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energy efficiency

Task 25 D2 report Sweden

Swedish context analysis and Business Models case studies for a more Effective uptake of DSM energy services for SMEs and communities

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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 work plan to be found on our task website.

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.

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.

Subtask 2 and Sweden

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.

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 country report is the Swedish Subtask 2 final deliverable for Task 25. The report first provides a short description of the analysis framework for the Swedish context and cases. Then the analysis of the Swedish context is discussed and finally the different business models and services selected for the deeper analysis are described. For the comparative analysis of cases, including the Swedish cases we refer to Deliverable 4 of Task 25.

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

This task focuses on three issues that are of key importance in the successful delivery of energy efficiency services. 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,

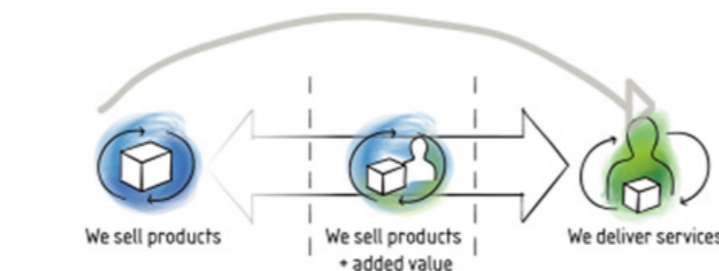
A third element of relevance to understanding how to deliver more effective energy efficiency is context. A business model design is strongly influenced by context, e.g. existing legislation and available subsidies, other bottlenecks and constraints, and various players within the current energy production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

Introducing the transition from only product to also service and user needs orientation in the EE market

A different perspective than the technology push perspective is what could be defined as a service logic. [Vargo and Lusch, 2004] In this perspective, the service is the fundamental basis of exchange.

This implicates that not goods, but knowledge and skills are the fundamental source of competitive advantage and therefore are the main drivers of value. One of the characteristics of services is that their value is experienced in use. The main goal of a firm is therefore to facilitate outcomes the user wishes for and values. From this perspective, the user has a dominant role in the creation of value as well as in the creation of the business model.

Transition!



In reaction to the 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). These new players offer richer customer experience with new services and new business models and force utilities to start discussing new business models (IRENA 2014). In Europe new business models tops the strategy agenda of European utility executives (Bigliani, R. et al. 2015). 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.

Necessary Entrepreneurial capabilities

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) (Janssen & Hertog 2016 forthcoming). 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.

Context

The national regulatory and political frameworks in many countries are 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 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).

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). In addition, business models are part of or embedded in a socio-technical system or ecosystem (Johnson and Suskewicz, 2009), and these systems are fast changing and complex environments. Because of these continuous changes and complexity, learning and experimentation are of main importance for business model development (McGrath, 2010; Chesbrough, 2010).

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). 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 (Shove, ecee 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).

In this Task we explicitly focus on this shift from product orientation to also service orientation in the Energy Efficiency field. For a much more detailed description of this paradigm shift, the role of entrepreneurial skills and the role of context see our Deliverable 4 report.

Sweden – context analysis

This analysis uses a multi-level perspective to describe the relevant context for business models in the market that sell energy efficient products or services or both. As there is an impact of contextual factors on the development of business models and businesses in general (Provance, Donnelly, & Carayannis, 2011) (Huijben & Verbong, 2013) a context analysis can be considered useful. Context can be interpreted in two ways: first of all it can include policy landscape pressures, deep structural trends in the macro environment that determine contextual opportunities. Context also includes barriers for socio-technical transitions (Geels, 2002) which can be seen as relevant context for the market. Besides that, in the process of a transition firms bring products or technologies to the market via their business model (Boons & Ludeke-Freund, 2013). Dominant business models are present in the regime, while radically innovative business models develop their niches to form and grow (Bidmon & Knab, 2014). As in the wider market transition, these firms operate within a larger context, and their business models face selective pressures present in the regime. This context analysis will describe the broader landscape, the environment in which a firm and the business model are positioned and policy that specifically tries to empower the energy efficiency niche. Smith & Raven (2012) note the relevant context is formed by the 1) established industry structures, 2) policies and political power, 3) market and user practices, 4) dominant technology and infrastructure, 5) the cultural significance of the regime and 6) scientific knowledge. These factors and landscape pressures will be described below for the energy efficiency market.

Broader landscape

Swedes are used to a reliable and continuous flow of energy. Modern, industrial Sweden was formed on the basis of access to vast natural resources (iron, wood and hydro power), and has shifted its energy mix over time. Development of nuclear was to complement hydro as a new “clean” resource. Oil for heating was replaced by wood residuals and waste incineration. Today, energy in Sweden is widely considered to be “clean” (i.e., the generation mix is largely comprised of hydro power, renewables, and nuclear power). Therefore, there is a wide spread belief that saving energy has minimal or negligible climate or other environmental impacts. Energy security concerns based upon recent events in neighbouring countries are considered manageable.

Energy taxes contribute significant revenues to the Swedish national budget (39 billion out of 790 billion SEK, which influences policies on energy efficiency. On the municipal level some energy utilities (owned by the municipality) show little interest in energy efficiency because of its effect on the income of the utility. However, the interest in energy efficiency is mixed as some municipalities proactively promote efficiency. Energy efficiency is sometimes perceived as equal to lowering energy use and then considered as a threat for instance within the energy intensive industries in Sweden.

In sum, energy efficiency is not considered a very important political topic. Despite this, there are many examples of local activity and building owners interested in profitable projects. Sweden also has to implement directives from the European Union that influence the market. There is also a growing interest of (environmental) certification of buildings. Passive houses are also growing in number.

Furthermore, Sweden has a history of concern for and promotion of healthy indoor environments. This context has helped the market for energy efficiency, as developing and maintaining a healthy indoor environment and energy efficiency often go hand in hand. As nuclear power is phased out in Sweden there is a growing concern for managing power (W) and not only energy (kWh).

Structural elements

Established industry

In Sweden there is little demand for energy efficiency services as such. Energy efficiency is instead included as an “add on” benefit when a consumer buys something else such as lighting, ventilation etc. Like other countries, Sweden does have an ESCO-market but is not well established in all sectors.

Energy utilities traditionally have not been involved in energy efficiency as Sweden has opted for voluntary measures under the Energy Efficiency Directive (i.e., utilities do not have energy obligations). However, there is a growing interest in energy efficiency (from a very low level) driven by an interest in keeping customers.

Customers have doubts about the genuine interest of the energy companies, and also have experienced rising energy bills even when they save energy (customers feel they still pay the same although they use less kWh). Energy utilities are not obliged to work with energy efficiency.

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.

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.

ESCOs in Sweden originate from companies selling controls or maintenance, or from consultancy companies. There are also examples of energy utilities working as ESCOs. Customers are currently more prepared and seem to be able to include more measures in the projects. ESCO-projects are often successful in terms of the amount of energy saved, but customer satisfaction is not at the same level. This could be due to the complexity of the projects and that entrepreneurs often have more knowledge of building installations than their customers. ESCO-companies have now formed a group within EEF¹, and are working together to expand the market and adjust their business models.

The banking sector in Sweden considers an investment in energy efficiency as any other investment. The national energy agency is now starting a new project to discuss energy efficiency related financing issues with banks and investors.

New entrepreneurs can get subsidized loans for investments in their company from a state sponsored programme (ALMI).

Political context

As energy in Sweden is considered “clean”, there is a wide spread belief that saving energy has minimal or small climate or other environmental impacts. Energy security and recent events in countries close by does not seem to be considered a problem for most people. Swedes are used to a reliable and continuous flow of energy. Another factor is that taxes on energy contribute a great deal to the Swedish national budget as mentioned above. Another factor that holds back energy efficiency is the CHP-plants.

If heat use is reduced this gives the plant less ability to produce electricity.

All political parties agree that efficiency is important; however, concrete, national-level policy actions are few. Two examples include: 1) the efficiency target is not ambitious, and in fact Sweden will achieve the target before the agreed date; and 2) Sweden has decided not to implement energy efficiency obligations on energy suppliers. In addition we like to add that recently (June 2016) five out of seven political parties in the Swedish parliament agreed to set a new target for energy efficiency and also to look into the possibilities with energy efficiency obligations.

In sum, the national-level political will and drive for ambitious energy efficiency policies 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 such as in Växjö, Malmö, the Royal Seaport Development in Stockholm, and in Lund. In addition, municipal companies are also doing leading work in the area of procurement and building codes. They seek to promote energy performance requirements beyond the national ones to drive deployment of proven energy efficient technologies and approaches. Sweden also has a state financed network of local “energy advisors”. Both individuals and companies can get advice from this service.

Sweden also has to implement directives from the European Union, like the EED, which affects the market. There is also a growing interest of (environmental) certification of buildings. Passive houses are also growing in number.

In 2015 the government established a parliamentary level “energy commission”. The purpose is to investigate the future need of energy in Sweden and how to supply this need. The commission is primarily focused on electric supply. The goal is to deliver a broad political agreement with the focus on 2025 and ahead. The work within this commission resulted in the above mentioned new target for energy efficiency and energy efficiency obligations.

¹ EEF is a trade organisation for companies selling energy efficiency in Sweden where also ESCO-companies are members.

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. There are several weaknesses in the area of building codes. Municipalities cannot set energy efficiency requirements on new buildings beyond national building codes (if they don't own the land). This has mitigated experimentation and innovation in new building designs. The second weakness is that responsibility for energy efficiency is divided on different national agencies. The Housing Agency (Boverket) sets the building codes including energy requirements. However, this agency does not have the responsibility for energy efficiency.

There is a gap in terms of a single responsible agency for ensuring energy efficiency is embedded in national politics (not only the building codes). Another weakness is the supervision that building owners fulfil the requirements in the building codes. This is the responsibility of the municipalities that often don't have resources and/or knowledge to carry out the needed inspections.

Financial and fiscal supporting measures
Most interviewees in Sweden cited the need for specific energy efficiency incentives – or at least mention that such incentives from the government would be supportive. In the past, Sweden has had tax incentives or other types of incentives to energy efficiency projects. However, there is no such support from the government at this time.

There is an overview of the measures that have been taken to stimulate the demand for energy efficiency:

Market & User practices

Public procurement and support for buyer's groups of energy efficient solutions (Belok for large commercial property owners, Bebo for housing and multifamily housing owners, and another for grocery store chains) are positive and powerful developments in Sweden. A similar trend exists in the EU. The policy instrument enables a partnership between the Energy Agency (STEM), which coordinates the group, and the private sector members who implement the projects. For example the groups are trying to push more comprehensive retrofit packages, such as in ventilation. Packages are designed so that the whole package is cost effective, as opposed to fragmented measures undertaken one by one individually. This allows some measures to pay for other ones and to push for a target of 50% energy reduction (at whole building level). So far this effort has been very successful.

Sweden is also a forerunner in using technology procurement to get beyond best available technology. The idea is to support market development and procurement of products that do not yet exist, though more recently the focus is on both technology and also new methods of doing things. More can be done through public procurement and the buyer's groups to aggregate volume and pull new technology or solution procurement ahead. Individual programs could be better integrated into public procurement processes.

In the single family housing market there is a need to address fragmentation issues. If you need to fix your windows you turn to one contractor; heating systems another contractor; etc. Who does a homeowner trust when there is competing advice from different energy advisors or contractors? What about packaged solutions by a qualified company? There is potential to develop more integrated, packaged solutions for the single family and condo markets (as is starting to happen through the buyers group mentioned earlier).

This service or commercial sector is generally weak as there are little to no regulatory drivers. There are some exceptions in the retail area (IKEA is one example) and real estate markets (Humlegården is one example) that maintain annual energy savings goals and work with suppliers/tenants to drive energy efficiency efforts. There is a continued need to develop the market for EE services (ESCO services) including renovations in this sector.

Public sector procurement and initiatives could help to play a role here to create market pull, as was done in the first wave of ESCO work with public sector players are clients. There is a long-time government (STEM) support for municipal energy advisors including establishing networks to share experiences. There is also a drive to establish industrial networks focused on energy management and efficiency.

Most entrepreneurs in the Swedish interviews noted that low energy prices make energy savings by itself a weaker argument. Insulation or quick payback measures may be exceptions, though higher energy prices or energy efficiency incentives would likely help boost those measures. The value proposition for energy efficiency depends on the company and market.

Some examples are cited below:

- High quality/well designed (e.g., Friendly Building) Does not sell low-energy homes or energy efficiency. Sells well-designed, high quality homes!
- Better electrical safety, avoiding downtime and costly repairs (e.g., Megacon, ClimaCheck, eSmart): Improving production efficiency, improving electrical safety, and/or avoiding equipment failures/production disruption are larger benefits than energy savings
- Improved energy billing (e.g., Megacon, Humlegården): Submetering and monitoring to bill tenants for energy

Culture

According to interviews (Exibea) Swedes tend to have an overly positive view of themselves as "green" or "environmentally friendly". This notion that "I am Swedish and therefore already 'green'" can make selling energy efficiency services more difficult. There is also a lack of trust in, and understanding of, companies selling energy efficiency. This is now addressed by the organisation EEF in a certification of their members.

Policy context

Financial	<p>National policy Energy efficiency target (2020) – but the target is considered to have been met ahead of schedule</p> <p>Responsibility for energy efficiency is divided between different departments in the government and different national agencies</p>
Legislative	<p>Residential No direct subsidies are available on national level at this time. In the near future (2016) a subsidy scheme for building complexes will be launched.</p> <p>Building codes – there are requirements but inspection (enforcement) is not sufficient to ensure compliance</p>
Financial	<p>Commercial SMEs can get financial support for energy audits</p>
Legislative	<p>EED (energy efficiency directive) (European Union, 2012):</p> <ul style="list-style-type: none"> - Firms with 250+ employees or annual revenues above 50 million euros are obliged to do an energy audit. - The directive makes a 1.5% reduction of energy use mandatory for energy distributors and retailers through energy efficiency measures. This is not implemented in Sweden as government claims the target will be fulfilled without this measure. - 3% of publicly owned buildings have to be renovated annually. In Sweden the interpretation of "publicly owned" is very narrow and only a small part of buildings are obliged to follow this.

