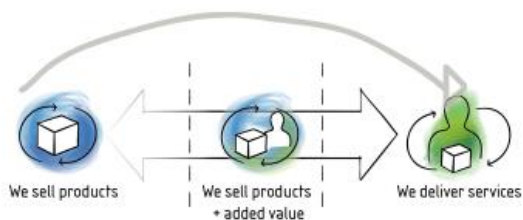




Transition!



IEA DSM Task 25

Effective business model design and entrepreneurial skills for energy efficiency services: A comparative international analysis

Deliverable 4

Dr. R.M. Mourik, Drs. R. Bouwknecht, Dr. C. Castaldi and Dr. J.C.C.M. Huijben (Duneworks, Ideate, Technical University Eindhoven)

June 2016

Contents

Introducing Task 25.....	3
Why this Task is important and necessary.....	3
Subtask 2: Identify proven and potential business models for energy services	4
Reader's guide.....	5
Energy Services and Business Models as transformative agents in the EE market	6
From delivering goods to services in the Energy Efficiency market: a transition	6
New ways of delivering real value to customers	9
Energy service delivery: Being user centered is key	10
New business models to deliver services with more value to customers	10
Barriers to the Energy Services Business Model.....	13
Dynamic capabilities to deliver services	13
Hindering regulatory and political frameworks	16
A Comparative Case Analysis of key factors and elements of effective energy efficiency business models	17
Three levels of analysis: business model, entrepreneurial capabilities and context	17
The role of Context in the examined cases	18
Analysing context, business models and entrepreneurial capabilities in dynamic interaction	21
The intuitive change	21
1 Pushing harder: the referral/resellers strategy.....	22
2A Reframing what you propose/ the partner strategy.....	24
2B Pushing something else: the user phase strategy	27
3 Responding to needs: the servicing strategy	29
Conclusions and recommendations.....	33
References.....	34
IEA Demand Side Management Energy Technology Initiative	38



Introducing Task 25

In November 2014 Task 25 started under the umbrella of the International Energy Agency Demand Side Management Technology Initiative. A Task focused on business models underpinning Energy Efficiency services. This introduction provides the basics about the task and its core views and goals.

Why this Task is important and necessary

Task 25 is trying to understand what can be done to stimulate the market uptake of Energy Efficiency. The premises behind this question is that the current system (the established system) is technocratic and push oriented and that a more user centered approach will be more effective. In order to find out what works when, where and why we have to understand the system at the level of the proposition and the business model, at the level of the entrepreneur and his skills and at the level of all the actors in the system. Also, we have to understand interaction and exchange of various types of value.


We fully acknowledge that the current climate and energy policies reflect the interests of established stakeholders and potentially allow for low-hanging fruit type of changes and inhibit more radical type of changes. In this Task we work towards an understanding of this tension between the established regime and new business models and propositions that aim to transform the system.

We have found that there is no canon yet in relevant literature on how and at which level such processes of shifts should come about, or how to make them come about. And we are convinced that these questions are essential as part of a "theory of policy" for a true green transformation.

The energy efficiency market still is being defined in terms of -for example- technological, subsidiary or legal possibilities. These descriptions not only influence the way business models are being created, but also the way they are being studied (as for example, technical or contractual constructions) and being reviewed by, for example, policy makers. We think this is an exponent of what is called 'the tech-push perspective. In this perspective, the basis of economic activity is the making and distribution of goods (output). The main goal of a firm is then is to maximise profit margins through efficient production and distribution. Consequently, in this perspective, the user has a passive (consuming) role and service is an ad-on, with the main purpose to increase the output of goods.

The task thus has a very explicit strategic framing and we do explicitly work with and towards a framework that reflects these strategic questions, with the sociotechnical transitions methodology and value flow model complementing the more individual proposition and business model focused methodology of the business model canvas analysis. For a more thorough discussion of these frameworks and models please take a look at our workplan (IEA DSM 2014) to be found on our task website <http://www.ieadsm.org/task/task-25-business-models-for-a-more-effective-uptake/>

We decided to focus exclusively on Energy Efficiency services (by this, we exclude production like solar, biomass etc.). Based on typologies found in all countries we decided to focus on Energy Efficiency propositions offering:

- 
1. Retrofitting (product or service included)
 2. Smart (home) management systems (product or service included)
 3. Renewable waste energy (product or service included)
 4. Lighting (product or service included)
 5. Total solutions


Subtask 2: Identify proven and potential business models for energy services

The Task is divided in 4 subtasks. Subtask 1 is about management. Subtask 3 is about training relevant stakeholders based on findings in Subtask 2. Subtask 4 is the dissemination task. Subtask 2 is the focus of this report.

This report is delivering results from Subtask 2. There are many energy service business models “out there” and often they are closely linked to existing market structures and policies. In other words, business models are often country and context specific. The subtask is focused on performing an inventory of different existing business models, both in the participating countries and also including global examples of successful business models. In the different participating countries we analyse what business models exist, and what frameworks (market and policy) accompany them.

Subtask objectives

1. Identifying country specific suppliers, clients, and their stakeholder networks and trying to establish national advisory expert networks to continue working with throughout the task.
2. Narrowing down the focus of both services, target groups and typology of business models in close cooperation with national experts and other relevant stakeholders.
3. Clarifying how the different parameters of success of business models and services will relate to each other in the analysis – economic profitability, scale of impact and real savings, business creation, growth rate, synergies with other values, adoption rate etc.
4. Developing a task specific typology or categorisation of business models and services for EE.
5. Developing an overview of existing energy service business models in the participating countries and their frameworks/ecosystems and how they meet and incorporate client needs.
 - a. Longlist overview of existing services and business models
 - b. Shortlist overview of services to be focused on in more detail.
6. Reviewing global existing business models and their frameworks/ecosystems with a clear focus on quantifying and qualifying effectiveness.
7. In-depth comparative analysis of around 4 similar business models in different countries and around 12 per country. Determining patterns, drivers and pitfalls.

- 
8. Identifying key factors that make services (and their vendors) succeed in the participating countries through an in-depth analysis of country specific markets and policies for energy services and their influences on business models.
 9. Organising country workshops with service providers and clients.


Together with the national experts, we first drew up a longlist of interesting Energy Efficiency propositions in the participating countries. The selected propositions are interesting because they are more or less successful, effective and often fit the existing system well for some reason but still manage to create real uptake of energy efficiency (fit propositions), or they are interesting because they are 'unconventional, innovative' and focus on the high hanging fruit and real transformations of the system, we call these the stretch propositions (Huijben 2015).

Based on initial information collected in this longlist and based on the categorization of 5 types of energy efficiency propositions we made a selection of propositions that would be further analysed to understand their business model, and the interaction with the context and existing system. The selection will allow for comparison of similar propositions, with sometimes different outcomes, and operating in different political, institutional, technological, socio-cultural contexts. In a parallel movement we started fleshing out the business model canvas for each of the propositions on the shortlist. The canvas however is a snapshot, while the underlying business is a very dynamic and complex entity which operates in a system, which is also very complex, with its own dynamics. Therefore, we investigated the entrepreneur's journey for each of the propositions as well, which is a description of the business and how it has evolved over time. Also, we identify how the system influenced this development. In order to collect our data we interviewed all these entrepreneurs both on their business, their skills and their perspective on the system they operate in.

Once these individual case studies were performed and a national context analysis was conducted we entered the next stage of the task: the comparative analysis. For an extensive overview of the methodologies used see Annex 1.

Reader's guide

This report is the Subtask 2 D4 deliverable for Task 25. The remainder of this report first provides a more in-depth discussion on the global shift from product to service delivery, a shift also emerging in the energy efficiency sector. Then we discuss the three levels and key factors that make services (and their vendors) succeed or not in the participating countries. For an overview of the specific country reports we refer to the Deliverable 2 reports.



Energy Services and Business Models as transformative agents in the EE market

From delivering goods to services in the Energy Efficiency market: a transition

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 are varied but include amongst others user acceptance problems because of a lack of focus on the needs of these users, a lack of viable business models, a lack of the necessary entrepreneurial capabilities to deliver services and finally restrictive policy contexts which all hinder the uptake and upscaling of energy efficiency.

In reaction to this lack of uptake of energy efficiency products many businesses and utilities are (intuitively) changing their business and turning towards a more service oriented model. We are witnessing a transition from a focus on delivering the physical goods needed to achieve energy efficiency to a focus on offering solutions including both goods and services. A recent study on North-American and European utilities (Bigliani, R. et al., 2015) for example demonstrates that utilities are facing many challenges and in addition also face new competition for (the wallets of) their customers from nonutility players (including ICT companies, consumer electronics and energy equipment manufacturers, telecom) that offer richer customer experience with new services and new business models and in response are discussing new business models (IRENA 2014). In Europe new business models tops the strategy agenda of European utility executives (Bigliani, R. et al. 2015)¹. North-America is following, as a survey amongst stakeholders demonstrate, where new business models were seen as the most important challenge by 2% of respondents in 2014 to 34% of the respondents in 2015 (Bigliani, R. et al. 2015). And of these business models, the service model, including PV charging, HVAC services, rooftop solar, Bundles home services, community energy, data management) is most appealing to utilities that are forward-looking, with even plans to decouple the service from the sale of a commodity supply contract (Bigliani, R. et al. 2015).

Examples of emerging energy efficiency services include integrated or one-stop shop or bundled offerings around retrofitting, smart (grid) services, lighting-as-a-service, heating-as-a-service, smart energy management as a service and the more common ESCo's and EPC contracts.

The Cambridge Service Alliance, a leading research-industry cooperation states that in many sectors we are indeed facing a transition from a system consisting of products, outputs, elements suppliers and transactions to a system consisting of solutions, outcomes, relationships, network partners and ecosystems, packaged as services (Martinez & Turner 2011). Let us first define in more detail what a service is. Vargo and Lusch (2006) define a

¹ The same point was also made by Peter Fox-Penner in 2010 in book Smart Power, and even already in 1980 by Roger Sant in the Harvard Business Review (coming Markets for Energy Services)

'service' as: "the application of competencies for and to the benefit of the receiver. [...] This service centred view of exchange implies that the goal is to customize offerings, to recognize the consumer is always co-producer [of value], and to strive to maximize consumer involvement in the customization in order to better fit his or her needs (Vargo and Lusch, 2006).

Two key elements stand out in this definition of a service and resonate with the archetypical differences between goods and services as summarized in the Table below. First, the role of goods change. In the goods delivery model, or the goods logic, delivering goods is center stage and technology plays a key role in enabling production of competitive goods. This is what is referred to as a 'technology push' logic (Dosi, 1982). If services added to the delivery their aim is to facilitate the sale of the goods, or to enable some minimal market 'demand pull' whereby customers can partially indicate their specific needs.

