Web2Energy

The Intelligent Network of the Future.

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Landis+Gyr

manage energy better

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Smart Grids need a powerfull ICT solution

Web2Energy:

Novel ICT Solutions for Smart Distribution Networks

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- Consortium of 10 Partners (DE, AT, CH, NL, PL)
  - HSE (utility): Consortium leader
  - Landis+Gyr: Smart Meter Solution Provider
- Research project
  - 2,9 MEUR from the EU via the Seventh Framework Programme

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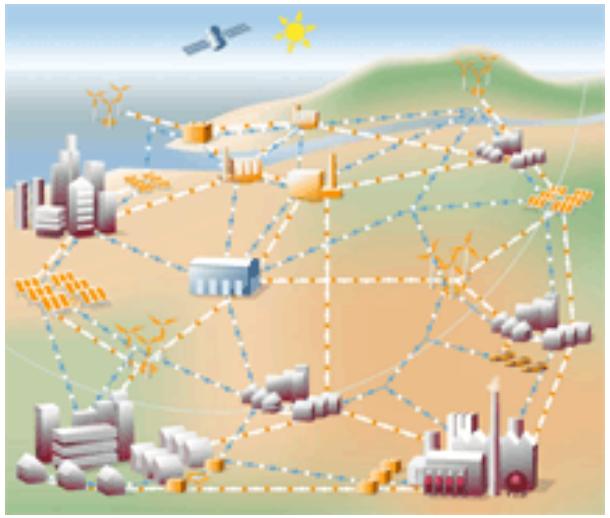
Smart Grid needs a powerful ICT solution



Germany

- *peak load: 80 GW*
- *weak load: 30 GW*
- *strong growth of renewable generation mainly photovoltaic and wind power*

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- Variable Tariffs: Offering variable tariffs. The consumer participates in the energy market and can help to decrease the peak load.
- Smart energy management: A large number of small power producers, storage and controllable loads (industry) will be coordinated.
- Smart terminal automation: Through automation and remote control it will be possible to remotely switch MV (medium voltage) terminals in case of disturbances with supply interruption within minutes for supply recovery. The former manual switching took 1 hour on average.

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The HSE field test area and the ICT clients

management of distributed sources

- waste-to-energy plant
- biogas plant
- digester gas
- combined heat and power unit (CHP)
- hotel (CHP)
- wind energy
- photovoltaics
- hydroelectricity

customer integration, effective demand side management

- friendly customer
- industrial power plant
- housing and industrial estate

self-healing capabilities

- CC control center
- transforming station (TFS)
- transforming station with power supply photovoltaics > 1,5 MW
- substation
- S substation with splitting switch
- telecommunicated short circuit meter
- cut-off point

