This number is almost close to the break even point, 97,998,546 yen. That is, if the reduction in the installment cost by more than 1/2 and adequate sales of RPS credits or GE are assured, the project may become possible. These conditions are necessary for the PV project to be financially viable.

Accomplishments in Community Field

To promote renewable energy and energy-saving behaviors, Ohisama-Shinpo-Energy considers disseminating information as the integral part of its project. Ohisama-shinpo-Energy disseminates the information to the community through activities such as holding seminars and lectures designed to raise awareness, diffusing the information about its project through conferences and visitations, and training entrepreneurs of renewable energy businesses.^{54 55} These activities are essential for success because the promotion of renewable energy and energy-saving is closely linked to its level of acceptance by the people who will utilize and benefit from it. The details of these activities are found in the section ‘Overcoming the barriers’.

In addition to the dissemination activities, Ohisama-Shinpo-Energy has contributed to the economy in its community, Iida, by creating jobs through the renewable energy project. In April 2007, Ohisama-Shinpo-Energy has two full-time and two part-time employees. Moreover, Ohisama-Shinpo-Energy has provided job opportunities to the community by outsourcing engineering works to local companies for installment and maintenance of PV systems and energy-saving utilities.

Recommendations in Community Field

To improve the performance of the above dissemination activities led by

⁵⁴ The partnership made these activities possible because Minami-Shinsyu-Ohisama-Shinpo can be active for these non-profit activities which might not be implemented by Ohisma-Shinpo-Energy which is for profit organization. Moreover, because Minami-Shinyu-Ohisama-Shinpo shares practical knowledge and experiences of Ohisama-Shinpo-Energy, non-profit activities become practical and effective.

⁵⁵ Although Ohisama-Shinpo-Energy implemented several activities to raise awareness for renewable energy among a large number of people, the effect of the activities is unknown. The appropriate evaluation methods for those activities have not yet been established.

Ohisama-Shinpo-Energy to promote renewable energy, I recommend the following actions.

First, Ohisama-Shinpo-Energy and Minami-Shinsyu-Ohisama-Shinpo should ensure resources for dissemination activities, such as manpower and financial resources. Minami-Shinsyu-Ohisama-Shinpo has been playing the main role for dissemination activities. These activities were funded by a subsidy from the Ministry of Environment.⁵⁶ Because the subsidy ended in March 2007, Minami-Shinsyu-Ohisama-Shinpo might run out of resources for these activities. To make these activities sustainable, I recommend that Minami-Shinsyu-Ohisama-Shinpo secure resources by recruiting new members or volunteer staffs in order to increase manpower, and cooperate with other non-profit organizations in Iida for dissemination activities.

Second, Minami-Shinsyu-Ohisama-Shinpo could offer practical advice for energy-saving activities for local citizens. Through the ESCO project, Ohisama-Shinpo-Energy accumulated practical knowledge and experience for energy-saving technologies that can be shared with citizens. For example, there are many technologies and measurements that can be applied to residential housing. For instance, changing incandescent bulbs to fluorescent bulbs is easily applicable to any housing.

Finally, Minami-Shinsyu-Ohisama-Shinpo should continue to cooperate with the government of Iida. The government of Iida has greatly assisted Minami-Shinsyu-Ohisama-Shinpo with their dissemination activities such as organizing the lectures in the public kindergartens, and therefore it is expected that the government of Iida will continue to support such non-profit activities. Minami-Shinsyu-Ohisama-Shinpo could propose a specific joint project of dissemination activities with the government of Iida to further expand the cooperation with the government.

⁵⁶ As well as the business project that Ohisama-Shinpo-Energy undertakes, most of information dissemination activities described in this paper was subsidized by the Ministry of Environment from 2005 to 2006. The subsidized activities include the seminar in the public building, the lectures in the kindergartens, and the training-seminar for entrepreneurs.

Accomplishments in Policy Field

The roles of the MFO, Ohisama-Shinpo-Energy, in the policy field is to provide the policy advice to shape successful policies. Ohisama-Shinpo-Energy supported by Green Energy. Com offered the policy advice to the government of Iida, helping to develop the innovative project plan.