Technology

Generally speaking the niche technologies are sufficiently developed to reach energy efficient outcomes in a cost effective manner. There is a need however to be aware of problems that can occur with the new technologies; such as harsh light from LED sets.

A lot of these innovations are produced but still are not visible in the market. An exception is the research on smart services and smart products that are related to the smart meter. These still require a lot of attention in the field of R&D. It should be an objective of entrepreneurs to become aware of their offer and how it fits in the bigger picture of an integral solution. There are technology procurement projects by STEM (Swedish Energy Agency) that develops new technology.

Scientific Knowledge

Scientific knowledge in indoor and working environment is high in Sweden. It is essential that R&D in these fields go along with new products and services on energy efficiency.

Conclusion

The Swedish market for energy efficiency is complex. It deals with different government institutions at the national, regional and local levels (vertically) and cross-cuts different agencies (horizontally). The subject is part of three government departments and even more national agencies. Furthermore it deals with different types of niches, markets and a very broad traditional system as these include the producers but also users of energy: thus everyone and every day.

Context analysis

Industry structures	<i>Key players energy regime</i> Energy retailers: fierce competition, low margins on energy: leads to the search for new business models, often more service oriented. Working with energy efficiency is a way to keep customers. ESCOs: relatively developed in some segments, but needs so develop to maintain customers.
Policy context	See table 1. "Policy Context"
Market and User practices	Energy Efficiency itself is not appealing Energy costs not perceived as painful or high; does not create urgency The use of energy is an invisible practice Lack of trust and transparency in businesses: these are key-values that firms should communicate
Technology and Infrastructure	Most energy efficiency measures are well developed R&D still plays a role, especially for smart services Integrating measures and creating value in a systematic solution still a key issue
Culture	Swedes are already "green" and generally low interest in energy efficiency. However, home owners/building owners who purchase a solar PV system and see how much energy is produced tend to become interested in their energy patterns. They start to ask questions about how they might make their solar energy "go farther". In this way the PV system installation helps to catalyse interest in energy efficiency.
Scientific knowledge	Scientific knowledge in indoor and working environment is high in Sweden.

5 Banks provide mortgages for homes and on the other hand finance loans and several projects. This means that in this sense they could have an interest in house renovations.

The Swedisch case studies

The initial longlist for Sweden contained 41 potentially interesting businesses/ energy efficiency services. The majority of these services were focused on visualising energy use for homes, buildings and industry. This overrepresentation of this kind of service is also visible in the shortlist of selected cases. There were no lighting services identified, and only one renewable waste energy.

Based on several indicators such as for example access to information, focus on delivery of a service on top of technologies, we selected the cases for further analysis. The table below highlights the selected cases.

Category of Energy Efficiency service	Name of business	Description of proposition	Success Declining - Stable o Growing +
Retrofitting	Cremab	Purchasing, selling, installing Insulation	o
	Ahlsell	Energy labeling of products (heat, electrical, ventilations etc). Wholeseller labelling directed to installers and retailers	+
Smart management systems (home/industry)	Climacheck	Third party verification and optimising of refrigeration system energy performance for manufacturers	-/o
	FerroAmp	EnergyHub system with facility smart meter controlling power electronics	+
	E-smart	Improved control of energy bills and invoicing; Energy and demand cost savings	-/o
	Humlegarden	Energy visualisation for commercial tenants. Tips for reducing energy use. Developing "digital" building knowledge bank	o
	Megacon	Developing and selling energy visualisation software/hardware	-/o
	Exibea/Eliq	Simple-to-use, home energy mapping, comparison, and tips	o/+
Total (one stop shop) solutions	Friendly Buildings	Total process from design to sell of EE homes	+
	ETC	Testing and decision support and sales of EE products	++
Renewable waste energy	-	-	-
Lighting	-	-	-

In the chapter below we provide case descriptions for each of the services.

Smart Management Services

The Story of Exibea Sweden

Exibea is a company delivering home energy management products and services. While today they primarily sell hardware to homeowners, who then receive a free, simple-to-use, energy mapping service, they aspire to create a service-driven model. That is, they would give the hardware to homeowners for free and then sell energy services for a monthly fee. They developed this product with private capital and some early financial assistance from the Swedish government (Energy Department). They also got recognised as an innovative firm, receiving a 'top Clean tech firm' award.

Currently hardware (sensors, gateways) comprises 80% of their revenue stream. With this purchase, customers receive a basic energy analysis service for free. Exibea also provides a premium service subscription enabling hands-on comparison and tips that are relevant and customised for the customer to take action to save energy and money. This service makes up 20% of their revenue stream. Once installed the customer can chose what type of feedback or alert they would like.

Their product has been on the market since 2010. The market for energy management products and services is relatively immature in Sweden, and the market for home management or smart homes is even more nascent.

Exibea would welcome more competitors to help grow the overall market, and to help them differentiate from perceived competitors like OPower, which does not provide the same level of in-depth analysis. Market development and sales are key issues and a focus for Exibea. Exibea has several thousand users. Their customer segment entails single-family home owners and row house owners. While they have successfully targeted the technology and "energy nerd" segment, this constitutes a relatively small part of the overall market in Sweden. The complexity of their value proposition may be low for those "energy nerds" or technically inclined, but it may be a complex proposition for many customers who are not as technically inclined or used to apps.

Exibea involves their users indirectly in conceptualising and innovating, through the data they gather that helps them understand the energy flows in a home. The customer actually only unlocks the value when they use the product, when they are involved and actually act on the tips provided by Exibea. Exibea furthermore uses a forum and user community (consisting of these geeks) to receive customer feedback, as well as conducts regular customer inquiries. They have an internal customer service unit that receives continuous feedback from users. As such their concretion and conceptualising capabilities are well established.

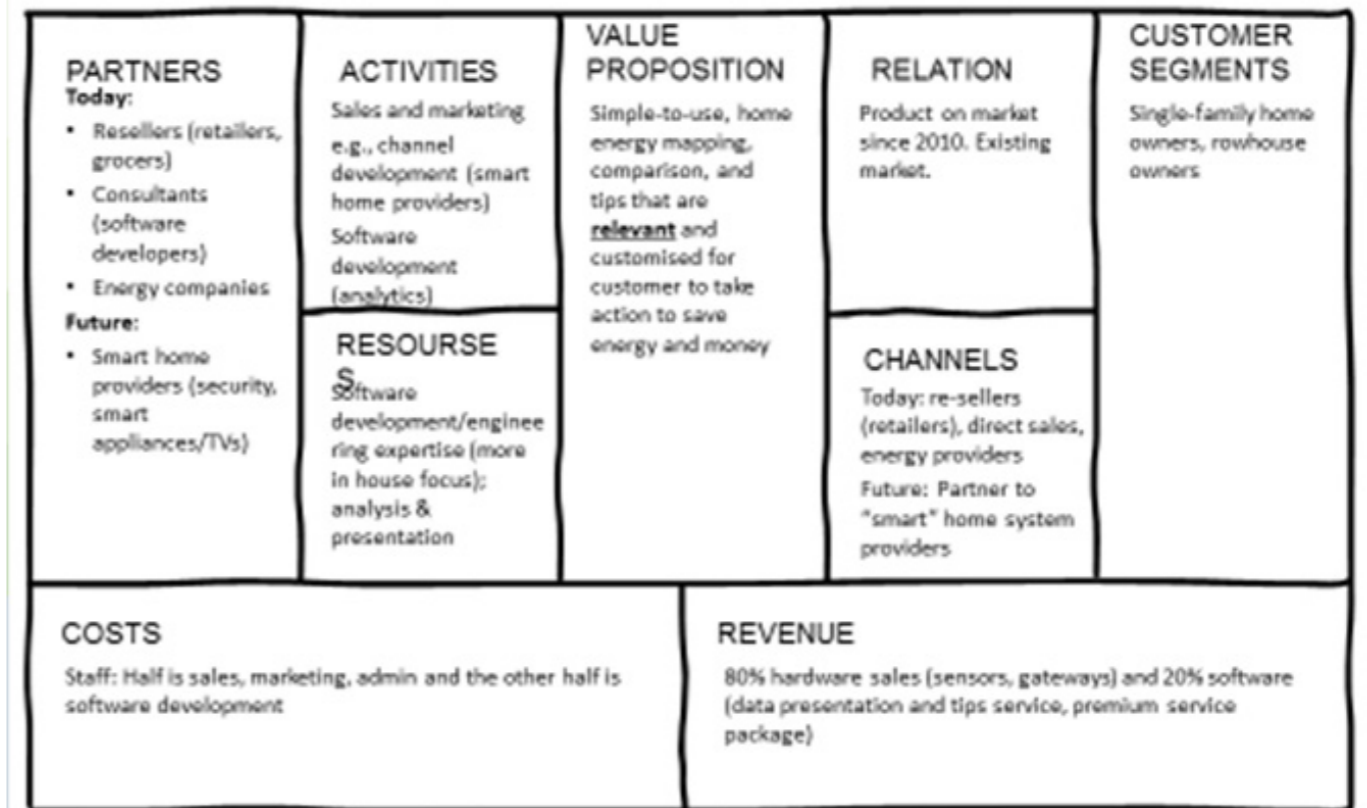


Figure 1: the business model canvas for Exibea. The canvas is based on the canvas developed by Ostelderwalder & Pigneur 2010

Based on customer involvement Exibea developed a new service (alerts), which is to be released in Spring of 2016. They developed intelligent algorithms that identify normal consumption patterns and abnormalities for every household. As such Exibea can see what is "normal" for any given household because they have several thousand users whose data they process and can compare over time. Then they can profile and compare the users based on "like" characteristics e.g., free standing homes heated via district heating systems that are located in a similar geographic area.

Exibea initially partnered with resellers (retailers, grocers), consultants (software developers) and energy companies. These partners are a resource as well and a channel to Exibea. The software development expertise resource was first mainly outsourced but Exibea increasingly focuses on getting that resource in house and develop that intelligence in house and become a really smart firm. The same applies to the expertise for analysis and visualisation of the data collected in the homes. This leads to a cost structure where most of the costs are geared towards labour (half for sales, marketing and administrative stuff, and the other half is about software development).

Exibea experienced initial growing pains and even were ready at some point to fold-up the company. But they first decided to better understand the market and why the masses were not buying their products. To do so they polled people at exhibitions, trying to understand how they think about themselves and their energy efficiency. What they found out is that indeed 90% of individuals consider themselves already very energy efficient. In addition people experience energy management as 'one more issue in my life I need to deal with' instead of as something that will make their lives easier. Consequently the Exibea products and services end up low on the priority ladder for residential customers. This is now seen as the biggest barrier facing Exibea.

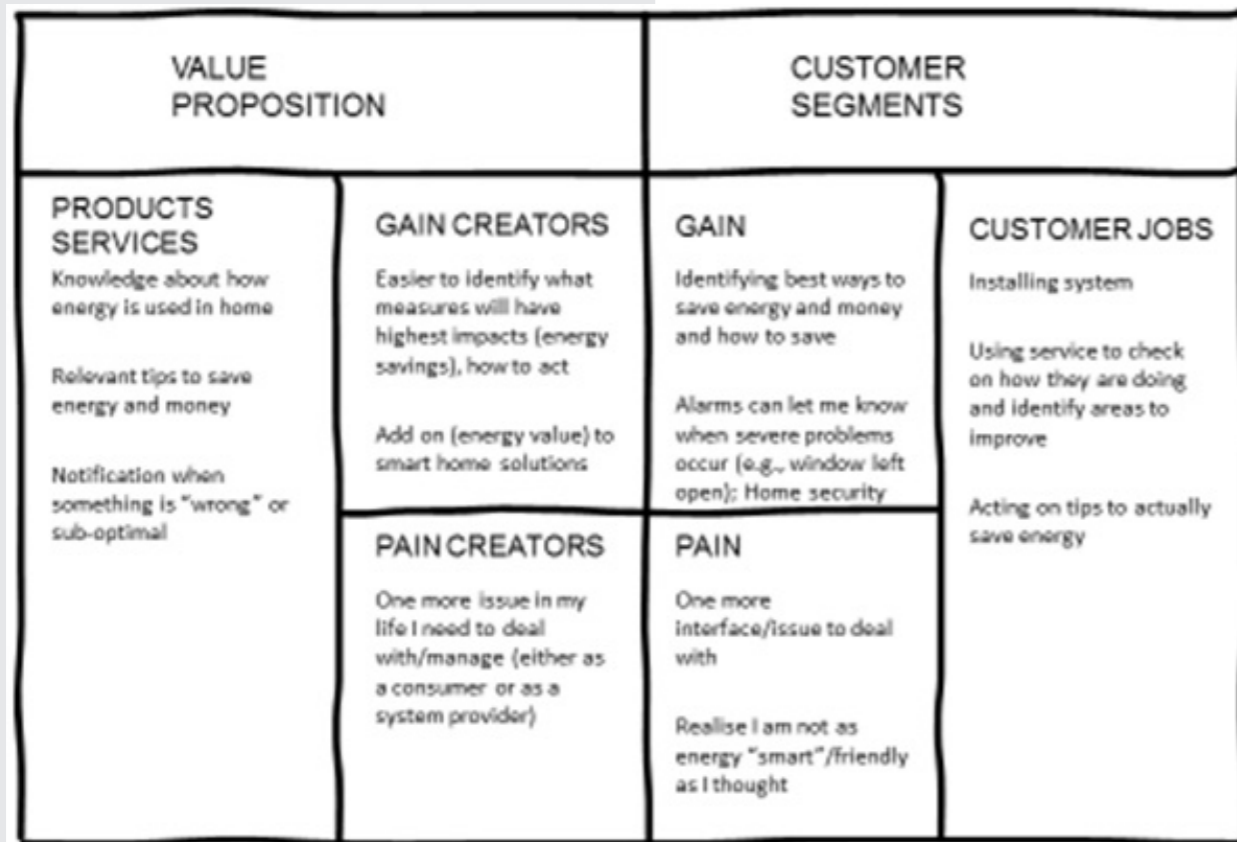


Figure 2: The Customer Value Canvas for Exibea. The canvas is based on the canvas developed by Ostelderwalder & Pigneur 2010

