

PROPHET. Prediction and management tool for Photovoltaic Solar Energy

PROPHET provides the power estimation which will generate a cluster of PV systems in the same climatic region

[PROPHET] offers an innovative solution that replicates the power dynamics generated by a cluster of PV systems in the same climatic region. It is an emulator which does not need data nor hardware, not even monitorization at PV plants, it only needs the radiation data provided by the existing meteorological stations. In this way, the PV power limitations are set only a few days a year, obtaining a greater amount of PV power.

Technology solution supported by the Technical University of Madrid

Technology solution

Researchers from the Technical University of Madrid and the Public University of Navarra have developed an emulator for the generated power by a cluster of PV systems located in the same climatic region.

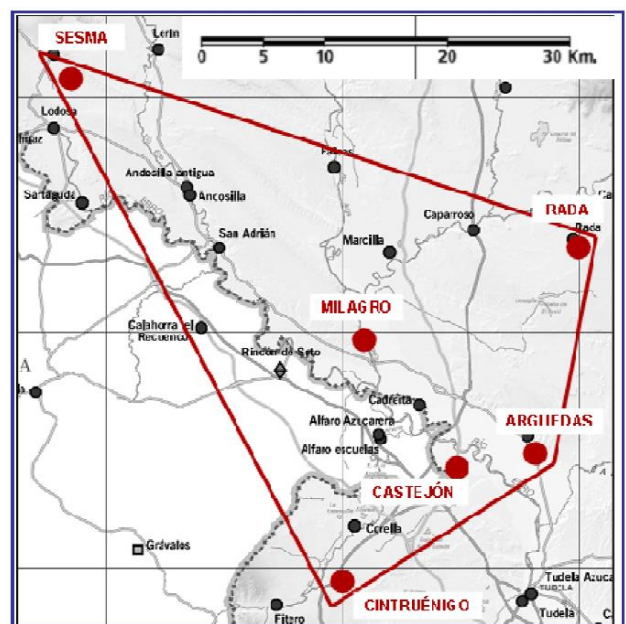
The tool only works with the irradiance indicent at a point data, accurately replicating the power dynamics generated by the cluster of PV plants.

In this way, the network robustness can be checked in terms of power and frequency without monitorization or telemetry of the PV plants which are being managed.

Areas of application

- **Energy:** efficiency improvement and the PV sector integration in the network, transmission system operators (TSO)

"The estimation done by PROPHET will enable penetrations up tu 30% of PV power in the European electric system"

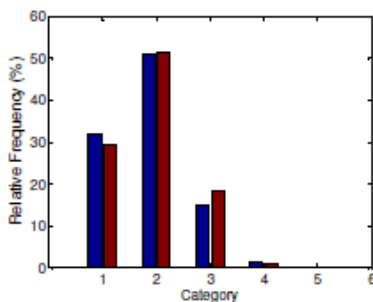


Market demands

▪ Energy

- One of the electric power characteristics is that it cannot be stored in large amounts, so for the proper operation of the electric system, the production of the plants should be instantly equal to the consumption in an accurately way.
- When power is generated, PV plants enter disruptions in the network, which makes it necessary to set a limit for the PV power that can be sent to the electric system.
- This variability in the generated power is one of the biggest challenges for the massive integration of PV systems in the electric network.

"The biggest challenge is to adapt the renewable energies contribution – dependent on the meteorological conditions – to the electric system where the production and consumption balance is needed"



. Histograms of $DARR_{\text{real}}$ observed over a year and the simulated ones, $DARR_{\text{sim}}$

Market potential

▪ Energy

- Photovoltaic Solar Energy will lead the renewable energies with an anual growth rate of 14.6% until 2019 [elperiodicodelaenergia.com – March 2015]
- The estimated average global growth of photovoltaic infrastructure during the period 2013-2017 is 66% [IHS].
- Currently, the renewable energy sources represent a share of 17.27% of the generation capacity in USA, being 1% the photovoltaic energy but in continuous growth [elperiodicodelaenergia.com – Julio 2015]

▪ Network Operators

- Red Eléctrica Corporation obtained a net profit of M€ 717,8 in 2014, 35,7% bigger than 2013 [El mundo - Febrero 2015].

Competitive advantages

- Enables up to 30% of PV power in the European electric system.
- Easy implementation; minimum infrastructure needed.
- It can be applied to a cluster of PV plants in the same climatic region
- It does not need hardware nor PV plants monitorization.
- It uses data provided by an existing meteorological station in a region.

References

- The Solar Energy Institute (IES-UPM) is a centre of reference worldwide at the photovoltaic solar energy sector. It has a wide and long relationship with industry and with other important and globally recognized centres.
- The UPNa is a leader in the power electronics equipment for renewable energy systems.

IPR

- Patent pending in Spain
- International Patent applied via PCT [PCT/ES2015/070906]

Development stage

- ☐ Concept
- ☐ R & D
- ☒ Lab Prototype
- ☐ Industrial Prototype
- ☐ Production

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