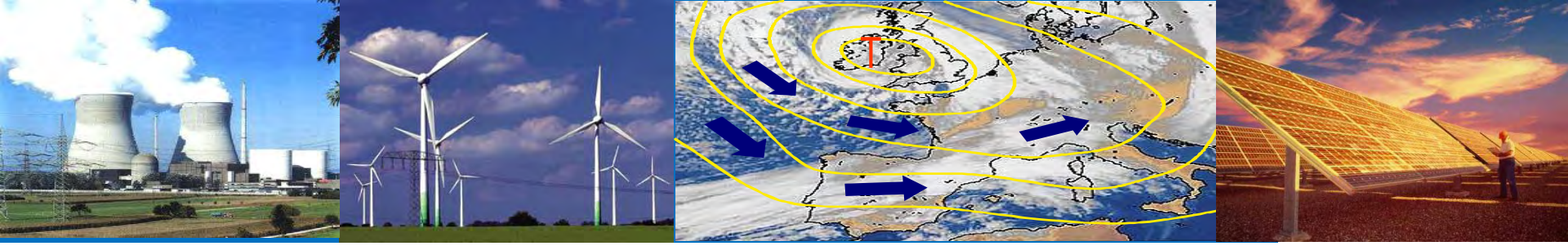

Netzintegration von PV –

ENDORSE - Entwicklung einer Solarleistungsvorhersage auf Satellitenbasis für die Netzbetreiber

Smart Grids Week 2012 – Bregenz – 24. Mai 2012

Holger Ruf

Hochschule Ulm

Institut für Energie & Antriebstechnik

SEVENTH FRAMEWORK PROGRAMME

Technik
Informatik & Medien
Hochschule Ulm
University of Applied Sciences

Contents

Hochschule Ulm

- Project ENDORSE
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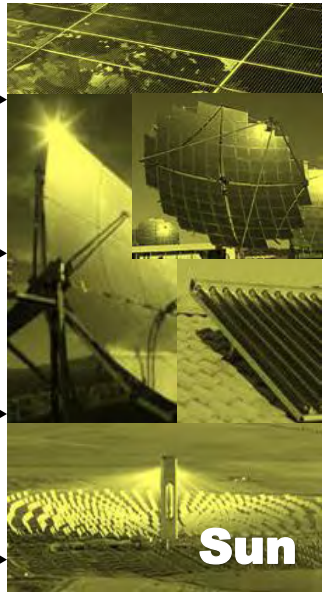
  - Roof Potential Analysis
  - Satellite
  - Services for DSO

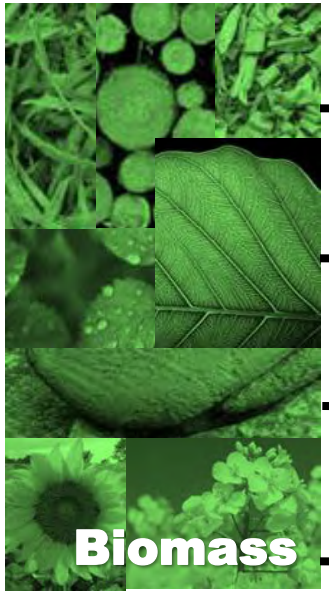
ENDORSE

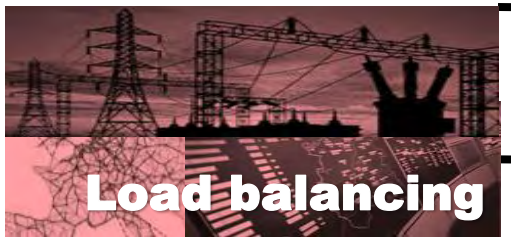
Pre-market downstream services in renewable energies

Hochschule Ulm

Measures and observations







CUSTOMERS

Develop pre-operational downstream services:

- Assess conditions for **self-sustainability** of services
- **Disseminate the achievements** to foster the use of Core Services data and other EO data
- **Stimulate the market** of downstream services

