Microgrid solutions and best practices in Germany

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iPLON® The Infranet Company

Solar-Log™

stadtwerke Schwäbisch Hall GmbH

Technology Arts Sciences TH Köln

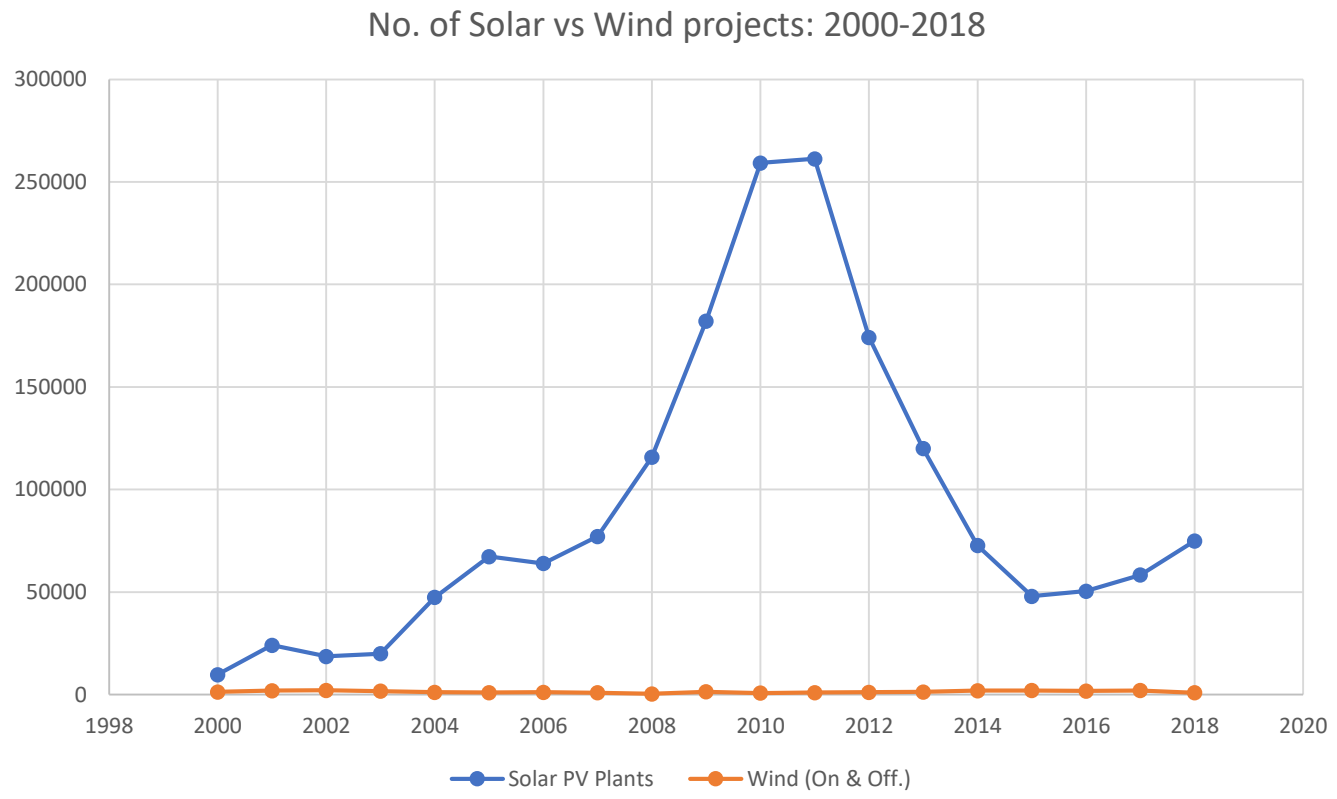
NEXT KRAFTWERKE

The German energy sector

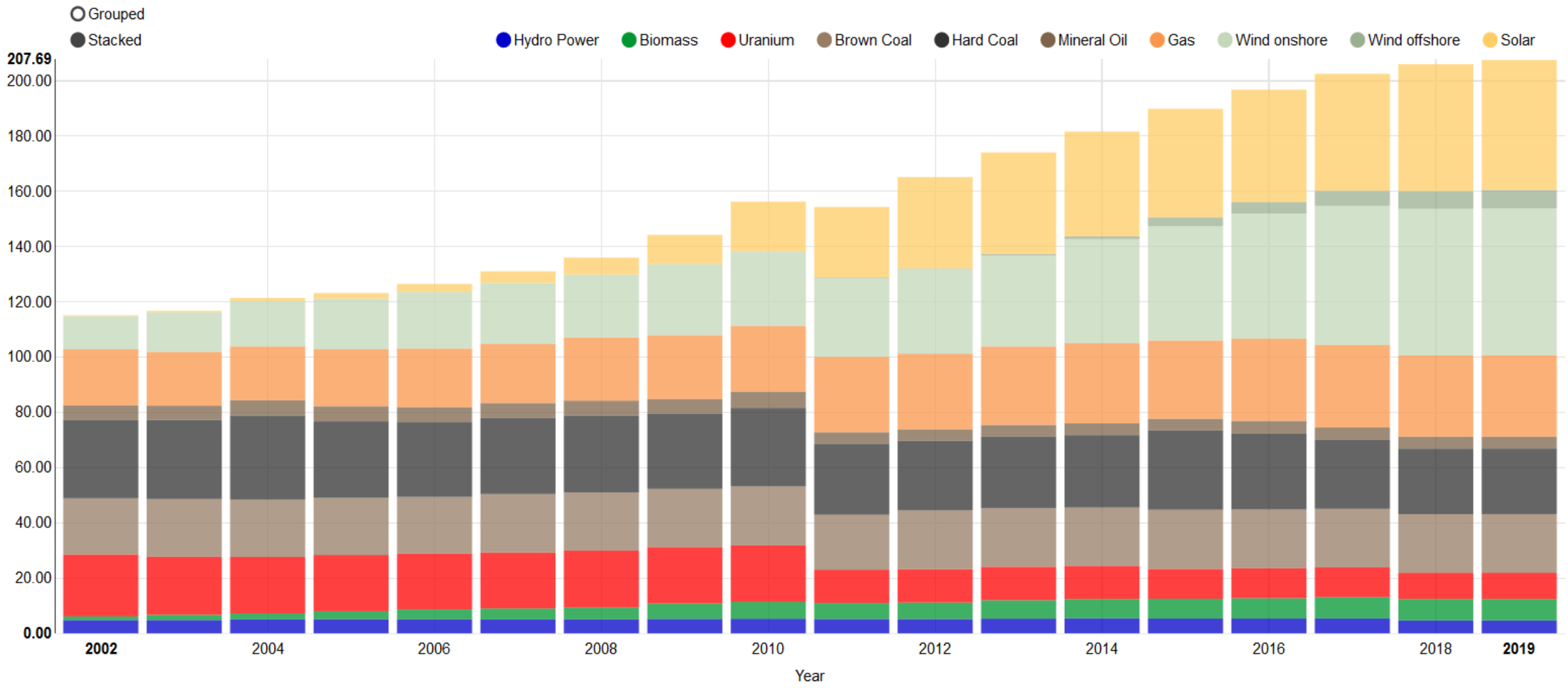
- Decentralization
- Liberalization
- Digitization

