

DSM Spotlight

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



100% *Towards 100% renewable energy supply – strategic development of power system flexibility*

Burning fossil fuels for electricity and heat production is the largest single source of global greenhouse gas emissions [1]. Decarbonising the world's electricity supply within the next decades is thus considered as one of the major necessities for mitigating climate change. A key option to achieve this is shifting electricity generation to renewable energy sources, much of which is variable (VRES), such as wind, solar and hydro energy.

Variable Renewable Energy Sources, or VRES, are the fastest growing sources of electric power generation today. They have already become cost competitive with conventional (fossil fuel based) generation in many circumstances, or at least have an industry roadmap to reach such levels in the coming 10-15 years [2]. However,

relying almost entirely on the stochastic weather-determined output of VRES requires a transformation of the way power systems are planned and operated – an increasing amount of flexibility will be needed to ensure a stable and reliable operation. Due to the operational complexity of power systems as well as their long investment cycles, it is crucial to prepare the strategic development of flexibility now.

Under these considerations, the key question for the transition to VRES-dominated energy systems therefore becomes “How can we ensure that future power systems have the flexibility needed in order to match demand and variable supply?”. To address this question, Ecofys and the European Copper Institute have worked on a

continued on page 2

Note from the Chairman

Sharing What We Know



Together with our sponsor, the European Copper Institute, we are aiming to improve our outreach. The question we are working to answer is “What more can we do besides putting our excellent findings and results into well-written reports?”

Nowadays, this aim for improvement starts with a communication strategy that, at least, deals with social media and digital communication using the foundation of a good website.

We, as an IEA Technology Collaboration Programme (TCP), use a variety of communication tools, but there is always room for improvement.

One of our long-standing events is our “DSM Day.” Each year we hold two Executive Committee meetings in our member countries, and as part of these meetings the host countries organise a

continued on page 13

Member Countries

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

Sponsors

EfficiencyOne | European Copper Institute | RAP

series of projects exploring the power system flexibility potential and need. The first phase analyzed the spectrum of available flexibility options now and in the future [3]. The second phase dealt with the key question of whether 100% VRES-based power systems are possible. The flexibility roadmap defined the pathway to such systems in the form of concrete policy steps needed for using these options while increasing VRES shares [4]. The third phase focused on answering the question of how the transition of specific (country) systems to higher VRES shares can be enabled. The flexibility tracker, an assessment tool, was developed to monitor the readiness of specific systems for high VRES shares and to outline the key actions needed to enable the transition. This article presents an overview of key findings of these projects to feed into the power system flexibility debate. The tracker aims to create awareness on the scope of flexibility potential and barriers, and how best practices can be promoted. In such a sense, it follows the mission also of the IEA DSM Programme to foster collaboration and understanding. In particular, it embeds the DSM challenge in the full set of flexibility options to allow comparisons of actions.

A Flexibility Gap Is Created While Shifting To Higher Shares Of Variable Renewables

Power systems are designed to ensure a spatial and temporal balancing of generation and consumption at all times. Power system flexibility is an inherent feature in the design and operation of

power systems. It is the ability of a power system to respond to changes in demand and supply. Ramp rates, minimum up/down times, and start-up/shut-down times are commonly used indicators of flexibility; measured as MW available for ramping up and down over time. However, as these indicators are not easily measured, signs of inflexibility are often used to assess the flexibility of a system, that is frequency excursions due to unplanned events in balancing demand/supply, significant RES curtailments, area balancing errors, negative market prices, price volatility or price spikes.

Traditionally, flexibility in power systems was provided almost entirely by the supply side. Two key tasks for the power plant fleet were to follow all variations in the demand (variability) and to ensure that the system stays in balance in the case of the sudden loss of a generating unit (uncertainty). Thus, variability has historically been an issue primarily related to demand, while uncertainty was an issue primarily related to supply. Growing shares of VRES have a dual impact on increasing the need of flexibility by: a) increasing the supply variability and uncertainty (net demand fluctuations are increased compared to demand) and b) displacing flexible conventional power plants (peaking units are the first to leave the market when a decrease of their operating hours makes them financially unattractive). This leads to the creation of a flexibility gap, (Figure 1). This gap should be filled in by new flexibility options, such as demand side flexibility,

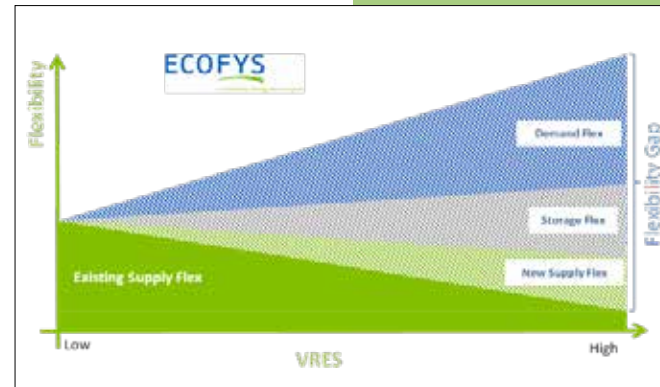
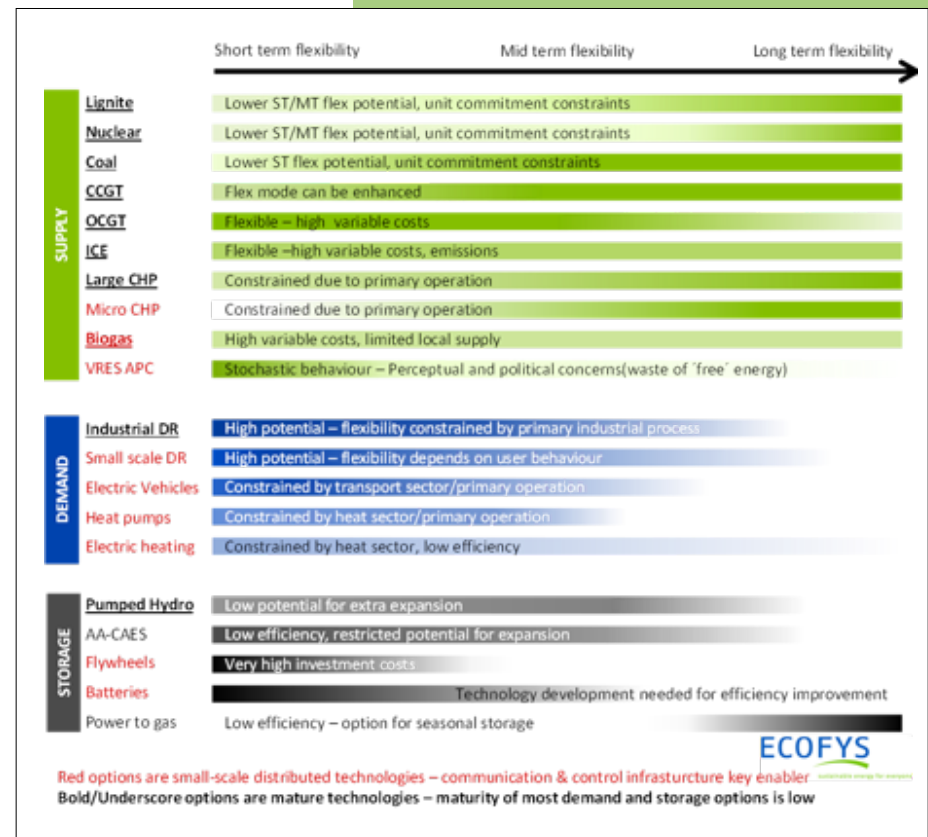


Figure 2: Comparative assessment of the characteristics of flexibility options in different operational timeframes



continued on page 3

100% Renewable Energy – from page 2

energy storage and new supply flexibility (i.e., control of VRES and new flexible conventional units).

