

Renewable energy

production and potential in EU Rural Areas

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Science for Policy report

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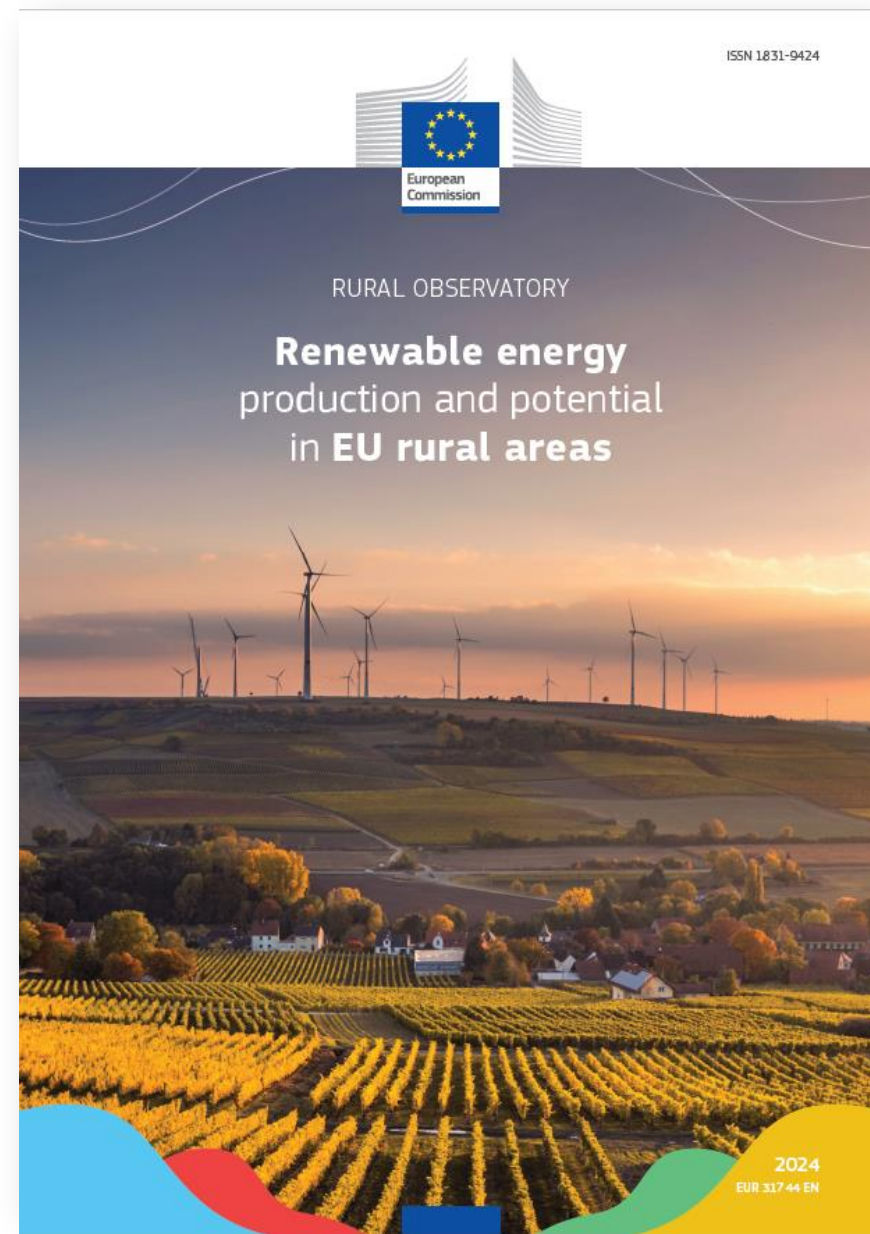
- Perpiña Castillo, C., Hormigos Feliu, C., Dorati, C., Kakoulaki, G., Peeters, L., Quaranta, E., Taylor, N., Uihlein, A., Auteri, D. and Dijkstra, L. (2024). Renewable energy production and potential in EU rural areas. POEU, Luxembourg, JRC135612.

Collaboration:

- This study was conducted by the Territorial Development Unit (European Commission – Joint Research Centre) under the Rural Observatory framework of the EU rural vision (<https://rural-vision.europa.eu>), with the contribution of DG for Regional and Urban Policy and DG for Agriculture and Rural Development.