Solar & Wind (no. Of registered plants under the EEG scheme)

	Number of powerplants	
Year	Solar PV Plants	Wind (On & Off.)
2000	9708	1295
2001	24104	1903
2002	18602	2099
2003	19974	1688
2004	47409	1145
2005	67301	1002
2006	63975	1173
2007	77098	872
2008	115717	387
2009	182118	1381
2010	259233	764
2011	261302	972
2012	174206	1159
2013	119966	1313
2014	72688	1945
2015	47972	1976
2016	50416	1760
2017	58359	2028
2018	74913	886
Total	**1,745,061**	**25,748**

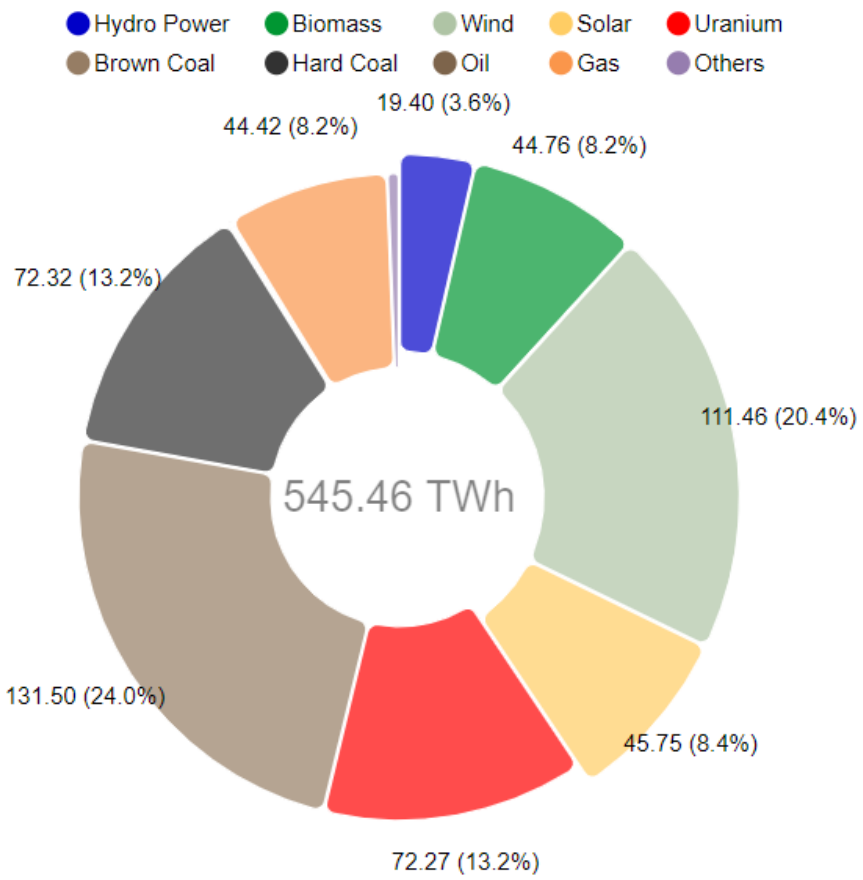


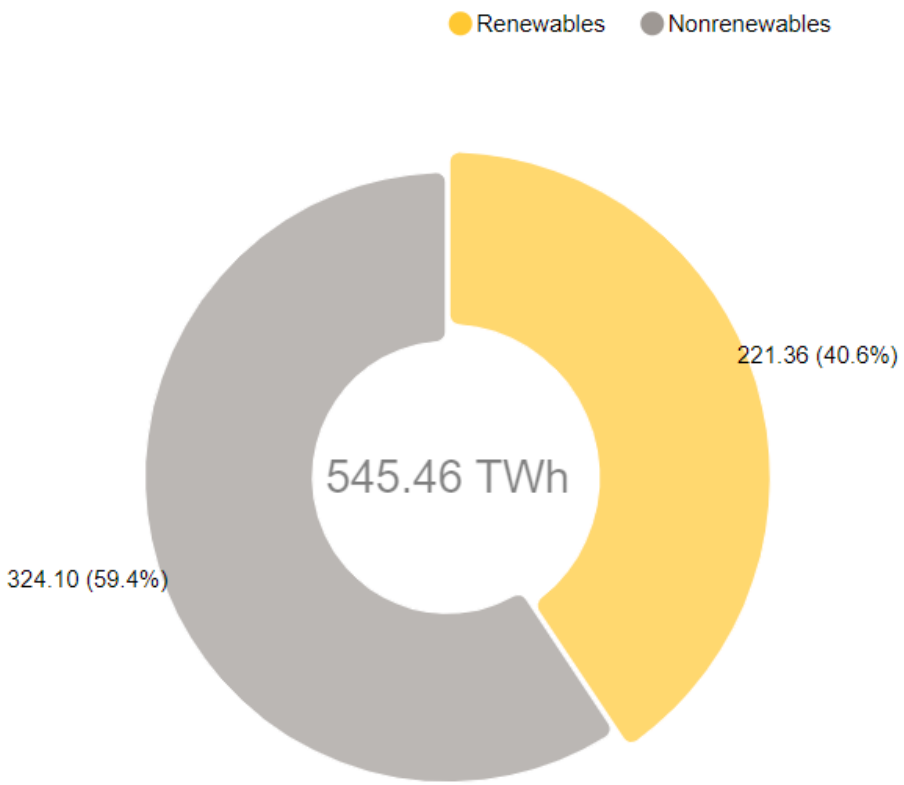
Net installed electricity generation capacity



Datasource: AGEE, BMWi, Bundesnetzagentur
Last update: 02 May 2019 19:02

Net public electricity generation in 2018





Net electricity generation of power plants for public power supply.
Datasource: 50 Hertz, Amprion, Tennet, TransnetBW, Destatis, EEX
Last update: 13 Mar 2019 11:44

The need for Multi Utility Companies (Stadtwerke)

stadtwerke
Schwäbisch Hall GmbH

The European Energy Award® is a programme for planning and implementing energy and climate protection policy goals and measures in municipalities.

