

Prof. Gerd Heilscher
Ulm University of Applied Sciences – HS Ulm
WP 4/6 - E1 – Load Balancing (HS ULm, DLR)
13.01.2011

ENDORSE



E1 – Load Balancing

within electricity distribution grids enabling high penetration of photovoltaic power systems



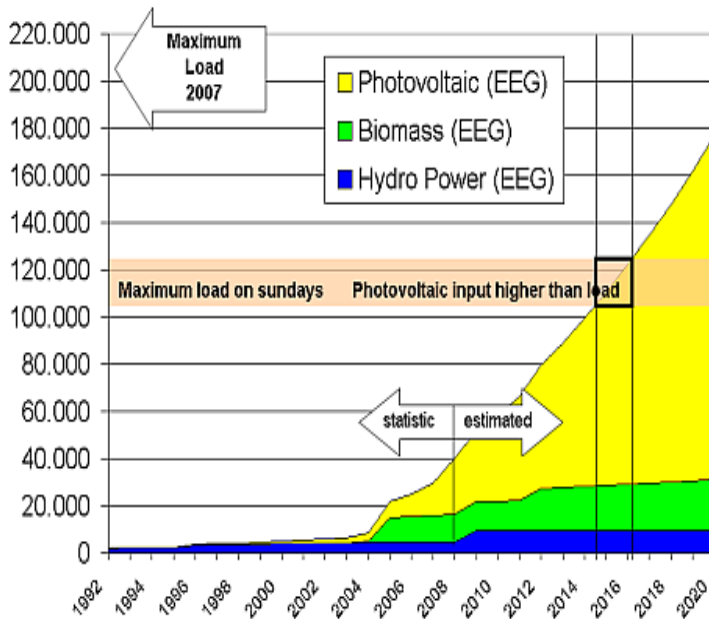
Foto: Bausparkasse Schwäbisch Hall / Lorenz-Behälterbau

Grid connected PV (D)

- 75% connected to local distribution grid
- Systems up to 30kW have to be connected
- Only systems >100 kWp could be shut down
- Grid operator did not shut down PV up to now

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Distribution Grid

- Photovoltaic input will be higher than load on sundays at the end of ENDORSE project

January 13-14 2011

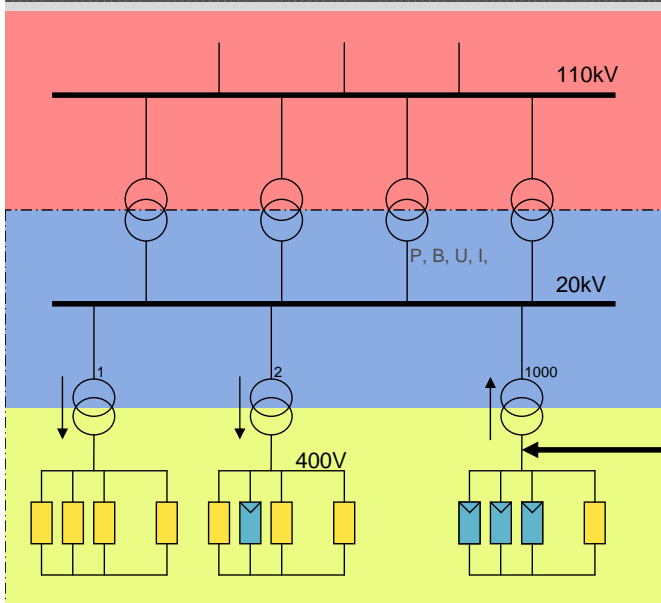
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Distribution Grid

- Grid operators have no measurements at the low voltage level
- Peak current readout every 4 years at transformer level

Grid control centre, SWU Ulm

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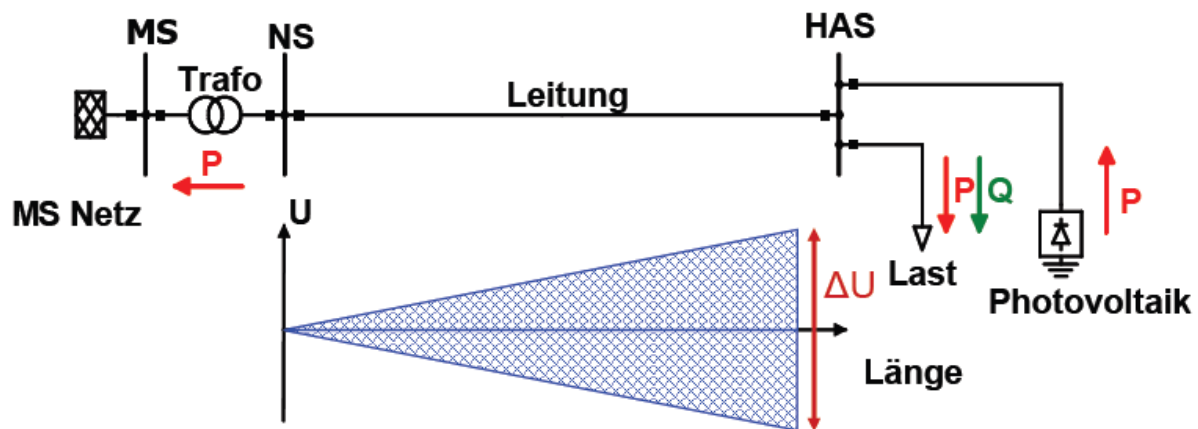


