Smart-Home/Smart-Metering (Smartgrid)

Unterschiedliche Umsetzung in Deutschland und in Frankreich
Différentes mises en oeuvre en Allemagne et en France

March 21, 2014

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Common ground in both countries

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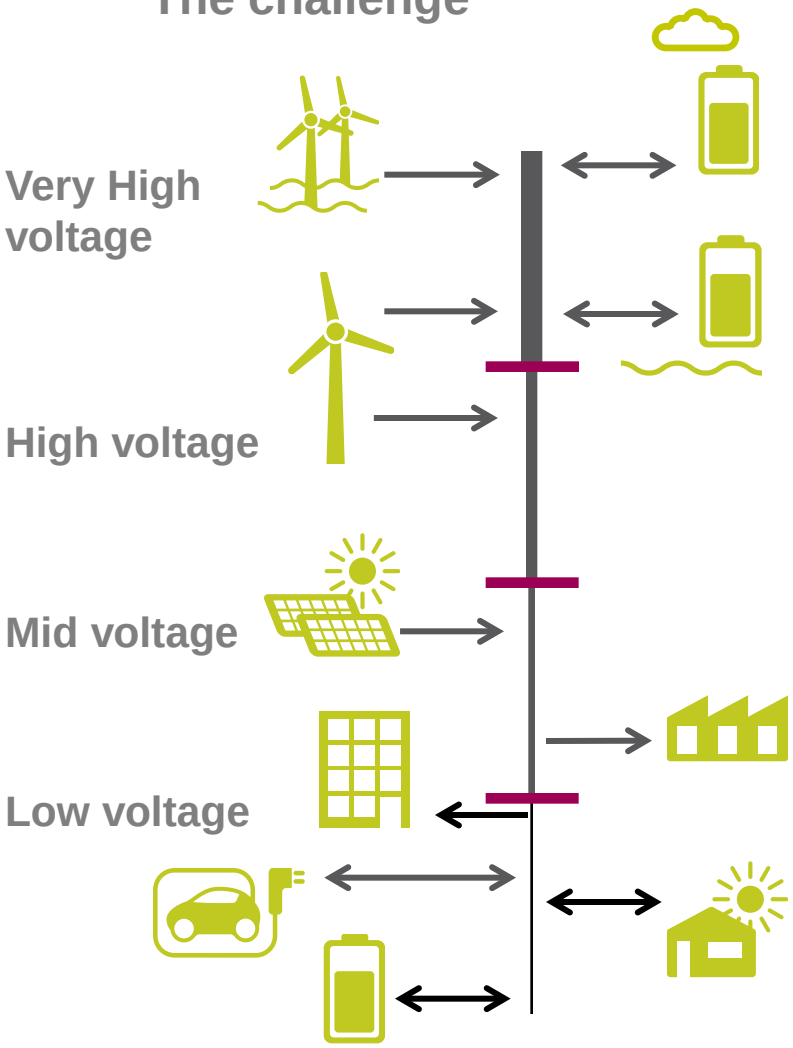
Smartgrid/Smartmetering : one single need

The challenge



Utilities :

- Ensure network stability in the context of renewable energies, decentralised production and storage
- Participation of the final consumer to network regulation : energy efficiency, demand side management