Peter Breuning

Head of department: grid control & engineering services at Stadtwerke Schwäbisch Hall GmbH (multi utility)

Lecturer University Heilbronn & Harz

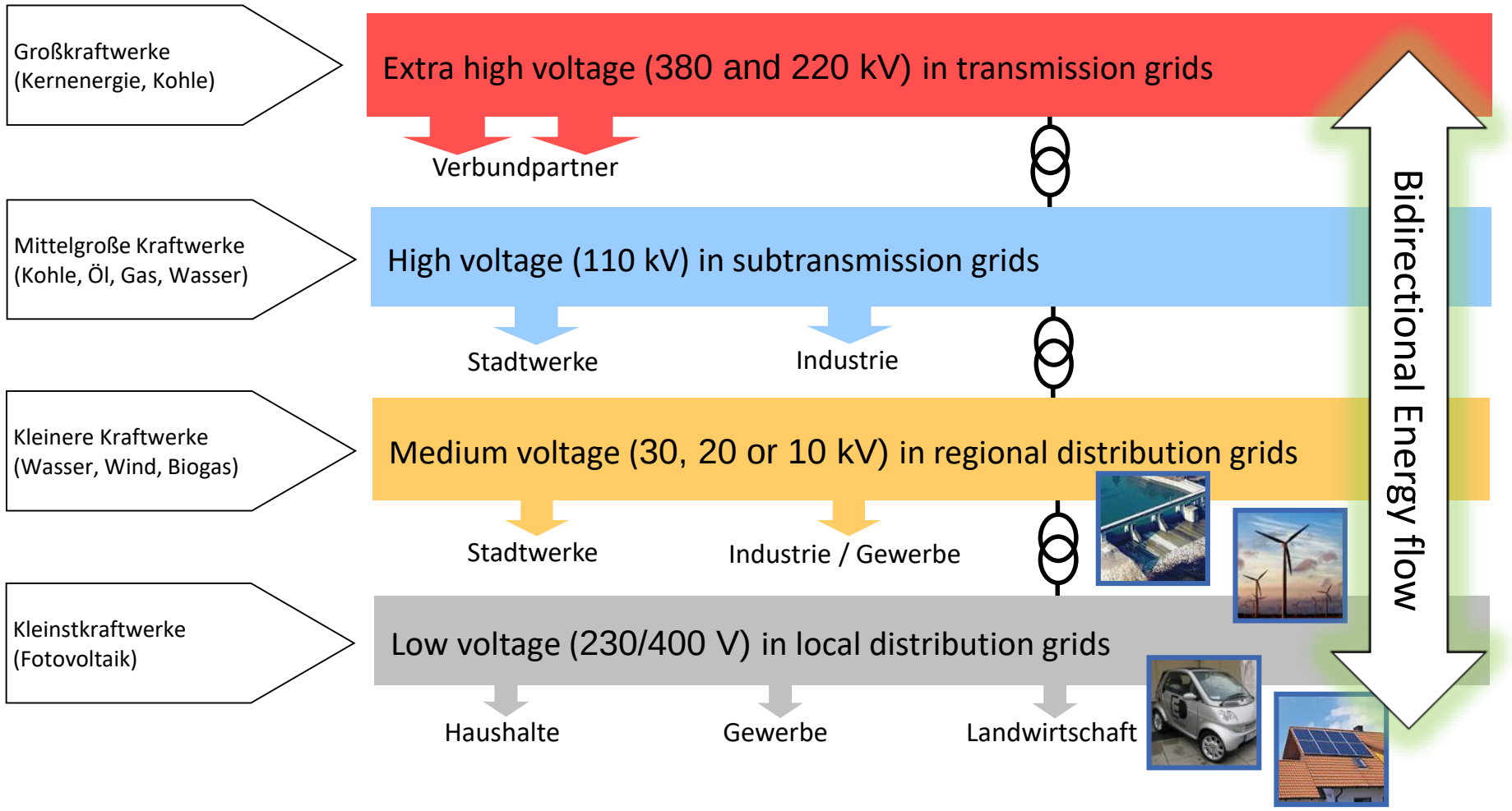
Speaker IDS User Group --52 Multi Utility Companies

Member working group FNN (VDI) (directive for power plant connections, HV-grids)

Technical Direktor "power grids" - Smart Grid platform BaWü

Decentral RE supply side management

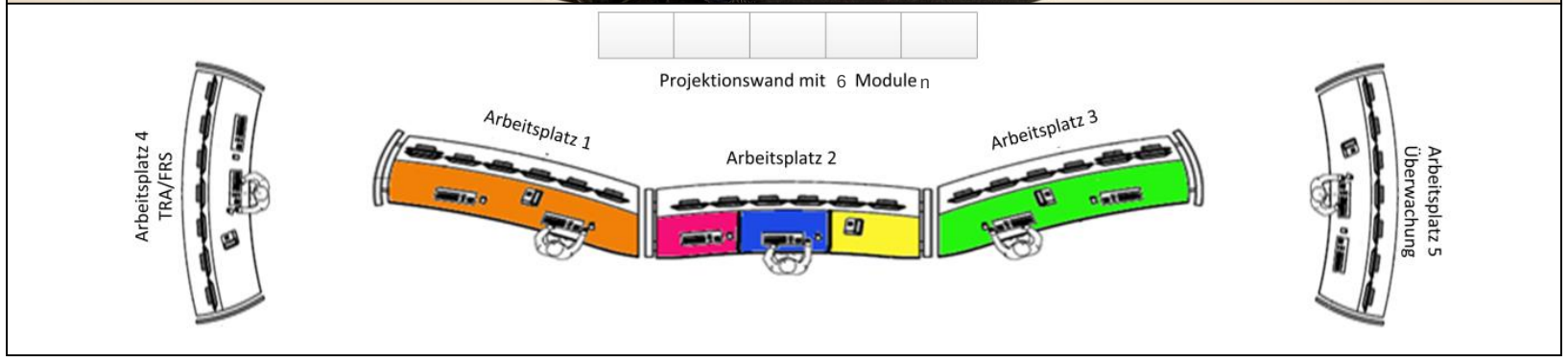
Energy flows in between the voltage levels with (renewable) DER