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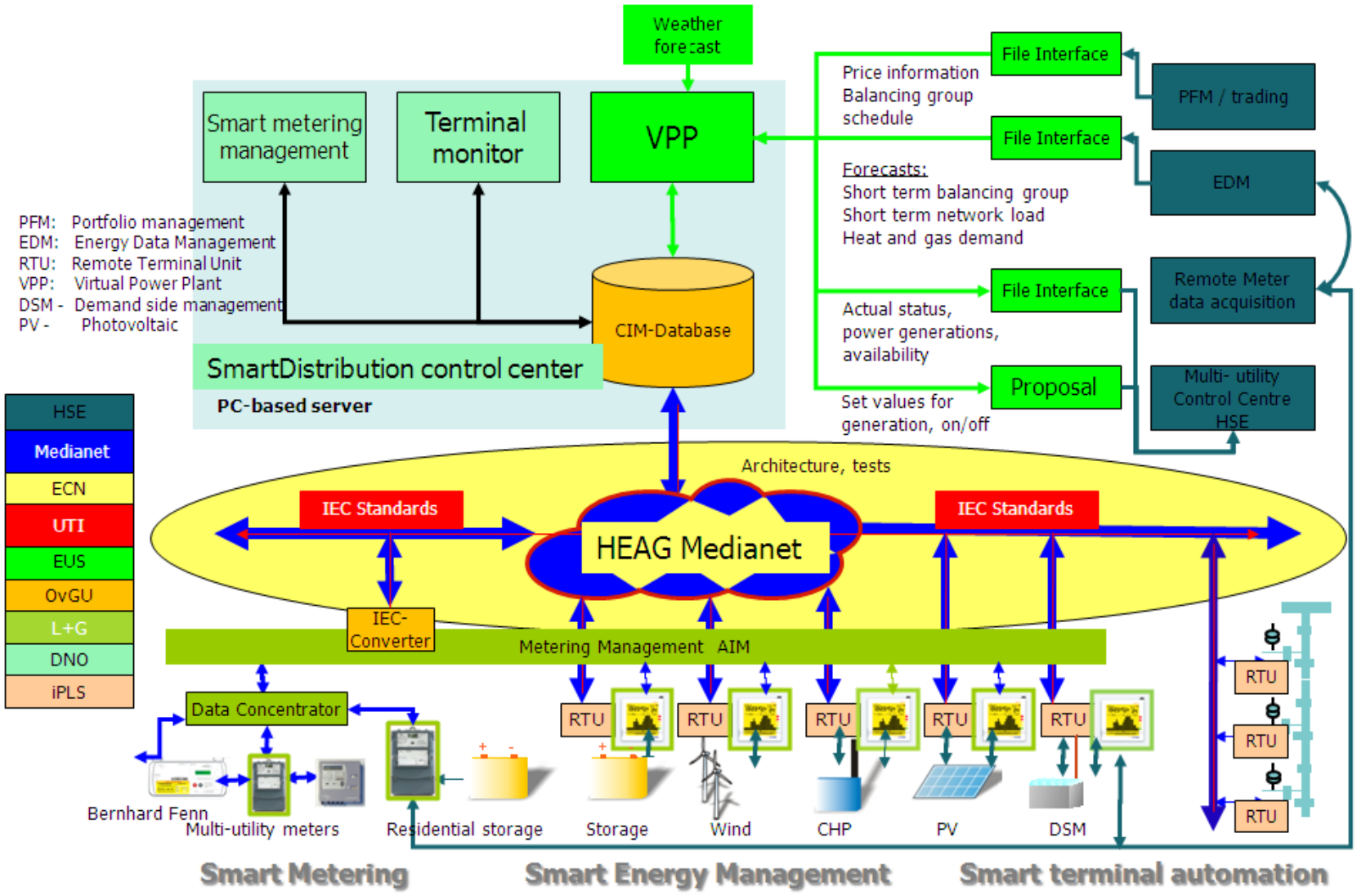
The HSE field test area and the ICT clients



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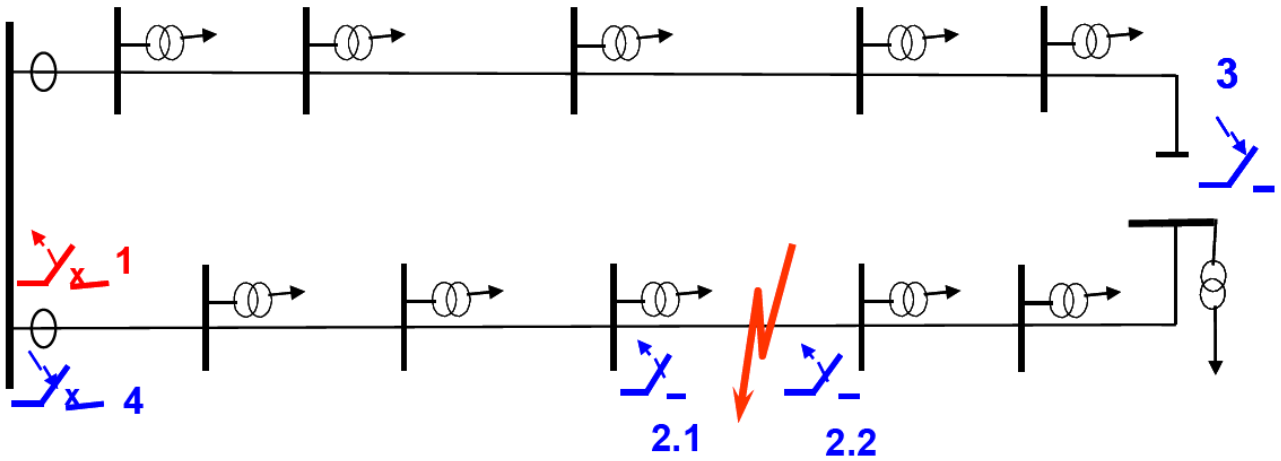
Smart terminal automation



Test area for Smart terminal automation

- A 20kV loop at a 110/20kV substation was selected.
  - All terminals will be obtained with RTUs and monitored regarding the short circuit indicators and the isolator switch status.
- Expected benefits shall exceed:
  - Reduction of energy not delivered in time: 75 %
  - Shortening the average interruption time from currently 45 minutes to 20 minutes

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Renewable energy generation

Die Bundesregierung

Renewables as part of W2E

Today, renewable energy generation is not scheduled based on economics.

