Welcome to the IEA Task 14 Workshop

at SMA Solar Technology AG, Kassel, Germany

by Martin Braun

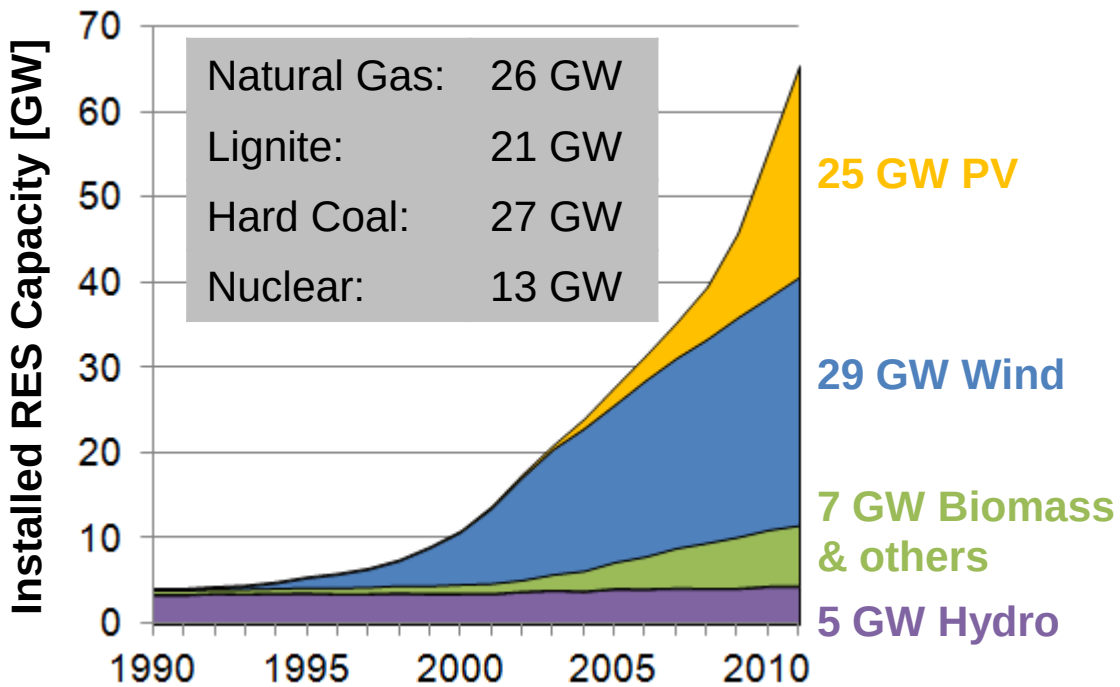
Head of Department Distribution System Operation at
Fraunhofer Institute for Wind Energy and Energy System Technology

Juniorprofessor for Smart Power Grids at the University of Stuttgart

Fraunhofer IWES

The installed capacity of renewable energy sources (RES) has grown by over 1200 % over the last 20 years in Germany.

Growth of RES in Germany 1990 - 2011



Source: BMU (2012), Umweltbundesamt (2012)

PV Facts for Germany

Electricity from PV:

- 2011: 19 GWh (about 3 % of overall generation)

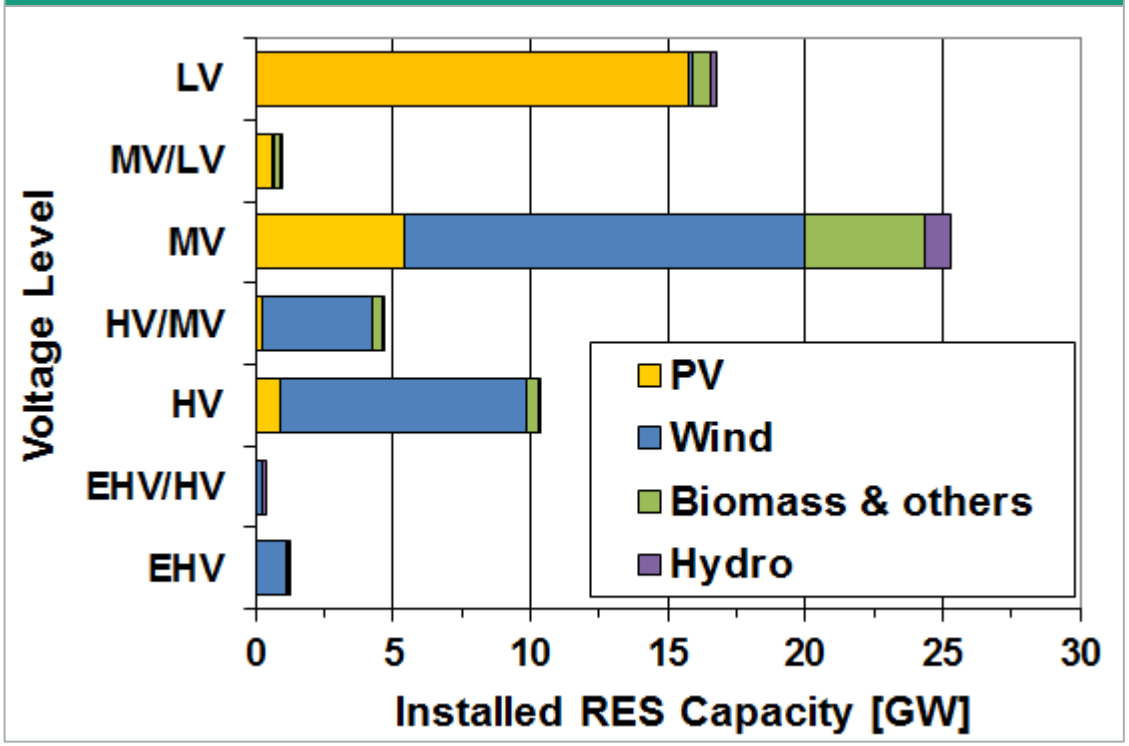
Number of PV systems:

- > 1,000,000

Fraunhofer IWES

The majority of the PV systems are installed in the low voltage grid.

RES Capacity according to Voltage Levels



Source: DGS (2012)

Amount of overall PV capacity in LV grid:

- ~ 69%
- Usually PV plants with less than 100 kW

Amount of overall PV capacity in MV grid:

- ~ 26 %
- Usually PV plants greater than 100 kW

Summary of the PVSEC 2011 Key Note Presentation
"Is the Grid Ready to Accept Large-Scale Photovoltaic Deployment?"

1. **Germany is a show case for large-scale PV deployment (see best-practice examples and learn from errors)**
2. **Recommendations for international large-scale PV deployment:**
   - **Start early enough with extension of Transmission System: Matter of Time !**
   - **Include smart reactive power and voltage control functions to reduce Distribution System extension costs: Matter of Costs !**
   - **Consider PV as an active part of power system operation → for stability and cost-efficiency**
     - **Frequency & voltage support**
     - **Integration in system security actions → remote control**
     - **Match production and demand → incentive system**
3. **International exchange and harmonization necessary !**

International Exchange and Harmonization

10:10 – 10:30 **Smart Grid Show Cases**	„E-Energy“ – Ludwig Karg, B.A.U.M. Consult GmbH
10:30 – 11:00 **What is / will be Produced?**	„PV Power Prediction in Germany“ – Dr. Elke Lorenz, University of Oldenburg
11:00 – 11:30 **Distribution System**	„Distribution Grid Integration of PV in Germany – New Challenges for DSO“ – Johannes Brantl, E.ON Bavaria AG
11:30 – 12:00 **Transmission System**	„System Compliance of Renewable Energies - New Challenges for TSO“ – Dr. Christian Schulz, TenneT
12:00 – 12:30 **PV as an Active Part of Power System Operation**	„PV Inverter Technology Review – How Smart PV Systems can improve the hosting capacity“ – Daniel Premm, SMA Solar Technology AG

Today‘s Agenda

First Panel

10:10 „E-Energy“ - Ludwig Karg, B.A.U.M. Consult GmbH

10:30 „PV Power Prediction in Germany“ - Dr. Elke Lorenz, University of Oldenburg

11:00 „Distribution Grid Integration of PV in Germany – New Challenges for DSO“ - Johannes Brantl, E.ON Bavaria AG

11:30 „System Compliance of Renewable Energies – New Challenges for TSO“ - Dr. Christian Schulz, TenneT

12:00 „PV Inverter Technology Review – How smart PV Systems can Improve the Hosting Capacity of Distribution Grids“ – Daniel Premm, SMA Technology AG

12:30 Lunch – hosted by SMA Solar Technology AG

Second Panel

14:00 Country Report USA - Benjamin Kroposki, National Renewable Energy Lab

14:30 Country Report Japan - Prof. Kazuhiko Ogimoto, University of Tokyo

15:00 Country Report China - Wang Yibo, Chinese Academy of Science

15:30 Open Discussion

16:00 Closing of the workshop

16:00 Factory Tour SMA Solar Technology AG (Registration required)

18:00 Dinner – hosted by SMA Solar Technology AG

Fraunhofer IWES