Brief Building Report – NCC Head office

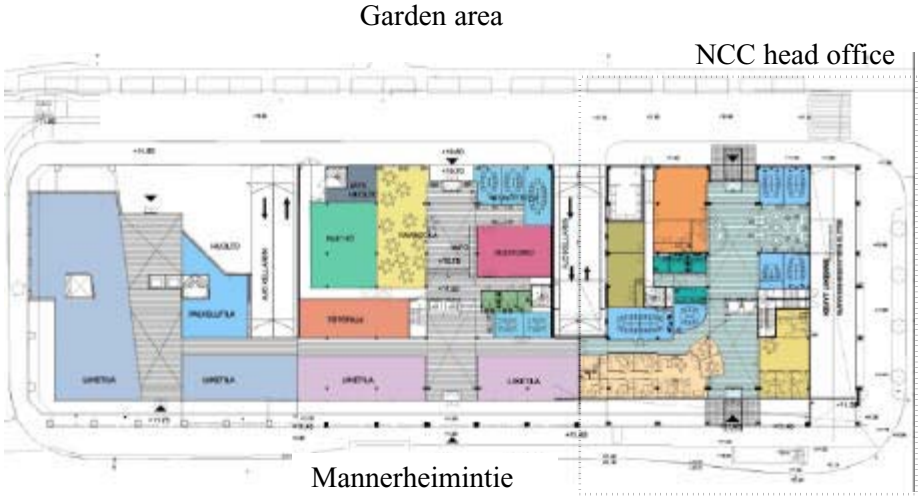
General information

BUILDING	**NCC Head office, wp 8**
Site Location	Mannerheimintie 103a, 00280 Helsinki, Finland
Type of Project	Office
Building size	13500 sqm (gross area)
Building Owner	KOy Mannerheimintie 103a (Nordisk Renting)
Short Description	Office building near Helsinki downtown along Mannerheimintie. Lessee of the building is NCC Rakennus Oy

Author	Pekka Kiuru and Hannu Havanka	Architect	Optiplan Oy/Mr. Juha-Pekka Rindell
Company	NCC Property Development Oy	Builder	NCC Property Development Oy
Address	Mannerheimintie 103a, 00280 Helsinki, Finland	Designer	Optiplan Oy
Telephone	+358 10 50751	BiPV system prov.	Naps System Oy
Email	hannu.havanka@ncc.fi pekka.kiuru@ncc.fi		

Building Design and Layout

The new NCC head office in Finland is located very visible area along Mannerheimintie only 10-15 minutes from Helsinki downtown. Area is old parking yard. Other side of the area is Mannerheimintie and other old garden area. Area is developed by NCC Property Development Oy together with Helsinki city authotories. In the developed quarters is three lots and NCC head office is one of the buildings. Helsinki city has given very exact demand to the building shape and façade. On the Mannerheimintie side the building is eight floors high and on the other side only four floors high because of garden area. The building façade must be traditional.

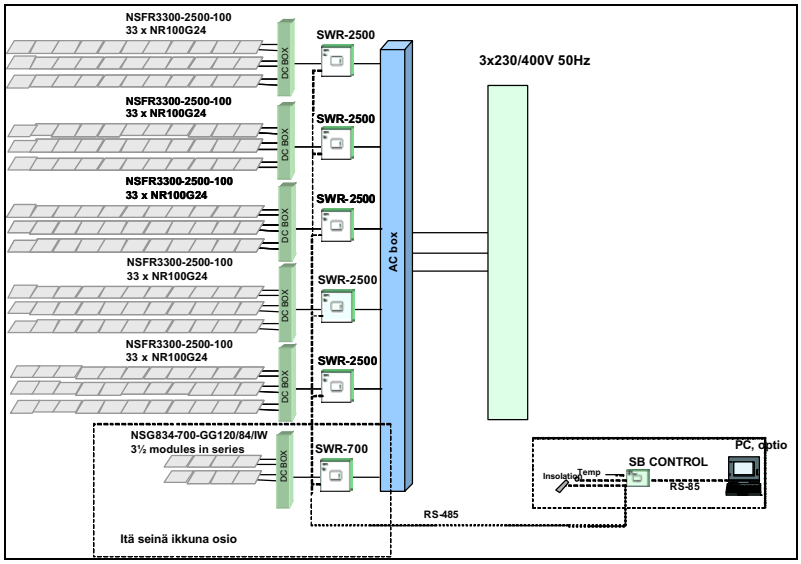


In the NCC head office building is app. 300 workdesks. The building is modern high class office building with latest technology.

