



# Remote monitoring of PV at district level (WP2.1)

8th Concerto Renaissance Meeting

**Bruno Gaidon**  
October 1 2009



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1

## Background



### First housing project

- 3 sections of estate - 79 000 m<sup>2</sup>
- Date of construction : 2007-2010
- High architectural quality
- European funded project (CONCERTO)

#### Section A

Nexity Apollonia  
Tania Concko

#### Section B

Marignan Bouwfonds  
Massimiliano Fouksas

#### Section C

ING Real Estate  
MVRDV



# Background



**Section A**  
Nexity Apollonia  
Tania Concko



4 PV systems  
78 kWp  
SMA



**Section B**  
Marignan Bouwfonds  
Massimiliano Fouksas



6 PV systems  
97 kWp  
Fronius



**Section C**  
ING Real Estate  
MVRDV



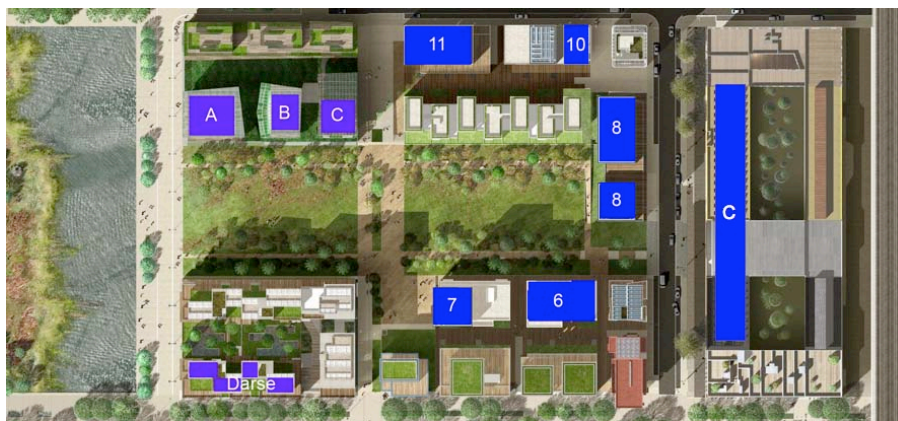
1 PV system  
65 kWp  
Not known



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# Background



11 PV systems - 250 kWp

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## The need



Within CONCERTO, we have to analyse the performance of PV systems ...

... but short term monitoring is not the key issue !

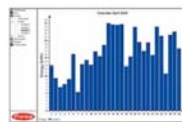
In the long term (20 years) we have to :

- Make sure that PV systems stay in operation !
- Detect quickly any kind of failures !
- And also make sure that the energy produce is what is expected !

## Problems



- Most inverter manufacturers have their own monitoring device
- Of course, nothing is standardised and compatible
- It is therefore complicated, time-consuming and inconvenient to monitor a lot of PV systems
- Monitor and failure detection should be in place for 20 years !



## The solution



A large-scale PV monitoring system :

- Independent from inverter brands
- Little or no additional hardware to install
- Easy to use and to detect any failure
- Can be use at all king of scale : building, section, district, city or country !

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7

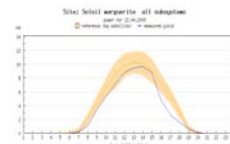
## The prototype



Installation of a prototype at Hespul's office on a 13 kWp PV system (6 inverters)