Key enablers for the role of these options are energy markets and power networks. Energy markets should remove all barriers and allow all technologies to participate in flexibility provision. Power grids should enable the large-scale pooling of flexibility resources as well as the use of flexibility from small-scale distributed energy resources.

New Flexibility Options Are Needed For A Successful Energy Transition

By linking flexibility to the VRES shares of a system, a new, wider definition of flexibility emerges related to the capacity of a system to balance demand and supply on the different operational timeframes:

- Short-term flexibility refers to balancing markets with a timeframe of up to one hour and is more related to the “classical” definition of the capacity of a system to follow rapid variations in demand.
- Mid-term flexibility refers to operational scheduling of systems (spot markets, up to days), and relates to the capability of a system to schedule the resources necessary to operate the system with high VRES shares.
- Long-term flexibility refers to long-term scheduling of systems (future contracts – seasonal variations, investment timeframe) and relates to the capability of systems to have in place the necessary resources to ensure reliable and economic operation in the long term.

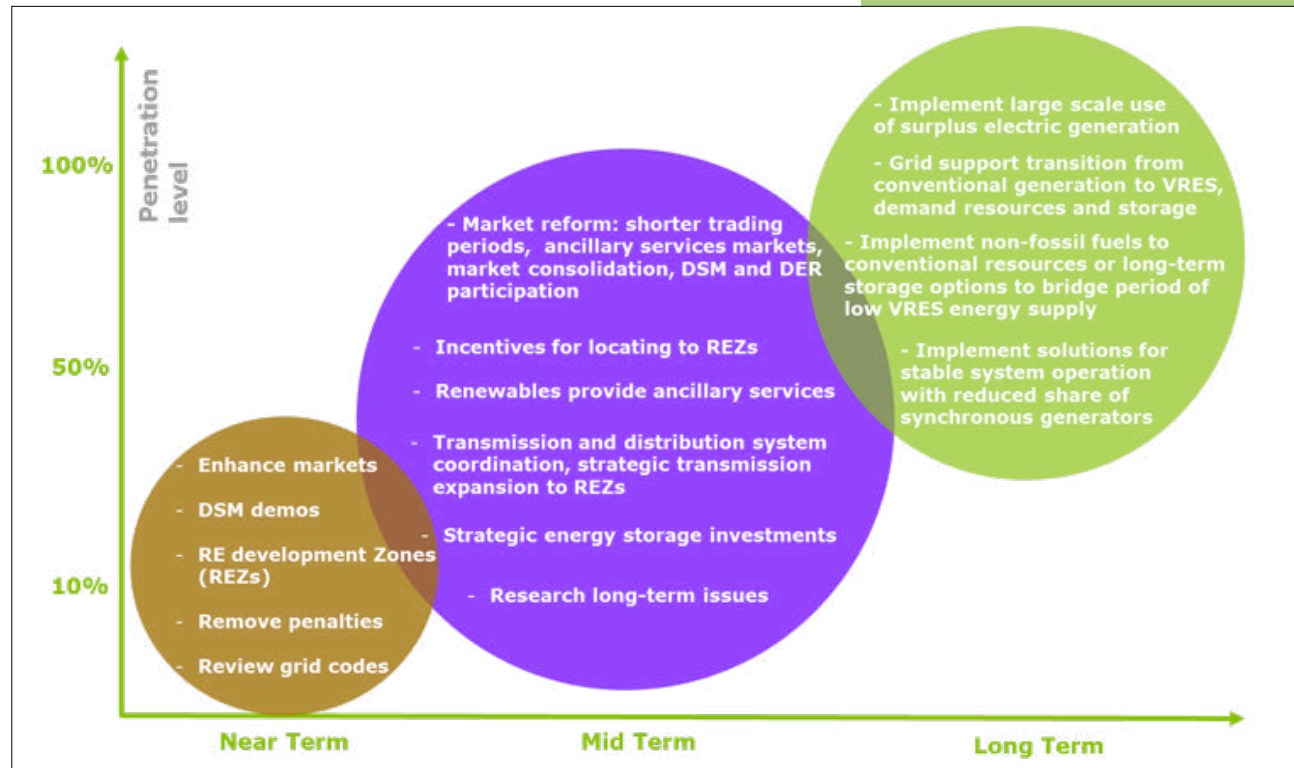
Different flexibility options are best suited to different operational timeframes. Figure 2 shows a summary of the potential of options with respect to the three key operational timeframes and colour shades show the suitability of the technology with respect to the different flexibility timeframes.

The variety of options shows that there are several options to be considered in the different timeframes. Traditionally, the supply side (thermal power plants) provides the majority of short-term flexibility. With increasing VRES shares, key options for the provision of short-term flexibility from cold start are OCGT and ICE, but at the expense of high variable costs. Key supply options for mid-term flexibility are flexible coal, gas and ICE plants. The potential of CHP depends on thermal storage and on primary operation constraints. Active power control of VRES is also an option for both short and mid-term flexibility.



◀ Figure 3: Key elements of the power system transition

▼ Figure 4: Changes needed for the transition of power system with growing VRES penetration levels



continued on page 4

The demand side offers a very high potential in both short and medium-term, with large-scale DSM being the most mature option. Small-scale DSM presents a potential, but this option requires enabling communication and control infrastructure.

Concerning long-term flexibility, only power-to-gas is an alternative to fossil generation, though with limited potential and maturity. On the demand side, no significant options appear since shifting demand in longer periods is not generally applicable. Demand is what drives the energy system, not vice versa.

For further information on these flexibility options in power systems, please see [3] and [5].

How To Facilitate The Transition To Very High VRES-Shares: The Flexibility Roadmap

How the transition towards very high VRES shares unfolds will depend on the conditions of the specific power system – the availability of renewable resources, energy storage opportunities, composition of demand, interconnectivity to other power grids, etc. However, the consideration of VRES-dominated power systems reveals the elements that are common to all systems during this transition. Based on this view, we identified the seven key elements that are needed for a 100% VRES system, which are illustrated in Figure 3. The relative importance of these features will vary from system to system depending on local conditions, but each of them represents an important contribution to developing systems capable of functioning efficiently and reliably relying on VRES.

1. Exploiting the flexibility and energy storage inherent in demand, with today's power consumers becoming power system partners (prosumers).
2. Enabling liquid, expanded and close-to-real time power markets in order to access existing sources of flexibility and exploit the diversity of distant VRES.

3. Controlling variable renewable generators to provide grid support services and to reduce variability and uncertainty deriving from renewable resources.
4. Implementing price incentives or other mechanisms that appropriately reflect diversity-related benefits in the development of new VRES.
5. Instituting long-term energy storage to cover longer periods (weeks to months) of low renewable energy supply.
6. Instituting more sophisticated communication and controls to coordinate flexible resources across supply and demand, and across transmission and distribution grids—the “smart grid.”
7. Developing new electric energy demand schemes to capitalize on the occasional, but increasingly frequent surplus energy events.