Recommendations in Policy Field

Ohisama-Shinpo-Energy could continue to assist the local authority to develop practical policies or projects. For example, because Ohisama-Shinpo-Energy is a member of the 'Iida environmental consultative assembly', it could give advice for renewable energy policies or projects to the government through the assembly. Ohisama-Shinpo-Energy could possibly develop effective and feasible plans using the know-how gained from its subsidized project. For instance, as the government of Iida has an ambitious target to promote PV systems and energy-saving activities,⁵⁷ Ohisama-Shinpo-Energy might be able to propose attractive plans for them. Since policy support is indispensable for the promotion of renewable energy, Ohisama-Shinpo-Energy is expected to continue to function to shape the practical policy through giving policy advice to the government of Iida.

Overall Evaluation of Ohisama-Shinpo-Energy

Although it has achieved a variety of accomplishments leading to the facilitation of renewable energy in business, community, and policy sectors, evaluating the overall effectiveness of Ohisama-Shinpo-Energy in promoting renewable energy is difficult. That is because the accomplishments in the community and policy sectors are difficult to be quantitatively measured.

Considering only Ohisama-Shinpo-Energy's business accomplishments, Ohisama-Shinpo-Energy's effectiveness does not appear particularly significant. The company's future PV project will not be feasible without subsidies, and many goals

⁵⁷ The government of Iida has the goal to promote PV systems for 30 % of all the household by 2010.

of its ESCO project for small-scale clients were not achieved, although Ohisama-Shinpo-Energy could continue these projects in the future based on their expectations for success. However, it is important to notice the indirect effects that Ohisama-Shinpo-Energy purposely incorporates into its projects to facilitate renewable energy. These effects include disseminating information about Ohisama-Shinpo-Energy's project, raising awareness about renewable energy and energy-saving, and training for renewable energy entrepreneurs. These effects could have a large impact on the promotion of renewable energy. For instance, it is not immediately possible to quantitatively estimate the impact of Ohisama-Shinpo-Energy's kindergarten lectures on changes in children's behavior. Nevertheless, it is possible to conceptualize some possibilities. The lectures stimulate awareness over energy-saving behavior and use of renewable energy. If the behavior of children actually changed, then the lecture could have a large impact in reducing future energy consumption. The same mechanism can be applied to the other activities: raising awareness and disseminating information through investments from citizens, holding seminars for renewable energy entrepreneurs, and disseminating information through conferences and visitations. Therefore, considering the indirect effects in promoting renewable energy by Ohisama-Shinpo-Energy, the effectiveness of Ohisama-Shinpo-Energy as a Market facilitation Organization (MFO) could be increased.

The impact of Ohisama-Shinpo-Energy promoting renewable energy still seems small, yet this is likely due to the small scale and short history of its activity. It takes time for activities indirectly promoting renewable energy to generate impacts, and Ohisama-Shinpo-Energy expects to further extend its operation of ESCO and the renewable energy project, including photovoltaic and biomass. If the scale and impact by Ohisama-Shinpo-Energy's activities increase in the future - including activities with both direct and indirect effects to facilitate renewable energy - we will be able to more clearly determine its efficacy. Also, the future contribution of Ohisama-Shinpo-Energy to promote renewable energy will justify its effective utilization of the subsidy, because the company accumulated its business know-how

through the subsidized project. Therefore, to properly verify the efficacy of Ohisama-Shinpo-Energy, its future operations need to be observed. However, to verify Ohisama-Shinpo-Energy's effectiveness, an appropriate method to evaluate its operation to indirectly promote renewable energy needs to be developed.

Chapter 7: Conclusion

In this paper, I explored the effectiveness of the Japanese Market Facilitation Organization (MFO), Ohisama-Shinpo-Energy Private Limited Company, in promoting renewable energy. In order to investigate this MFO's effectiveness, I examined its accomplishments by exploring the result of the project, including photovoltaic (PV) and energy-saving businesses. Also, I examined the functions the MFO has performed, the barriers that it has faced in executing this project, and how these barriers have been addressed.

