

Final Report for Activity 1

-Examination and development of a support platform for installation of solar power-

Objective of the activity

In the City of Yokohama, it is necessary to promote the widespread use of renewable energy facilities, especially those for solar power generation, with the aim of realizing a decarbonized society. When introducing solar power generation systems, citizens and local business operators need to collect necessary information for the installation first. However, this information collection stage is already a burden to them as related information is currently not organized.

Thus, we will construct an information platform regarding solar power generation equipment to alleviate the burden.

This platform will be set up on the City of Yokohama's website to organize and provide information necessary for citizens and local business operators to introduce the solar power generation equipment, such as explanations on how to introduce the equipment, references to installation companies that operate the business in the city, and the procedures and flow regarding the installation.

1 Description of the activity

1.1 Survey of other local governments' websites

We surveyed the information we should post on the platform based on the websites run by the local governments that have already constructed the platform: Tokyo, Nagano Prefecture, and Nagoya City.

We checked each website and then picked up the site configuration and posted information items to study information to be published on our website.

1.2 Survey of information regarding solar power generation systems

To construct the platform regarding the installation of solar power generation systems, the following information was surveyed.

1.2.1 Installation flow of a solar power generation system

We studied the installation flow of a solar power generation system with reference to the flow posted on the websites of the following entities: the Tokyo Metropolitan Government, the Agency for Natural Resources and Energy, the Japan Photovoltaic Energy Association, Hyogo Prefecture, Panasonic Corp., Smart Tech Co., Ltd., and Denka-kun (Unit Co., Ltd.). We considered the flow items, the order of the items, and the contents of the items for our platform based on the reference information.

1.2.2 Introduction of a solar power generation system

(1) Benefits of the introduction

We surveyed the benefits of installing a solar power generation system from the three viewpoints: electricity cost saving, improvement in disaster response measures (further improvement by the combined use with a storage battery and EV), and global warming countermeasures. Then, we created the draft of the content to be posted.

(2) Introduction methods

We surveyed the introduction methods of a solar power generation system including the installation at consumer's own expense, lease, and PPA (Power Purchase Agreement). We then created the draft of the content.

1.2.3 Potential information regarding installation of solar power generation systems

In order to post potential information regarding installation of solar power generation systems (hereinafter referred to as "solar potential") on the roofs of houses, office buildings, and other structures in Yokohama City, we compared the two online simulation map tools, the Suncle operated by TEPCO Ventures Inc. and the Environmental Insights Explorer by Google LLC.

1.3 Survey of subsidies related to solar power generation systems

We collected information on subsidies and subsidy projects by the national government (the Ministry of the Environment and the Ministry of Economy, Trade and Industry) and prefectural governments that can be utilized by citizens and local business operators when they install a solar power generation system.

We collected information on subsidies that fall under the following:

- Subsidies to support citizens of Yokohama City and business operators that have an office in the city.
- The installation of solar power generation equipment is the requirement for receiving subsidies. (Information on subsidies related to EVs, storage batteries, and ZEHs and ZEBs is also collected if their eligibility requirement is to install solar power generation equipment.)
- Subsidy projects that have been implemented in FY2020.
- The installation sites of solar power generation systems are not limited to emergency evacuation areas and other specific buildings.

1.4 Survey of installation companies of solar power generation systems

We surveyed installation companies that are engaged in solar power generation system construction on houses and office buildings in Yokohama City.

In order to create a list of installation companies in the city, we selected companies that (1) perform a reliable operation and (2) are engaged in the construction in Yokohama City.

1.5 Study and creation of the website design

We studied the design of the website that would post the described survey results above.

In addition, we created the installation flow of a solar power generation system based on the survey results in 1.2.

2 Results of the activity

2.1 Survey of other local governments' websites

Table 1 lists the information items regarding solar power generation posted on the websites run by Yokohama City, Tokyo, Nagano Prefecture, and Nagoya City.