Reaching higher penetration levels requires creating a solid foundation in the early stages of resource development. Unlike the traditional evolution of grids, the concept of an evolving “integrated grid” arises where the traditional boundaries between generation, transmission and distribution need to be reviewed.

There is a wide range of actions to transform the power systems of today that need to be implemented, broadly illustrated in Figure 4. Not all of the changes are needed immediately. There is a progression of actions that will be most economically implemented if taken in coordination with the increasing reliance on VRES. The transformation will be

continued on page 5

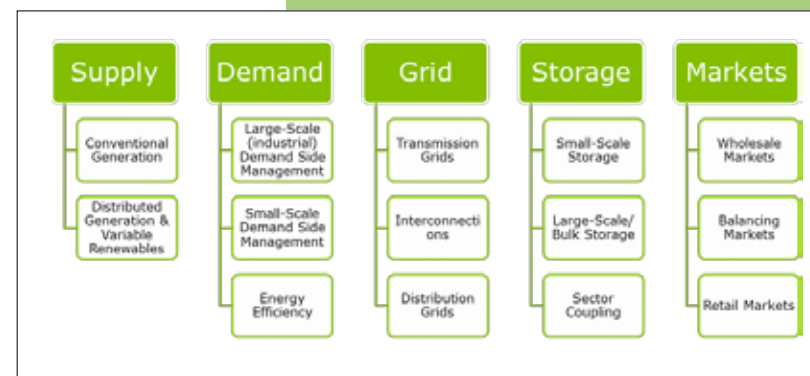


Figure 5: Categorisation of power system flexibility options in the flexibility tracker

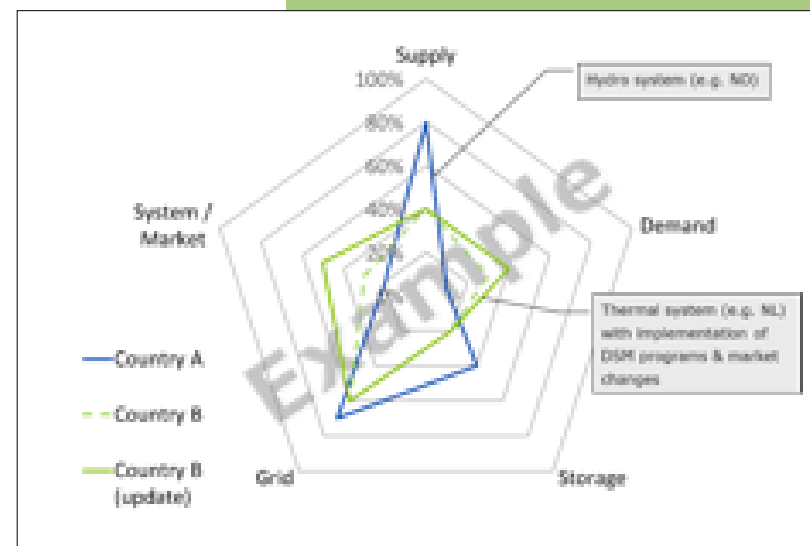


Figure 6: Exemplary assessment of power system flexibility

100% Renewable Energy – from page 4

unique to each system, but may be broadly divided into three development periods:

- Near-term up to about 10% of energy coming from VRES;
- Mid-term for penetration levels in the range of 50%; and
- Long-term for the highest penetration levels, approaching 100%.

These periods are not entirely distinct generalizations of the transformation process. They are merely guides to what is coming, and suggestive of measures to consider for systems along the development path. For further information, see [4] and [6].

How To Shape The Transition For Specific Power Systems: The Flexibility Tracker

The important next step in supporting the transition of individual power systems is to be able to assess the flexibility level and to prioritize the needed actions. For this purpose, we developed an assessment tool that can a) monitor the readiness of an electricity system for higher shares of renewables and b) inform policy makers on the policies needed for the transition to low carbon energy systems with high VRES shares.

The methodology is based on combining a set of flexibility Key Performance Indicators (KPIs) that refer to the needed policy actions that can be mapped to five key categories: supply, demand, network, storage and markets. The KPIs are accompanied by explanatory texts that inform users on the need and background for each policy action. The rating is based on a set of transparent questions on the a) current situation (answers based on statistics) or on b) compliance with policies (majority based on Yes/No questions). At its current prototype version, the tool comprises 52 flex KPIs, organised in the 5 key categories mentioned above and in 14 subcategories (see Figure 5). The assessment is done based on a set of 82 questions. Figure 6 shows exemplary assessments.

The tool is currently being applied to a set of European systems, and leading to specific attention points and recommendations to enhance system flexibility. The next steps involve shifting to a global application that can help in raising global awareness on the topic of flexibility and energy transition in power systems.

This article was contributed by Dr. Georgios Papaefthymiou, Dr. Edwin Haesen and Thobias Sach of Ecofys and Hans de Keulenaer of the European Copper Institute.

References

- [1] US Environmental Protection Agency, "Global Greenhouse Gas Emissions Data," 2016. [Online]. Available: <https://www3.epa.gov/climatechange/ghgemissions/global.html>.
- [2] Fraunhofer ISE, "Levelized cost of electricity - renewable energy technologies," 2013. [Online]. Available: <https://www.ise.fraunhofer.de/en/publications/studies/cost-of-electricity>.
- [3] Ecofys, "Flexibility options in electricity systems," 2014. [Online]. Available: <http://www.ecofys.com/en/publication/flexibility-options-in-electricity-systems/>.
- [4] Ecofys, "Power System Flexibility Strategic Roadmap," 2015. [Online]. Available: <http://www.ecofys.com/en/publications/power-system-flexibility-strategic-roadmap/>.
- [5] International Energy Agency, "The Power of Transformation - Wind, Sun and the Economics of Flexible Power systems," 2014. [Online]. Available: <https://www.iea.org/publications/freepublications/publication/the-power-of-transformation--wind-sun-and-the-economics-of-flexible-power-systems.html>.
- [6] G. Papaefthymiou and K. Dragoon, "Towards 100% renewable energy systems: Uncapping power system flexibility," *Energy Policy*, vol. 92, p. 69–82, 2016.
- [7] International Energy Agency, "Harnessing Variable Renewables - A Guide to the Balancing Challenge," 2011. [Online]. Available: <https://www.iea.org/publications/freepublications/publication/harnessing-variable-renewables.html>.

Ireland

The Home Energy Efficiency Conundrum

Ireland needs energy efficiency; we need it more than any other country in Europe. We sit at the outer edge of Western Europe buffeted by strong Atlantic winds while at the same time being protected from extreme weather by the generally kind North Atlantic drift coming from the Gulf Stream.

But we have leaky buildings and a strong dependency on fossil fuels. In winter average daily temperatures are around 5°C while humidity is well over 80%. This leads to a damp climate where both our buildings and people's health are prone to suffer.