Test of GSM data transfer to a dedicated website



Test of automatic failure detection algorithm

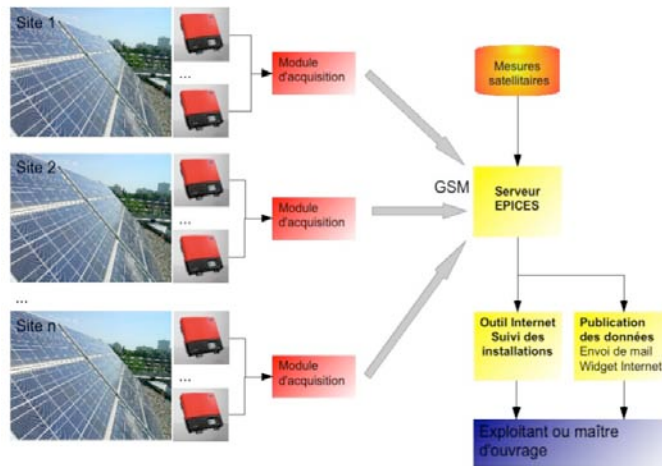
Type of error	17.00	18.00	19.00	20.00	21.00	22.00	23.00
Data transmission failure							
Global error detected							
Global inverter							
String failure							
Module failure							
Power limitation							
High noise at the power							
MPPT tracking							
Grid inverter							
High temperature							
Shading							
Overvoltage							
Grid voltage							
Grid fault							
Grid disconnection							
Unknown failure							

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8

## The district-scale monitoring device

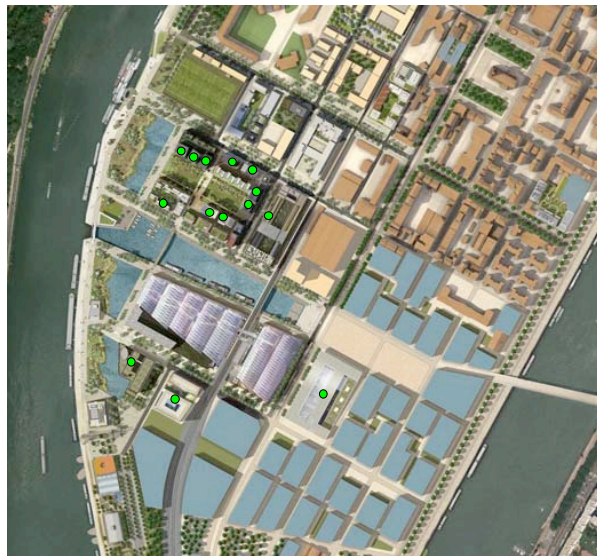


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9

## Interactive Internet website



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10

## Interactive Internet website



For each PV system :

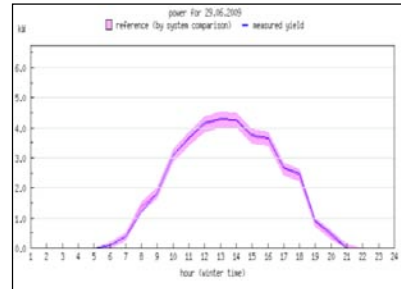
### Ilot A - Bâtiment C

Peak power : 10 kWp

Actual power : 3,4 kW

Status : **OK**

Production data



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11

## Interactive Internet website



For a group of PV systems :