When the service is centre stage however, the demand pull logic becomes dominant, and goods and technologies become mere enablers of the provision of valuable services (Vargo and Lusch, 2006). For the case of energy efficiency, physical goods like smart meters, algorithms, smart home devices, appliances, solar panels etc., become enabling tools and assist in providing benefits, but the focus is on how they realize users' benefits.

A second key element in this definition of services is that the role of the user is fundamentally different. One of the characteristics of service is that its value is experienced in use. The main goal of a firm is therefore to facilitate those outcomes that the user values. From this perspective, the user has a dominant role in the creation of value as well as in the creation of the business. This entails that user involvement is by definition more important in delivering a service. Co-creation and co-learning are key since the unit of exchange in the supplier-user relation is the service itself rather than the physical goods. This implies that intangible assets like knowledge and skills are the fundamental source of competitive advantage for companies delivering services and therefore are the main driver of overall value.

Table 1: Goods versus services: key differences. Based on Miles 1993

Goods	Services
Tangible: physical, can be touched and felt, can be stored and transported	Intangible: experienced, a process, task or action performed for the customer
Offer is stated in terms of product characteristics	Offer is stated in terms of experienced value
Capital-intensive production, highly standardized output, economies of scale	Labour-intensive production, highly customized output, no economies of scale
Technology-push logic: technology is key driver of production possibilities	Demand-pull: technology is only an enabler, customers' needs are key drivers
Production, distribution and consumption are separated	Production, distribution and consumption take place simultaneously
No customer involvement in production, low levels of customer interaction before and after production	Consumers are co-producers of services and of service innovation


Mass and global distribution	Localised distribution
Ownership transferred through sale	No ownership, user is experiencing value in use
R&D driven innovation	Service innovation as co-created with users

The transition to delivering services (servitisation) instead of delivering goods is not new and has taken place throughout the economy for several decades now (Vandermerwe and Rada, 1989). Several processes explain the rise of 'service economy' (OECD, 2000). Demand-side explanations include the idea that higher levels of economic development entail an increasing demand for services. Richer individuals opt more easily for buying services instead of engaging in self-service, especially when skills become very specialized. Increased demand has come also from companies in other sectors, whereby service companies have been increasingly supplying specialized intermediate inputs. This process of outsourcing is strongly linked to the globalization and fragmentation of value chains. In these processes, the availability of information and communication technologies (ICT) has played a key role in fuelling the growth of services (Miozzo and Soete, 2001). By allowing codification, storage and transportation of services, services have become less tangible and better tradable. More trade and a less localised distribution have enabled specialized service sectors to emerge and flourish, especially for the case of knowledge-intensive business services.

Companies within manufacturing sectors have undergone a process of servitisation which is still going on. They are typically driven towards services by tight profit margins in highly competitive markets with standardized products. They then try to move to cost structures leaning more on the price of knowledge rather than on the price of labour or natural resources (Chesbrough, 2010). One of the first success stories is the one of IBM, reinventing itself as a provider of expert consulting (Sawhney et al., 2004). Typically, differentiation strategy of manufacturing companies rely on offering higher quality to their users by including add-on services, from repairation to consulting. Most companies are still at an early stage of their servitisation process, but are increasingly challenged by service-based business models introduced by new entrants. For instance, most car manufacturers still think according to a goods-logic but some of them are pushed to consider themselves as providers of mobility services (The Economist, 2016).

As for service sectors, they are also being disrupted more and more by user-driven business models that cleverly bypass the traditional barriers to growth inherent to service characteristics. In particular, customized output and economies of scale can be achieved at the same time thanks to more recent advances in ICT and the use of Big Data (see the examples of AirBnB and Uber).

For the specific case of the energy sector, there is little data on the market share of energy services in the total energy market, or energy efficiency market. In general product-service systems (Roy, 2000), configurations where the service offered uses goods to deliver a specific function, like warmth, lighting or mobility, are particularly relevant for the energy sector. Some data exists on the growing market share of services such as ESCos and Energy performance Contracting (EPC), and some data exists on the expected growth in workforce in the energy efficiency services sector. For example, a US 2010 research on the energy efficiency services workforce stipulated that the workforce would increase from 100.000 person year employments in 2008 to almost 400.000 in 2020 (Goldman, C. et al. 2010). Data on the market share for services such as lighting-as-a-service, smart energy services such as



home automation, heating as a service or bundled or integrating offerings around for example retrofitting is rather difficult to find. What we do witness however, is that big players in the energy sector such as General Electric, Schneider Electric, but also many utilities are turning their business towards this service model approach. GE for example just launched Current, an integrated offering business worth a 1 billion dollar in revenue.² In 2008 however, in the US, most firms providing energy efficiency services were very small (often under 10 people) with only a few very large firms. The numbers above on the focus of utilities and equipment manufacturers worldwide on services and new business models suggests however that the number of larger players in the energy efficiency services sector will quickly increase.

New ways of delivering real value to customers

As described above, a key difference between delivering goods versus delivering services is that instead of a technology push market approach a demand pull market approach is taken. This entails gaining a real understanding of the end-user needs and in particular understanding what keeps these end-users from investing in energy efficiency or behaving in a more energy efficient way. The outcome is an energy efficiency service that is really valued by end-users, for which demand pull exists, leading to better market position of the business delivering this service.


Many end-users -households, house owners, managers of businesses etc.- intend to behave, manage, live or purchase more energy efficient. Despite their intentions, many of them however still have great difficulty identifying the opportunities they have to do so, let alone being able to decide if and which product or technology to choose or how to change their behaviour. Over the years, for example in the IEA DSM task 24³, we have learned that Energy Efficiency is a diverse and therefore complex value proposition that is very difficult to grasp, and in fact is not appealing to most customers.

There are many value propositions/energy services and accompanying business models out there that focus on the savings generated by lowering bills, or that focus on providing insight in energy consumption patterns by means of monitoring. Although saving money on energy costs seems an easy proposition, in practice the majority of people and businesses seem little or less than interested in doing so (Mourik and Rotmann 2013). As a consequence most of these services face great difficulty being up scaled to mass market. Despite various attempts to introduce elements to spur demand, such as labels, certification of products and providers, the present approach still is very much a technology push approach. Most energy services offered in the marketplace are thus still designed from a goods or technical perspective and as a result the services proposed are very often unsuccessful because insufficiently tailored to end users' needs.

In order to solve this problem, it is not enough to provide a technology as a solution. There is an emerging need for services (enabled by technology) that provide a clear solution to a perceived need. And those services need to take into account the fact that supplying energy is not the goal, but the function in everyday life that can be filled therewith (Walker and Cass, 2007; Shove and Walker, 2010) (Mourik and Rotmann 2013). This implies that to be successful at delivering valuable energy efficiency services, the providing businesses need to

² <http://www.greentechmedia.com/articles/read/ge-launches-1b-energy-services-company-current>

³ <http://www.ieadsm.org/task/task-24-phase-1/>



focus on delivering services that go beyond energy efficiency, or even put energy efficiency or energy savings as a secondary outcome and instead focus on needs or multiple benefits that are not necessarily directly linked to energy, e.g. health, employability, employer productivity, indoor climate, comfort, wellbeing, but also cost, control or ease.

For energy service providers the benefit of providing services lies in the potential it has in unlocking up to 42% of energy efficient technologies investments and savings⁴. A potential that has mainly to do with the better understanding of the actual end-user needs, the changed relationship with this end-user, which also brings along benefits such as decreased churn for utilities, and more access to relevant user data during the use phase. In addition, many more successful and innovative services being developed aim at empowering end-users by swapping complications of ownership, providing integrating platforms and help make choices between options, thus avoiding decision fatigue and aim at solving other more process related barriers. This is a clear difference compared to the business as usual often single technology or product push approach which until now was clearly not sufficient in unlocking the savings and investments. Previous research in the field of solar energy has shown that offering integrated services such as a combination of financing, vendor selection and installation, issues consumers find complicated, indeed help scale up the market (Huijben and Verbong, 2013; Drury et al, 2012). And research and practice indeed demonstrates that when the users' perspective is centre stage right from the start in developing services, chances rise users will experience the services as valuable, with higher turnover, higher sales, increased competitive advantage as results, we will discuss this link with the business success in more detail in the section on dynamic capabilities needed to deliver services.

Energy service delivery: Being user centered is key

As discussed in the previous section, one key difference between delivering goods and services is the role of the end-user, being involved in coproduction. But how end users (both consumers and businesses) can be involved in developing services and underlying business models is still a question to answer in the field of energy efficiency. End users can be passive informants in service and business development, or can actively co-create either individually or collectively engaged (Cui and Wu, 2015; Habich et al, 2015.). Recent research in the field of end-user participation in the development of services identified four active and co-creation roles for the end user: the role of explorer, inventor, designer or distributor (Nambisan and Nambisan, 2013). But. Although in many sectors co-creation and active engagement is becoming mainstream. But Tolkamp (2015) identified that this is different in the field of energy services and in particular the development of the business models underpinning these services. In the energy field, especially around residential energy visualisation technologies and community energy co-creation does take place, but little to none when it comes to the business model.

New business models to deliver services with more value to customers

Having established that energy services are increasingly considered to be the next step in creating a mass market for energy efficiency the market also need to understand what

⁴ In the January 20, 2016 "what Energy Efficiency can learn from Solar, Uber and Spotify" post on www.energypost.eu; Angela Ferrante, chief marketing officer for SparkFund, the potential is stated as unlocking up to 42%, equivalent of 20 billion dollar in new investment by 2020.

business models⁵ that enable the delivery of services look like in contrast to those delivering goods. Many authors state that we indeed need new business models to develop the market for sustainable services, to change our current energy production and consumption system and thus to achieve sustainability and energy savings goals (Johnson and Suscewicz, 2009), (Boons and Lüdeke - Freund 2013), (Chesbrough and Rose Bloom 2002), (Zott , Amit , and Massa 2011). Essentially business models are a way of creating value for various stakeholders, including end users (Osterwalder, Pigneur, and Clark 2010) (Zott, Amit, and Massa 2011). Osterwalder, Pigneur and Clark (2010) coined the business model canvas which is now widely used by businesses to design their business model. They state that a business model should consist of nine building blocks to ensure a good market delivery: Key partners; Key activities; Key resources; Value proposition; Customer relationships; Channels; Customer Segments; Cost structure; Revenue Streams. Research, including that by IEA DSM Task 25 found that a business model for delivering goods into the market demonstrates significant changes compared to a business model delivering services into the market. In the two hypothetical canvasses below we highlight these changes.

