



PV Integration into Markets and Electricity Networks

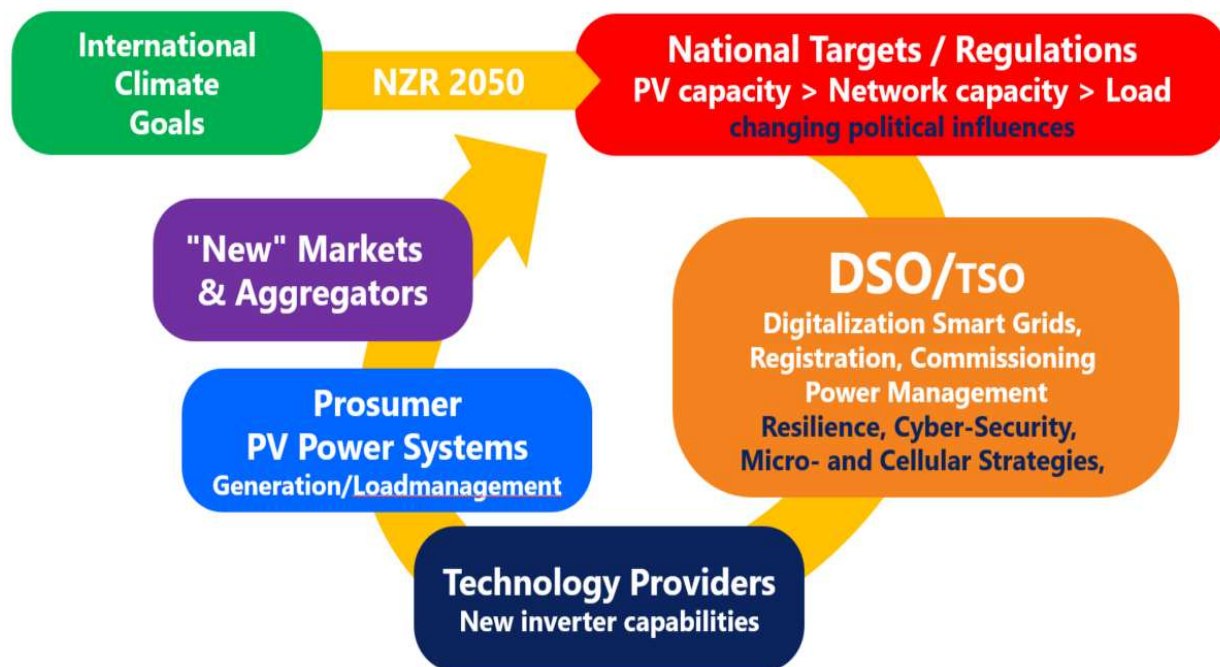
Prof. Gerd Heilscher, Technische Hochschule Ulm, Germany, IEA PVPS Task Manager – Task19 – PV Integration

EUPVSEC – IEA-PVPS T1 – 17.09.2026, Rotterdam, The Netherlands

Technology Collaboration Programme

by **iea**

IEA PVPS - PV Integration into Electricity Networks and Markets



Task 19 International Expert Group
48 Experts from 21 Countries



Prepare the technical foundations for solar PV as a major component of a 100% renewable energy-based power system

