THIS PROJECT IS CO-FUNDED BY THE EUROPEAN REGIONAL DEVELOPMENT FUND
investing in your future

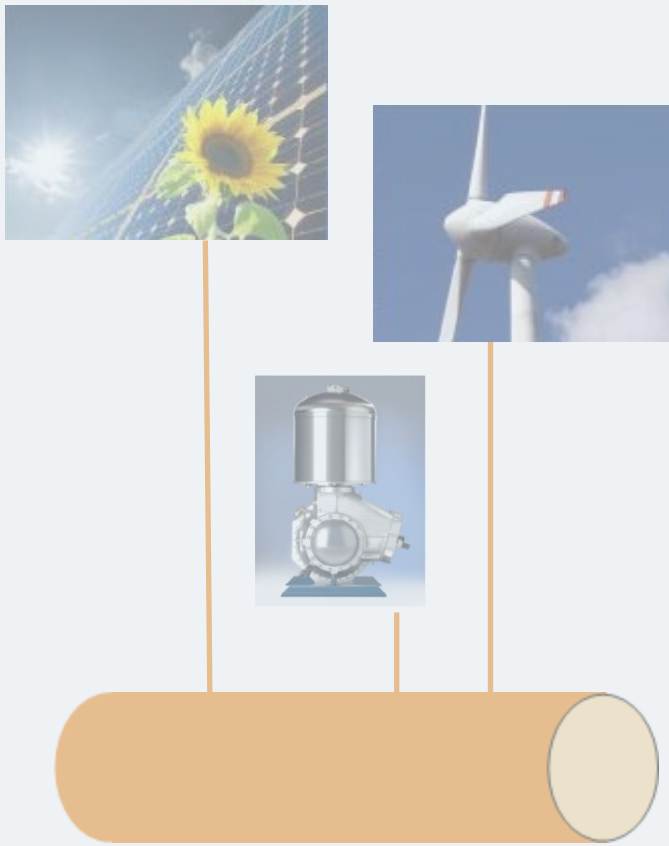
Virtual Power Systems as an Instrument to Promote Transnational Cooperation and Sustainable Energy Supply in the Alpine Space

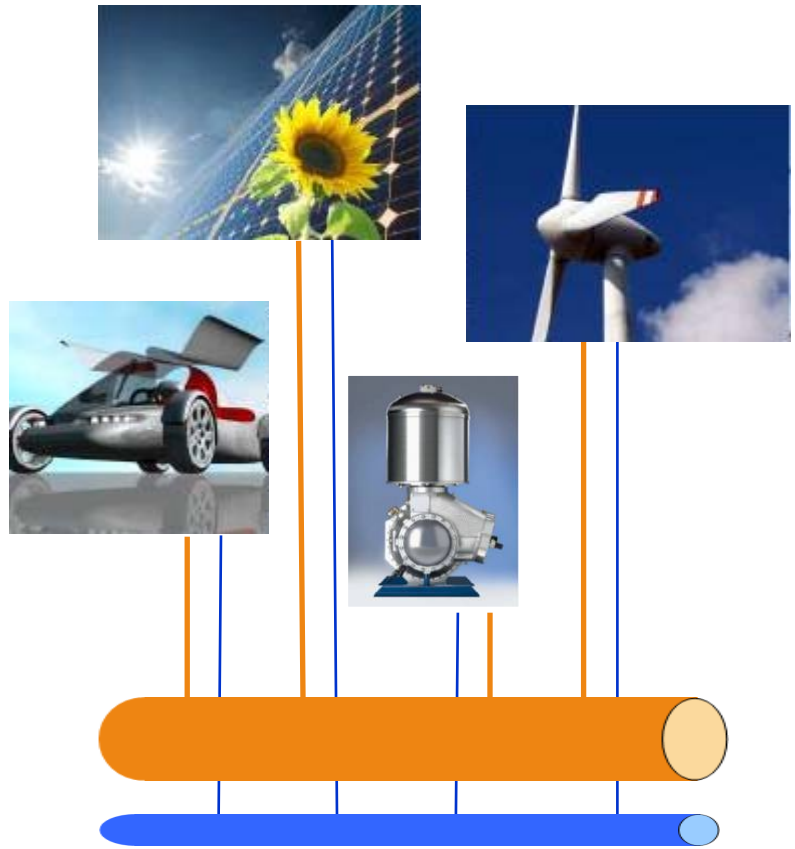
Ludwig Karg

B.A.U.M. Consult GmbH
Gotzinger Str. 48
81371 München
Deutschland
L.Karg@baumgroup.de

www.baumgroup.de

Copper or Silicon?