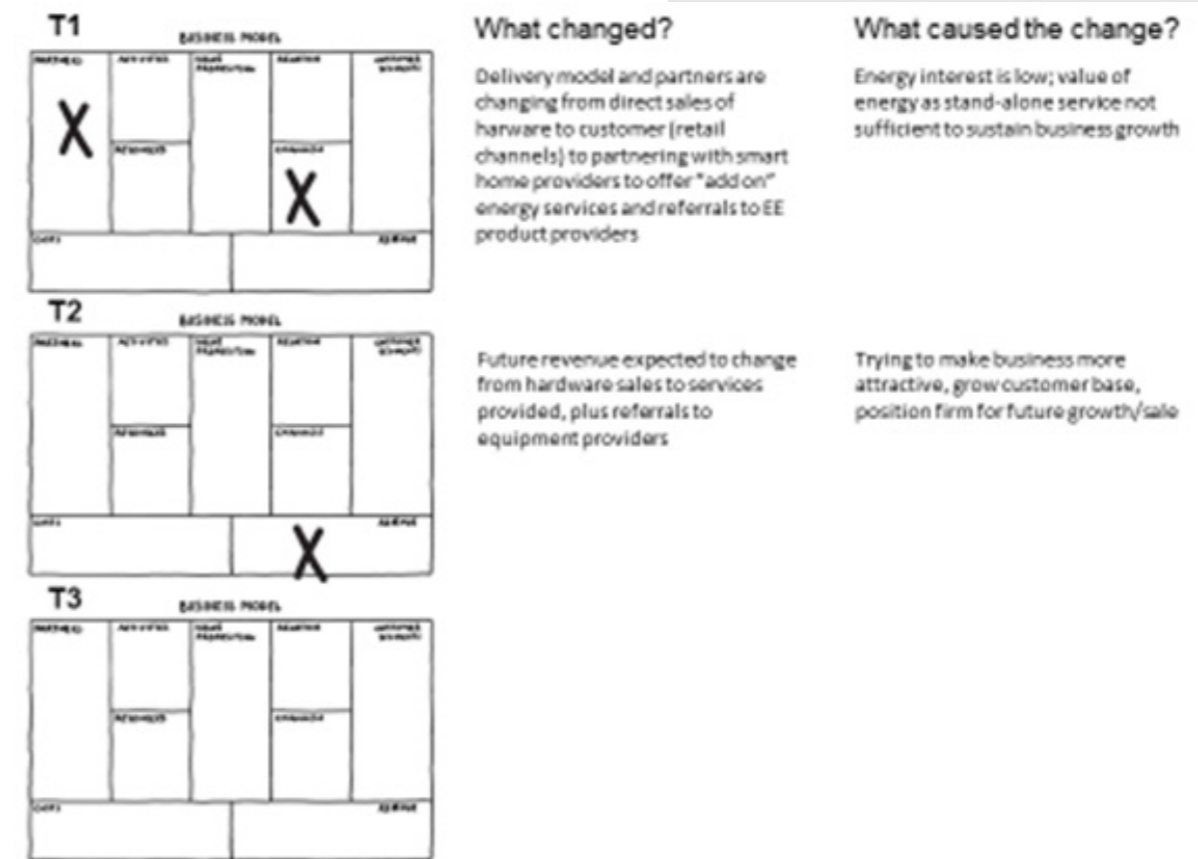


Figure 3: the entrepreneurial journey of Exibea

Given that Exibea feels they are hitting the ceiling in terms of customer base, they are exploring B2B2C models to provide a higher level of value by partnering with smart home and security providers. They are looking globally for new partners, including large companies like Samsung. They envision their energy service becoming one “app” within an ecosystem of value for the homeowner – security services, energy services, etc. Especially their ‘alert’ service would be very compatible with those home management systems as, for example, it would allow Exibea to notify a homeowner that a window was left in the winter based on abnormal heating patterns.

Exibea is also working with several utilities on a B2B2C model. The challenge is to meet the electric utility’s needs while making sure the customer is pleased. Unfortunately these needs and requirements are pretty different so that makes it

difficult. In terms of the payments, Exibea has an arrangement with a Norwegian utility company where they increase the customers' monthly fee to pay for Exibeas monitoring and energy advice service. Exibea receives a portion of the increased monthly fee.

Exibea thus wants to become a B2B or B2B2C type of company for both utilities and smart home platform partners. They are therefore now stretching the ‘intelligence’ competencies in house to orchestrate a one-voice solution to platform companies. Exibea explicitly visions that their way forward to scaling up is to become part of delivering value beyond energy efficiency. Exibea hopes this will open up the market beyond geeks and expects that the future revenue will change from hardware sales to services provided, plus referrals to equipment providers.

The Story of Climacheck Sweden

Climacheck is a cleantech company active mainly in Sweden but also in Europe, as well as in the USA, Australia and the Middle East. Climacheck offers a method for analysis of cooling and heating processes, with the objective of optimising the functionality and daily operations of heat pumps, refrigeration and air conditioning equipment and systems. The market for fault detection and diagnostic systems is moderately new in Sweden and growing though some firms have been working in this area since the 1980s. The value proposition for measuring actual performance of equipment and systems is complex, and not well established even in Sweden. Some large owners like IKEA include monitoring and diagnostic systems in system procurement, but most do not. ClimaCheck would welcome new competitors to help grow the value proposition and entire market for fault detection and diagnostics. There are only a few “real” competitors, although several large firms claim that their services do what Climacheck’s does.

Like so many of the companies we analysed, Climacheck was founded by an engineer who experienced a technical need. In this case the entrepreneur worked with heat pumps and found that there was no tool available to measure the actual performance of the heat pump. He developed this tool, patented it and in 2004 he build a company around this tool. ClimaCheck is in a way a “hybrid” business. They sell or rent their energy monitoring products and systems to OEMs or other industrial/business customers. They also work as consultants to analyse refrigeration systems and identify faults (problems). And, they sell an ongoing monitoring service as well. ClimaCheck purchases all hardware from third-party suppliers, which they then assemble and test internally before selling. The hardware is customised, standard products. It allows ClimaCheck to cost-effectively provide PC-based and cloud-based monitoring services to customers

ClimaCheck’s clients include owners, contractors, consultants and manufacturers of all types of air conditioning and cooling systems in industries like the food industry and the retail sector, properties and buildings, and manufacturing. The company is growing slowly with 600+ systems installed in over 20 countries.

Climacheck is a micro company consisting of 5 employees, but explicitly aims at developing strong partnerships with partners that can act as

resellers or referral partners and act as channels as well. Therefore Climacheck aimed to partner with local distributors and installers, consultants and hardware suppliers. Initially the company believed that the consultants or entrepreneurs selling/installing the refrigeration or HVAC systems would partner with ClimaCheck to increase the quality of their services, or enhance their services with energy efficiency and monitoring services. However, this has not been the case. These firms do not want to install a monitoring system because it can expose flaws in the products or installation services (their livelihood). In addition, it would cost them time to revise/re-write previous bids (i.e., to include specifications for monitoring) for which they are not compensated.

In a parallel movement, given the contextual problem that performance checks are not mandatory, Climacheck aims to motivate potential large end-users such as large real estate companies) to think about how to include performance monitoring in their procurement. The value proposition revolves around the technical functionalities and outputs of the tool such as increase, and sustain, efficiency, reliability and lifetime of refrigeration, air-conditioning and heat pump systems through optimization of performance. ClimaCheck’s solutions are said to increase energy efficiency considerably, and often lead to energy savings of 10-40%. The World Wildlife Fund checked Climacheck and estimated that the tool, when used as a maintenance tool in the air-conditioning market would achieve substantial emission reduction.

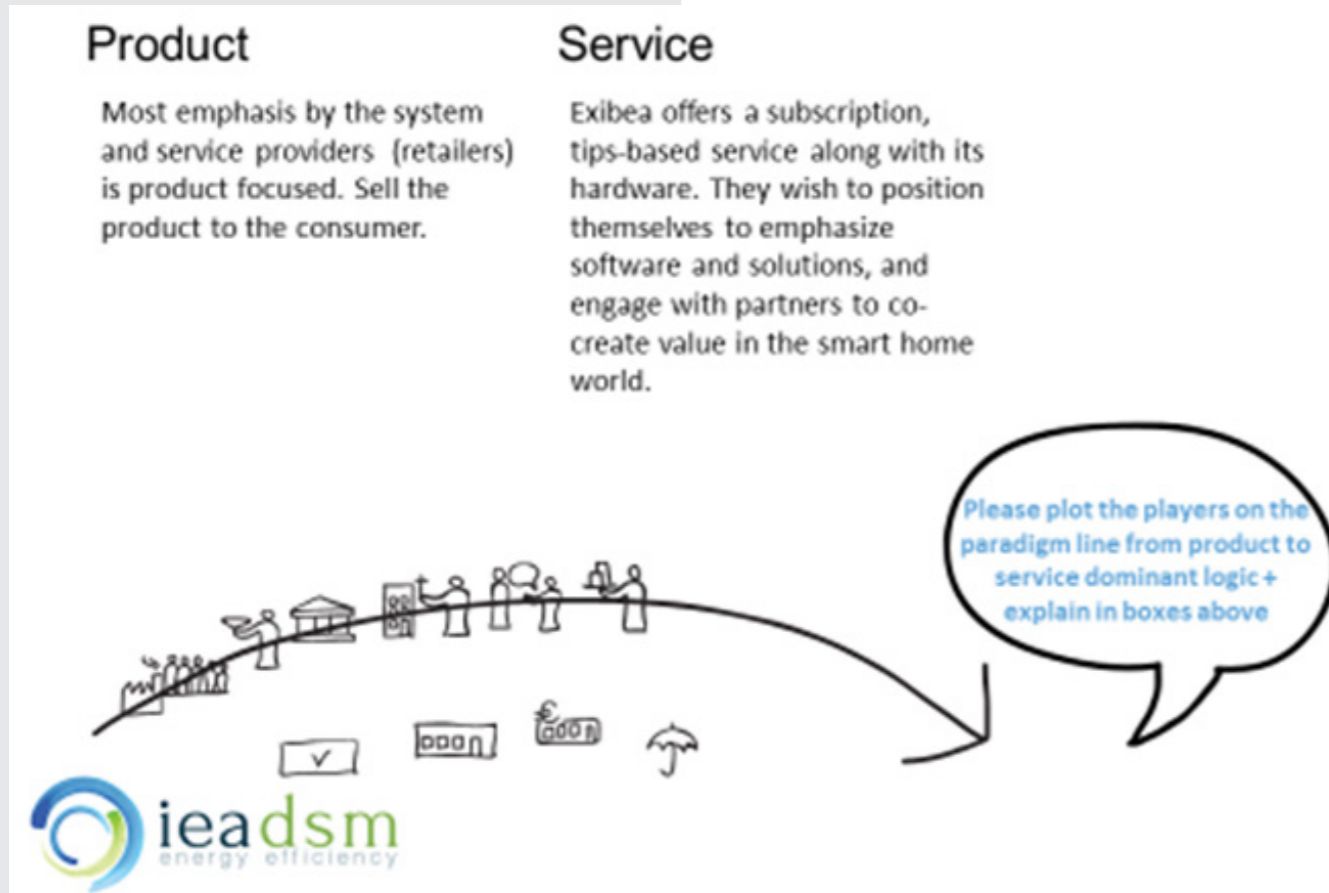


Figure 4: where do Exibea and her stakeholders stand in the product versus service paradigm?

