

# Country report - Overview on ongoing Projects

## AIT Energy und Smart Grids

Matthias Stifter

Austrian Institut of Technology  
Energy Department  
Electric Energy Systems

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# Content



## Project highlights Smart Grids

- DG DemoNet Validation
- IEA ENARD Annex II
- iSOLVES:PSSA-M
- MetaPV
- SEESGEN-ICT
- Consumer2Grid / Building2Grid
- PV Store
- Sun Power City

AIT Smart Grid Research Infrastructure - SimTech Laboratory

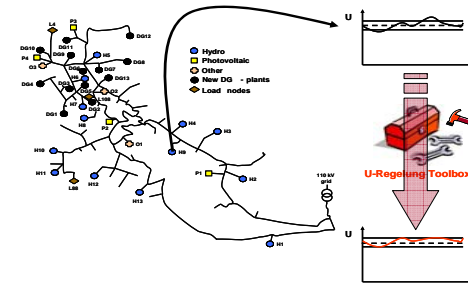
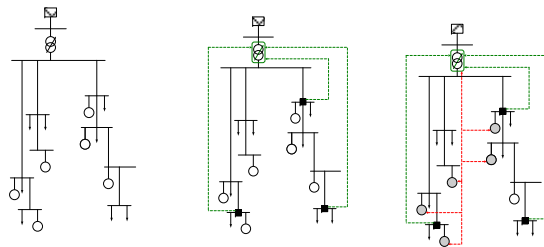
# DG DemoNetz - Validation



RES impact on Power Quality

**DG DEMO NETZ**  
KONZEPT

**BAVIS**



Development of Voltage Control Algorithms, technical and economical assessment

Detailed improvement of algorithms, development of planning tools

**DG DEMO NETZ**  
VALIDIERUNG

Development, Field test, Analysis and Validation – Proof of Concept

## IEA-ENARD: Annex II

- The scope of Annex II deals with **system integration into low and medium voltage networks** including technical, economical, organizational and regulatory aspects and related active distribution network operations.
- The work program is divided into three tasks (draft):
  - **Task 1: Aspects for Activation of Distribution Networks**
  - **Task 2: Management of Active Distribution Networks (technical, economical, organisational)**
  - **Task 3: Cross Cutting Issues, Interrelation and Dissemination**
- End of Annex II will be in the next couple of months (report and results)

## ISolves:PSSA-M

### Measuring the real situations in the LV-grid



#### Situation

- Low voltage grid are not well known
- Planning is based on estimation
- Dispersed generation and e-mobility is a challenge for the low-voltage grids

Knowledge about the LV-grid in detail would (PEN-impedance, unsymmetry) would allow better use of resource and increase efficiency

#### Method:

- Long term measurement with synchronised snap shots  
=> Analyse LV grid and simulate diff. SG concepts

**Innovative Solutions for Optimization of Low Voltage Electrical Systems**  
**Power Snap Shot Analysis by Meters**

# EU Projekt MetaPV



- EU Projekt: **Metamorphosis of Power Distribution: System Services from Photovoltaics – MetaPV**
- Development of the necessary elements for enabling active grid support from PV, namely:
  - enhanced control capacities implemented into PV inverters,
  - adapted grid control strategies and infrastructure including means of communication where required,
  - an efficient use of distributed storage
- Demonstration of additional benefits from PV in a Belgium distribution system, namely:
  - power quality improvement,
  - increased security of power supply.
- AIT is leading WP3 - Innovative Network Planning and Operation for Additional PV Benefits

## SEESGEN-ICT

- Thematic Network on Increase of Energy Efficiency in SG through ICT
  - WP2 Intra-grid management of SG
  - WP7 Requirements for test facilities

