The Dutch PV Portal 2.0

Schepel, Veikko ; Tozzi, Arianna ; Ziar, H.; Isabella, O.; Zeman, M.

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V. Schepel, A. Tozzi, H. Ziar, **O. Isabella***, M. Zeman

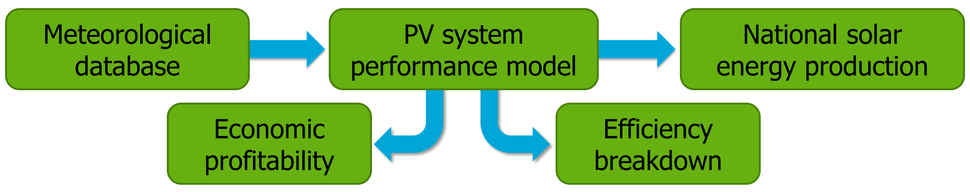
Photovoltaic Materials and Devices group, Delft University of Technology, the Netherlands (*Contact: o.isabella@tudelft.nl)

Veikko Schepel

Olindo Isabella

Motivation and objective

- Publicly available, scientifically accurate information on photovoltaic (PV) energy is needed.
- Knowledge of PV research groups can be communicated to the public to this end.
- Websites can be a useful tool for such education.
- **Development of a comprehensive, interactive PV website for the Netherlands.**

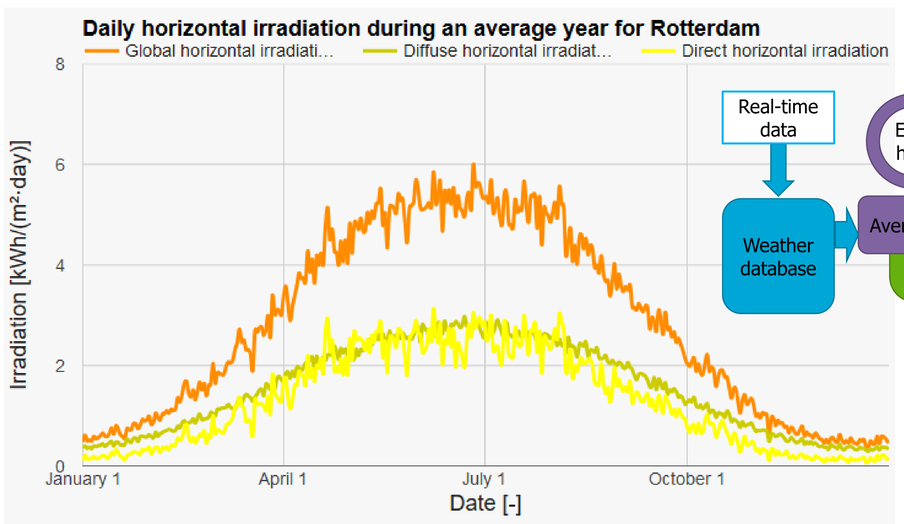


Take-aways

- The Dutch PV Portal (PVP) 2.0 website showcases the potential of photovoltaic energy generation in the Netherlands.
- The website incorporates innovative features
  - Dynamic climate database;
  - Visualization of real-time PV system efficiency losses;
  - Dynamic calculation of soiling losses;
  - Optimal inverter sizing selection;
  - Estimation of the Dutch national solar energy production.
- The website methodology can be applied to create a similar portal for other countries of interest.
- In a future release of the website, all portal components will be improved and expanded upon.

Meteorological database

- Every 10 min., meteo data from 46 Dutch weather stations are stored in a database. → A second database stores climate data for each weather station. → The climate data are updated dynamically with real-time weather data. → All data are freely accessible to website visitors.