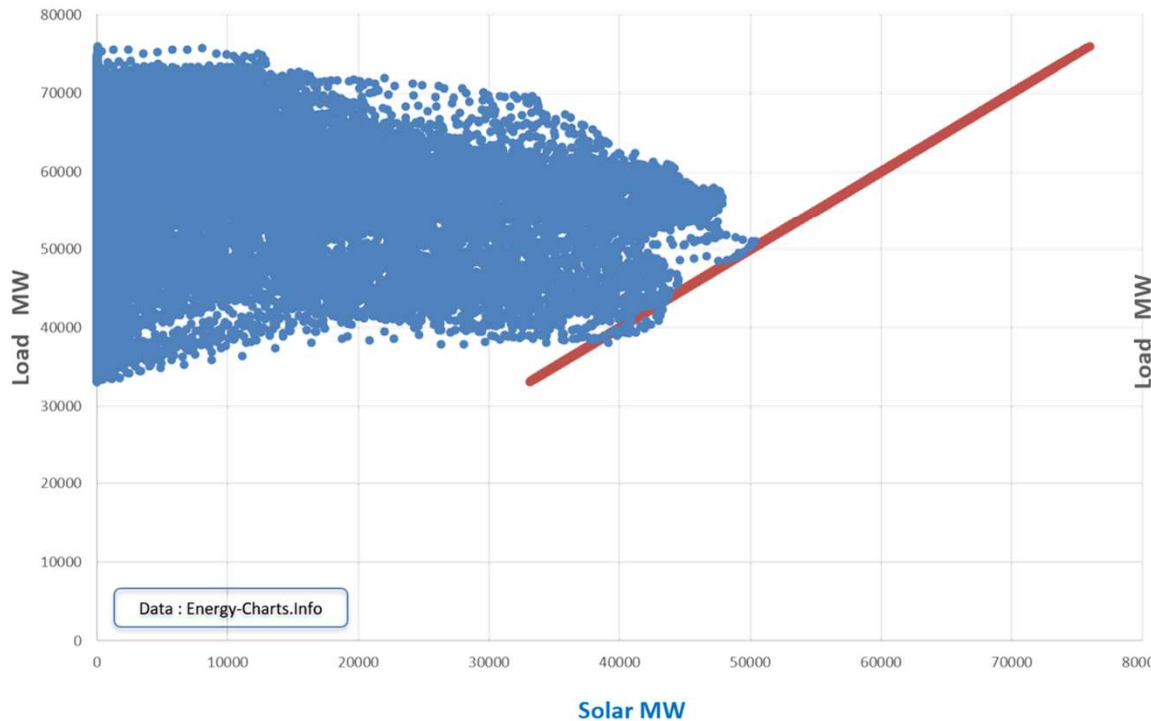
The focus extends beyond traditional grid management to explore the roles and responsibilities of PV systems within an increasingly digital and resilient energy network. It aims to provide guidance on managing overpowered systems, enhancing control strategies, and fostering cooperative approaches across different renewable energy sources and consumer devices.

