DSMSpotlight

The Newsletter of the International Energy Agency Demand-Side Management Programme October 2014

Task 24

Storytelling Illustrates How We Are Changing Our Energy Path

Once upon a time...Finnfjord, a small, family-owned business far north of Norway's Arctic Circle decided to become the world's first carbon neutral ferrosilicon plant.

Every day...its owners and clever staff pondered how to go about this immensely difficult task (seeing ferrosilicon plants use an enormous amount of power for their smelting processes).

But, one day...they found a way to make use of the excess heat and offgases from their production to power a steam turbine, which would produce electricity for the company, reduce their demand significantly and vastly increase their energy efficiency.

Because of that...they struck an agreement with Enova, the Norwegian government enterprise responsible for promotion of environmentally friendly production and consumption of energy, that they would receive a sizable grant which would help them implement their grandiose idea.

But then! They discovered that there were a lot of technical difficulties in getting the technology to work, resulting in a year's delay of work and a significant budget overrun. Still, when it was finally started, the new boilers immediately lowered demand by a very large amount, thus proving the feasibility of the project.

Because of that...other, larger, multi-national companies are now making use of

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Note from the Chairman

Demand Side Management is Getting Back on Track

The worst thing that can happen to an energy efficiency research area is that it becomes a victim of excessive hype. That people actually believe they've found the silver bullet that will save the day.

Examples of this are in the areas of hydrogen, fusion, CCS and DSM. Millions (if not billions) are spent on the topic until people realize that the solution isn't meeting the hyped up expectations.

And then, dramatic budget cuts and dismantling of research centres follow.

Unfortunately, these are the result of political action. Our budget providers tend to get overly enthusiastic in both directions – going after the silver bullet and burying work.

Now this is not a "blame the politicians" introduction. We from the research side are not very good at managing the expectations of the public and policy makers.

The examples mentioned above can deliver huge contributions to our energy supply and climate

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PARTICIPATING COUNTRIES

Austria
Belgium
Finland
France
India
Italy
South Korea
Netherlands
New Zealand
Norway
Spain
Sweden
Switzerland
United Kingdom
United States

SPONSORS

RAP
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Storytelling *from page 1*

Finnfjord's innovativeness to improve their own efficiency, but of course at much less risk. This has unlocked significantly more funds from Enova, which makes sense from the Government agency's perspective as they use public money to fund these projects. The less risky a project - the easier it is to justify using taxpayer money. However, it does not seem fair from the forerunners' perspective, as Finnfjord took on most of the risk and developed and trialed the technology in the first place.

So, ultimately...there was a clash between two Norwegian policies – one stimulating increased energy efficiency, the other stimulating innovation. This also showcases the difficulty in deciding how to bridge the 'valley of death' - with government push or market pull?

But finally, the end result was very successful, with energy savings of up to 35% for an upfront investment with a payback time of 7-8 years. Norway's ferrosilicon plants are fast becoming the most environmentally friendly in the world, thanks to our small family business with its big ideas (and some help from the government). The end.

IEA DSM Task 24: Closing the Loop - Behaviour Change in DSM: From Theory to Practice is investigating case studies from four domains (SMEs, smart metering, building retrofits and transport) in its participating countries. The case studies were collected and analysed according to social science methodologies, yet when we tried to discuss our findings, we found that there were a lot of misunderstandings and miscommunication due to the different jargon used in different sectors (for example, government, industry and the third sector) and between different research disciplines. The one common 'language' that we found could bridge these divides was storytelling, in its many forms.

The example above from Finnfjord, is storytelling in its most literal form. We also tell our participating countries' stories, different sector's stories, energy experts' own energy stories and the stories of the different models of understanding behaviour change which often underpin demand side management policy, programme or project design. Storytelling takes the 'sting' out of language, which often has very specific meanings to specific audiences (it is quite frightening how much dispute there is among the social sciences on the terms 'behaviour' or 'practice', or how differently 'demand side management' can be understood by different sectors). A story also evokes a feeling, an almost sub-conscious way of 'getting it' which often carries the message (or the 'moral' of the story) better - despite its more metaphorical or simplistic description - than a 150 page social science or policy report ever could.