Around 85% of our energy is imported and 97% of these imports are fossil fuels. So we need energy efficiency! New building regulations mean that homes built since 2014 will be "A" rated and have some form of renewable energy measure incorporated into them. But most of our current homes will be with us in 2050, and they are older and were built to much less stringent regulations. In fact, almost 90% of our current homes will still be in use in 2050 and the average BER (Building Energy Rating)/EPC (Energy Performance Certificate) of a home in Ireland is E1, with almost one quarter of homes being either F or G rated.

But we're doing lots to change this. SEAI, the Sustainable Energy Authority of Ireland, is the national energy agency for Ireland. Our mantra is

energy efficiency first. We run many programmes for businesses and homes to help them reduce their energy use, and it works well. For instance, 180 of our largest industrial users saved €36 million in energy costs last year.

What To Do

We also run a number of programmes for homeowners to encourage them to upgrade the energy efficiency of their homes. Over 300,000 of them have done this to date, that's a good success rate. But we need to do more; we need to go faster and do deeper home retrofits.

Below is a representation of a cost curve for residential property in Ireland. You can see that many measures are cost positive, that is, those below the line will save more than they cost over their lifetime, and when combined into a package, a deeper retrofit of a home can often be cost positive. In addition, we know from our research with homeowners that one of the main reasons people upgrade the energy efficiency of their home is to achieve

continued on page 7

Around 85% of our energy is imported and 97% of these imports are fossil fuels. So we need energy efficiency!

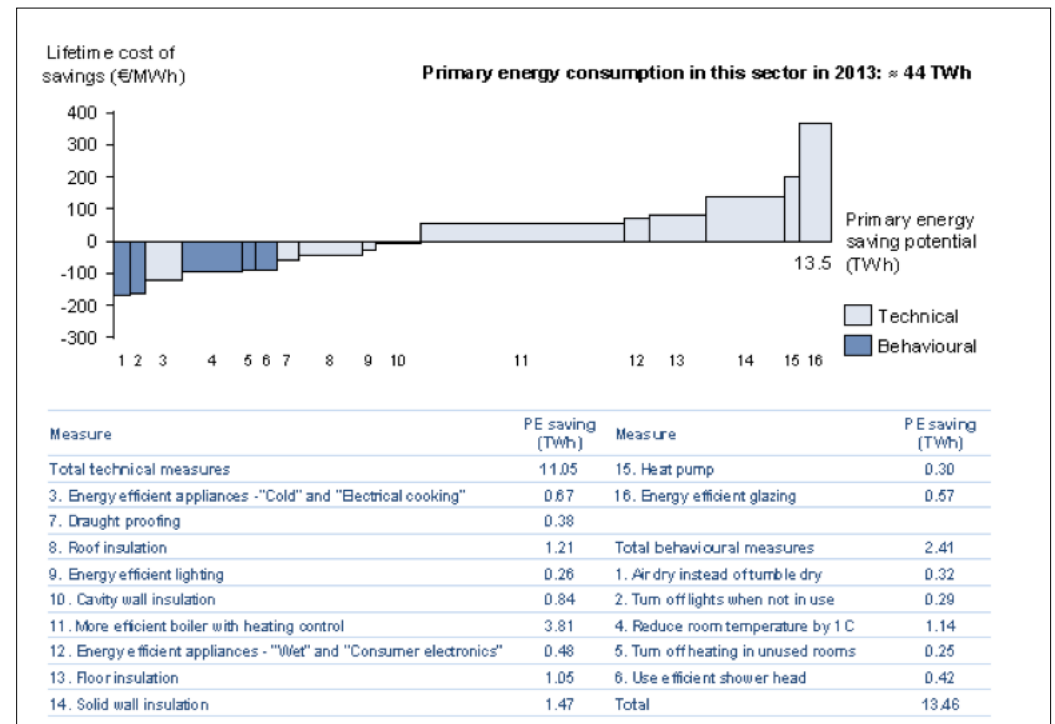


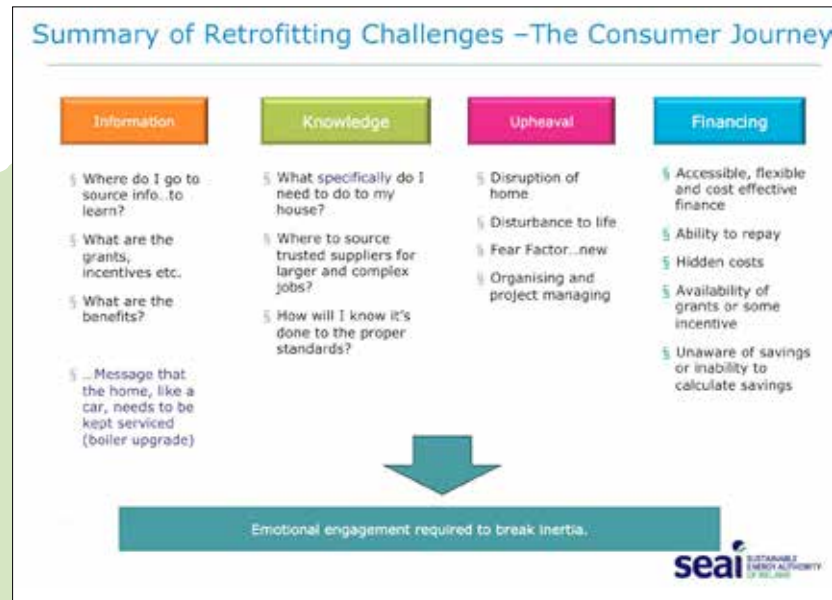
Figure 1. Energy Efficiency cost curve for the Residential buildings sector

comfort and lifestyle quality, so it's not always about the savings.

We also need to recognise that not all solutions are technical in nature; many involve behavioural change and these are not so easy to effect and measure. This is something that SEAI has started to explore, and for which we will develop trials to test and analyse the best models to effect change in people's behaviour.

How To Do It

How do you make this energy efficiency step-change in homes so that we get people to do more and better home energy upgrades? Well, overcoming the barriers is a good place to start, and we've been working hard on figuring out what these barriers are by talking to people; those who've done the retrofit and those who haven't. And we've found that we need to do more to engage people – because mostly they're not thinking about us or about energy efficiency! And even when they're engaged, lack of information, knowledge, support and financing are all barriers to action. We need to provide people with the means and confidence to act. The picture below shows the various barriers that consumers have told us they face when we ask them about having an energy efficient home. Often energy efficiency is not on their radar, and even when it is, they want tailored and targeted independent advice on what to do in their specific home; and then help with how to do it. That involves providing support in terms of finding properly qualified contractors at a good price and ensuring



that a quality job is done; and sourcing an attractive financing offer if they need it. So essentially they want end to end support because this is fairly new and rather scary for them. After all we are talking about their homes, the most important place to them and their families.

So who provides that role? It's not readily available in the market at present and of course it has a cost to it.

Trying It Out

When we look at home retrofit, this is a different decision process to one that involves behavioural change. A home renovation is a purchase decision and our role is to nudge that decision in favour of energy efficiency measures so that the homeowner widens their

perspective and does not just consider a new kitchen or a new suite of furniture. Transforming the existing renovation market should be part of the route to achieving an energy efficiency housing stock.

So we're doing various trials and pilots with homeowners to see what works for them. Innovation and flexibility is the key to figuring out the models that will best work to encourage and enable homeowners to act. Some test the support mechanisms, some test how to move towards deeper retrofit and some test what financing models are attractive to homeowners. Below is a flavour of some of the financing trials.

