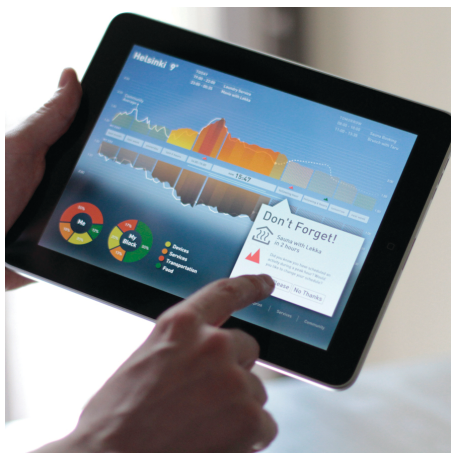
Am I as smart as my smart meter is?

Swedish experience of statistics feedback to households

Prof. Jurek Pyrko, Efficient Energy Systems, Lund University, Sweden

Smart Meters

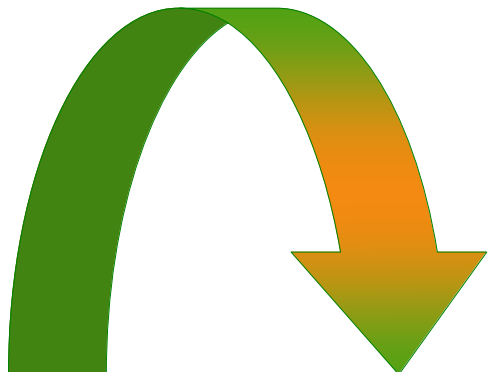
Feedback



Information

Statistics

Electricity Use



Electricity Use

Smart meters in Sweden

- July 1st, 2009
- Billing based on **monthly** readings
- Earlier studies 0-12%
- Expected savings 3-4%
- ≈5 mil. remote meters
- Investments **≈1.5 bil. €**
- 95% hourly reading
- **80%** two-way communication

Objectives

To investigate the influence of improved energy **feedback** in Swedish dwellings (Internet-based energy statistics) on:

- ☐ electricity **savings**
- ☐ potential of changing electricity **use patterns**

Hypothesis

The statistics service, as **feedback** to households, might lead to **lower** electricity use, if the households get better **understanding** of their energy use patterns and costs

Methods

- Random customer lists and data from grid companies
- **Users** (experimental groups) - customers who used statistic services (in all cases, Internet-based)
- **Non-users** (control groups) - customers who have not used the statistic's services
- Customers not informed about their participation in the study during energy use measurements (**Howthorne effect** avoided!)

Methods

- Quantitative and qualitative:
  - ☐ Customer's electricity use, energy behaviour, values and attitudes
- Data "**before**" and "**after**":
  - ☐ For Case 1 and 2: 3 years "before" and 3 years "after
  - ☐ For Case 3: two 6-month continuous periods
- Weather corrected energy use data (degree-days)

Energy User Profile

- Differences between Users and Non-users, their energy habits and behaviour
  - ☐ indoor temperature level
  - ☐ airing
  - ☐ thawing of food
  - ☐ knowledge of the annual electricity use level
- "**Good**" (conscious) energy behaviour → plus points
- "**Bad**" energy behaviour → negative points
- Grades range from -10 to +14 points

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Case 1

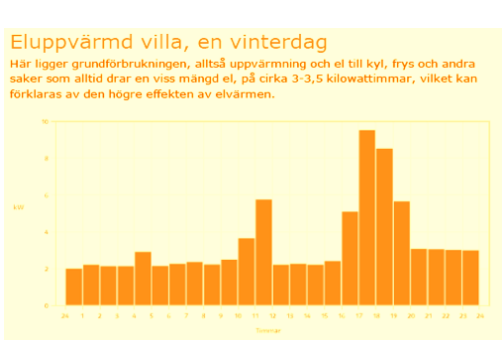
Grid company Skånska Energi (Southern Sweden near Lund) with an Internet-based statistics service "My Electricity Use"

Case 2

Grid company Öresundskraft (in Helsingborg) with its Internet-based service "Your Pages"

Case 3

E.ON Sweden (in Malmoe), with Internet-service "Energy Dialog - Private"



Case 1 - Results

Skånska Energi

	3 years "before" and 3 years "after"
In flats: Users (as a group) Non-users (variation)	
In single-family houses: Users (as a group) Non-users (variation)	
Totally as a group: Users Non-users	**Increased +28%** **Decreased ~10%**

Case 2 - Results

Öresundskraft

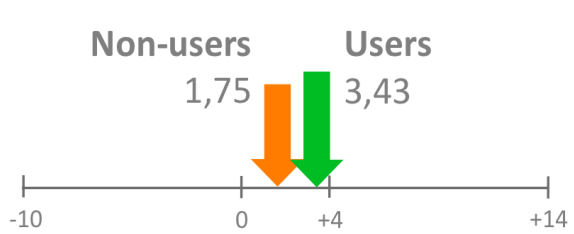
	3 years "before" and 3 years "after"
In flats: Users (as a group) Non-users (variation)	**Increased +18%** **Varied +/- 10%**
In single-family houses: Users (as a group) Non-users (variation)	**Decreased -13%** **Varied +/- 20%**
Totally as a group: Users Non-users	

Case 3 - Results

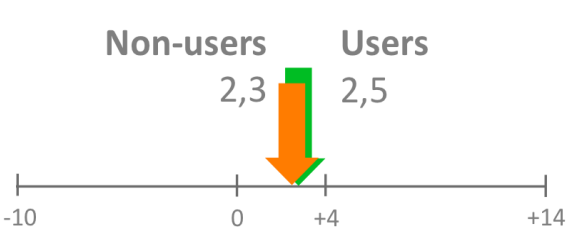
E.ON Sweden

	6 months "before" and 6 months "after"
In flats: Users (as a group) Non-users (variation)	
In single-family houses: Users (as a group) Non-users (variation)	
Totally as a group: Users Non-users	**Decreased -0.04%** **Increased +0.02%**

Energy User Profile Case 1



Energy User Profile Case 2



Energy User Profile Case 3