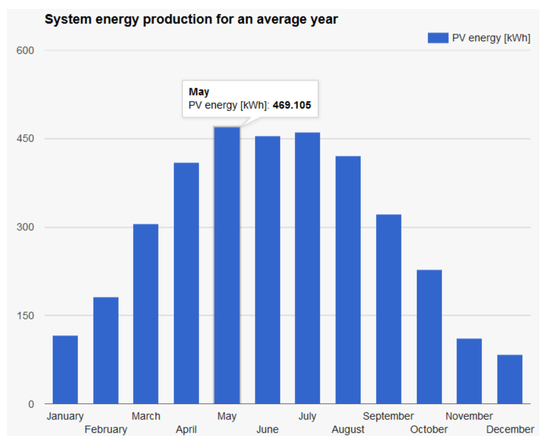


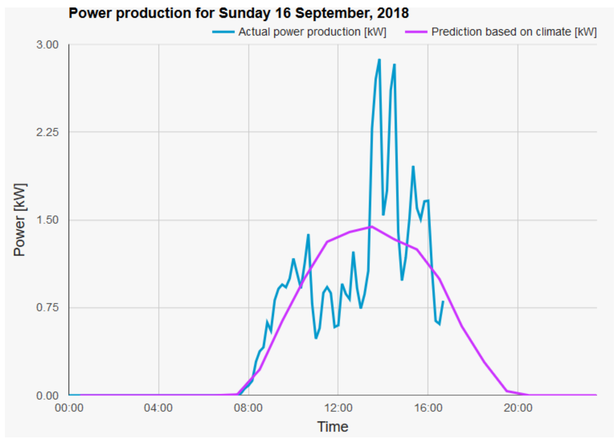
PV system performance model

- Website users can design PV systems for any location in the Netherlands.
- System performance calculated with meteorological data in 'chain of efficiencies' model:

$$\eta_{System}(t) = \eta_{PV}(t) \cdot \eta_{MPPT}(t) \cdot \eta_{Other}(t) \cdot \eta_{Inverter}(t)$$

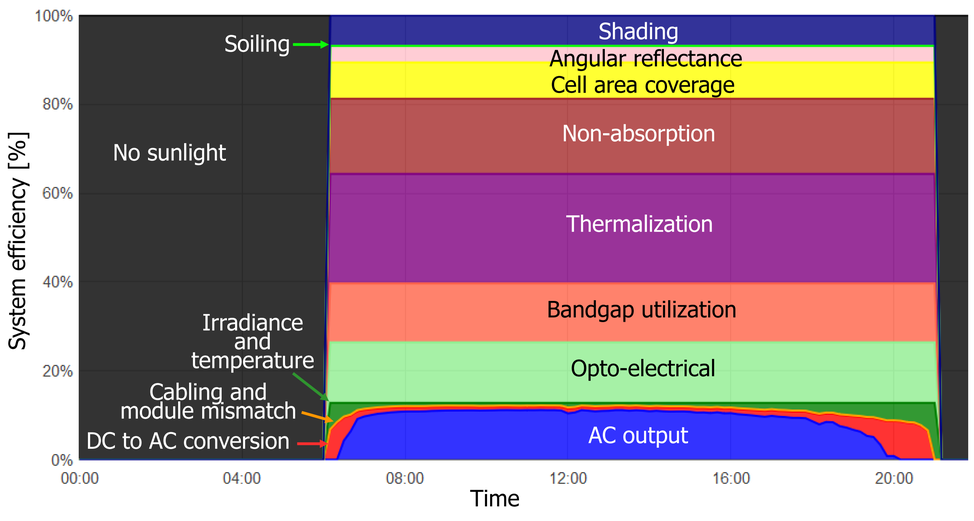
- Two innovative features:
  - Dynamic calculation of soiling losses;
  - Optimal inverter size selection based on system tilt and azimuth.