Welcome to our newest member!
We look forward to supporting Ireland as it works to meet its energy efficiency goals as well as to learn first hand from Ireland's committed work in this field.

Rob Kool
IEA DSM Chairman

continued on page 8

Testing Finance Mechanisms

We know from research with homeowners that lack of funds is a major barrier to undertaking efficiency work on their homes, and 44% of them told us that they would be willing to borrow to carry out this work. In making this decision, the interest rate was by far the most important characteristic in taking out a loan.

As part of our role to test out what works, we have a number of employers providing loans to their employees to upgrade the energy efficiency of their homes; these loans are then paid back over time through their salary. Under the trial, SEAI provides an incentive to the employee to approximate tax relief somewhat similar to that which we have under the bike to work scheme in Ireland. It's in the early days, but so far this has been well received by employees.

We are also testing what features are necessary to provide to homeowners to encourage them to undertake a deep retrofit of their homes that will bring the home up to an A or B Building Energy Rating. SEAI provides a financial incentive to homeowners, and partners manage the trial and provide tailored advice and design guidance as well as procure panels of contractors, and arrange and quality assure the work being done. In addition, they are seeking to secure a low cost loan provider to join the project.

Finally, we are working with a number of credit unions (local community banks) in Ireland who partner with energy service suppliers to provide a low cost loan offer to upgrade the homes of their customers. Again, independent advice is provided on works to be completed in the home,

and contractors are arranged to carry out work that is quality assured. SEAI provides a financial incentive, which is discounted from the cost of work by the energy service company.

This is a flavour of the sorts of pilots SEAI are testing to assess what works best in the market to encourage homeowners to act. We need to figure out, with homeowners, what works best for them, as to do develop a programme without their input would be folly, as we have seen elsewhere.

Asking consumers what they think SEAI has, over the last four years, done a lot of research with homeowners, in questionnaires, focus groups and workshops. We continue to keep the community involved in our developments and work with them to test what works.

We are conscious that we need to understand consumers' decision-making processes (Figure 2) and how to affect this at the awareness and engagement stage. How budget limits affect decisions. And if we help with the financial proposition, how we can effect change in both the timing and choice of their decisions.

We don't have all the answers, but we're trying things out and talking to consumers to find out what works for them. So we're listening and learning. That's probably the most important thing to start with. Because Ireland needs energy efficiency...we know that!

This article was contributed by Josephine Maguire, National Coordinator-Better Energy, SEAI, josephine.maguire@seai.ie.

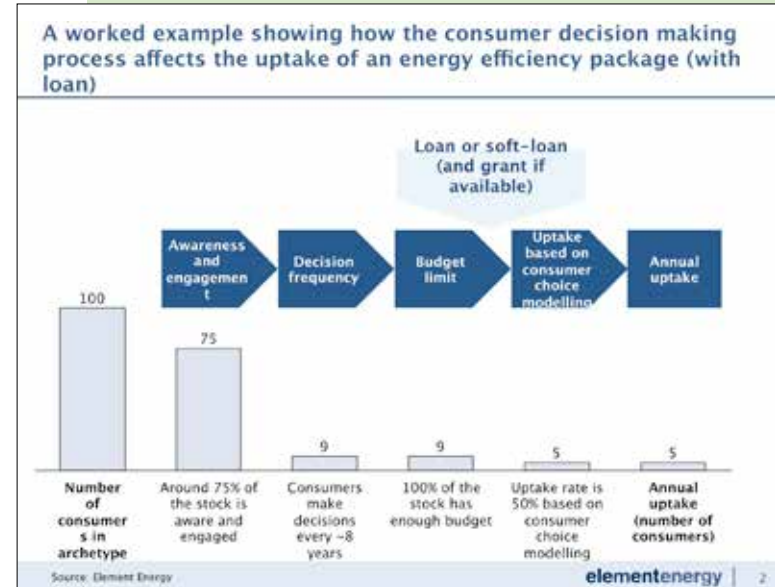
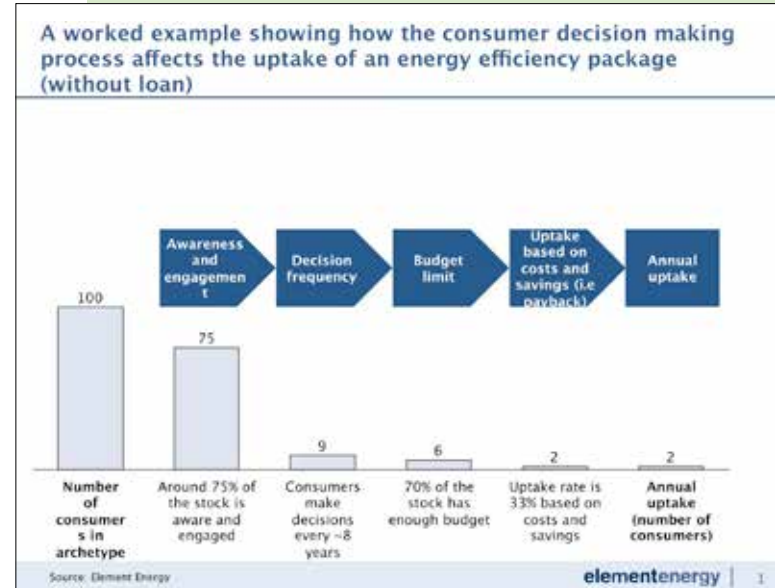


Figure 2. Examples showing how the consumer or decision making process affects the uptake of an energy efficiency package (with and without a loan)

Task 25

Towards a Service Supporting Business Model What we can learn from more than 50 business models in energy efficiency services

Despite the obvious need, we still witness a very modest market uptake of energy efficiency and DSM. It is expected (IEA 2015) that as many as two thirds of the total potential for energy savings in 2035 will not be exploited and in general energy efficiency businesses see only a modest growth of the energy efficiency market. Some refer to this as the 'energy efficiency paradox' (van Soest and Bulte, 2001). Worldwide, many studies are being conducted in order to get a better understanding of what is causing this apparent lack of market uptake of energy efficiency and DSM (van Soest and Bulte, 2001; Polzin, F. et al. 2015). Reasons for this vary, but include amongst others: a lack of viable business models, a lack of the necessary entrepreneurial capabilities to focus on the needs of the users as well as deliver services and restrictive policy contexts.

In IEA DSM Task 25: Business Models for a More Effective Market Uptake of DSM Energy Services more than 50 cases in six countries (selected out of a long list of more than 200) are providing data on best practices and failures to explain this lack of uptake and provide some essential ingredients for success in the Energy Efficiency Service Business. The research consists of in-depth analysis of the business model of each case, in-depth interviews with the providers and entrepreneurs, and country workshops that include entrepreneurs. To understand the differences between similar models in different countries, specific attention is paid to the country specific context and how the entrepreneurs deal with context restrictions. Their stories about their success as well as their struggles provide lots of information on the viability of their business models, their capabilities to deliver valuable services successfully as well as to respond to changes and their movements

towards a viable, service oriented business model. This article provides an overview of the main findings.