+ Renewables generate the maximum possible power independent of the current demand.
+ The price per kWh for renewable is fixed and usually much higher than the market price for energy.
+ Renewable energy units are not obliged to schedule their output. The TSO is responsible for managing fluctuations due to renewables.

A growing part of the energy production is fully independent of any market mechanisms.

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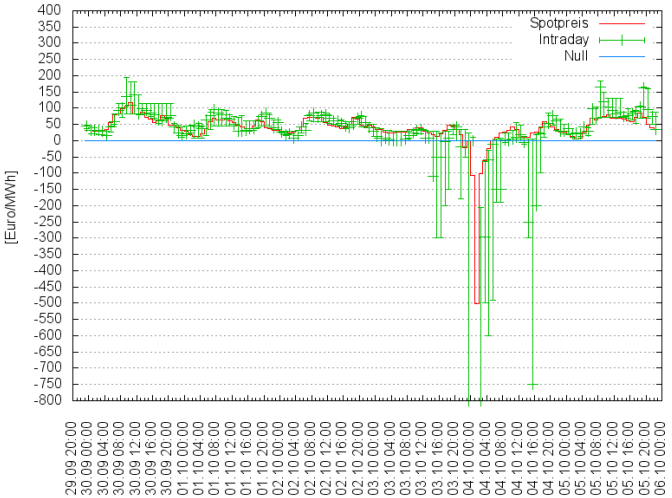
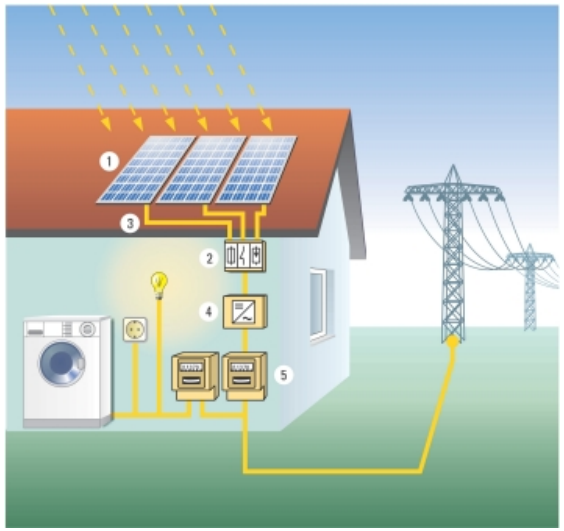
Renewable energy generation



Negative price for energy

In April 2008 the German power exchange in Leipzig (EEX) introduced the concept of negative price for energy.



Impact on the DSO

Renewable energy generation not only impacts the TSO but also the DSO. Some renewables feed energy in the low and medium voltage network. In this case the DSO has to adapt their network management.

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The Virtual Power Plants

VPP component type and installed power (kW)

gasturbine (1)	104.000	controllable 391.970
biogas plants (1)	370	
combined heat and power (3)	6.000	
digester gas (3)	1.500	
storage (20)	100	
controllable load	280.000	
- W102	55.000	
- W18	172.000	
- W21	53.000	
windenergy (3)	9.000	intermittent 11.550
photovoltaics (17)	2.550	
hydroelectric with 10.000 kW		

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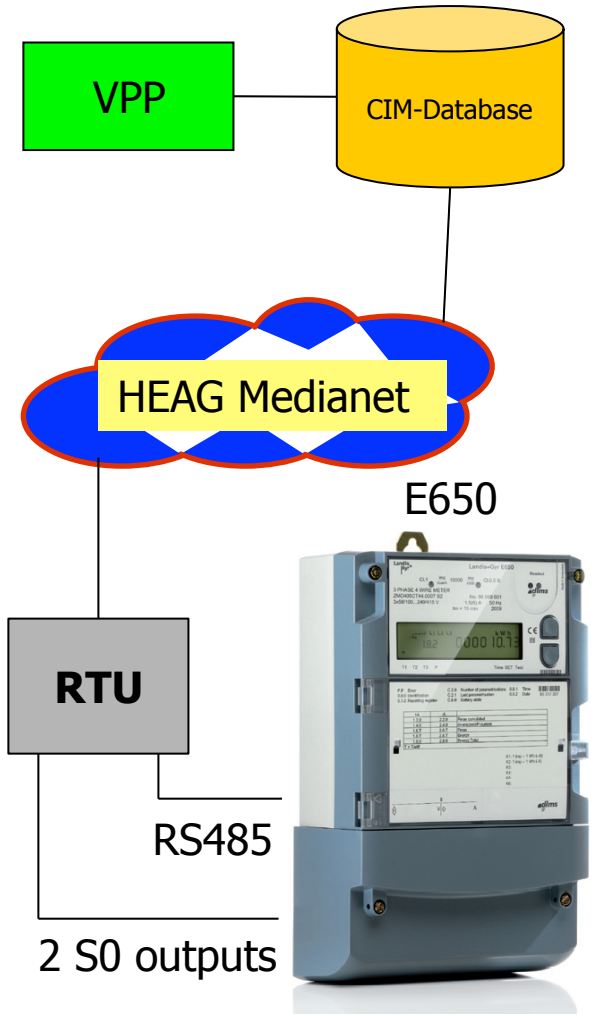
The Virtual Power Plants



