

Brief Building Report Kollektivhuset

General information

BUILDING Kollektivhuset

Site Location	Hans Knudsens Plads, Copenhagen, Denmark		
Type of Project	Facade renovation of multistorey housing block for disabled tenants		
Building size	224 flats		
Building Owner	Vanføres Boligselskab Københavns Kommune (Afdeling 1), foundation for disabled people in Denmark		
Short Description	Kollektivhuset is a building for disabled people located close to one of the most trafficated roads to the center of Copenhagen		
Author	Henrik Sørensen	Architect	DOMUS Arkitekter
Company	Esbensen Consulting Engineers Ltd.	Builder	Boligselskabet DVB
Address	Carl Jacobsensvej 25 D DK 2500 Valby Denmark	Designer	
Telephone	+45 33 26 73 00	BiPV system prov.	GAIA Solar
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*Kollektivhuset, Hans Knudsens Plads
Copenhagen, Denmark. Photo: NCC.*

Building Design and Layout

The building is a typical concrete high-rise, 11-storeyed building from the late fifties.

The facade facing west has been consisting of open balconies in the whole length of the building facing the heavily trafficated road. The balconies have been refurbished and redesigned, and have become more comfortable for the disabled users by enlargement and glass covering. In the new facade PV panels have been worked in, they produce both heat and electricity.

By replacing the balconies and providing a glazed balcony the lifetime of the facade will be substantially extended, since no concrete parts of the elements are directly exposed to the outdoor climate.

BiPV Principles

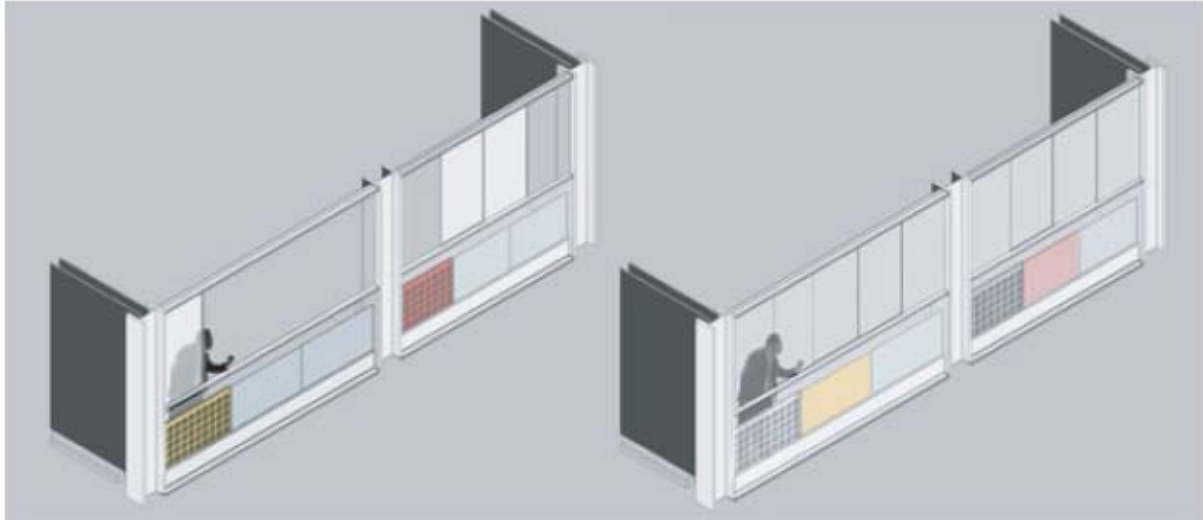
General Description

There are 224 PV-modules placed vertically on the facade of the balconies of the building. The modules are connected to four inverters which delivers the power to the grid. Solar cells are laminated to a sheet of toughened glass with EVA and transparent Tedlar.



Building Integration

The front glass of the parapet is a normal glazed balcony glazing, ensuring water tightness and sound protection from the main road in front of the building. Behind this glazing the PV-modules are placed. The space between the front glass and the PV-module is ventilated to the exterior during Summer and to the interior during Winter.



Visual Appearance

The PV-modules are visible from the outside of the building and with the combination of coloured glass sheets behind the modules, which are moveable, and living facade with small variations in the appearance is obtained.

On the pictures below both the anticipated visual appearance and the realised appearance of the building is shown.



Technical Data

Total PV Production (MWh)	8
Total Peak Power (kWp)	10100
Total Area/no of modules (m ² /#)	166/224
Inverters	
Total no	4
System	SMA- String inverter
Monitoring system	
General	Standard BEMS
PV System	Sonny Boy Control +

Divided into:

Facade		Roof	
PV Production (MWh)	8	PV Production (MWh)	
Peak power (kWp)	10100	Peak power (kWp)	
Area/no of modules (m ² /#)	166/224	Area/no of modules (m ² /#)	
Windows		Balconies	
PV Production (MWh)		PV Production (MWh)	
Peak power (kWp)		Peak power (kWp)	
Area/no of modules (m ² /#)		Area/no of modules (m ² /#)	

Monitoring

The power production is monitored by a Sonny Boy Control+ where the electrical AC production is monitored together with DC power, system balance etc. Key results from the monitoring is continuously shown at a public display in the entrance hall of the building.

Economy

The key economical figures are:

Total construction costs, including planning, commissioning, monitoring and dissemination has been 1,938 Mio Dkr. incl. 25% VAT

Total construction costs incl. scaffolding, grid-connection was 1,566 Mio Dkr. incl. 25% VAT

Work Progress

The table below summarises the work progress for the demonstration buildings included in the PV-NORD project.

The building construction

Status:

Start of construction:

The building construction finished:

The building is completed

1959, PV-system installed 2002

1959, PV- system installed 2002

Residents moving in: The building has been occupied since construction
Comments:

The solar cell modules

Status: The solar cells are mounted
Deliverance: 2002
Mounted: 2002
Comments:

Monitoring and ICT system

Status: The system is running
Deliverance:
Installation: Together with the solar cells and inverters
Initial tests: August 2002
In use: September 2002
Comments:

Outcome and Lessons Learned

The system has been installed as planned and has been successfully in operation since installation, despite a errors described in the following.

One inverter had to be replaced during operation, due to faults in the electricians controlling the inverter. Cables had to be repaired due to a construction worker drilling holes for another part of the facade.

These faults and errors were covered within the warranties of the various contractors and has not caused further costs to the building client.

In the design phase the near-shadow problems were carefully addressed and the design process demonstrate that the close co-operation between the manufacturer, the electrical designers and the architects has been crucial to succeed with the project.

Furthermore the careful planning of the exterior appearance of the facade has been a key to the acceptance and use of the building as an important reference building in Copenhagen for building integrated photovoltaics.

Comments

In the coming years more projects with building integrated photovoltaic systems are expected in the Copenhagen area. The system of Kollektivhuset has been specifically designed to match the architecture and the technical possibilities of the building. However all the generic recommendations from the design process and the installation and monitoring phase has proven to be very valuable for other design teams and dissemination of the project results and continuous monitoring of the electrical production will go on also after the conclusion of the PV-NORD project.