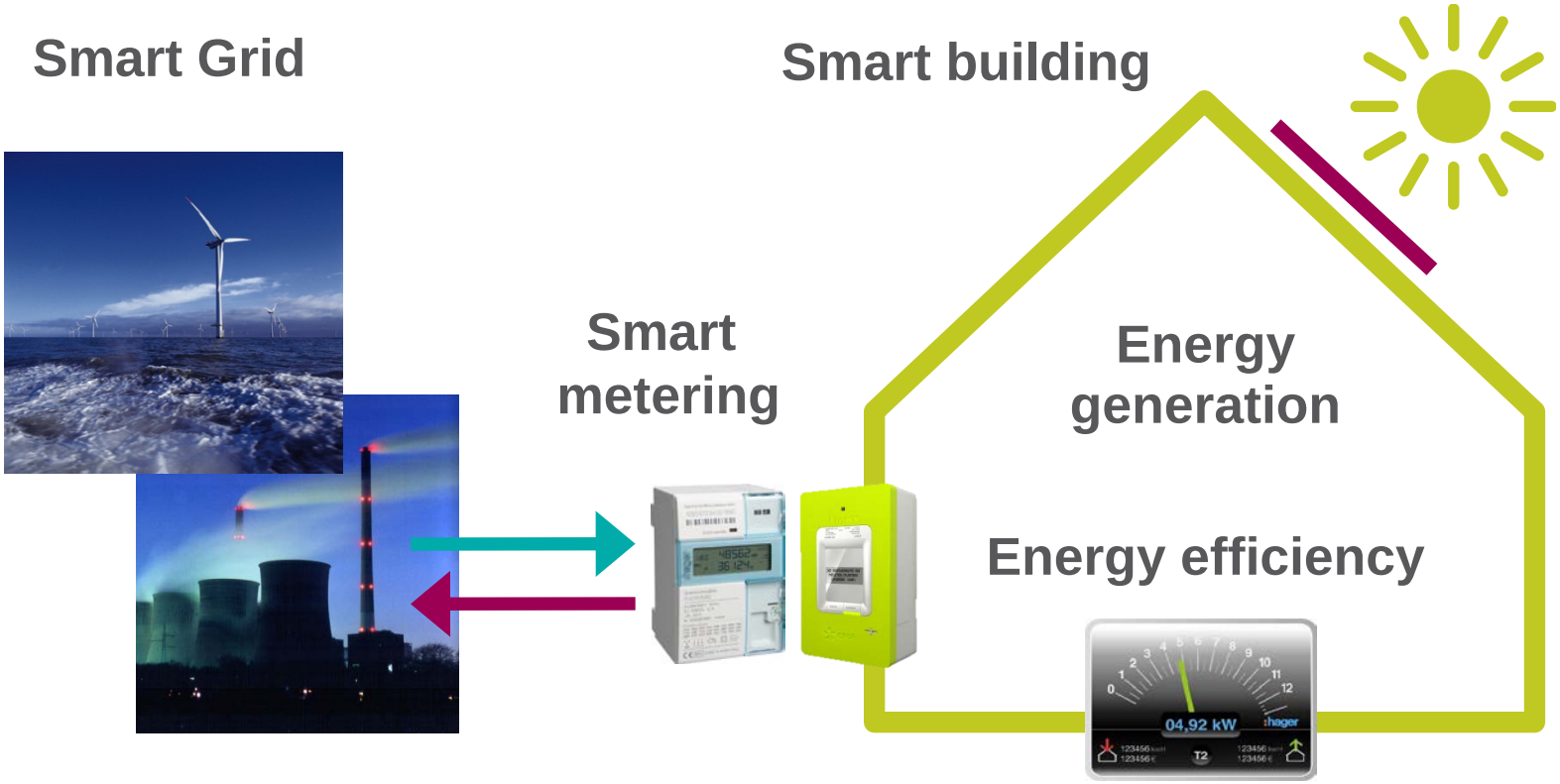
Energy distributors

- Remote electricity metering and contract management
- Integration in multi energy context (gas, heat, water, …)

End user

- Awareness will favour implication
- Some usages compatible with direct control, but user wants to decide
- Energy management through Home Automation will contribute actively to network management

Key elements of our future energy system



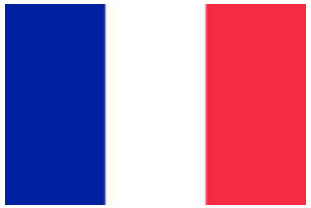
The energy analysis is a basic requirement and basis for a better understanding of the energy demand

Energy analysis of the energy demand

Target: Information about the energy consumption

- Analysis and evaluation of the total energy consumption
- Detailed information about the use of energy and the corresponding costs. Background for a better energy efficiency.
- Comparisons of individual days and weeks
- Solution: Smart information for intelligent decisions
  - Total energy consumption of the building
  - Detailed information about selected circuits and appliances
  - Tariff information
  - Status of energy saving targets

Implementation in France



Implementation in France

- Decisions of implementation
- Experimentation projects
- French architecture
- Connection with international standardisation

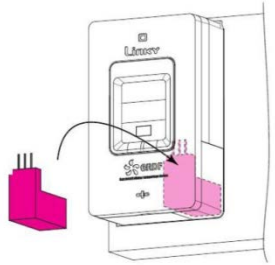
France : Environment and Decisions

- **Metering is the heart of network regulation since decades**
  - Electricity tariffs such as J/N, EJP, Tempo are the incentives to manage
  - Electronic meters are equipped with customer information link (cable)
  - Electrical equipment manufacturers already provide energy management solutions

- **The new meter LINKY is the chosen solution for future Smartmetering**

  - Since 2011 experimentation on 250 0000 installations
  - Equipment in Lyon and Tours deliver experience until January 2015
  - Smartgrid functionalities and usage planned to gather experience
  - National deployment of 35 millions meters between 2016 and 2020 decided

- **Optional smart home functions are foreseen**
  - LINKY meters are « smart home ready »
  - Currently under development : standardised radiofrequency link ERL (Emetteur Radio Linky) with KNX and Zigbee protocol will enable quick installation
  - Following the experimentation phase, commercial offers as incentives to manage will be available.



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France : Experimentations

Tours

- 250 000 meters installed replacing older meters
- Validation of the IT system to support the infrastructure done