www.endorse-fp7.eu

GMES

REA

SEVENTH FRAMEWORK PROGRAMME

Smart Grid – Many Pieces

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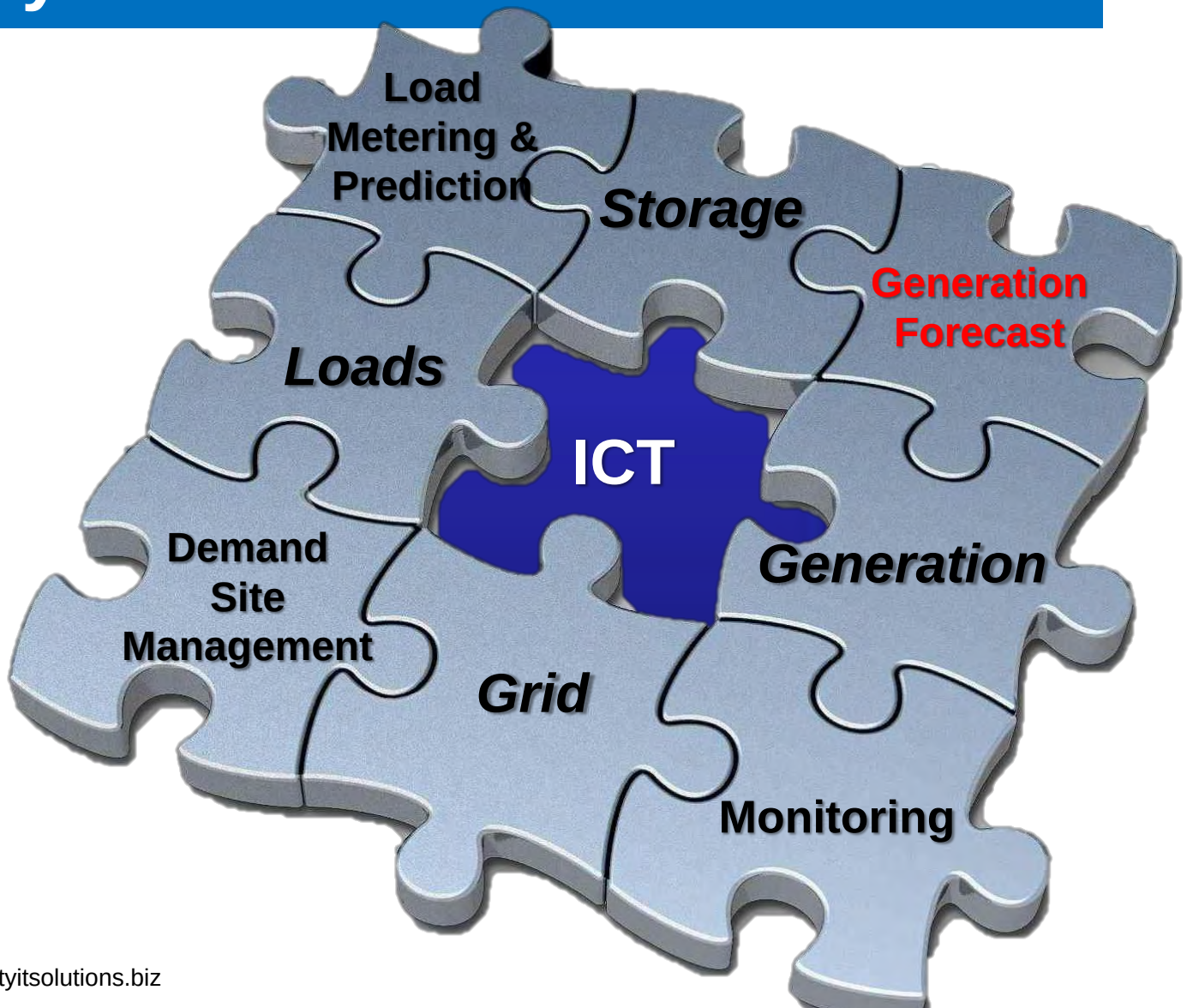

Picture: http://integrityitsolutions.biz

Renewables In Ulm

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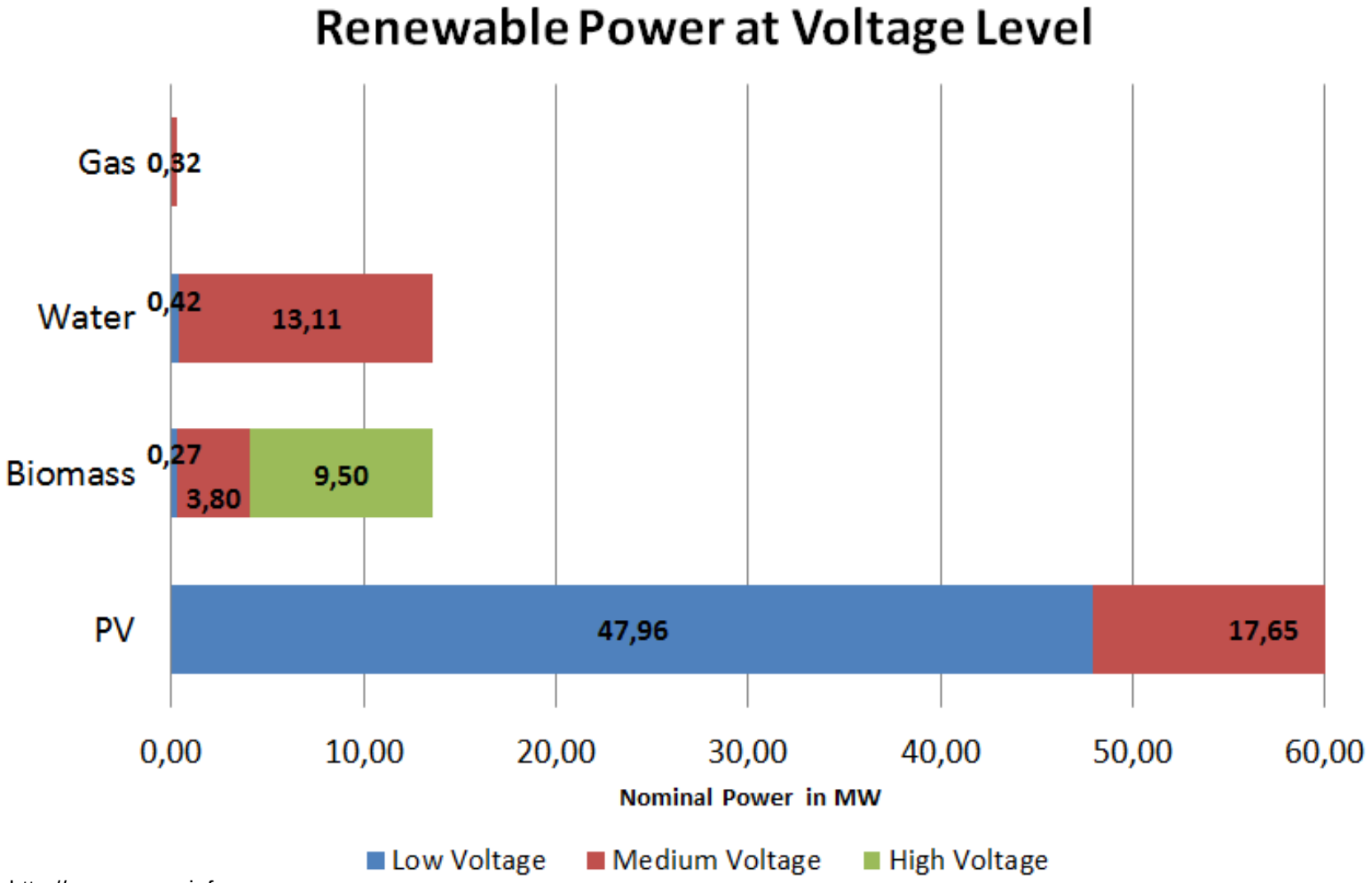

