

Lessons learned from European pilot projects

Recommendations how to integrate Demand Side Management into the energy market

Julia Schmidmayer

AIT Austrian Institute of Technology, Energy Department

Overview

- Problem statement or ‚why do we need Demand Side Management?‘
- Methodological approach
- Guidance to analyse DR pilot projects
- Pilot projects
- Recommendations
- Good practice examples of DSM operator models
- Conclusions

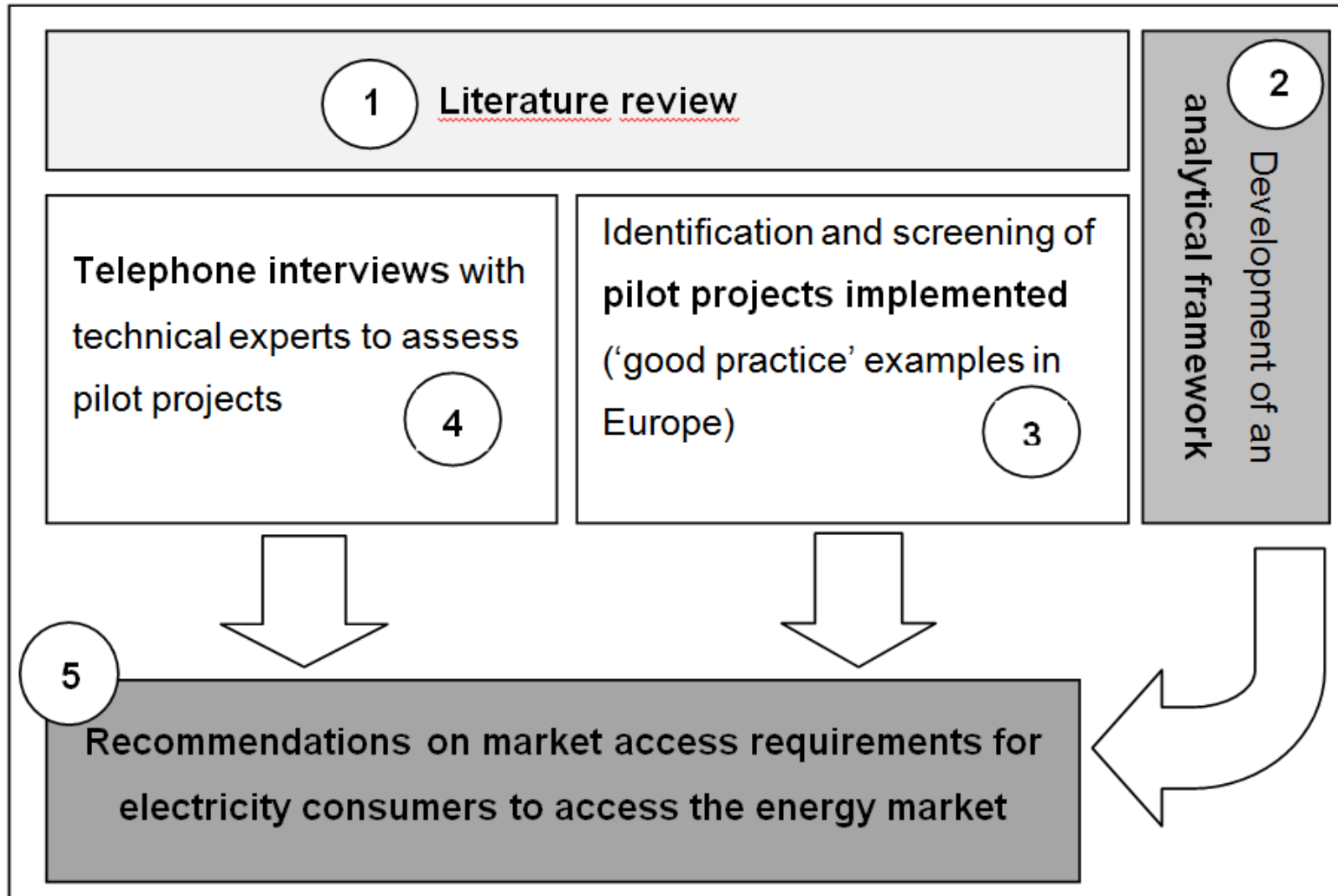
Why do we need Demand Side Management (DSM)?