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Distribution Grid



- Voltage band limits photovoltaic potential

Reference: TU Munich

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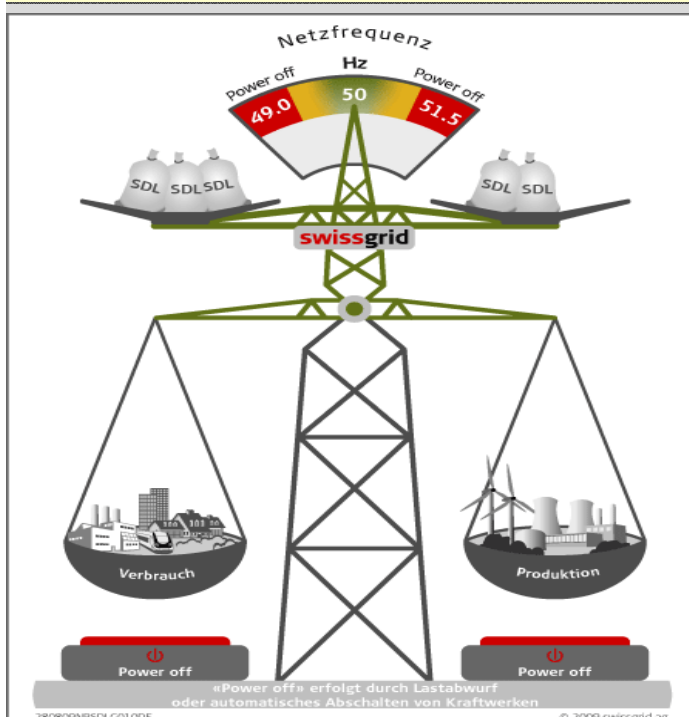
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Load Balancing

- The energy input and the load have to be balanced at any time
- Photovoltaic is in this system a negative load

Objective

- Solar power forecast has to become as precise as load forecast

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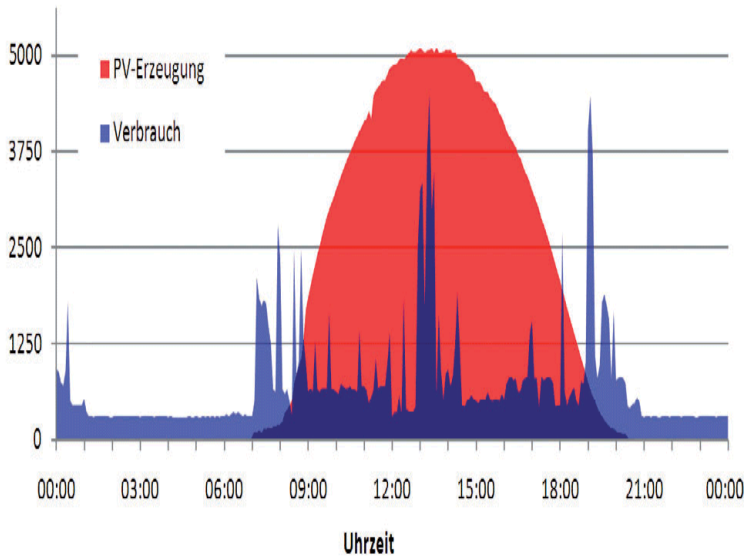
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Challenges

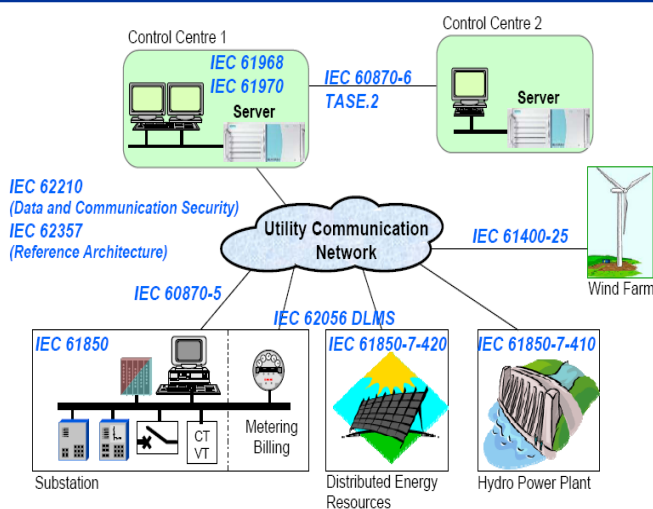
- Connection of solar power prediction to grid control centre
- Switch of PV in overload situation
- Switch on load at the same time

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IEC TC 57 and
TC 88
Standards

IEC Committees – Power System



Expectations

- Learn about problems of the grid operators
- Customize prediction to their needs
- Learn about uncertainty of prediction at local level (1 pixel and below)
- Higher time resolution 60 ...15...5...? Minutes
- Error in correspondence to critical situation of the grid

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Grid control centre, SWU Ulm

Product

- Solar power forecast at local scale

Service

- Integration of solar power forecast into distribution grid control centre
- Customized prediction according to their needs

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- Innovation
 - Small regional scale
 - Directly integrated
- Market
 - 900 utilities operating distribution grids in Germany
 - All distribution grids with high penetration of PV in Europe

Measure of Success

- User Feedback
- Knowledge about
 - distribution grid needs
 - Use of earth observation (GMES) based services in grid control centre application
- Uncertainty of solar power forecast at the level of load forecast
 - local scale
 - high time resolution
 - during critical situation of distribution grid
- Grid control centre knows
 - when it has to shut down / reduce PV input
 - what will happen to the grid due to shut down
- Outlook
 - Turn on of additional load at time of predicted high solar input is cost effective

Contact

- **Hochschule Ulm**
 - Institut für Energie- und Antriebstechnik
 - Eberhard Finckh Str. 11
 - D-89075 Ulm
- Prof. Gerd Heilscher
 - +49 (0)731-50 28360
 - +49 (0)179-5978 024
 - heilscher@hs-ulm.de
- M.Sc. Holger Ruf
 - +49 (0)731-50 28348
 - ruf@hs-ulm.de