Source: http://energymap.info

E1-Load Balancing - Targets

- What is the effect of the increasing number of PV systems to the electrical low voltage distribution grid?
- How can satellites support the PV penetrated grid? What is necessary?
- How can this forecast be integrated into the grid control center?
- What are the benefits of the users (DSOs)?

Cloud Motion – PV Power Ramps

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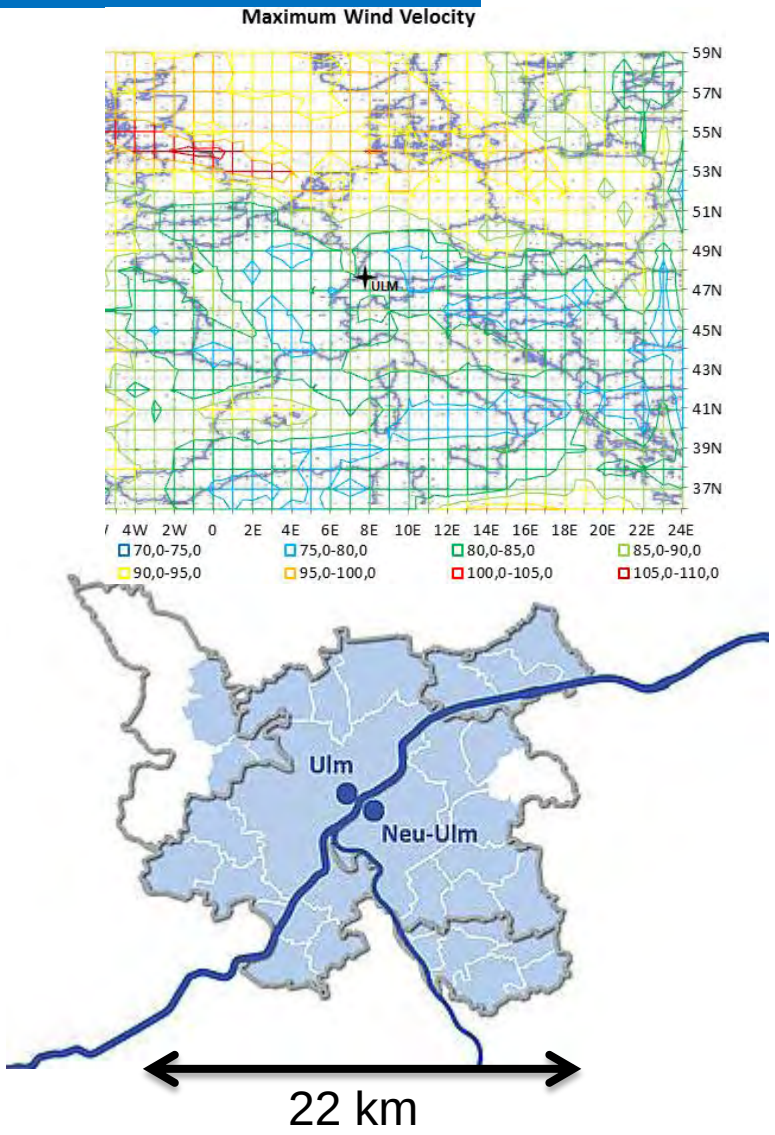
- Clouds forces power ramps in the grid

- What are the effects to the distribution grid?
- How fast?
- How often?
- Spatial balancing effects?



The Product „Load Balancing“ – How Do The Forecast Work?