Benchmarking Germany - Tamil Nadu

Country	Area	Per person Consump-tion	Number of Utility Companies	Population
Germany	357,021km^2	7081 kWh/year	> 800	80,767,000
Tamilnadu, India	130,058 km^2	684 kWh/year	1	72,138,958

Multi utility control room at Stadtwerke Schwäbisch Hall



Multi utility Company

Electrical power supply
365 Mio. kWh/a grid
1.145 Mio. kWh/a trade

Natural gas supply
552 Mio. kWh/a grid
3.350 Mio. kWh/a trade

Water supply
2,7 Mio. m³/a
13 % self water procurement
4 spring water facilitys

District heat supply
122 Mio. kWh/a

Baths „Schenkensee“
459.000 visitors/a
indoor and outdoor pool, sauna

Parking
5 parking decks (1.533 parking positions)
2 car parks (325 parking positions)

Public Services Schwäbisch Hall GmbH

- ~500 employees, there of 17 trainees
- 258 Mio. € total revenue

Energiedienstleistungen

Contracting
SHERPA
distant meter-reading of energy meter and EDM
process control of t DD4 al facilities

Facility-Management
224 stations
18.900 data points

Energieerzeugung

48 BHKW-modules
1 combined-cycle plant
8 Biomass CHP plant
3 wood-fired power station
6 hydro station
7 wind engine

Renewable Energy

photovoltaics:	59,0	MW
water power:	2,5	MW
wind power:	46,0	MW
biomass:	27,0	MW
landfill-/biogas:	0,2	MW

Grid stability: Measures taken up by the Stadtwerke

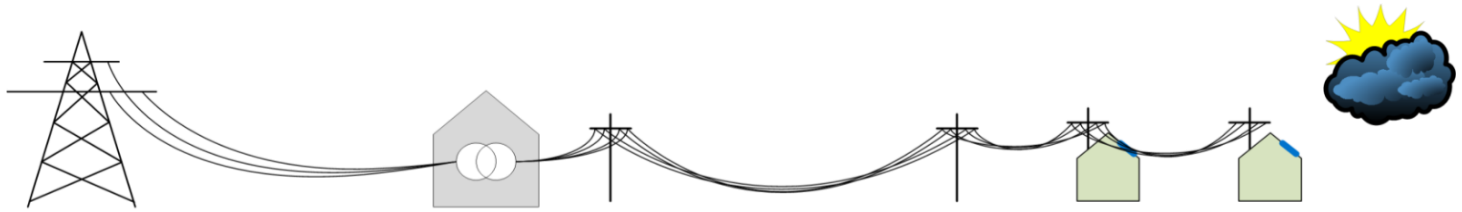
Challenges

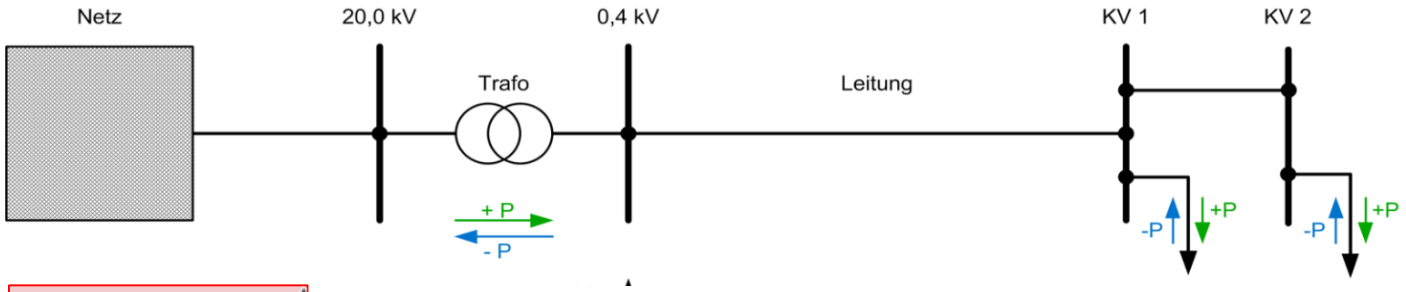
- not enough electrical power in the local grid
- electric powered cars (e mobility)
- the customer now a Prosumer