## Consumer2Grid/Building2Grid

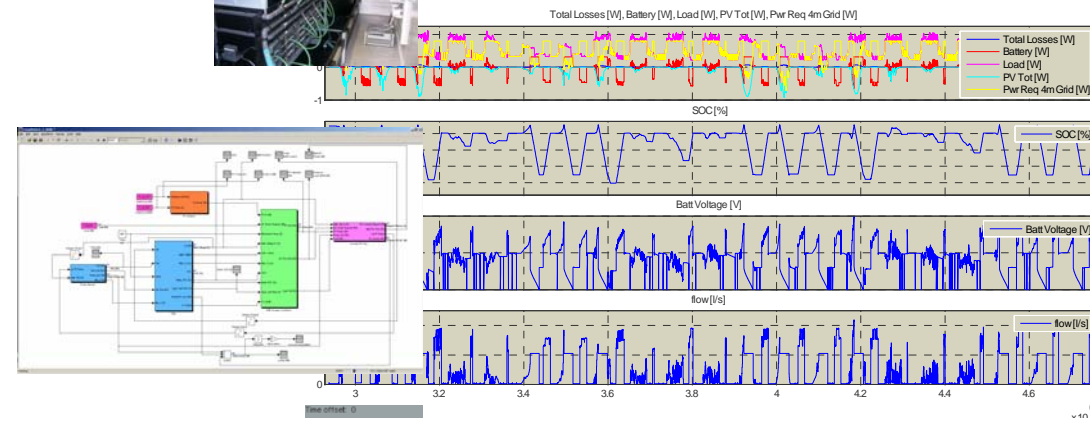
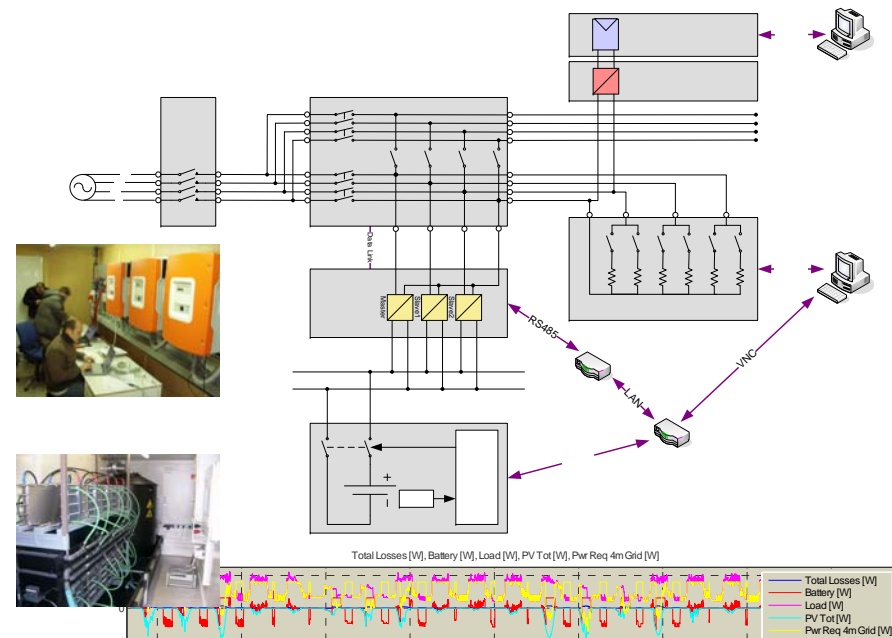
- Interface functional buildings with the distribution network
- Integrate into the smart grid management methods
  
- The role of the consumer as an active participant in the grid.
- Investigation of building technologies which are applicable to participate in the intelligent Energysystem