Solar Touch Down to Load – Germany 2025



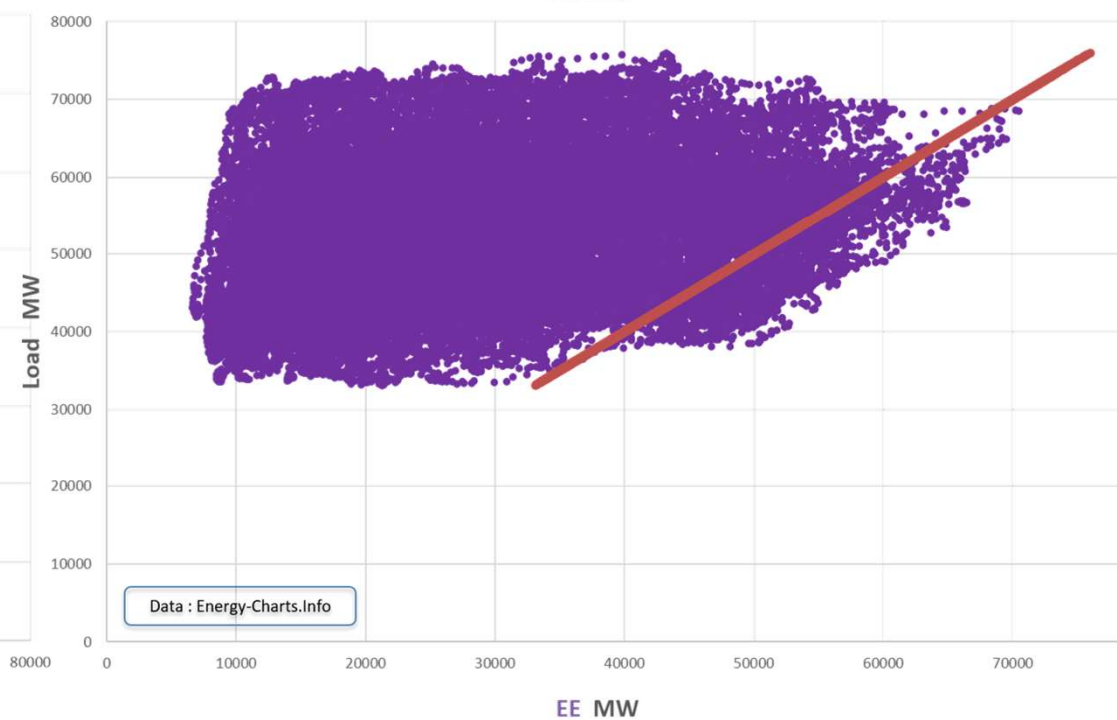
Solar Power

quarter-hourly



all Renewable Sources (RE)

quarter-hourly



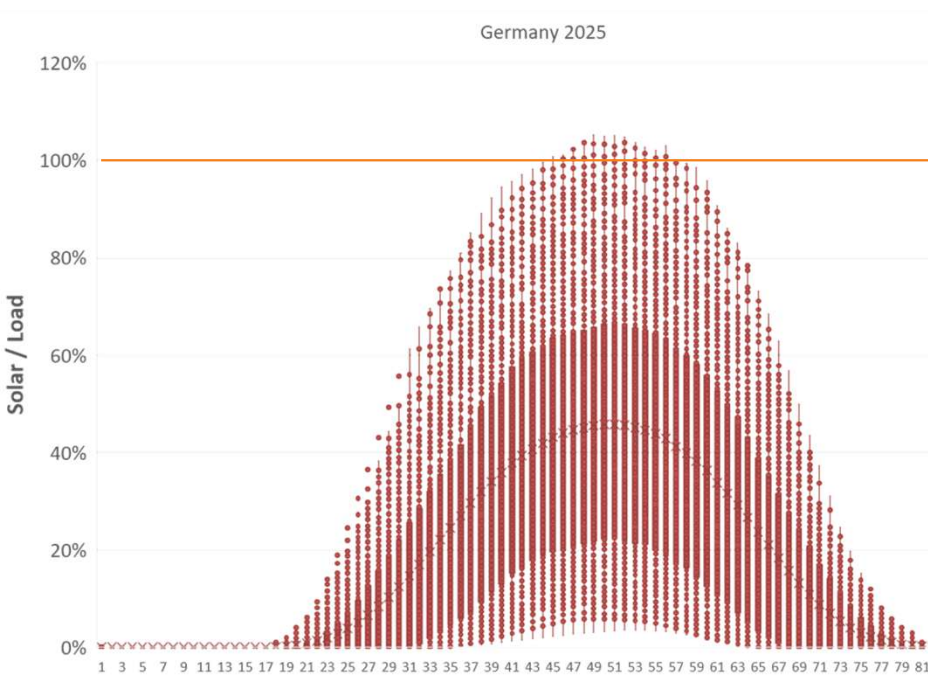
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No happy landing... negative prices, grid congestion, connection delays