- **Increase of energy demand and CO₂ emissions** due to urbanisation and population growth
- **Paradigm shift of energy system** needed
 - Utilisation of renewable energy technologies
 - Reduction of impacts of climate change
- **Challenges**
 - Stability and security of energy supply
 - Major infrastructure investments in the European electricity grid
- **DSM to ease the pressure** that the electricity market is technically and economically experiencing
 - Overcome current regulatory barriers
 - Implementation of Demand Response (DR) programs

Methodological approach 1/2

- **Discussion on market access requirements** provided to electricity consumers to attract them accessing the energy market
- **Good practice examples of DSM operator models**
- **DSM potential in residential sector still controversial** as only small loads are available
 - **Supported by results of co-funded pilot projects** to prove applicability in real-life conditions
 - **Concept of load aggregation**
 - **Integration of energy and ICT concepts incl. user engagement**, definition of use cases and their economic impact

Methodological approach 2/2



Guidance to analyse DR pilot projects

Categories	Description of category
Participation and acceptance of consumers	Consumer motivation to change their behaviour and accept to participate in the market (e.g. user activation, access to information, data security & privacy)
Institutional and regulatory framework	Set-up and structure of electricity markets to enable participation (e.g. definition of roles and responsibilities of market players, formalisation of interactions between different parties)
Economic and financial aspects	Financial profitability of DR services (e.g. business models, profitability)
Technical aspects	Technical conditions in relation to hardware, software and interoperability (e.g. data communication standards, enabling technologies, interoperability)

Pilot projects



Recommendation 1

- **Community creation supports user activation as the sense of belonging to a community influences the engagement and participation**
 - *Activation of interest*
 - *Engagement of consumers*
 - *Communication campaign* based on in-depth user segmentation and analysis of perceptions, attitudes and behavioural patterns
 - *Communication activities* tailored to the needs of a specific customer group
 - Testimonials
 - Emotional messages
 - Events, open house days, trainings

Recommendation 2

- **Variable tariff models need to offer an added value for an acceptable price to attract consumers**
 - *Measurement of electricity consumption patterns* of households
 - Identification of change or shift of electricity consumption during a DR event
 - *Dynamic price signals* show good effects to increase DR participation
 - Tariff structure must not be too complicated
 - Tariff should *match to energy behaviour* in order to promote user engagement in DR programs

Recommendations 3 & 4

- **Based on the visualised electricity consumption data consumers can be incentivised with premiums and other rewards to participate in DR programs**
 - *Feedback devices* visualising energy consumption data influences user behaviour
 - Results of pilot projects showed that users prefer *in-house displays and mobile applications*
 - Users want to influence devices automatically responding to DR signals
- **Data protection, privacy & security aspects need to be considered when ICT infrastructures and systems are designed and participation agreements with consumers concluded.**
 - *Analysis of ICT infrastructures and systems* in relation to their security demand and risk mitigation
 - *Participation agreements* with users

Recommendations 5 & 6

- **The institutional and regulatory transformation of the energy market requires the introduction of new market players that develop services attractive for consumers**
 - Definition of roles and responsibilities of market players
 - New roles of market players (e.g. aggregator, energy system manager)

- **Detailed cost-benefit-analyses are crucial for defining the added value of business models; financial advantages for consumers are quite low. Thus, aggregators respectively companies, who offer aggregation services, need to concentrate on key messages on a broader level in order to attract consumers**
 - *Business model* = value creation of market participants based on value adding processes and revenues
 - Bottom-up driven development of business models involving all stakeholders
 - *Implementation concepts*

Recommendation 7

- **Standardisation and interoperability of technologies proved to be a basic condition for interaction of technical appliances and enabling technologies**
 - *Harmonisation of communication* of technical devices very time consuming and cost intense
 - Technical standardisation and interoperability of technical devices
 - Involvement of manufacturers
 - Software and communication issues of components
 - *Smart home network* based on an interoperable ICT architecture ensuring interconnectivity

Good practice examples of DSM operator models

■ **PowerMatcher Suite**

- Operation of devices automatically optimised aiming at an optimal match between electricity generation and consumption
- Open source technology
- Designed for various business areas based on utilising flexibility

■ **E-DeMa market place**

- Intermediary bringing together supplier and consumer
- Electronic business and legal relations between market players

■ **E-Energy RegModHarz**

- Concept of a Virtual Power Plant (VPP) aiming at full exploitation of renewable energies
- Household's devices connected to a bi-directional energy management interface (BEMI) and automatically controlled

Conclusions

- **High market access barriers for residential consumers**
- **Requirements**
 - Long-term activation of residents
 - Attractive tariff schemes
 - Visualisation of energy consumption
 - Data protection
- **DSM operator models following the concept of a VPP**
 - Sector of residential consumers still untapped in Austria
- Analysis of pilot projects proved that **load aggregation in the residential sector does not offer a viable business model**
 - Limited economic advantages for residential consumers
- **Expectation that market for DR in the residential sector will develop in the upcoming years**



AIT Austrian Institute of Technology

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Mag. (FH) Julia Schmidmayer, MSc

julia.schmidmayer@ait.ac.at