

Advanced Metering Infrastructure

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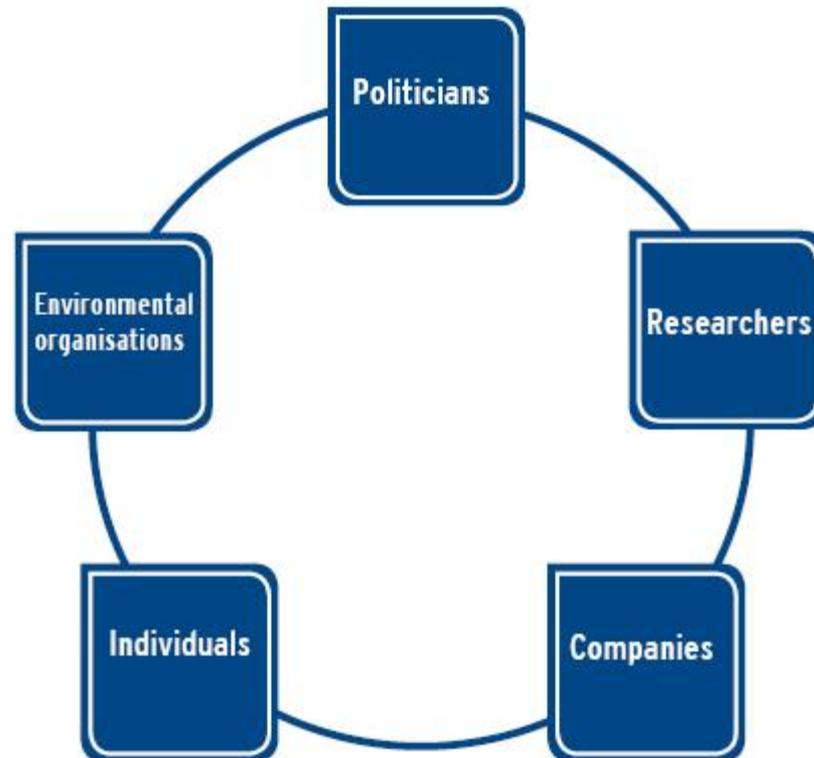
- Company information
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Our ecological footprint is growing bigger all the time ...

- There are now around 6.7 billion people on our planet.
- Forecasts suggest that by 2050 we will have passed the nine billion mark.
- If we continue to consume at the same rate we do today, by 2050 we will need two planets to sustain our lifestyle.



... It's getting warmer and the ice is melting
– Who is responsible for driving change forward?



The complete company

- Energy services
- Electricity supply grid
- Electricity trading
- Renewable energy (wind power)
- District heating
- District cooling
- Gas trading
- Gas distribution
- Broadband/networks
- Research & Development



New services

Together with our customers we aim to create a “smarter city” by:

- Security
Increased fire security, improved protection against break-ins and reduced key handling.
- Climate benefits and fairness
Reduced energy use, better understanding and the opportunity to only pay for what you use.
- Freedom from worry
We are responsible for the whole chain which saves you time and problems.
- Economic improvements
Lower costs, no unexpected expenses and easier follow-up and control.



Electricity supply grid

- Grid companies own and maintain cables, substations and transformers.
- The companies extend and reinforce the electricity grid as required and ensure that electricity reaches you.
- Our supply reliability stands at 99.992%.



Electricity trading

- All electricity that is sold to private customers comes from renewable sources.
- Our corporate services are tailored to give you total control over operation and energy costs.



Research & Development

Five core areas in which we are investing research and development.

- Transport sector.
- Renewable electricity and gas.
- Using energy more efficiently.
- Smart networks and infrastructure.
- Communication and PR.



A complex industry



Our vision and our core values

Our vision

- A sustainable society in Gothenburg

Our core values

- Farsightedness
- Stability
- Expertise
- Environmental commitment



Our mission

- We are an energy company, a service provider that uses infrastructure to offer products and services that are stable and sustainable.
- We meet customers' needs by supplying services and products. We shape our solutions jointly with our customers in order to make them more competitive.
- We are a company with a strong environmental profile.



Our customer priorities

- Reliable delivery.
- Fast and accurate information.
- Good quality and business ethics in all our dealings.
- Our products and services are based on farsighted development.