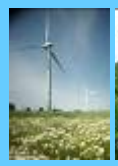
Managing Production and Consumption

VPS (Virtual Power System)

- matching generation and consumption (including storage)
- optimizing usage of existing grid
- new business models (tariffs, services)

VPP (Virtual Power Plant)

- multiple **power generators** (different type)
- controlling effectiveness and efficiency
- protection of grid (no overloads, no peaks)





VLP (Virtual Load Plant)

- multiple **power consumers** (private, biz)
- demand side management to control load
- controlling and optimizing appliances



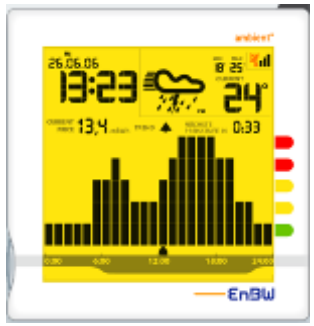


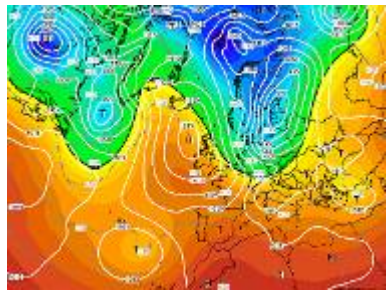
Virtual Power Systems: the AlpEnergy Definition

A Virtual Power System integrates, manages and controls distributed energy generators and storage capacities and links their technical operation to the demand of consumers and the energy market.

Elements to operate Virtual Power Systems

- Smart Meters
- Gateways for decentralized control
- VPS Central Control
- Displays
- New tariffs and services
- Prediction systems
- Intelligent appliances





A new Power World

- Hints to save power - derived from continual measurement of power consumption
  - Load management to reduce costs of municipal facilities and road lighting
  - A heat-pump that switches off when the refrigerator starts - to reduce peak consumption and costs
- Heating a passive house with excess power and forget about the gas grid
- Fuel from the power outlet – but only when it is green and cheap

A new Power World

- Storing wind energy at night with fly wheels, feed in when peak load
- Balancing energy from biogas plants
- Remote start of micro CHPs to cover load peaks
- Consortium of biogas plants and PV-owners jointly selling power
- CHPs and a microgrid for a village in the Alpes
- Giving electric car batteries a second life

AlpEnergy on a Glance

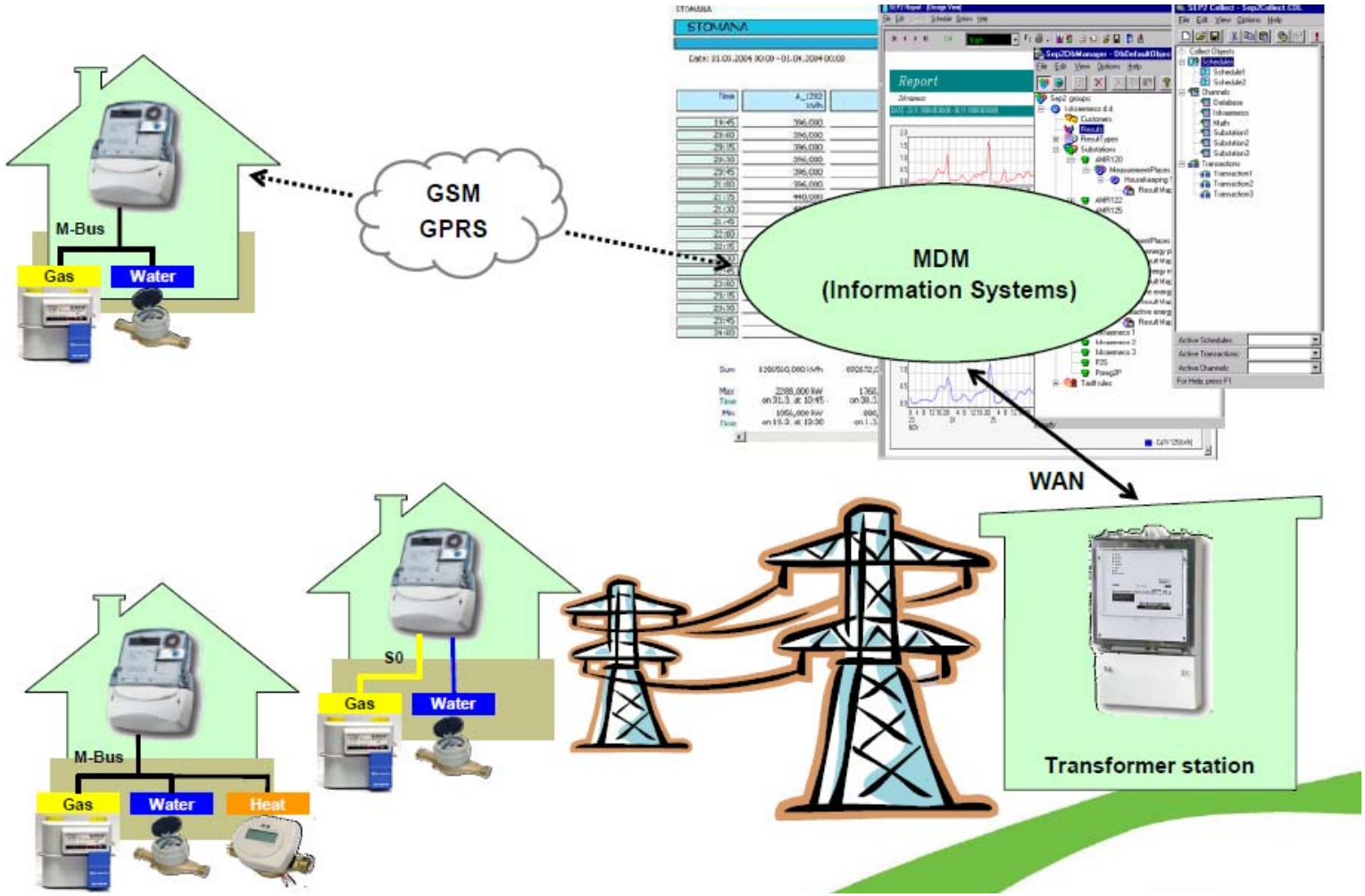
- 12 partners in Italy, Germany, France, Slovenia and Switzerland
- Lead Partner: Allgäuer Überlandwerk (AUEW)
- Budget 2,8 mio EUR
- EC and national funding
  - 76 % European Regional Development (ERDF)
  - 24 % national funding
- runtime 2008 - 2011

