Photovoltaïque et projet territorial

Journée d’étude Futurs Urbains

Bruno Gaiddon
25 juin 2018
1992 – First grid connected PV system in France (1 kWp)

(Green) power to the people
2009 – PV Consulting

Example: Coriolis building – ENPC – 170 kWp
IEA PVPS Task 10
Urban Scale PV applications
2004-2009
IEA PVPS Task 10
Urban Scale PV applications
Nieuwland – Netherlands – 1 MW – 1999
IEA PVPS Task 10
Urban Scale PV applications
Lessons learnt

1 - Business model

2 - Urban planning

3 - Grid issues
1 – Business models

- Feed-in tariff for PV systems <100 kWp

- Solar auctions for PV systems >100 kWp ...

  ... but with unfair selection criteria

- Northern part of France out of the competition!
1 – Business models

- 6 June 2018 – Opinions page in Le Monde signed by 200 decision makers
- Call for equity in PV auctions to take into account the solar resource in the selection criteria
2 – Urban planning

• 2003 : innovation in the urban planning process

• Obligation to cover part of the energy consumption of buildings with renewable energy

• Tested on the first housing block of a redevelopment area in Lyon

• Replicated in another redevelopment area in Paris
Lyon-Confluence urban project

A major urban development in Lyon - France

Basic long-term statistics (2020)
150 hectares (70 renewed)
1,000,000 m² net floor area
20,000 residents (7000 in 2000)
22,000 jobs (7000 in 2000)
Urban planning in France

Local Community
- Policy maker
- Initial land owner

Public urban developer
- Site design
- Infrastructure work
- Selection of developers

Property developers
- Design building
- Land and buildings owners
- Sell it or keep it
2003-2009 : first PV systems

First housing project
  • 3 sections of estate - 79 000 m²
  • Date of construction : 2007-2010
  • High architectural quality
  • European funded project (CONCERTO)
2003-2009 : first PV systems

The urban innovation (2003) : the international design competition included a section on energy efficiency and renewable energy systems!

- 80% of RES on heating consumption
- 80% of RES on domestic hot water consumption
- 50% of RES on commons electricity consumptions
2003-2009: first PV systems
2003-2009: first PV systems

265 kWp – 11 PV systems
2003-2009: first PV systems

265 kWp – 11 PV systems
2011 – Positive energy buildings

HIKARI – 190 kWp (Rooftop PV + PV façade)
2011 – Positive energy buildings
2011 – Positive energy buildings
2018: new blocks

A3 – ICADE - 28,000 m²
420 kWp
2018 : State of progress

Today : 29 PV systems – 2,0 MWp
2018 – State of progress
3 – Grid issues

Rural Grid

Substation

MV 0,7 km LV 1,0 km

40 consumers

Urban Grid

Substation

MV 0,4 km LV 0,7 km

180 consumers
3 – Grid issues

Consumers and producers

Voltage

+10%

High production
(Summer - around 14:00)

Un

-10%

High consumption
(Winter - around 18:00)

Distance
3 – Grid issues

- OFF-Load Tap Changer of MV/LV substation set at +2.5%
- Optimization of grid design for new consumers
- But very problematic for new PV producers as this reduces the hosting capacity of LV grids
3 – Grid issues

- High grid connection price
- Threshold of 400 €/kWp
  (to be compared to 1500 €/kWp, a typical system price)

BT 36-100kVA
3 – Grid issues

• Solar and grid cadaster (GIS tool)
3 – Grid issues

Strategy to reduce PV connection price
• Set OFF-load tap changer at 0% (DSO)
• Undertake study to assess hosting capacity (DSO)
• Demand inverter downsizing (Policy)
• Mutualize grid reinforcement cost (Policy)
• ...
Conclusion
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