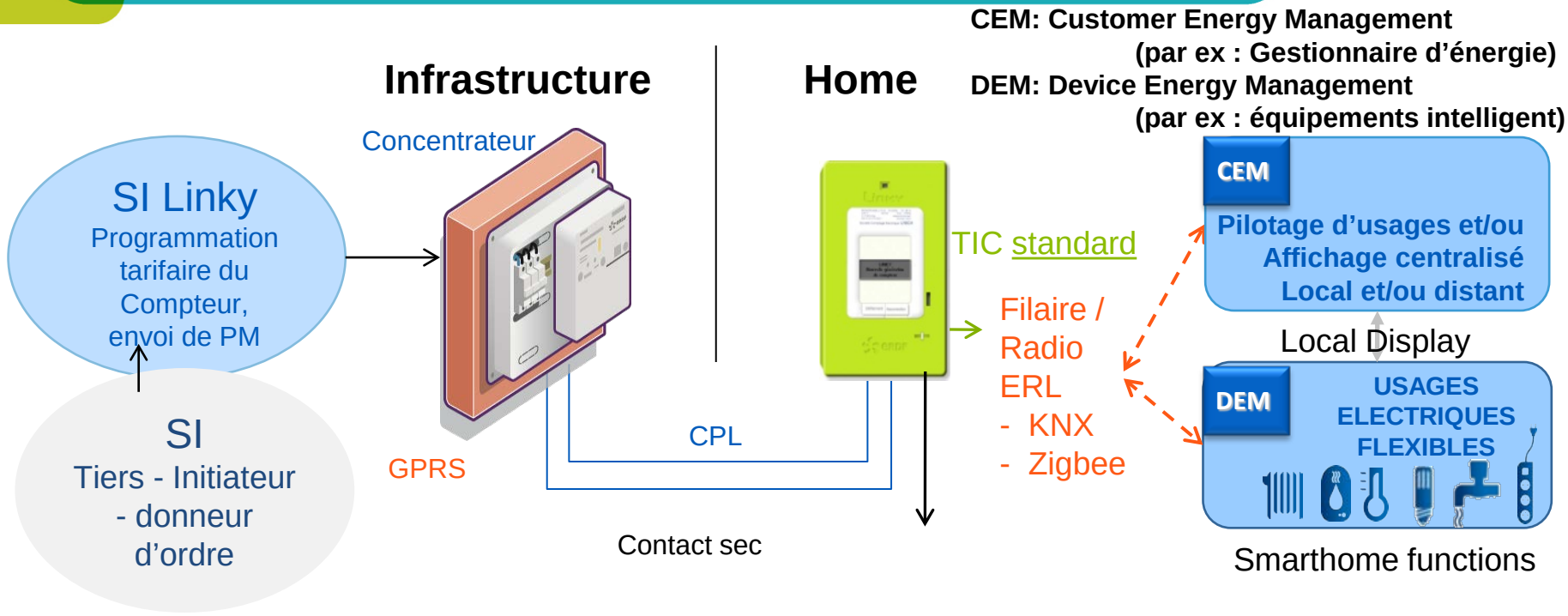
SMART ELECTRIC LYON

EDF (Coordination)

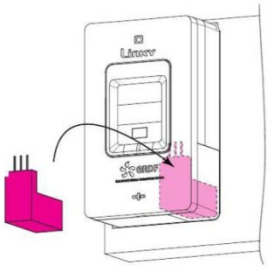
Smart Electric Lyon : http://www.smart-electric-lyon.fr/

- Experimentation of information and energy management systems
- 25 000 homes will be equipped with intelligent electrical systems and connected to smarthome equipement
- This will enable to test and validate the services connected to the LINKY meter, and the home automation functions of the partner manufacturers

Architecture LINKY - Smart Electric Lyon



- Easy installation with radio frequency network : ERL secured multiprotocol interface
- Possibility of local supervison of use of energy
- LINKY meters delivers tariff information to the energy management
- Smarthouse – home automation will help optimisation of energy use depending on tariff and forecast.
- Users can choose the way of energy management (accept/no)
- Network manager can experiment peak consumption management



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The French SM/SH architecture model

Promoted by DGCIS [Ministry of Industry] in the framework of COSEI [Comité Stratégique de la filiaire Eco Industrie]

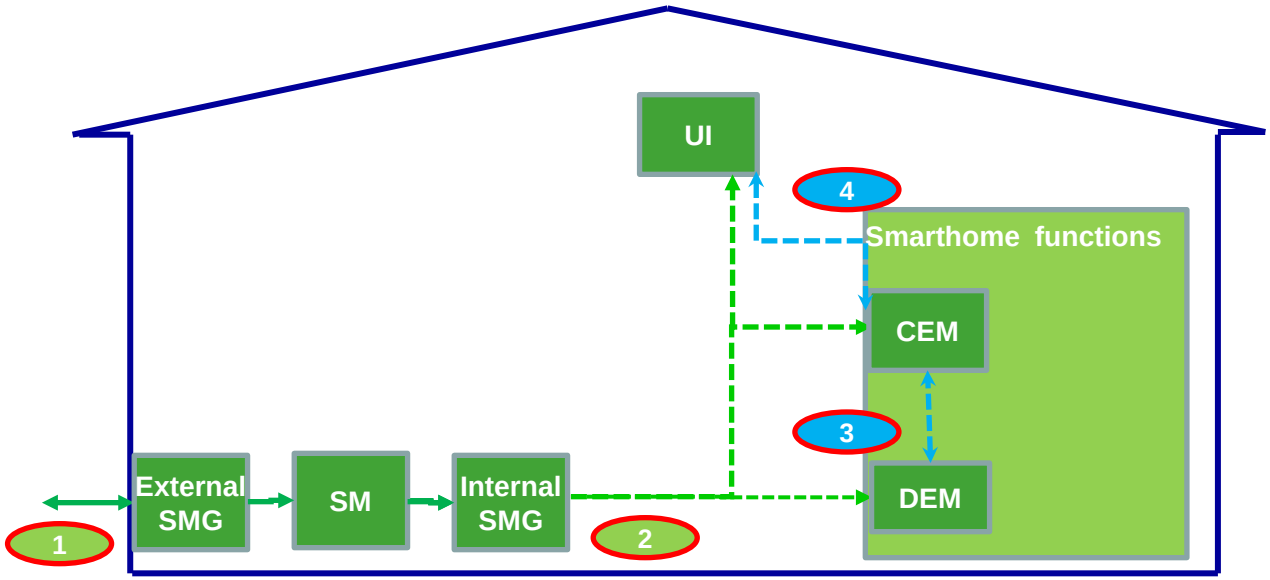
And its Working Group “Normalisation aval compteur”