AlpEnergy in Gorenjska

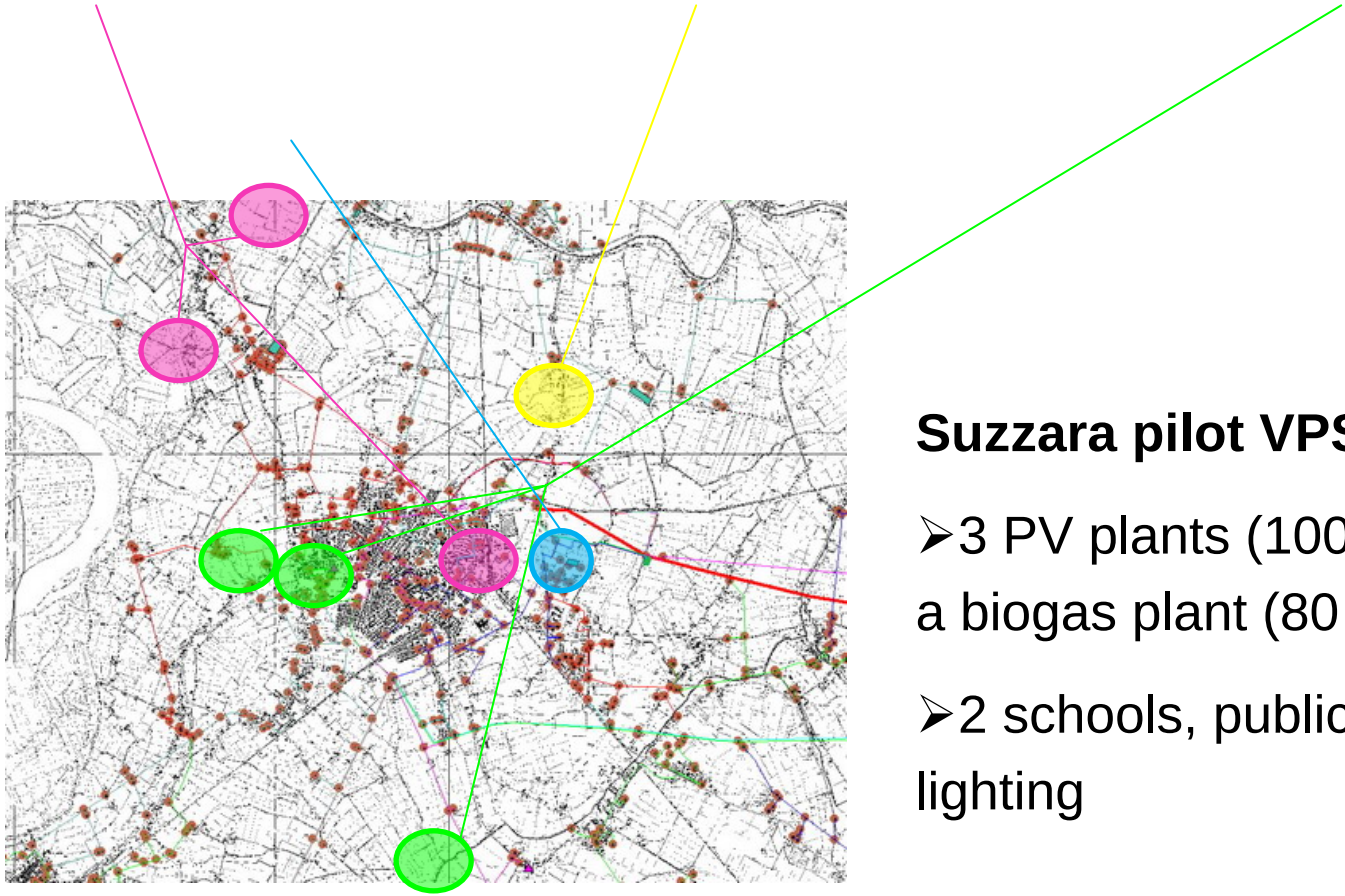
Banking, Telecommunications, Traffic, Telephony, Information society, Public networks, Consumer electronics and finally … **MEASUREMENT**