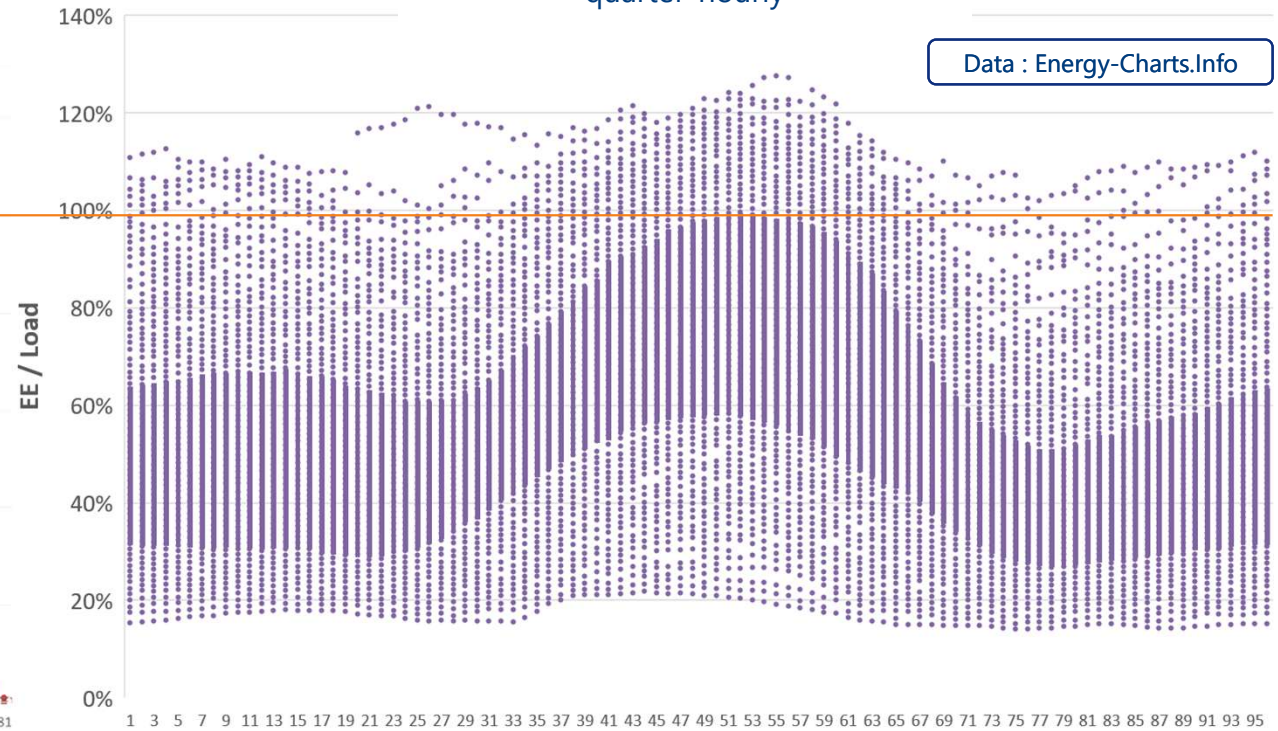
Daily Solar Integration Challenge – Germany 2025