Ohisama-Shinpo-Energy is a private business establishment in Iida, Japan, and initiated the renewable energy project in 2004. The barriers addressed by Ohisama-Shinpo-Energy include: 1) high cost and low pricing leading to low profitability, 2) lack of a legal framework for independent power producers, 3) lack of financing and credit, 4) lack of manpower and skilled personnel, 5) lack of information about renewable energy among critical players, 6) inadequate business models, 7) lack of an appropriate business developer, and 8) opposition from existing interest groups. In the project, Ohisama-Shinpo-Energy has performed several MFO's functions: (1) market research, (2) consulting service, (3) financing, (4) partner matching, (5) information dissemination, (6) training, and (7) policy advice. These functions have enabled Ohisama-Shinpo-Energy to be productive in facilitating renewable energy because these functions positively influence essential and important sectors for renewable energy markets: business, community (citizens), and policy (governments).

Performing the variety of MFOs' functions mentioned above in the project, including PV and energy saving, Ohisama-Shinpo-Energy has contributed to the development of renewable energy in the field of business, community, and policy. In the business field, Ohisama-Shinpo-Energy has successfully finalized the subsidized project: the PV project completed the installation of 207.93 kW of PV systems on 38 buildings by March 2005, and the energy-saving project finalized the 15 Energy Service Company (ESCO) contracts by March 2007. Both of the projects have been producing the expected profits and expect to expand in the future. In addition to the

Ohisama-Shinpo-Energy's operation for business, Ohisama-Shinpo-Energy has provided opportunities to communities for the facilitation of renewable energy through a variety of means: 1) raising awareness of citizens about renewable energy and energy-saving through lectures, seminars, and the collection of investments from a large number of citizens on its renewable energy project; 2) providing training opportunities for renewable energy entrepreneurs through seminar; and 3) disseminating information and know-how about Ohisama-Shinpo-Energy's project by attending conferences, allowing outside observation of its project, and announcing progress and accomplishments of its project by well-organized website and newspapers. Moreover, Ohisama-Shinpo-Energy has contributed to the realization of the energy policy for the promotion of renewable energy by advising the local government to develop the innovative renewable energy project plan.

In order to strengthen its activities, the following actions may be taken. First, in the business field, Ohisama-Shinpo-Energy may seek further cooperation with the local government to expand its business, join networks to exchange and gain useful information about renewable energy projects, and put more effort into training its own manpower to independently act and avoid the need to borrow large manpower from other organizations. Second, in the community field, to maintain effective dissemination activities, Ohisama-Shinpo-Energy should take the following actions: establishing stable financial and manpower resources for dissemination activities, initiating the offer of practical and free advice about energy-saving for local citizens, and maintaining cooperation with the local government for future activities. In the policy field, Ohisama-Shinpo-Energy may deliver policy advice to the local government to develop practicable and effectual policy, based on the experience acquired during its business project.

Although Ohisama-Shinpo-Energy has achieved certain accomplishments in the renewable energy sector, it is necessary to note that Ohisama-Shinpo-Energy's impact promoting renewable energy seems small because of the small scale and short history of its activity. It takes time for Ohisama-Shinpo-Energy's activities in community and policy fields to generate results. Also, these results are unknown

because quantitatively evaluating the accomplishments in the community and policy sectors is difficult. Therefore, to exactly assess the effectiveness of Ohisma-Shinpo-Energy, more time and additional studies about Ohisama-Shinpo-Energy's future operations are necessary.

In conclusion, although the effectiveness of the MFO is not completely explored in this paper, some of the activities of Ohisma-Shinpo-Energy could be effectively duplicated in other places and by other organizations. Of course, all the activities of Ohisma-Shinpo-Energy might not be completely replicable because the functions and roles that an MFO can perform may differ depending on a variety of factors: the type of MFOs organization, needs in their community, and maturity of the markets in which they perform. Nevertheless, other types of organizations, or organizations operating in different circumstances, might be able to apply certain components of Ohisama-Shinpo-Energy's activities, such as the business models of its project, which functions of MFOs and how they are performed by Ohisama-Shinpo-Energy, the relationships and cooperation among stakeholders, and particular measures carried out by Ohisama-Shinpo-Energy to address the barriers. For example, raising investments from citizens could be useful in other developed countries. Therefore, I hope that other organizations, especially organizations in Japan and developed countries whose circumstances are similar to Japan, will refer to the activities of Ohisama-Shinpo-Energy and implement certain appropriate actions to spread the use of renewable energy.