The Goods vs Service Oriented Business Model

For a goods oriented (tech-push) business, the main focus is on the existence of value in a product, the way it can be produced at its lowest cost and sold with the highest margins. In a service oriented model on the other hand, value is created (and experienced) only in the use of a product. The main focus is therefore on creating and delivering an outcome the user wishes for. As a consequence, the user becomes centre stage and technologies and products are merely enablers to meet these outcomes that customers desire. The "canvasses" below (format based on Osterwalder and Pigneur 2010) illustrate the main differences between a product and a service oriented business model.

Task 25: First Findings

For each case, a business model was mapped for at least two moments in the lifecycle of the firm: the

initial coming to market business model and one with the main changes that have been made since, at the moment of the interview. The entrepreneurs were also interviewed about their capabilities to conduct a service oriented business as well as their abilities to deal with restrictions at the context level. In this article, we focus on the main changes witnessed in the business model. For more information about the full analysis, including the findings on capabilities and context see our Task 25 reports, "Effective business model design and entrepreneurial skills for energy efficiency services" and "Report Sweden".

Four Strategies

Many energy efficiency firms initially develop a proposition that is based on a technological invention (for example, a new technique to optimize the performance of a cooling installation). Their business is built 'around' this technology and many of them start selling their offer to a more or less familiar client

continued on page 10

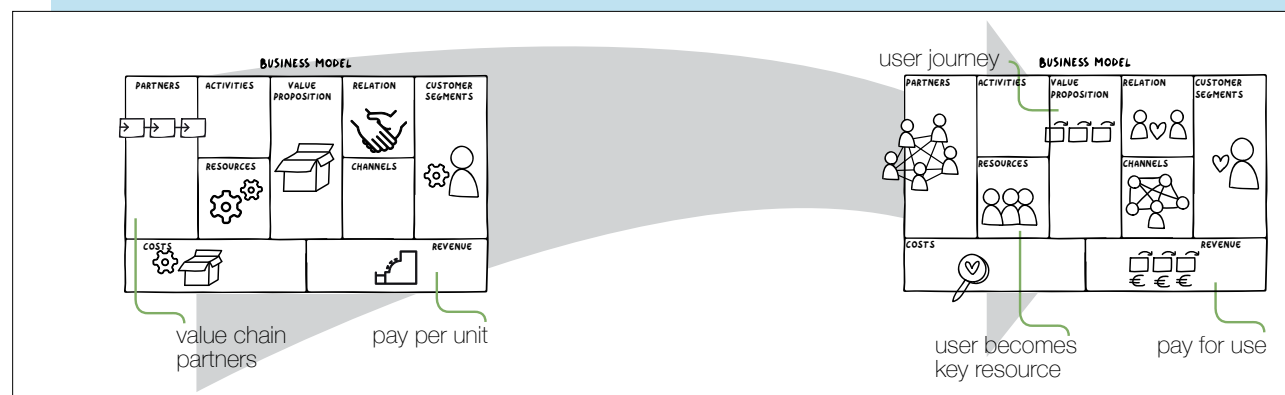


Figure 1. Illustrates the Goods vs. Service Oriented Business Model

base. After some time, many of the firms experience a stagnation of uptake. When this stagnation is occurring, entrepreneurs choose (often unconsciously) different strategies to deal with this. Looking at the cases we can identify four main business strategies, which can be seen as four stages of development, from a product oriented business model towards a service oriented business model.

Focus-On-Transaction Business Model: Pushing Harder

Some entrepreneurs make an effort to try to boost sales in order to push the same proposition harder, for example through resellers and referrals. The basic technology or product does not change and neither does the value proposition, market or client segment. The only elements that witness significant change are the partners (resellers or consultants), activities (training resellers) and resources. Partners are aligned to be supportive of the provider and the proposition and to help deliver the service as a product (SAAP). For these entrepreneurs, energy efficiency is the obvious benefit of their technical solution, for example the improved performance of the cooling installation.

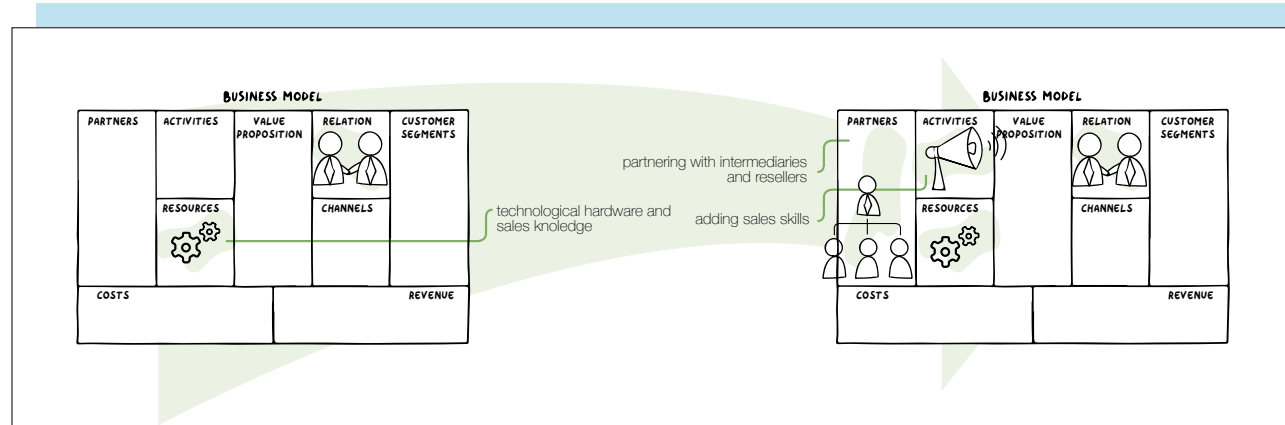


Figure 2. Illustrates the Focus-On-Transaction Business Model: Pushing Harder

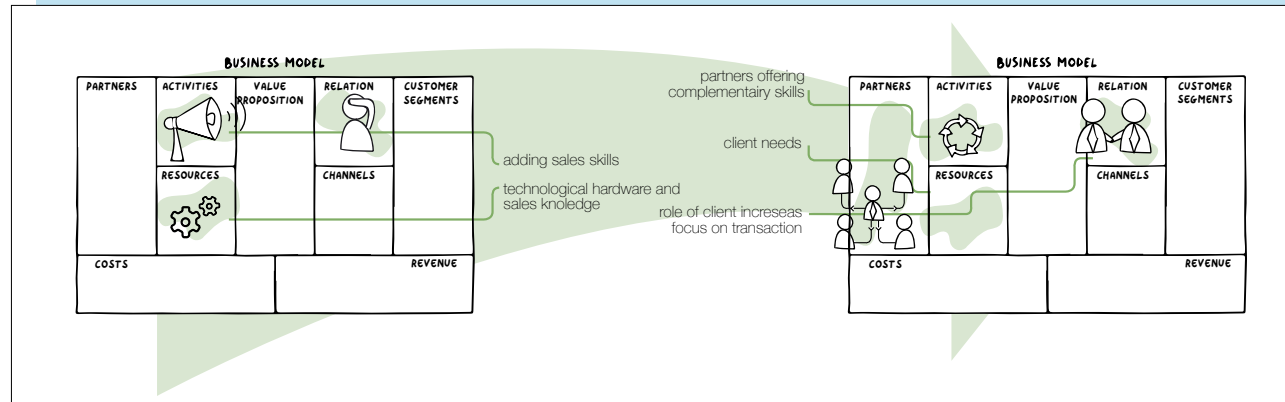


Figure 3. Illustrates the Purchase-Buying Process In Focus: Reframing

The Purchase-Buying Process In Focus: Reframing

The cases that reflect this strategy start as practically identical to the first strategy. The only difference is that they seem to have a more equal relation with their key supply chain partners, not a hierarchical one. Once this type of business is faced with a standstill in the market, efforts are undertaken to understand user needs better. By getting in touch with potential buyers through personal contacts, tailored quotes, personal telephone calls or follow-up talks. All efforts are aimed at influencing the purchasing decision. The use phase of the service remains out of focus. Often in response to this deeper understanding, the companies start appreciating that energy efficiency or a specific technical characteristic of the product is not a top priority to clients, but an extra benefit that is

only experienced in use. In response, the firm chooses to reframe the offer in language the client recognizes. Friendly Buildings for example, decided to (successfully) reframe their initial passive homes to modern design houses in order to stimulate the sale. The houses themselves didn't change.