Table 2: a goods focused business model. Canvas template based on Osterwalder and Pigneur (2010)

A Goods focused business model				
Partners	Activities	Value proposition	Customer relationship	Customer segment
Supply chain partners	Focus on short term	A thing that can be felt, touched	Customer relationship is one-off in terms of transaction	All
Vertical cooperation	Focus on predictability Management Technological process efficiency aspects of the delivery or cost-structure process innovation follows product innovation	Can be standardised Tangible goods Stockable Stated in outputs and product characteristics The product or good is used by the user to satisfy needs Possession Offer is non-negotiable Value is destructed as soon as transactions has taken place	Low customer involvement Low customer contact	
	Resources	Value creation only between company and	Channels	
	Economic Labour		Mass distribution One-off	

⁵ We build on the definition of a business model as defined in the RE-BIZZ study commissioned by IEA-RETD (Wurtenberger et al. 2012): 'a strategy to invest in EE and DSM, which uses services as delivery mechanisms to create value and to lead to an increased penetration of EE and DSM in the built environment.'

	Commodity Codified knowledge	customer	Distributors Traditional marketing	
Costs Price of labour or natural resources Can be low labour intensive due to standardisation		Revenues Incidental payments payment per hour/unit		

Table 3: A service focused business model. Canvas template based on Osterwalder and Pigneur (2010)

A Services focused business model				
Partners	Activities	Value proposition	Customer relationship	Customer segment
Many /different type of partners	Long-term relationship building	Delivering both a product and process at the same time.	Focus is on maximising customer (user) experiencing value in use	All
Multiple value creation	Produced in buyer-seller interaction	Tailor made, customised		
Collaborative approach	Consumers are co-producers	Actual experience is the value		
More ecosystem approach to partners	Provided and experienced at same time	An activity solving a problem or a need		
Customers as partners	Improvement of delivery or cost-structure	Immaterial fuzzy nature		
Involvement of professionals delivering the service (front desk employees, consultants, distributors etc.)	Product innovation often follows process innovation	Non stockable		
	Training or education of customers to maximise value	Stated in outcomes of experience		
	Training of seconders and intermediaries	Focus on usability		
	Renewal in internal competences, skills and			

	culture to fulfil the services guaranteed	Coproduced with clients		
	Resources	Focus on Adoption Process		
	High share of tacit knowledge	Technology is enabling the service-offer	Channels	
	(Social) Capabilities		Localised distribution	
	People		Social marketing	
	Enabling technology		Peer to peer	
	Deep customer understanding		Use of ICT and (big data) in delivering the service	
Costs		Revenues		
Price of knowledge		Continuous payments		
Can be high labour intensive due to customisation		Monthly fees		

Barriers to the Energy Services Business Model

Most of the new business models in the EI sector are delivering goods with add-on services. The truly service oriented types of businesses are actually struggling in the market. Several reasons explain this struggle: competition with old business models, insufficiently putting the user centre stage, context barriers such as regulations. Overcoming these barriers requires two key characteristics from the service oriented businesses: very specific organizational capabilities and business model innovation to deal with regulatory and political factors.

Dynamic capabilities to deliver services

There are many possible ways to provide services on energy efficiency: new forms of cooperation; alternative 'roles' for end users or new revenue models. Unfortunately, many suppliers of energy efficiency services do not possess the skills to put together a viable business model. Energy utilities and energy companies are potential key suppliers of energy efficiency services, given recent regulation such as the Energy Efficiency Directive that demands that these companies realize substantial energy efficiency with their clients. Yet, they seem to be in dire need of knowledge on how to implement viable service oriented business models. In addition many of the stakeholders in the 'energy efficiency chain' do not know how or why to cooperate with the other stakeholders within the value chain, or fail to

use the right channels to bring the propositions to their relevant customers. As a *result*, *potentially* great ideas and propositions never take off in the marketplace. Research on service delivery proposes several key skills necessary for designing and implementing services. Often, these skills require the companies to completely switch their mind-set from a goods-based to a service-based logic. In particular, service developers face challenges in understanding what Unique Buying Reasons users have, since they are focused on the Unique Selling propositions and technical possibilities (Nilsson et al 2012). Buying reasons are hard to grasp because value can be financial, but is most likely related to intangibles like wellbeing, status, comfort, health, knowledge or skills (IEA 2012). To design, develop and deliver services that provide what the users want, there is an urge for service provider to understand needs, motives and context of their users (Den Hertog et al 2010).

By now we know that a (new) service is composed of several different elements, closely linked to the dimensions of the business canvas (Janssen, 2015). For these elements to work well together, the service provider needs several dynamic capabilities that have to do with the ability of the company to realize new solutions and respond to changes in the environment where they operate (Janssen et al, 2015). Four sets of capabilities turn out to be particularly significant.


1. Sensing user needs and (technological) options: this capability is about engaging in a meaningful interaction with users and other stakeholders to extract relevant information for fitting the service to the expressed needs. This interaction can be about co-learning, by sharing knowledge from both sides, or about contextualizing, by making efforts to match service offerings with actual needs.
2. Conceptualizing: engaging in service provision often means that the companies experience frequent interactions with users and stakeholders. Yet, the same companies might not always be able to take a step back and uncover general patterns in the rich variety of context-dependent needs. Service providers able to conceptualize have strong induction capabilities and they are engaged in innovation on a regular basis.
3. Co-producing and orchestrating: services often require the alignment of several different actors as they bridge for instance several physical inputs providers to create the end experience. Companies able to co-produce have developed capabilities for working together seamlessly with different partners, have strategies on how to create consistency and smooth procedures for interaction, particularly in the case of diverging incentives.
4. Scaling and stretching: a final key capability relates to the marketing skills of service providers and their ability to package their offerings in a way that large user groups will recognize the value of those offerings. This capability is about finding and promoting a general formula for value creation.

Table 4: summing up the capabilities, the how to and the impact on the business

Capabilities	Sensing user needs	Sensing technological	Conceptualising	Co-producing and	Scaling	Stretching
What	Engaging in a meaningful interaction with users and other stakeholders	Engaging in a meaningful interaction with users and other	take a step back and uncover general patterns in the rich	Alignment of several different actors to create the end	Marketing/branding skills of service providers and their ability to package their offerings in a	Being able to align the internal processes of the

	to extract relevant information for fitting the service to the expressed needs.	stakeholders to extract relevant information for fitting the service to the expressed needs.	variety of context-dependent needs Strong induction capabilities Innovation on a regular basis	experience Working together seamlessly with different partners	way that large user groups will recognize the value of those offerings.	company to deliver the service seamlessly
How	Systematically observing and evaluating needs Analysing actual use of service Segmenting	Staying up to date with tech Use of different info sources to identify possibilities Follow competitors	Experimenting Ideating	Initiating and maintaining partnerships Collaborating Coordinating activities several parties	Developing branding strategies Actively promoting services Scaling up	Aligning new services with current business and processes
Impact on successes	higher than average profits higher innovativeness of companies, higher turnover from improved products/service	higher than average profits Higher innovativeness of companies,	higher than average profits higher innovativeness of companies Higher percentage of sales coming from entirely new products.	rapid growth in market share		

The importance of in particular sensing and orchestrating is further increased with the shift discussed above within the field of energy services towards the provision of bundled services. Visnjic and Neely (2015) state that service providers are shifting from being 'doers' to becoming 'problem solvers', capable of orchestrating the delivery of complex services.




We have empirical evidence that these capabilities indeed help companies pursuing the development of new service solutions (Janssen et al, 2015). In particular, both sensing user needs and conceptualizing capabilities are found to be positively correlated both with higher than average profits and with the innovativeness of companies, as measured by the share of turnover they get from improved rather than existing products (goods and/or services).

It should be noted that these capabilities are not independent from each other but they form instead a coherent set of elements reinforcing each other. Conceptualizing plays in fact a key central role, being at the intersection of the sensing capabilities on one hand, and the capabilities more related to implementation at the other hand. When it comes to the relation of capabilities with the ability to gain a higher than average market shares, it is the sum of all capabilities that is strongly correlated to companies' performance.

Hindering regulatory and political frameworks

A business model design is strongly influenced by context, e.g. existing legislation and available subsidies, other bottlenecks and constraints, and various players within the current energy production and consumption system and consequently some type of business models are encouraged, others are hindered (Bidmon and Knab, 2014; Provance, Donnelly, and Cara Yannis, 2011; Geels and Schot 2010; Huijben and Verbong 2013 Mormann 2014). If we want to create markets for energy efficiency services we need to consider current energy markets infrastructures, regulation and support mechanisms in place (both for old and new technologies) since these directly influence the business model opportunities in a country (Huijben and Verbong 2013)]. Business models thus reflect and reproduce the social and political organisation of state and market action, ideas about energy (as a resource or as service), interpretations of public and private space and responsibility and ideas about the role of consumers and providers in constituting demand (Grandclement et al. 2015). These institutions not only influence the way business models are being created, but also the way they are being studied, monitored and evaluated (by, for example, policy makers).

The current climate and energy policies reflect the interests of established stakeholders and potentially allow for low-hanging fruit type of changes and inhibit more radical type of changes. A clear tension exists between the established energy regime and new service oriented business models that aim to transform the system (Bidmon & Knab 2014)]. Findings from our Task 25 context analysis being performed in the different participating countries indeed is that the current energy efficiency market still is being defined in terms of technological, subsidiary or legal possibilities targeting product and goods innovation and less so services. The tech-push perspective is centre stage in many framework conditions. In this perspective, the basis of economic activity is the making and distribution of goods (output). The main goal of a firm is then to maximise profit margins through efficient production and distribution. Consequently, in this framework, the user has a passive (consuming) role and service is an add-on, with the main purpose to increase the output (of goods). The traditional financing models for these product oriented business models is up front financing to fix the market failure of the valley of death, thus reiterating the existing system and encouraging business models to work with this upfront financing, and develop technical and contractual constructions around the delivery of goods, with resources and processes are built and managed solely within the firm. The public sector in many countries is very reluctant to provide financial support to services because they do not want to disturb the market, however, they start from the assumption that there is a well-functioning energy efficiency market. However, the current market for energy efficiency is a strongly regulated construct that does not comply with the laws of market. In particular, the supply side or the demand side is stimulated by subsidies and campaigns etc. As a result the energy efficiency market is dominated by limited types of business models mainly focused on delivering goods



and given the established framework conditions only incremental innovation of business models occurs in the energy regime (Bidmon & Knab 2014). Because of that business models that challenge or stretch the existing framework, i.e. servitisation business models have a difficult time emerging (Huijben 2015).

