

# PVSAT – Satellite Based Monitoring of Grid Connected PV Systems

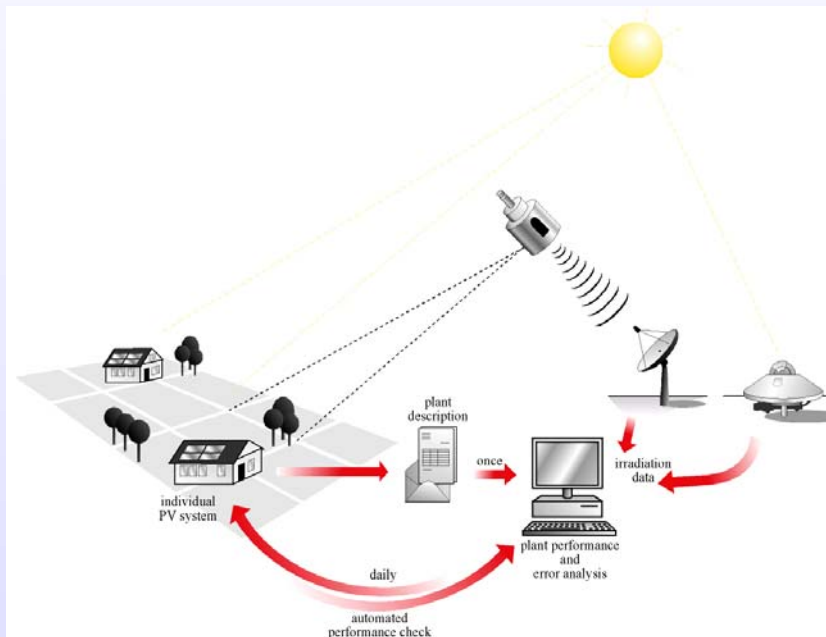
## Targets:

Reduce outage time and maintenance effort by

- automated yield monitoring of PV systems
- early identification of efficiency losses
- automated fault diagnostics
- notification of insufficient energy production to the operator
- long term storage of operating data including permanent access



Efficiency losses caused by shading are automatically identified



Functional principle of the satellite based monitoring of PV systems

## Functional principle:

1. Daily electronic registration of the energy production and forwarding of the data to a central server
2. Calculation of the expected energy yield:
  - hourly values of the global irradiation derived from satellite and ground measured data
  - simulation of the energy production of the PV system
3. Daily comparison of the measured and prognosticated energy production
4. Automated identification of different factors resulting in an efficiency loss, e.g. shading, snowfall, inverter failure, string outage, etc. (see reverse side)
5. Notification to the operator

## advantages:

- Area-wide (all over Europe with a resolution of 2 x 3 km) and competitive because the satellite data supersedes the on site irradiance measurement
- High quality thanks to fine adjustment of the satellite derived irradiance with ground measured data
- A web service grants access to the stored yield data at any time
- Automated notification, if the energy production falls short of one's expectations



MSG-1 Satellite image of August 26. 2003

The development of PVSAT is part of the EU programme „energy, environment and sustainable development“ and is assisted in Switzerland by BBW. The project started in November 2002 und will last until October 2005. The commercial application will start in 2005.

Project partners:

Carl von Ossietzky University of Oldenburg, University of Utrecht, MeteoControl GmbH, Fraunhofer ISE, Enecolo AG.

Enecolo AG

Sandra Stettler, Peter Toggweiler

Lindhofstrasse 52; CH 8617 Mönchaltorf

Tel. ++41 (0)44 994 90 01; www.solarstrom.ch

**enecolo**  
energy ecology