The Purchase-Buying-Use Process: Networking

This third strategy demonstrates a shift from pushing a solution to becoming problem solvers in reaction to reaching stagnation, sometimes triggered by unsolicited feedback from clients. The main change is the growing awareness that the client is in fact a 'user' and usage

isn't a one-off moment, but a process in time. This means that the use phase - after transaction - provides key insights for new business opportunities. Another essential difference with the former strategies is that not only the language is changing (framing), but also other essentials in the proposition. These businesses might still have a strong technology push start, but are not afraid of developing a totally new package around that technology or even adapting their technology to meet new user needs. Many of these businesses are developing single type technologies in the smart

continued on page 11

metering, smart ICT and feedback sector. They are trying to pivot the company away from direct consumer sales towards a business-to-business partner relationship. They aim to partner with a larger company offering a larger and more complex value proposition to end users, sometimes not directly related to energy efficiency at all but more focused on delivering health benefits, safety benefits, comfort, etc. All elements of the business model change to some extent, where the clients and the value proposition and partners change significantly. Resources change as well, from technical know-how and marketing expertise to also or sometimes foremost include user and usage data as a resource. Activities therefore change to data handling instead of developing soft and hardware.

The Servicing Strategy

Some entrepreneurs don't start with a tech-push energy efficiency proposition at all. The coming into existence of these type of firms mostly originates in a deep concern with the needs of a certain group of people. Their unmet needs are thoroughly known and researched and the initial value proposition is tailored to a small group of those customers. An iterative process of build-test-learn in co-creation with customers and partners leads to a network type of enterprise, where a proposition is the result of a cooperation between more or less equal partners, and users.

After the initial start, they expand their business gradually with new or extra benefits that fit the needs and lives of the customers. The largest difference between this strategy and the others is that users and their needs and lives are at the core of the business, instead of the value proposition. Once the client base proves to be loyal, extra benefits can be added. Even more, clients may suggest new services that they consider valuable. Energy efficiency is an example of such an extra benefit. The trusted relation with clients and partners therefore is an essential resource, as is the capability to translate the variety of wishes and needs in such a way that it fits in the proposition and doesn't damage the trust. Especially

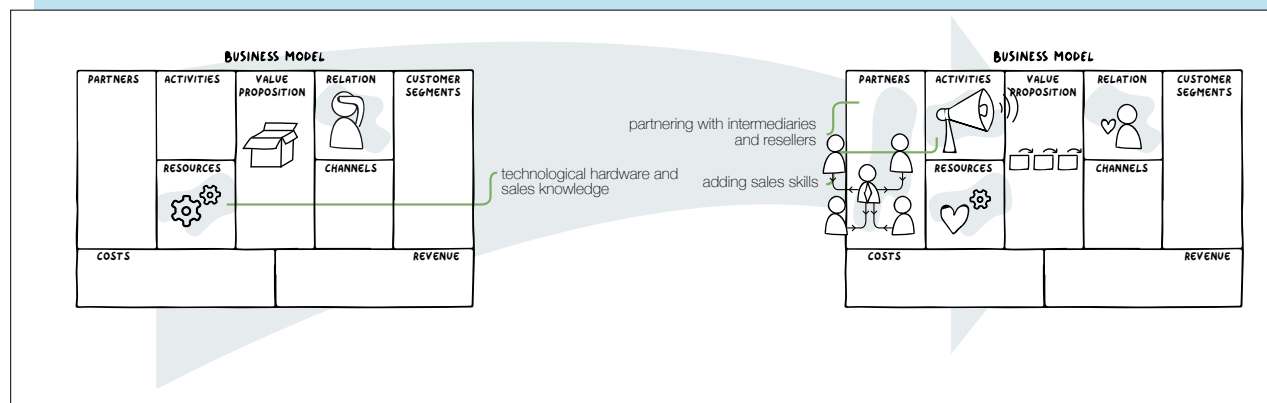


Figure 4. Illustrates the Purchase-Buying-Use Process: Networking

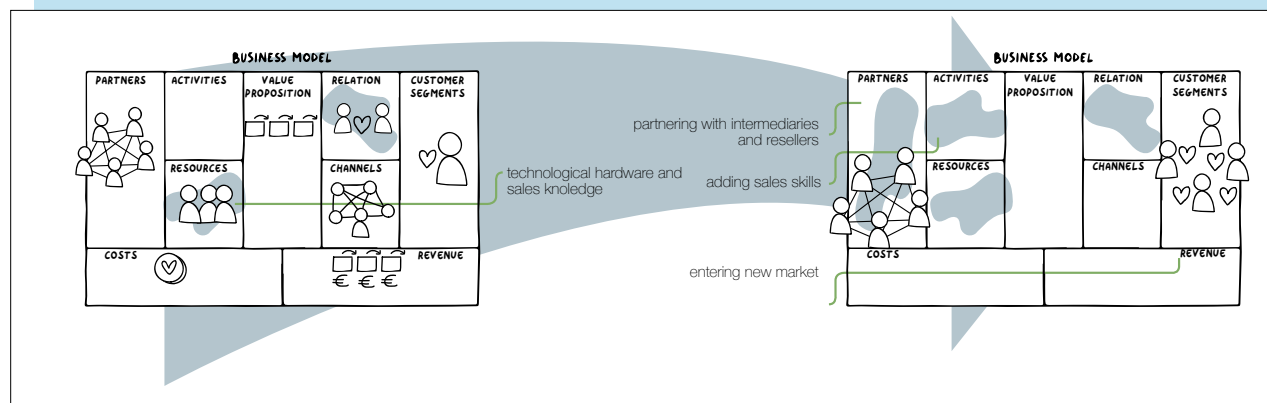


Figure 5. Illustrates the Servicing Strategy

for B2C (business-to-consumer) businesses, maintaining a trusted relation with clients is becoming difficult when the client base is growing. Although client databases and data mining are essential skills, maintaining an intimate relation and customizing a value proposition are becoming a real challenge.

Next Steps

In the upcoming year, IEA DSM Task 25 will complete the analysis for all participating countries (Norway and South Korea only just joined the Task). Besides that, a toolbox will be developed to support entrepreneurs as well as

key stakeholders (such as network partners, policy makers, investors) to create and conduct a business in a successful, service oriented way.