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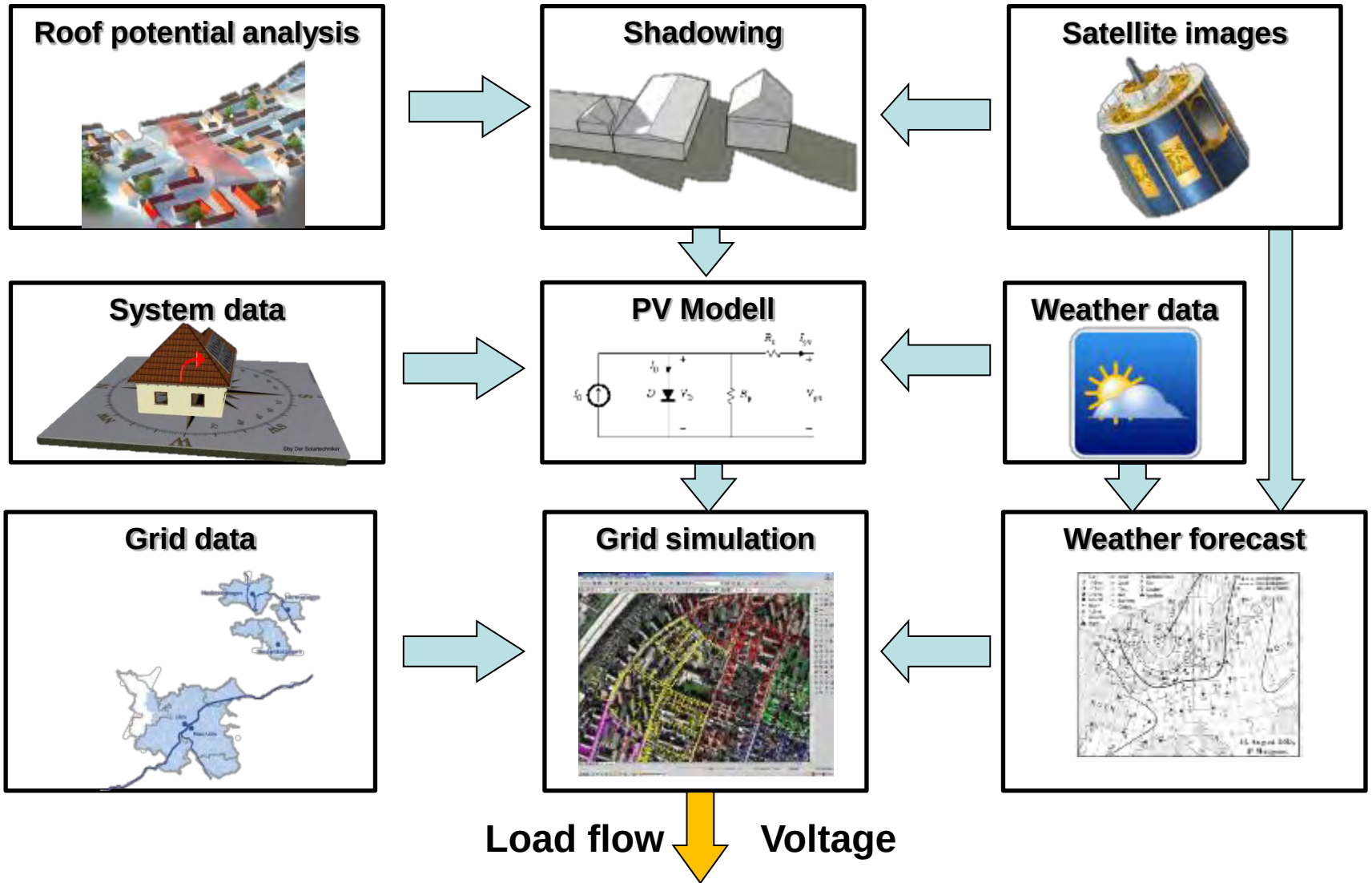

First Test Site

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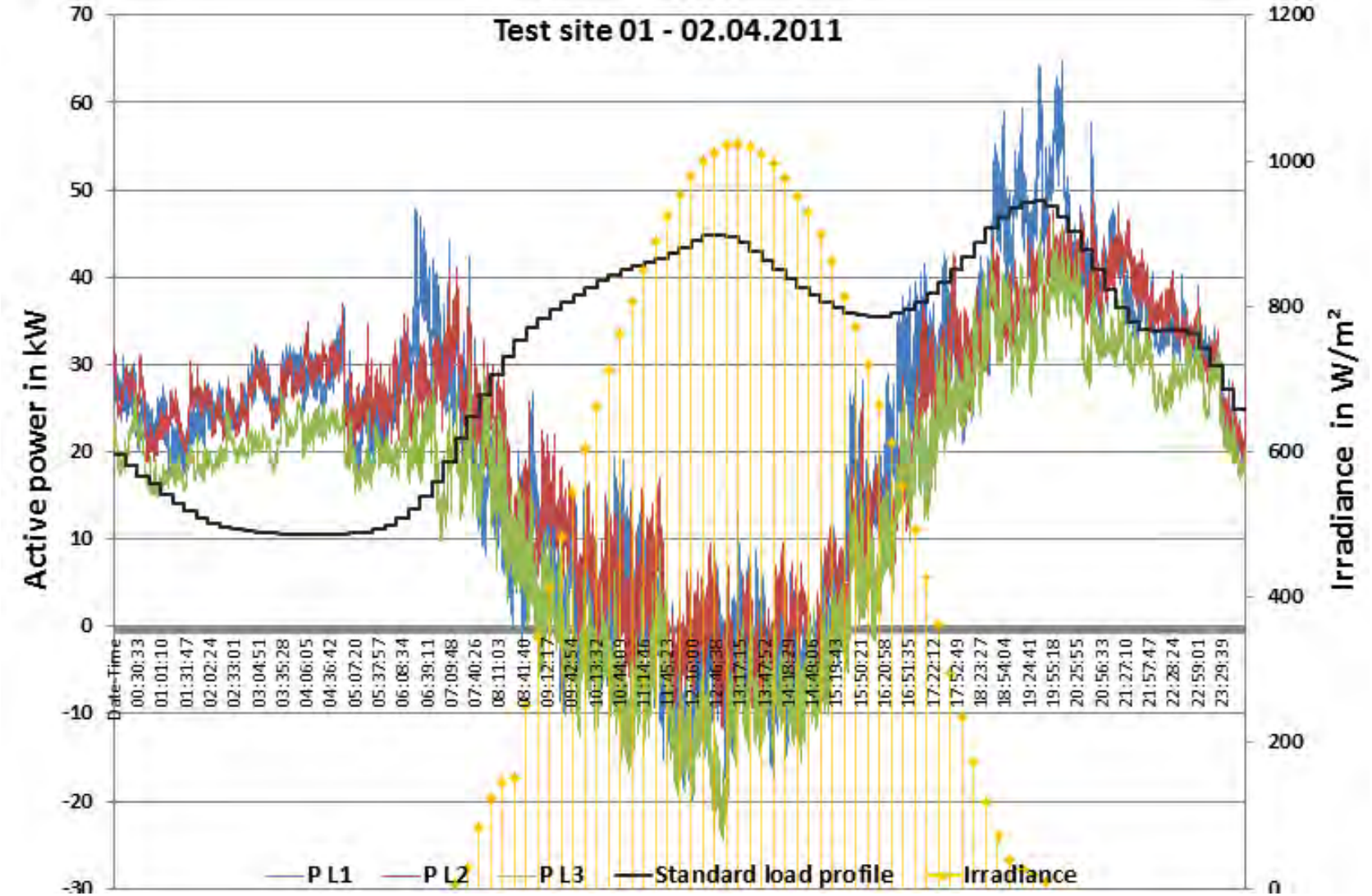
- 133 Houses
- 17 PV, total 221kWp
- 1 Transformer (630kVA)
- 0,2 km²

