



PV UPSCALE

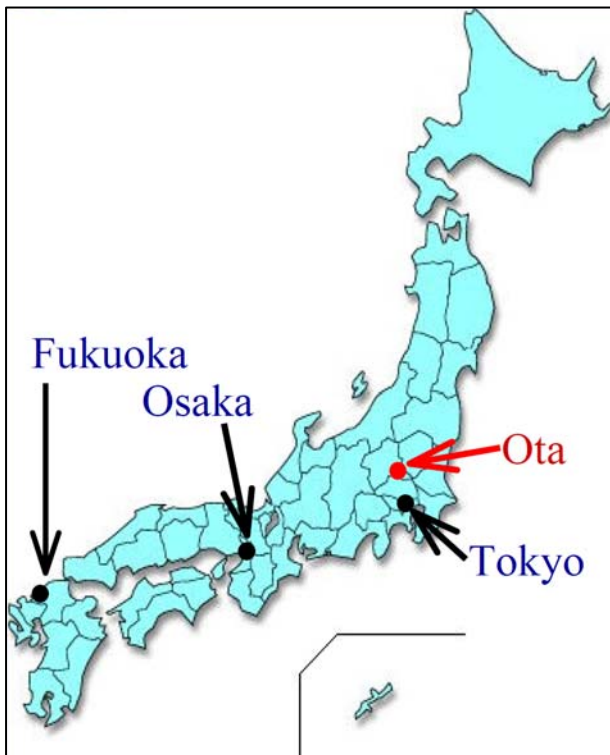
Urban Scale Photovoltaic Systems



Jyosai Town PV Demonstration Area

Introduction

Ota-city is an industrial city in the Kanto area with approximately 220 thousand inhabitants. Many factories are located in the area including Fuji heavy industry, which is a major automobile company in Japan. Jyosai town, the demonstration site of the PV project, is a new residential area in the central part of Ota-city.



Location of Ota city and site map of the demonstration area (Jyosai town)

In 2002, NEDO (New Energy and Industry Technology Development Organization) initiated a new R&D program for PV grid interconnection. The objective of this program is to demonstrate that a power system of several hundred residences, where each residence has a PV system, can be controlled by the technologies developed in this program without any technical problems.

Stakeholders from various fields joined this research project. The leader of the project was Kandenko company ltd, an electrical engineering and construction company.

Meidensha company (Electronic manufacturer), Electric Power Engineering Systems company ltd (Power consultant), Shin-Kobe Electric Machinery company ltd (Battery manufacturer), Matsushita Ecology Systems Company Ltd. (Electronic manufacturer), Tokyo University of Agriculture and Technology (Academic), and Ota-city (Local government) were the other members who joined this project from the beginning. Omron Company (Electronic manufacturer),



Nihon University (Academic), and JET¹ (Official testing organization of electronic devices) joined afterwards.

The demonstration site was selected as having the following two factors:

- Adequate possibilities of certain levels of voltage rise in which output control function of power conditioner will operate.
- Reasonable schedules for the construction and installation of the test devices are possible.

Description of the PV programme

All the PV systems were installed on the roofs of the residential houses. The number of houses equipped with PV is 553. Most of the houses were newly built houses but there are also a few cases where PV systems were installed on existing houses. The capacity of the PV systems is 2.13 MWp in total. The first PV system in the project started operation in December 2003, and the installation of the PV systems had completed in May 2006.

The development project of the demonstration-site, Jyosai town, was originally planned as a normal housing area development. In order to shift the concept of the project to the solar development and align with the needs for the research on PV grid connection, the local government was also included in the project team. In addition, the concept of this project had been explained to the potential owners of the houses. The development plan was modified so that it matched with the research project.



Overview of the demonstration site

¹ JET: (Japan Electrical Safety & Environment technology Laboratories)



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Summary of problems, barriers, solutions and recommendations

Negotiation with utility company

In order to implement this research, a number of PV systems needed to be connected to the normal grid (without special protective devices); therefore, various questions were raised by the utility company from the security perspective. Examples of the questions are shown below.

- Is the system designed to regulate the output when excessive voltage rises occur by the electricity reverse flow, so that the voltage can be controlled within a certain range?
- Is the system designed to disconnect from the grid within a given length of time if an accident happens on the distribution line?
- Can the system be disconnected promptly along with utility's instruction in the case of intentional blackout for distribution line maintenance?
- How will the system respond if an accident happens on the system side?

In order to assure the security of the system, a site office was set up and monitoring staff were stationed at the office on a full-time basis. In addition, an integrated control system was developed so that the staff could monitor and control the system.

Although most of the questions raised by the utility company are solved through those measures, there are still some technical questions remaining for the second issue and research is being conducted to overcome this issue.



Overview of the demonstration site



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Cooperation with the house owners

As this project is focused on research, cooperation with the house owners was essential. Conflict with residents in the area could lead to a serious risk for the project.

Explanatory meetings for the house owners were held many times to ask for cooperation of the residents. In addition, official contracts were made to avoid troubles.

It should be noted that this project was aimed at research and the costs were paid from the research budget, therefore, it might be quite different from a general development project. In addition the organization, structure, and mindset of the utility companies in Japan are quite different from that in Europe or the US. In Japan, it is very important to understand the utility's intention through prior consultation.



Overview of the demonstration site

Sources of further information

Clustered PV project:

http://www.nedo.go.jp/english/publications/brochures/pdf/ota-project_nedo.pdf

Ota-city: http://www.city.ota.gunma.jp/gyosei/0020a/007/01/english/e_index.html

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