BiPV Principles

General Description

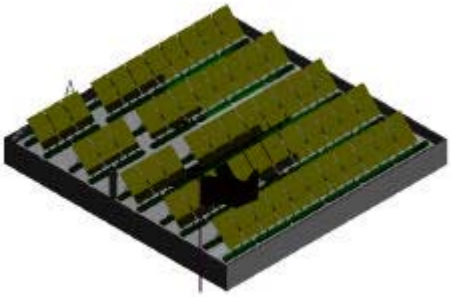
The total solar module gross area is 147 m2. The nominal power of the system is 17,3 kWp. Panels are mounted mainly on roof but a small section of semitransparent modules is mounted on the east wall of the building. The solar system is divided into 6 subsystems (= inverters) and they are divided between three phases. The graph below shows the general electrical layout:

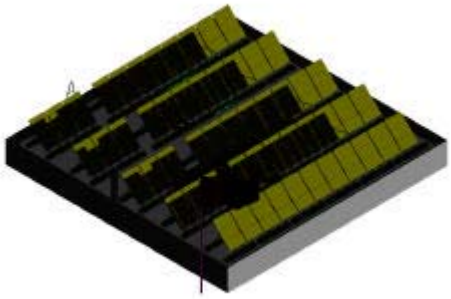


Building Integration

The solar modules are mainly installed on app. 15 m x 15 m roof area that is in top of the ventilation room. The modules are not visible if looked very close from the building. However, they can be seen nicely from the distance when driving towards the building along the main road of Helsinki. A small portion of the system is integrated into windows in 7th floor in east wall. The window modules are glass-glass laminates integrated into insulating window elements. The modules let light enter between the cells.

The roof modules are mounted on concrete basement with Naps SM6 aluminum structure in optimum tilt angle and towards south. There are 5 rows. Each row has 33 modules of 100 Wp each. Some shadowing of modules will happen in winter time because of the other rows and some ventilation pipes but on annual basis the loss is reasonable low. Drawing attached shows shadowing at certain time.





Shadowing at 15th March 08.00 (left) and 15th November at 09.00 (right).

Visual Appearance

Due to strictly demands of the traditional facade the modules were installed mainly on the roof. On the other hand the solar system is now installed at optimum tilt angle towards south to provide best possible solar production. The rack mounting system can only be seen from a distance so there wasn't any demands on visuability. The system can be seen from front side, when driving pass the building.

The system integrated to windows in seventh floor give possibility to present pv-system to office customers. In the seventh floor NCC has its official premices and fitness premices.

The data will be delivered to the building automation system. The data will be presented in the info screen situated in the NCC main lobby.

Helicopter view. Panels on the roof (left). 7 th floor lobby in official premices (right).

Technical Data

Total PV Production (MWh)	15
Total Peak Power (kWp)	17,3 kWp
Total Area/no of modules (m²/#)	147 m2/172 modules
Inverters	
Total no	6
System	6 subsystems
Monitoring system	
General	No
PV System	Yes

Divided into:

Facade		**Roof**	
PV Production (MWh)		PV Production (MWh)	14,5
Peak power (kWp)		Peak power (kWp)	16,5 kWp
Area/no of modules (m²/#)		Area/no of modules (m²/#)	139 m2/165 modules
Windows		**Balconies**	
PV Production (MWh)	0,5	PV Production (MWh)	
Peak power (kWp)	0,8 kWp	Peak power (kWp)	
Area/no of modules (m²/#)	8 m2/7 modules	Area/no of modules (m²/#)	

Monitoring

The monitoring is done by Sunny Control Plus unit that monitors the individual values of all 6 inverters and total values. It also measures ambient and roof panel temperature and also solar radiation. The values will be recorded into a PC.

Economy

The cost of the PV system is approximately 1% of the total cost of the building project. The estimate includes the subsidy from the EU.

Work Progress

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

The building construction

Status:	finished
Start of construction:	1.1.2003
The building construction finished:	30.6.2004
Residents moving in:	August 2004
Comments:	

The solar cell modules

Status:	Finished
Deliverance:	2003 November window elements, May 2004 roof

	system
Mounted:	May-June 2004
Comments:	Connected into grid 2004 August

Monitoring and ICT system

Status:	going
Deliverance:	August 2004
Installation:	August 2004
Initial tests:	September 2004
In use:	September 2004
Comments:	Data storing is done manually so far

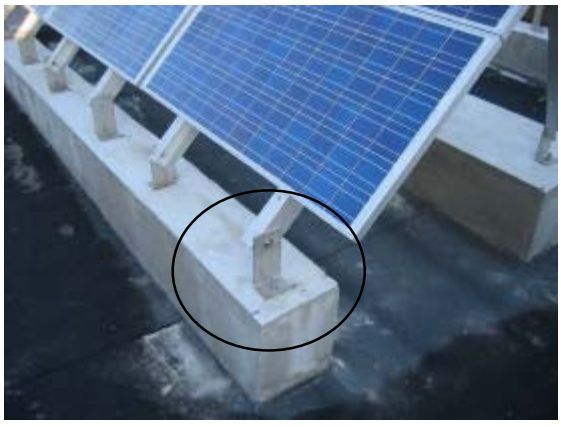
Outcome and Lessons Learned

The construction and installation of the PV system did come true according to the plans without any major problems. Difficulties were with the roofpanel foundations. Panels were founded over the waterproofing without any holes to waterproofing. Concrete cakes take all the pressure coming from the wind.

Comments

Roof panels

Roof panels



Roof panels were lift up starting the first row (left) and ending the last row (right).

Inverters (left)

7 th floor panels (right)