Only 17 PV systems on 133 roofs – up to now.

Active Power – Sunny Day

Hochschule Ulm



Simulation Active Power

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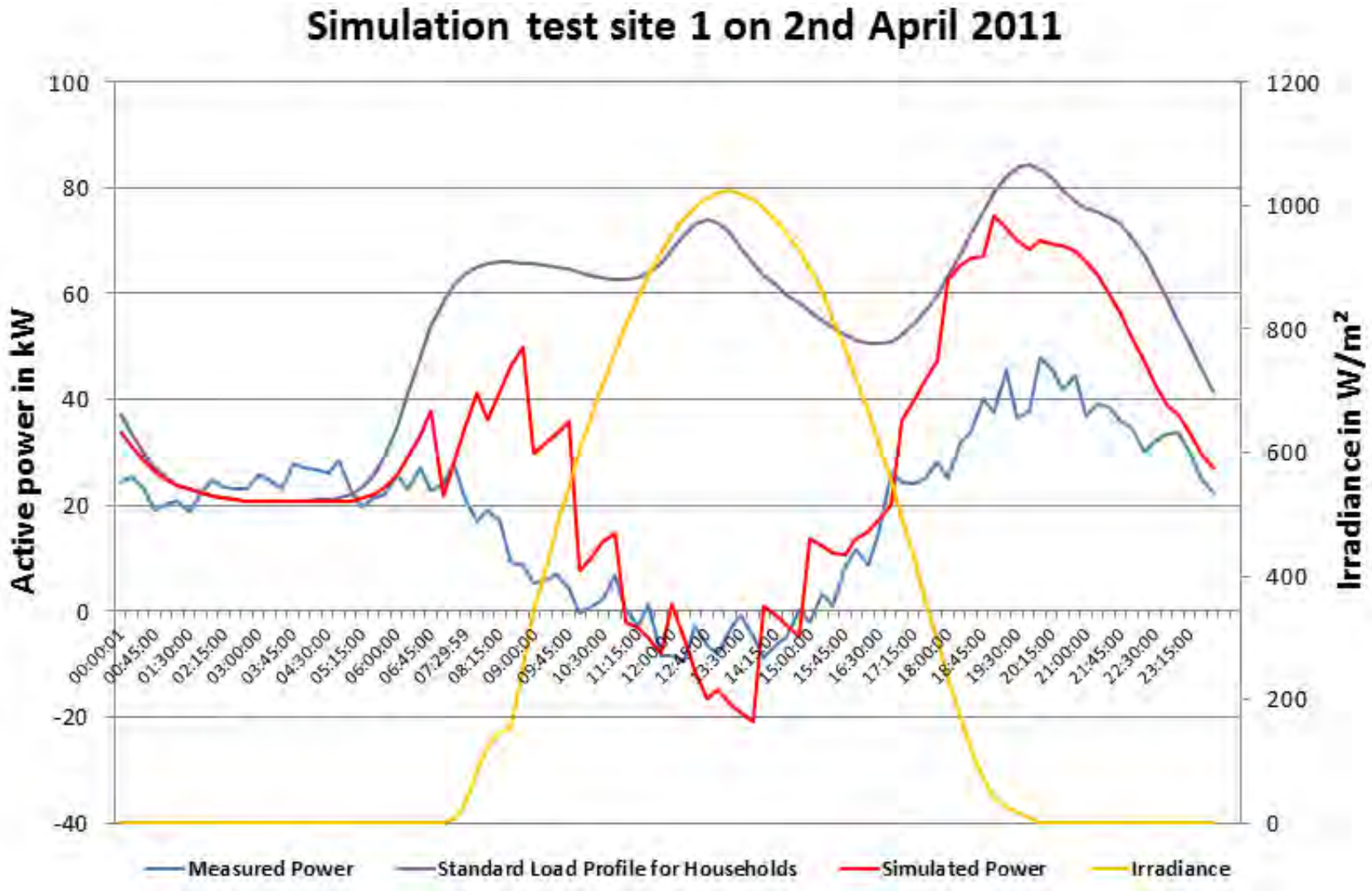
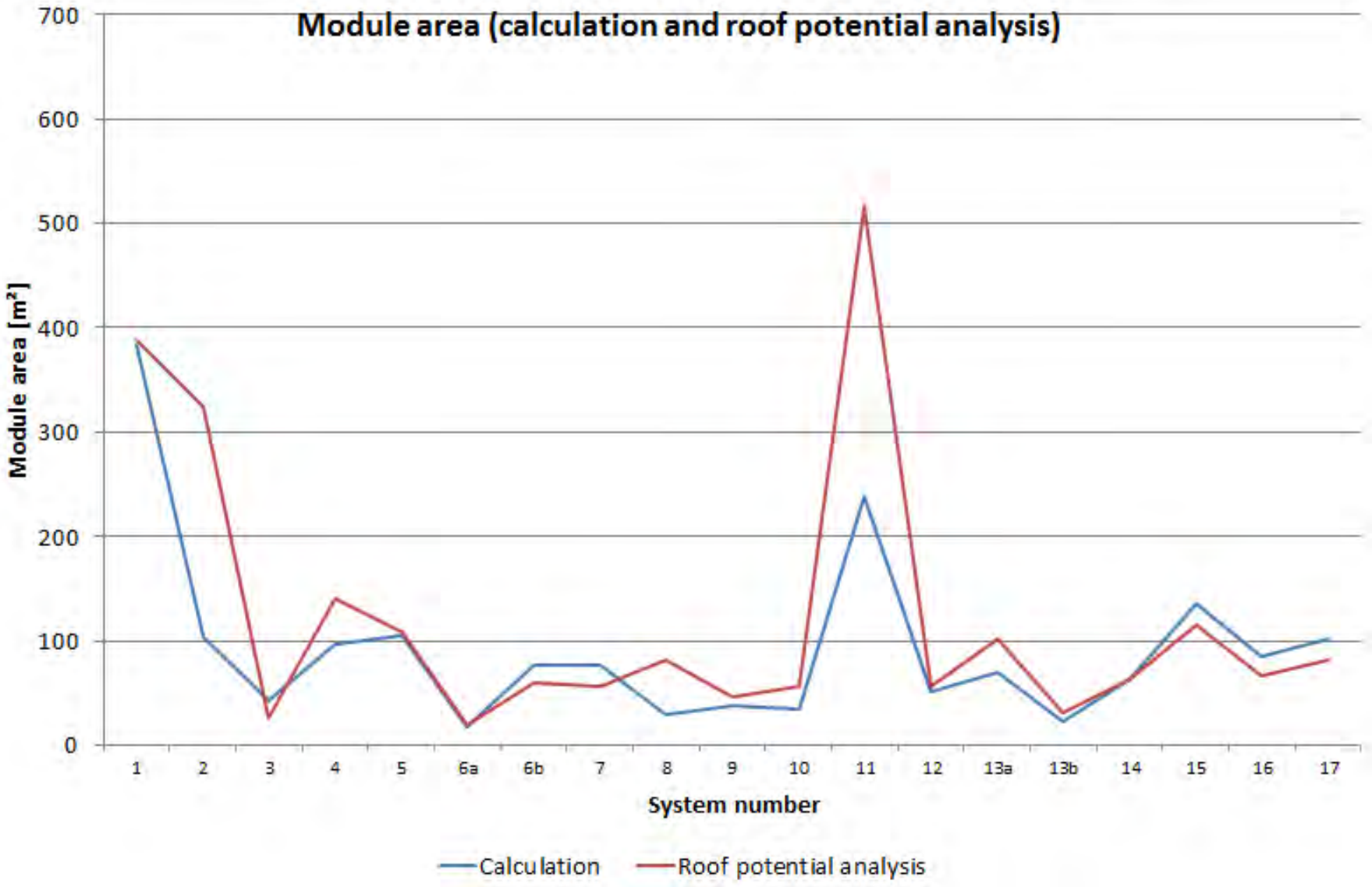