Table 1: Information items regarding solar power generation posted by local governments

Posted information item	Yokohama City	Tokyo (Coolnet Tokyo)	Nagano Prefecture	Nagoya City
Solar power generation introduction flow		○		
Solar potential map		○	○	○
Subsidies	○	○	○	○
List of construction companies		○	○	
List of maintenance/inspection companies			○	
Guidelines for introducing solar power generation		○	○*	
FIT system information (including the link on the Agency for Resources and Energy)			○	○
Rooftop leasing business		○	○	○
Information about storage batteries				○

2.2 Information regarding solar power generation systems to be posted on the website

2.2.1 Installation flow of a solar power generation system

We selected 13 items from the installation flow of a solar power generation system posted on the websites of the Tokyo Metropolitan Government, the Agency for Natural Resources and Energy, the Japan Photovoltaic Energy Association, Hyogo Prefecture, Panasonic Corp., Smart Tech Co., Ltd., and Denka-kun (Unit Co., Ltd.).

Table 2 shows the outline of each flow item and the source websites.

Based on the selection results, we defined the following 11 flow items to be posted on the platform: "1. Consideration and consultation," "2. Field survey and estimate," "3. Subsidy application," "4. Construction contract," "5. Grid interconnection application," "6. Business plan certification application,"

“7. Power interchange contract,” “8. Start of construction,” “9. Completion inspection,” “10. Start of operation,” and “11. Aftercare/maintenance.”

These flow items for the platform were defined by modifying the selection results as follows:

- “Field survey,” “simulation,” and “estimate” were integrated into one item, “2. Field survey and estimate,” as they are presumed to be implemented in almost the same timing.
- “Grid interconnection application” and “Power interchange contract” were separated as it is necessary, according to the Agency for Resource and Energy’s website to obtain the prior consent on grid interconnection from electric power companies to receive the business plan certification from the national government.¹

¹ https://www.enecho.meti.go.jp/category/saving_and_new/saiene/renewable/business/index.html

Table 2 Installation flow items and details of a solar power generation system

No.	Flow item	Detail	Tokyo	The Agency for Resource and Energy	The Japan Photovoltaic Energy Association	Hyogo Prefecture	Panasonic Inc.	Smart Tech. Co., Ltd.	Denka-kun (Unit Co., Ltd.)
1	Consideration and consultation	- What is to be checked in advance - Information gathering method for consideration Ex) Comparing manufacturers' webpages, product catalogs, etc., and inquiring to contractors	○	○	○	○	○	○	—
2	Field survey	- What is to be surveyed and necessity of survey Ex) Check the surrounding environment, roof size and shape, etc., and study the most suitable system	○	—	○	○	○	—	○
3	Simulation	- Effects to be recognized in advance Ex) Annual power generation efficiency and power saving effect	—	—	—	○	—	○	○
4	Estimate	- Notes on estimation Ex) Differences in handling manufacturers and construction methods depending on the contractor, and presence or absence of aftercare/maintenance	○	○	○	○	○	○	○
5	Subsidy application	- Eligibility for receiving subsidies from local governments - Notes on receiving subsidies Ex) Checking requirements and time required for application	○	—	○	—	—	○	○

No.	Flow item	Detail	Tokyo	The Agency for Resource and Energy	The Japan Photovoltaic Energy Association	Hyogo Prefecture	Panasonic Inc.	Smart Tech. Co., Ltd.	Denka-kun (Unit Co., Ltd.)
6	Construction contract	- Notes on contract Ex) Put the construction period, payment terms, etc. clearly in writing. Be sure to get a contract, specifications, blueprints, final quotation, and wiring diagram.	○	○	—	○	○	○	○
7	Business plan certification application	- Information on the Feed In Tariff system	○	○	○	—	—	—	○
8	Grid interconnection application Power interchange contract	- Required application items Ex) Connection to the power grid, desired start date of electricity receiving, and registration of an account to transfer income from electricity selling	○	○	○	○	○	○	—
9	Start of construction	- Estimated time required for construction	○	○	○	○	○	○	○
10	Completion inspection	- Outline of inspection after completion of construction, and documents to be received	○	○	○	○	○	○	○
11	Start of electricity selling	- Documents to be received from the electric power company	○	○	○	○	—	—	—

