Demand Side Management case book
International approaches and lessons learned in Demand Side Management

March 4th, 2015

B3.2: Effective Customer Engagement for Smart Grid Project Success
Agenda

Presentation of the case book on DSM*
Demand management approaches
Example cases
Focus on NICE GRID
Selected findings

*DSM=Demand Side Management

Author: Rémy Garaude Verdier – Christophe Arnoult
Agenda

Presentation of the case book on DSM*

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Example cases

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*DSM=Demand Side Management
A case book representative of the current DSM experience

- The case book on DSM has been released in May 2014
  - Release during 5th Clean Energy Ministerial in Seoul on May 12th 2014
  - Second version to be released during 6th Clean Energy Ministerial in Mexico

- Promotion of a worldwide exchange through
  - 12 cases from Africa, Asia, North America and Europe
  - Involvement of worldwide top-notch demonstrators in the Demand Side Management domain
    - E.g. 4 case book contributors recognized as finalists (top 10) of the 1st ISGAN Award of excellence

- Modernize the states regulations to ease the development of Smart Grid technologies
  - Inclusion of recommendations regarding market establishment in the Key findings and the Executive Summary
  - Key Regulations, Legislation & Guidelines chapter at the end of each case
    - Feedback from ISGAN Secretariat to contributors: “Highly recognized by many government officials”
Agenda

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Demand Management Approaches

Device / Appliance Efficiency
1. Conservation

Customer Behaviour
2. Passive customer feedback information
3. Price-based incentives / disincentives

Smart Grid
4. Automated load control
5. Volt VAR optimization (better forecasting & integration of data)
Agenda

Presentation of the case book on DSM
Demand management approaches

**Example cases**
Focus on NICE GRID
Selected findings
Separate projects, building off learning and results:

- **Consumer2Grid**
  - Visualization and feedback on customers demand for behaviour change

- **Persuasive End-user Energy Management**
  - Communication of grid conditions for customer behaviour change

- **Building2Grid (ends 2015)**
  - Buildings managed as active grid management assets

- **Vehicle2Grid**
  - Managed with market and system based controls

Participants

- 1 industrial
- 30 small commercial
- 474 residential customers (58 buildings)

- C2G – OK results, declining over time
- PEEM – better results, lasting
- B2G – good theoretical results, need market development
- V2G – good theoretical results, need market development

www.smartgridssalzburg.at
Consortium of 4 utilities: NB Power, NS Power, St. John Energy, Maritime Electric

- 2 VPPs: NBISO, NSISO
- Residential: Hot water heating, space heating (via aggregator)
- Commercial: pumping, HVAC, refrigeration, etc. (via customer EMS and via aggregator)
- Provides 10 minute spinning reserve, and Real Time Generation Dispatch

Participants:
- 1164 residential
- 81 commercial
- Total 14.3 MW

Aggregators:
- Integral Analytics (residential)
- Enbala (commercial)
- UNB (residential + commercial)

- 2 VPPs operational
- 80% customer satisfaction
- AMI can be slow – using internet

www.powershiftatlantic.com
DENMARK EcoGrid EU Real-time market demonstration
Demand Response – Price-based

Real-time market response
• Residential (heat pumps, hot water heating, space heating)
• 5 minute price response via customer programmed preferences
• “Bidless” market with prices announced ex-ante (no auction) reduces barriers for small players

Participants
• 500 residential (manual control)
• 1200 residential (automatic control)
• 100 commercial / industry (automatic control)

Home Automated Control
• GreenWave Reality
• Siemens-SyncoLiving

• Project completion in 2015
• Customer savings of 2-4% anticipated

Early Adopters: Focused on social & environmental values
• Mainstream: Focused on customers looking “smart”
• Guarantee not to lose money.

www.eu-ecogrid.net
Kitakyushu Smart Community Council

- AMI communications & control
- Dynamic Pricing (variable, critical, incentive)
- Renewables + fuel cells, community storage, cogeneration (H₂ by-product)

Participants:
- 38 Customers (1 industrial, commercial, residential)

Community Energy Management System (CEMS)
Building Energy Management System (BEMS)
Home Energy Management System (HEMS)
Factory Energy Management System (FEMS)
Retail Energy Management System (REMS)

