

# High PV Penetration in urban area

## Summary

Urban energy system modelling of distribution grids to plan, monitor and nowcast the spatiotemporal variability of the electric consumption

Sponsor	Project	Solution
<div><p>The e-shape project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement 82085</p></div>	<div></div>	<div> </div>

## Taxonomy

- Energy & mineral resources / renewable energy
- Urban development / smart cities
- Environment climate & health / meteo and climate
- Financial & digital services / insurance and real estate
- Infrastructure & transport / construction

## User profile

Target users include:

1. Urban planners
2. grid operators
3. industrials
4. aggregator for energy trading
5. researchers in Energy and Urban planning
6. citizens

## Service description

Rooftop PV systems in urban areas are very interesting because they do not emit air pollutants nor GHGs during their exploitation, they produce electricity where this electricity is consumed, and they add value to unused urban roofs and parking shades and may reduce urban heat island effect. But, due to complex shading effects in urban context (vegetation, surrounding buildings, superstructures of roofs, etc.) and local atmospheric and meteorological effects, their massive penetration in urban areas will induce a significant variability in space and in time in the energy injected in the electric grid. As far as the electric demand side is concerned, a detailed modelling of energy requirements from residential, commercial, and industrial buildings with varying demand profiles for electricity is also required. Therefore, there is a need, in urban area, for Geographical Information System (GIS)-like tool for grid operators, urban planning decision makers, industries, aggregators for solar energy trading, citizen (PV self-consumption) and researchers. This GIS-tool is meant to provide an urban energy system modelling of distribution grids to plan, monitor and nowcast (i.e. and short term forecast) the spatiotemporal variability of the electric consumption on one hand and of the production of fleet of PV rooftop systems on the other hand.

Existing GIS-tools for the Nantes (F) and Oldenburg (D) areas will be enhanced by new satellite-based datasets. The cost/benefit of using satellite-based data will be assessed in several specific use cases.

## Customer experience

The service has been demonstrated and assessed by 40 professionals in the solar radiation domain during the 9<sup>th</sup> edition of the solar training co-organized by Soda Transvalor and MINES ParisTech ARMINES.

A live recording video of this session is available here:

## Need

- Historical analysis of PV variability (case #1)
  - Usage: PV self consumption (sizing individual systems, In Sun We Trust)
- Historical analysis of PV variability (case #2)
  - Usage : Simulated PV injection in different source points of the electric grid for different scenarios of PV penetration (for DSO, e.g. ENEDIS)
- PV nowcasting and short-term forecasting (case #3)
  - Usage: Energy trading with portfolio of PV rooftop systems

## Challenges

The main challenge is to transition from the generation of pre-computed static solar cadaster to urban scale solar variability information computed on-demand and on-fly via interoperable service hosted on WEkEO cloud infrastructure.

## Results

The service is currently assessed by several companies in the field of solar photovoltaic installation, operation and management. The information provided by the service has proven to be of interest for those companies and NDA's have been signed before disclosing in more details explicit fields of industrial application.

## References

Learn more about the service: <http://geocatalog.webservice-energy.org/geonetwork/srv/fr/catalog.search#/metadata/d9f3542d-2626-4294-b61e-c356faf0741f>

Learn more about e-shape: [www.e-shape.eu](http://www.e-shape.eu)

A question? Contact the Helpdesk: <https://helpdesk.e-shape.eu>