

Case Study S3C

Linear



S3C related keywords:

- Demand Response
- Dynamic tariff structures
- Smart appliances

“Flemish households test smart appliances”

Project Summary

The Linear (‘Local Intelligent Network and Energy Active Regions’) project is a large-scale research and demonstration project aiming to **activate domestic demand response** to facilitate the integration of distributed (renewable) energy resources in the low voltage grid. The project not only aims at developing the needed technical solutions to realise a **technological breakthrough** of domestic demand response, but also looks at **possible future energy market structures and potential business cases** to validate the flexibility available at the consumers’ premises. Both the technical solutions as well as the business cases are implemented in a pilot engaging about 240 Flemish families.

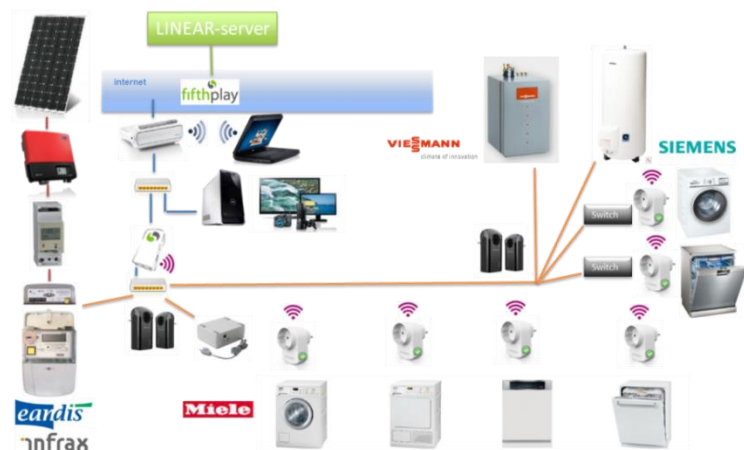


Figure 1: Linear field trial set-up

What sets this project apart from other Smart Grid projects?

Within the field trial, two different demand response solutions are tested, i.e. manual ‘**Time of Use**’ (ToU) tariffs (in 6 time blocks, tested by about 25% of the participating families) and automated ‘**Flexibility**’ (remote start of smart appliances within user defined constraints – tested by about 75% of participating families). Within the “Flexibility” group, participants do not see the ToU tariffs, but for half of them the algorithms activate the appliances based on these ToU tariffs.

For each group a different **reward system** will be used. The ‘Time of use’ group gains money by shifting electricity demand according to the tariffs, while the “Flexibility” group is compensated according to the hours of flexibility given.

Another strength of the project is that the technologies deployed at field trial participants were developed in such a way that they **never impinged on the comfort level** of energy practices and end users always retained ultimate control of their appliances.

By involving different energy market players within the project, Linear managed to look at the value of flexibility from the viewpoint of energy markets, but also from the grid perspective. Four business cases for domestic DR are therefore explored during the project. Two of these cases are in the interest of the retailer / balance responsible partner (BRP), i.e. **“portfolio management”** (optimization of electricity purchases and sales on the day ahead market by means of DR) and **“wind balancing”** (reducing the intraday deviations between predicted and measured wind power generation by means of DR). The DSO is the party concerned in the other two cases, i.e. **“LV transformer load”** (avoiding peak loads on low voltage transformers by means of DR) and **“LV feeder voltage profile”** (managing the voltage profile of low voltage feeders by means of DR).

2 groups of families
2 remuneration models tested
Flexibility ⇔ Time of Use

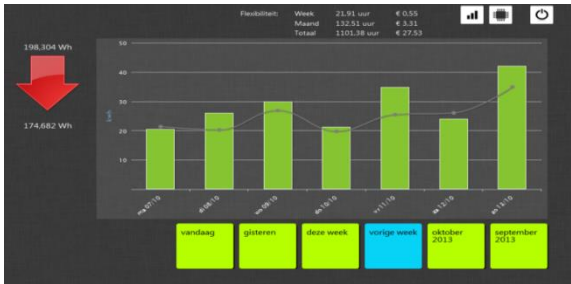


Figure 2: Feedback to customers dependent on customer group: left "flexibility" customers (weekly view) - right "Time of Use" customers (monthly view)

What happened?

The field trial started in spring 2013 and will conclude in summer 2014. In total 459 smart appliances and 7 electrical vehicles are deployed in the field trial.

Figure 3 shows the number of hours of flexibility offered with white goods by the top 10 participants per week until now. Overall, the dishwasher is the front-runner. Field trial results will be available after the summer.

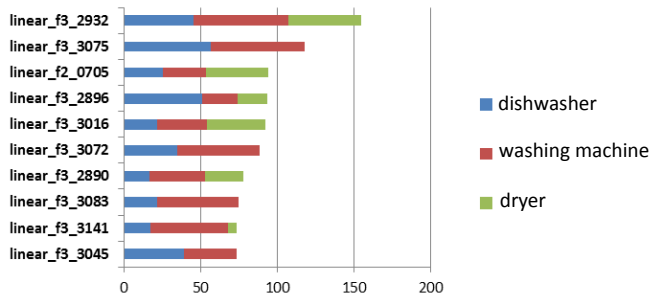


Figure 3: Top 10 hours flexibility offered per week

Further information / Contact

Contact S3C:
 Erik Laes (VITO)
 E-Mail: erik.laes@vito.be

Contact Linear:
 Wim Cardinaels (VITO)
 E-Mail: wim.cardinaels@vito.be

Linear Homepage: <http://www.linear-smartgrid.be>