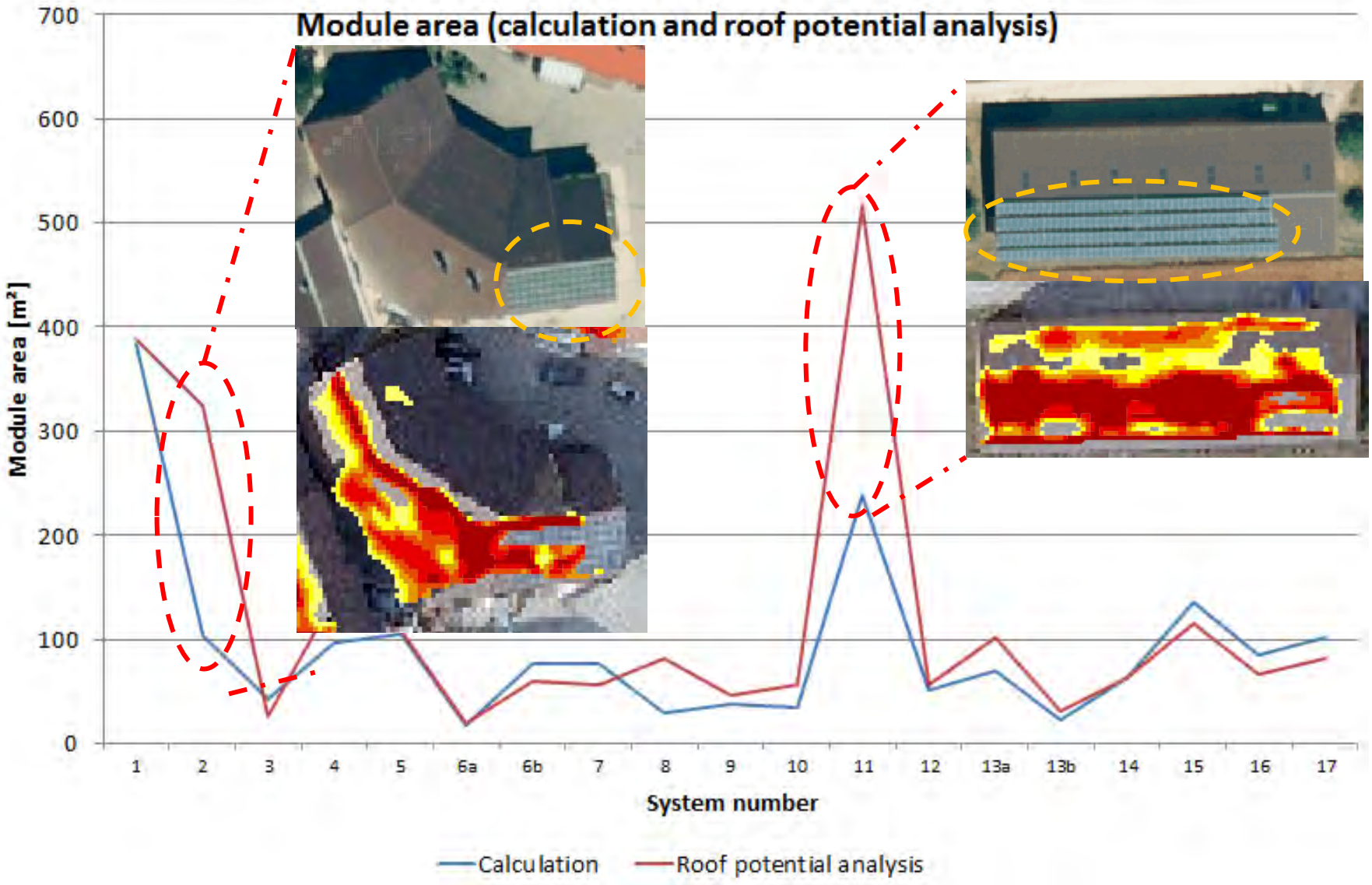
Roof Potential Analysis vs. Reverse Calculation