A Comparative Case Analysis of key factors and elements of effective energy efficiency business models

Three levels of analysis: business model, entrepreneurial capabilities and context

This task focuses on the three issues discussed above, which are of key importance in the successful delivery of energy efficiency services. As explained above, sustainable business models can benefit from taking a user-centred approach. This is directly related to the fact that service value is being co-created with the end user. No user means no service. Business models and energy services focusing on the customer perspective and their unique buying reasons for energy efficiency are therefore the next step in creating a mass market for energy efficiency. These new types of business models and energy services are arguably much more effective than the so far rather technocratic and technology push approach


A second element of importance to delivering effective energy efficiency services is the ability and skills of entrepreneurs and providers of services to focus on this customer perspective and tailor their services. This is becoming increasingly important in creating future competitive market strategies. This certainly applies to the changing customer market for energy companies and utilities and other suppliers, which are in dire need for new business models and effective energy services. These skills include customising and co-creation, contextualising, orchestrating, stretching and scaling,

A third element of relevance to understanding how to deliver more effective energy efficiency is context. A business model design is strongly influenced by context, e.g. existing legislation and available subsidies, other bottlenecks and constraints, and various players within the current energy production and consumption system.

The creation of the business model and value proposition, the context in which the business model and service is deployed and finally the capabilities of the entrepreneur/enterprise in navigating the context and user related issues are at the core of our analysis of the country specific cases discussed in the next sections.

This chapter is work in progress and will be updated with additional insights from cases studies in the participating countries. When performing our context analysis we examined if and how the business model elements, the entrepreneurial capabilities changed in response to experienced context drivers or barriers. This dynamic analysis of changes in the business model and the entrepreneurial capabilities is new to the field, and we hope to make a contribution to the research on business model innovation and dynamic capabilities with the analysis below and the four strategies identified in our cases.

This current document contains the analysis based on the 10 Swedish business models that Task 25 analysed, to understand what patterns or strategies emerge on the three levels we identified as of importance to effectively selling energy efficiency products and services: the business model, the entrepreneurial capabilities and the interaction with context. These strategies are dynamic (often intuitive) attempts of entrepreneurs and their business model to position themselves in the paradigm shift from product to service.



We will first discuss context separately and on a more general level and then conclude with a description of patterns or strategies discernible amongst the investigated cases when analysing the dynamic interaction between context, business models and entrepreneurial capabilities and the evolving of both business model elements and dynamic capabilities in the course of time.


The role of Context in the examined cases

As the Swedish context analysis demonstrated Sweden has 182 000 companies that **could** sell energy efficiency. This number is the total amount of firms within sectors like insulation, construction/building, lighting etc. However, not a lot of these companies are indeed explicitly selling Energy Efficiency. Only a small number (around 65) has organised itself into a branch association. The context analysis highlighted that today, energy in Sweden is widely considered to be “clean”. Therefore, there is a wide spread belief that saving energy has minimal or negligible climate or other environmental impacts. This belief is not overturned with real measurements either. While there is significant savings potential from improved metering, monitoring and feedback/diagnostic systems, the value proposition for measuring actual performance of equipment and systems is complex, and not well established even in Sweden. Some large facility owners like IKEA include monitoring and diagnostic systems in system procurement, but most do not. This makes the market for smart energy services quite challenging.

In a way, proposing optimising, performance analysis type of products is a counter intuitive proposition to many industrial and commercial clients. As one of the entrepreneurs involved in this market states: “what you are actually trying to sell to the client is a solution to mistakes, wrongs in their systems. You are in a way saying you were acting stupidly before, but with this product that can stop. No sane client will want to buy something that will demonstrate that his system did not perform accurately before”. Another challenge for these type of businesses is that they are usually not present at the moment a client experiences a pain for which their product could provide a solution (downtime, failing equipment, a high energy bill). The market for energy management type of products and services is relatively immature in Sweden, and the market for home management or smart homes is even more new.

Most entrepreneurs in the Swedish interviews furthermore noted that low energy prices make energy savings by itself a weaker argument. And the accompanying lack of trust in, and understanding of, companies selling energy efficiency is not conducive to the creation of demand. An intermediary group of stakeholders in Sweden is now addressing this trust issue by the organisation EEF which aims at certification of its members.

In addition, the national-level political will and drive for ambitious energy efficiency policies in general in Sweden is low. Despite this political climate, efficiency projects are started and there are many examples of local activity and building owners interested in profitable projects. The municipal and city level has been very active in pushing for energy efficiency through “smart” sustainable developments. Public procurement and support for buyer’s groups of energy efficient solutions are positive and powerful developments in Sweden. There is a growing demand for more packaged solutions from the Swedish users. For example the buyers groups are trying to push more comprehensive retrofit packages. This is partly a reaction to fragmentation issues, especially in the single family housing market. There is potential to develop more integrated, packaged solutions for the household and




condo markets (as is starting to happen through the buyers group mentioned earlier). This implies that the more aggregated demand level of communities, cities, municipalities is a good entry point to energy efficiency businesses.

The built environment and building related business have another favourable context event. There are pressing issues regarding renovating housing complexes constructed in the 1960s and 70s (“Miljonprogram”). The government has set aside specific investment help for those buildings and energy efficiency will be a requirement in this program. Another hot topic in the buildings area is building codes. As with the smart energy services, monitoring and evaluation of actual performance and fragmented responsibility for energy efficiency in the building sector is an issue. In Sweden there is little demand for energy efficiency services as such. Energy efficiency is instead often included as an “add on” benefit when a consumer buys something else such as lighting, ventilation etc.

Analysing the Swedish and other national context and in particular the national regulatory and political frameworks in the participating countries is key to understanding why certain types of business models come into existence and others do not. This context directly influences the business model opportunities in a country (e.g. Huijben and Verbong, 2013). Research demonstrates that in many countries this regulatory and political framework is not favourable towards service oriented business models and can hinder the development of an energy service market.

The current frameworks in many countries in Europe, including Sweden, are very much product focused/technology-push business model oriented, hindering service oriented business model (i.e. financing schemes favour the delivery and innovation on products instead of services). For example, the Swedish policies which are aimed at rated performance and labels (The EU label), and not focused on measured real performance or diagnostics hinders the development of services around this issue. The focus is on sales of products such as energy efficient measures and installations, not on system performance or optimisation which requires a service and as such these kind of business models and propositions are experiencing challenges, partly induced by the existing context. Regarding building energy certificates Sweden differs from many other European countries because it actually measures energy use.

The Swedish regulatory and political context furthermore demonstrates a lack of maturity in relation to certain fields of energy efficiency, following the lack of maturity in the market for energy efficiency in general. As the newly established association for Energy Efficiency states, there are almost 182.000 companies that could be labelled energy efficiency companies, but only a very small minority indeed positions itself as working in the energy efficiency market. The market for energy management type of products and services is relatively immature in Sweden, and the market for home management or smart homes is even more new. There is no regulation aimed at facilitating the use of energy management, partly also because energy savings are not high on the political agenda. There is a new law on “energy auditing in large companies” as a part of fulfilling EED. Especially the national-level political will and drive for ambitious energy efficiency policies in general in Sweden is low. And in addition, the market for energy efficiency in general is very fragmented, and because of this fragmentation and lack of maturity a lack of trust came into existence. This vacuum is now closed by community groups organising themselves in buyer groups. These buyers groups have been there for 15 years at least. It is not community based but set up around building owners (offices/multifamily buildings/single family buildings). But the trust issue is not yet addressed by the regulatory or political level. Certification, labelling in the energy efficiency field, other than in building sector is not taking place. It is a group of



industrial stakeholders which are now organising and establishing an energy efficiency association that certifies its members. The buyers groups indicate another issue related to weak maturity, weak regulation and low energy efficient related incentives, combines with low energy prices. Analysis for Task 25 by Creara (2016) of the relationship between market characteristics and entrepreneurial strategies demonstrate that these above mentioned conditions are usually met by a strategy by businesses which is not based on lowest price offers of the product (sales price). We can thus conclude that buyers groups aiming to negotiate price of products come into existence in reaction to a market situation where there is a lack of competition on lowest price, in combination with fragmentation and immaturity.


A business model design is thus strongly influenced by context, e.g. existing legislation and available subsidies, other bottlenecks and constraints, and various players within the current energy production and consumption system and consequently some type of business models are encouraged, others are hindered (Bidmon and Knab, 2014; Provance, Donnelly, and Cara Yannis, 2011; Geels and Schot 2010; Huijben and Verbong 2013 Mormann 2014).

Each country context and market is different, but some patterns can be discerned, also to be witnessed in Sweden. This pattern is a move from an energy efficiency sector being dominated by companies delivering products to one where different types of companies are emerging. Companies who are moving more towards servitisation or sometimes make a very big shift towards this servitisation. A very clearly discernible strategy or pattern, is the emergence of a very specific kind of service focused on providing a more integrated or bundled solution focusing on facilitation, trust building, relieving uncertainty, and providing a one-stop-shop for residential or business customers. These bundled services do not necessarily include the provision of energy performance contracts or outsourcing through ESCos.

This kind of entrepreneurial strategy focuses more on delivering a total package that goes beyond the buy moment but also includes the use phase in her focus. This strategy seems to bloom in a context where the bottleneck is that the market is offering a lousy offer, is unorganized, lacks dominant players, and lacks a recognizable image, or clear position and demonstrates weak regulatory context. This analysis is also evidenced in the context analysis performed by Creara for Task 25 (Creara 2016).

These bundled or one-stop-shop services are emerging in the retrofitting sector, but also in the smart services. For example, several utilities are exploring new business models and are looking beyond energy services to offer other services such as broadband, security, and home comfort (Bialgini, R. et al. 2015). Several smart management systems service providers, amongst others in Sweden and the Netherlands 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 value proposition to end consumers in the smart home world. One of the Swedish business cases for example aims to move away from delivering products to providing a forum where demand and supply can meet and provide a solution to the decision fatigue or stress created by the fragmented market and at the same time become a hub for all relevant partners. As such this forum mediates between needs and offers on the demand and supply side, they create alignment.

Although this type of bundling is emerging in Sweden in the energy management and smart grid/renewables sector, we are not witnessing many of these in the light as a service, or new heating services.



The business model designs in Sweden can thus be demonstrated to indeed be influenced by the specific Swedish context. This influence is occurring on the level of the nine building blocks of a business model (partners, activities, resources, costs, revenues, value proposition, channels, client relation and client segment), but is also influencing the need entrepreneurs might feel to develop certain capabilities in designing and deploying products and services (the capability to sense user needs and technological options, the capability to conceptualise, the capability to co-create and orchestrate an offer, the capability to scale an offer and to stretch the different elements of the business to provide the offer). In the next section we discuss the different patterns or strategies we have identified as emerging in the energy efficiency sector, not only in Sweden but across the participating countries. We will focus the discussion on what the different strategies imply for the business model and the necessary capabilities of the entrepreneurs/enterprises.