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No.	Flow item	Detail	Tokyo	The Agency for Resource and Energy	The Japan Photovoltaic Energy Association	Hyogo Prefecture	Panasonic Inc.	Smart Tech. Co., Ltd.	Denka-kun (Unit Co., Ltd.)
12	Aftercare/maintenance	- Necessity of maintenance	○	—	○	○	—	—	○
13	Disposal		—	—	○	—	—	—	—

2.2.2 Installation method of a solar power generation system

(1) Benefits of the introduction

Table 3 shows the survey results of the benefits of installing a solar power generation system. The information described here is based on the websites of the Japan Photovoltaic Energy Association and the Coolnet Tokyo.

Table 3 Benefits of installing a solar power generation system

Classification	Description
Improvement in disaster response measures (further improvement by the combined use with a storage battery and EV)	In the event of a power outage due to a disaster or other emergency, a solar power generation system can be used as an emergency power source. Power up to 1.5 kW is available in a typical household solar power generation system. The system can be used as the power source for a television and a charger of mobile phones, although the output power varies depending on the amount of solar radiation during the sunlight hours. In addition, the solar power generation system can be utilized as a more secure emergency power source when it is adopted in combination with a storage battery.
Global warming countermeasure	Electricity generated from solar power is clean energy. The effect of CO ₂ reduction due to the use of a household solar power generation system can be represented by a forest area. For example, when power of 4 kW is generated from solar power at eight houses, CO ₂ emissions equivalent to the area of a forest as large as Tokyo Dome are reduced.

(2) Introduction styles

Table 4 shows the survey results of the introduction styles of a solar power generation system including the installation at consumer's own expense, lease, and PPA (Power Purchase Agreement). The information described here is based on the websites.

Table 4 Introduction method of solar power generation equipment

Classification	Description
Installation at the consumer's own expense	A consumer purchases and installs a solar power generation system by oneself. The consumer makes a contract with a construction company of the system, and purchases the system and then has the company install it. The consumer can sell electricity to an electric power company under a contract as all generated power belongs to the consumer. Self-consumption is also freely possible. The maintenance cost is paid by the consumer.
PPA (Power Purchase Agreement)	A consumer offers a space such as a site and roof to a PPA operator, and the PPA operator installs power generation equipment at its own expense and undertakes the operation and maintenance of the system. The PPA operator measures the amount of generated power consumed by the consumer and charges the electric bill corresponding to the amount, and the consumer pays for the electricity.
Lease	A consumer asks a lease company to install and operate/maintain a system in exchange for paying a monthly lease fee. The consumer can sell electricity to an electric power company and consume it as all generated power belongs to the consumer. Another feature of this style is that the initial capital expenditure for the installation is low.

[Reference URL]

Cleverly Home: <https://kurashi.cleverlyhome.com/f-post/5658>

Environment Business Online: <https://www.kankyo-business.jp/dictionary/024402.php>

2.2.3 Information on solar potential map

Table 5 shows the results of comparison between the two online simulation map tools, the Suncle provided by TEPCO Ventures Inc. and the Environmental Insights Explorer by Google LLC.

Since the comparison results found that the Suncle can provide various simulations such as the electricity selling profit and power saving profit based on the potential information, we decided to put an external link to the Suncle.

Table 5 Comparison of solar potential maps

Study item	Suncle	Environmental Insights Explorer
Indication of solar power generation potential	Uses color brightness on the map.	Uses color brightness on the map.
Language	Japanese	English
Information other than potential	Power saving profit, electricity selling profit, CO2 reduction effect, etc.	Nothing particular

2.3 Survey of subsidies related to solar power generation systems

We checked information on 19 types of subsidies and other support projects that are available for citizens and business operators in Yokohama City when installing solar power generation systems.

2.4 Survey of construction companies of solar power generation systems that offer services in Yokohama City

In order to create a list of installation companies of solar power generation systems in the city, we selected companies that (1) perform a reliable operation and (2) are engaged in the construction in Yokohama City.

As for (1), we deemed companies referred to by related organizations or local governments to perform operations with a certain level of reliability. Based on this assumption, we selected 78 operators that are referred to by the Japan Solar System Development Association (JSSDA), the Japan Photovoltaic Energy Association, and the Kanagawa Solar Bank System.