Share of Solar Power / Load
quarter-hourly



Share of all RE / Load
quarter-hourly



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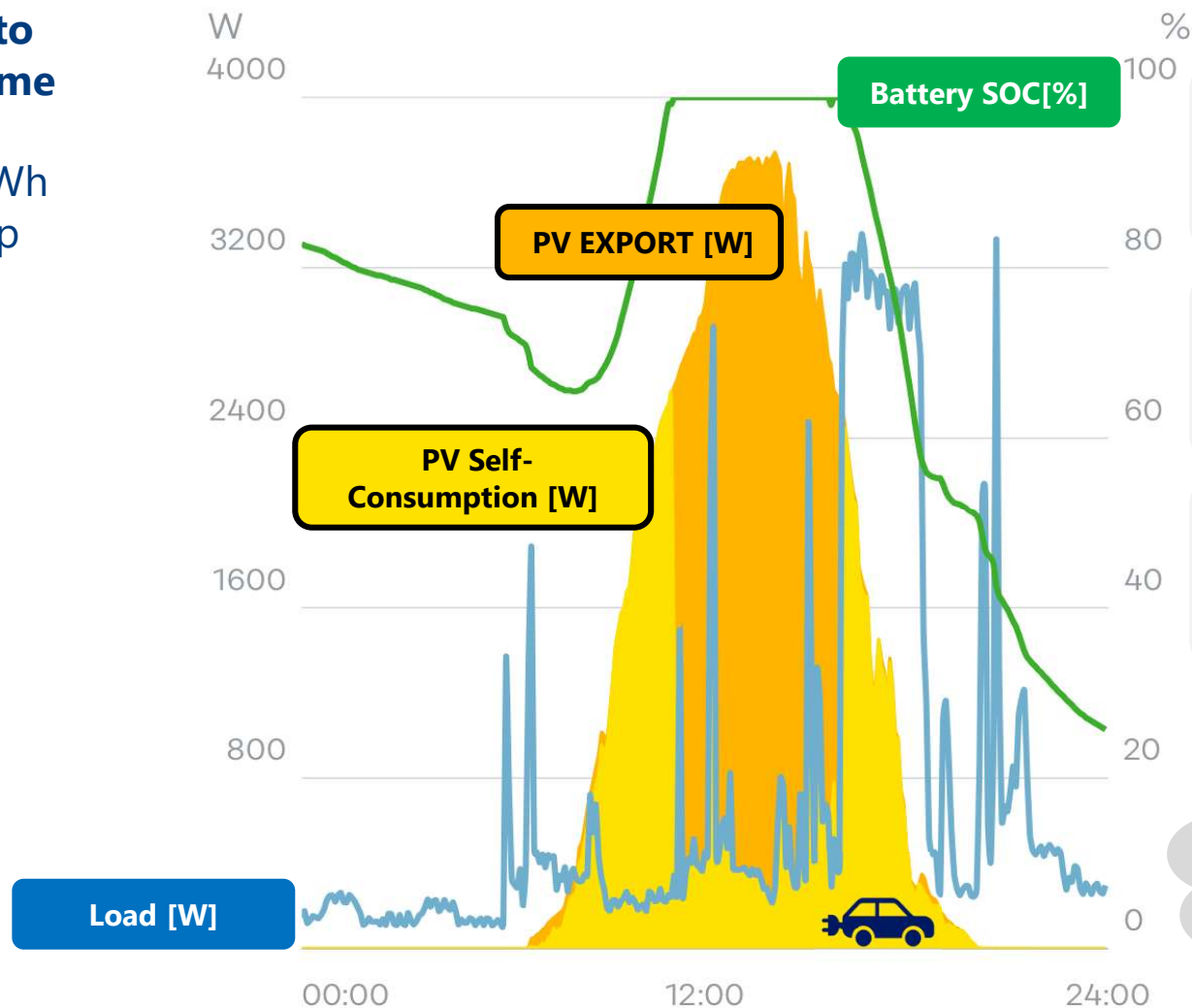
Need to continue adding RE... to become a Firm Power to cover Load
We have to stop fixed feed-in tariffs... we get in contact with real markets