The target

- Connect individual energy producers to virtual power plants.
- For the project, the meters for the virtual power plant are parallel to the meter for billing purposes

The E650 ICG meter

- The Landis+Gyr ICG meter E650 will be connected to an RTU.
  - The RS485 is used to transmit register values
  - The S0 output is used to transmit energy proportional pulses in short time frames.
- The RTU utilizes IEC 61850
  - One main subject is to enhance IEC 61850 for Smart Grid / Smart meter applications

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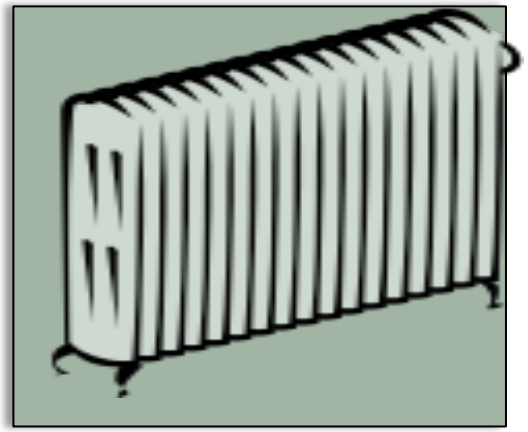
Controllable Loads in the Smart Grid



Controllable load (consumer)

+ Most of the controllable load in the project is thermal storage heating.
+ The load is switched on and off via ripple receivers.

Utilized Infrastructure

+ The project utilizes the existing infrastructure of ripple receivers, meters and thermal storage heating devices.
+ Minimizing CAPEX in the field

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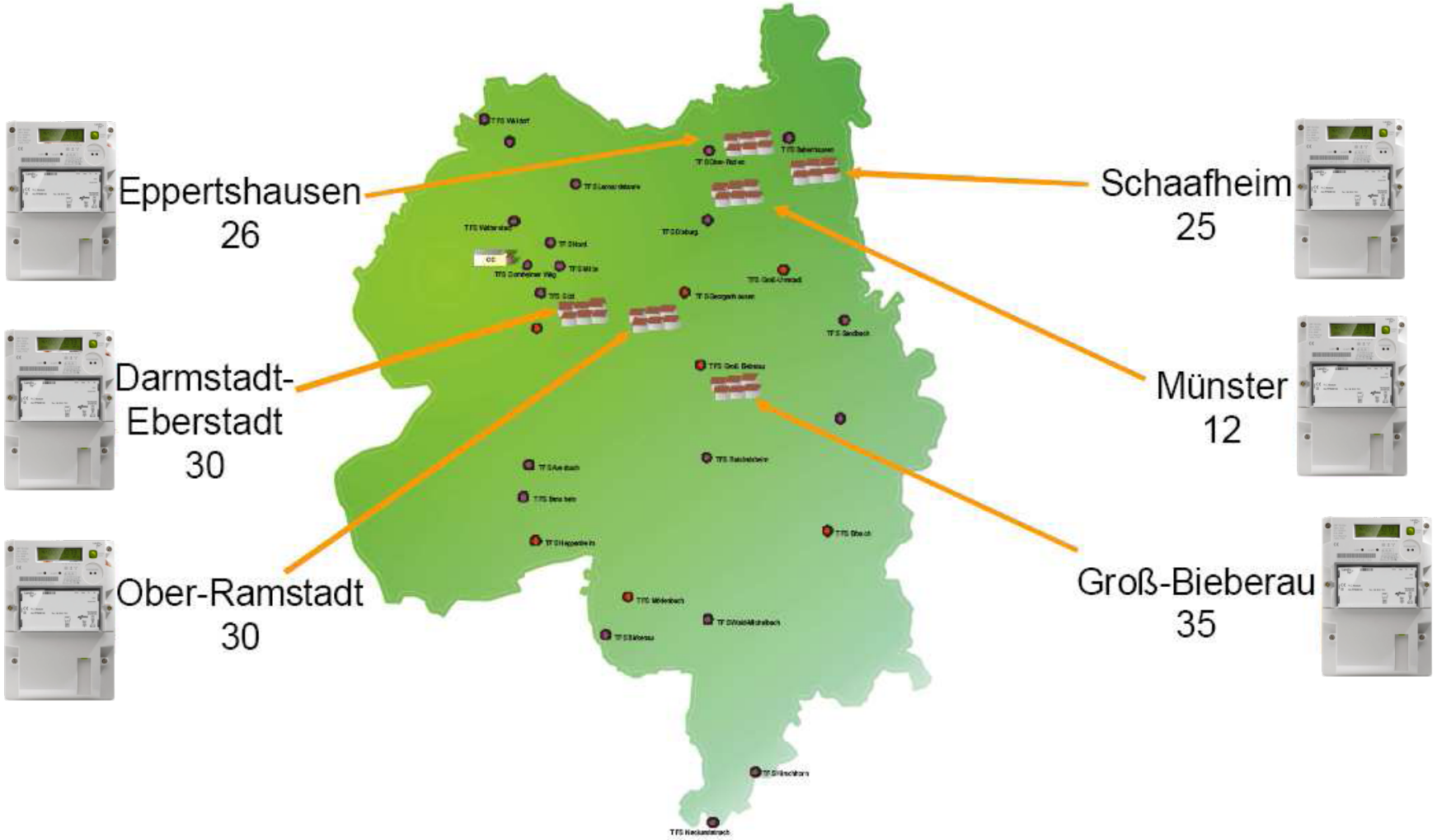
Smart Consumer



