NTT Aoba Dori Building

IEA PVPS

Introduction

This project is a building within the next generation of information and communication office buildings, which are planned to consolidate the call centre bases of the NTT (Nippon Telegraph and Telephone Corporation) group, located in the central area of Sendai City. (NTT Facilities Inc., project manager Takeo Sakamoto, chief architect Hiroaki Yamayoshi, architect Hisashi Hasegawa, architect Masanobu Nojiri, architect Tomohide Satou)

At the design stage, after gathering and analysing project examples of wall-installed PV panels, the design was confirmed. At the construction stage, intensive and frequent discussions within the joint venture between Takenaka, Daiichi, Hutech (general contractor) and LIXIL (façade contractor) achieved the final design and construction technology.

Source: Successful Building Integration of Photovoltaics – A Collection of International Projects

Aesthetic integration

To express the innovative character as the next generation of information and communication office buildings, a louvre type of PV modules is installed on the façade with a pattern of horizontal lines which is a design feature of the entire building. The louvre type of BIPV is installed alternately to keep continuity with the louvres of the air supply and exhaust facilities at the edge of is installed the façade.

Energy integration

The electricity generated by the façade is used in the building for the shared office area. The project does not qualify for the Japanese subsidy system (FIT) so all generated electricity is consumed internally.

Besides the BIPV system on façade, balanced environmentally conscious measures are applied also to each of the building materials, air-conditioning facilities and electricity facilities. For the façade, it was introduce a naturally ventilated sash system which utilizes fresh air and enables load reduction for the air conditioning system during mild weather. A desiccant air-conditioning system was adopted to control the temperature and humidity separately, creating a more comfortable indoor environment. For the electricity system, LED lighting is installed throughout the entire building and an additional 17KW PV system is installed on the roof.

Technology integration

The BIPV module for the façade of this project contains solar cells laminated between two tempered glass panes and are fixed at the top and bottom edges with an aluminum frame. High-transmission glass is used as the front cover, contributing to increase the conversion efficiency. Electric cables are contained within the aluminum frame on the top edge to avoid visibility from the outside. Aluminum fixing clamps are adopted mainly to decrease the weight and increase weathering resistance. Each element of the façade is intended to be “maintenance-free”.

The project required integration of PV modules into a large wall. Efforts for cost reduction include

reduction of the number of materials and components and use of standardized PV modules. Finally, the number of PV module types was reduced to only three.

Decision making

The reason for the BIPV adoption were that it is a fitting façade design for the environmental concept of the project, that as a design-given condition, a large sheer wall on the southern façade is necessary, and that a certain amount of solar irradiation can be gained on the southern wall. The visible appeal of environmental architecture may enhance the company image and is publicly appreciated.

Lessons learnt

During the design of tailor-made PV modules for walls, accurate consideration of fixing or assembling of each component is required, comparing it to the design using standard modules. Then rational integration of each element, including building materials, PV cells and electric wiring, is quite significant. The dimensions of PV modules for lower level walls should be carefully determined because they strongly influence the appearance of the design. In urban areas, before PV installation on the wall, the effect of shading by nearby buildings and other objects needs to be assessed.

The challenges of the project were to combine technical integration of each elements (building materials, PV cells, electrical wiring etc.) and the realization of the innovative design image. We received the feedback that the eye-catching façade BIPV façade enhances the information and communication office building and is quite impressive. (NTT Facilities Inc., project manager Takeo Sakamoto, chief architect Hiroaki Yamayoshi, architect Hisashi Hasegawa, architect Masanobu Nojiri, architect Tomohide Satou).

The “pay-back time” is usually recognized as a big challenge for a BIPV project, but in this project, successful environment-friendly architecture was more highly prioritized. To communicate this and to develop awareness of this kind of architecture within the community is the goal of the project. Cost-reduction efforts were applied at critical points including the reduction to three types of modules.

PROJECT DATA

Project type	New construction
Building use	Office
Building address	2-8-25 Ichibancho, Aoba-ku, Sendai City, Japan

BIPV systems

BIPV SYSTEM DATA

Architectural system	rainscreen
Integration year	2013
Active material	polycrystalline silicon
Module transparency	Opaque
Module technology	Glass-backsheet, recognizable PV, customized modules
System power [kWp]	20
System area [m²]	423
Module dimensions [mm]	1,790/1,223/1,414 x 302
Modules orientation	South
Modules tilt [°]	90

BIPV SYSTEM COSTS

Stakeholders

BIPV system designer

NTT Facilities Inc.

BIPV components producer

LIXIL Corporation
2-1-1 Ojima, Koto-ku, Tokyo, Japan
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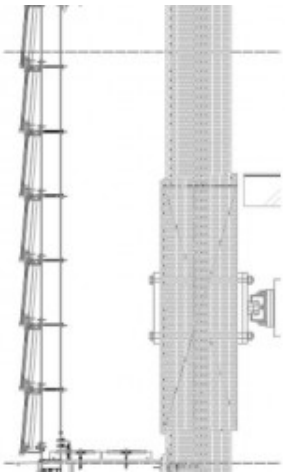
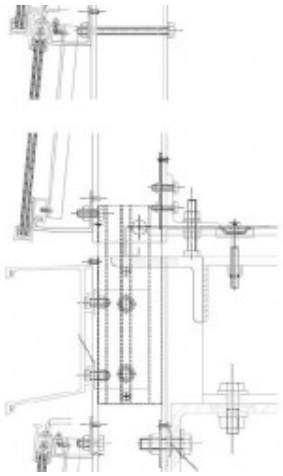
https://www.lixil.com/





Case study author:

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