

# Advanced Metering Infrastructure

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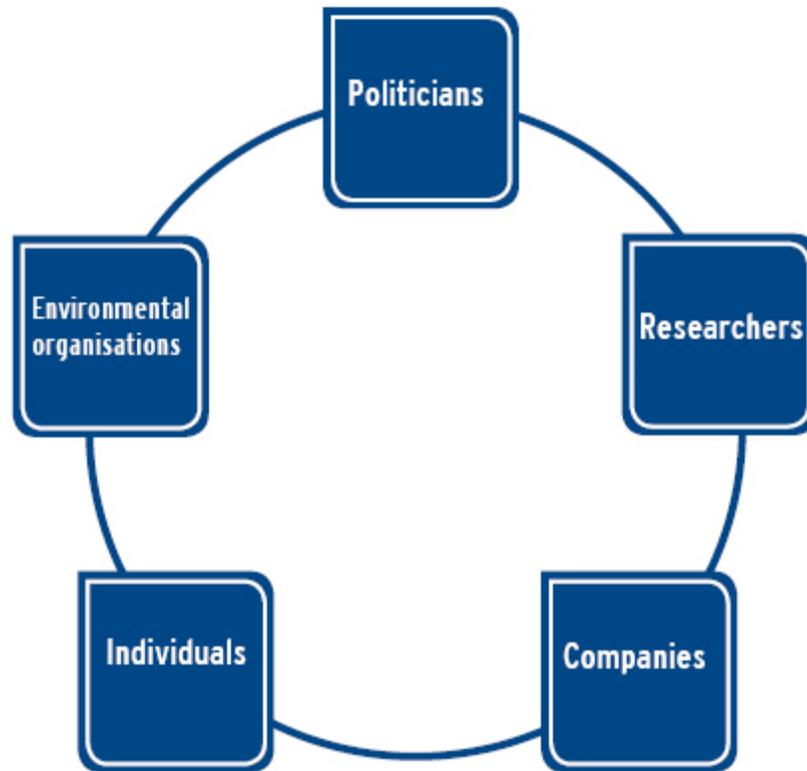
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## Our ecological footprint is growing bigger all the time ...

- 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.



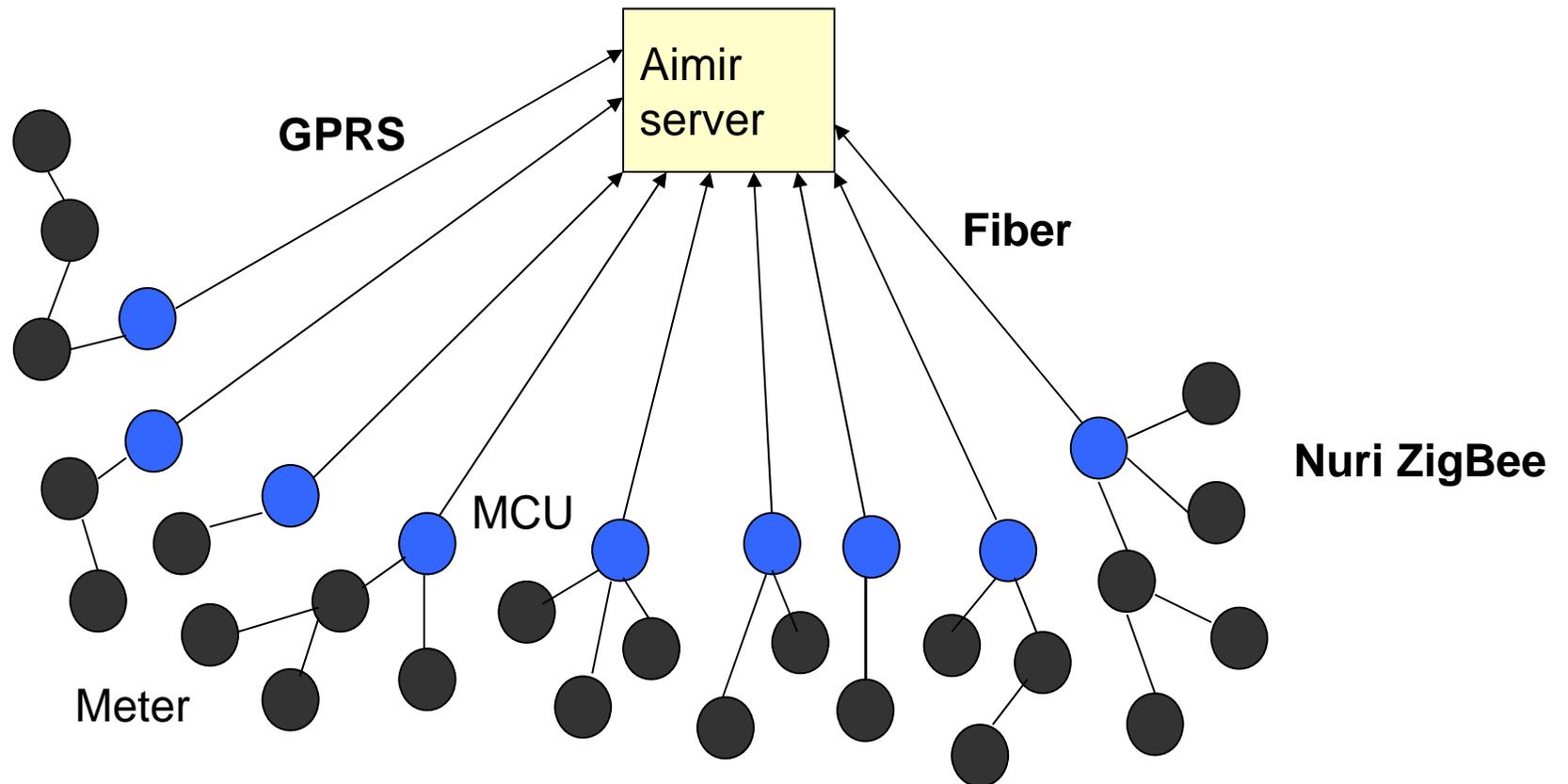
# Advanced Metering Infrastructure?