Analysing context, business models and entrepreneurial capabilities in dynamic interaction

The comparative analysis of the business models and skills and interaction with context (where information about this was available) highlighted a Swedish sector in transition towards a more service oriented sector. Of course the production type of businesses still exists and need to exist. Products and goods are both necessary to realise the transition towards a more sustainable energy system. The Swedish business models are mostly technologically and product driven, at least at the start, revolving around an individual technological piece of hardware or software. None of the businesses started off offering an outcome driven, total solution, enabled by a bundle of technological features. Most of the businesses are thus very much representatives of the product dominant logic. These technologically driven companies only started changing (parts of) their business model towards a more service oriented business models once confronted with absence of market growth or uptake. But increasingly the delivery of these goods and products is more often 'enriched' with ad-on services, and there are even business models and value propositions emerging where energy efficiency is no longer the primary value delivered, but a secondary outcome of other value delivery. Based on the analysis of cases in all participating countries, and certainly also evidenced in Sweden, we can identify 4 patterns. Three patterns depart from a technological push, a fourth pattern starts demand driven:

The intuitive change

An interesting learning from the cases is that most companies seem to have experienced some sort of first –blockade- in the uptake of their business. When this is experienced, entrepreneurs make some intuitive adjustments towards a more service oriented business. These adjustments are efforts to stimulate the uptake of the Value propositions. However, at the point where we've had contact with the companies, some of them realized that the changes they've made are insufficient. In the section below we discuss the four strategies the cases demonstrate.

1. The first pattern is built around a specific manner to try to boost sales (and thus aimed at pushing the same proposition harder): through resellers and referrals. The basic technology or product does not change, neither does the value proposition, market or client segment. The only elements that witness significant change are the partners, activities and resources. Partners are aligned to be supportive of the provider and the proposition and help deliver the service as a product (SAAP)

2. The second pattern we witnessed is that of reframing what is being proposed. In this type of pattern, the things that really change in the business model is a reframing of the value proposition, the understanding of the client, resources and client relationships. And that the partners are now viewed as equal partners and are viewed as valuable resources. The rest of the business model building blocks remain the same. Partners are equal in service of the proposition. This strategy is a 'one off' business model, that is, a business that focuses on selling a proposition.
3. The third pattern is a shift from pushing a solution to becoming Problem solvers. These businesses 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 complex value proposition to end consumers. Here all elements of the business model change to some extent, where the clients and the value proposition and partners change significantly. In this strategy the product is delivered as A Service (technology is enabling). This strategy is a hard one to follow, the shift to servitisation is difficult mainly because key capabilities are naturally very underdeveloped by tech oriented companies. This raises the awareness that partners are essential and the client is more than a client by a valuable user and the use phase is a critical focus.
4. The fourth pattern highlights businesses responding to needs from customers. Here the business model is designed around and even with the clients, having them even actively be part of the business model as resources and partners.

1 Pushing harder: the referral/resellers strategy

PUSHING HARDER: The referral/resellers strategy		
Moment in time	Start	T1-change
Events/moments in entrepreneurial journey	Technology driven/pushed Solution to not yet perceived problem	Hitting the ceiling in terms of demand for their product
Business model/changes	Partner interaction hierarchical in value chain Activities focused on hardware and software development Resources: technological hardware, and sales knowledge and tech- know-how Value proposition strongly focused on function of product Normative/missionary like push of EE	Changes only in partners, activities and channels, not in value proposition, costs, revenues, resources, client relation or segment Partnering with intermediaries able of reselling and using them as sales channels (they move towards client without increasing knowledge of clients, they make use of channels with more knowledge of clients. Activities aimed at developing

	<p>Client relation is distant, not personal. Little focus on user needs/pains (only ad-hoc and intuitively)</p> <p>Clients are more often industrial and commercial</p> <p>Channels are traditional, mainly focused on cold acquisition (telephone calls).</p> <p>Cost structure traditional: personnel and material</p> <p>Revenue system one –off product sell oriented (80%) sometimes up to 20% subscription fee to service</p> <p>Incidentally goodwill, next to the normative or missionary like push</p>	<p>resellers channels</p> <p>Training of resellers and sometimes potential clients in understanding product</p> <p>Sometimes these reseller partners are considered as resources but mostly they are considered as mere sales channels</p>
Context issues/reactions	<p>Fragmented market</p> <p>Lack of true and strong competition</p> <p>Weak regulation</p> <p>Lack of trust in product</p> <p>Context perceived as hindering</p>	<p>Creating demand: altering procurement rules of large clients (e.g. Ikea)</p> <p>Demanding regulatory creation of trust through use of labels, certification.</p>
Entrepreneurial capabilities	<p>No systematic user needs sensing</p> <p>Systematic sensing of tech options</p> <p>No conceptualising</p> <p>No orchestrating</p> <p>No scaling</p> <p>No stretching</p>	<p>No active or systematic user needs sensing, do collect user information but do not analyse it as outside information.</p> <p>No conceptualising</p> <p>Orchestrating: developing supply side to include their tool in offer or create clients demanding the service</p> <p>Scaling: Buying or developing consultative and sales skills (resellers/referrals).</p> <p>Training and or educating potential resellers</p>
Exemplar cases	Sweden: Megacon, Climacheck, esmart, Ahlsell	

The first strategy is called Pushing Harder/ the reseller or referral strategy. This type of energy efficiency business has a strong technology driven start. Usually a very passionate and skilled engineering entrepreneur developed a concept and is now trying to market it. Often to the more commercial and or industrial type of client. The selling occurs by stressing the technological functions and characteristics of the product (safety, reliability, control, optimisation, verification) to their clients, not the benefits the product can help deliver to the end-users (clients) of the clients such as for example safe and fresh food (for refrigeration clients). Partners usually are the more technological types of partners, co-developers of the product. This type of business is not really focused on sensing user needs, certainly not in a systematic manner, and not during the use of the product. The aim is to sell a one-off product. The cost structure is very traditional and includes costs for personnel and costs for material needed to build the product. The revenue structure is also mostly product oriented, with one-off payments, hardly any recurring (monthly) fees. And if the companies have recurring (monthly) fees or subscriptions, this is at most 20% of their revenues, with 80% one-off payments for the sale of a product.

Once the business starts experiencing that the early adopters have saturated, the market is static and a ceiling seems to be reached, the response is to focus on the scaling capability of marketing and sales. So the companies aims to buy and or hire the marketing and or sales capability. To this end a relationship with a certain type of intermediary is developed: consultants, installers or even Original Equipment Manufacturers (OEMs) are approached and either paid to resell/refer the product, or trained into better understanding the product and as such being able to better refer it to potential clients. The training is focused on the technical characteristics of the product. Whereas the capability of sensing user needs remains undeveloped. There are no activities aimed at sensing user needs systematically and adapting the value proposition to these needs. If an activity of the sort is performed it is aimed at understanding what words or arguments to use to sell the product. But these arguments remain quite technical and do not reach a strategic level. Another capability that is potentially built up is the orchestrating capability, where the business aims to develop relationships with retailers to get them to consider offering their product as part of a package to their clients. So it is not the orchestrating capability in a traditional manner, where the company aligns her partners to act as one in delivering the user experience, but it is orchestration aims at being one of the elements being aligned and offered as part of a package. These type of companies do not demonstrate strong conceptualising capabilities, or innovation capacity in the sense of developing totally new products or services. Any innovation being performed is incremental. They do not aim to innovate their product, or develop a set of services to facilitate the uptake of their product. The capability of sensing technological options comes naturally to this type of business. The relationship with the clients is not developed strongly in order to understand the characteristics of specific client contexts. Similar types of clients, e.g. all active in the refrigeration sector, are approached in similar ways. This model is about keeping as much as possible the same, but pushing harder and using other channels to enlarge the market potential.

2A Reframing what you propose/ the partner strategy

Reframing what you push: The partner strategy		
Moment in time	start	T1
Events/moments in entrepreneurial	Technology driven/pushed Solution to not yet perceived problem	Hitting the ceiling or no uptake at all

journey		
Business model/changes	<p>Partner interaction in value chain more equal, focused on partnering and co-creation with partners</p> <p>Activities focused on hardware and or software development</p> <p>Resources: tech and marketing knowledge and know-how</p> <p>Value proposition focused on function of product</p> <p>Normative missionary push of EE</p> <p>Client relation is standardised. Little focus on user needs/pains (only ad-hoc and intuitively)</p> <p>Cost structure traditional: personnel and material</p> <p>Revenue system one –off product sell oriented (80%) sometimes up to 20% subscription fee to service. Goodwill or competitive edge enters the revenue model</p> <p>Clients are more often industrial and commercial</p>	<p>Changes mainly in resources, client relation and value proposition</p> <p>Reframing the proposition to sell the same product with different argument (Design homes instead of passiv homes), in a way acknowledging that EE is low on the priority list of clients</p> <p>Service is used as a retention instrument</p> <p>Partners selected based on high quality to allow for branding</p> <p>partners considered as valuable resources</p> <p>development of more personal and tailored client relationships</p>
Context issues/reactions	<p>Lack of consumer demand for energy savings and efficiency</p>	<p>Creating demand through development of client relationship and co-designing procurement rules</p> <p>Experimenting, piloting</p>
Entrepreneurial capabilities	<p>Sensing user needs weakly developed</p> <p>Sensing of technological options well developed</p> <p>Conceptualising, if performed, focused on the delivery process up to the sale, not in use phase</p> <p>Conceptualising not focused on product innovation, incremental innovation done reactively</p> <p>Orchestrating, co-creation with partners of initial</p>	<p>Changes in capabilities mainly on sensing user needs, conceptualising and scaling.</p> <p>Sensing user needs: but only revolving around process up to the purchase, not the use</p>

	<p>product.</p> <p>Scaling, branding is explicitly performed as means to create competitive edge</p> <p>Stretching performed in company where relevant, e.g. back office, service department, marketing department.</p>	<p>phase</p> <p>Conceptualising: if a change occurs in this capability it is on the process level. The process of delivering the product is innovated to deliver a more tailored offer to clients and providing a follow-up.</p> <p>Scaling: branding differently, reframing the proposition, focused on delivering quality and reputation as a differentiating element</p>
Exemplar cases	Sweden: Humlegarden, Friendly Buildings, Cremab	

2A The second strategy is called Reframing what you propose/ the partner strategy.