Graphic designer

- Laura Spirito



Aim of the study



The study provides an assessment of **renewable energy** in the EU's rural areas focused on **solar, onshore wind and hydropower energy sources**. It highlights the **current contribution** of rural areas to the EU's electricity production from these RESs and explores the **technical potential production** that is still untapped.

Beyond energy contributions, the report also provides an overview on of the **concept of energy communities** and a perspective on them in **practice based on case studies**.

EU's renewable energy production and potential

Production

- In 2023, the estimated EU's electricity production from the three RES reached **975 TWh**.
- **72%** of the EU's renewable energy production was found to take place mainly in **rural areas** (700 TWh/year).

Technical potential

- The untapped technical potential production of electricity could reach cumulatively up to **12 500 TWh/year**, more than 5 times the electricity consumed in 2021.
- **78%** of the EU's untapped potential is located in **rural areas** (9 800 TWh).

Solar energy



PRODUCTION

250 TWh/year

POTENTIAL

11 000 TWh/year

40 times

Onshore wind energy



PRODUCTION

350 TWh/year

POTENTIAL

1 400 TWh/year

4 times

Hydropower



PRODUCTION

375 TWh/year

POTENTIAL

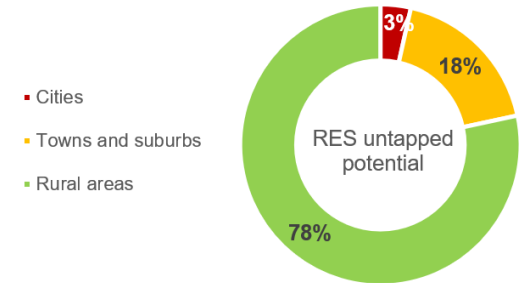
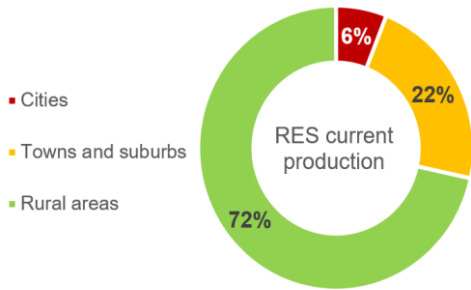
130TWh/year

35% more

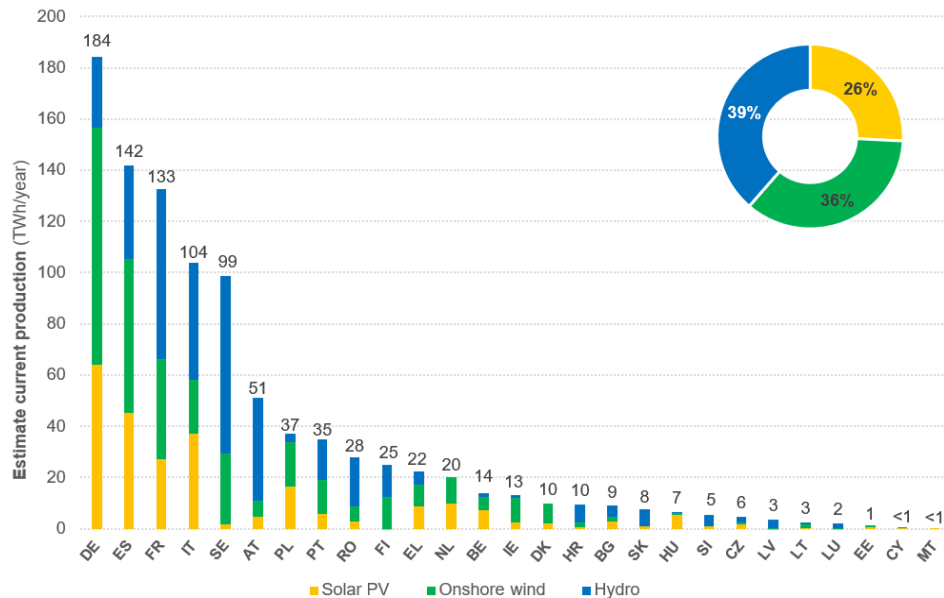
RURAL AREAS and the EU's main producers of renewable electricity

