**ON THE POTENTIAL OF ROOFTOP-PV AS A HOUSEHOLD APPLIANCE WITH NEGATIVE ELECTRICITY DEMAND – EVIDENCE FROM AUSTRIA**

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## Overview

In the meantime, PV self-generation of optimally sized rooftop PV systems are already competitive in many countries (or are close to competitiveness). Depending on the households load profiles, up to 30% self-generation of a PV system is possible. In an increasing number of European countries (e.g. Austria, Germany), shared PV generation in multi-apartment buildings is already possible among tenants (on a voluntary basis, not mandatory). Corresponding legislation exists. In recent years, an increasing number of pilot projects have been implemented, e.g. in almost all bigger cities in Austria. Synergies of aggregated load profiles can be used to further increase the share of self-generation and thus competitiveness. Thinking already beyond the meter within on multi-apartment building, the energy community of shared PV generation becomes true in reality (see e.g. European Commission, 2016).

## Methods

In this contribution, a model is developed to estimate the cost-optimal large-scale economic potential of shared rooftop PV systems based on neighbourhood energy communities (ECs) in Austria. In a first step, an optimisation model determines the cost-optimal rooftop PV capacities for representative neighbourhood ECs in characteristic settlement patterns (SPs). The neighbourhoods are composed of single family house and multi-familiy houses representing different densities of settlement patters in Austria (rural areas, municipalities, sub-urban areas, city centers). Next, the number of ECs in the large-scale area of investigation is determined by allocating buildings to SPs and ECs. Finally, the optimal large-scale, EC-based rooftop PV potential is determined by upscaling.

In addition, different sensitivity analyses are conducted varying techno-economic parameters (incl. usage of battery storages) as well as considering different policy measures like energy efficiency implementation (retrofitting) and heating system changes in addition to shared rooftop-PV generation.

## Results

For Austria a cost-optimal economic rooftop PV potential of approximately 10GWp has been identified to be used for shared PV generation in ECs. This PV capacity would already be sufficient (in terms of expected PV deployment) to meet the Austrian 2030 policy goal of a 100% renewable electricity generation. However, results also indicate that accommodating the cost-optimal rooftop PV capacity is difficult in cities/towns in contrast to rural areas. Thus, future ECs should be implemented not only on neighbourhood level, but across the boundaries of different SPs. Results of different sensitivity analyses (as outlined abouve) will be presented in the final version of this study.

## Conclusions

The results shown recommend to treat building integrated rooftop-PV systems simply as household appliances with negative electricity demand. Technologies like battery storages or cooperations within an energy community increase synergies, thus share of self-generation and competitiveness. Further synergies can be reached in case of optimale building retrofit and heating system changes. Heat pumps, naturally, are favourable candidates to further increase profitability of the entire technology portfolio implemented.

## References

European Commission: “Winter Package 2016” - The Winter Package consists of a package of legislative measures to facilitate the transition to a clean energy economy. The overall objectives of each proposed measure are briefly outlined in the Commission Communication ‘Clean Energy for all Europeans’, COM (2016) 860 final.

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