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IAEE European Conference 2013

Energy Economics of

Phasing out Carbon and Uranium

Duesseldorf

August 18-21, 2013

Program Committee

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The IAEE European Conference 2013 is supported by

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PROFIT MAXIMISING WITH SUPPORT SCHEMES - RENT SEEKING IN THE PV SECTOR

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(1) Overview

Significant cost decreases of the PV technology have been observed (technological learning) in recent years. This leads to an increasing competitiveness of PV generation in comparison to remaining electricity generation technologies [1]. In some European countries current or in the next coming years in the residential and commercial/industry sector PV is competitiveness. PV competitiveness in this context means that the investment in a PV system is economic without any support schemes over the lifetime of the PV system. Despite this PV competitiveness in some European countries, policies strategies follow the funding of PV with different support schemes in the future. Most of these funding strategies guarantee a fixed remuneration up to 15 years. Nowadays the PV industries ensure a module lifetime over 25 years and efficiency decreases maximum up to 20% till 25 years. Also the inverter producers guarantee functionality up to 25 years and in case of a converter exchange, this exchange is ensured and no additional costs incurred. Policies strategies enable, depending of the kind of support schemes and the duration that the time, when the investment in a PV system is depreciated is much lower than the lifetime of the PV system, although PV industry guarantee more than 25 years functionality of their devices. Certainly the depreciation time could be lower than the lifetime of the PV system also without support schemes.

(2) Methods

A simulation model (developed in the European IEE project “PV Parity” [2]) enabling comprehensive dynamic PV competitiveness studies under a variety of different constraints and assumptions on the future development of several important parameters describing LCOE of PV generation (e.g. specific cost, efficiency, etc.), on the one hand, and wholesale/retail electricity price developments as well as further technology options influencing load profiles of different customers, on the other hand. The simulation model’s objective is to calculate the Net Present Value (NPV) of several different economic parameters (revenues from selling into the grid, cost of purchases from the grid, cost of PV generation) over the lifetime of the PV generation plant for different customer groups being characterised by different load profiles. Ultimately, the model conducts a comparison of the cumulated NPV of cost over the same period for a customer without and with support schemes.

(3) Results

In accordance with the heterogeneity of the European electricity market, especially in case of retail prices, also the situation to achieve PV competitiveness in the different European countries is diverse. One important assumption for the simulation of the PV competitiveness is that the PV system size is maximized for the share of self-consumption in order to address the best economic performance. The current trend is contra dictionary to that, as due to the current situation of high feed in tariffs the PV operators will maximise their profits with as large PV systems as possible. An overview for different European countries and the calculated year for achieving PV grid parity in the residential sector is shown in Figure 1.

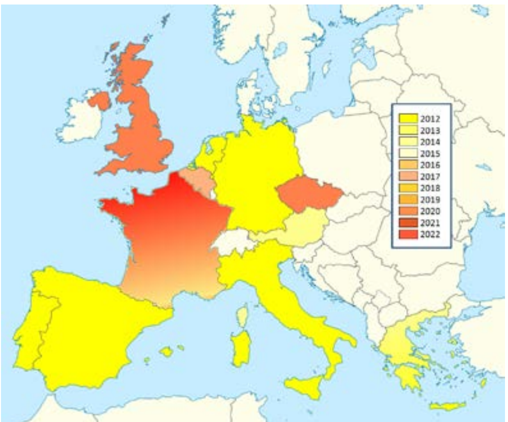

Figure 1 Overview of achieving the dynamic PV grid parity in different European countries

The main driver that made PV more and more competitive are support schemes. Due to the significant decrease of PV system costs and increasing electricity retail prices the PV competitiveness is already achieved or close to it mainly in countries with support schemes. How far these support schemes are still necessary or even enhance the profit margins of PV systems is shown by examples for different countries. Shown in Figure 2 the example of Germany

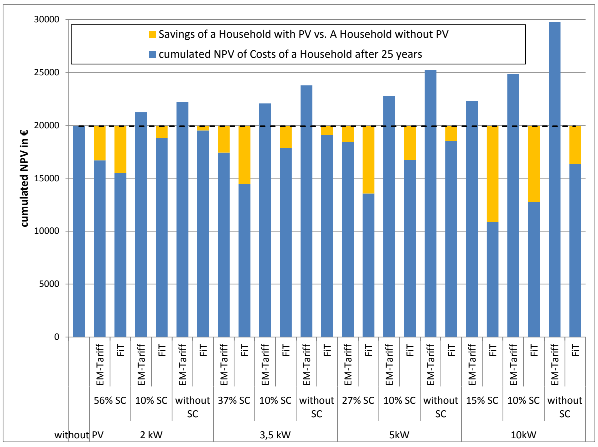

Figure 2 Comparison of cumulated NPV of Costs of a Household with and without a PV system and with and without support scheme after 25 years in Germany

(4) Conclusions

Support schemes are necessary to enable the market entry of immature technologies and even more to lead to competitiveness in technology providing industries. PV achieves the competitiveness first of all as a decentralized electricity generation technology. The possibility that generation is used locally and may reduce household peak demand positive effects for the grid can be observed, especially in the southern regions of Europe. For larger PV system size without any self-consumption there will be no competitive in next couple of years and a supporting FiT is still necessary. How useful these large PV power plants are is matter of opinion. A future problem of PV to be competitive on the electricity wholesale market is the merit order effect of PV [3]. This effect reduces the competitiveness of large scale PV plants with a growing share of PV in the electricity system. Investment subsidies do not burden future support schemes as FiT up to 20 years. An important factor is also the level of the FiT so there is no private profit maximizing and high rates of return. "Rent seeking" in this relation will be a future problem. Self-consumption of PV generation leads to lower revenues for the grid operators and reinforcement of the grid can determine additional costs driven by PV. New market rules might be created and can postpone PV competitiveness but not stop.

References

[1] Solar Photovoltaics – Competing in the energy sector – Part 1, European Photovoltaic Industry Association (EPIA), 2011.

[2] IEE project "PV Parity": www.pvparity.eu

[3] Haas R., Lettner G., Auer H., Duic N.: "THE LOOMING REVOLUTION: HOW PHOTOVOLTAICS WILL CHANGE ELECTRICITY MARKETS IN EUROPE FUNDAMENTALLY", 2012