. . . . . .

AlpEnergy in Gorenjska



AlpEnergy in Mantova



Suzzara pilot VPS:

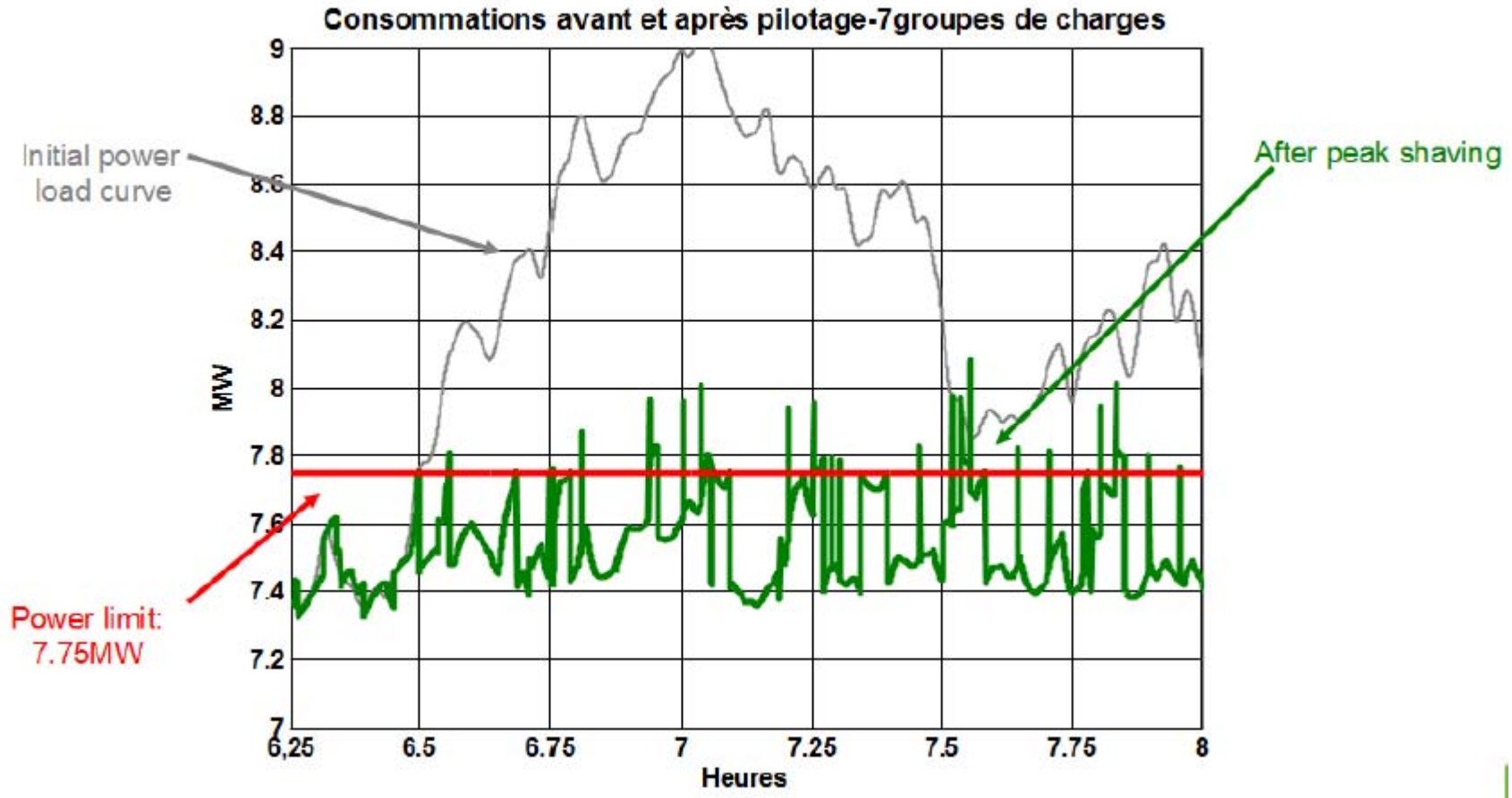
- 3 PV plants (100 kW), a biogas plant (80 kW)#
- 2 schools, public offices and lighting