Appendix A Interview Questions

Staff of Ohisama-Shinpo-Energy Private Limited Company, Green Energy. Com Co.,Ltd, and the Institute for Sustainable Energy Policies

Outline of the project

- Why was the project initiated? What is the purpose of the project?
- Who are the stakeholders of the project? What are their roles?
- What kind of interactions does Ohisama-Shinpo-Energy have with the organizations concerned with the project?

Barriers to promote a renewable energy market

- What kind of barriers does Ohisama-Shinpo-Energy face in the project?
- How are the barriers addressed?

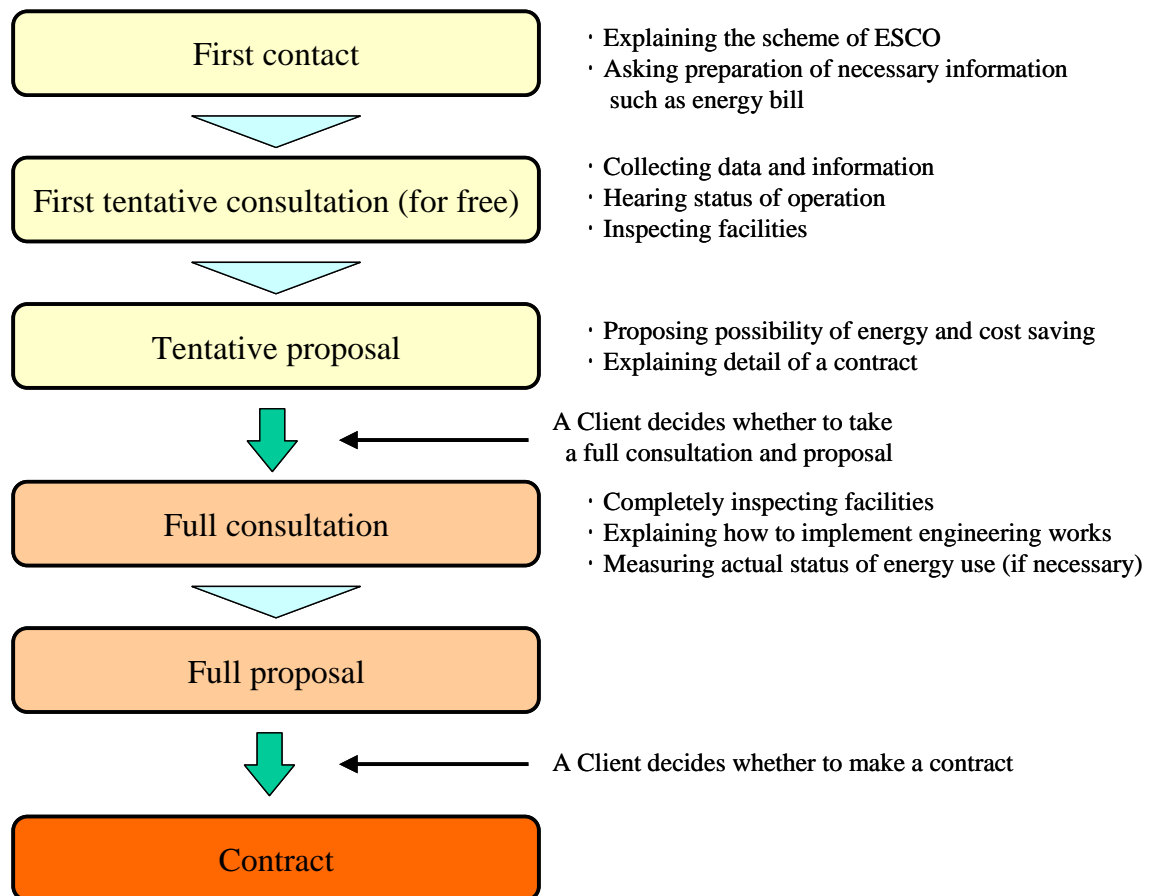
Functions as an MFO

- Which functions of an MFO does Ohisama-Shinpo-Energy perform?

Success of the project

- What is the outcome of the project?
- Can Ohisama-Shinpo-Energy expand its renewable energy business? Can its business be sustainable?
- What kind of contributions does Ohisama-Shinpo-Energy make to promote renewable energy through activities disseminating information about renewable energy?
- What kind of contributions does Ohisama-Shinpo-Energy make to shape effective policies for promoting renewable energy?
- What improvements are necessary to enhance the performance of Ohisama-Shinpo-Energy?