# PV-Store:

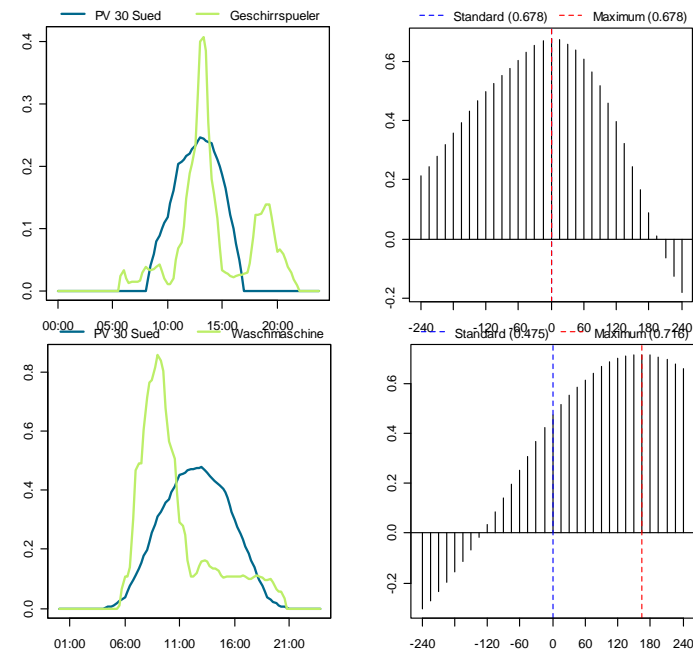
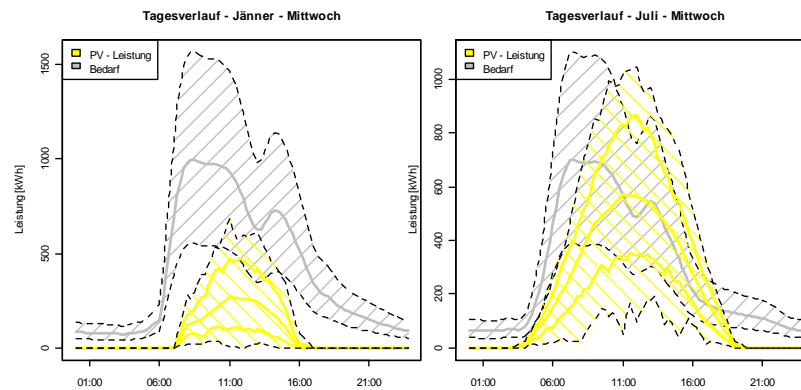
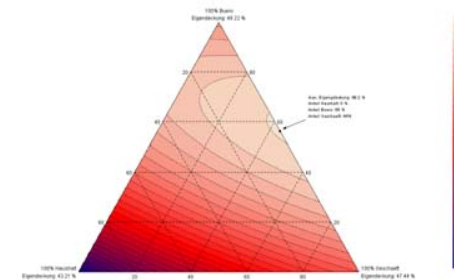
## PV and Vanadium Redox Flow Batterie for Stabilising LV Grids

- Modelling and Simulation of Batterie System
- Test setup and Measuring
- System Integration
- Validation of Model
- Sustainability assessment
  - Economical
  - Ecological
- Operation modi:
  - Peak shaving
  - Power feed-in
  - Increase autonomy
  - Multifunctional operation (combination)



# SunPowerCity

- Integration of large scale of building integrated PV (BIPV)
  - Optimise load and generation
  - To increase the coverage of the own requirements (self-sufficiency)
  - Correlation between consumer and generation
  - Grid integration issues