AlpEnergy in Rhônalpes

- Electrical heating is very developed
  - Represents 10% of the electricity consumption (50 TWh)
  - Equips 22% of the main houses in Rhône-Alpes
  - Equipped 70% of new buildings the last 3 years
- Extreme challenges for the power-grid
  - Large areas in trouble during winter
  - Weakness on distribution network in rural and mountainous areas

But: a huge capacity of controllable loads !

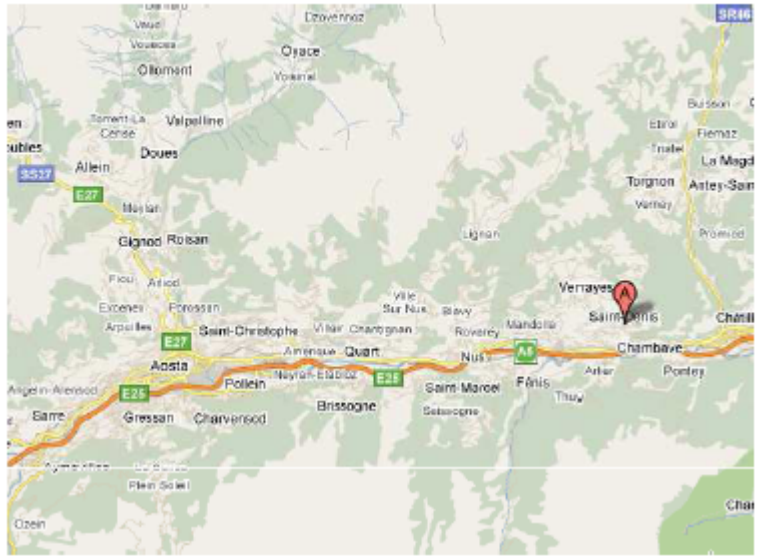
AlpEnergy in Rhônalpes

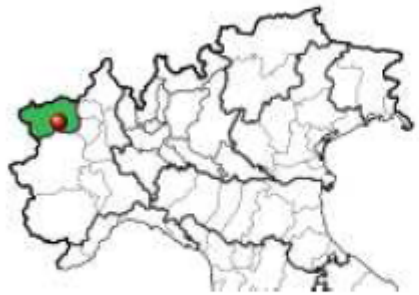


AlpEnergy in AOSTA

Saint-Denis (AOSTA)

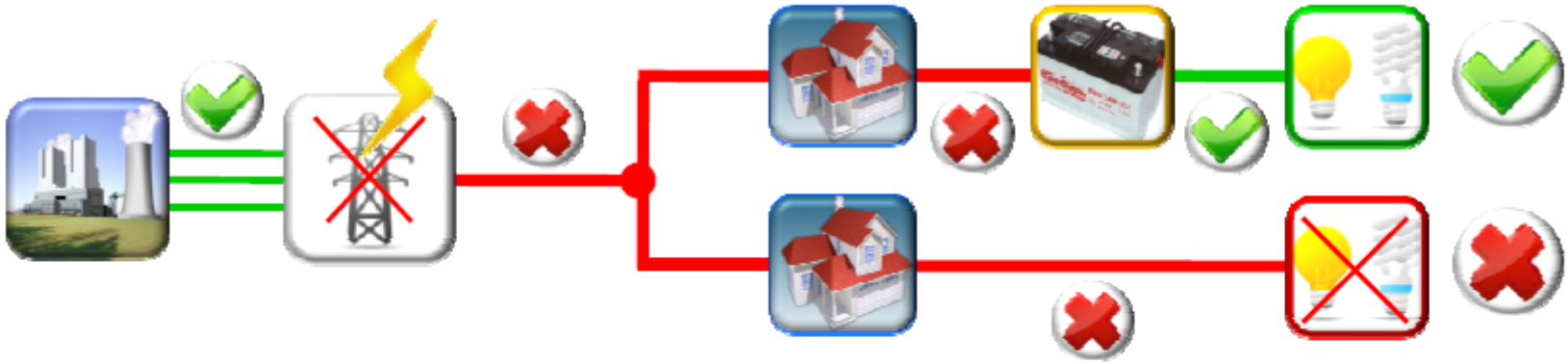
- Small village (370 people)
- Most of mono-familiar houses
- Scattered mountain area
- Possible local energy production (difficult to “export”, local energy storage)
- Difficult internet access (GPRS only)