When is it advanced?

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

# AiMiR

## ZigBee based AMI system



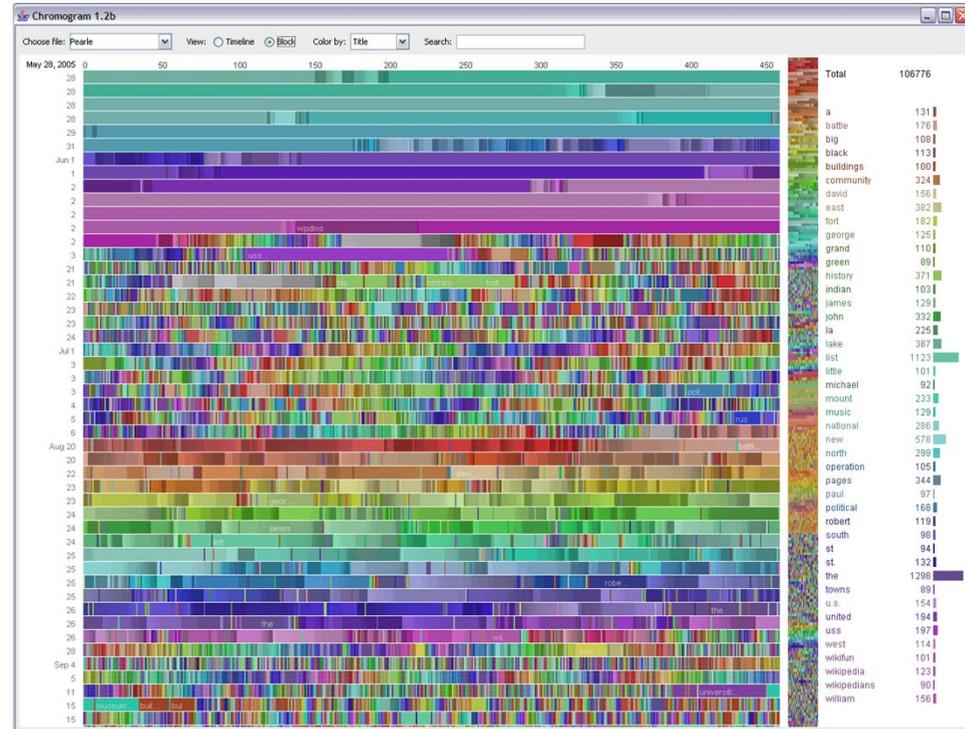
## AiMiR facts

- 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

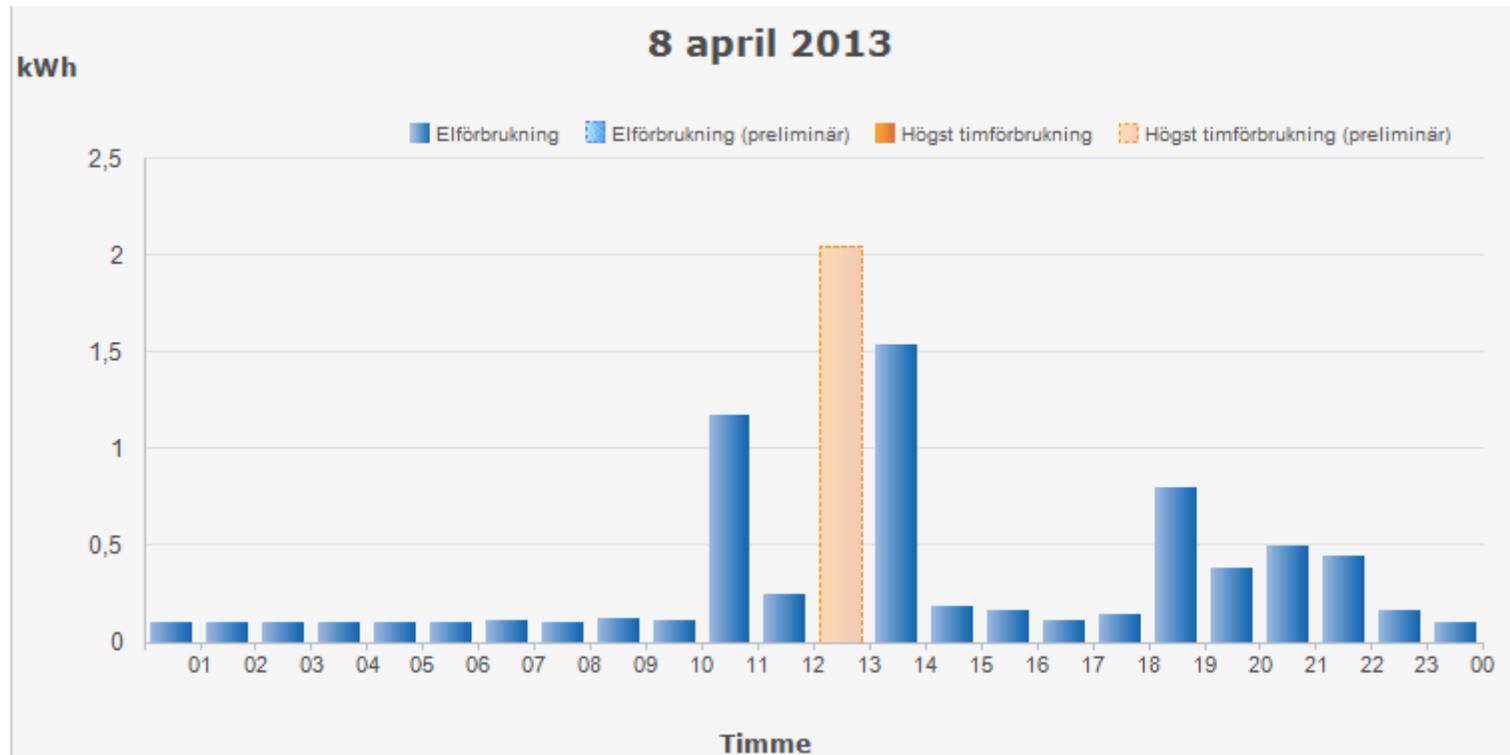
- 270000 x 24 meter values + some extra
  - 270000 x 6 x 2 power quality values
  - Loads of events
  - Topology data
- Every day...



*Find the information in the data*

# Challenges

## Privacy



# Challenges

## Time

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

# Challenges

## 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:**