Innovative Finance and Business Model for PV Power Plants on Multiple Dwellings in Austria for On-Site Consumption

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Introduction

The aim of the project PV4Residents (2. call Stadt der Zukunft, Austrian Ministry for Transport, Innovation and Technology, project no. 850126, November 2015 till April 2017) was to develop an innovative business model which enables a higher application of photovoltaik (PV) plants on multiple-dwellings by addressing a prosumer approach. The produced electricity will be consumed in a large share by the residents unburdening the grid. Residents have the possibility to invest in their own PV plant. Sinking PV feed-in tariffs and prices for PV modules make on-site consumption of PV power economically attractive.

Approach

Two representative buildings in Graz and Salzburg have been chosen for gathering technical and economic information and for examining the proposed business model in real-life conditions. Involved stakeholders were: housing companies; the residents of representative buildings; electricity utilities and network operators; representatives of the cities of Graz and Salzburg, and of the regional governments. The study comprised seven steps:

- **Step 1:** A first outline of possible business models, based on existing knowledge.
- **Step 2:** Definition of all technical needs for a PV plant on a multiple dwelling (see technical concept in Figure 1). Storage solutions and load management have been checked.
- **Step 3:** Clarification of legal questions, including in particular national law that regulates the electricity sector (“Elektrizitätswirtschafts- und Organisationsgesetz”, EWOG), relevant housing legislation and the Consumer Protection Act. The legal form of a cooperative society for the financing and operation of such a PV plant has been evaluated.
- **Step 4:** Estimation of efforts and costs for administration, including billing models (proposed method in EWOG amendment) considering the use of smart meters.
- **Step 5:** User-specific aspects including energy efficiency potentials and user profiles, survey of residents about their willingness to participate in such an approach and in energy efficiency.
- **Step 6:** Calculation of Levelized Cost of Electricity (LCOE) have been calculated for the chosen PV plants of model houses. In addition to usual approaches, administrative costs, tax, bank interest and other costs were included in order to show full costs of electricity generation. Investment schemes with different technical needs for a PV plant on a multiple dwelling have been checked.
- **Step 7:** Results from step 1 to 6 have been summarized, evaluated and used for the final definition of the new business model. The results have been presented and discussed with stakeholders.

Results

The new service and business model for PV on multiple dwellings concentrates on how the produced electricity can be consumed to a high degree by the residents in an economically feasible way. Surpluses can be fed into the grid or sold to adjacent consumers. An energy cooperative would act as central management unit. Figure 2 shows a possible flow of information and payments in the developed scheme. Interested residents can participate in financing the PV plant via a loan for which they receive an attractive interest. They would purchase the generated electricity from the cooperative re-financing the investment. The model can only be run in an economic way if the tariff for the PV electricity is equal to or below market prices and covers all involved costs.

While the cooperative is a suitable form of organization, the associated administrative costs importantly impact the economics of the model. Therefore, cooperatives should encompass several buildings and PV plants in order to reduce fixed costs per kWh produced. Figure 3 shows the LCOE including administrative costs for a model plant of 30 kWp in Graz, depending on the number of similar plants/houses being administered by one cooperative. The foundation of the cooperative, the model development as well as the mandatory bi-annual revision were assumed to be fixed costs. The final minimum tariff for residents includes 20% tax on top of the LCOE. The example in the graph is economic starting from a minimum of 2 plants (green line below red area).

While the model would be feasible in the current legal context if agreements with the local distribution system operator and the regional energy authority can be achieved, the currently discussed amendment of the EWOG would importantly facilitate implementation.

References

Details of the analysis including all assumptions will be published in the project report in the coming months.