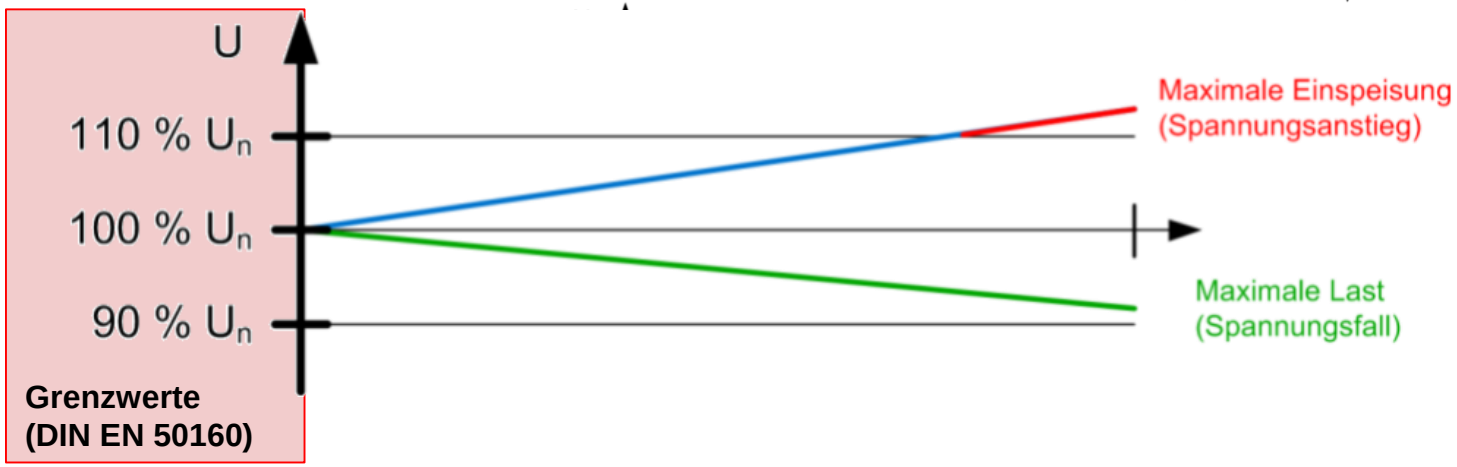
Solutions

- Voltage stabiliser
- Phase shifter
- Smart meter bidirectional information (customer behaviour)
- Battery / storage

Issue: high voltage in the end of the grid







Grid stability solution 1: Voltage regulation with transformers

Benefit

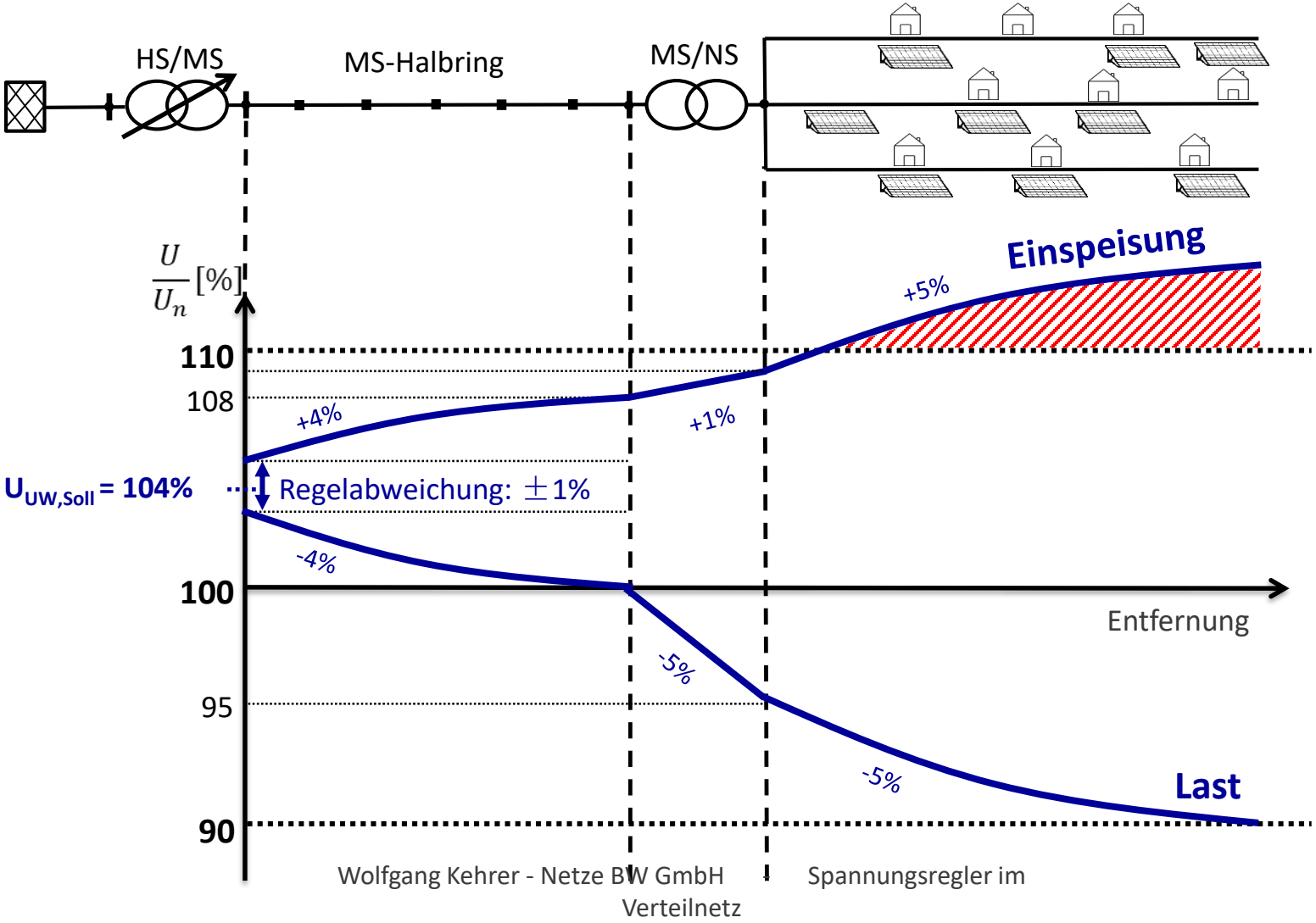
- proven technology
- low maintenance
- save cost