We see this strategy with companies who focus on a transaction moment, a one off relation with their clients. They don't consider an active relation that remains during the use phase of a proposition as relevant. However, between T0 and T1 there is a huge difference in the role of the client. In this strategy, the client is understood, and the needs and wishes are taken seriously and are being used for building a relation and the process of selling the proposition. This is an essential difference where the relationship and role of the user changes fundamentally, in T0 passive, in T1 active (using design to connect with clients, or using the one off relation like Cremab). Also, in future (T2) this relation can be used to add extra value and new services. However, in the timeframe of this research these companies still held on to a one-off relationship with their clients, a focus on a one time transaction.

This second model still resembles the first model in many ways. At the start the model is practically identical to the first model. The only difference is that this model starts off with a different, more equal position vis-à-vis partners. But once this type of business is faced with a standstill in the market development they demonstrate clearly different strategies in reaction. Instead of pushing harder, efforts are undertaken to understand user needs better. The capability of sensing user needs is developed. This occurs through personal contacts, including training of potential users, tailored quotes, personal telephone calls, follow-up talks. No systematic and pro-active sensing of user needs in use phase occurs though, all efforts are aimed at the purchasing decision, not the use of the product, but this might be because the proposition itself is meeting the needs of the client. Often, in response to this deeper understanding the companies start appreciating that energy efficiency or specific technical characteristics of the product is not a top priority to clients. And in response the value proposition is altered to reflect this. For example instead of trying to sell passiv homes, the homes are sold as design homes.

The capability of conceptualising is also further developed, however not towards technological innovation but process innovation aimed at building a trust relationship with clients. The technologies are still at the core of the value proposition and remain more or less untouched. The Cremab business for example performed some process innovation, delivering the process as a service, delivering timely quotes, a no-hassle type of process around retrofitting, with a focus on delivering ease and comfort instead of energy efficiency alone. But the insulation measures used did not change. The Friendly Buildings business did change the process of selling the homes but the homes themselves were not changed. Partners for these type of businesses usually are the more technological types of partners, co-developers of the proposition. However, these partners are explicitly used to underpin the branding of the product, they are selected on the basis of excellence and quality. Follow-up is performed to make sure the process was experienced as pleasant, and potential technical matters are solved in this follow-up. But that is where the model stops. The cases representing this strategy show a clear stop at the use phase. The actual use phase of the home or insulation measures is not used as a gateway to delivering more services, for example smart home services. However, the cases might in the future develop to also focus on the use phase, and as such move towards the third strategy. Similar to the first strategy, the revenue structure is also mostly product oriented, with one-off payments, hardly any recurring (monthly) fees. And if the companies have recurring (monthly) fees or subscriptions, this is at most 20% of their revenues, with 80% one-off payments for the sale of a product. A few companies also mention more intangible revenue in the form of Goodwill. These are companies that implement their energy efficiency product and or service as a way to meet other goals such as a competitive edge in their respective market (rental market, retail market). To sum up, this strategy is very much about reframing what you propose. As a strategy it is already much more on a path towards servitisation, focusing on user needs, partnering with excellence partners increasing value instead of economics. However, what is missing still, is a focus on the delivery of services around the product, allowing for an extended relationship with the clients beyond the purchasing phase.

2B Pushing something else: the user phase strategy

PUSHING SOMETHING ELSE: the user phase strategy		
Moment in time	start	T1
Events/moments in entrepreneurial journey	Technology driven/pushed Solution to not yet perceived problem	Unsolicited feedback from clients or hitting the ceiling
Business model/changes	Partners are equal and selected based on quality Activities focused on hardware and software development Resources: knowledge and know-how Value proposition strongly	Changes in partners, activities, resources, value proposition, client relationship and segment. Effectively the whole business model is tweaked Finding explicitly service oriented partners that help deliver complex packages (partnerships for co-creation and co-innovation). Also, partnerships through launching customers (key accounts) pivot away from direct consumer sales towards a

	<p>focused on function of product</p> <p>Normative push of EE</p> <p>Client relation is distant, not personal. Little focus on user needs/pains (only ad-hoc and intuitively)</p> <p>Cost structure traditional: personnel and material</p> <p>Revenue system revolving around selling services, on a monthly fee based on product also developed in house.</p> <p>Goodwill, CSR, competitive edge, client churn important revenue!</p> <p>Clients are more often residential than industrial</p>	<p>business-to-business partner relationship</p> <p>Value proposition changes to deliver a platform, a datacentre for other B2C clients.</p> <p>Data collection and handling becomes an activity</p> <p>Data and ICT becomes a resource</p> <p>These companies actively seek new client relationships with businesses. Use phase comes into focus</p> <p>Also active searching for new segments to be able to start moving into new markets</p> <p>The revenue system increasingly revolves around delivering ongoing services and selling equipment becomes a add-on.</p>
Context issues/reactions	<p>Low competition</p> <p>Lack of trust from public</p> <p>Fragmented market</p> <p>Weakly regulated market</p>	<p>One-stop-shop solutions</p> <p>Networking</p> <p>Becoming problem solvers instead of missionaries</p>
Entrepreneurial capabilities	<p>Sensitive to user needs</p> <p>Good sensing of technological options</p> <p>Conceptualising focused on innovating technologically</p> <p>Orchestrating aimed at delivering the initial product</p> <p>Scaling aimed at marketing the initial product</p> <p>Stretching developed around the product</p>	<p>Developing user needs sensing capabilities strategically:</p> <p>as means to develop business model</p> <p>Systematically</p> <p>Active co creation with users</p> <p>Orchestrating: Shifting from being 'doers' to becoming 'problem solvers', capable of orchestrating the delivery of complex services.</p> <p>Or, what we saw happening as well: aiming to become orchestrated, having another partner doing the orchestration and being one of the links in the chain</p> <p>Conceptualising capability developed: innovating into very new products and services</p>

Exemplar cases	Sweden: FerroAmp, Exibea	

This third pattern or strategy demonstrates a shift from pushing a solution to becoming problem solvers in reaction to reaching a ceiling, or sometimes also in reaction to unsolicited feedback from clients. This unsolicited feedback then triggers a company to reflect on its value proposition and start focusing more actively on user needs. The main difference with 2A is that not the language is changing (framing), but essentials in the proposition. The main change is the awareness that their client is in fact a 'user' and usage isn't a one of moment in time. This means that the use phase, after transaction, provides key insights for innovation. These businesses 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. Especially when they become part of a larger package. These businesses, very often businesses developing single type technologies in the smart metering, smart ICT and feedback sector, 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 consumers, sometimes not directly related to energy efficiency at all, but more focused on delivering health benefits, safety benefits, comfort etc.. Here 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 data as a resource. Activities also change to data handling instead of developing soft and hardware.

What happens in reaction to this sensing of user needs is a realisation that their specific technology, which is very specifically focused on energy and energy efficiency or conservation is actually not really valuable to their end-users. What makes this strategy significantly different from the first two is the focus on extending and deepening the relationship with the end-users of the package, focusing on the use phase, with the aim to collecting data valuable to thee businesses they now aim to develop as clients, thus moving from being B2C to B2B2C businesses. Another clear difference with the other two strategies is that this strategy is about delivering multiple value to the client and to partners. It is about going beyond energy efficiency and focusing on real user needs. The analysis, systematic analysis, of the user needs is centre stage. These companies very strongly develop the capability of sensing user needs, where the users are both the business mediating between them and final (residential) users.

Another capability these businesses develop strongly is orchestration. They explicitly set out to become aligned with deliverers of a larger more complex value proposition, and in reaction to that they also develop their conceptualising capability, making sure they innovate their product strongly to match the technological system it becomes part of. For some of the businesses in Sweden, for example, this implied that their value proposition was adapted from delivering a metering device to delivering a platform, a hub where different complex datasets could be merged and turned into actionable information for different users.

Becoming part of a network delivering multiple value thus becomes the main strategy for these type of businesses.

3 Responding to needs: the servicing strategy

RESPONDING TO NEEDS: The servicing strategy

Moment in time	start	T1
Events/moments in entrepreneurial journey	<p>Demand driven service</p> <p>Energy Efficiency is main driver of value (sometimes not even part of the proposition)</p>	<p>Time is ready to add Energy Efficiency as an extra benefit for part of or complete user base.</p>
Business model/changes	<p>Equal partnerships in serving the user.</p> <p>Activities: building relationships with users and potential partners.</p> <p>Revenue: Goodwill, memberships competitive edge, client 'relation' most important revenue</p> <p>Value proposition is personalized/customized</p> <p>Cost structure: more innovative financing mechanisms such as crowdsourcing</p> <p>Client Relation is built on trust and long term focus</p> <p>Userphase is key RESOURCE and used for innovations</p>	<p>Equal partnerships in offering to niches</p> <p>User is partner through co-creation</p> <p>Value proposition is more 'fluid' and changes based on what clients demand/need</p> <p>User is an active resource</p>
Context issues/reactions	<p>BM is responsive to context changes</p>	
Entrepreneurial capabilities	<p>sensing of user needs is a core capability</p> <p>sensing of technological options in enabling the Value proposition</p> <p>Conceptualising: engaging with customers for co-creation and co-innovation</p>	<p>Conceptualizing becomes difficult when client base grows.</p>

	<p>Orchestrating</p> <p>A satisfactory customer experience is driver for orchestration of both the Business Model and the customer journey (user journey)</p> <p>(=orchestration aimed at serving the user while using)</p> <p>Scaling: aimed at continuous innovation.</p> <p>stretching</p>	<p>(especially for B2C)</p> <p>Datamining and collecting customer intelligence is becoming of growing importance.</p>
Exemplar cases	Sweden: ETC	

This fourth and final strategy is a completely different one, in the sense that where the others are reactive in cocreating and working with clients, in this strategy this is the start.

Some entrepreneurs don't start with energy efficiency, like ETC in Sweden. The coming into existence of these type of enterprises mostly originates from 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 being 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 an intensive cooperation between –more or less equal- partners, and with (at least a representative group) customers.