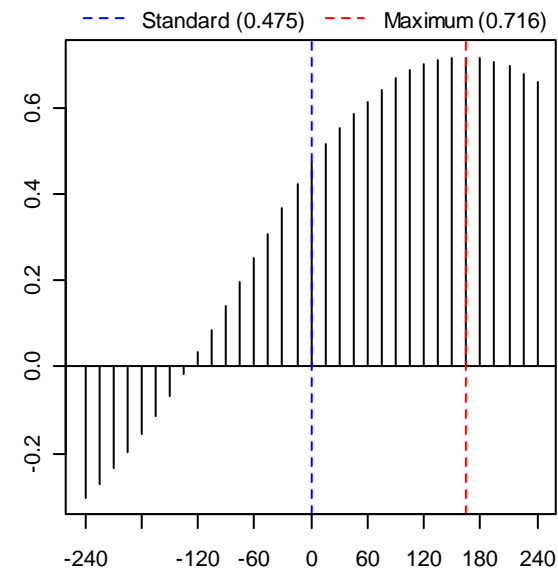
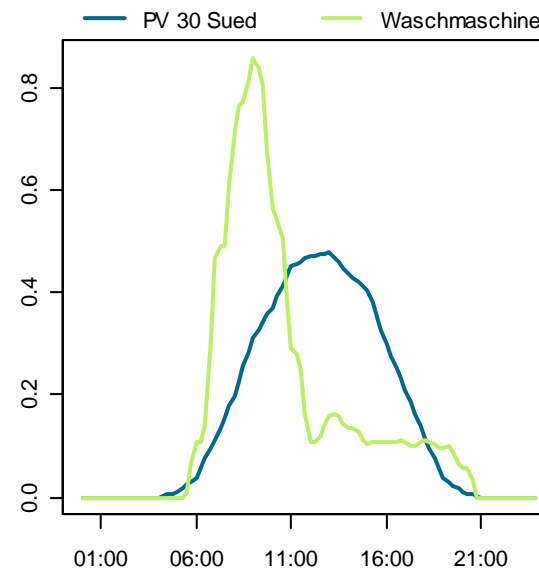
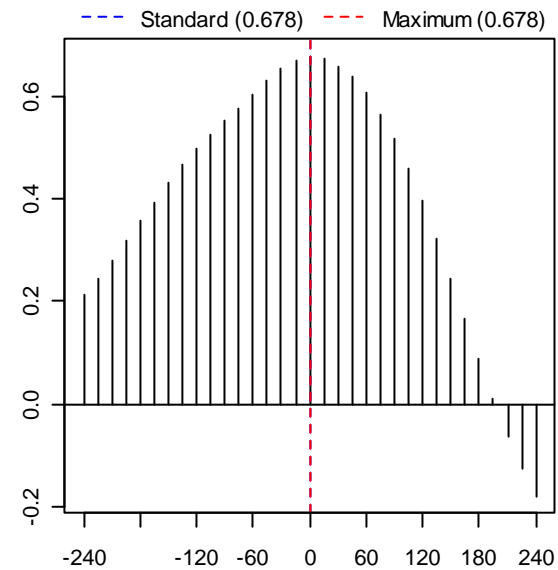
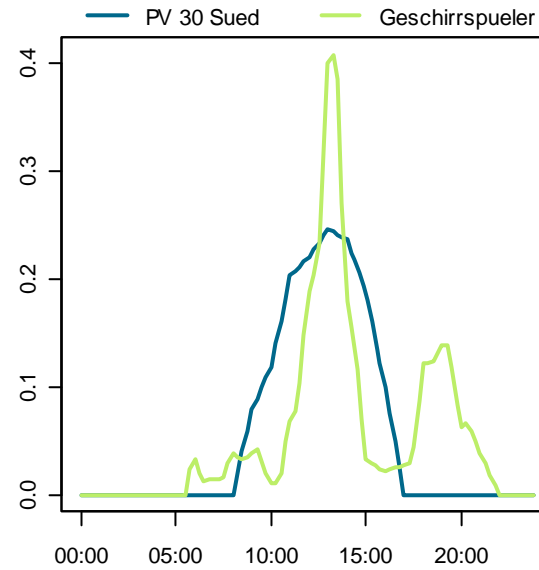
# SunPowerCity