We have collected many stories from around the world - a lot of them started as 'hero stories', where, for example, a clever energy efficient technology was going to save the world. Most often, they turned into 'learning stories' where straightforward intervention approaches based on an understanding that humans mostly act economically rational were often found to be lacking or insufficient. Sometimes, they turned into 'love stories', for example when an energy efficiency programme ended up having huge health benefits or other social improvements. And sometimes, they turn into 'horror stories' where bad programme design or perverse outcomes might mean that some very unintended consequences happen. We will continue to experiment with storytelling and its impacts. We also have cartoons, videos, podcasts and... 150 page social science reports. If you are interested in finding out more about DSM Task 24 or the stories we can tell, drop us a line at drsea@orcon.net.nz

Article contributed by Dr. Sea Rotmann. For more information contact the DSM Task 24 Co-Operating Agents Sea Rotmann, drsea@orcon.net.nz, and Ruth Mourik, ruth.mourik@duneworks.nl.

News

You Don't Want to Miss!

Stories

You Don't Want to Miss

The Fellowship and the Ring - Research and DSM in New Zealand

The Hitchhiker's Guide to DSM

There is a disturbance in the force - the future of transport in NZ

An insulation love story

The political thriller of DSM

The Good, the Bad and the Ugly - a frontier's tale of South Africa's DSM

Energy Experts' Stories

DSM Programme

The Times They Are A-Changin'

The times they are a-changin' and so is the work of the IEA DSM Programme. The basics of DSM are the same. When we want to alter the how the energy system is operating there is still only two ways to go – change the load level or change the load shape. Many engineers are satisfied to stop here as it describes in full what happens during generation, transmission and distribution and how we can make use of more sustainable resources (read fuels) as well as relieve the strain of bottlenecks in the system.

But DSM is not only a matter for engineers. As a matter of fact, it may even be more of a matter for those that have to plan for, finance and motivate the changes. When the IEA Secretariat in the report, *World Energy Outlook 2012*, showed that the world could almost reach the 2-degree target for global warming only by using profitable energy efficiency measures it became evident that we have a mental gap to deal with. The gap between what people say and what they do. The say "Yes, we are economically rational" but then do the opposite!

Of course we have known about this for a long time, but we have not been not fully aware of the magnitude and maybe less aware that arguing rationality was simply not enough to get the activity from users of energy, from businesses, from planners and from politicians. It is with these renewed insights that the IEA DSM Programme has developed a new Strategic Work Plan.

One area that the IEA DSM Programme is placing more emphasis on is the "acceptance" of the measures that rationality and logic suggest and what we normally call the "potential". It is important to remember that result equals potential multiplied with acceptance. If acceptance is zero even a HUGE potential returns zero result! And, acceptance is among other things about business models and behavioural issues. Theses are the type of issues being addressed in *IEA DSM Task 24: Closing the Loop - Behaviour Change in DSM, From Theory to Policies and Practice* and *IEA DSM Task 25: Business Models for a More Effective Uptake of DSM Energy Services.*

The IEA DSM Programme is working to broaden the perspective of energy systems with the new

		Market Transformation Issues		**Instruments for Market Transformation**	
		Potential (Planning)	**Acceptance** (Business Models, Behaviour)	**Delivery Mechanisms**	**Policy**
Technological Issues	**Load Level**	5, 20	7, 15, **16, 24, 25**	1/sub9, 3, 6, **22**	9, 10, **18, 21**
	Load Shape	13, 19	2, 14, **23**	8, 11	4
	Distributed Generation (RES)		**16 (part)**	**17**	

Current Tasks shown in bold text and Completed Tasks in plain text.

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Task 1 Subtask 9 – Evaluation Guidebook on the Impact of DSM and Energy Efficiency Programmes

Task 2 Communications Technologies for Demand-Side Management

Task 3 Technology Procurement

Task 5 Marketing of Energy Efficiency

Task 6 Mechanisms for Promoting DSM and Energy Efficiency in Changing Electricity Businesses

Task 7 Market Transformation

Task 8 Demand-Side Bidding in a Competitive Electricity Market

Task 9 The Role of Municipalities in a Liberalised System

Task 10 Performance Contracting

Task 11 Time of Use Pricing and Energy Use for Demand Management Delivery

Task 13 Demand Response Resources

Task 14 Market Mechanisms for White Certificates Trading

Task 15 Network-Driven DSM

Task 16 Competitive Energy Services

Task 17 Integration of Demand Side Management, Energy Efficiency, Distributed Generation and Renewable Energy Sources