- Participants : ERDF, EDF, Orange, IGNES, ST,…
- Goal
  - Describe a French Smart Home architecture
  - Promote standards at European level to support French industry players
- Results :
  - Defintion of an “open” architecture model
  - References to European and worldwide standardisation

The French SM/SH architecture model (1)

Smart Metering centered architecture

System using exclusively data coming from metering infrastructures



Functional components	
CEM	Customer energy management
DEM	Device energy management
SM	Smart metering
SMG	Smart metering gateway
UI	User interface

Information streams	
⇢	Control / Data
⇢	Data dissemination toward compatible devices
→	Metering data / Voltage quality data / technical data

Corresponds to the Smart Electric Lyon environment

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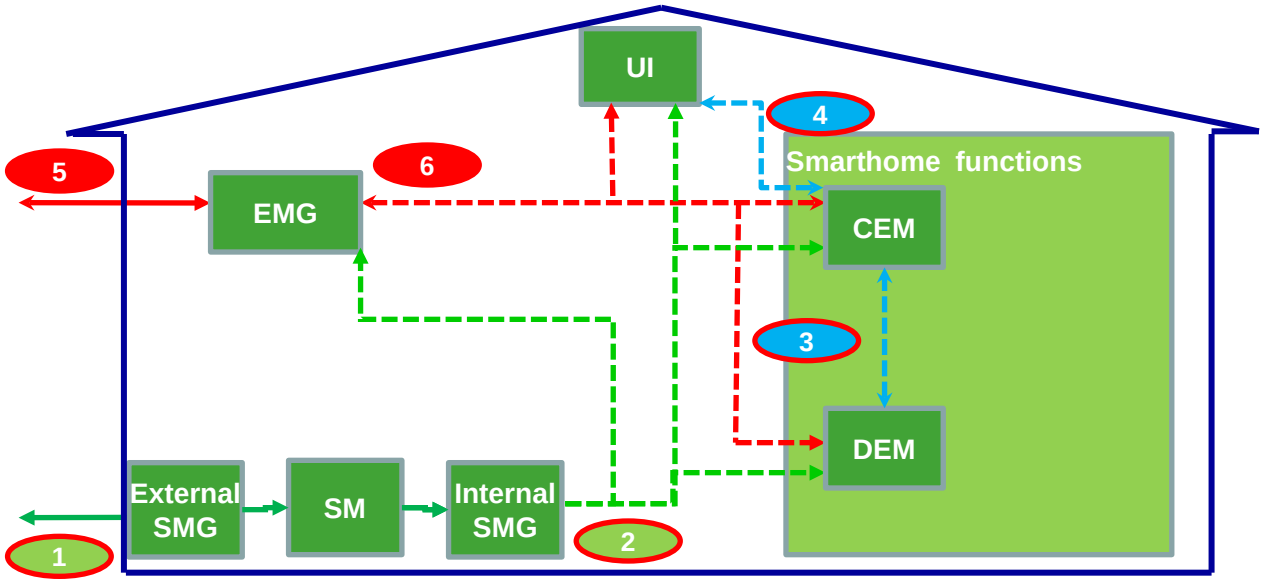
The French SM/SH architecture model (2)

Two-way communication architecture

System using data coming from metering infrastructures, enhanced data, and communicating with the outside world



Functional components	
CEM	Customer energy management
DEM	Device energy management
EMG	Energy management gateway
SM	Smart metering
SMG	Smart metering gateway
UI	User interface

Information streams	
⟶ ⇢	Flexibility request / Price incentives / Data
⇢	Control / Data
⇢	Data dissemination toward compatible devices
⟶	Metering data / Voltage quality data / technical data

Will enable internet access by alternative/additional services

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International standardisation/ regulation

- **AFNOR – Système de Normalisation – UTE makes the link**

- **At European level : Mandates M/431 et M/490**
  - To build a standard framework for Smartmetering and Smartgrid
  - M/431: Smartmetering
  - M/490 : Smartgrid
  - Development of standards by CEN/CENELEC/ETSI

- **CENELEC (European Electrotechnical Comittee) TC205**
  - Covers Home and Building Electronic systems
  - Develops standards for user interfaces
  - Communication and data modelling for smartmeter displays
  - Communication and data modelling for smartgrid functions
  - Liaises IEC (International Electrotechnical Comminttee) PC118

Implementation in Germany

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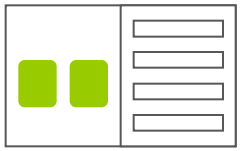
Since 10 years we have in Germany a modular approach for smart metering