## Correlation with PV:

### Examples

Dishwasher

Washing machine

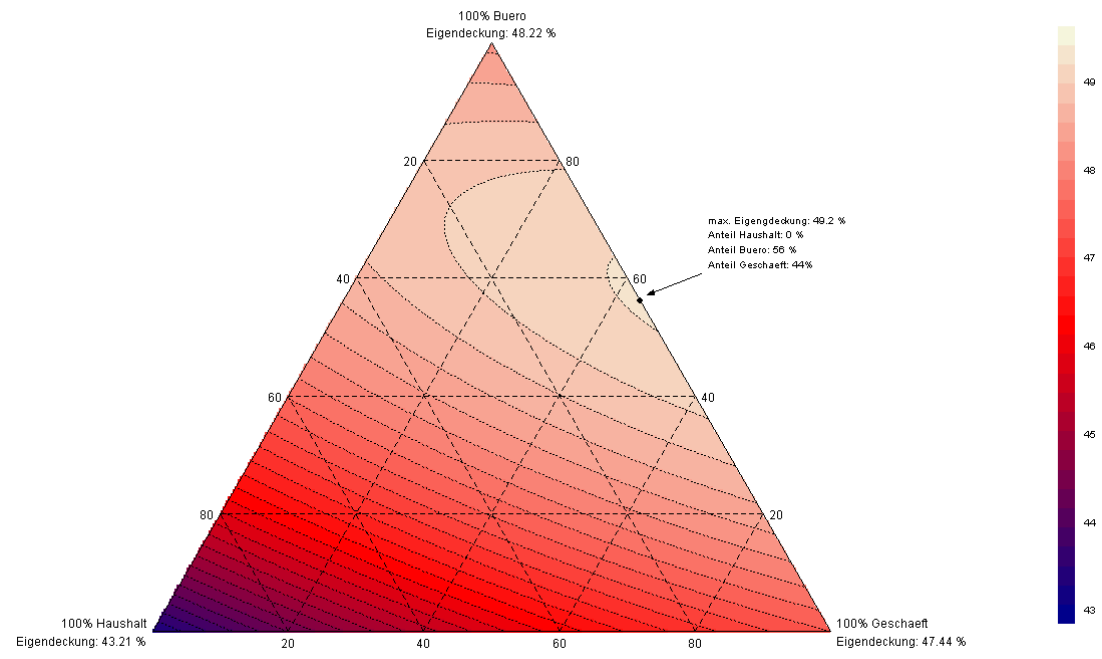


# SunPowerCity

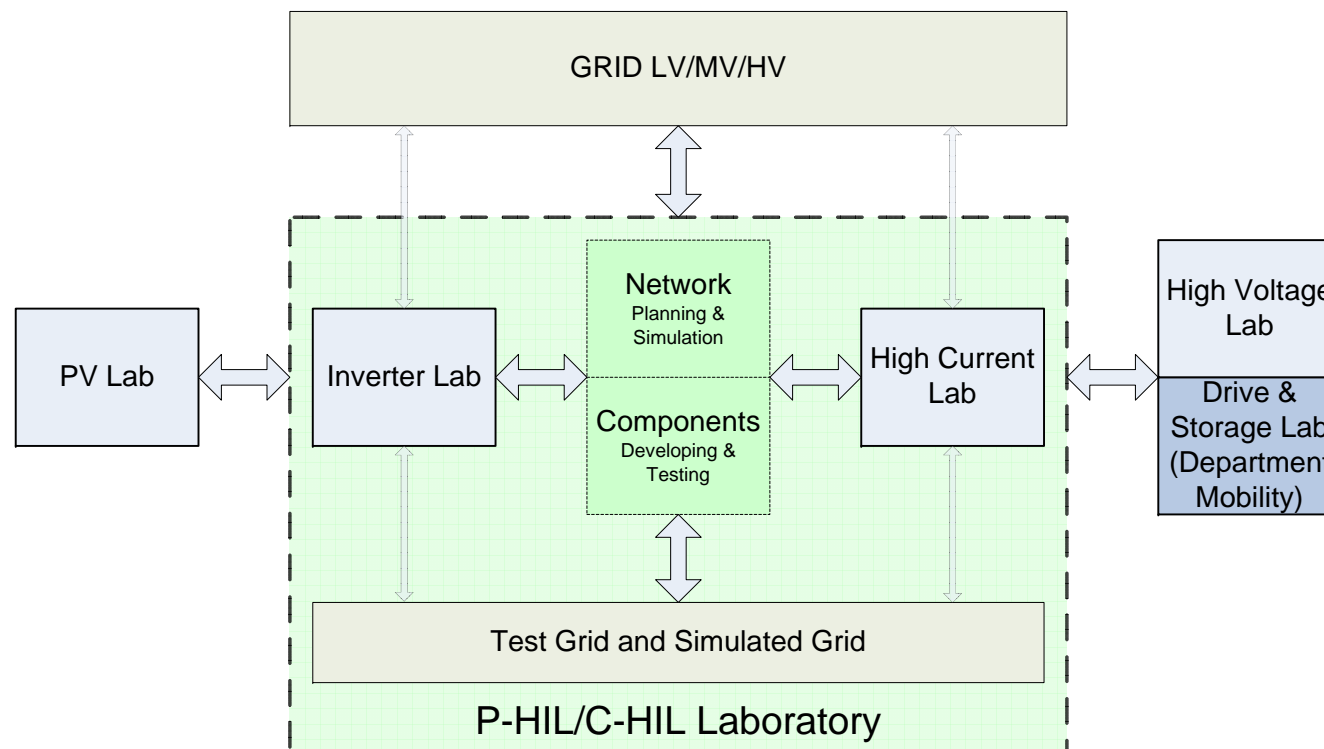
## Mixture of building functions

### Examples

- household
- office
- shops



# Infrastructure for real-time simulation of Electric Distribution grids - SIMTECH



## Technical Relevance

- **New grid components**
- **Development of components**, impact on the grid
- **Smart Grid management** concepts
- **Experimental grid simulation:**
  - Conventional Assets:
  - Active Netcomponents:  
Power-Hardware-in-the-Loop (P-HIL),  
Controller-Hardware-in-the-Loop (C-HIL)

## Infrastructure

- real time amplifiers for AC (0–480 V, 0.5 MVA, 3 kHz Bandwidth)
- DC Source
- Computercluster for real-time simulation
- Simulation of communication systems
- Climate simulation
- testbeds
- Monitoring and SCADA System
- Interfacing existing infrastructure (high current lab 150 MVA)