For more information contact Ruth Mourik, Task 25 Operating Agent ruth.mourik@dunetworks.nl or Renske Bouwknegt, Co-Operating Agent Renske@ideate.nl. To read more on Task 25 work or download reports visit the websites, <http://www.ieadsm.org/task/task-25-business-models-for-a-more-effective-uptake/> and <http://www.dunetworks.nl/geen-categorie/iea-dsm-taak-25/>

Task 17 *International Symposium – Demand Flexibility and RES Integration*

Participants in IEA DSM's Task on Integration of Demand Side Management, Energy Efficiency, Distributed Generation and Renewable Energy Sources are studying how to better integrate flexible demand (Demand Response, Demand Side Management) with Distributed Generation, energy storages and Smart Grids. Improved integration will mean an increase in the value of Demand Response, Demand Side Management and Distributed Generation and a decrease in the problems caused by intermittent distributed generation (mainly based on renewable energy sources) in the physical electricity systems and in the electricity market. In May, the Task leaders had the opportunity to join other energy experts to share the Task's work and learn from others working in the energy field.

On May 9th, the IEA hosted a symposium for energy experts to exchange information on "Demand Flexibility and RES Integration" in Linz, Austria. It was part of the Austrian Smart Grids Week 2016. Contributions came from a wide variety of IEA Technology Collaboration Programmes (TCPs), one of which was the DSM Programme (see Figure 1).

If renewables and distributed generation are to be effectively integrated into future energy systems, demand side flexibility is needed. As it involves many different aspects – technical capabilities of equipment (e.g., heat-pumps, storages, photovoltaic systems) to consumer behavior to aggregation for market participation, the IEA brought IEA TCP experts to discuss recent research results, technology options and international activities together with academics, distribution network operators and representatives from industry.

The morning started with a welcome by the Chairman of the DSM TCP, Rob Kool, and a keynote by the IEA's Luis Munera. The meeting continued with discussions on technology and equipment flexibility with contributions from the Heat Pump, Energy Conservation through Energy Storage, and Solar Heating and Cooling TCPs. The morning closed with a session on electric vehicles (EV) as an option for domestic electricity storage. The afternoon focused on buildings as energy storages and the active role of buildings in uncovering the DG-RES embedding potential, improved load forecasting and buildings software, and hardware component interoperability. Then, new customer energy services, business models, insights from ISGAN and the work of Phase 3 of DSM Task 17 were presented. The day concluded with a panel session on the tight interaction between the customer and the energy systems needing to come from the already demonstrated increased energy efficiency to active contributions of end-users to the commercial market and the technical operation of electricity grids. The presentations from this meeting can be found at on the IEA DSM Task 17 [webpage](#).

continued on page 13

DSM TASK 17 PUBLICATIONS

The following reports will be published in October 2016

- Roles and Potentials of Flexible Consumers and Prosumers
- Valuation Analysis of Residential Demand Side Flexibility
- Best Practices and Lessons Learned
- Conclusions and Recommendations

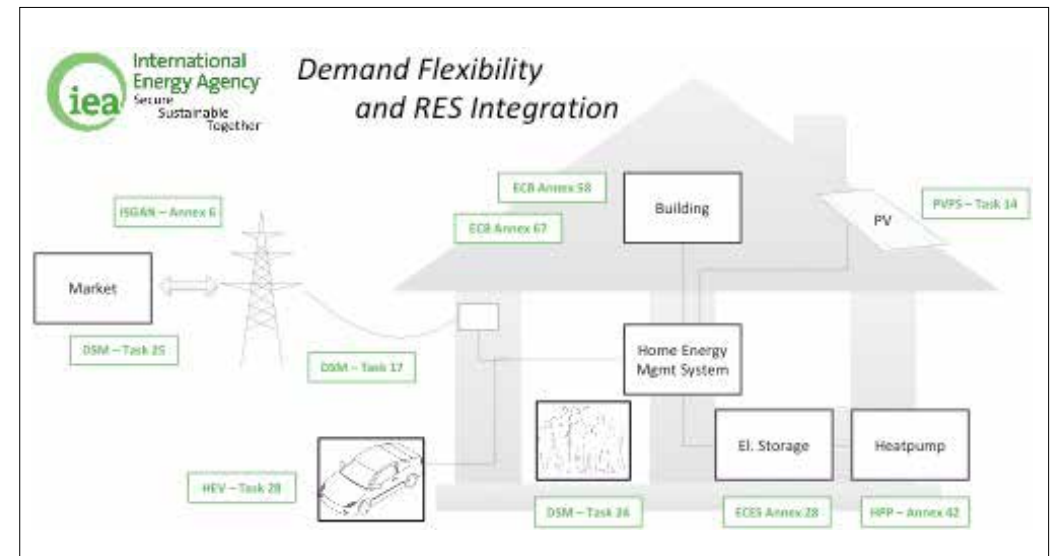


Figure 1. This illustration shows how IEA TCPs (the green boxes) are supporting Demand Flexibility and RES Integration

Task 17 – from page 12

Two key conclusions from the meeting were that smart ICT facilitated interaction of flexible loads is required for commercial and operational grid management and services. And, a better mapping of customer behavior is needed to provide well-aligned incentives for commercially optimal and grid friendly operation. This way of interaction will combine best with energy transaction based models instead of fixed billing schemes.

These conclusions are also the conclusions from DSM Task 17 Phase 3, which is in its final phase. However, there is a successor Task being developed that will link DSM Task 17 Phase 3 results to recent developments in data science analytics for energy efficiency applications, enriching the information, and structuring the massive amount of data coming from current sensor and smart meter rollouts.

For more information on DSM Task 17 visit www.ieadsm.org or contact the Task Operating Agents Matthias Stifter matthias.stifter@ait.ac.at and René Kamphuis rene.kamphuis@tno.nl

Note from the Chairman – from page 1

day for DSM TCP experts and national experts to share their work and discuss challenges facing demand side management and energy efficiency. On October 13th, Belgium is hosting one of these days on “The Role of DSM to Provide Flexibility in Electricity Systems” in Brussels. Interested in this topic? Please let us know, and we’ll formally invite you. There are options for your participation – you can attend in person or you can receive the meeting report after the event.

Another way we share what we know is through the DSM University. Here we have a monthly webinar with excellent presenters and excellent topics available for all. Missed one? They all can be viewed online any time that’s convenient for you. Just follow the link: <http://www.ieadsm.org/dsm-university/>, register and get started.

We want more though so together with the IEA Secretariat we’re looking for options to become a more “formal” academy that will allow experts in the field of energy to take courses and become super specialists in the field of Demand Side Management.

We’ll always have more to offer than you can imagine!



Rob Kool
IEA DSM Chairman

Issue No. 62, September 2016

Editor: Pamela Murphy
KMGroup, USA



Visit our website for easy access to reports, news and contact information.

ieadsm.org

Follow IEA DSM on:   



The DSM Spotlight is published four times a year to keep readers abreast of recent results of the IEA Demand Side Management Technology Collaboration Programme and of related

DSM issues. IEA DSM functions within a framework created by the International Energy Agency (IEA). Views, findings and publications produced by IEA DSM do not necessarily represent the views or policies of the IEA Secretariat or of the IEA's individual member countries.

For information on the IEA DSM visit our website at www.ieadsm.org.