



Status of Smart Metering Deployment in Luxembourg

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Status of Smart Metering deployment in Luxembourg

- Governing directives and laws**
- Luxmetering**
- The Mission**
- Expected benefits**
- Timing**
- General Smart Meter Functionality**
- Security challenges**



Governing directives and Laws

□ EU Energy Efficiency Directive (2012/27/EU)



□ Law of June 19th 2015 which stipulates the introduction of Smart Metering in Luxembourg:

- All legacy gas and electricity meters will have to be replaced by Smart Meters.
- All meters will be read by one common central system, operated by a common operator.
- Besides gas and electricity meters, the system has to be open for other metering data like water and district heat.

Luxmetering G.I.E

The setup and management of the common meter reading platform will be executed by Luxmetering G.I.E, which is an economic group of interest (G.I.E.) of the 7 luxembourgish gas and electricity DSO's.

Scope of responsibility:

- Specification, purchasing, installation and management of the national meter reading platform
- Common purchasing policy for hardware (meters, concentrators, handheld units, communication hardware) for all DSO's
- Pilot- and Rolloutproject coordination



The Mission

- Create customer awareness for energy consumption (by consumption history, reference and peer to peer comparison,..)
- Market stimulation by new time of use based tariffs from suppliers
- From July 1st 2016 every new installed gas & electricity meter will be a smart meter
- A common central platform, operated by all 7 gas & electricity Distribution System Operators (DSO)
- Multifluid: besides gas and electricity meters, the system will be open for water and district heat



Expected benefits

- **Customers:**
 - Instant consumption information via customer port (2-12s)
 - Detailed consumption history over 2-3 years
 - More frequent invoice based on precise data
 - Saving advices through suppliers or Independant Energy Service Providers
 - More flexible tariffs based on time of use
- **DSO's:**
 - More precise and frequent quality of service information
 - Faster outage recovery
 - Data input for medium term Smart Grid
 - Better long term planning especially for LV grid
- **Suppliers:**
 - Precise data for invoicing
 - Purchasing optimisation through better forecasting
 - Development of new time of use tariffs with more flexibility for the customer
 - Better revenue protection



Assumptions

Customer energy consumption reduction scenarii

| Scenario | 1 | 2 | 3 | 4 |
|-------------------------------------------------------|------|------|----|------|
| Install inhouse display (IHD) | | | X | X |
| Compare customer consumption to reference | X | X | | X |
| Energy consulting | X | X | | X |
| Provide historic consumption data to customer | X | X | | X |
| Clarity and transparency in communication to customer | | X | | X |
| Gaz consumption reduction rate | 0,5% | 1% | 3% | 3,5% |
| Electricity consumption reduction rate | 0,5% | 2,5% | 3% | 4,5% |
| Electricity peak reduction | 0,5% | 2,5% | 3% | 4,5% |

Based on 2011 study « Energy Demand Research Project: Final Analysis » from the British Office of Gas And Electricity Market



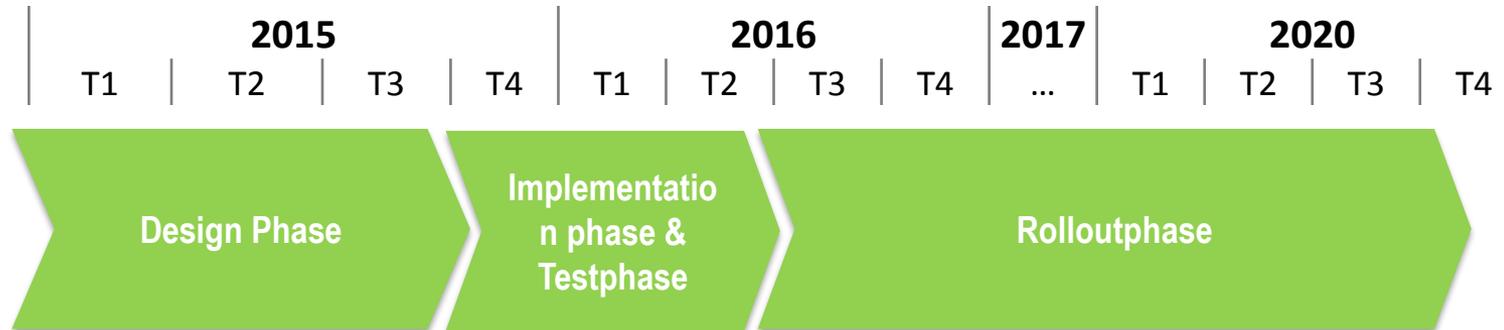
Timing (1)

- Starting from July 1st 2016, every new installed or replaced electricity and gas meter will be a smart meter
- >95% of all electricity meters must be replaced by december 31st 2019.
- >90% of all gas meters must be replaced by december 31st 2020.