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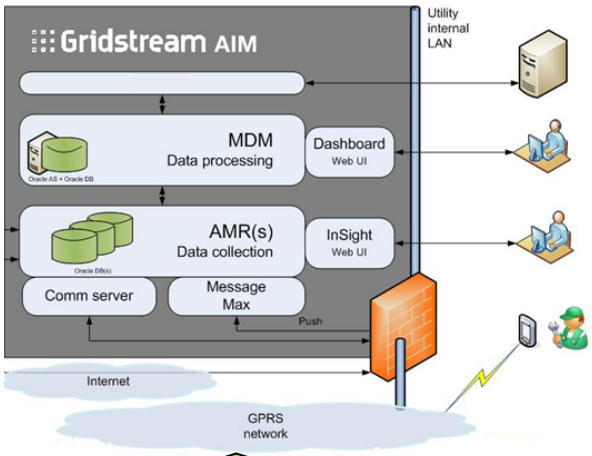
E350 plus Gridstream AIM



E350 & E35C

The target

+ The project Web2Energy investigates the willingness of the people for energy saving and load shifting due to better information on cost and demand. A user-friendly Web-portal will be used.

The E350 with GSM/GPRS

+ The project utilizes the E350 with GSM/GPRS communication due to its future-proved modular concept.

Gridstream aim

+ The project utilizes the existing Gridstream aim system. The system is unique because one can download tariff schedules.

AMM-System

Flexible Tariffs: A view of Landis+Gyr

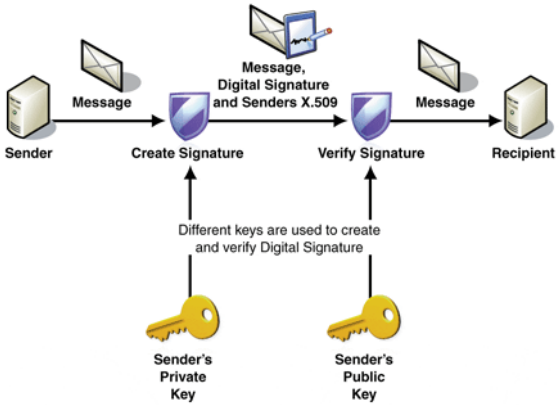
Flexible tariffs need an integral approach

	Fixed	Time Variable	Price Variable	Time & Price Variable
Time Frame	static	dynamic	static	dynamic
Price	static	static	dynamic	dynamic
Example	*T1/T2*	*tariff bleu*		

- \+ Usability for billing purpose taking into account the German law for meter certification, consumer protection as well as the capabilities of the IT and communication infrastructure including cost for equipment and process
- \+ Consumer-friendly because end users shall control their energy consumption. Need for appropriate information systems with sufficient "early warning" (What is the cost for electricity in 3 hours?)