Task 18 Demand Side Management and Climate Change

Task 19 Micro Demand Response and Energy Saving

Task 20 Branding of Energy Efficiency

Task 21 Standardisation of Energy Efficiency Calculations

Task 22 Energy Efficiency Portfolio Standards

Task 23 The Role of Customers in Delivering Effective Smart Grids

Task 24 Closing the Loop - Behaviour Change in DSM, From Theory to Policies and Practice

Task 25 Business Models for a More Effective Uptake of DSM Energy Services

Task 17

DSM Workshop @ Austria's Smart Grids Week

During the Austrian Smart Grids Week this past May, the IEA DSM Task 17 and the European project EcoGrid EU jointly organised a workshop to foster the exchange between 70 demand response/demand side management experts and stakeholders from 15 different countries.

IEA DSM/EcoGrid EU Workshop

This meeting of experts and stakeholders focused on the latest activities in the field of active demand response (DR) and demand side management (DSM). The presentations were divided into four topic areas

revised some so easier to replace with this:

- DSM Potential of Buildings: The first session, which addressed the potential of DSM – How big is the potential and how can it be accessed? – had four speakers from academia, consultant and industry. The presentations covered successful implementations on a building and community scale with participation of customers to nationwide analysis of potentials of households and small and medium enterprises.
- DSM for Distribution Networks: This block focused on the impact and interactions of flexible loads with the distribution grid. Three speakers from academia and government gave a comprehensive overview of ongoing efforts and projects. They covered new and established concepts for activating demand response with the concept of agent-based market operation (Figure 1) and virtual power plants.
- DSM for Market Participation: Five presentations were given from academia, industry and the transmission operator perspective. Discussions started at small-scale validation of the new real time market implementations of EcoGrid EU and ended with countrywide and European level market integration.
- DSM and EV (electric vehicles): The last block focused on controlled charging of electric vehicles as a resource of demand response. Two projects were presented 1) experiences of integration and interaction of EV with smart homes from a distribution system operator (Figure 2) and 2) studies on modeling potentials and impact from academia.

All 13 presentations are available on the IEA DSM website under *DSM Task 17: Integration of Demand Side Management, Energy Efficiency, Distributed Generation and Renewable Energy Sources*

Round Table Discussion

The workshop concluded with a round table discussion at which time the presenters were invited to answer questions from the session chairs and audience.

What is the impact of demand response on the electrical network?

- Finnish Project SGMS aims to reduce the needed voltage band as much as possible, which can avoid costly grid reinforcements. Impact of PV generation on the need for grid reinforcement on low voltage

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Figure 1. Energy Dashboard of PowerMatchingCity
(source: TNO)

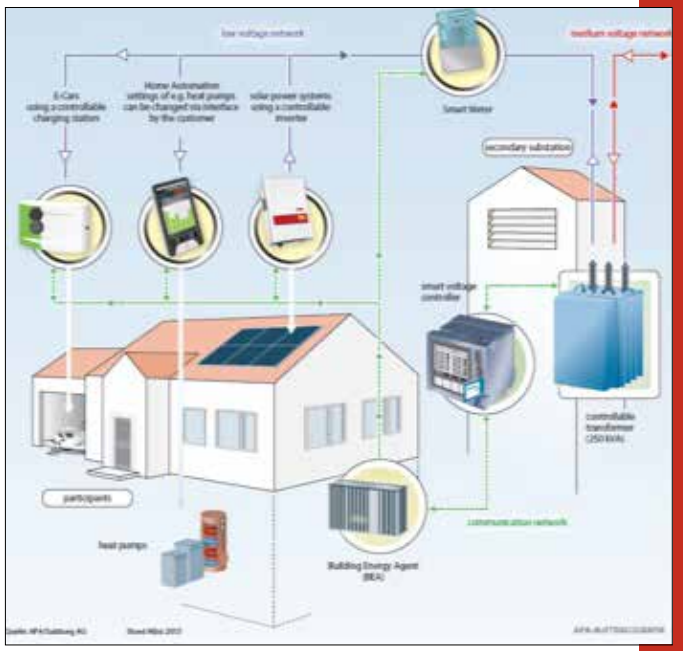

Figure 2. Smart Grids Model Community Köstendorf
(source: Salzburg AG)

levels can be reduced by 30-50%, if also generation reduction is considered together with the activation of flexible demand.

- There may be a critical mass of flexible loads which can de-stabilize the system due to oscillation effects. Large amounts of fast dynamic reacting loads can cause severe problems (re-bound effects).