Timing (2)

The Luxmetering project started in January 2015



2015 :

- Design phase
- First pilots: hardware and software tests
- Implementation of the central system test environment

2016:

- Implementation of the pre-prod and prod central system
- Pilotphases with 100, then 15000 (1/7/2016) gas and electricity meters

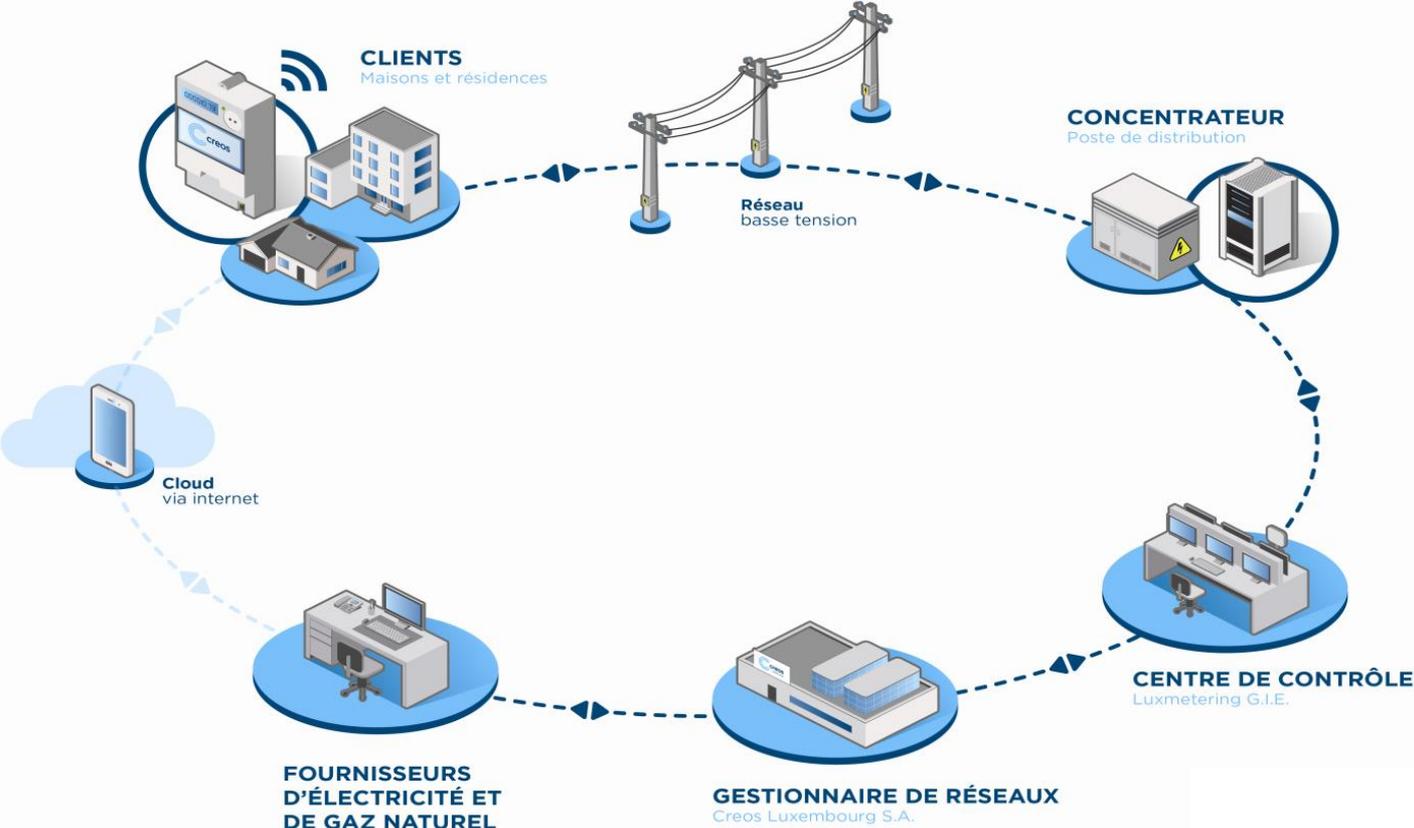
2016-2020:

- Massrollout of all electricity and gas meters, covering the whole country of Luxembourg