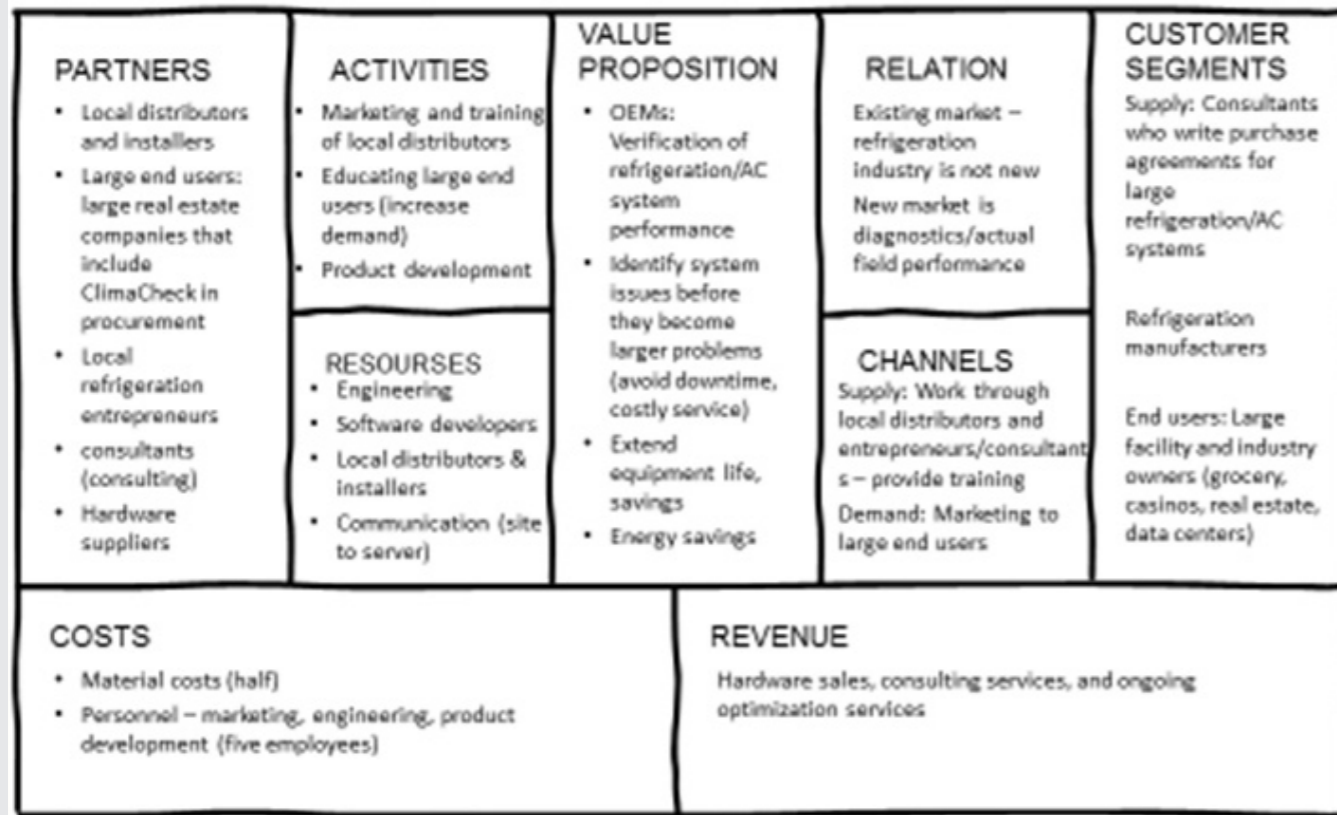


Figure 5: the business model Climecheck. Template based on Osterwalder and Pigneur (2010)

The activities of Climecheck revolve around on the one hand product development, but lately Climecheck also aims at developing its partners explicitly as resource, and trains them in the use of its performance monitoring tools. The resources reflect this dual strategy, and resources include engineering, communication skills and software developers on the one hand, and on the other it includes the local distributors and installers. The cost structure of the business is very traditional, with almost 50% going to materials and the remaining half to personnel, marketing and product development. The revenue structure demonstrate a slight shift toward services, with consulting and constantly ongoing optimisation services accounting for 20% of the revenues. The owner does not feel the need to make a lot of profit but the company does need to make sufficient profit to cover the costs. The owners is in it for the technology and its development.

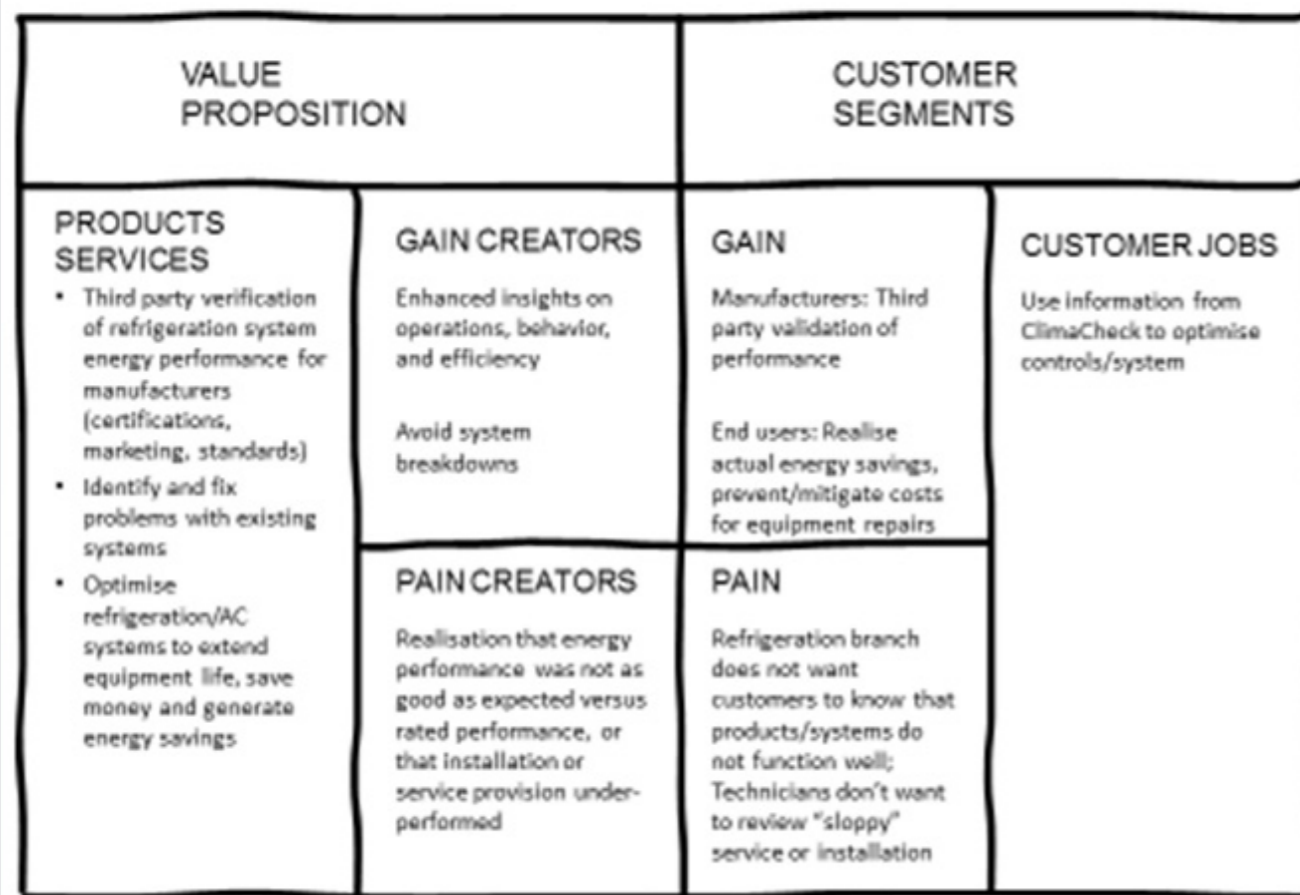


Figure 6: Customer value canvas Climecheck. Template based on Osterwalder and Pigneur (2010)

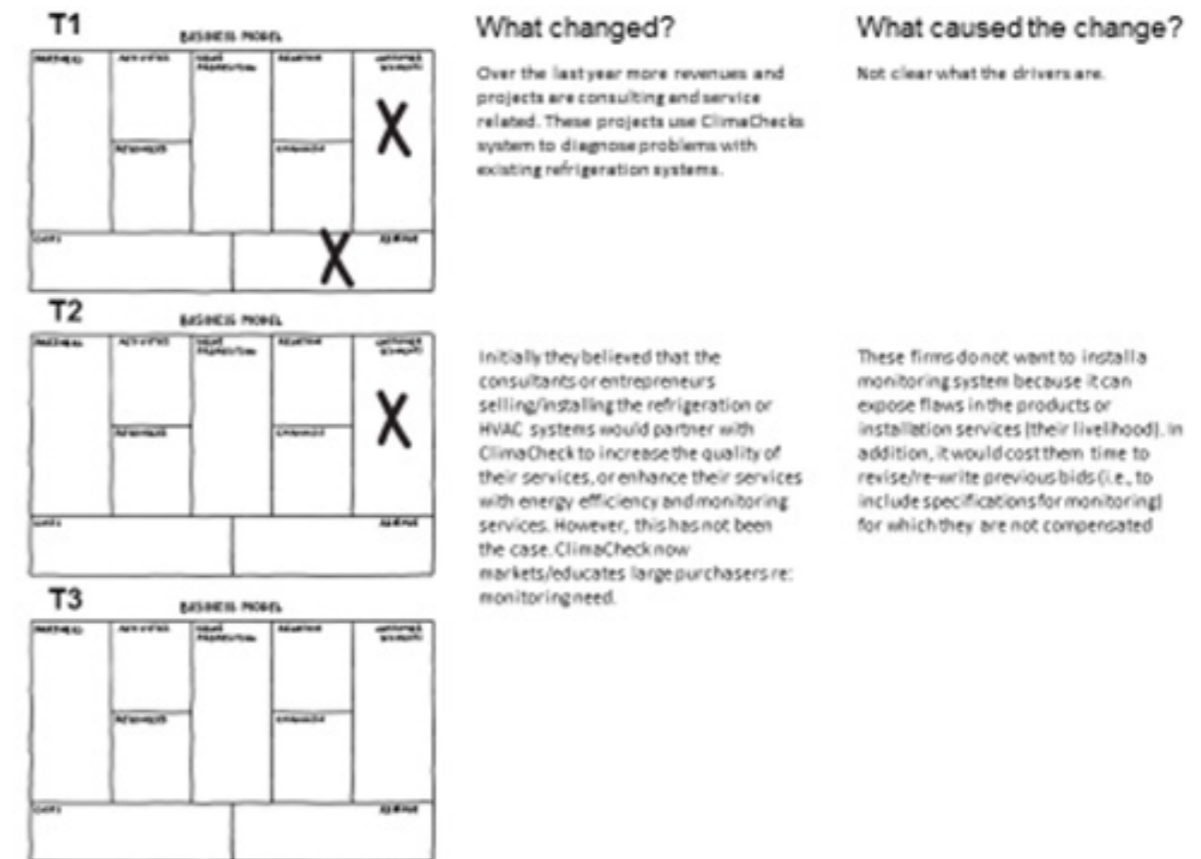


Figure 7: the entrepreneurial journey of Climecheck

ClimaCheck is clearly very technically competent and good at sensing technical options but capabilities necessary to develop the sensing of user needs lack. Sales and marketing prowess and capacity is lacking. They have tried twice and not been able to attract a capable person to take on this position. The owner has a lot of engineering and technical expertise, but is not sales or marketing focused or interested. ClimaCheck is not innovating its product radically or developing completely new products, as such the conceptualising capability is limited as well. ClimaCheck does explicitly aim at orchestrating with its attempt at aligning the resellers and referral partners to act as middle actors between the tool and the clients who do not see the value of the tool. Scaling is not very strong, and stretching in the sense of building the company around services, including for example a focus on setting up a sales and marketing division have so far not been successful. ClimaCheck does try to be user "mindful" or oriented in the sense that they hold trainings and webinars to build competence among the users of their software and products. They also try to work and educate larger customers about why diagnostics are important. So from that standpoint they are user centered, but it is a one-way 'educating' of the user approach, instead of collecting user needs and developing the product and or service in response to these needs.

The Story of Megacon Sweden

The Swedish company Megacon was founded in 1984 by a very technologically passionate engineer and started with products aimed at earth leakage fault detection. The founder has a technical background in electronics and electrical safety. He started Megacon in 1984 with a focus on improving electrical safety in buildings and industry. There were problems at that time with transients and they developed products to help control potential electrical safety problems. The firm developed through the 90s and became energy focused when new technology was introduced in 1992 to remotely "read" meters. This was a commercial decision, not an idealistic one. Peter introduced Megacon to the stock market in 1997, when it was anticipated that the whole market would open up to use and sales of hourly energy data. Then in 1998 politicians stopped the development of relevant regulations and essentially took away the market opportunity. Since then the firm has operated on a small scale, focusing on industry and commercial markets.

In time Megacon bought another company Enercom (England) and invested in developing a visualisation software platform to support the hardware. Since then they sell hardware (loggers) and software (energy visualisation) to business and industry customers. Megacon is a small company with a few employees.

Megacon distributes its offer also internationally, not only in Sweden, and works with resellers or distributors in the UK, Germany, Estonia and Finland.

Megacon partners with technical partners such as metering manufacturers such as ABB, electrical contractors and installers and energy consultants and explicitly aims to develop these partners as new distribution partners in the face of a static market uptake. In Sweden system providers wield a lot of influence because they are packaging Megacon's products and services with other things and selling projects to the customers. Marketing and sales to those actors is important for Megacon. In terms of activities and resources the company is very clearly on the product dominant logic side of business development. Activities are focused on developing and selling the hardware and software, and resources consist of marketing and sales and software developers.

Cost and revenue structures are traditional with software and hardware related costs and personnel costs, and revenues consist of one-off sales of hardware and software. The software however holds the potential to become part of a service offering around visualisation and energy management. There are competitors such as Schneider Electric and Siemens on the industry side. And there are other competitors serving the commercial real estate market.