What is the main motivation to move to closed loop demand response (e.g., in the USA or in the EcoGrid EU project)?

- Closed loop has been chosen because they anticipated a smoother and determinable response from the system (Figure 3).
- The predictability and the immediate feedback of the system is a requirement for stable activation of the system's flexibility.

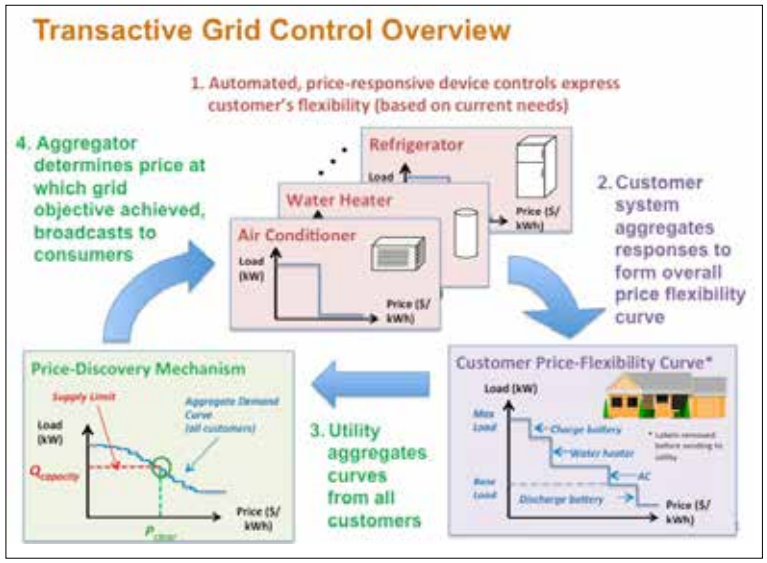

Figure 3. The closed loop 'transactive grid control' concept (source: PNNL)

What are the drivers for demand side management and demand response?

- Projects have shown that often system conditions and not primarily the customer benefits in Europe and the United States (system operation efficiency through load shaping measures). In India the energy and cost effectiveness of the energy system is significantly improved through DSM (energy end use efficiency through load level measures).

Is it possible to store the energy and thus increasing the load with demand response?

- From a technical point of view it is possible, but there are huge investments due to physical constraints (storage capacities, etc.). Pre-cooling has been researched in the US, but it does not seem like an efficient way to use energy.
- Studies show that the maximum storage time (load shifting) is limited by demand response process, in case of the utilization of thermal energy storage. Unless a large amount of electric energy storage system is available, the storage time is limited to hours.

What are market based demand response experiences from DSO to solve regional and local problems?

- Aggregators must not be discriminated or detained. But the system responsibility should stay at DSO level, while maintaining an overall optimization concept. The physical capability of the network is always the limiting factor, and grid operator needs to be the last instance.
- The DSO might be responsible for sending limits. DSO may put price on capacity limits.

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IEA DSM Task 17

The aim of Phase 3 is to exchange experiences and knowledge on integration of demand side management (DSM) and demand response (DR) in residential and commercial buildings in order to achieve optimal embedding of renewable energy resources in electricity networks and markets. In the framework of this project, the role of available technologies like PV systems, electric vehicles, electric and heat storage systems, heat pumps, micro-CHP in combination with energy management systems and smart meters for implementing dynamic tariffs will be assessed.

The Task will address:

- The current role and potential of flexibility in electricity demand and supply of systems of energy consuming/producing processes in buildings (residential, commercial and industrial) equipped with DER (Electric Vehicles, PV, storage, heat pumps, etc.) and their impacts on the grid and markets.
- The interdependence between the physical infrastructure of grid and the market side will also be looked upon.
- The scalability and applicability of conducted and ongoing projects with respect to specific regional differences and requirements will be explored.

Smart Grids *from page 5*

Workshop Wrap Up

There is an ever growing resource of comprehensive analysis studies and simulations that estimate various response potentials for different devices and control levels as well as energy efficiency potentials for DSM. It appears that the energy system performance is the overall driver, but while load levels are primarily the concern where the energy system struggles to bear the total demand in peak times (lower reliability), the dynamic load flexibility is needed where massive intermittent renewable and distributed generation is taking over to dominate the generation portfolio. It seems to be obvious that low energy prices and missing market mechanisms are still the main barriers for automated demand response and return of investment the barrier for energy efficiency.