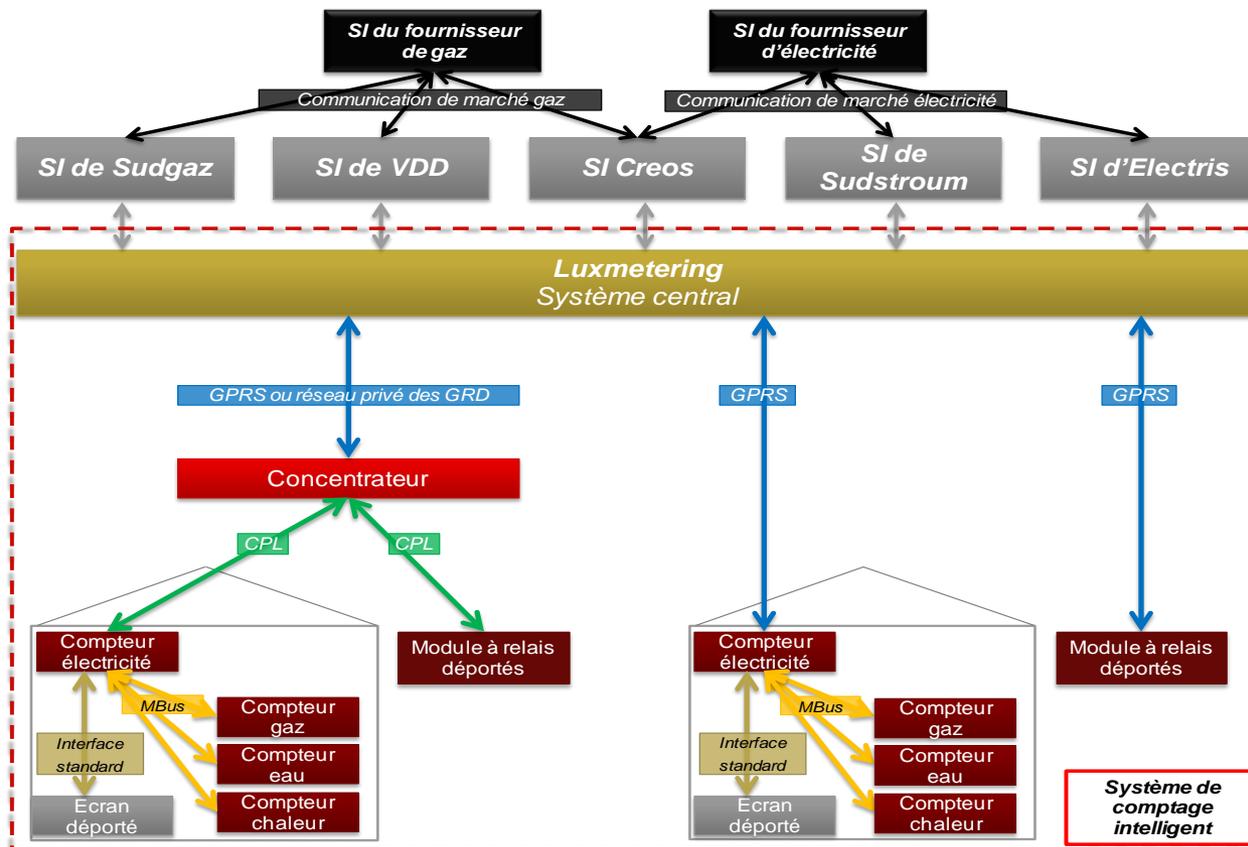
Information flow of the Smart Metering System

Smart Meter



System Architecture

The System architecture uses PLC Communication Technology between the electricity meter and the concentrator, and M-Bus technology between the electricity- and gas/heat/water meter. Data transfer from the concentrator to the central system is done via GPRS.



Smart Meter Functionality: electricity

- 4 Registers for active, reactive, Import and Export Energy (1/4h)
- 3 registers for gas, water & heat (1 h)
- Alarms and Logs for quality of electrical energy supply (voltage, outages,...) and tampering detection
- Calendar functions for relays



- 2 external relays for home applications (Heating,...)
- Service interface
- LCD screen to visualise registers and messages
- PLC connection to concentrator
- M-Bus connection to gas, water & heat meter
- Customer port
- Breaker