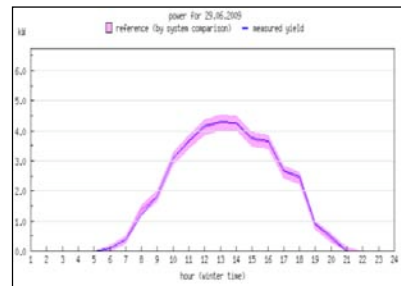
### CONCERTO area

Peak power : 250 kWp

Actual power : 117 kW

Status : **OK**

Production data

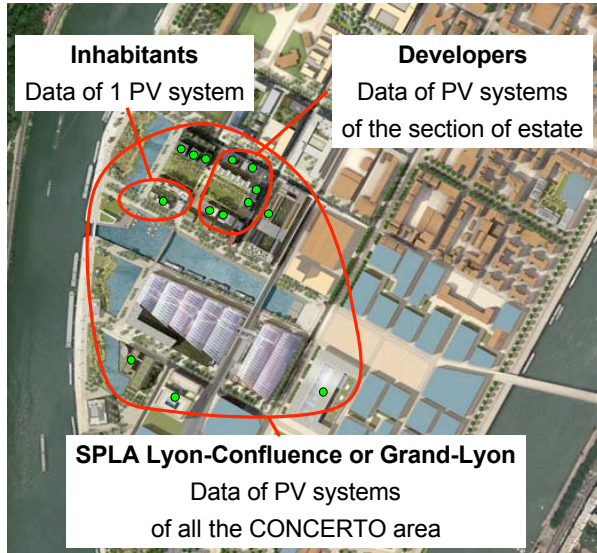


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12

# Interactive Internet website



# Automatic failure detection




**Ilot A - Bâtiment C**

Peak power : 10 kWp

Actual power : 3,4 kW

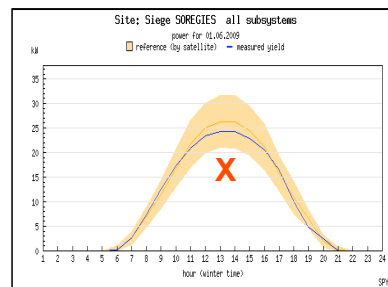
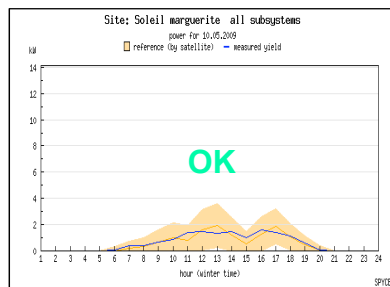
Status : Failure

Failure detection



type of error	23.06.	24.06.	25.06.	26.06.	27.06.	28.06.	29.06.
data transmission failed	Green	Green	Green	Green	Green	Green	Green
defect main switch	Green	Green	Green	Green	Green	Green	Green
defect inverter	Green	Green	Green	Green	Green	Green	Green
string defect	Green	Green	Green	Green	Green	Green	Green
module defect	Green	Green	Green	Green	Green	Green	Green
power limitation	Green	Green	Green	Green	Green	Green	Green
high losses at low power	Green	Green	Green	Green	Green	Green	Green
MPP tracking	Green	Green	Green	Green	Green	Green	Green
hot inverter	Green	Green	Green	Green	Green	Green	Green
high temperature	Green	Green	Green	Green	Green	Green	Green
shading	Green	Green	Green	Green	Green	Green	Green
snicover	Green	Green	Green	Green	Green	Green	Green
grid outage	Green	Green	Green	Green	Green	Green	Green
sailing	Green	Green	Green	Green	Green	Green	Green
degradation	Green	Green	Green	Green	Green	Green	Green
unknown failure	Green	Green	Green	Green	Green	Green	Green

# Failure detection



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# Status of progress



## Installation of PV systems : on-going



## Installation of monitoring hardware : on-going

## Finalisation of website : January 2010

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16



## WP2.3 Common monitoring



### European Workshop CONCERTO+

### Monitoring energy use in cities: From community energy management to sustainable local energy policies

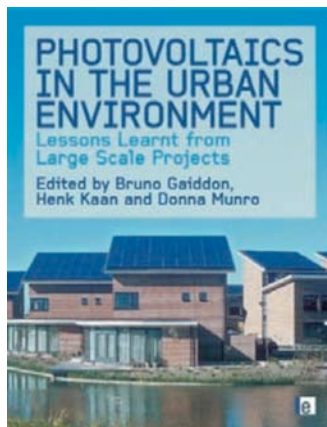
22-23 October 2009  
Vienna, Austria

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17

## WP4.2 Dissemination



### Book on Photovoltaics in the Urban Environment

22 case-studies of Urban Plans with PV  
USA, Japan, Australia and Europe  
France : 3 (Grand-Lyon)  
Spain : 1 (Barcelona)

ISBN 9781844077717  
www.earthscan.co.uk

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18



**HESPUL**  
114, boulevard du 11 novembre  
F-69100 Villeurbanne  
Tel : +33 4 37 47 80 90  
Fax : +33 4 37 47 80 99  
info@hespul.org  
www.hespul.org



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