



# On the statistics of photovoltaics in Europe

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## Introduction

- Statistics are essential in following progress in deployment of renewables and how fast decarbonisation policies are effectively reaching zero-emission targets by mid-century
- Data collected at Eurostat is provided by statistics agencies of European countries, however methods to collect this data differ per country.
- This leads to various uncertainties and potentially to reduced trust in the current and potential contribution of photovoltaics (PV) to renewable energy targets in Europe.

## Data (EU27)

- Total PV capacity [1]: 162 Gwp (2021), 203 Gwp (2022)  
Three categories: small, medium, large
- Generated electricity [2]: 164 TWh (2021), 210 TWh (2022)  
>75% from five countries: Germany, Spain, Italy, France, the (cloudy) Netherlands

## Methodology change

- Three Categories 2021: <20 kW, >20 kW - <1 MW, >1 MW
- Eight Categories 2022: >10 kW, <20 kW, <30 kW (rooftop, off-grid), >20 kW - <1 MW, >30 kW - <1 MW (rooftop, off-grid), >1 MW (rooftop, off-grid)
- Reporting AC and DC capacity

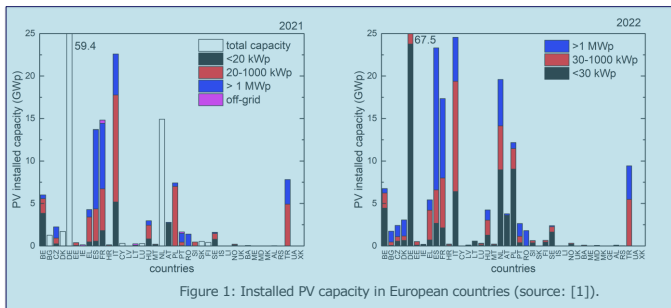


Figure 1: Installed PV capacity in European countries (source: [1]).

## Specific yield per country

EU-27 averages

2021: 1012 kWh/kWp

2022: 1036 kWh/kWp

Deviations are NOT only due to differences in irradiance, e.g., Spain, Estonia, Norway

Austria: 1000 kWh/kWp (constant since 2012)

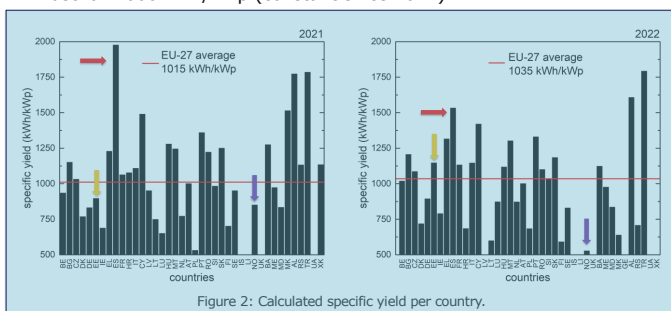


Figure 2: Calculated specific yield per country.

## WE NEED YOUR HELP

Reporting PV stats within Europe is a task of Eurostat and is based on reports from national statistics agencies. The methodologies differ per country. **Would like to help digging up the methodology used in your own country?**

It is our intention to collect methodologies at least for all EU-27 countries and report on them in a review paper, which also will allow to compare and recommend improvements.

Link to Google form



## Five key countries

11-years, 2012-2022

- Deviations are due to differences in irradiance, except Spain
- Comparison with PVGIS method [3], which employs optimal tilt and orientation for each country and assumes a performance ratio of 0.75
- For ES, SK, SE, TR, actual yield much larger than determined from PVGIS. Lower values would be expected due to non-optimal tilt and orientations

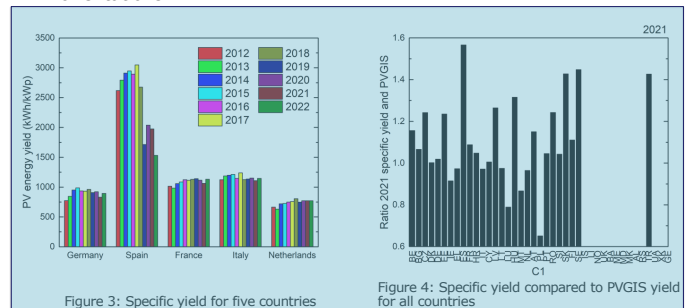


Figure 3: Specific yield for five countries

Figure 4: Specific yield compared to PVGIS for all countries

## Methodology Statistics Netherlands (CBS)

- PV system owners are required to register their system details using an online service ([www.energieleveren.nl](http://www.energieleveren.nl)): PV power (DC and AC), address (EAN code). No information on tilt or orientation is required
- Total PV system capacity updated on a monthly basis, per municipality
- Monthly energy yield calculated using actual monthly irradiance based on spatially resolved method using KNMI ground-based meteorological stations and irradiance corrected specific yield of 875 kWh/kWp [4]
- Current discussion on method modification
- Other national agencies used **DIFFERENT METHODS** [5]

## Conclusion

- PV performance across Europe varies, due to irradiance variations
- Collection of PV capacity data as well as energy generation is not carried out in the same manner for all countries leading to potentially erroneous picture of the overall contribution of PV
- Recommendation: **harmonize collection, processing and reporting!**

## References

[1] Eurostat, [https://ec.europa.eu/eurostat/databrowser/product/page/NRG\\_INF\\_FPCRWB](https://ec.europa.eu/eurostat/databrowser/product/page/NRG_INF_FPCRWB)  
 [2] Eurostat, [https://ec.europa.eu/eurostat/databrowser/product/page/NRG\\_IND\\_URED](https://ec.europa.eu/eurostat/databrowser/product/page/NRG_IND_URED)  
 [3] PVGIS, <https://re.jrc.ec.europa.eu/pvgis/tools/en/>  
 [4] Eurostat, Eurostat metadata and national reference metadata, [https://ec.europa.eu/eurostat/cache/metadata/en/nrg\\_quant\\_esms.htm](https://ec.europa.eu/eurostat/cache/metadata/en/nrg_quant_esms.htm)  
 [5] W. van Sark, L. Bosselaar, P. Gerritsen, K. Esmeijer, P. Moraitis, M. van den Donker, G. Emsbroek, Update of the Dutch PV specific yield for determination of PV contribution to renewable energy production: 25% more energy!, Proceedings of the 29th European Photovoltaic Solar Energy Conference (Eds. T. Bokhoven, A. Jäger-Waldau, P. Helm), WIP-Renewable Energies, Munich, Germany, 2014, pp. 4095-4097. DOI: 10.4229/EUPVSEC20142014-7AV.6.43