Modular and manufacturer independent conception

Role	Utility (DSO)	Grid service operator	Grid service operator	Utility, energy sales, customer, electricians
Hardware	**Meterboard** 	**Meter** Gas, Electricity, Water	**Communication** SMG	**Module (extention)** Switch; In-house-communication Smart Home; New services (tariff)
Aim	Standardisation in product segment meter board. Basic request for market development.	“Basic” meter with basic functions and applications (can be extended if required)	Multi Utility Solution with open and flexible communication (WAN and LAN)	Innovative solutions and new business areas

The legislation describes the framework of smart metering, with a strong focus on data security

Law on the energy industry (EnWG) – §21 of July 2011

§ 21d Measuring system

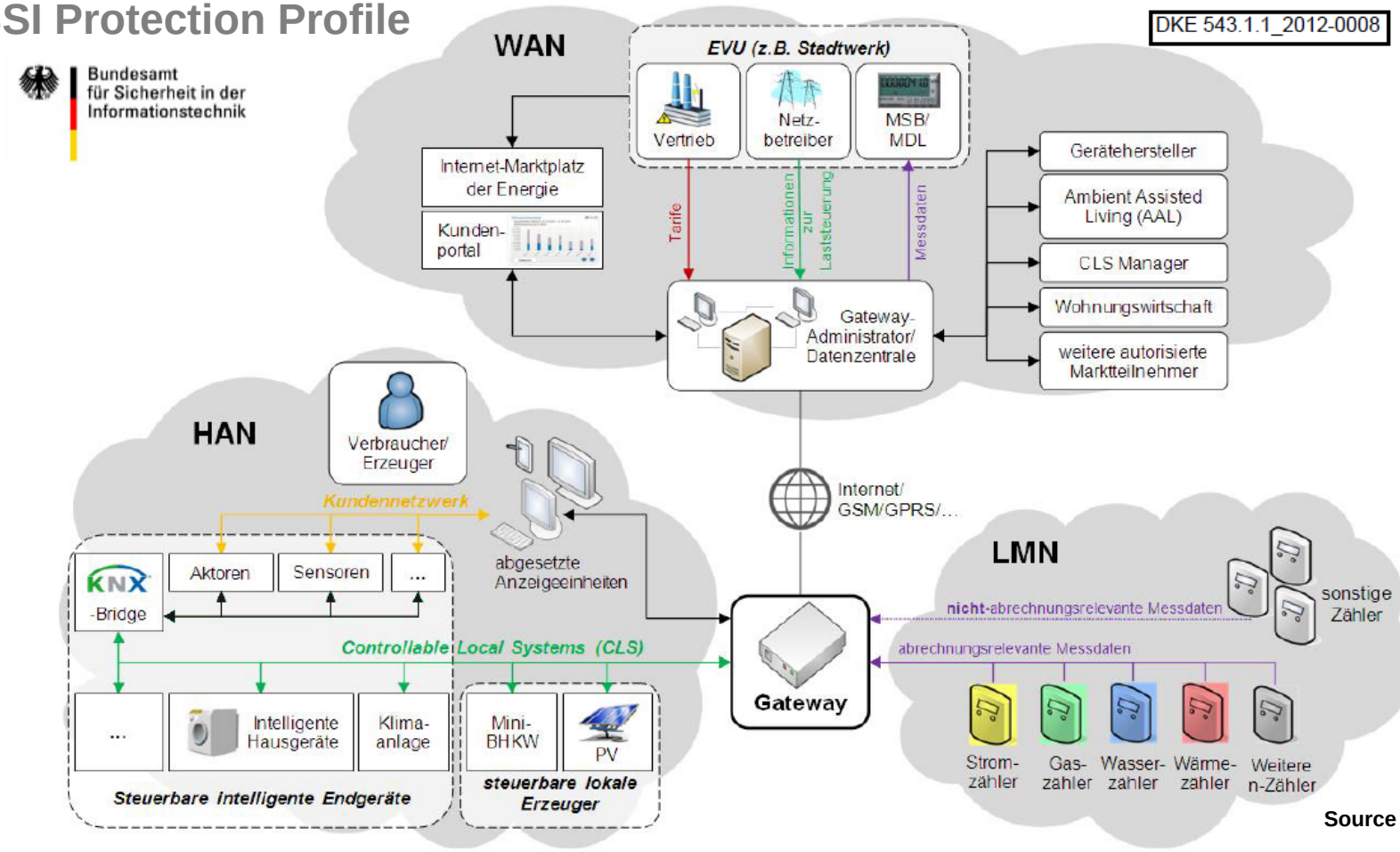
- A measuring system as defined by this law is a measuring equipment embedded in a communication net which measures electrical energy and reflects the actual energy consumption as well as the actual useful life.
- Data security, data integrity and compatibility. Adherence of a security profile proved by certification.

