More than 60,000 grid connected PV-Home-Storage systems in Germany – Lessons Learned

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Sometimes 85% RE in the grid

![Graph showing energy sources and consumption]

- Consumption
- Conventional Power
- Solar
- Wind
- Hydro
- Biomass
- Export

85% of the consumption

9. May 2016

Grafic: agora-energiewende [1]
Motivation: Being independent

Source: G.Mester for SFV [2]
Motivation: Increase of self-consumption

EEG feed-in tariff PV <10kWpk

Year

References:
STAWAG Aachen and www.SFV.de, 8.5.2017 [3]
Motivations for PV batteries

- Hedging against increasing electricity costs
- Lapse of guaranteed feed in tariff
- Contribution to the German Energiewende
- Protection against power failures
- Safe investment
- General interest in storage technology
Market Incentive Program
Market incentive program for PV-batteries

- **Issued** by German Federal Government
  - **Performed** by KfW Bank

- **Purpose:** Stimulate market
  - Stimulate Market
  - Reduce cost

- **Initiated** 2013
  - **Re-launched** 2016
  - until 2018

- **Funding by**
  - Reduced interest rates
  - Repayment grant on investment,
    decreasing 3%-points per month
    25% at begin of re-launch
    19% in May 2017
Market incentive program for PV-batteries

Requirements

- Feed-in limitation
  50% of installed PV power
- 10 years warranty
- Registration with monitoring program
Market trends
Installations of PV Battery Systems in Germany since 2013
2016: More PV battery systems than electric cars

- **11,410** new electric vehicles in Germany
- **min 15,000** installations of PV Battery Systems
New Products enter the market frequently: Good marketing
Development of retail-prices (incl. VAT)

18% p.a.
Development of battery technologies

![Bar chart showing the development of battery technologies over time, with new installed systems represented as percentages for Lead and Li-Ion batteries. The chart includes data for Q2, Q3, Q4 of 2013, 2014, 2015, and Q1, Q2, Q3 of 2016.]
Battery technologies

The bar chart compares the installed and usable capacities of lead and lithium batteries. The installed capacity for lead batteries is significantly higher than that for lithium batteries. The usable capacity, on the other hand, is relatively similar for both types, with lithium having a slight edge.
Feed-in limitation
Problem: Grid overload

Optimizing self-consumption:

- Start battery charging early in the morning
- Feed-in if battery is full
Solution: Feed-in limitation

Optimizing self-consumption:
- Start battery charging early in the morning
- Feed-in if battery is full

Grid relieving operation:
- Delay battery charging
- Cap peak production during noon
Impact of feed-in limitation

Feed-in limitation:
- Without storage: 10% to 20% loss of annual energy
- With storage: only <5% loss of annual energy

Annual feed-in solar energy

![Graph showing the impact of feed-in limitation with and without storage.]

With storage
Without storage

Requirement for KfW funding:
- Feed-in limit 60% until 2015
- 50% since 2016
Publication of annual report 2016

- Results of this presentation can be found in the current annual report of Speichermonitoring

- Among others: List of manufacturers, typical system design measured self-consumption and autarky, …

- PDF version is publicly available: www.speichermonitoring.de
Summary

- Incentive program is supporting market introduction
- Synergies used:
  - Self-consumption
  - Avoid grid overload
The Presenter

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