Advanced Metering Infrastructure

Research Project 2
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Agenda

- Background
- Research motivation and questions
- Research methods
- Research findings
  - Stakeholders
  - Legislation
  - Smart meter
  - Technology
  - Communication
- Conclusion & recommendations
Background – The Market

- Liberalization
  - Trend of energy saving
  - Trend of emission reduction
- EU report see the trends hence the need of AMI, smart meter is there in 2005/2006
- In reaction to that Dutch Ministry of Economic Affairs commissioned NEN (Netherlands Normalization Institute) to draft a document describe the needs and requirements focusing on E and G.
- In April 2007, NTA 8130 was finalized
- In March 2011, Ministry of EL&I issued AmvB (Algemene Maatregel van Bestuur) on smart meter
- Both of them, give the task to GO to define specific requirements for Dutch smart meter – hence the birth of DSMR, the current version is 4.3
- Prosumers can sell back the energy which lead to crowd production
Research Motivation & Question

- Motivation
  - Understand the system
  - Take full advantage of the new system
  - ECO friendly
  - Energy saving

*How to optimize the information flow between the stakeholders of the AMI in order to better facilitate the liberation of Dutch energy market?*
Sub-questions

I. Who are the core stakeholders
II. Clear overview of AMI
III. Division of task domains
IV. (Metering) Information flow
Research Methods

- Desk research
  - Open meter
  - DSMR
  - Relevant research papers
- Interviews
  - Prosumer
  - GO
Finding – Stakeholders
Finding - Legislation

- EU → NL → NTA/AMvB → DSMR
- The parliament will debate the policy (final) on 24th June 2012 (news)
- GO is the owner of the whole infrastructure
- EDSN is the market facilitator
- NMA/Chamber of Energy carries the responsibility for checking if parties do follow the electricity and gas regulations
- Ownership of data depends on the type of information it contains
  - Privacy part
  - Technical part
Finding - Legislation

- SC / ISP metering data reading

**Energietransitie**
Door inzicht van de klant in zijn verbruiksgewijze kan deze bewustere keuzes maken.

**Inzicht in gegevens**
Leveranciers en derden kunnen – indien zij toestemming hebben van de klant – verbruiksgewijze ophalen en gebruiken voor jaarafrekeningen, verhuizingen, energiebesparing doeleinden, etc.

**Uitlezen Slimme meter**
- 6 x per jaar verplicht
- + bij switchen en verhuizen
- Dag- en intervalstanden op verzoek van de klant.

**Slimme netten**
Een slimme meter is onderdeel van een 'slim net' (smart grid), welke de grootschalige toepassing mogelijk maakt van duurzame technologieën. Ook zorgen slimme netten ervoor dat de netbeheerders de netten op afstand beter kunnen monitoren, beveiligen en besturen.
Smart Meter

- DSMR

1. Ministry of Economic Affairs
   - NEN/Netherlands Normalization Institute
     - Drafted based on E&G
     - Finalized in April 2007
     - Commissioned

2. Ministry of EL & I
   - AMvB/Algemene Maatregd van Bestuur
     - Issued in March 2011

Netbeheer

- DSMR/Dutch Smart Meter Requirements
Smart Meter

- GOs are purchasing and rolling out smart meters according to DSMR 2.2+ by now
- By 2013, they will use DSMR 4
- Two types of smart meters: PLC and GPRS
- By 2015, DSMR 5 (possibly EU standard)
- Kill switch available now, will be used starting from 2013
Smart meter
Smart Meter
Technology

- PLC (Power Line Carrier) use existing infrastructure
  - Prime / G3 PLC (both uses DLSM/Cosem)
  - DC (Data concentrator) at transformer station
- GPRS use mobile network
  - Need Teleco provider
  - GO choose Teleco for its own network
  - Direct connect to C-AR through local AR
Communication

- EDSN – C-AR / ODA
  - Virtual port: P4
  - EDSN is the communication hub
  - C-AR for SC (supplier company)
  - ODA for ISP (independent service provider)
- GO, SC and ISP have to be certified
- Annual audit report has to be sent to GO from both SC and ISP to prove legal operation
- 6 times metering data reading by law
- 15 minutes interval for E and 60 minutes for G, data is read daily
- Privacy is a big concern

**Basic patterns can be inferred with minimal analysis, even with power measurements every 30 seconds.**

There is a high correlation between power segments and consumer interaction with appliances.
Conclusion

- Core stakeholders from different interests groups and task domains
  - GO (owner of the infrastructure)
  - Prosumer (usage produce data)
  - EDSN (market facilitator)
  - Teleco providers (GPRS)
  - ISP (provide value-added services)

- The overall picture of the whole system
  - Metering networks (PLC & GPRS)
  - Local AR and C-AR
  - EDSN as communication hub
  - GO is the center part
  - EDSN will be the future center
Recommendations

- Possible improvements
  - Security & Privacy
    - Check both base contract and extra contract
  - System & Network
    - Avoid potential bottleneck “EDSN”
  - Usability
    - User should be able to adjust the permission directly (DigID?)
That's IT!
Thanks for your attention!
Facts

- Smart meter is more for consumption shifting, no direct saving
- Regulation and specification not final
  - EU regulation and standard maybe there
- Process not fully automated
- Bright future, but long way to go
  - Appliances mostly not ready/not available
  - Inter-section/inter-industry cooperate needed
  - Current situation is only a small part of the future big picture
Communication

Het systeem bestaat uit componenten ‘in het veld’ en uit applicaties ‘bij de utility’.

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- Datastroom
- Energiestroom

Netbeheerder

Elektriciteitsmeter met Communicatieroute

Watermeter Gasmeter

Commerciële Dienstverlener (ODA: Overige diensten aanbieder)

Energiebesparingsadvice en/of verbruikzinzicht

Facturering + voorschot door nauwkeurige schatting
Use case

- HAN (Home Area Network)
Use case

- Prosumer