SyM² – E750
Revolutionary tariffing scheme

Tariffing like in the telecommunication industry



Tariffing outside the MID seal

Data signature using a private and public key enables the tariffing outside the certification seal.

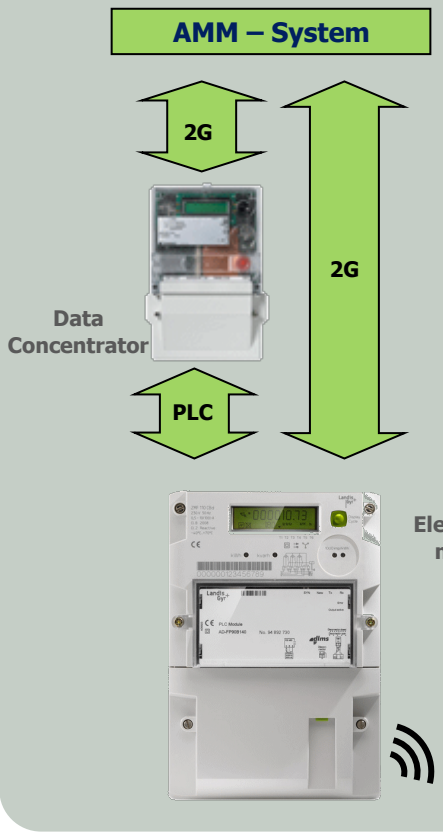
Total Cost of Ownership

- \+ future prove of investment
  - \+ flexible for new tariff schemes
  - \+ „Smart Grid" ready
- \+ improved customer royalty due to flexibility on tariff schemes
- \+ lower certification cost
  - \+ no need to certificate the multiple tariffs
  - \+ no need to certificate the load profile
  - \+ no need to certificate the pulse output
  - \+ the time for certification can be reduced from 7,5 to approx. 2 hours, resulting in **25 €** lower cost.

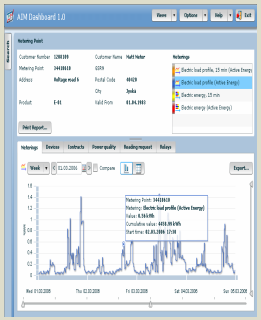
AMM-System: A view of Landis+Gyr
Utilized Customer Information Systems

AMM-Systems with CIS for energy efficiency

Smart Metering Solution



Web-Portal



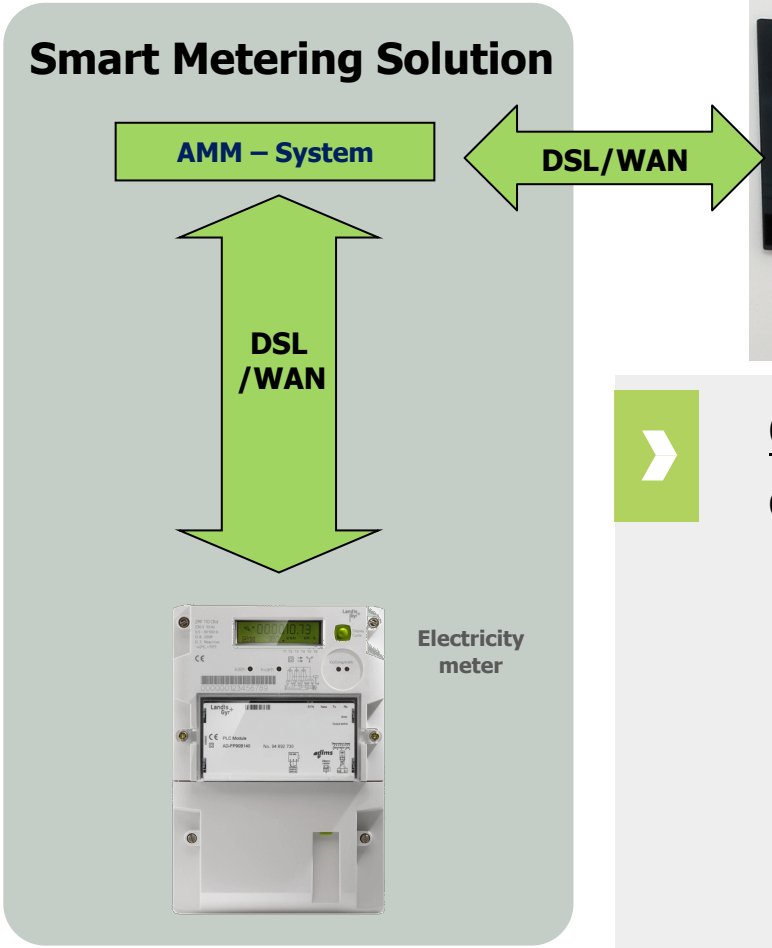
+ updating the consumption values usually every 24 hours
+ tables for the TOU scheme can be updated and transmitted to the meter