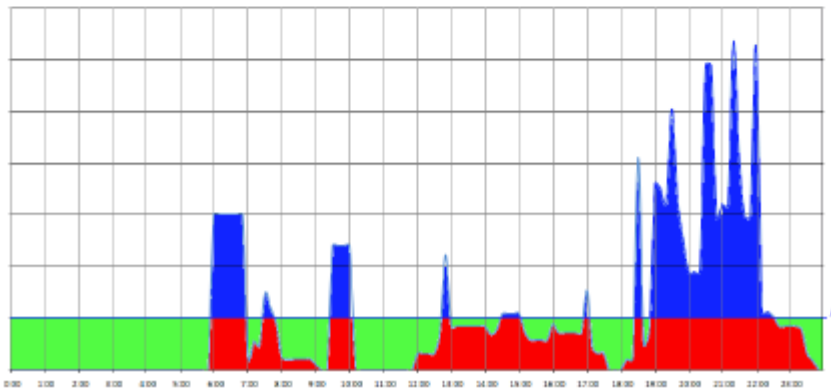


AlpEnergy in AOSTA

- Provide the energy in case of blackout (30min 1hour)



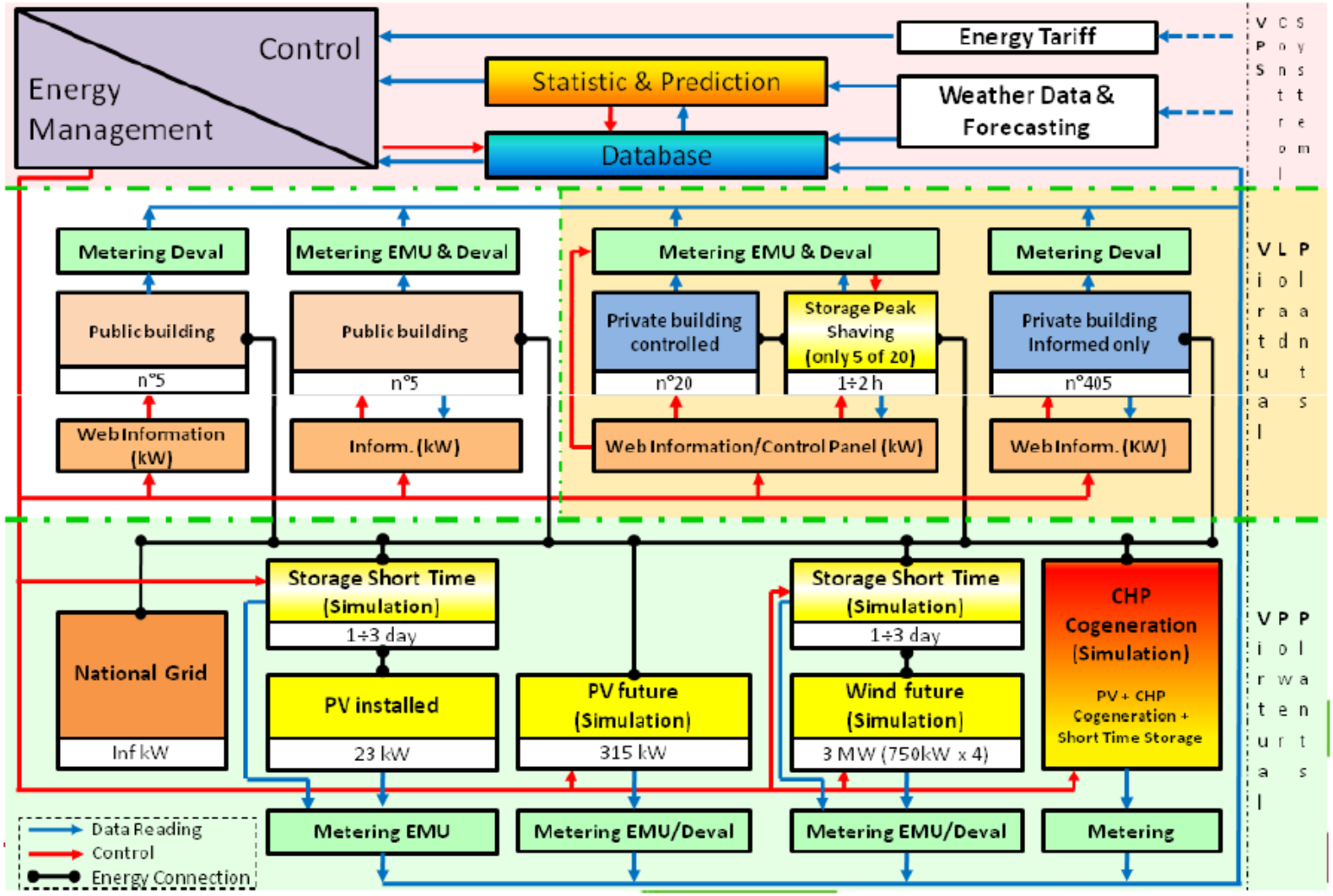
- Manage the energy "Peaks" in case of overconsumption (grid load reduction)



Energy managed by the Storage System;
Energy managed by the National Grid;
Energy available to recharge the Storage System.