§ 21c Assemby of measuring systems

- Focus on new applications and big renovations
- Applications > 6000 KWh
- EEG Applications > 7KW

The legislation describes the framework of smart metering, with a strong focus on data security

BSI Protection Profile



Source : BSI

Technical Directive TR 03109

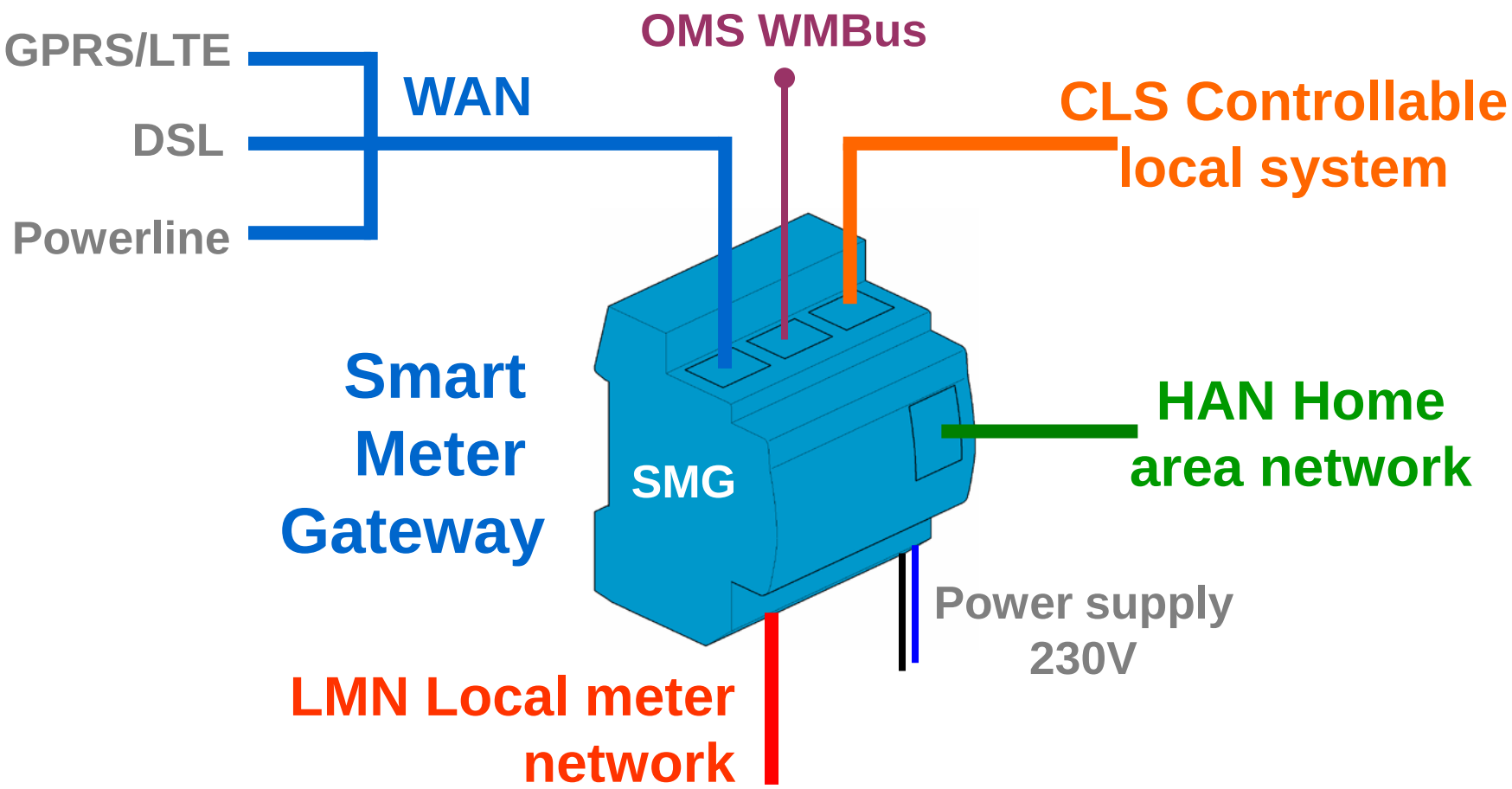
Key elements of the metering system

+

Meter

SMG - Smart Meter Gateway

Smart meter gateway and the interfaces



Smart meter gateway and the functionalities

GPRS/LTE

DSL

Powerline

WAN

- Data security

OMS

- Data security

CLS Controllable local system

Heat pump
Cooling system
Ventilation system
Boiler
Electrical Vehicle
...

Smart Meter Gateway

HAN

- IP based communication
- Data security

Smart Home Display
in the living area

LMN

- Data security

or

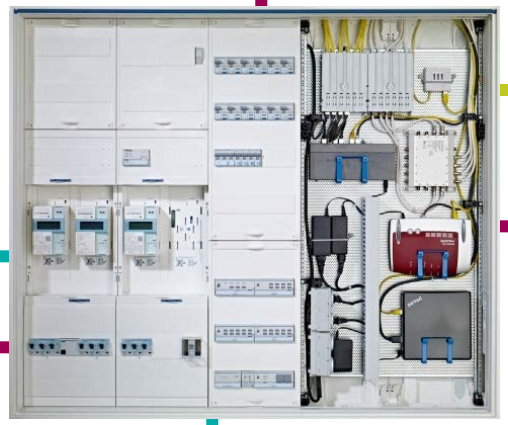
Integration of the metering system into the meter board and smart home