Home-Display

+ updating the consumption values usually every 15 seconds
+ displaying the actual and historical consumption in kW, kWh und Euro

AMM-System: A view of Landis+Gyr
Broadband Customer Information Systems

AMM-Systems with innovative Customer Information Systems



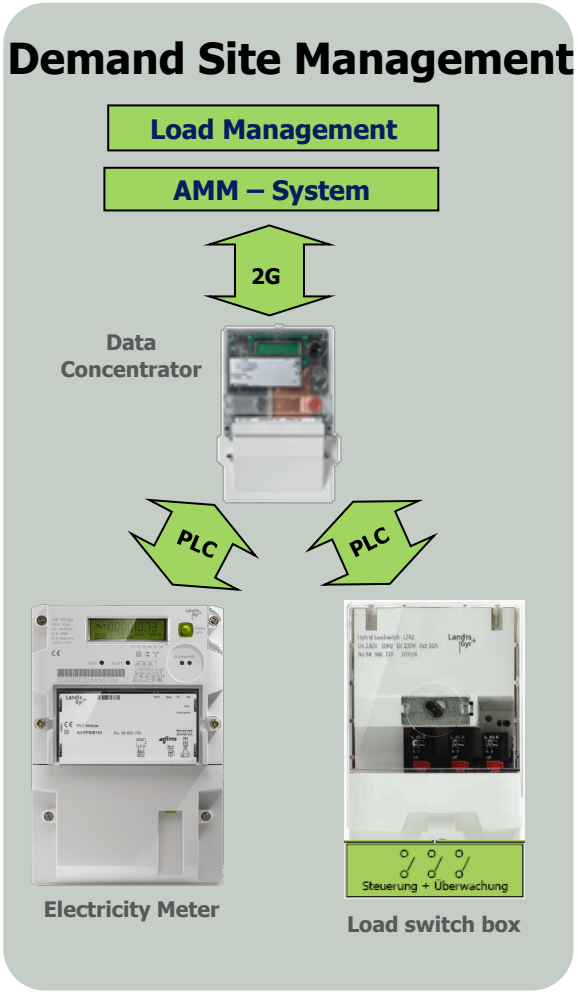
Customer information

data transmission based on Ethernet:

+ energy management information (instantaneous power, consumption profiles etc.) are transmitted in short intervals (e.g. every 1-2 seconds) and visualized in real time
+ billing information is transmitted in longer intervals (e.g. week/month etc.)

AMM-Systeme: A view of landis+Gyr
An innovative road to Demand Site Management

AMM-Systems and Demand Site Management



Conventional Load Ripple Control

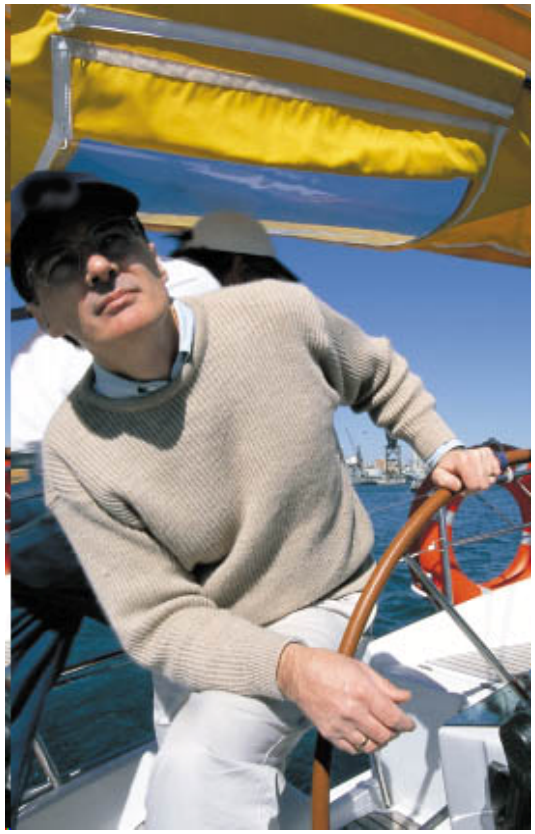
+ proven technology for load management and DSM and tariff switching