Weakness

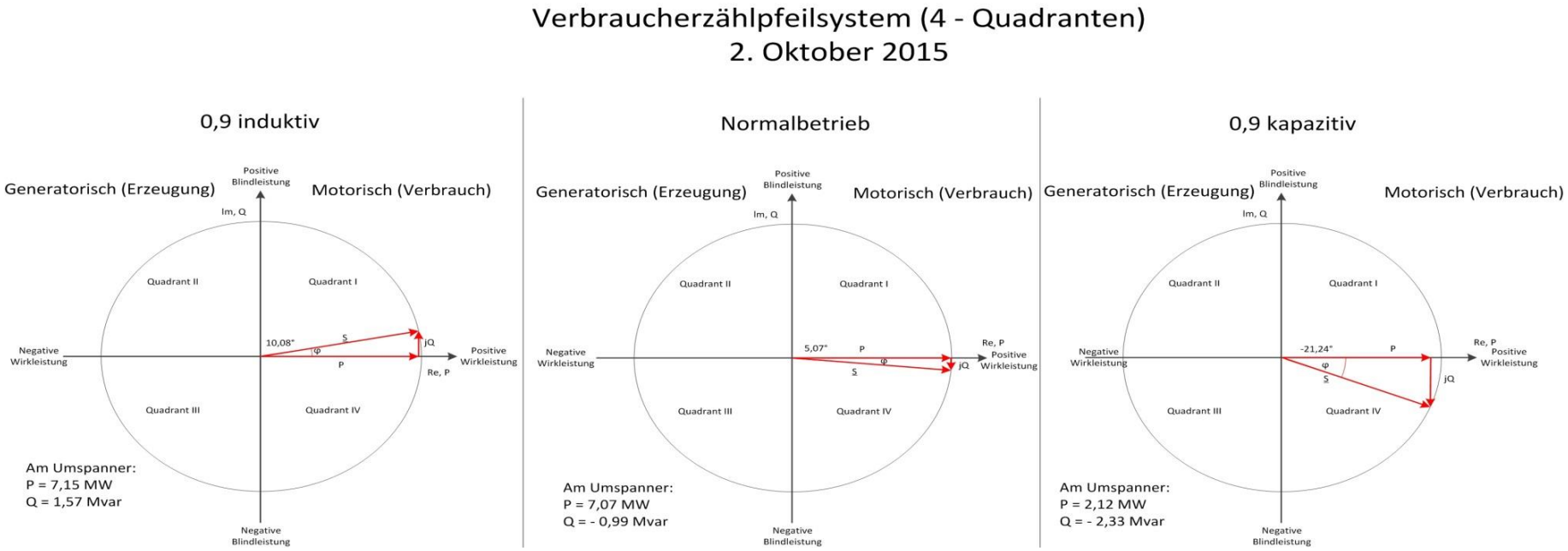
- initial investment (3:1)

GRIDCON® Transformer (Trafo) & iTAP® (Regeleinheit)
von Maschinenfabrik Reinhausen GmbH
Quelle: MR GmbH

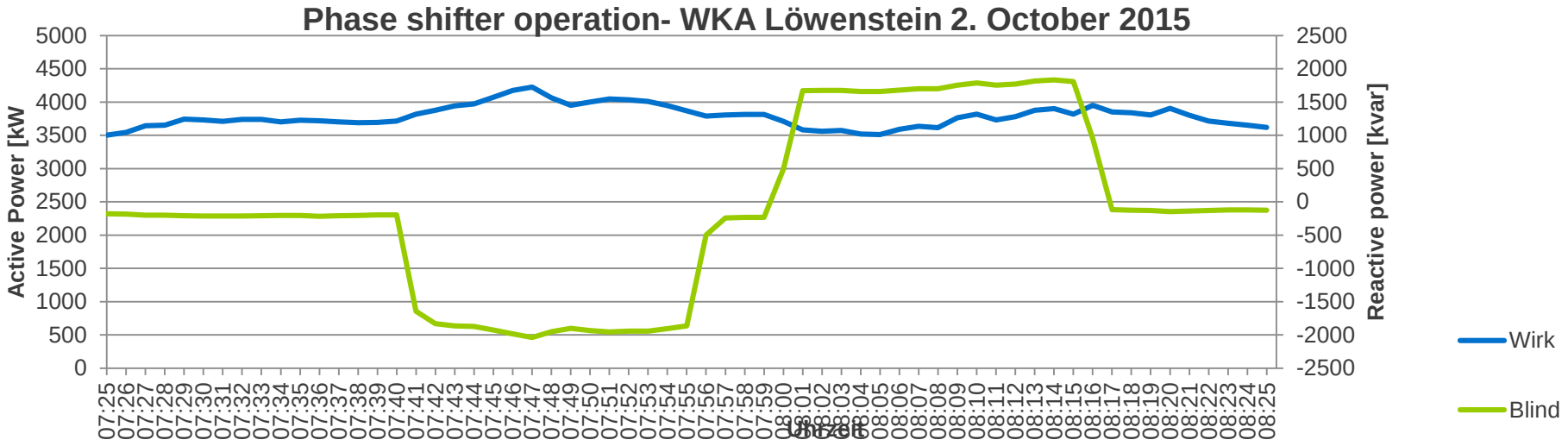
Case: Line voltage drop in Distribution Network