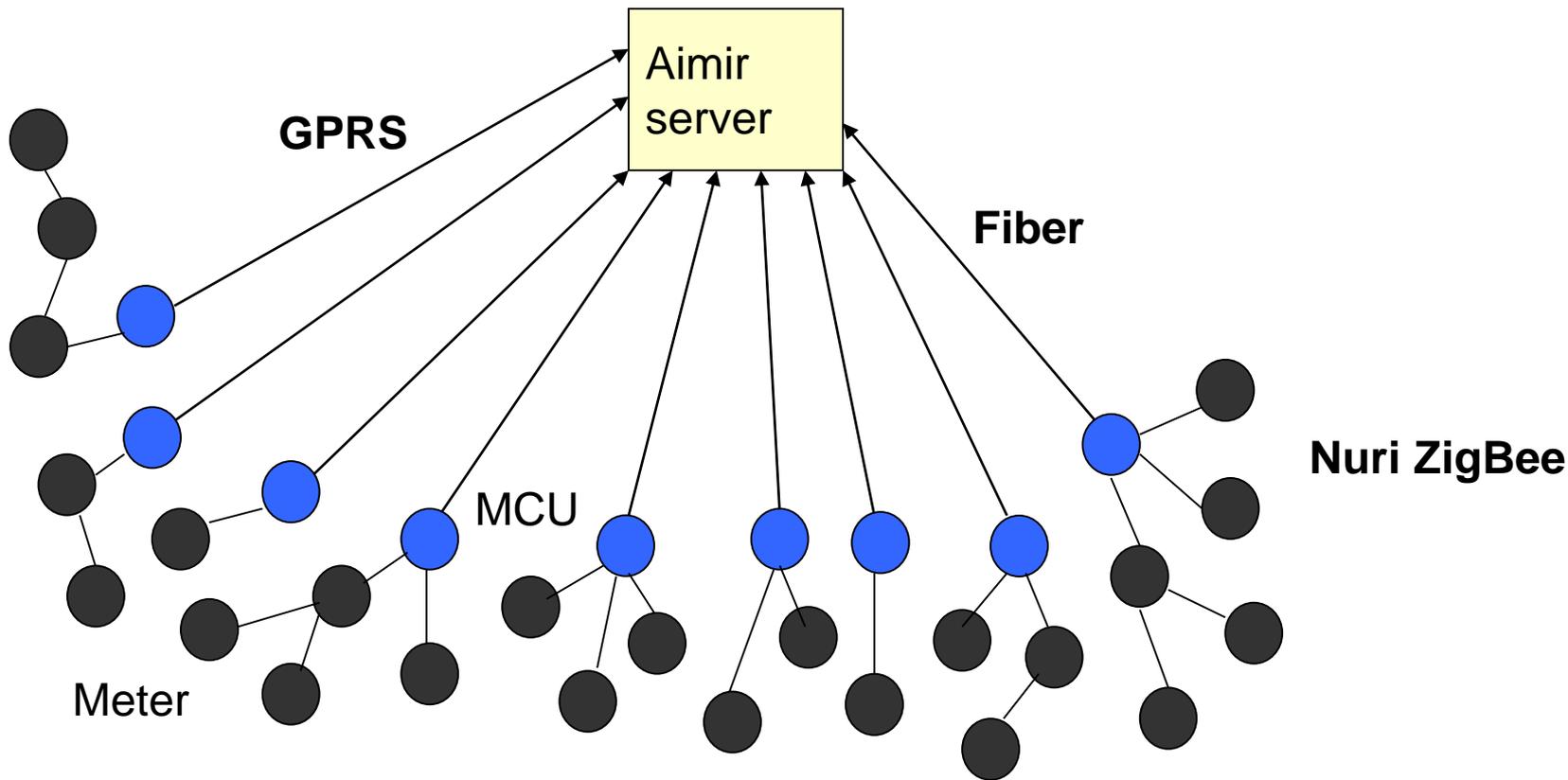
Advanced Metering Infrastructure?

When is it advanced?

- AMR Automatic Meter Reading
- Log and send events
- Send and receive control messages

AiMiR

ZigBee based AMI system



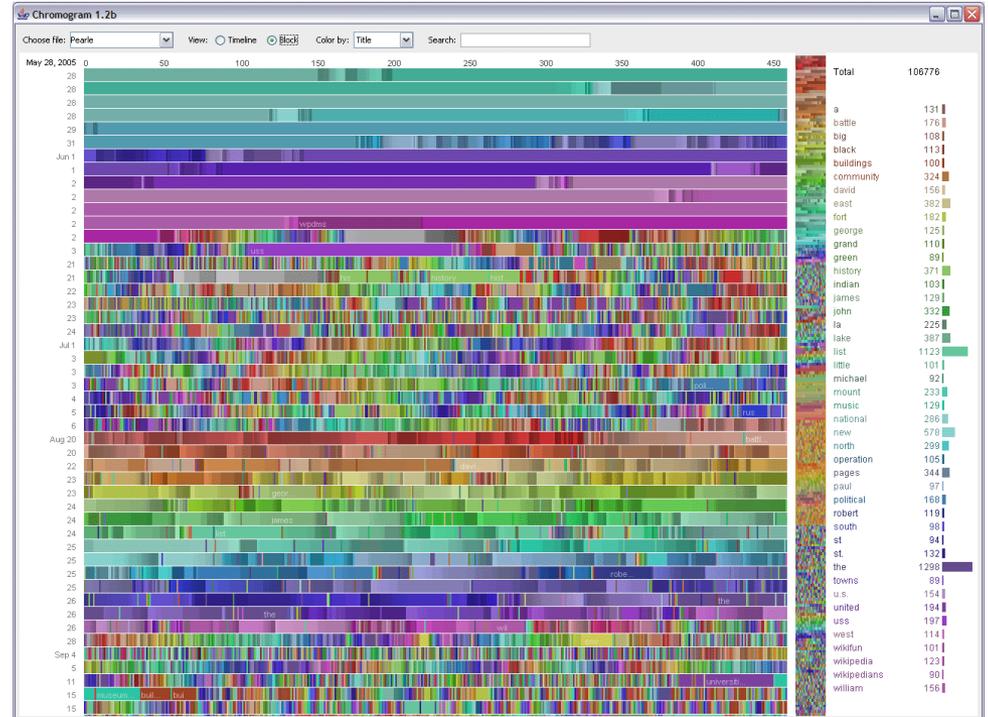
AiMiR facts

- 270 000 electricity meters
- 5000 district heating meters
- 3000 water meters
- 8000 collector units
- Self-healing radio network
- Redundancy in metering values
- Power quality data
- Power outage events
- Breaker function