- 9-13% decrease in peak
- Results data for Int’l Standards Development
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Author: Rémy Garaude Verdier – Christophe Arnoult
Winter 2014 – Demand response

Offers presentation

Voluntary Savings

Pilot heating systems

TO CONSUME DIFFERENTLY:
To voluntarily reduce or shift consumption in order to contribute to the consumption peaks control

TO PILOT:
The electrical heating in a remote way in order to reduce consumptions
Winter 2014 – demand response

Recruitment and first results

- 12.5% average recruitment for BtoC (1650 customers)
- 207 individual participants
  - 167 through the “Voluntary savings” offer
  - 40 through the “Pilot heating systems offer”
  - Load management:
    o Voluntary savings: 350 W
    o Pilot heating systems: until 400 W
- In addition to B to C recruitment, 11 industrials have been recruited
- Results
  - A good understanding of load shedding
  - A strong mobilization of the participants for the voluntary savings experience
  - A need for tool for individual and collective feedback
  - For industrials: a substantial gap between the expected and the actual response
Summer load shifting
Focus on the Solar Bonus offer

Traditional off-peak hours

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- In France, off-peak hours time are decided by the DSO
- Residential clients can choose either a base tariff or a on/off peak tariff
- 8 off-peak hours are offered: 22:00-6:00 or 22:30-6:30 for example
- In 2014: 15,10 c€/kWh\text{peak} vs. 10,44 c€/kWh\text{off-peak}

Every day, for 37 clients during summer 2014

New off-peak hours: a four-hour block substitution

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- Four off peak hours are added during the 12:00 PM – 4:00 PM block
- For 25 clients, combined with a new start of electrical boiler at 12 PM
Summer load shifting
BtoC recruitment and first results

- 17.5% average recruitment for BtoC (475 customers)

- 82 individual participants
  - 37 through the “Solar bonus offer”
  - 25 through the “Electric boiler” offer
  - 20 through the “PV+Storage offer

- Load shifted in 2014: **2795 Wh**
  - **385 Wh** through the “solar bonus” (from Noon to 4 PM)
  - **2410 Wh** through the “Electric boiler” (from 2 PM to 4 PM)

- Results
  - Overall, a positive approach of the customers
  - In particular, a very good response to the solar bonus offer
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Selected case book findings

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Many projects focused on the social prestige and environmental benefits as opposed to the economics up front.

Initial opinions changed once they were allowed to experiment.

Customer Engagement
Key Findings

Prepare customers’ buy-in:
- Have a clear perception of the benefits and risks of the service and identify relevant customer approaches
- Build a guiding team: reshuffle customer services if needed and train customer facing employees

Publicize the opportunities and remove obstacles:
- As many people as possible should hear the call for action loud and clear, with messages sent out consistently and often
- Address the reluctance linked to the fear of losing money or quality of service
- Define clear rules regarding the protection of data

Support the customer throughout the process:
- Customers quickly exhibit signs of fatigue. Support them in the whole process.
- If the participants perceive that the service has improved, their engagement should sustain.

Actively recruit customers:
- Communicate up front with customers
- Identify customer expectation (social values, environmental aspects, financial benefits,...) and communicate for buy-in
- Do not hesitate to engage the “mainstream” customers through perks and other short term wins to let them overcome obstacles and empower them to spread the word
Customer Engagement
Stakeholder action

At the equipment providers level, companies could:
- Launch innovative small and medium-sized equipments to make the shift from a small number of large power plants to a large number of flexible users feasible: Make it simple and easy to use
- Develop VPP and systems including peak demand reduction and ancillary services based on load management and storage

At the system operators level, utilities could:
- Facilitate and foster a DSM ancillary services market by including relevant stakeholders and decision makers to support system balance through load management

At the customers level, individuals and industrials could:
- Participate through an acting agent but maintain the possibility of controlling the devices and processes
- Understand in depth the opportunities of DSM
- Be able to determine the capability to participate in a DSM program

ENCOURAGE STANDARDIZATION AND COOPERATION BETWEEN STAKEHOLDERS
Thank you for your attention!

Visit our website: www.grid4eu.eu

All public deliverables are available on the GRID4EU Website:

http://www.grid4eu.eu/project-demonstrators/deliverables.aspx