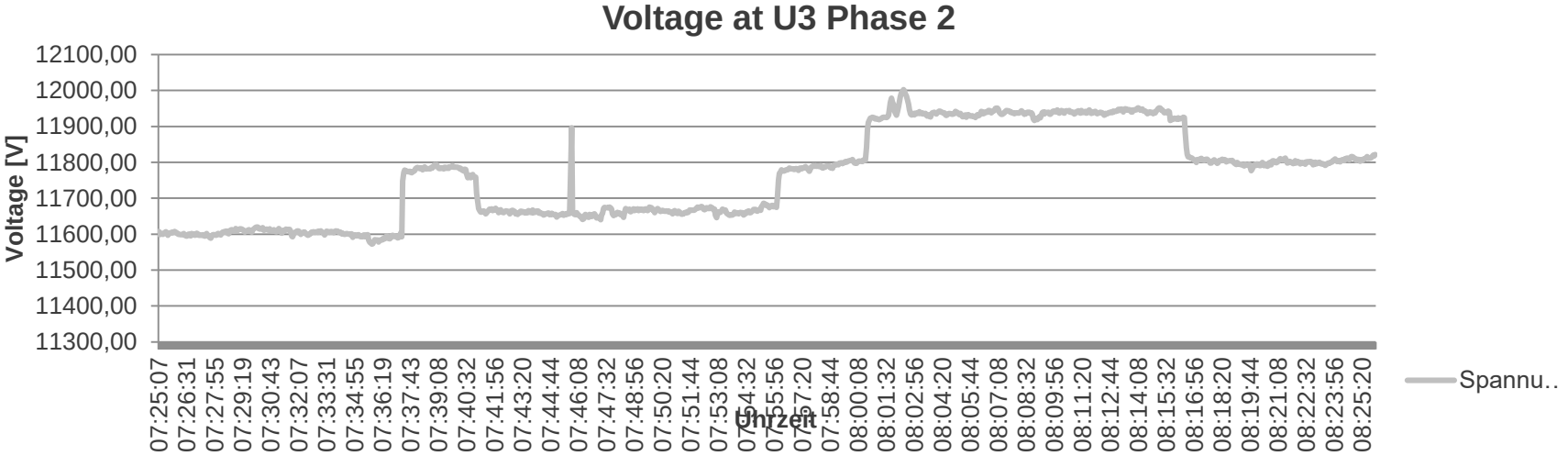


Grid stability solution 2: Phase shifter

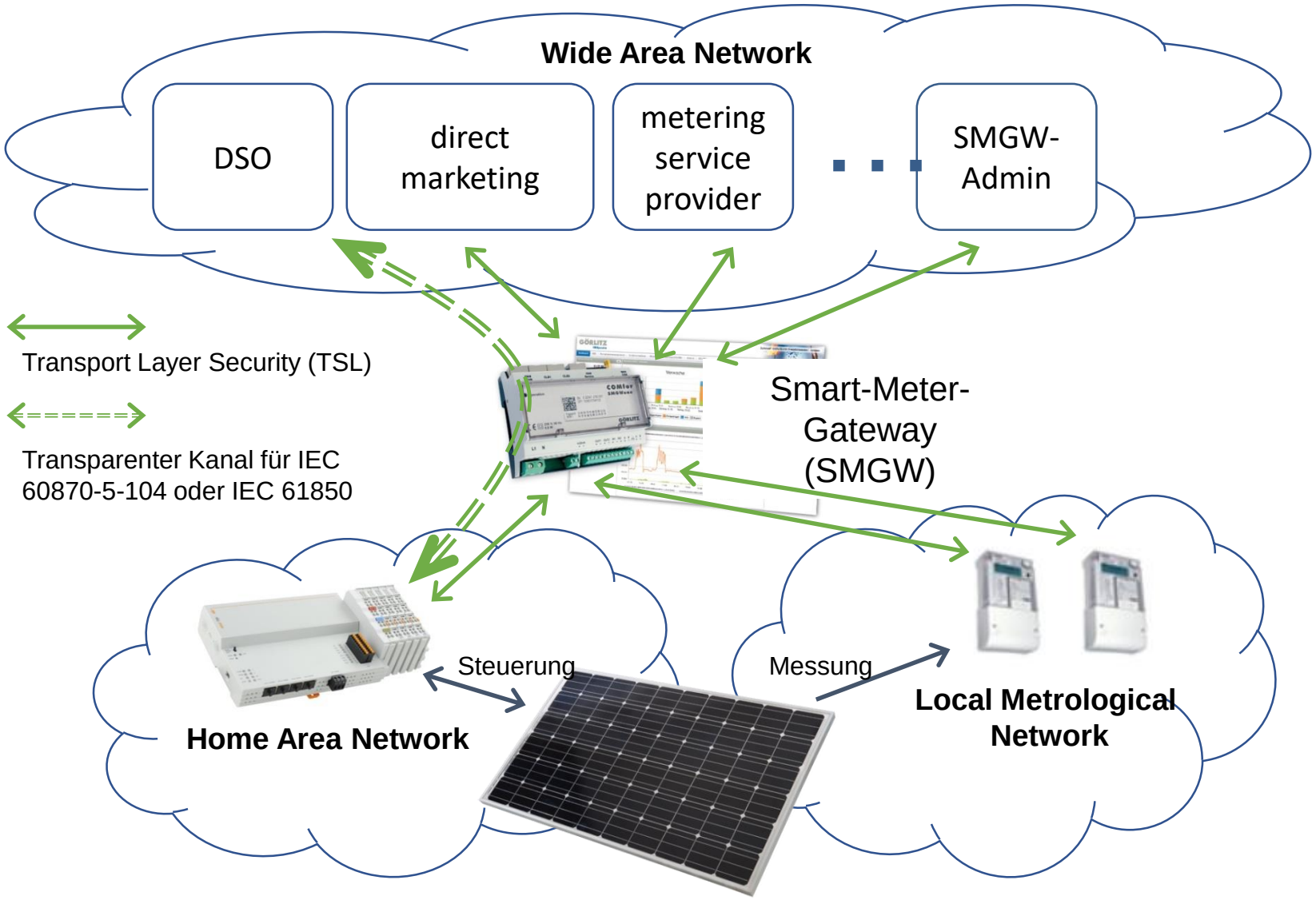


Phase shifter: Possibility of 300V (11.6 to 11.9kV)

