Grid Feed-in Behavior of Distributed PV Battery Systems

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30th European PV Solar Energy Conference and Exhibition
16th September 2015, Hamburg, Germany
Incentives for the feed-in limitation in Germany

- EEG 2012
- EEG 2014

Alternatively to the feed-in management for PV systems < 30 kWp

KfW-program for PV-battery systems

Funding prerequisite

Follow-up of the KfW-program

Proposal
Operation strategies to realize a feed-in limitation

Peak-shaving by battery charging

Peak-shaving by PV curtailment
Energy flows of a single PV battery system

- Curtailment
- Direct use
- Battery charge
- Grid feed-in

PV power in kW/kWp

06:00 09:00 12:00 15:00 18:00
Grid feed-in behavior of a single PV battery system
Grid feed-in behavior of a single PV battery system

Feed-in power in kW/kWp

1 s
10 min moving average

06:00 09:00 12:00 15:00 18:00
Simulation set-up of the distributed PV battery systems
Grid feed-in behavior of distributed PV battery systems
Grid feed-in behavior of distributed PV battery systems
Grid feed-in behavior of distributed PV battery systems
Cumulative feed-in power of the PV battery systems
Conclusion

• Shaving feed-in peaks without shifting the battery charging causes **unnecessary curtailment losses.**

• Limiting the feed-in power to their 10 min moving average does **not avoid short-term feed-in peaks.**

• Feed-in peaks can be mitigated by **reducing the averaging interval** from 10 min to 1 min or less.

• A reduction of the feed-in limit to 0.5 kW/kWp can **improve the grid integration** of PV battery systems further.

• Distributed battery systems can **increase the hosting capacity** of the electricity grid for PV systems.