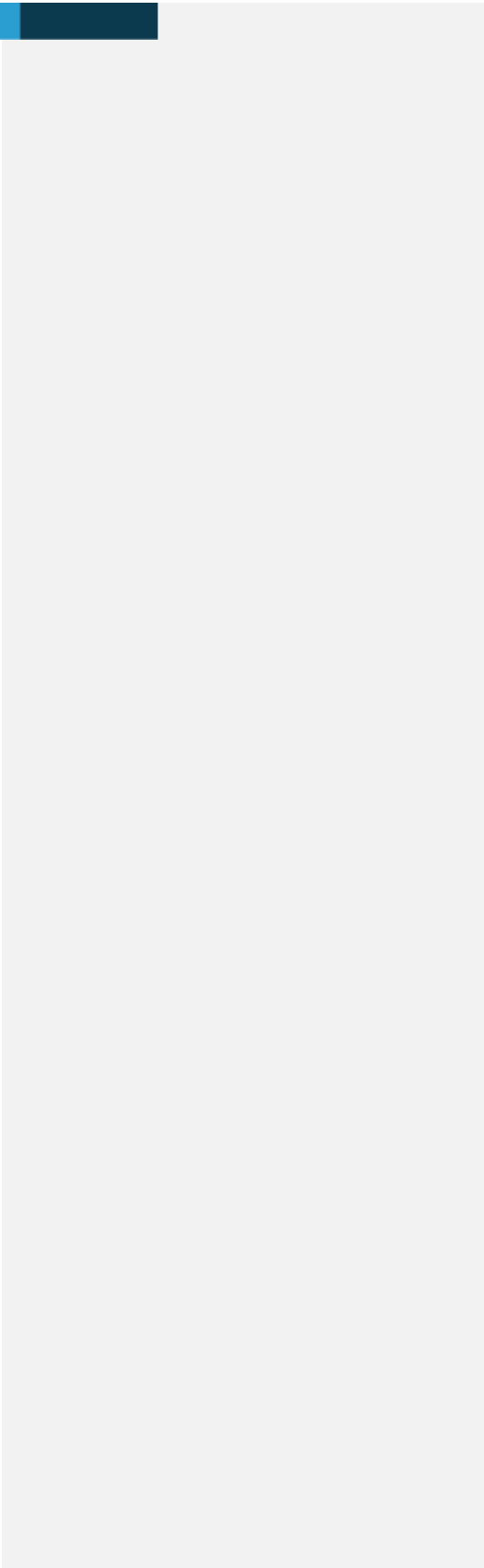
After the initial start, they expand their business gradually with new or extra benefits that in a way naturally fit the needs and lives of the customers. The largest difference of this strategy with the others is that the clients and their needs and lives are at the core of the business, instead of the value proposition. As a consequence, the key capabilities are essential resources in the business model and need to be highly developed in order to be successful.

Although in this strategy context also plays a role, the context is more given and the model finds its way within the given boundaries, and stretches them if needed.

Energy efficiency in this strategy is an example of this new or other benefit. In the case of ETC, a magazine developed for a green-minded group of people was created and developed into a successful business model. Once the client base proved to be loyal, extra benefits could be added. Even more, clients would suggest new services that they consider to be valuable to them. The trusted relation with clients and partners therefore is an essential resource, as is as 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.



There seems to be one essential difficulty in this strategy. For B2C businesses, maintaining a trusted relation with clients is becoming difficult when the client base is increasing. Although client databases and datamining are essential skills, an intimate relation and customizing a value proposition are becoming less obvious.



Conclusions and recommendations

To actually generate a change towards the much needed more user centered energy efficiency services we need to learn from and experiment with business models that challenge the existing framework conditions, learn to deal with the constantly changing and inherently complex and uncertain framework conditions, and to overcome internal organisation barriers [(Smith and Raven, 2012; Chesbrough, 2010; McGrath, 2010). A business model is already an ongoing experiment, considering that successful business models reinvent themselves constantly in response to changing frameworks (McGrath, 2010; Mullins and Komisar, 2009; McGrath, 2011; Chesbrough, 2011; Chesbrough 2010; De Reuver, Bouwman, and Haaker, 2013). This is clearly evidenced by the third and fourth type of strategy, both clearly adaptive business models underway to a full focus on servicing. These two strategies are consequently necessarily adaptive in the sense that to be able to deliver a service, the business model and the capabilities sensing and conceptualizing are fully developed in order to be able to continuously make changes, be responsive to the ever changing user context and changing value creation in the use phase.

This experimentation and or responsiveness is however not facilitated sufficiently by existing framework institutions such as public authorities. These kind of institutions could contribute to this experimenting by for example creating a platform or meeting point between the supply and demand side, functioning as intermediaries in allowing for the development of more balanced goods and services and business models could meet. Another way of facilitating this kind of business models is to subsidise the development of services and systems focused on delivering multiple value.

In addition, stimulating the incorporating and delivery of multiple value would lead to the development of more user and stakeholder centered approaches and built up of knowhow and entrepreneurial capabilities focused on user centered design. Such learning can be accomplished both within an organization and between different organizations and on societal level (McGrath, 2010). It can furthermore be argued that learning about and experimenting with the development of these capabilities to deliver energy efficiency and services more effectively is the responsibility of national frameworks (regulatory and political) and innovation policies. As discussed above, experimenting and reflective learning are necessary elements of this journey towards developing a more service oriented energy efficiency sector. Metcalfe and others have stated that (innovation) policy is about creating conducive context for organizations to engage in experimentation experimentation (Metcalfe, 1995; Metcalfe and Miles, 2000). Janssen (2015:120) makes an even stronger statement and states that: "In this respect, one cannot assume this is simply a matter of having the right funding instruments and framework conditions in place; weak innovation capabilities constitute a systemic failure that is detrimental for the processes of novelty creation within markets....The observation that many firms lack skills and competences to realize new services (Sundbo, 1997), can be regarded as a strong justification for policy intervention." Policy interventions such as the provision of business services aimed at enhancing these entrepreneurial capabilities of sensing user needs, orchestration, conceptualising, scaling and stretching would therefore we appropriate policy responses (Janssen 2015) (Rubalcaba et al., 2010).


Met opmerkingen [LB1]: Should not lessons learned from the business cases be included in this chapter? Or maybe that is something you do when all country reports are done??

Met opmerkingen [r2R1]: Indeed When we have also the Dutch, Austrian and Swiss cases analysed we will add a section comparing the cases in more detail.



References

- Bidmon, C. M., Knab, S., (2014) The Three Roles of Business Models for Socio-Technical Transitions. The Proceedings of XXV ISPIM Conference–Innovation for Sustainable Economy and Society: 8–11
http://papers.ssrn.com/sol3/Papers.cfm?abstract_id=2447647.
- Bigliani, R.; Eastman, R.; Segalotto, J.; Feblowitz, J.; Gallotti, G. (2015). Designing the new utility business models. White paper, Energy Insights IDC.
- Boons, Frank, and Florian Lüdeke-Freund.(2013). Business Models for Sustainable Innovation: State-of-the-Art and Steps towards a Research Agenda. *Journal of Cleaner Production* 45: 9–19. doi:10.1016/j.jclepro.2012.07.007.
- Chesbrough, H., Roosenbloom, R.S. (2002). The Role of the Business Model in Capturing Value from Innovation: Evidence from Xerox Corporation's Technology Spin-off Companies. *Industrial and Corporate Change* 11 (3): 529–55.
doi:10.1093/icc/11.3.529.
- Chesbrough, H. (2010) Business Model Innovation: Opportunities and Barriers. *Long Range Planning* 43 (2-3): 354–63. doi:10.1016/j.lrp.2009.07.010.
- Cui, A., & Wu, F. (2015). Utilizing customer knowledge in innovation: antecedents and impact of customer involvement on new product performance. *Journal of the Academy of Marketing Science*, 1-23.
- Den Hartog, P. (2010). Managing service innovation: firm-level dynamic capabilities and policy options. PhD thesis for Amsterdam Business School Research Institute.
- De Reuver, M., Bouwman, H., Haaker, T., (2013). Business Model Roadmapping: A Practical Approach to Come from an Existing to a Desired Business Model. *International Journal of Innovation Management* 17 (01): 1340006. Doi: 10.1142/S1363919613400069.
- Dosi, G. (1982). Technological paradigms and technological trajectories. A suggested interpretation of the determinants and directions of technical change, *Research Policy*, 11(3):147-162,
- Drury, E., M. Miller, C. Macal, D. Graziano, D. Heimiller, J. Ozik, T. Perry IV. (2012). The transformation of southern California's residential photovoltaics market through third-party ownership, *Energy Policy*, 42: 681-690, March, ISSN 0301-4215, 10.1016/j.enpol.2011.12.047.
- European Union. (2012, October 25). Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC Text with EEA relevance. *Official Journal of the European Union*, pp. 1-56.



Geels, F., Schot, J., (2010) Transitions to Sustainable Development: New Directions in the Study of Long Term Transformative Change. In Part I: The Dynamics of Transitions: A Socio-Technical Perspective. 1–101. New York: Routledge.

Goldman, C.; Fuller, M.C.; Stuart, E.; Peters, J.S.; Mc Rae, M.; Albers, N.; Lutzenhiser, S.; Spahic, M. (2010). Energy Efficiency Services Sector: Workforce Size and Expectations for Growth. Ernest Orlando Lawrence Berkeley National Laboratory.

Grandclemet, C., Pierre, M., Shove, E. (2015). How infrastructures and consumers interact: insights from the interface. Paper submitted to the ECEEE conference (2015)

Habich, A., R. Raven, J. Schot, J. Thøgersen, G. Verbong, and B Verhees. (2015). The Multi-Level Perspective and Its Relevance for EU-Innovate. WP1 interim report EU-InnovatE.

Huijben, B., & Verbong, G. (2013). Breakthrough without subsidies: PV Business Model Experiments in the Netherlands. Energy Policy (Vol. 56), 362-370.

Huijben, J.C.C.M. (2015) Mainstreaming solar: PV business model design under shifting regulatory regimes. Technische Universiteit Eindhoven. PhD Thesis.

IEA. (2014). Capturing the Multiple Benefits of Energy Efficiency: Executive Summary. International Energy Agency:
<http://www.iea.org/Textbase/npsum/MultipleBenefits2014SUM.pdf>

IEA. (2014). IEA DSM Task 25: Business models for a more effective market uptake of DSM energy services. International Energy Agency. Worlplan

IEA. (2015) Energy Efficiency Market Report 2015. Paris: International Energy Agency

IRENA. (2014). Rethinking Energy. Towards a new power system. 2014


Janssen, M.J. (2015). Service innovation in an evolutionary perspective, (2015), PhD Thesis, Eindhoven University of Technology.

Janssen, M.J. and den Hertog, P. (2016). Developing Service-based business models: which innovation capability for which innovation dimensions? Handbook of Service Innovation, forthcoming.

Johnson, Mark W., and J. Suscewicz. (2009). How to Jump-Start the Clean-Tech Economy. Harvard Business Review 87: 52–60.