Load Management of the 3rd Generation

+ Smart Load Switch Box enabling dynamic load management utilizing the two-way communication of Smart Meters (PLC)
+ Relays for direct load control e.g. 16A, 25A or 40A
+ Status information is transmitted from the field into the central station
+ Hybrid load switch boxes are able to receive PLC as well as ripple receiver signals

Summary
From Smart Metering to the Smart Grid Meter

Summary



- **Web-2-Energy**: Landis+Gyr participates in one of the most advanced Smart Grid / Smart Metering projects in Germany. The project incorporates the consumer into the Smart Grid.
- **Web-2-Energy** : The project combines smart energy management with load control due to price signals (indirect load control) as well as direct load control (ripple receivers)
- **Smart Grid**: The smart grid needs a new approach for tariffing and customer interactions utilizing customer information systems.
- **Smart Grid:** The smart grid needs innovative and cost effective load management based on price signals (from the energy provider) as well as direct control (from then DSO).

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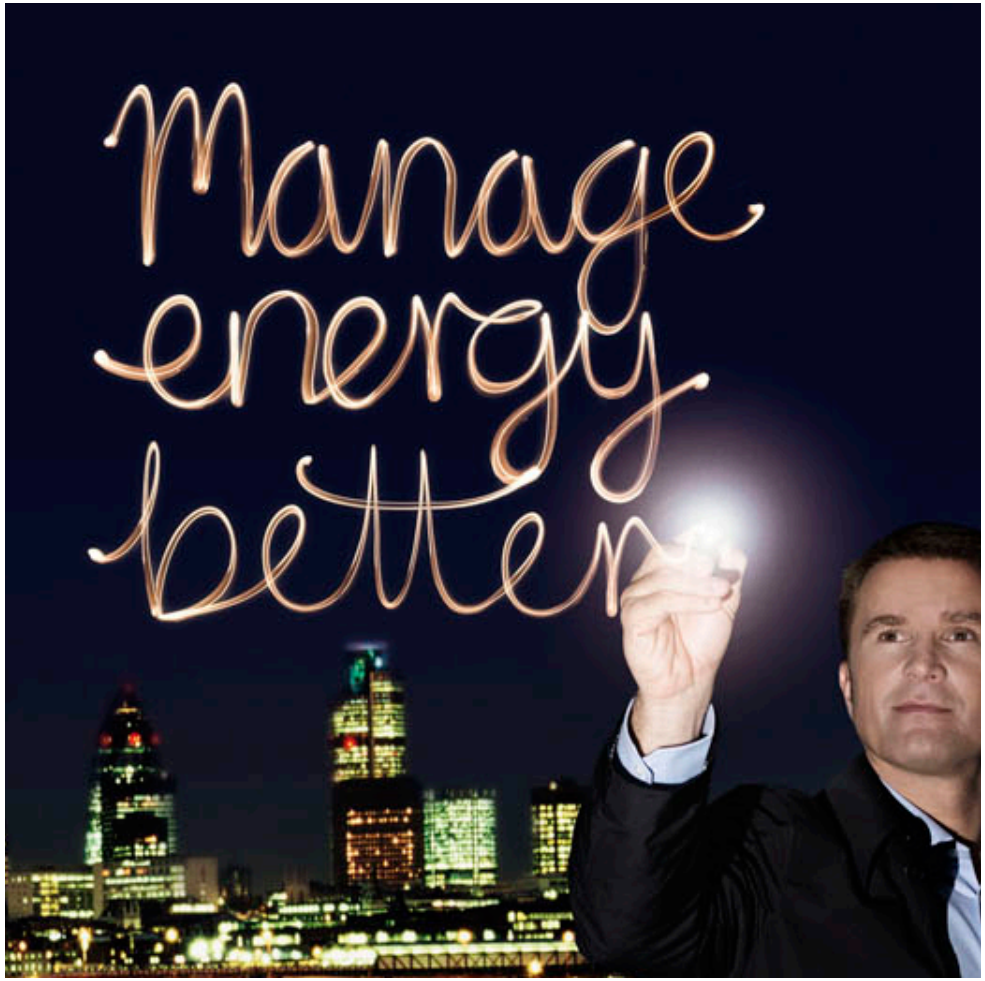

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