In the future

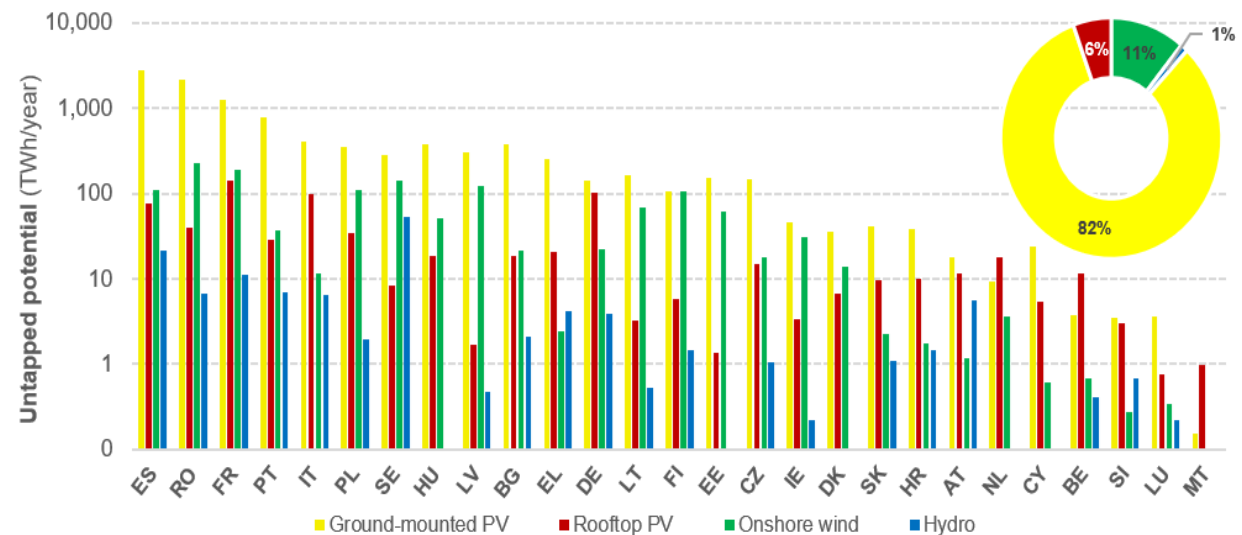
today



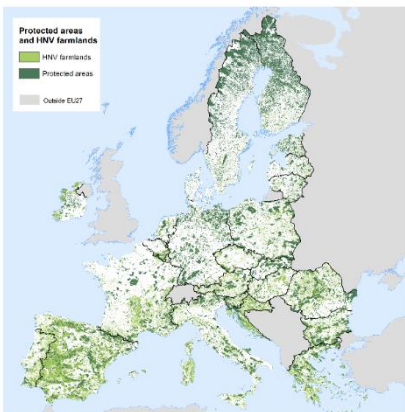
Current production: hydro, onshore wind, and solar similar contribution



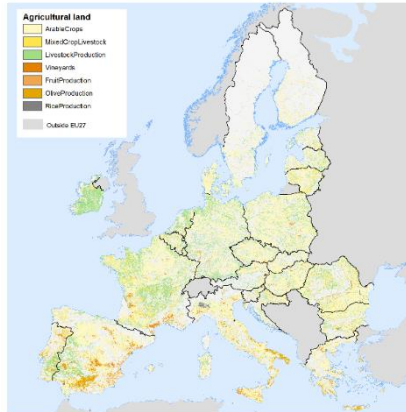
Untapped potential: solar, onshore wind and hydro



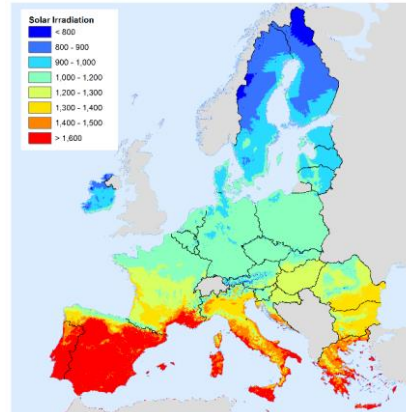
Protected and biodiversity areas



Agricultural land



Solar irradiation



Preserve rural areas' natural capital and agriculture

Key constraints when selecting sites for new solar and wind installations:

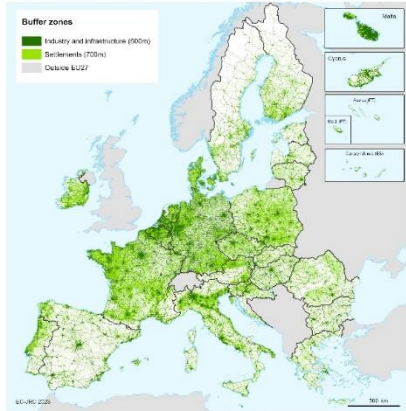
- **Exclusion of nature sites and protected areas**
Natura 2000, biodiversity and bird areas, peatlands, high natural value farmlands, forests, water bodies.
- **Agricultural land: only arable lands, mixed crops** and livestock areas included IF already severely eroded, at high risk of abandonment, low productivity

2 - 3% of the EU's surface available for new RES installations **80% in rural areas**

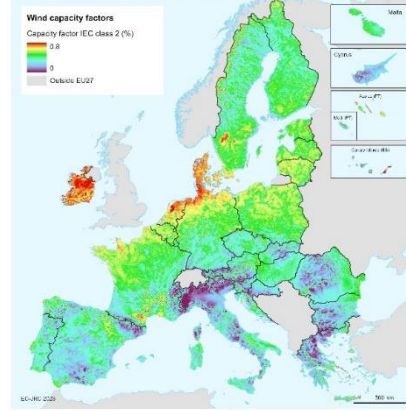
Aspect



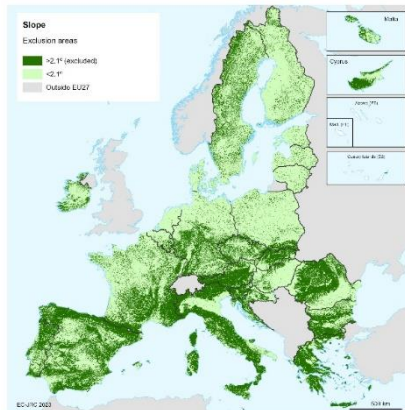
Settlements and infrastructure



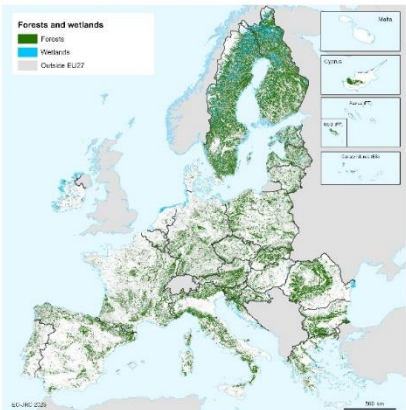
Wind capacity factors



Slope

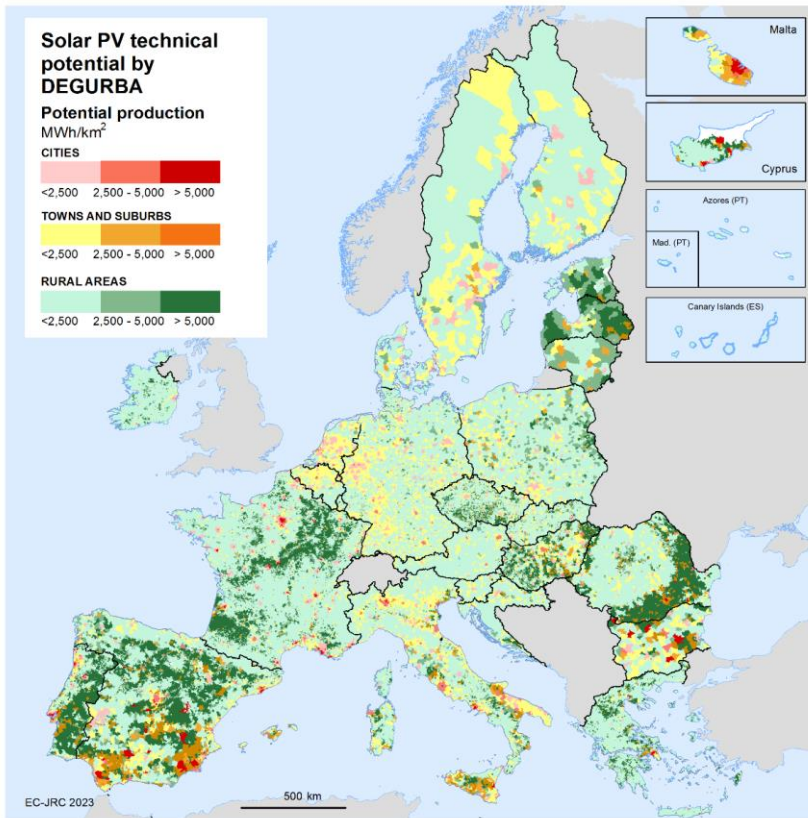


Forests and wetlands

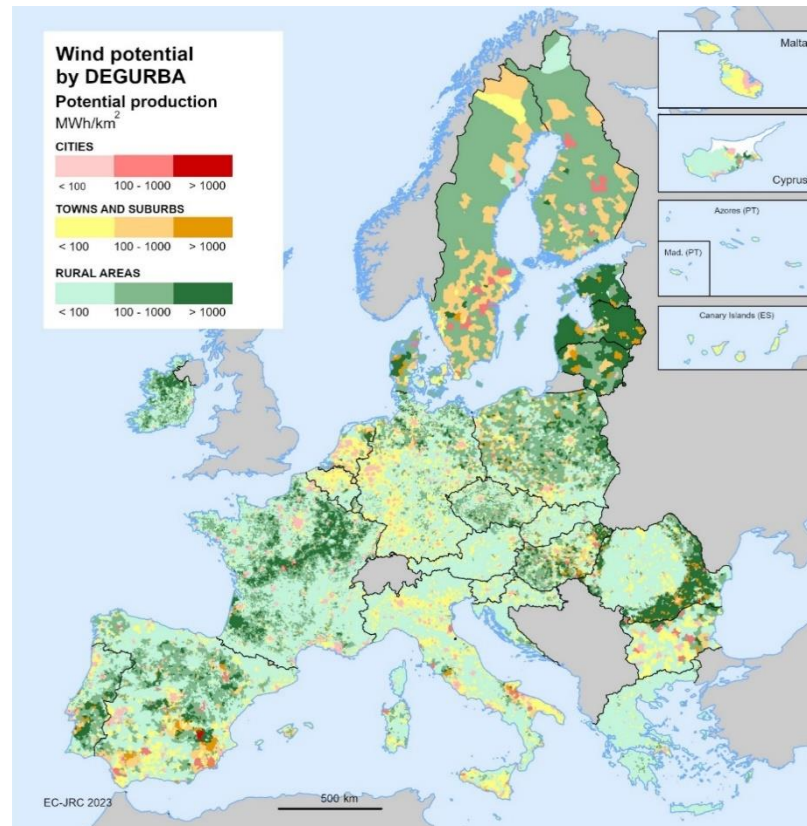


Potential production by degree of urbanisation