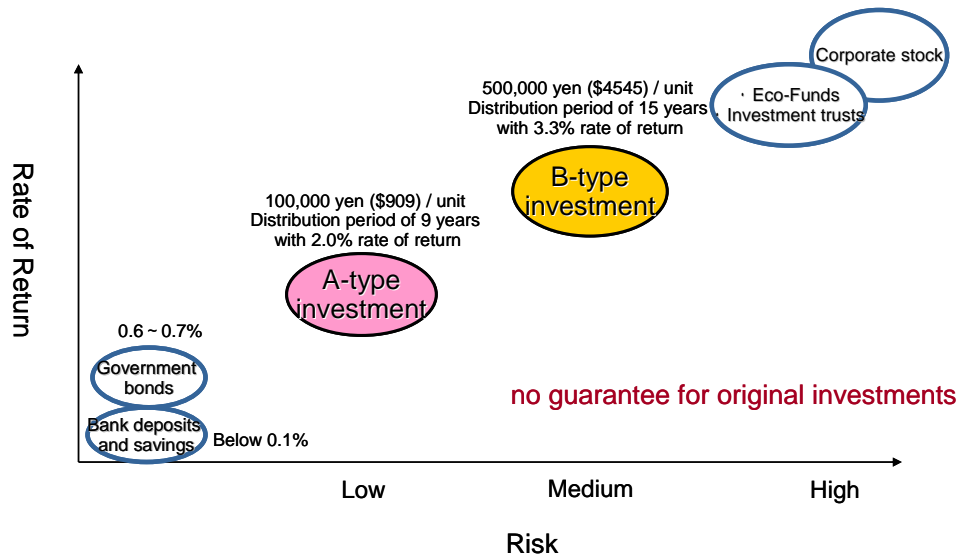
Appendix B The Procedure of ESCO



Appendix C Details of the Fund Scheme

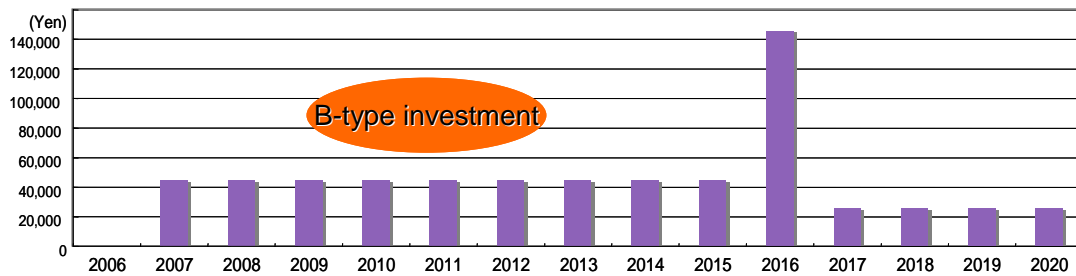
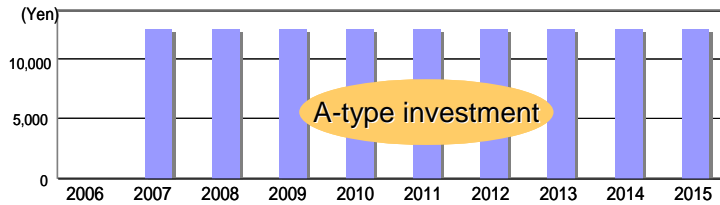
1. Position of the Fund among financial products in Japan

The fund has a little bit higher risk than government bonds and bank deposits, but is not as risky as investment trusts and corporate stock. In the age of low interest rate in Japan, it is more favorable than government bonds and bank deposits and savings.