Successful technical implementations of demand response projects show the enabling of these identified potentials, in case the missing market structures are provided. Especially real time markets for closed loop demand response, based on bidding and auctioning have been proved to fulfill expectations.

Experiences so far strengthen the decision for wide-area adaption and implementation. This applies to the presented contributions of DR in the USA and Europe and energy efficiency measures in India. The first systems are going into daily operation on basic time of use tariffs (e.g., Finland). Still the way to a nationwide rollout and implementation needs to overcome harmonization for regulation and market participation in most countries. New methods and simulation tools, which are able to investigate impact of DR and system interaction on a large scale, will be needed to support rollout.

Project EcoGrid EU

EcoGrid EU is working to develop a prototype of a European Smart Grid market platform that is able to incorporate small-scale distributed energy resources as well as flexible demand into the existing power system markets, balancing tools and operation procedures. The key idea of the project is to introduce a real time market (close to operation) distributing a real time price on which distributed energy resources and flexible demand can react.

EcoGrid eu
www.eu-ecogrid.net

To read the full article, Review of the Workshop on DSM Potentials, Implementations and Experiences visit the DSM Task 17 webpage.

DSM Programme *from page 3*

opportunities for local distribution and renewable fuels. Work is underway in several DSM Tasks *(Task 16: Competitive Energy Services (Energy Contracting, ESCo Services, Task 17: Integration of Demand Side Management, Energy Efficiency, Distributed Generation and Renewable Energy Sources, Task 23: The Role of Customers in Delivering Effective Smart Grids)*, but we need to deal with the fact that issues that traditionally were dealt with by the demand side can now also be motivation for local distributed generation or improved storage technologies.

And finally, we have to be imaginative in how DSM knowledge is packaged and distributed so as to make use of new delivery mechanisms, such as Energy Efficiency Obligations, and more targeted policies, such as those related to the Climate Change. In this respect, the DSM Programme is already meeting this demand with our work in *Task 18: Demand Side Management and Climate Change Task 21: Standardisation of Energy Savings Calculations*, and *Task 22: Energy Efficiency Portfolio Standards*. Not to mention our latest project – The IEA DSM University.

As far as the composition of the DSM Programme's work is concerned, the Task work has followed the trends and is a-changing with the time. Learn more about our work in the new "IEA DSM Strategic Work Plan".

There is a parallel trend in the work of the IEA where they have renamed Energy to be "the first fuel" while only a few years ago Energy was always referred to as the fifth fuel after Coal, Oil, Gas and Electricity. The IEA is trying also to pin-point and quantify the so called "Non Energy Benefits (NEB)" thus helping to break down the wall of ignorance against energy efficiency as a resource.

It is the DSM Programme's hope that the complementary work of our Programme and the IEA will spur action throughout the world!

IEA DSM Publications

The DSM Tasks publish reports throughout their project. To find reports relevant to your work visit the Publications page at www.ieadsm.org The most recent publications include:

Task 24 - Closing the Loop - Behaviour Change in DSM, From Theory to Policies and Practice *Power Matching City:Power To The People?*

This is the first in-depth country analysis of the Task 24 case studies work. Dr. Ruth Mourik, the Dutch expert, has analysed the Power Matching City pilot project (in the domain area of smart metering/feedback). Other countries participating in this work also will publish in-depth analysis of a case study in one of 4 domains (smart metering, building retrofits, transport, and SMEs).

The Little Monster

This is the 'teaser' for our 'Monster' report on the analysis of case studies using different models of understanding behaviour in 14 countries and 4 domains (smart metering, building retrofits, transport, and SMEs).

Chairman's Note *from page 1*

challenges. But, not in the timeframe and or to the extent that we want them to.

DSM was one of the first to suffer from "overheated" expectations. Several times it was suggested that the IEA DSM Programme change its name and go "under cover" with our work. We're happy we didn't do that as countries, energy companies and industry are showing increasing interest in Demand Response and Demand Side Management.

By now the market realises that we can't change energy use with a remote control or a funny or provocative poster. The increasing complexity of a market that supports several energy options requires a collaboration of both the technical and social research areas and the integration during the implementation phase of energy programmes.

DSM has proven to be an energy option that has true value, and after all these years, has demonstrated its value. Proof of which can be found in the work of the IEA DSM Programme.

Rob Kool
Chair, IEA DSM Programme

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