Hochschule Ulm



Roof Potential Analysis – Deviation and Reality

Hochschule Ulm



Satellite Images – Spatial Resolution

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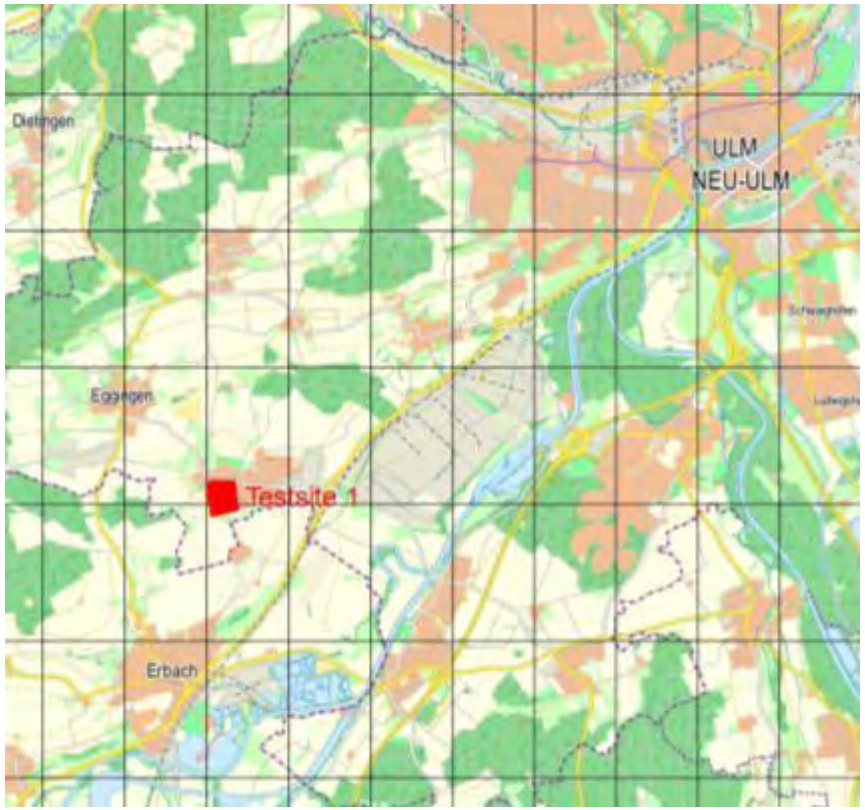
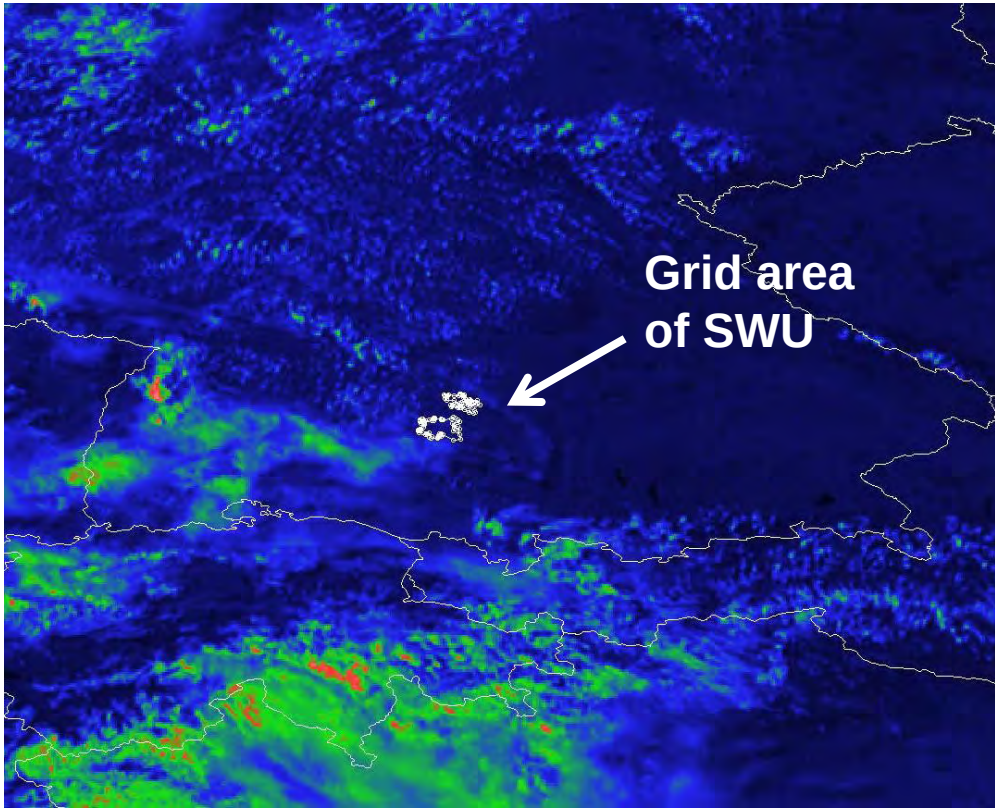