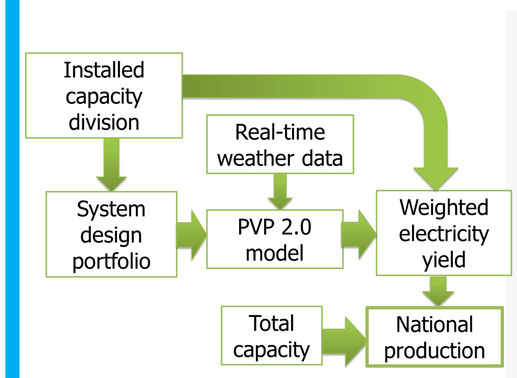
System efficiency breakdown

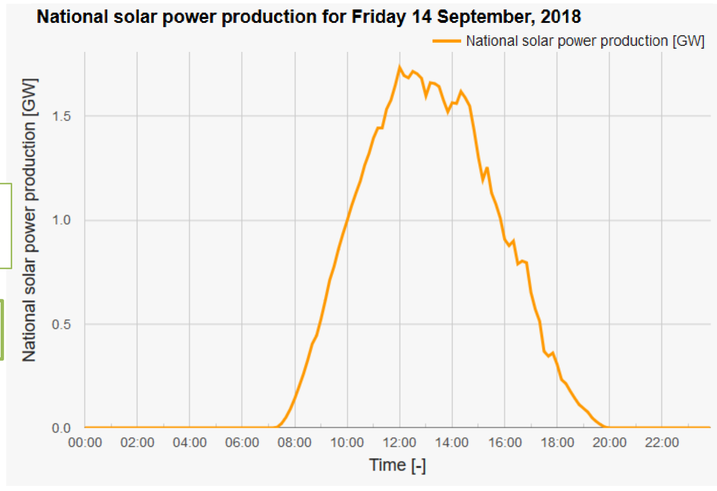
- Real-time PV system losses are visualized in a chart.



National solar energy production

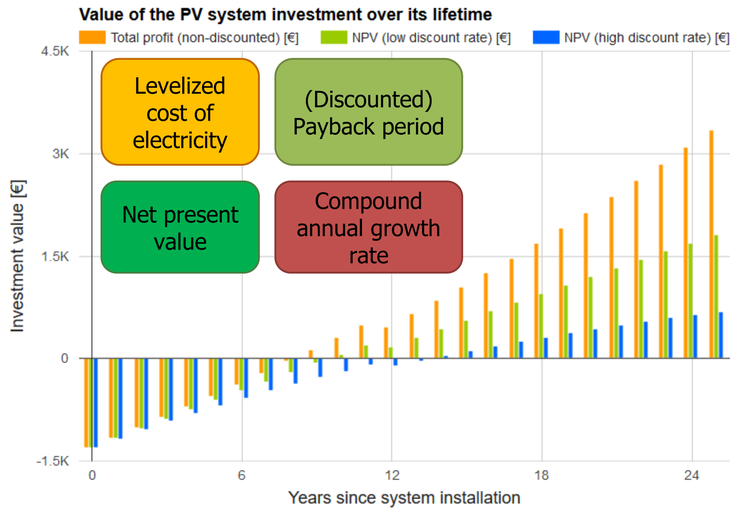
- Creation of a portfolio of 475 PV systems, representing Dutch installed capacity characteristics.
- Every 10 minutes, the national power production is calculated via this portfolio simulation.





Economic profitability

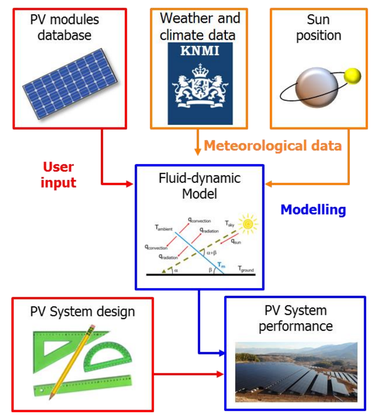
- Economic profitability of user-designed systems is calculated.
- The model evaluates the profitability under three discount rate scenarios.
- Current Dutch government subsidies support residential and commercial profitability of PV.



Additional features

- A simulated 6.9 MW_p case study tracks since 2014 energy generation and CO_2 emissions avoided.
- PV technologies and systems modelling are explained in the Dutch PV Portal 2.0 model.

965 people for one year	**4504** households for one year	**1135141** gallons of gasoline
23460 barrels of oil	**5044** tonnes of coal	**258667** tree seedlings growing for 10 years



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PVMD Delft University of Technology

TU Delft

Photovoltaic Materials and Devices Laboratory

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