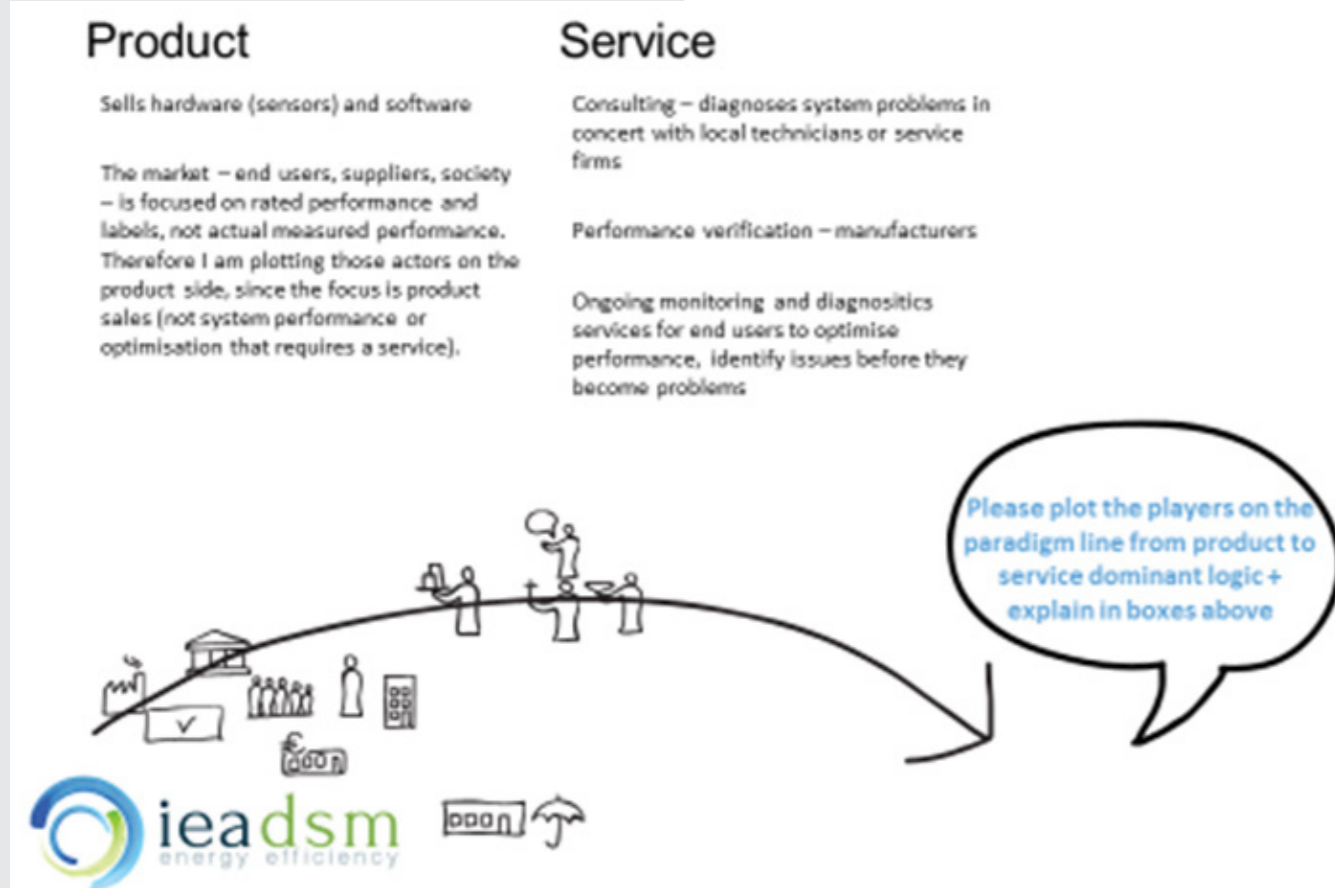


Figure 8 where do ClimaCheck and her stakeholders stand in the product versus service paradigm?

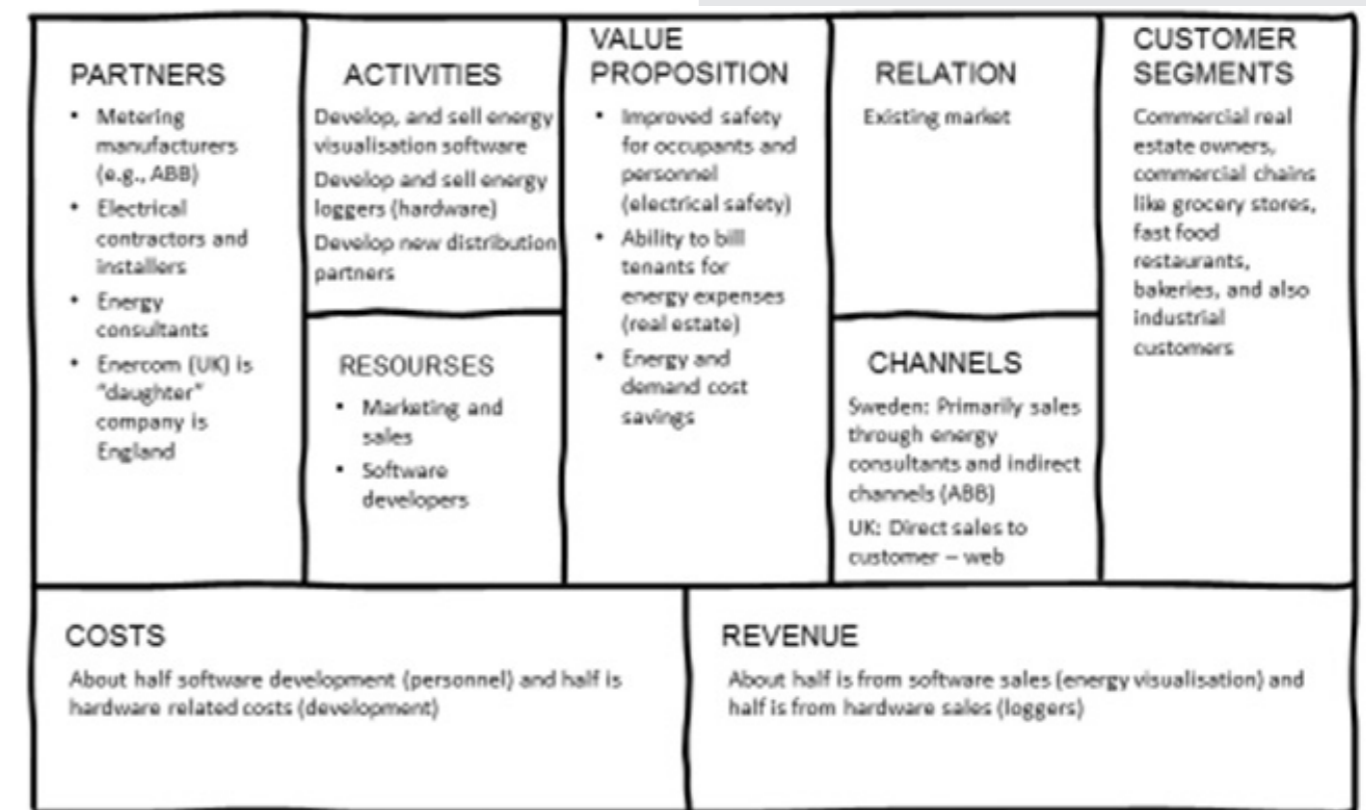


Figure 9: the business model canvas of Megacon. Template based on Osterwalder and Pigneur (2010)

The value proposition Megacon offers is diverse, for a diverse set of potential clients. Commercial clients can get improved electrical safety in their buildings and processes. Real estate companies purchase Megacon's products (meters and loggers) primarily so that they can bill their tenants for energy. And in principle the offering can also support energy and cost savings. For some customers the proposition is straight-forward. For example for the real estate companies which purchase Megacon's products to bill their tenants for energy. For other users the value proposition can be a bit more complex – energy management/visualisation as an enabler for cost savings. The companies need to be willing to devote some attention to energy and dedicate someone to act on the tips and information provided.

In Sweden Megacon sells products and service through an established network of energy consultants, electrical consultants and distributors. They do not work directly with end users or customers in Sweden. In England the market works differently. Megacon's sister company Enercom works directly with end users in the UK. Marketing and sales is considered important by Megacon and they do see that more sales is needed to expand or grow market opportunities, but new salespeople are expensive. Megacon seems to have mainly technically oriented staff (electrical engineering, software development). There is relatively low customer/end user involvement in Sweden as Megacon works with distributors and consultants to sell its products and services (not with end users). Megacon is good at sensing technological options and issues, but the capability of sensing user needs is less well developed.

The value proposition is very much stated in technical functionalities and standard offers around energy and cost savings, but Megacon experiences difficulty selling this proposition. Instead of performing activities aimed at understanding their clients, they prefer to focus on developing reseller channels. They also demonstrate a fairly passive attitude with respect to engaging customers on the software (service) side. Customers who are already engaged use the software and take advantage of the service; those that are not engaged do not use the service/platform often. The conceptualising capability is not strong, with little true and more radical innovation in the respective fields. Megacon does try to orchestrate her offer, but not so much herself, as through development of a reseller or referral system. Finally, stretching capability, focused on branding and making sure the company is developed around the user and the service is not developed strongly, in spite of the potential for this with the visualisation software and data available to them about the use phase. The company remains largely oriented towards a one-off purchase. Scaling is a real issue, the market uptake poses serious challenges.

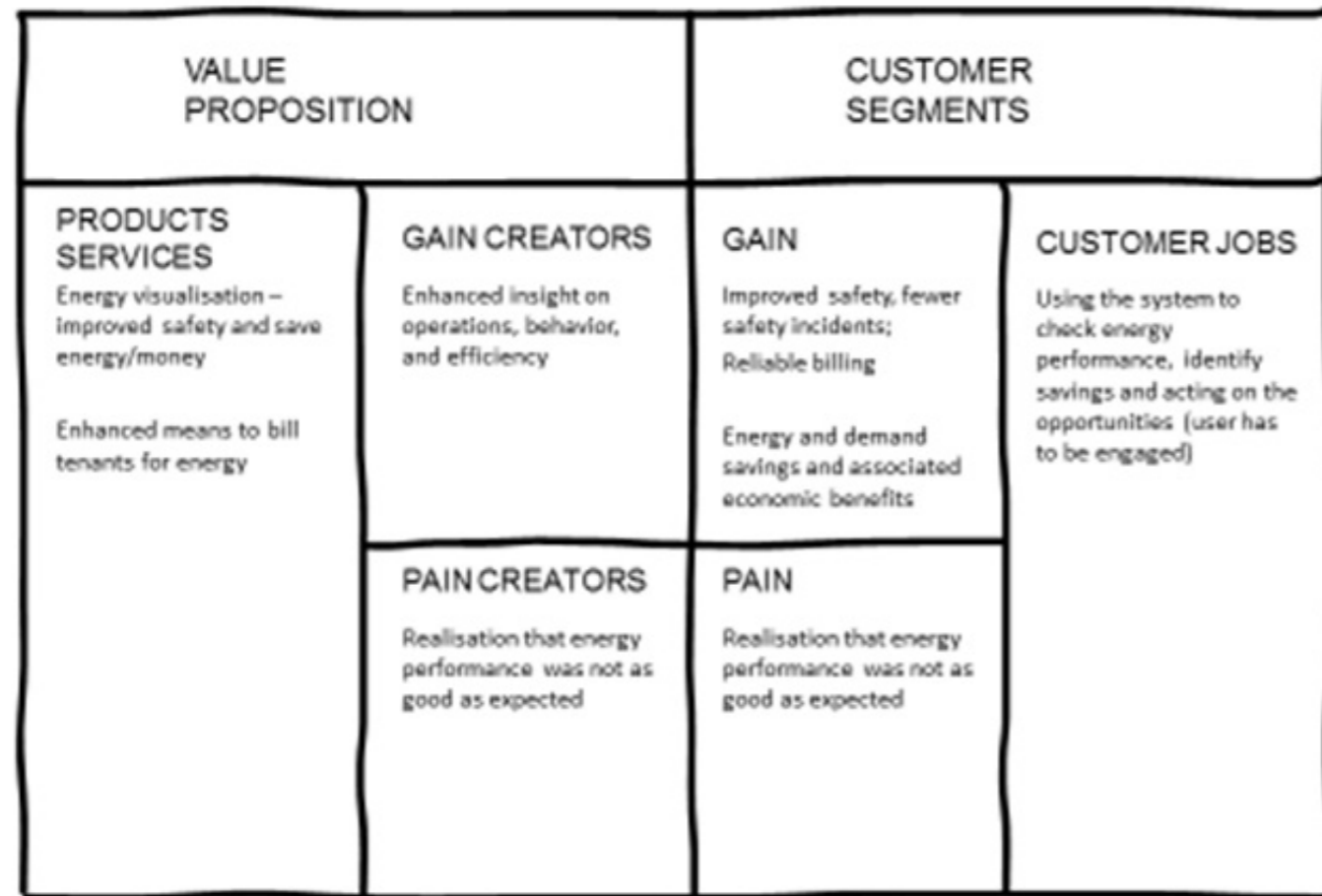


Figure 10: the customer value canvas of Megacon. Template based on Osterwalder and Pigneur (2010)

Product

Megacon is largely a product focused business selling meters and loggers.

Service

They sell a visualisation service along with their products. The revenue (income) is based on the number of meters installed and monthly bills.