Renewable energies

Conventional energies

Micro combined heat and power (CHP) or heat pump

Customer generation



Electromobility

Energy management

KNX

IP

Home networking – structured data wiring

Controllable consumer appliances as per Section 14a of the Amendment to the German Energy Act

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Pilotproject in Germany : Mülheim zählt

VORWEG GEHEN

- 100.000 smart meter installed
- Invest 30 Mio. €
- Visualisation of the energy consumption

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The standardisation environment of meter and meterboards will be extended by new requirements (Legislation, DKE and FNN)

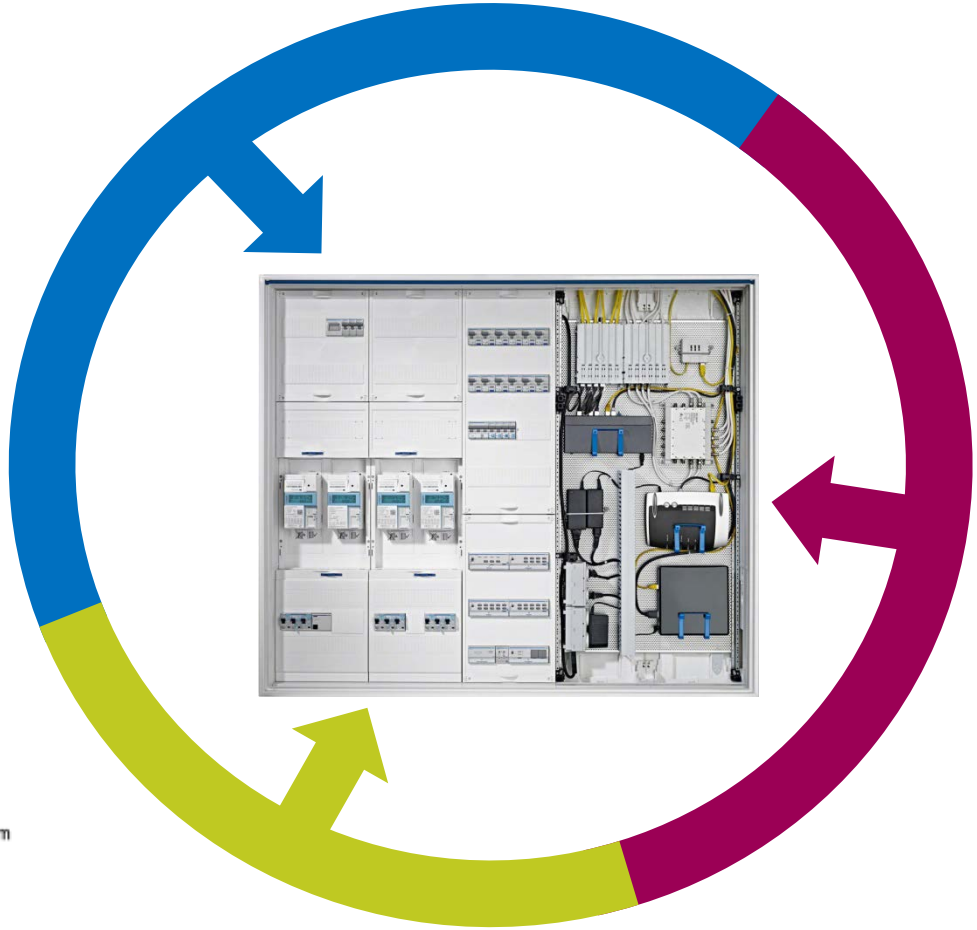
Standardisation Environment

DKE VDE DIN

DIN VDE 0603
Part 1
Part 2
Part 3
Part 5
Part 6
Part 8
Part 100

DIN 43870

DIN VDE 0418
Part 4



FNN FORUM NETZTECHNIK/ NETZBETRIEB

Utilities‘ Technical connection conditions (TAB)

Application Guides
4101
4102
4105
4400

Specification meter and smart meter gateway
- function
- construction

Bundesministerium für Wirtschaft und Technologie

Legislation: Law on energy industry (EnWG)
- MsysV / Tariff / Security / Rollout / Controllable loads

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Results of the cost benefit study, mandated by the government

Use cases in the actual EnWG

- Consumption > 6000 KWh :
Mandatory Metering System (IZ and Smart Meter Gateway).

- New applications :
Mandatory Metering System (IZ and Smart Meter Gateway).

- EEG applications > 7 KW :
Mandatory Metering System (IZ, Smart Meter Gateway and CLS Device).

- Controllable local applications §14a (z. B. E-Mobilitiy, Storage system) :
Mandatory Metering System (IZ, Smart Meter Gateway and CLS device).

Metering system (IZ + SMG) per year: 0,85 Mio.

Recommended Scenario through Ernst & Young

- Consumption > 6000 KWh :
Mandatory Metering System (IZ and Smart Meter Gateway).

- Consumption < 6000 KWh :
Mandatory Intelligent Meter (IZ) in the periodic replacement (IZ prepared for the integration of the SMG)

- New applications :
Mandatory Metering System (IZ and Smart Meter Gateway).

- EEG applications > 0,25 KW :
Mandatory Metering System (IZ, Smart Meter Gateway and CLS Device).