Status of PV plus Battery at Prosumer Level Today



Let's take a look into
a typical private home

Annual Load: 4000kWh
PV-System: 4,6 kWp
Battery: 11 kWh



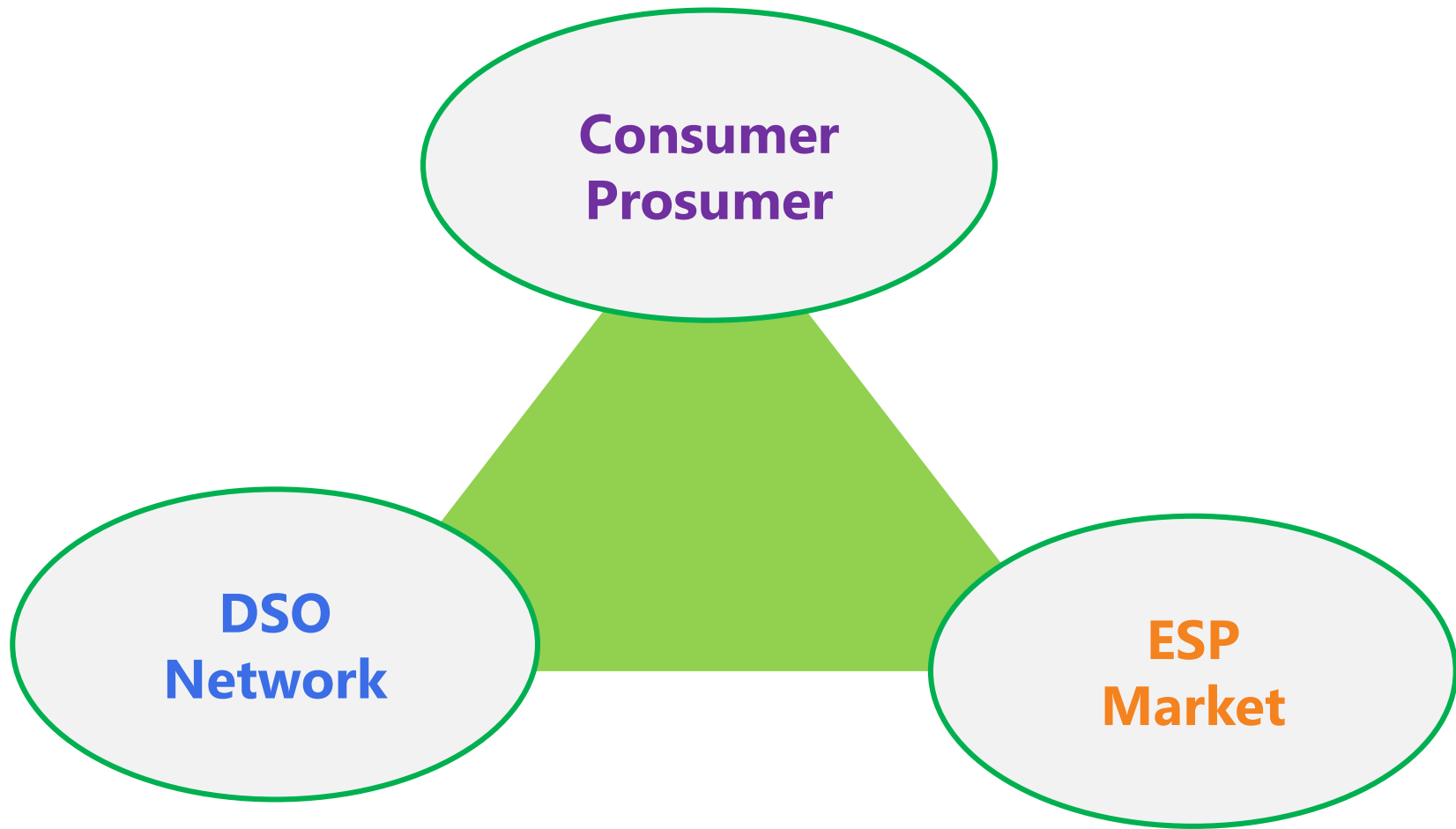
We optimize
Self-Consumption

Leave it to DSOs
to handle the
Midday PEAK

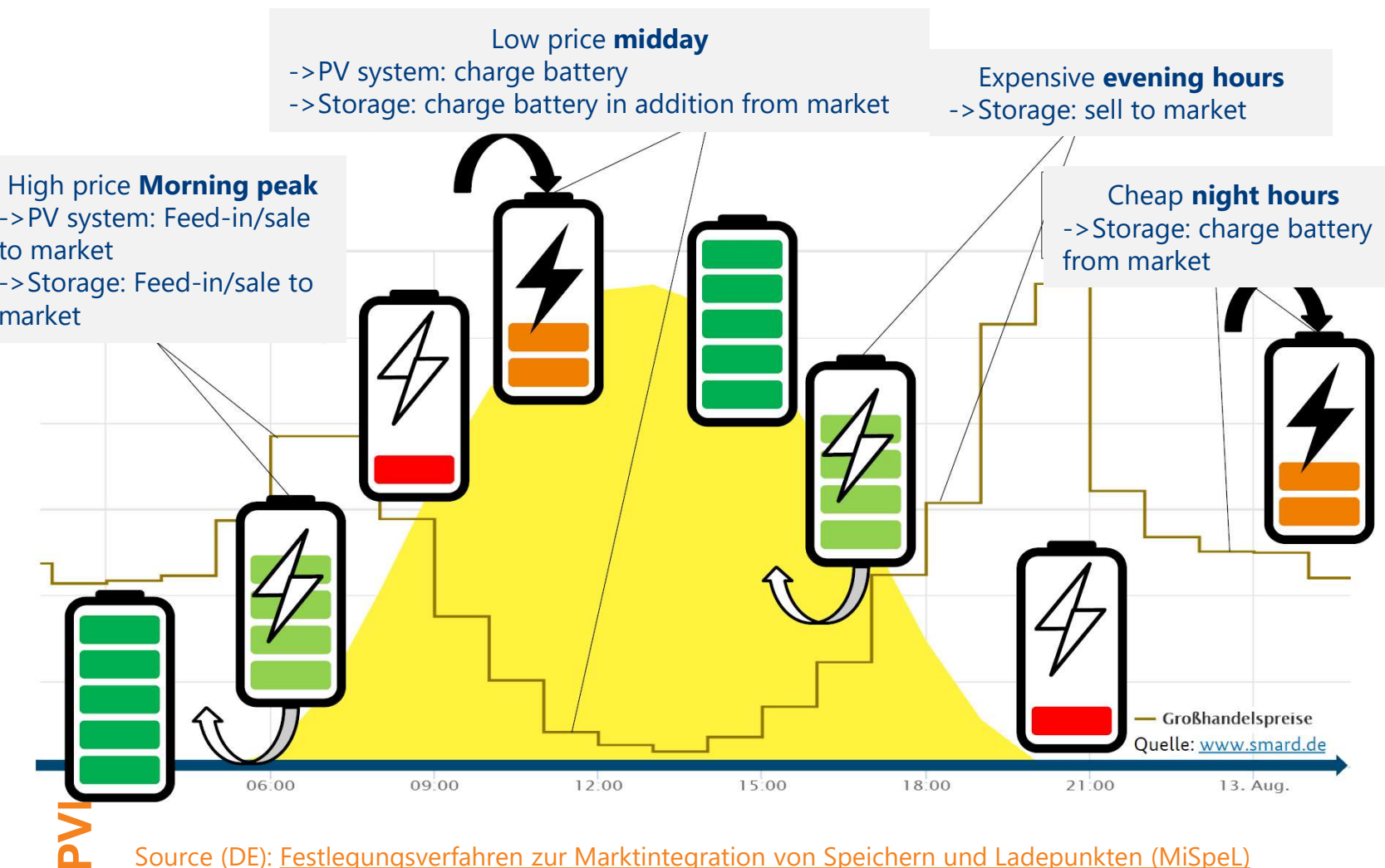
Push the market to
NEGATIV PRICES

Isn't this stupid?

It's a Triangle – Prosumer – Network - Market



PV+Storage BtM - Market-Oriented and Grid Serving



Residential battery market access

24 GWh (Germany)

12,4 GWh (Australia)

user-centric solution design

Easy access
cost-effective

smart meter
communication
service provider

Source (DE): [Festlegungsverfahren zur Marktintegration von Speichern und Ladepunkten \(MiSpeL\)](#)