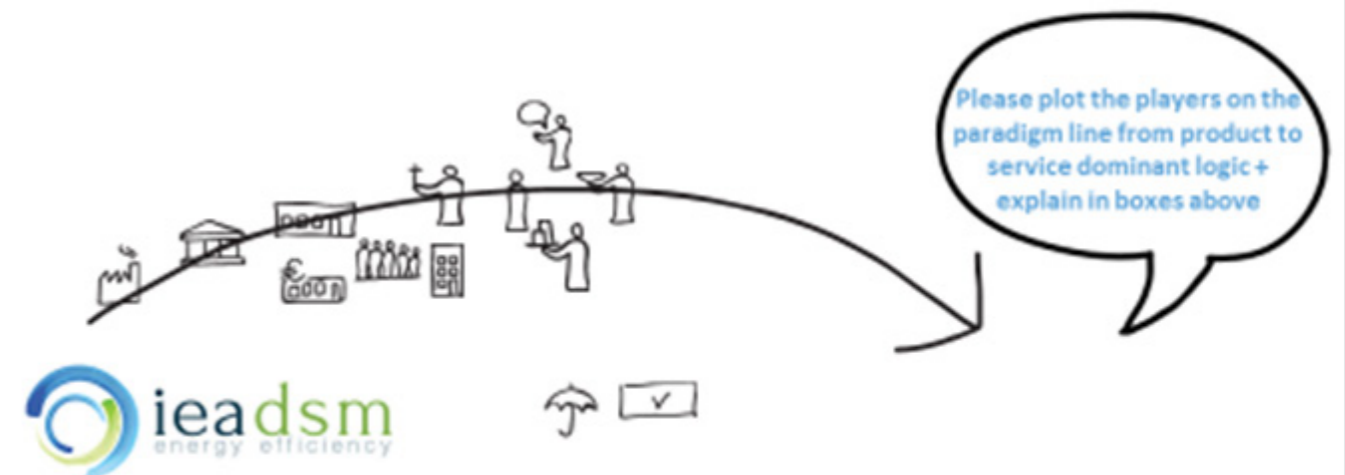


Figure 11: where do Megacon and her stakeholders stand in the paradigm shift from product to services?

The Story of eSmart Sweden

eSmart is an independent, private company owned by a serial entrepreneur, a one person firm. The founding entrepreneur has a strong love for sensing and visualization technology, not necessarily energy related. The firm received start-up capital from two public/quasi-public entities: ALMI (provides subsidised loans and business support) and Jönköping Business Development. Today the company has no outside financiers anymore.

eSmart has two different markets both B2B: 1) businesses or other end-users who can lower their energy and demand costs (these are Swedish business customers), and 2) electricity network operators who can use the real-time feedback to help manage the electric grid (Polish energy company). What eSmart offers as value proposition is very technically oriented and closely linked to the functionalities of his technology. One group of customers get improved control of energy bills and invoicing, with the potential accompanying energy and cost savings. The energy company clients get options for demand response and management. What eSmart does is installing a meter that reads utility meters through a pulse. A telecom account is set up, the data transferred, analysed, and returned to the customer, in a visualised real-time manner.

There are many competitors out there offering visualisation services. eSmart considers its real time (1 second) feedback to be the differentiating element because it allows customers, especially the industrial businesses, to see what is happening with processes in a granular way.

To be successful in offering this proposition eSmart partners with software developers, energy consultants that help resell the product, and are a main channel next to direct sales. In the beginning there was cooperation with a large Swedish group (the Swedish Energy group) that leveraged their energy historical visualisation platform for eSmart and now incorporate and sell eSmart products as well. He worked with partners early in the firm's development to develop and co-create the business model. In recent years has driven the firm himself.

The main activities of eSmart consist of developing and installing sensor and metering devices. Cost structures are fairly traditional with operation costs, software development. The revenue system is slowly adding revenues from service agreements, but most of the revenues consist of equipment sales.

The company has reached a ceiling. eSmart has a couple of hundred established customers.

But after a sales partner left the company is driving in cruise control, has a passive stance towards scaling up and stretching is not relevant considering it is a one person firm. eSmart has a hard time developing contacts and partnerships in Sweden. The owner does state he wishes he could find and hire a good salesperson. The firm lacks sales and marketing (entrepreneurial) skills. The company furthermore identified the need for a vision and a goal where her platform can be enabling, to increase the value for customers.

eSmart sends periodic reports to customers on how they are doing and where they can improve, and there are yearly calls to check in. The company is by default focusing on the use phase of the product, analysing the energy use of customers and providing feedback periodically. As such one could argue that the company is indeed focused on the user. On the other hand, the users are not involved in any co-creation of the hardware but the software is continuously adapted in reaction to feedback from users. As such the conceptualising capability is developed to some extent. The feedback is however not systematically and explicitly collected which leads to the conclusion that the sensing user needs capability is not strongly developed.

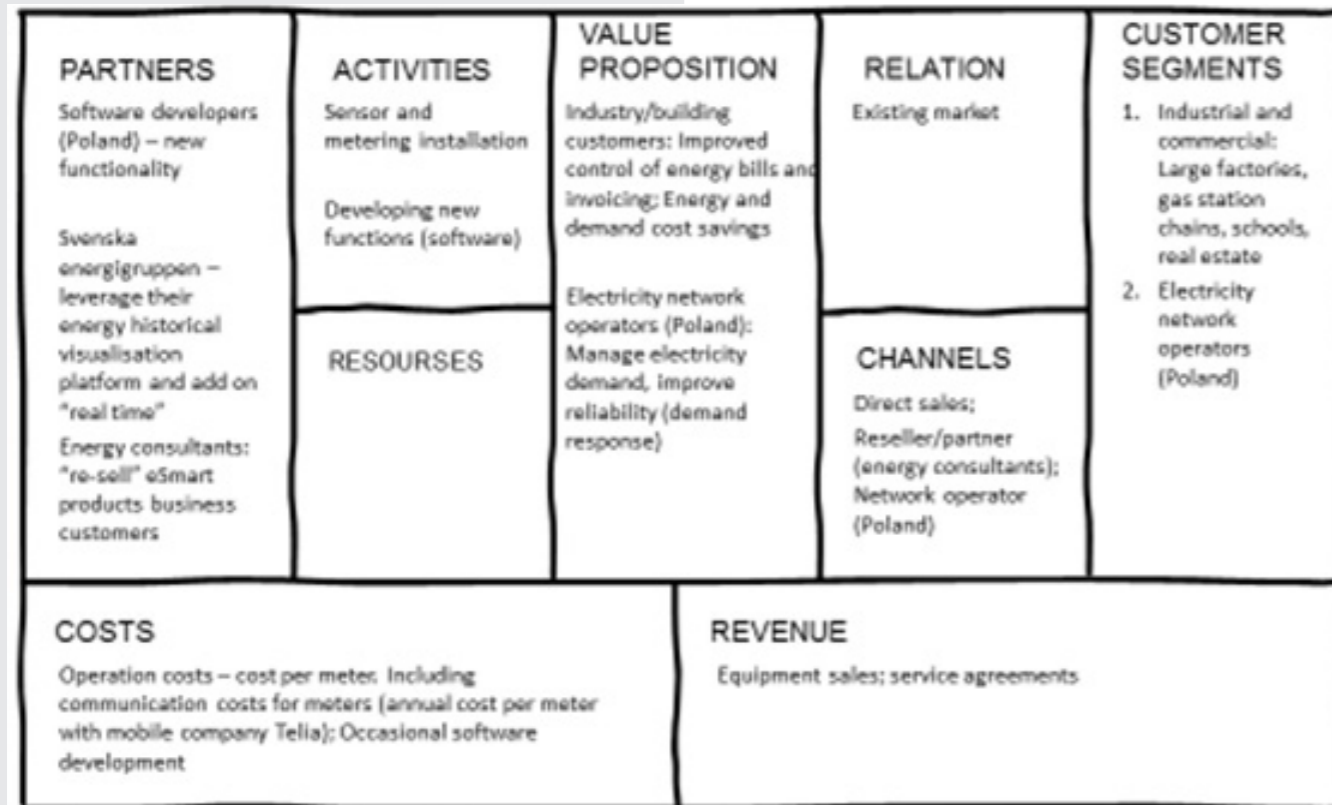


Figure 12: the business model E-smart. Template based on Osterwalder and Pigneur (2010)

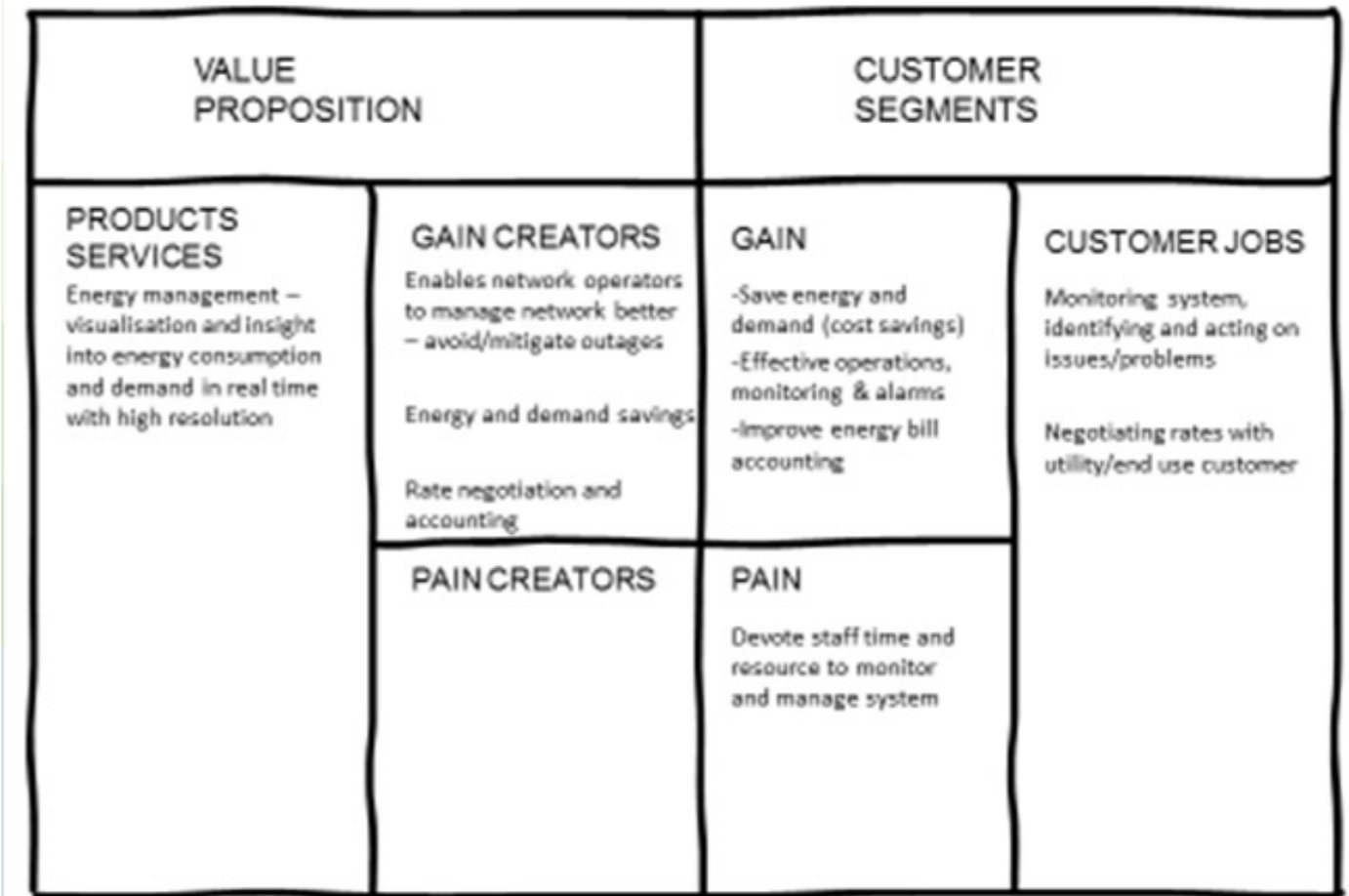
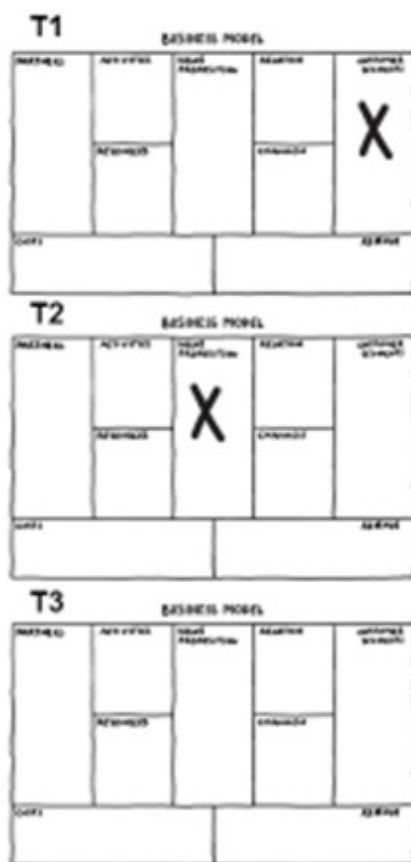


Figure 13: Customer value canvas E-smart. Template based on Osterwalder and Pigneur (2010)

As for the orchestration capability of acting as one voice in delivering a user experience, the company's capability is a little unclear. There is orchestration going on, but it is to clients sometimes unclear where eSmart begins or ends and other partners end or begin. For example, eSmart does work with some consultant partners who assist customers without energy managers to lower their energy use based on the feedback provided by eSmart.

One of the biggest challenges eSmart faces is that it is difficult to maintain the customer's interest. There must be an energy champion or manager with strong interest or financial interest available and responsible to motivate improvement over time. If that champion leaves then energy monitoring/management or interest in the system likely disappears. The CEO anticipated that visualisation and feedback would be more readily understood and valued in the market. Learning that the value proposition is not necessarily evident, or straight-forward is a setback and the company has yet to reposition for growth. At the moment eSmart is focused on supporting existing channels, but has "given up" looking for new customers and new channels. The development of the energy network clients in Poland was the result of a coincidental encounter, not of active positioning.