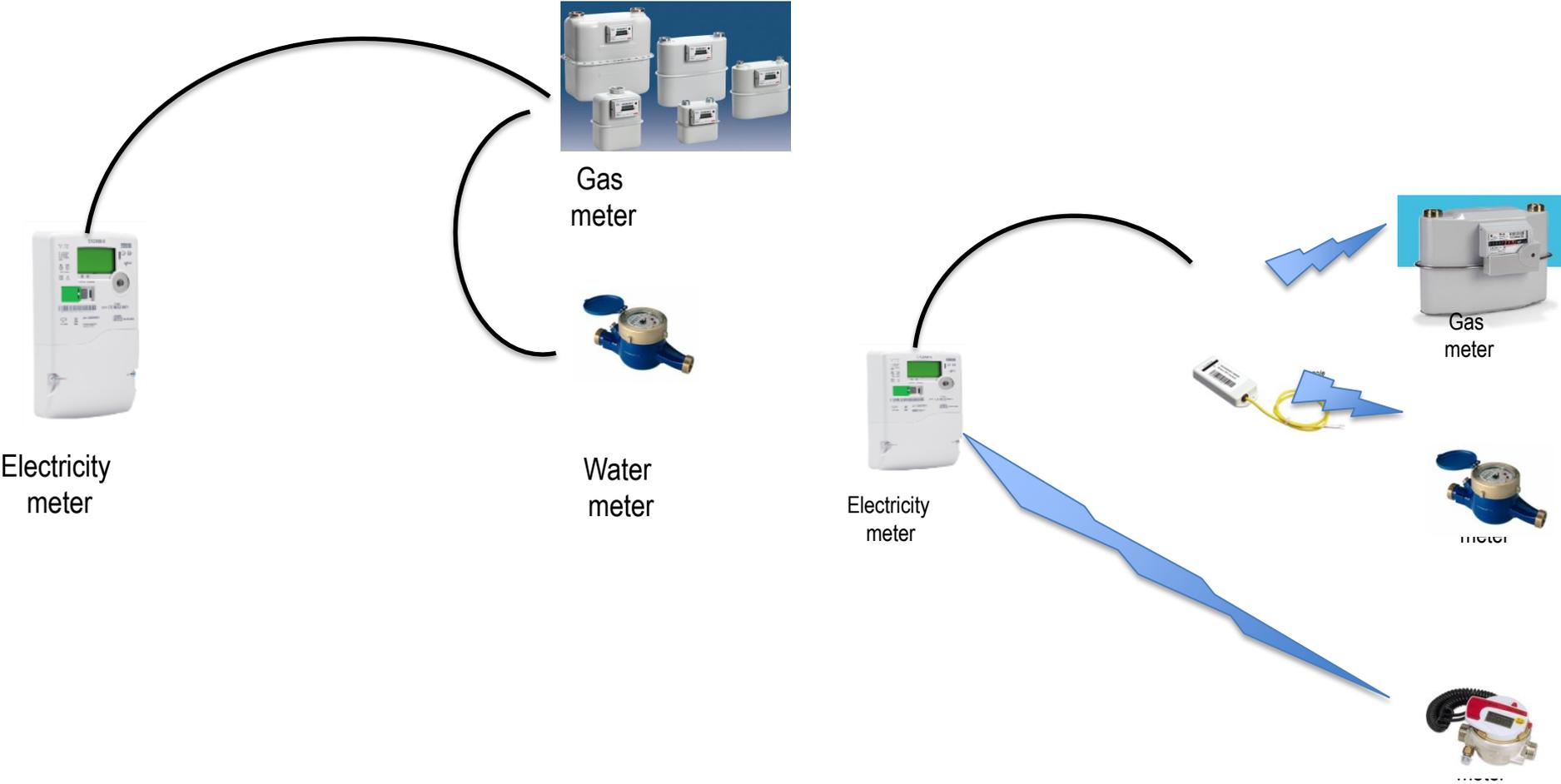
Smart Meter Functionality: gas, water, heat



- 1 Register (1 h)
- Technical Alarms and Logs (battery & tampering detection)
- LCD screen to visualise registers
- M-Bus connection to electricity meter
- Optional valve (gas only)



Link between electricity, gas, water and heatmeter



Electricity meter

Gas meter



Water meter

Electricity meter

Gas meter



Water meter



Heatmeter

Security challenges: critical infrastructure

- Customer consumption data is personal data and billing relevant and must therefore be protected
- In-built breaker could lead to mass blackout if system is hacked
- Smart Grid will rely on Smart Metering Sensors information: potential avalanche effects
- Potential impact on Smart Home if hacked
- As multifluid system (electricity, gas, water and district heat) all fluids may be impacted
- Critical infrastructure: sensitive to individual hacking, terror and state influenced attacks



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