2. Schedule for cash distribution

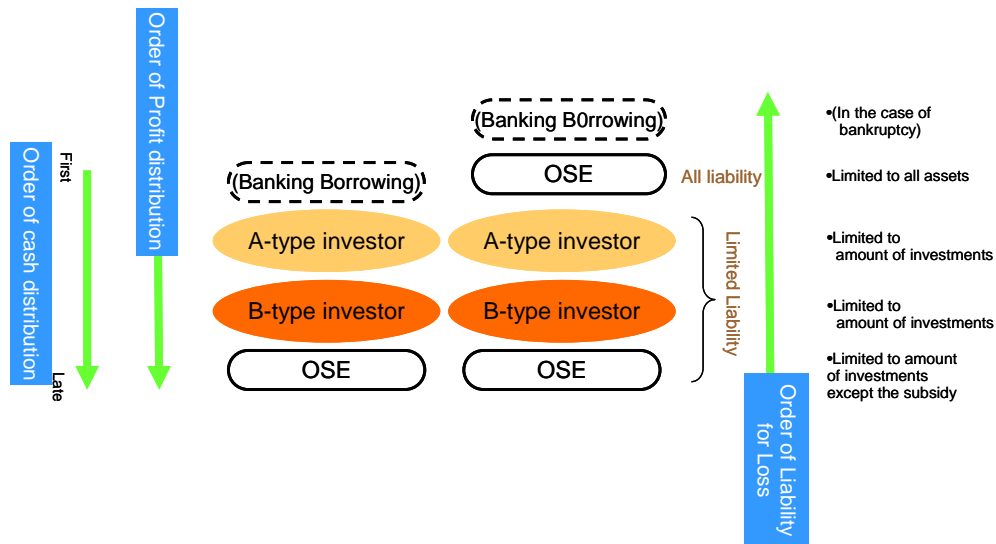
A-Type distributes a certain amount for 9 years with 2 % rate of return. B-Type has 3 phases for distribution, adjusted with the project income.



Year	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Total
A-type 100,000 yen		12,497	12,497	12,497	12,497	12,497	12,497	12,497	12,497	12,497						¥112,473
B-type 500,000 yen	0	44,660	44,660	44,660	44,660	44,660	44,660	44,660	44,660	44,660	145,630	25,615	25,615	25,615	25,615	¥650,030

3. Order of cash distribution & Exposure to risk

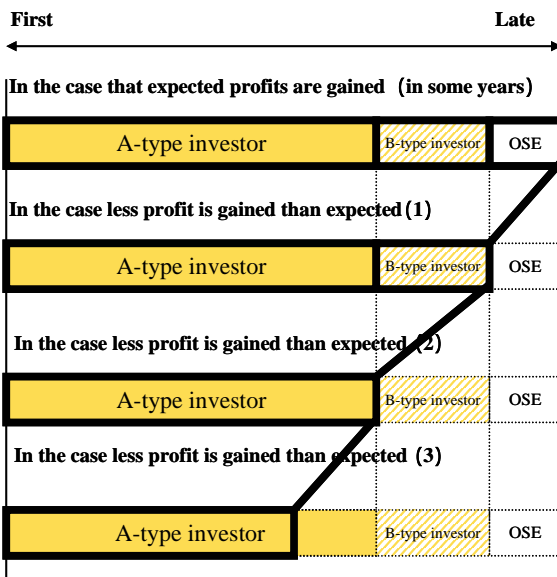
The order of cash distribution is the first for A-type investors, the second for B-type investors, and the third for Ohisama-Shinpo-Energy (OSE). The order of exposure to risk is first for OSE, the second for B-type investors, and the third for A-type investors.



4. Rules for cash and profit distribution :Order of Priority

4 – 1. Order of cash distribution

Order of cash and profit distribution is first, A-type investors, second, B-type investors, and third, the business owner (OSE) with a certain percentage of rate of return.



Rules for cash and profit distribution

Limited to the business profit for a single year, amount of cash distribution per year is decided by multiplying modified total investments* by a certain number. The distribution will be done in the order of priority below.