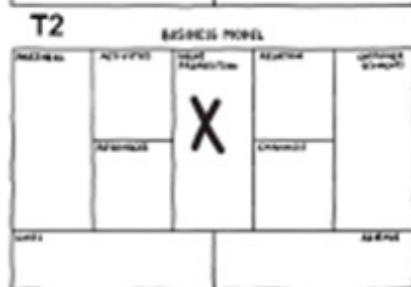


T1

What changed?
A coincidental encounter through Polish contacts led to business with an electricity network provider in Poland, which was a new customers segment

What caused the change?

Coincidental encounter plus high-resolution (real time) feedback provided by system is strength in use for grid monitoring and demand response



T2
What changed?
For network operators the value is monitoring network reliability and communicating to partners (industrial customers) to reduce demand in times of need

What caused the change?
Coincidental encounter plus high-resolution (real time) feedback provided by system is strength in use for grid monitoring and demand response



Figure 14: the entrepreneurial journey of E-smart.

Product

The supplier of the metering equipment is product oriented
eSmart is focused on selling its products through partners, and also in selling the ongoing service to customers. The service is sold as a subscription.

Service

Some partners, such as energy providers (Borlange Energi), are more service focused. They emphasize focusing on customer engagement (schools, businesses), helping them visualise consumption and save electricity. The emphasis here is more on the communication and relationship, with the product as a tool.



Figure 15 where do E-smart and her stakeholders stand in the product versus service paradigm?

The Story of Humlegarden Sweden

Humlegarden is a leading private real estate property owner and management company, based in Stockholm Sweden. Their aspiration is to be a leading, local provider of commercial real estate in Stockholm. As part of their environmental and climate goals, they provide tenants in their properties with an application, called Green Fingerprint. Humlegarden maintains an internal operations department and staff that manages building operations. Along with the Sustainability department, Humlegarden's operations team provides the Green Fingerprint application and service free-of-charge to tenants. Humlegarden does so for multiple reasons, a corporate mandate to save 2% of energy annually in the real estate they own is one driving element, but Green Fingerprint is also a selling tool, a differentiator maintaining a competitive edge towards other real estate companies in this high end segment where competition is not so much on price but on operational quality and servicing.

Green Fingerprint is a visualisation platform for commercial tenants such as law firms, retail, restaurants, to view energy consumption and identify areas for savings. This application supports both Humlegarden's and the tenants' sustainability efforts (e.g., CSR reporting).

Real estate management is certainly an existing market. In Sweden, a competitive one at that. However, providing tenants with energy visualisation and efficiency services is a newer opportunity.

Certainly there are competitors for Humlegarden, though it is not clear how many other real estate firms provide tenants with this type of free service. Probably not that many.

Green Fingerprint collects a lot of data about usage patterns, and Humlegarden does not want and cannot be storing and analysing all of that data. That is why they cooperate with Mestro, a data handling and storage business. The application itself was developed in close cooperation with Schneider Electric, and it buys the submetering products from ABB, a manufacturer. Apart from these parties Humlegarden has no partners. The main value proposition that Humlegarden is delivering to its tenants is high quality real estate. The energy application Green Fingerprint is used to offer tenants support in identifying potential energy savings, identify energy use trends and progress towards saving goals, improve safety with fewer incidents, improve reliable billing but also allows these tenants to use the application to report back on their environmental and sustainability efforts to investors and other stakeholders. In that way the value of Green Fingerprint is partly the same for Humlegarden and its clients (tenants). With this value Humlegarden aims to build goodwill amongst its tenants and potential new tenants, an important asset in a highly competitive commercial real estate market in Sweden. Goodwill and avoided churn is the revenue Humlegarden gets out of this. The costs include mostly the metering equipment and its installation, and the ongoing data processing and storage.

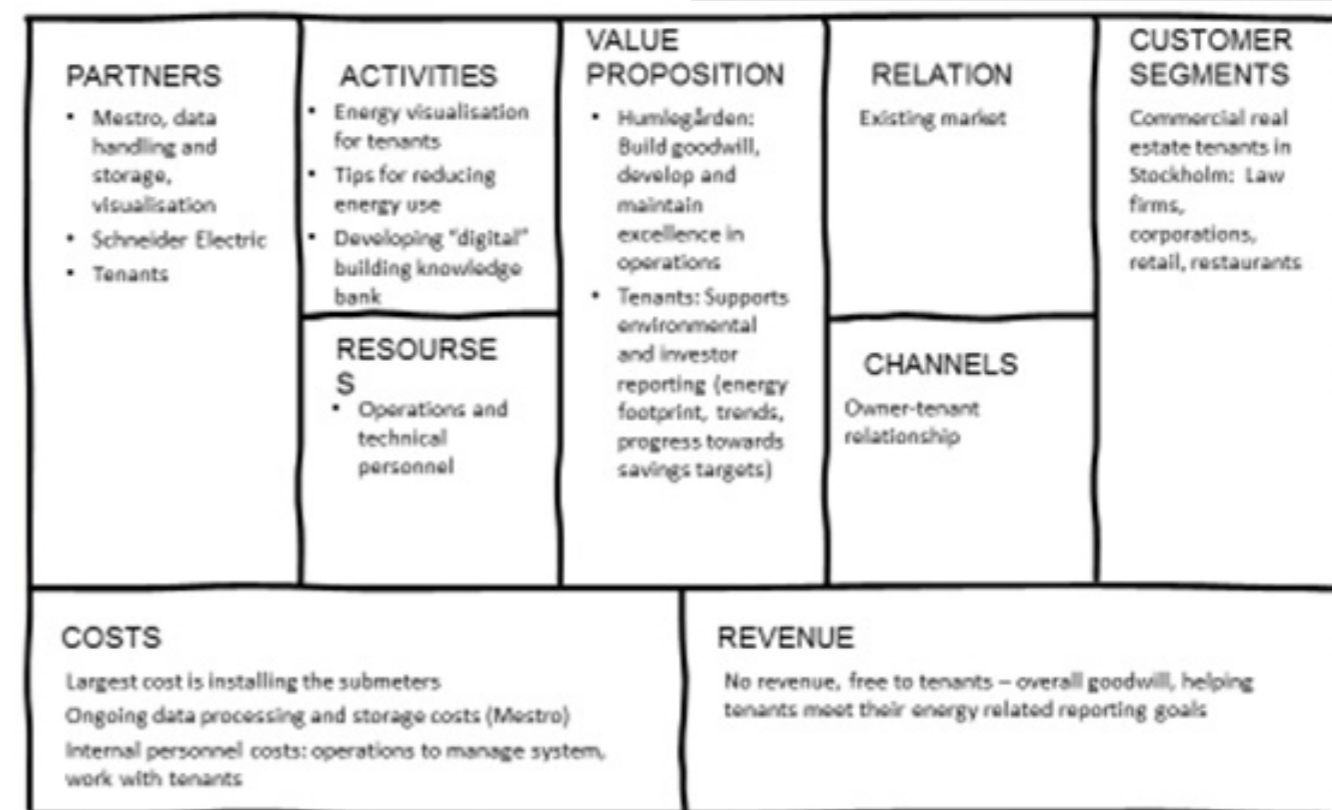


Figure 16: The business model canvas of Humlegarden. Template based on Osterwalder and Pigneur (2010)

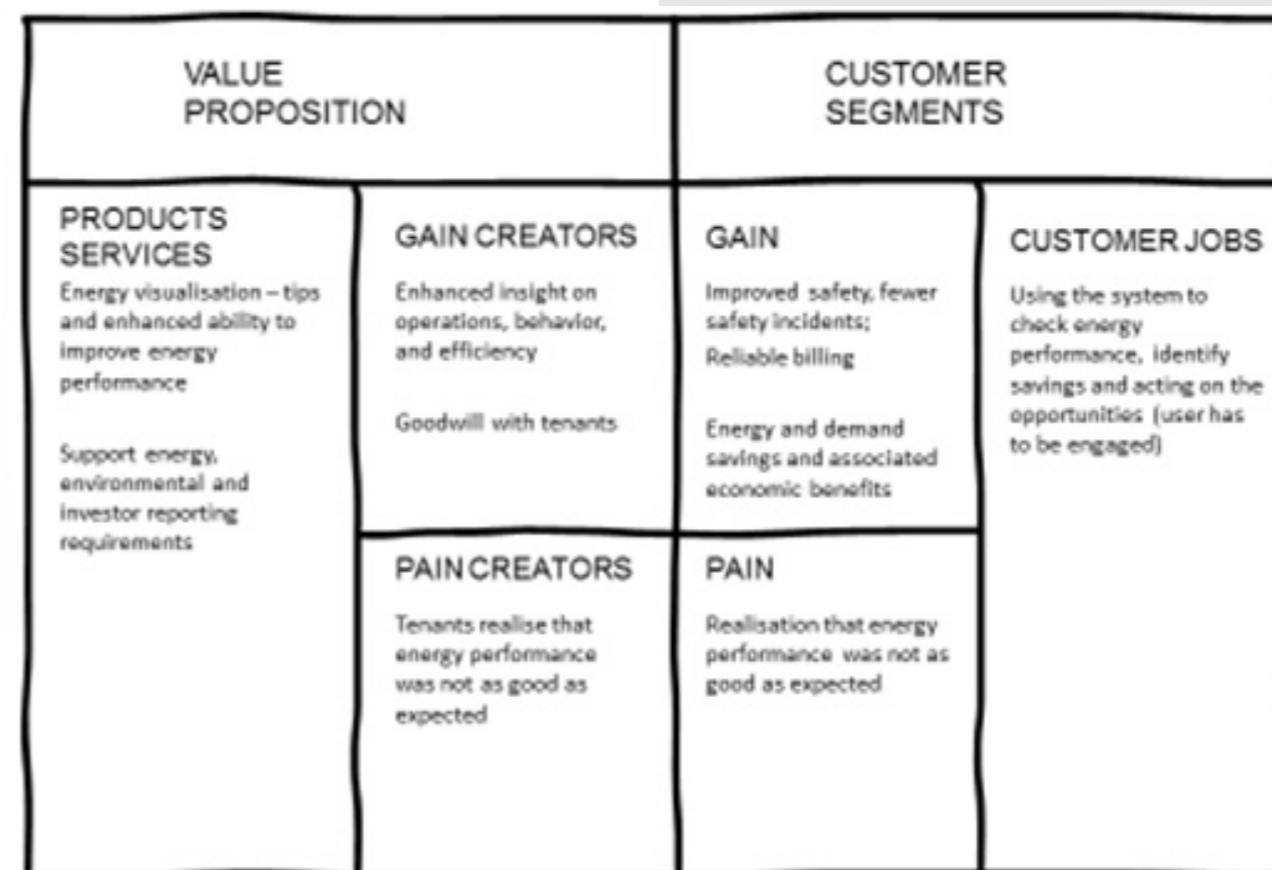


Figure 17: The customer value canvas of Humlegarden. Template based on Osterwalder and Pigneur (2010)

To develop and maintain this Green Fingerprint service Humlegården maintains an internal operations department and staff that manages building operations. Humlegården's operations staff must also engage with tenants around the value and benefits of using the Green Fingerprint application, for example in the training sessions and or personal introductions, which requires sales and marketing and communications skills. Humlegården outsources the skills necessary to do the metering, data collection, software platform for visualisation.

Humlegården is quite attuned to its clients and is proactive in engaging with tenants in support of tenant sustainability and energy efficiency efforts. Humlegården seems intent to maximize the use of Green Fingerprint by its tenants wherever they have installed the sub metering infrastructure necessary to support the application. They engage the tenants and provide training to stimulate use of the app.

On the other hand, Humlegården does not involve tenants in a formal way in decisions about where and how quickly to expand sub metering. These decisions are made by the Board. There is some co creation with the partners Mestro and Schneider to provide this service. However, the tool was not developed with tenants, they are only engaged in the use phase, and only as a receiving party.

Not all of Humlegården's buildings and therefore tenants have disaggregated sub metering, only 40% is outfitted with this necessary equipment. There is however no ambition within Humlegården to also upscale to the remaining 60%. Certification plays a role because of CSR reporting – Green Fingerprint supports CSR reporting for tenants.

One can conclude that Humlegården is very much service focused in terms of providing real estate and associated services to tenants. Green Fingerprint is one service provided to tenants. In terms of context, the partners, except for Mestro, are clearly product oriented.

The Story of FerroAmp Sweden

FerroAmp is a private company based in Sweden, established in 2010.. FerroAmp entered the market as a solar product selling company. It has an established network of partners and providers in the solar business, which seems to be a product-centric business (i.e., sell the system to the customer and then be done with the transaction). FerroAmp has an existing, product-centric business where they sell EnergyHub to customers or service providers with solar PV installations. This business model is fairly straightforward and accounts for the majority of their revenue. It fits within the current solar provider "type" business models and frameworks. At the same time FerroAmp sells services to end users, and is actively seeking new partners who can help it grow these services and create a larger energy and power management value proposition for businesses (real estate). The firm seems to be more commercially focused in its ambition (growth). EnergyHub has many functions – inverter, storage system, energy and power management system which makes the task of identifying competitors difficult.

FerroAmp's aspiration is to become a service-oriented company, working likely with and through larger partners to help business customers optimise energy and demand usage over time.

The ambition is that EnergyHub becomes an energy and power management platform that extends to many different aspects of energy value, including solar generation, energy storage, smart metering, energy efficiency, electric car charging, backup power (uninterruptible power supply), and micro wind/hydro generation. The business model for this type of service-drive model is still in development. FerroAmp is actively seeking partners to move in this direction, as they realise they are a small actor with a fairly unknown brand. They want to sell the approach of "measure first", then suggest follow on measures and services/products.