Concerning (2), we narrowed down construction companies of a solar power generation system that offer services in Yokohama City from among the companies selected in (1), by deeming them as such if they fall under the following:

- It is explicitly stated that they offer services in Yokohama City.
- They have a proven record in Yokohama City.
- They have an office in Kanagawa Prefecture.
- Their service coverage spans all over Japan.

As a result, we selected 43 companies.

2.5 Study and creation of the website design

We studied and created the design of our webpage that would post the above-mentioned survey results.

2.5.1 Website of the City of Yokohama

In the website of the City of Yokohama, we created a webpage, "Guidance on the introduction of a solar power generation system." Fig. 1 shows the created page (Japanese only).

The URL is: <https://www.city.yokohama.lg.jp/kurashi/machizukuri-kankyo/ondanka/etc/pvflow.html>

On this webpage, we decided to post the following items (1) to (6):

- (1) Benefits of introducing solar power generation equipment
- (2) Introduction method of solar power generation equipment
- (3) Introduction flow
- (4) List of construction companies
- (5) Solar map
- (6) Information on subsidies related to solar power generation

太陽光発電システム導入ガイド

太陽光発電設備導入のメリット

【温暖化対策への貢献】

太陽光発電による電気は地球温暖化の原因となる二酸化炭素を出さないクリーンなエネルギーです。例えば、住宅用太陽光発電システムの二酸化炭素削減効果を森林面積に換算すると4kWの太陽光発電約8棟分が、東京ドーム1個分の森林に相当します。

【非常用電源としての活用】

災害などで停電になった場合、太陽光発電を非常用電源として利用することができます。一般的な住宅用太陽光発電システムの場合、使用できる電力は最大1.5kWで、太陽が出ている時間帯の日射量により異なりますが、テレビや炊飯器、電気ポット、携帯電話の充電器などの電源として利用することができます。

また、蓄電池を合わせて導入すれば、太陽が出ていない時間帯においても、蓄電池に電力をためておくことによって、非常用電源として活用することができます。

太陽光発電設備導入のメリット

【自費設置】

需要家が自ら設備を購入し、設置する方法です。太陽光発電システムの施工会社と契約し、購入して設置してもらいます。発電電力は全て需要家のものですので、電力会社と契約して買い取ってもらうほか、自家消費が自由にできます。メンテナンス費用は需要家が負担します。

【PPA (Power Purchase Agreement)】

需要家がPPA事業者に敷地や屋根などのスペースを提供し、PPA事業者が発電設備の無償設置と運用・保守を行います。PPA事業者は発電した電力の自家消費量を検針・請求し、需要家はその電気料金を支払います。

【リース】

設備設置とメンテナンスをリース会社に依頼する代わりに、需要家は月々のリース費用を支払います。発電電力は全て需要家のものになりますので、電力会社へ販売することも自家消費も可能です。設置のための初期投資が少ないことも特徴です。

導入フロー

太陽光発電設備設置における一般的な導入フローを示します。

[太陽光発電システムフロー.pdf](#)

施工事業者一覧

神奈川県にて、太陽光発電設備を県民や県内事業者の方々にリーズナブルな価格で安心して設置していただくために、平成23年12月から「かながわソーラーバンクシステム」を運用しています。

施工事業者の選定にご活用ください。

かながわソーラーバンクシステム

<http://www.pref.kanagawa.jp/docs/e3g/cnt/f360844/> (外部サイト)

【リース】

設備設置とメンテナンスをリース会社に依頼する代わりに、需要家は月々のリース費用を支払います。発電電力は全て需要家のものになりますので、電力会社へ販売することも自家消費も可能です。設置のための初期投資が少ないことも特徴です。

ソーラーマップ

TEPCOフィンテック株式会社が公表するソーラーマップ(サンクル)にて、太陽光発電設備の設置に適した場所が地図上で確認いただけます。設置の判断、設置場所の選定にご活用ください。

サンクル <https://suncle.jp/> (外部サイト)