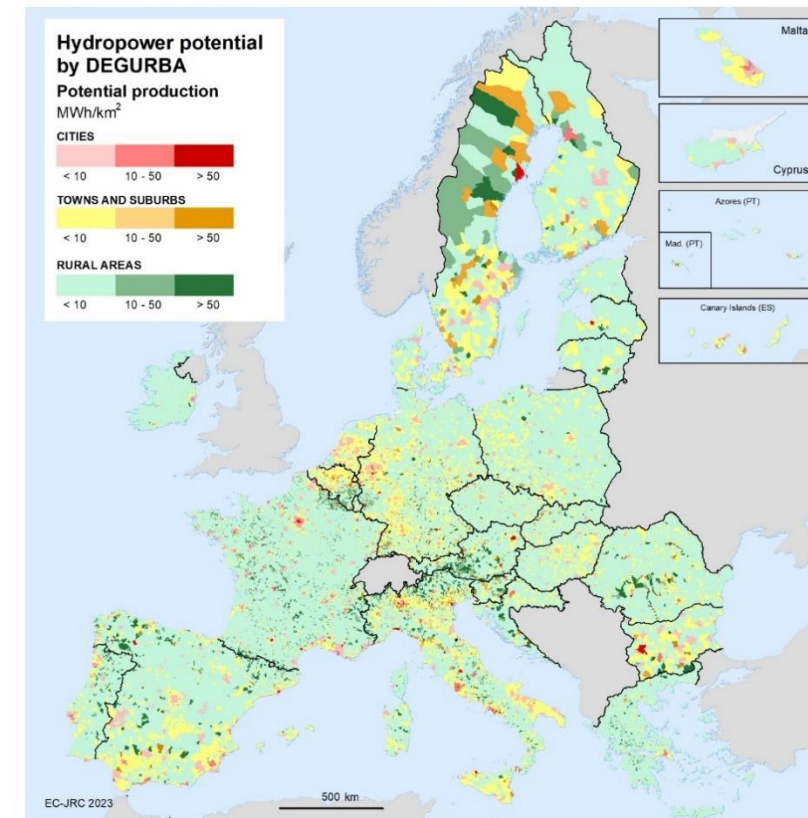
SOLAR PV SYTEMS: 10 400 TWh / year



ONSHORE WIND: 1 400 TWh / year

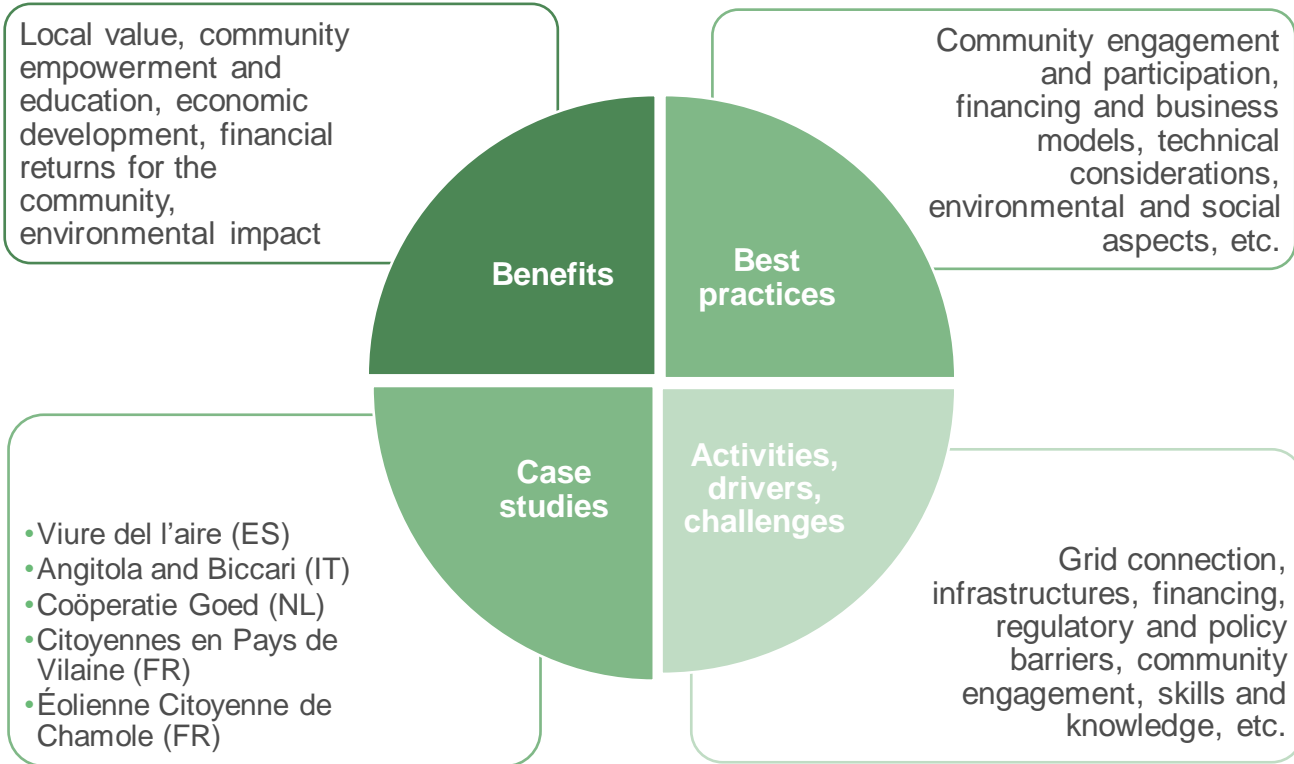


HYDROPOWER: 130 TWh / year



Energy communities

key for rural areas to retain the value of their natural resources and benefit from the green energy transition



Thank you



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