1. A-type investor
2. B-type investor
3. Business owner (OSE)

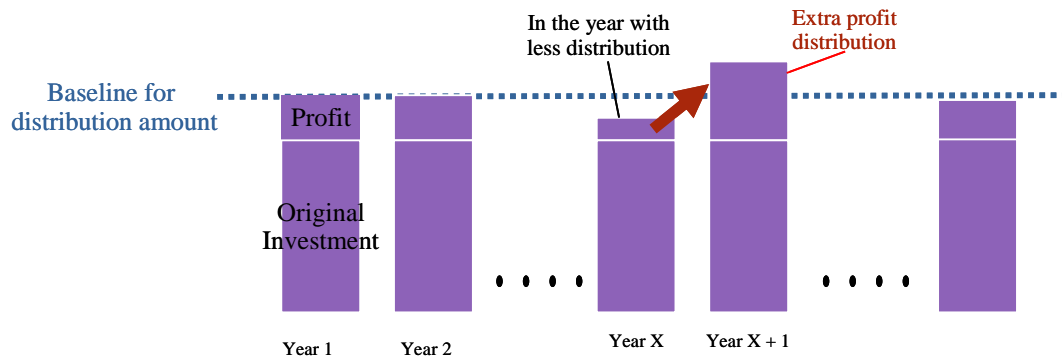
If planned amount of profit is not produced in a certain period, OSE first will take the risk not to gain the expected profits. B-type investors are the second, and A-type investors are the third.

To A-type investors, no cash distribution will be produced from the operation after April 1, 2015, because of termination of contract.

[* modified total investments = total investments - unoperated investments]

4 – 2. Scheme for redistribution of the profits for the business owner

- If the lack of profits for investors occurs in a single year, the profits for the business owner will be distributed to investors to compensate them for the past year's lack of profit distribution so that investors can recover soon.
- If a lack of profit is expected in future years, extra profit distributions could be taken in advance. (In the range of possible profit and based on the judgment of the business owner)



4 – 3. Extension of contract period (only for B-type investors)

- In the case that the total amount of profit distribution is less than planned during the contract period, the business owner can extend the contract period.

Appendix D The data used for the analysis for feasibility of the PV project

- The initial investment on the installment of the PV systems: 91,697,130 yen.
This number is calculated by: (total amount of installed PV systems in kW)*(installment cost yen/kW) = 207.93 kW * 441,000 yen/kW = 91,697,130 yen.
- The actual initial investment cost: 30,565,710 yen.
Because 2/3 of the installment cost of the PV systems is covered by the subsidy, the company actually pays 1/3 of the installment cost, 30,565,710 yen. This is defined as 'actual initial investment cost' in this analysis.
- The sale of the project: 5,716,000 yen in each year of the project period.
This is calculated by: the expected sale of electricity + the expected sale of green electricity. This analysis assumes that the sales in each year of the project period are the same.
For example, the expected sale in the first year of the project period is: (228,000 kWh * 22 yen/kWh) + (140,000 kWh * 5 yen/kWh) = 5,716,000 yen.
- The present value of the profit from the project.
The present value of the profit is calculated by the equation below.
Ax: the present value of the profit in year X of the project period
Cx: the cash inflow in the year X of the project period (the way to calculate this cash inflow is described below
D: discount rate⁵⁸
P: net present value for 20 years of the project period
$$A_x = C_x / (1 + D)^{x-1}$$
$$P = C_1 + C_2 / (1 + D) + \dots + C_{20} / (1+D)^{19}$$
- The cash inflow.
To calculate the present value above, the cash inflow needs to be calculated. The cash inflow in the year X of the project period is calculated by the equation below.
Fx: the cash inflow in year X of the project period
Sx: the sale in year X of the project period
Ix: interest cost for the investments from citizens in the year X of the project period⁵⁹
T: corporate tax rate⁶⁰

⁵⁸ The analysis applies discount rates between 2 % and 10 %.⁵⁸ The discount rate is determined based on the interest rate of the long-term government bond in Japan and the United States. According to the Ministry of the Finance, Japan, between 1999 and 2005, the rate of the long-term government bond in Japan ranges from 1.01 % to 1.77 % and in the United States from 4.02 % to 6.03 %.

⁵⁹ The amount of the interest cost is described in Appendix C.

⁶⁰ The corporate tax rate in Japan was 30% in 2005, according to the Ministry of the Finance, Japan. The analysis applies this number.

Ex: depreciation cost of the PV systems in the year X of the project period⁶¹

$$F_x = S_x - I_x - T * (S_x - I_x - E_x)$$

For example, the cash inflow in the first year of the project period is: (5,716,000 yen)
- (935,146 yen) - (30 %) * {(5,716,000 yen) - (935,146 yen) - (4,584,857 yen)} =
4,722,055 yen.

⁶¹ The analysis assumes that the depreciation costs are the same in each year of the project period. The depreciation cost is calculated by: total installment cost of the PV systems / project period = 91,697,130 yen / 20 year = 4,584,857 yen/year.

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