太陽光発電に関する補助金情報

環境省、経済産業省、神奈川県、横浜市が公表している太陽光発電に関する補助金情報を、以下のファイルにまとめました。太陽光発電設備の導入検討にご活用ください。

[再エネ導入補助金リスト.xlsx](#)

Fig. 1 Guidance on the introduction of a solar power generation system

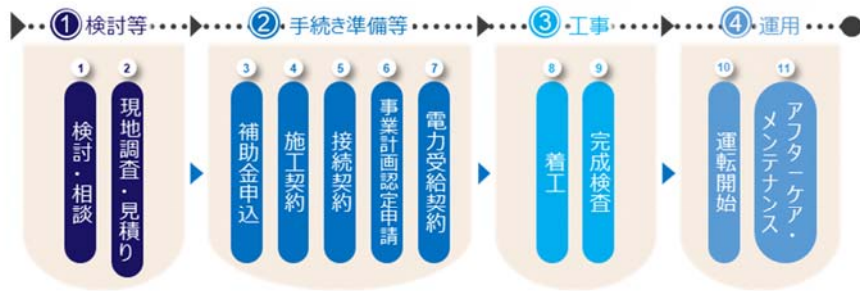
2.5.2 Introduction flow of a solar power generation system

We created the installation flow of a solar power generation system based on the survey results in 2.2. Fig. 2 shows the created flow (Japanese only).

The webpage explains the rough flow consisting of (1) Consideration, etc. (2) Procedures and preparations, (3) Construction, and (4) Operation, and outlines the 11 items defined in 2.2 under these four items.

In addition, we set up the Q&A section to answer expected questions from people who are considering introducing a solar power generation system.

太陽光発電システム導入フロー



※本フローは太陽光発電システム導入の一般的な流れを示しております。必ずしもこのフローの通りにならない場合がございますのでご了承ください。

各ステップの詳細

① 検討等

① 検討・相談

- 必要な事前調査
事前の検討として、まずは以下を確認します。
 - ・期待される発電量
 - ・設備の設置方法
 - ・太陽電池モジュールの枚数 など
- 効果のシミュレーション
太陽光発電設備の設置によってどのくらいの発電量を得られるのか、売電収入はどのくらいになるのかなどを具体的にシミュレーションしてみましょう。

※ソーラーマップ (<https://suncl.jp/>)
TEPCOフインテック株式会社が公表するソーラーマップ(サンクル)にて、太陽光発電設備の設置に適した場所が地図上でご確認いただけます。設置の判断、設置場所の選定にご活用ください。

- 情報収集の方法
太陽光発電システムについて、一般的な知識を身に付けましょう。実際に設置業者等に相談する時も、ある程度の情報を知っていたほうが話はスムーズに進みます。
 - ・インターネットで太陽電池メーカーや設置業者(販売店、施工業者)のホームページを見る
 - ・太陽光発電の展示会やイベントに参加する
 - ・複数のメーカーの商品カタログを手に入れ、見比べる
 - ・すでに設置した人の話を聞く

② 現地調査・見積り

- 現地調査
設置業者に、太陽光発電システムの設置が可能か調査と見積りを依頼します。設置業者は、日射量の予測や屋根の方位、形状(切妻、寄せ棟、片流れ、入母屋、陸屋根)、屋根材(瓦、スレート、金属板瓦棒)などを元に見積りを作成します。この時、自宅の設計図面や検針票などを準備しておくとうよいでしょう。

- 見積りの依頼
業者によって取扱いメーカーや施工法が異なります。できるだけ複数社から相見積りを取りましょう。相見積りの際は、単に金額を比較するだけでなく、アフターケアやメンテナンス等も含めて複数の業者から説明を聞いて下さい。
- 見積り時の注意点
モニターやキャンペーン、期間限定価格などがあっても、すぐに契約せず、十分な検討が必要です。ソーラーシステムのほかに家電製品などをつけたりすることでサービスを強調し、お得感を出して勧誘する場合がありますが、冷静に検討しましょう。

Fig. 2 Introduction flow of solar power generation system (1/4)