Martinez V. and Turner T. (2014); "Design competitive Service Business Models", in: Service Design and Delivery; Ed. Macintyre M. Parry G. and Angelis J; Springer; London

McGrath Gunther, R. (2010). Business Models: A Discovery Driven Approach. Long Range Planning. 43 (2-3): 247–61. doi:10.1016/j.lrp.2009.07.005.



Metcalf, J.S. (1995). Technology systems and technology policy in an evolutionary framework *Cambridge Journal Economics*. 19 (1): 25-46

Metcalf, J.S., Miles, I. (2000) *Innovation Systems in the Service Economy. Measurements and case study analysis*. Springer. 10.1007/978-1-4615-4425-8 (2000)

Miles, I. (1993). Services in the new industrial economy. *Futures*, 25(6), 653–672.

Miozzo, M. and Soete, L. (2001), [Internationalization of services: a technological perspective](#), *Technological Forecasting and Social Change*, 2001

Mormann, F. (2014). Beyond Tax Credits – Smarter Tax Policy for a Cleaner, More Democratic Energy Future. *Yale Journal on Regulation* 31.

Mourik, R.M.; Rotmann, S.; et al. (2013). Most of the time what we do is what we do most of the time. And sometimes we do something new. Analysis of case studies IEA DSM Task 24: Closing the Loop- behaviour Change in DSM: From Theory to Practice. Deliverable 2 for IEA Implementing Agreement DSM Task 24. November 2013

Mullins, J., Komisar, R., (2009). *Getting to Plan B: Breaking Through to a Better Business Model*. 1st ed. Boston, US: Harvard Business Press.

Nambisan, S., and P. Nambisan. (2013). *Engaging Citizens in Co-Creation in Public Services: Lessons Learned and Best Practices*. Research report. Collaboration Across Boundaries Series. IBM Center for the Business of Government.

Nilsson, H., Bangens, L., Goven, B., Andersson, B. (2012). We are lost if we don't develop new business models. Paper submitted to the ECEEE conference (2012)


OECD (2000), *The Service Economy*, Paris: OECD.

Osterwalder, A., & Pigneur, Y. (2010). *Business Model Generation*. Amsterdam: Self-published.

Osterwalder, A., Pigneur, Y., Clark, T. (2010). *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*. Amsterdam.

Polzin, F., von Flotow, P., & Nolden, C. (2015). Exploring the Role of Servitization to Overcome Barriers for Innovative Energy Efficiency Technologies—The Case of Public LED Street Lighting in German Municipalities (No. 2015-07). SPRU-Science and Technology Policy Research, University of Sussex.

Provance, M., Donnelly, R.G., Carayannis, E.G. (2011). Institutional Influences on Business Model Choice by New Ventures in the Microgenerated Energy Industry. *Energy Policy* 39 (9): 5630–37. doi:10.1016/j.enpol.2011.04.031.

- 
- Roy, R. (2000). Sustainable product-service systems, *Futures*, 32, 289-299.
- Rubalcaba, L., J. Gallego, Den Hertog, P. (2010). The case of market and system failures in services innovation. *Service Industries Journal*, 30 (4): 549-66.
- Sawhney, M., Balasubramanian, S. and Krishnan, V.V. (2004), Creating growth with services, *MIT Sloan Management Review*, Vol. 34 No. 4, pp. 34-43.
- Shove, E & Walker, G (2010). 'Governing transitions in the sustainability of everyday life' *Research Policy*, vol 39, no. 4, pp. 471-476.,10.1016/j.respol.2010.01.
- Smith, A., & Raven, R. (2012). What is protective space? Reconsidering niches in transitions to sustainability. *Research Policy*. (Vol. 41), 1025–1036.
- The Economist (2016), **The driverless, car-sharing road ahead**: Carmakers increasingly fret that their industry is on the brink of huge disruption, Jan, 6th 2016
- Tolkamp, J. (2016). A paradigm shift? User-centred business model design for energy efficiency services. Thesis for Eindhoven Technical University.
- Vandermerwe, S., & Rada, J. (1989). Servitization of business: adding value by adding services. *European Management Journal*, 6(4), 314-324.
- Van Soest, D.P., Bulte, E.H. (2001). Does the Energy-Efficiency Paradox Exist? Technological Progress and Uncertainty. *Environmental and Resource Economics* 18.
- Vargo, S.L.; Lusch, R.F. (2006). Service-dominant logic: continuing the evolution. *Journal of the Acad. Marketing Science* 36:1–10. DOI 10.1007/s11747-007-0069-6
- Visnjic, I., Wiengarten, F. and Neely, A. (2016). Only the Brave: Product Innovation, Service Business Model Innovation, and Their Impact on Performance. *Journal of Product Innovation Management*, 33: 36–52. doi: 10.1111/jpim.12254
- Walker, G. and Cass, N. (2007). Carbon reduction, 'the public' and renewable energy: engaging with socio-technical configurations. *Area*, 39: 458–469. doi: 10.1111/j.1475-4762.2007.00772.x.
- Wurtenberger et al. (2012). Business models for renewable energy in the built environment. ECN report.
- Zott, C., R. Amit, and L. Massa. (2011). The Business Model: Recent Developments and Future Research. *Journal of Management* 37 (4): 1019–42. doi:10.1177/0149206311406265.

IEA Demand Side Management Energy Technology Initiative

The Demand-Side Management (DSM) Energy Technology Initiative is one of more than 40 Co-operative Energy Technology Initiatives within the framework of the International Energy Agency (IEA). The Demand-Side Management (DSM) Energy Technology Initiative, which was initiated in 1993, deals with a variety of strategies to reduce energy demand. The following member countries and sponsors have been working to identify and promote opportunities for DSM:

Austria	Norway
Belgium	Spain
Finland	Sweden
India	Switzerland
Italy	United Kingdom
Republic of Korea	United States
Netherlands	ECI (sponsor)
New Zealand	RAP (sponsor)

Programme Vision: Demand side activities should be active elements and the first choice in all energy policy decisions designed to create more reliable and more sustainable energy systems

Programme Mission: Deliver to its stakeholders, materials that are readily applicable for them in crafting and implementing policies and measures. The Programme should also deliver technology and applications that either facilitate operations of energy systems or facilitate necessary market transformations

The DSM Energy Technology Initiative's work is organized into two clusters:

The load shape cluster, and
The load level cluster.

The "load shape" cluster will include Tasks that seek to impact the shape of the load curve over very short (minutes-hours-day) to longer (days-week-season) time periods. Work within this cluster primarily increases the reliability of systems. The "load level" will include Tasks that seek to shift the load curve to lower demand levels or shift between loads from one energy system to another. Work within this cluster primarily targets the reduction of emissions.

A total of 24 projects or "Tasks" have been initiated since the beginning of the DSM Programme. The overall program is monitored by an Executive Committee consisting of representatives from each contracting party to the DSM Energy Technology Initiative. The leadership and management of the individual Tasks are the responsibility of Operating Agents. These Tasks and their respective


Operating Agents are:

Task 1 International Database on Demand-Side Management & Evaluation Guidebook on the Impact of DSM and EE for Kyoto's GHG Targets – *Completed*
Harry Vreuls, NOVEM, the Netherlands

Task 2 Communications Technologies for Demand-Side Management – *Completed*
Richard Formby, EA Technology, United Kingdom

Task 3 Cooperative Procurement of Innovative Technologies for Demand-Side Management – *Completed*
Hans Westling, Promandat AB, Sweden

Task 4 Development of Improved Methods for Integrating Demand-Side Management into Resource Planning – *Completed*
Grayson Heffner, EPRI, United States



Task 5 Techniques for Implementation of Demand-Side Management Technology in the Marketplace
– *Completed*
Juan Comas, FECSA, Spain

Task 6 DSM and Energy Efficiency in Changing Electricity Business Environments – *Completed*
David Crossley, Energy Futures, Australia Pty. Ltd., Australia

Task 7 International Collaboration on Market Transformation – *Completed*
Verney Ryan, BRE, United Kingdom

Task 8 Demand-Side Bidding in a Competitive Electricity Market – *Completed*
Linda Hull, EA Technology Ltd, United Kingdom

Task 9 The Role of Municipalities in a Liberalised System – *Completed*
Martin Cahn, Energie Cites, France

Task 10 Performance Contracting – *Completed*
Hans Westling, Promandat AB, Sweden

Task 11 Time of Use Pricing and Energy Use for Demand Management Delivery- *Completed*
Richard Formby, EA Technology Ltd, United Kingdom

Task 12 Energy Standards
To be determined

Task 13 Demand Response Resources - *Completed*
Ross Malme, RETX, United States

Task 14 White Certificates – *Completed*
Antonio Capozza, CESI, Italy

Task 15 Network-Driven DSM - *Completed*
David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 16 Competitive Energy Services
Jan W. Bleyl, Graz Energy Agency, Austria / Seppo Silvonen/Pertti Koski, Motiva, Finland

Task 17 Integration of Demand Side Management, Distributed Generation, Renewable Energy Sources
and Energy Storages
Seppo Kärkkäinen, Elektraflex Oy, Finland


Task 18 Demand Side Management and Climate Change - *Completed*
David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 19 Micro Demand Response and Energy Saving - *Completed*
Linda Hull, EA Technology Ltd, United Kingdom

Task 20 Branding of Energy Efficiency - *Completed*
Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 21 Standardisation of Energy Savings Calculations - *Completed*
Harry Vreuls, SenterNovem, Netherlands

Task 22 Energy Efficiency Portfolio Standards - *Completed*
Balawant Joshi, ABPS Infrastructure Private Limited, India



Task 23 The Role of Customers in Delivering Effective Smart Grids - *Completed*
Linda Hull. EA Technology Ltd, United Kingdom

Task 24 Closing the loop - Behaviour Change in DSM: From theory to policies and practice
Sea Rotmann, SEA, New Zealand and Ruth Mourik DuneWorks, Netherlands

Task 25 Business Models for a more Effective Market Uptake of DSM Energy Services
Ruth Mourik, DuneWorks, The Netherlands

For additional information contact the DSM Executive Secretary, Anne Bengtson, Liljeholmstorget
18,11761 Stockholm, Sweden. Phone: +46707818501. E-mail: anne.bengtson@telia.com
Also, visit the IEA DSM website: <http://www.ieadsm.org>



DISCLAIMER: The IEA enables independent groups of experts - the Energy Technology Initiatives, or ETIs. Information or material of the ETI focusing on demand-side management (IEA-DSM) does not necessarily represent the views or policies of the IEA Secretariat or of the IEA's individual Member countries. The IEA does not make any representation or warranty (express or implied) in respect of such information (including as to its completeness, accuracy or non-infringement) and shall not be held liable for any use of, or reliance on, such information.