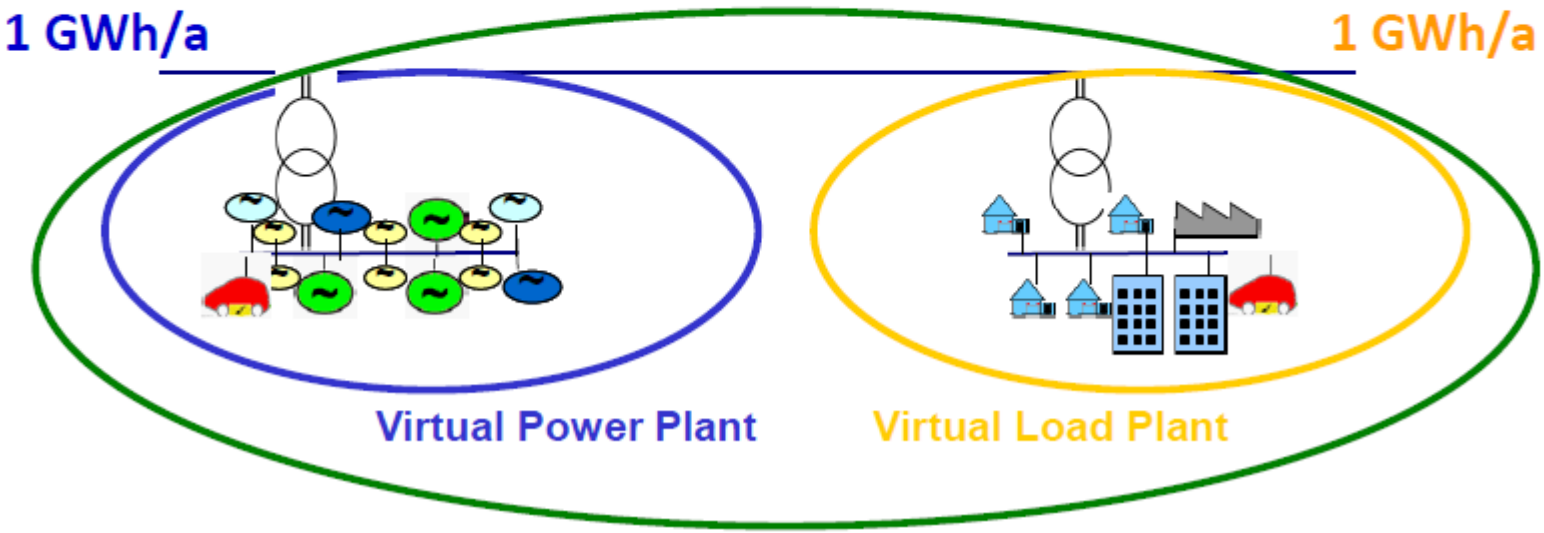
Limited/Controlled energy consumption

AlpEnergy in AOSTA

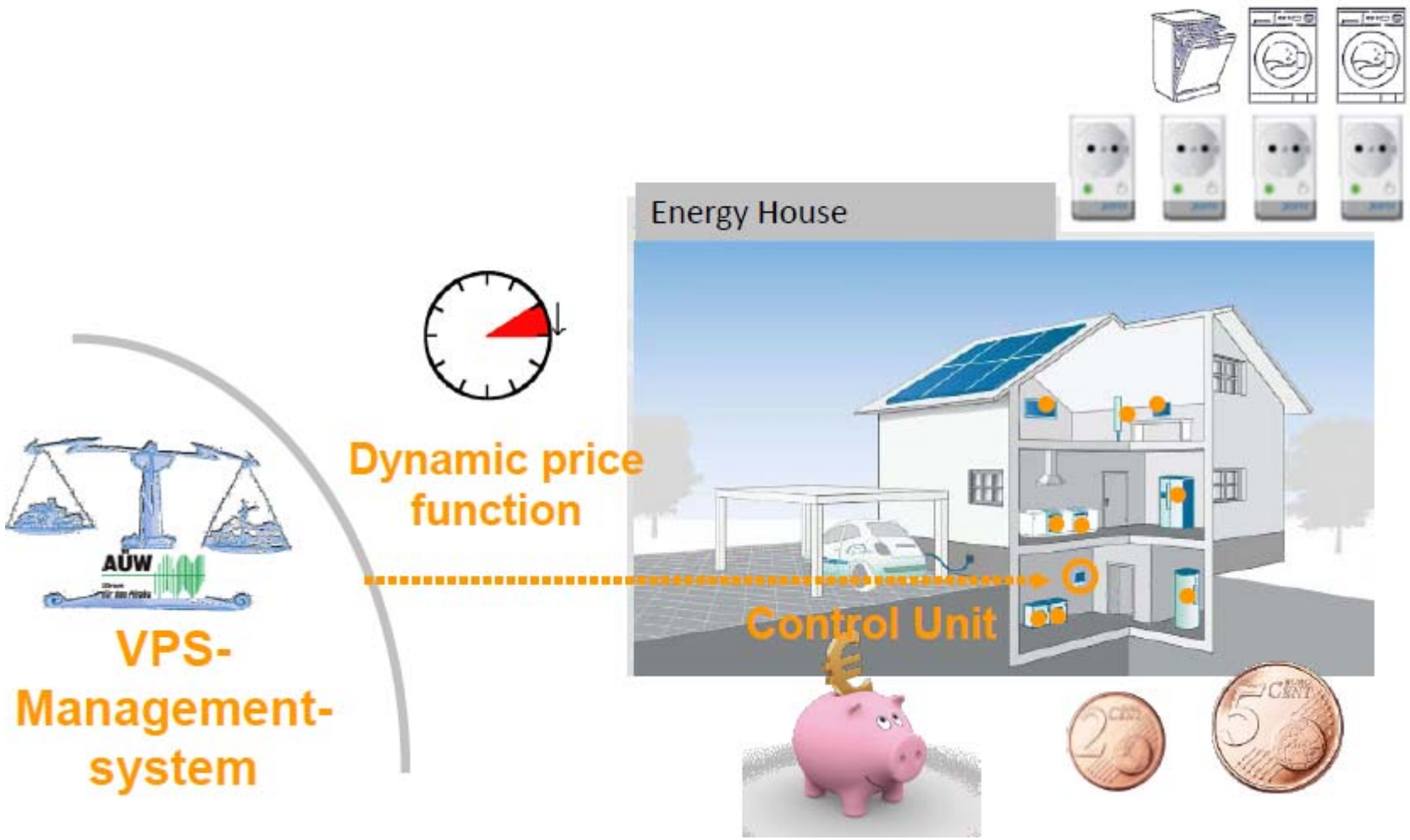


VPS Allgäu

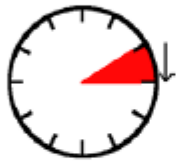
1. Conception 2. Implementation 3. Evaluation



AlpEnergy in Allgäu

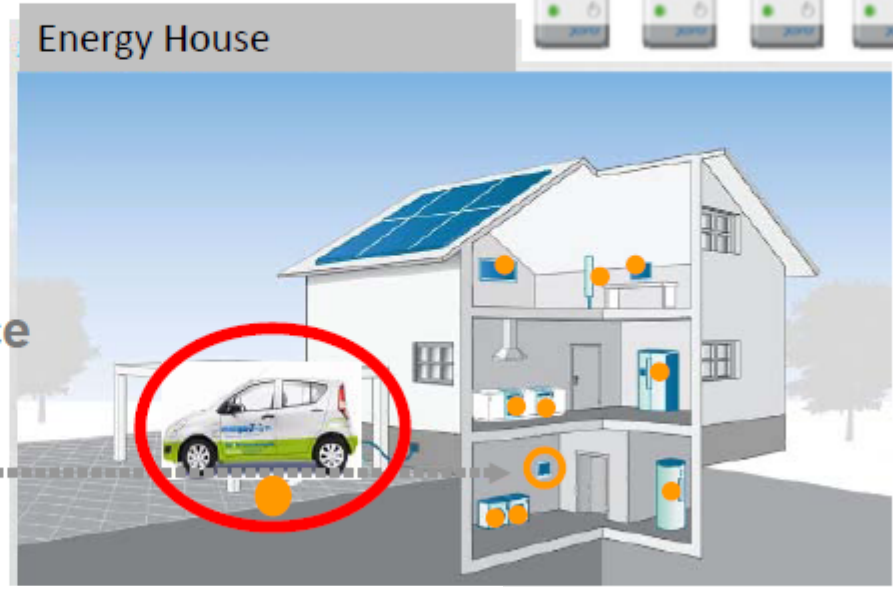


Energy Management System & Electric car



Dynamic price function

VPS-Management-system



First Results of AlpEnergy Project

- Joint platform for experience exchange

www.alpenergy.net

- White Book describing VPS concept
- Masterplans per partner region
- Implementation concepts for parts of the regional VPS solutions
- Feasibility study on cross-border VPS
- Recommendation paper on standards and Interoperability
- Links to other projects in the field of Virtual Power Plants and Smart Grids