Fig. 2 Introduction flow of solar power generation system (2/4)

運用

⑩ 運転開始

- 運転開始
電力会社との間で電力受給契約が結ばれたら、いよいよ運転開始です。
- 電力会社から受け取るべき書類（売電する場合）
電力会社から発行される系統連系契約書を買います。
- 設置費用報告（FITを利用する場合）
運転開始した日から1ヶ月以内にJPEA 代行申請センター（JP-AC）へ報告します。

⑪ アフターケア・メンテナンス

- メンテナンスの必要性
故障の兆候を見逃さないために、モニターで毎月の発電量を確認しておきましょう。
システム導入・設置時に、メンテナンスの内容や不具合が起こった際の対応などを業者と確認しておきましょう。
- 保証書の発行
メーカー保証書は忘れずに受け取り、大切に保管してください。
メーカーの保証書以外に、設置業者が独自の保証書を発行することもあります。

Q&A

Q1: 太陽光発電システムを構築するには何が必要ですか？

- A1:** 太陽光発電システムは、基本的には、次の機器で構成されています。
【①太陽光パネル、②接続箱、③パワーコンディショナ、④分電盤、⑤電力量計、⑥電力量モニター】
- ①**太陽光パネル:** 太陽光を受けて直流電力を発電します。
 - ②**接続箱:** 太陽光パネルに繋がれた配線を一本の線にまとめるための装置です。
 - ③**パワーコンディショナ:** 直流電力を交流電力に変換する装置です。家庭で使用される電力は交流電力です。
 - ④**分電盤:** 一般家庭にもあるブレーカーボックスです。パワーコンディショナで変換された電力は、この分電盤を通じて家庭内の各コンセントに送られ、電化製品等に使われます。
 - ⑤**電力量計:** 通常、太陽光発電をつける前に「買電」用のメーター（電力量計）が付いています。太陽光発電を設置すると、もう1つ「売電」量を計測するための電力量計を設置します。
 - ⑥**電力量モニター:** 発電状況や消費電力、売電量などを表示する機器です。今この時間の発電量をリアルタイムで確認できます。

Q2: 発電した電力は売ることができるのですか？

- A2:** 固定価格買取制度により、太陽光発電で発電した電力は電力会社に一定の価格で一定期間買い取られることになっています。10kW未満の太陽光発電システムについては、発電した電力のうち家庭で使用せず余った分を電力会社へ売る（＝売電）ことができます。
また、固定価格買取制度を利用せず、電力会社と個別に相対契約を結び売電する方法もあります。

Q3: 太陽光発電システムの寿命はどのくらいですか？

- A3:** 太陽電池自体は、20年以上持つと言われてます。太陽電池は稼働部分が少なく、表面は多くの場合強化ガラス等に覆われているので非常に耐久性に優れています。

ただ、性能が落ちるケースとして、太陽電池の一部に落ち葉等がついて影になった場合、長期間その状態が続くと将来的に破損と発電量の低下を招くことがあります。通常、汚れやゴミは雨で流れ落ちます。また、パワーコンディショナは、電子部品で構成されているため、太陽光発電システムの中では不具合が最も多いようです。一般的に寿命は10～15年と言われています。実際の事例として、設置して30年以上経つ今でも発電量は低下することなく順調に発電し続けている太陽電池もあります。ですが、この場合はパワーコンディショナを1～2回交換することが多いようです。

Fig. 2 Introduction flow of solar power generation system (3/4)

参考

※本フローの詳細は下記のホームページをご参照ください。

資源エネルギー庁	https://www.enecho.meti.go.jp/category/saving_and_new/sa/ene/renewable/business/index.html
一般社団法人 太陽光発電協会	http://www.jpea.gr.jp/setting/house/flow/index.html
パナソニック株式会社	https://sumai.panasonic.jp/solar/flow.html
北海道立消費生活センター	http://www.pref.hokkaido.lg.jp/kz/kke/sene/checkpoint.htm
シャープエネルギーソリューション株式会社	https://www.sharp-sesj.co.jp/products/home-solar/flow.html

Fig. 2 Introduction flow of solar power generation system (4/4)