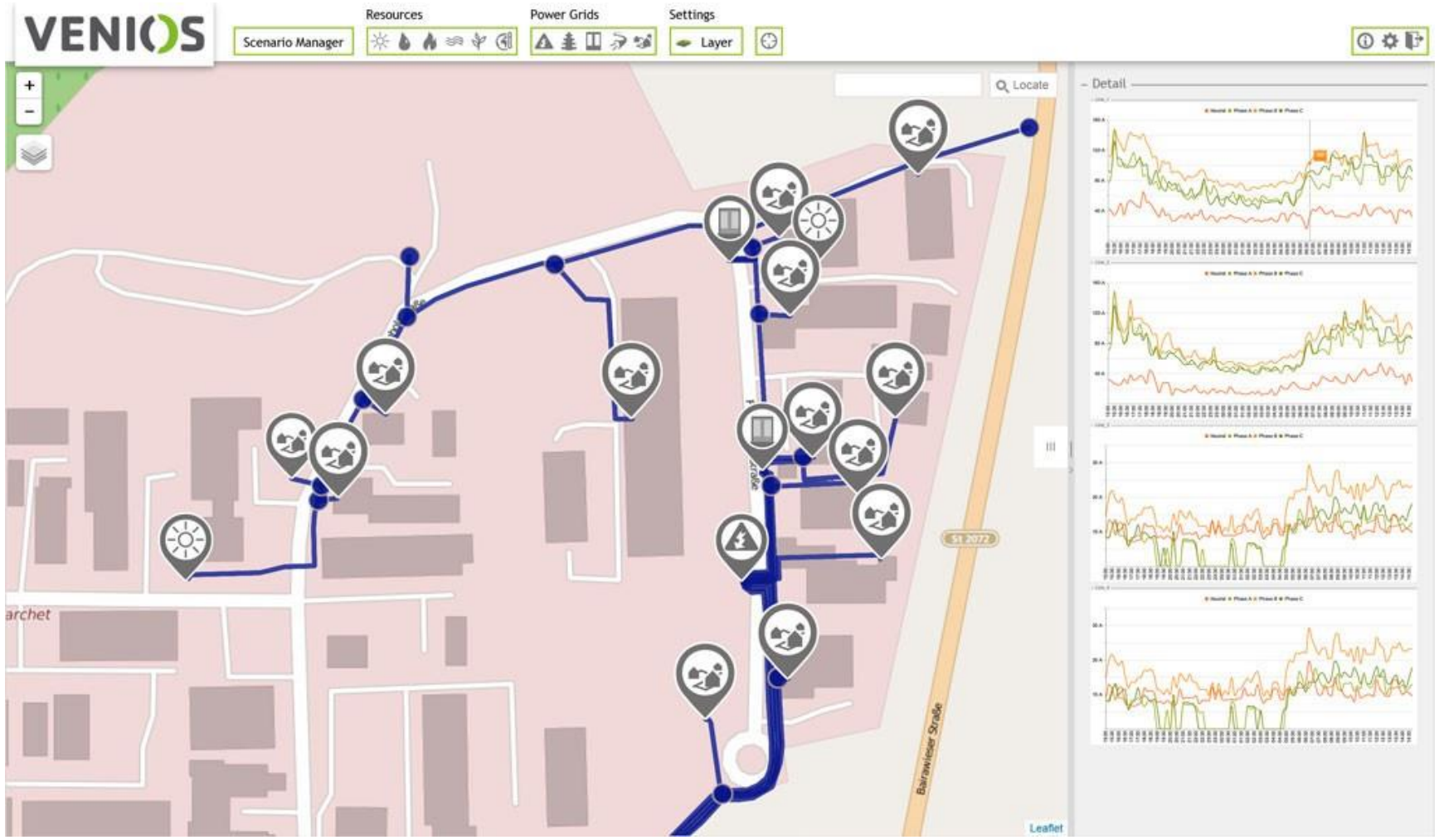




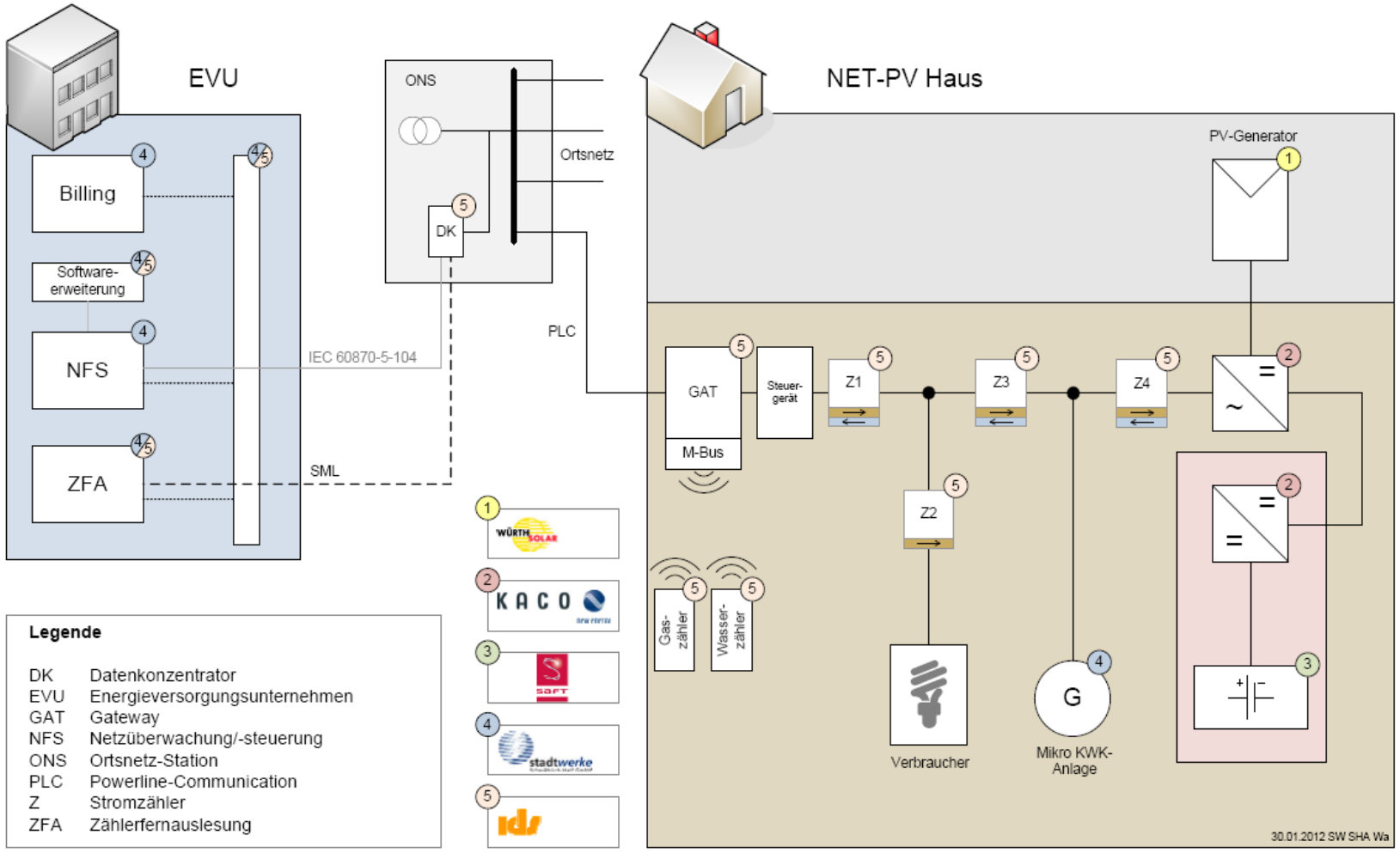
Grid stability solution 3: Smart meters



Information from low voltage grid (smart meter)



Grid stability solution 4: NET-PV research project funded by the German Government



Battery systems

Building with batteries

iPLON KFW-DEG Grid stability workshops- 2015

Thank you

धन्यवाद् நன்றி

Vielen Dank