



# VALUE OF PV AND RENEWABLE ENERGY COMMUNITIES IN SELECTED EUROPEAN COUNTRIES

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16. Symposium Energieinnovation Graz, 12.02.2020



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 764786

www.pvp4grid.eu

## First Classification of current PVP4Grid concepts

- **Group 1:** private local (onsite) self-consumption
- Group 2: collective local selfconsumption, shared PV system.

AT: Gemeinschaftliche Erzeugungsanlagen EIWOG §16a

• **Group 3:** collective selfconsumption at different locations

> EU: Erneuerbare-Energie-Gemeinschaften

Clean Energy for all Europeans Package, EU Richtlinie 2018/2001 §22



Source: Lettner G., Auer H.,, et al. "D2.1 - Existing and Future PV Prosumer Concepts", Public Report, 2018.

## Method Overview of energy flows for the optimization

- Optimization tool Hero<sup>Community</sup>
- Investment into PV and storages if beneficial
- Minimize annual costs (Investment, operational)

 $Total\ Costs(Year) = \alpha * Investment + Grid + Fixed - Revenues$ 



Grid consumption or in-feed

## **Selected Countries**



Map data ©2019 GeoBasis-DE/BKG (©2009), Google, Inst. Geogr. Nacional, Mapa GISrael, ORION-ME United States



Countries vary in:

- Electricity demand (due to sector coupling)
- PV generation per kW-peak
- Grid tariff design

#### **Current tariff design in the target countries**

#### Electricity costs = Energy costs + Grid tariffs + taxes and fees



## **Calculation of the Input Data**

#### Sector Coupling: Heat Pumps and Electric Vehicles



\*Load profile generator source: Pflugradt N., 2019. https://www.loadprofilegenerator.de

## Setup for the renewable energy community

"European Village" represents average housing situation in Europe



energy within the community

## **Community Scenarios**

possible

Community:

possible



**Electricity costs with investments** 

#### $Total\ Costs(Year) = \alpha * Investment + Grid + Fixed - Revenues$



0

#### Change in Total Costs (compared to Grid Consumption)



## Installed PV capacity in kWp



## Installed battery capacity in kWh



## Conclusions



- The value of PV and renewable energy communities depends not only on PV generation but as well on grid tariff design / electricity prices
- Renewable energy communities make PV more profitable, reducing the need of subsidies, due to:
  - **Lower investment costs** due to community investments
  - More beneficial due to increased self-consumption
- Energy communities give everyone access to PV in case of building restrictions or rooftop limitations
- Barrier: Ownership rights could lead to no community systems, if 100 % of owners need to agree -> Maybe change that to 60 % (Portugal)
- Missed chance: PV is not considered in many new apartment buildings. Installations afterwards often not profitable. Consider putting it into law!



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