Challenges

Big data

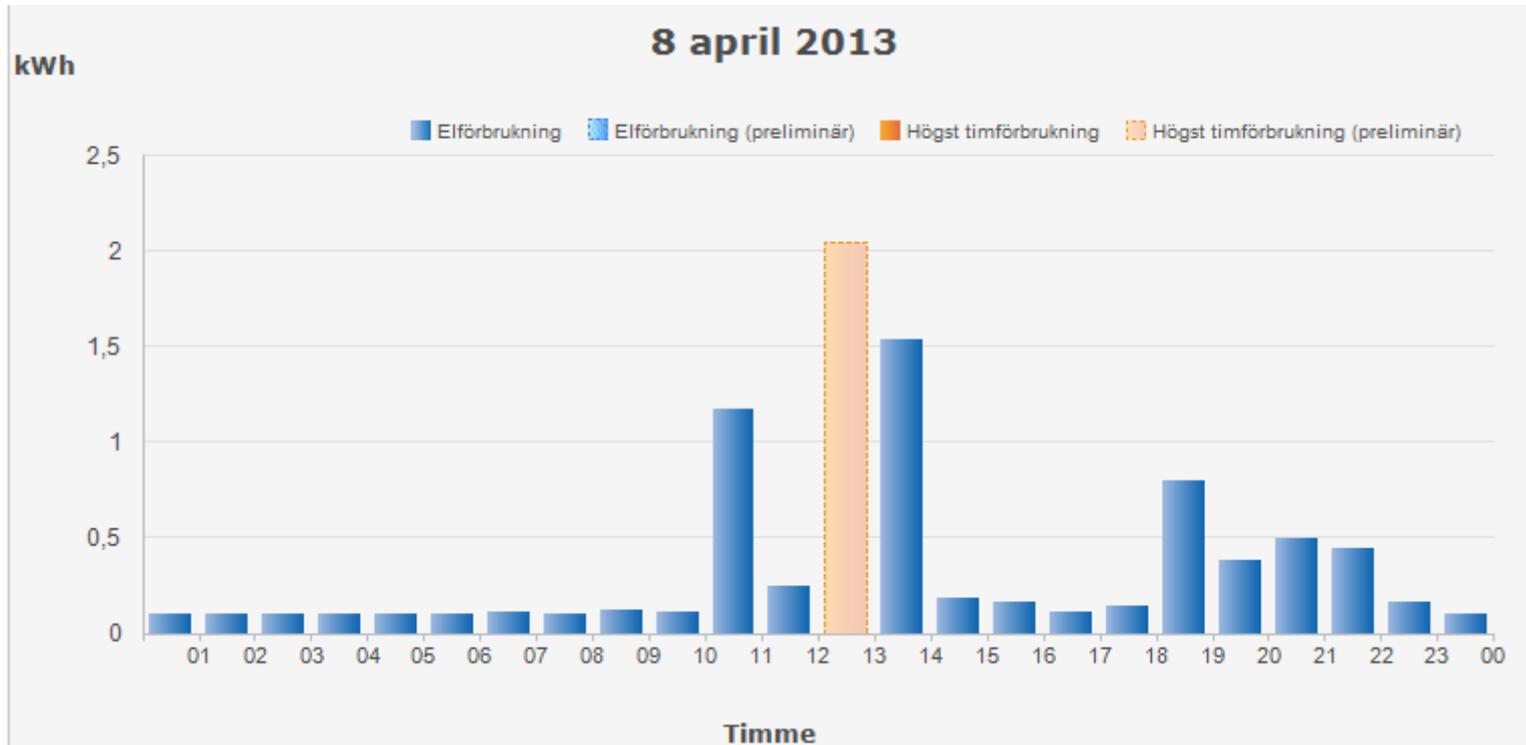
- 270000 x 24 meter values + some extra
 - 270000 x 6 x 2 power quality values
 - Loads of events
 - Topology data
- Every day...



Find the information in the data

Challenges

Privacy



Challenges

Time

- 278001 clocks in the network
- How to deal with disagreements

Challenges

Validation

- Validation is very basic only finds the large errors
 - How to find the small ones
 - Malicious customers
-
- Solution: Streaming?

Challenges

Emergence

Wikipedia:

emergence is the way complex systems and patterns arise out of a multiplicity of relatively simple interactions.

In other words:

Put lots of smart meters on a small area and unexpected things might happen.

More questions:

Thesis opportunities?

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