- EEG applications < 0,25 KW :
Mandatory Intelligent Meter (IZ) in the periodic replacement (IZ prepared for the integration of the SMG)

- Controllable local applications §14a (z. B. E-Mobilitiy, Storage system) :
Mandatory Metering System (IZ, Smart Meter Gateway and CLS device).

Intelligent meter (IZ) per year: 3,12 Mio.
Smart Meter Gateway per year: 1 Mio.

Definitions:
SMG – Smart Meter Gateway
IZ – Intelligent meter, prepared for the integration of the Smart Meter Gateway

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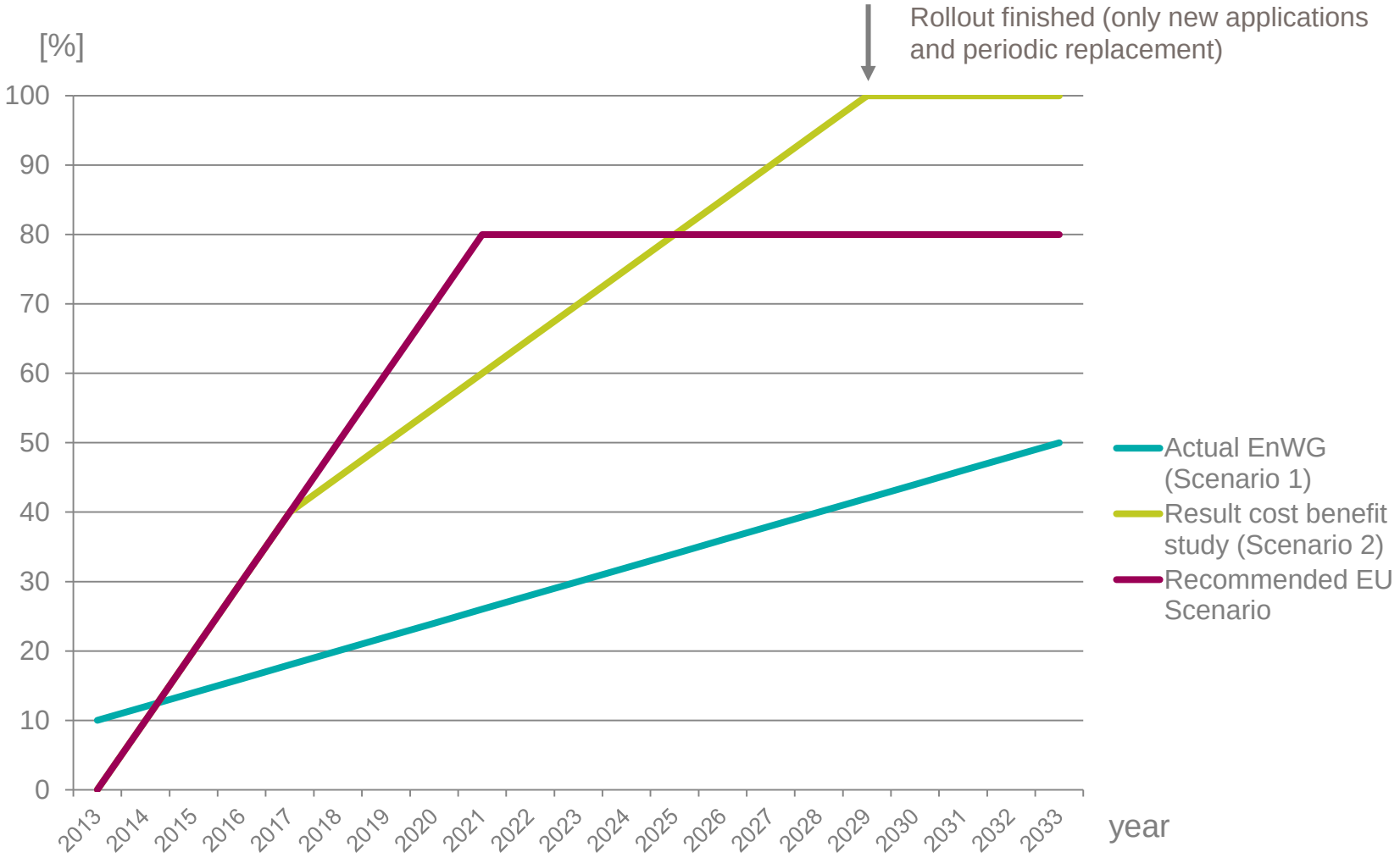
The following roll out time schedule, is the outcome from the described use cases in the study



Johannes Hauck
Hager Electro GmbH & Co KG

Conclusions

- Germany
  - Modular approach with a meter and smart meter gateway
  - Strong focus on data security
  - Complex and interminable development of the smart meter gateway
  - Metering system is prepared for the future energy system (smart grid)
  - Pending legislation about smart metering rollout
- France
  - Decision of deployment taken for 2016
  - Experimentations in progress on metering display and energy management
  - Utilities, Manufacturers, Consumers are involved
  - Smarthome will be an important part of the Smartgrid management

  - Looking forward for 2016-2020 for realisation …..

Thank you for your attention!

Danke für Ihre Aufmerksamkeit

Merci pour votre attention

Questions ?