Some Thoughts about Solutions



Smart Meter

real time data

- Smart Meter
- Smarter Meter
- Smart Meter light
- iMSys

Control

inverter, battery,
flex loads

- EEBus
- OpenADR
- SunSpec
- CSIP CA/AUS

Communication

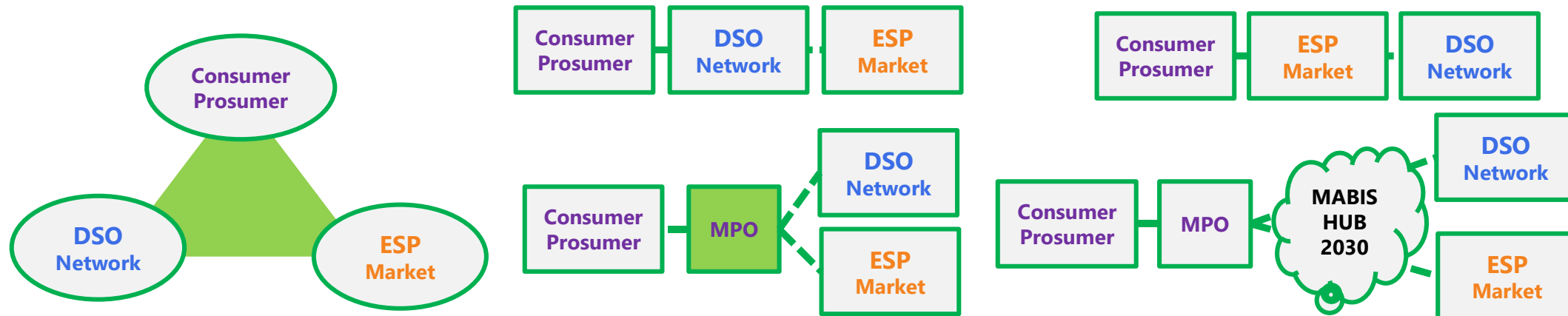
cheap, secure
standards

- IEEE2030.5
- IEC 61850

Service Provider

vendor lock-in
trust

- Energy Community
- Octopus
- 1Komma5g
- GridX

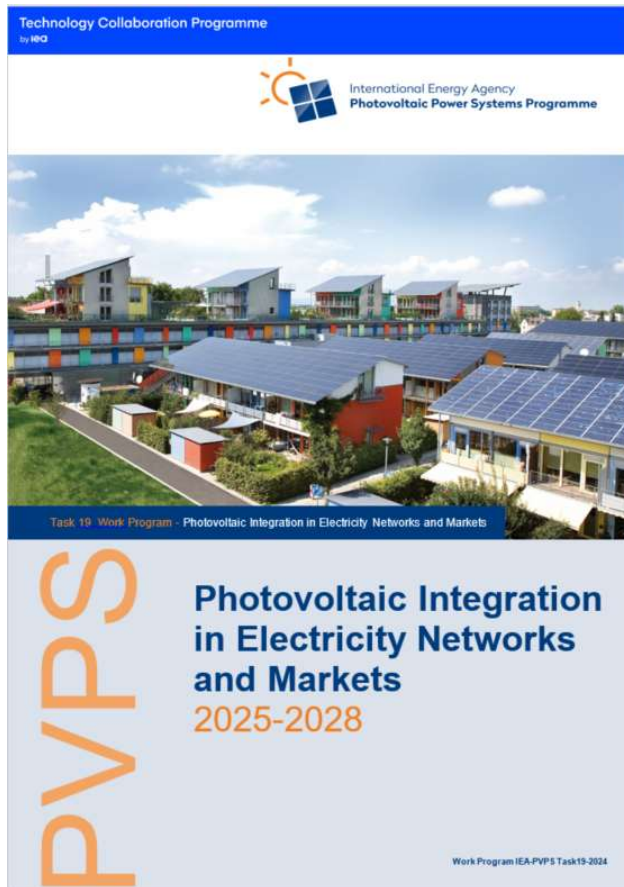


PVPS

Market communication challenge with mio. of Prosumers
Today 3 mio. messages per day > 2035 40-100 mio messages per day (DE)

[Further Reading: Common European Energy Data Space:](#)

IEA PVPS Task 19 works on this stuff



1 National PV Targets versus Grid Capacity	2 Rights and Obligations of Prosumers	3 PV in Smart Grids
4 Approval and Commissioning for Interconnection of PV Systems	5 Curtailement Power Management	6 New Inverter Capabilities
7 Aggregators, Local Markets and Energy Communities	8 Local Energy Management	9 Energy Economy in a 100% RES Based Power System

Contact – IEA PVPS Task 19 Task Management



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- Communication

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