Test site and pixels –
Ground measurements necessary



Grid area and overview –
what is coming to us?

Services

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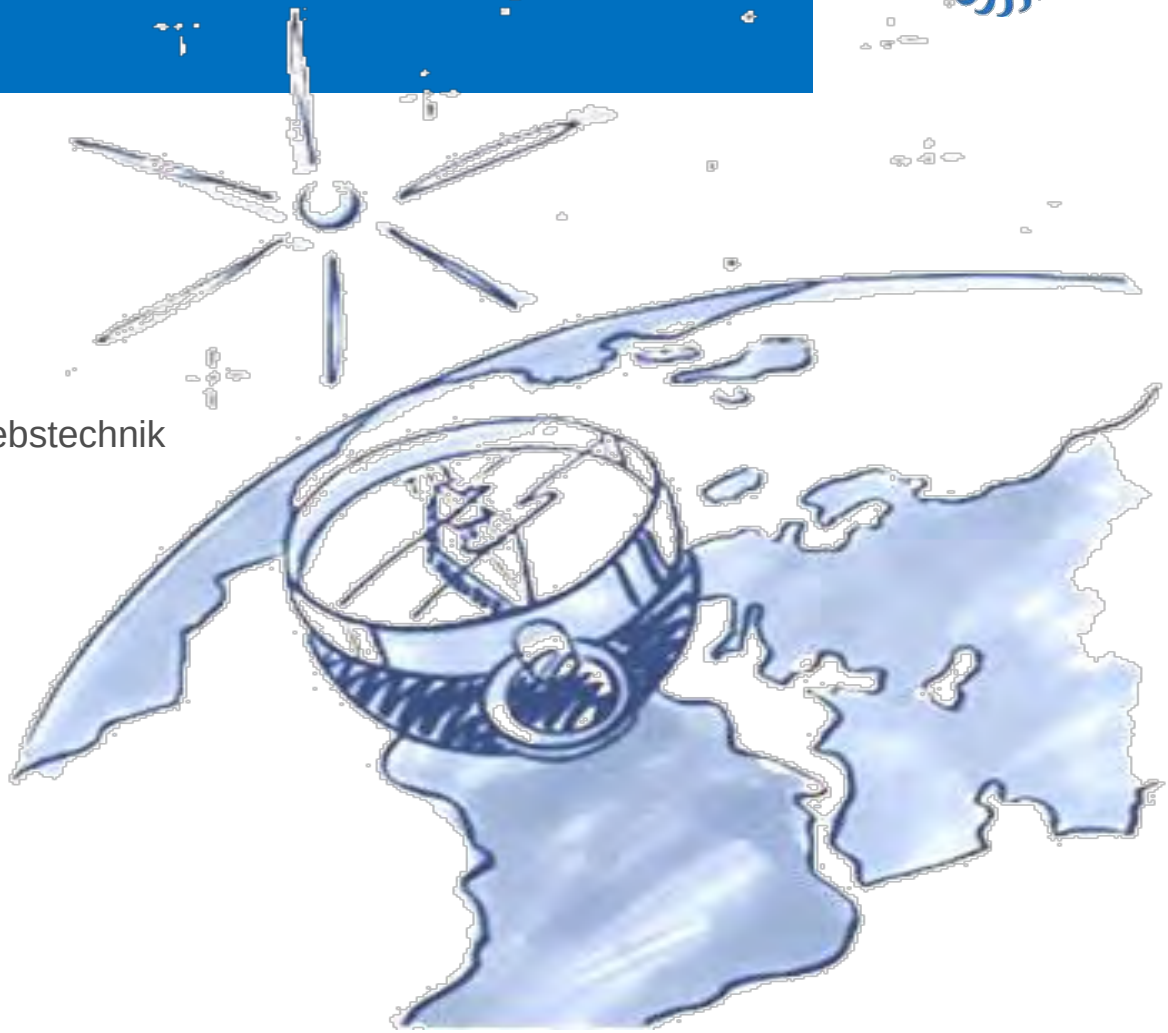
SERVICE

- Strategic and conceptual grid planning
  - How much PV could be installed?
- Grid operation
  - How large is the generated PV power now?
  - And in 1…3 hours?
- EEG accounting
  - How many energy have to be bought? Today? Tomorrow?

Contact



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