The solar market is an existing market for FerroAmp but new to Sweden. The energy management market is also emerging. EnergyHub is sold to both businesses and home-owners. Though the future direction is business focused. The value proposition was fairly technical and not very straightforward to most potential customers. Some consider the value to have solar energy systems. Others see value in cost savings terms: lowering their demand/fixed electricity tariff. But there are many more layers of value that can be added – the services and service infrastructure needs to be developed for customers to see and realise this value! The value proposition is therefore evolving and some aspects like power management, energy storage, are newer.

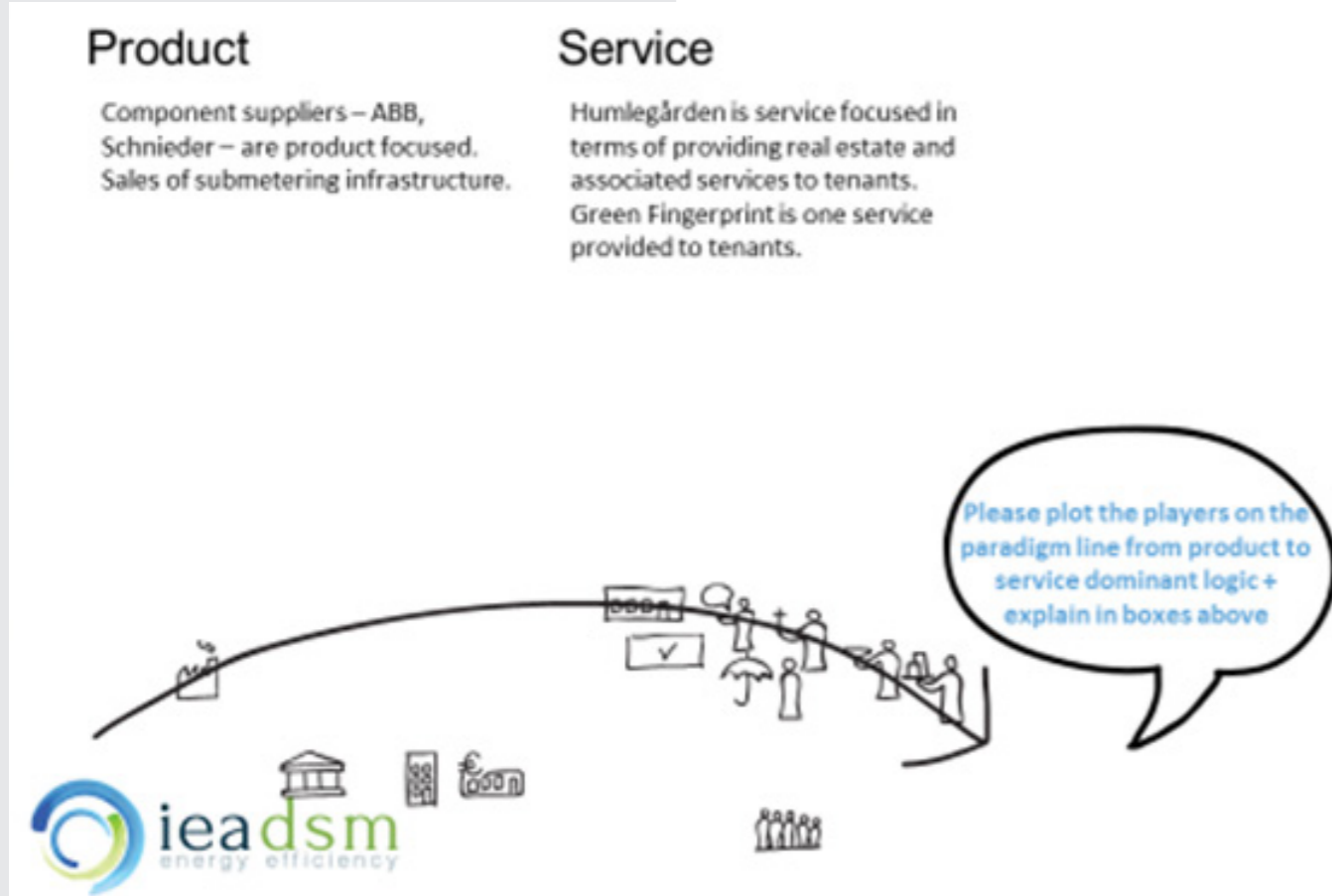


Figure 18: where do Humlegården and its stakeholders stand on the paradigm shift from product to service?



Figure 19: the business model canvas of FerroAmp. Template based on Osterwalder and Pigneur (2010)

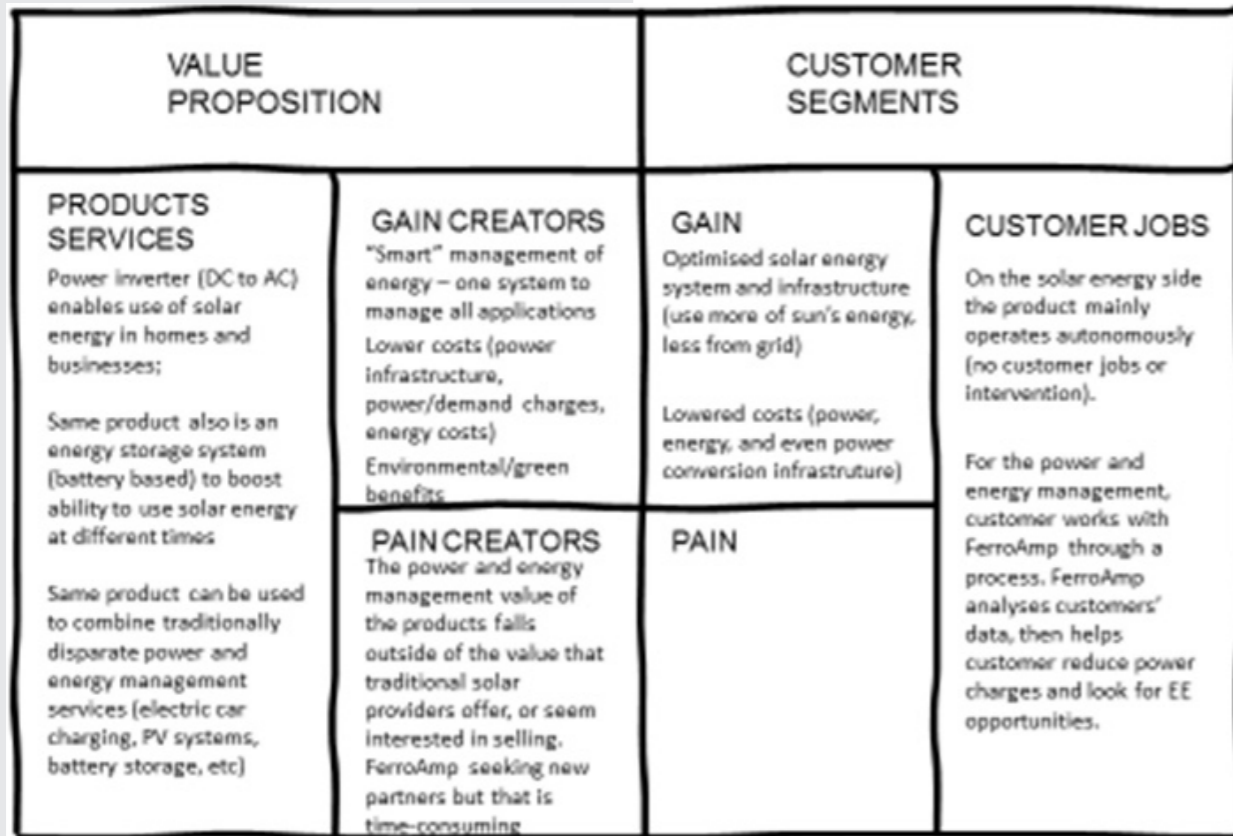


Figure 20: the customer value canvas of FerroAmp. Template based on Osterwalder and Pigneur (2010)

The majority of their solar customers are not involved in the design of either the business model or the products and do not provide feedback. They purchase a solar system and FerroAmp's product is already incorporated into that system. It didn't seem that FerroAmp anticipated that the product would be interesting from a power and energy management platform standpoint. It was only when a customer (municipal energy manager) asked to see the data they capture and began to tell FerroAmp about the types of value he was looking for that they started to realise and work to develop services. The Municipal customer wanted access to the data FerroAmp collects to better manage energy in municipal buildings. FerroAmp realised that the EnergyHub product coupled with services then had potential to offer greater value in "smart" grid world. They are now trying to sell the measurement based approach to understand the facility, then suggest solar systems, EE measures, etc. So in a way the service model development has been a result of a "co-creation" activity with one very engaged customer. After that, during pitches, FerroAmp employees were more and more confronted with customers who say they are fascinated by the data that is gathered and ask if that data can be shared. This created an 'aha' moment. (Figure 21)

However, nowadays, they are working with some customers who actively sought out the data that FerroAmp collects and analyses. These customers are more involved and important in co-creating the benefits/value of energy management. And FerroAmp also uses these customers to explore the new market they want to get after beyond solar cell products. As such it can be stated that FerroAmp is actively building up the systematic user needs sensing capability. They perform a lot of in-person meetings with potential clients and although according to the marketing manager the firms' skills tend to be more technical (electrical engineering, software development) as opposed to entrepreneurial, they have an active Marketing Manager and roadmap for business development. In addition a sales team has been set-up that is out there trying to develop new services. This demonstrates that both the conceptualising and stretching and scaling capabilities are under development. The company sees the need for a culture change to allow for the focus on service delivery instead of solar product sales. FerroAmp is piloting this more bundled approach with a municipality. This pilot is explicitly used by FerroAmp to test the potential for orchestration, where their energyhub would be part of a bundled offer led by a larger partner. (Figure 22)



What changed?

Municipal customer wanted access to the data FerroAmp collects to better manage energy in municipal buildings. FerroAmp realised that the EnergyHub product coupled with services then had potential to offer greater value in "smart" grid world. They are now trying to sell the measurement based approach to understand the facility, then suggest solar systems, EE measures, etc

What caused the change?

One engaged customer prompted the change.

Figure 21: FerroAmp's entrepreneurial journey

Product

Sells products – components – to optimise and reduce costs of solar systems.

Service

In development – energy efficiency services based on measurement capabilities and services built on top of these capabilities

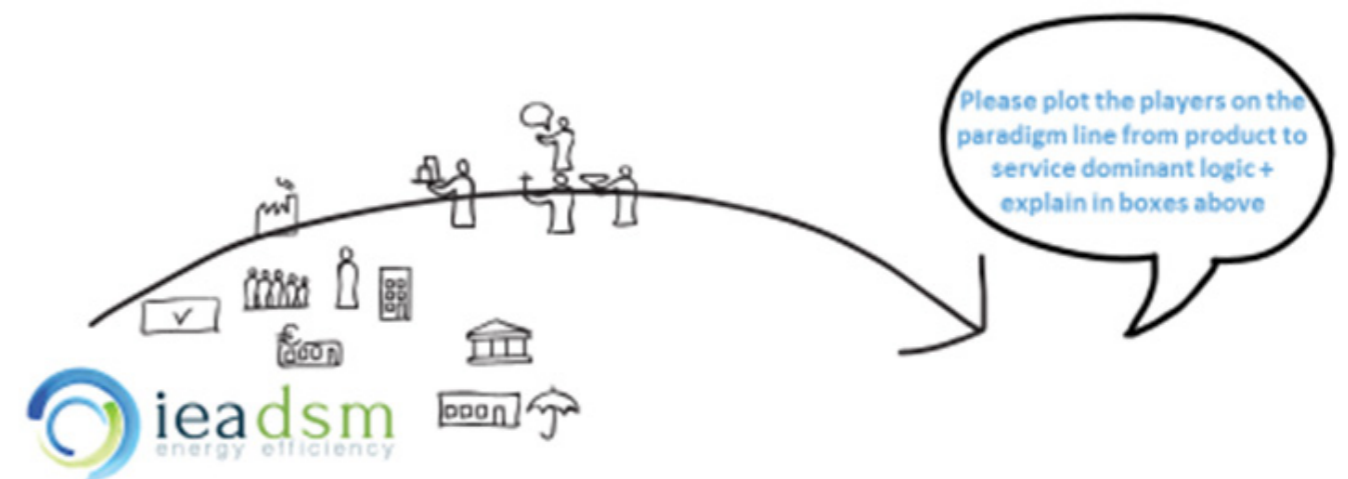


Figure 22: where do FerroAmp and her stakeholders stand in the paradigm shift from product to services?

Retrofitting cases

The Story of Ahlsell Sweden

Ahlsell is a long-time existing company in Sweden. Ahlsell actually is a chain of stores selling products to installers such as electricity and ventilation equipment. Ahlsell sells well amongst installers, and have a good network of clients and suppliers, but they started thinking about this new service because the end customer, (the customer of the installer) asked them what they did themselves about climate/energy efficiency. That made them start thinking about what could provide them with a competitive edge. They thought that really sensing user needs would be worthwhile here, and they performed a survey amongst building owners and industries as to why they did not buy more energy efficient products. What these clients told them was that they lacked capital, knowledge about what product was best, and time to develop this knowledge.

In fact the Swedish market for energy efficiency products was and still is very fragmented, immature, with many market players. It is unclear to potential clients what and whom they should chose for, and this created inertia. Furthermore, in Sweden, a political push or regulation towards energy efficiency is largely absent, although the public increasingly is recognizing the need for taking care of the environment. Indeed, several of their clients had started asking about the Corporate Sustainability and Responsibility of Ahlsell. After one too many of these type of questions So Ahlsell felt the need to look more "green", green their brand for commercial reasons. And at the same time increase or open-up the market for energy efficiency products.

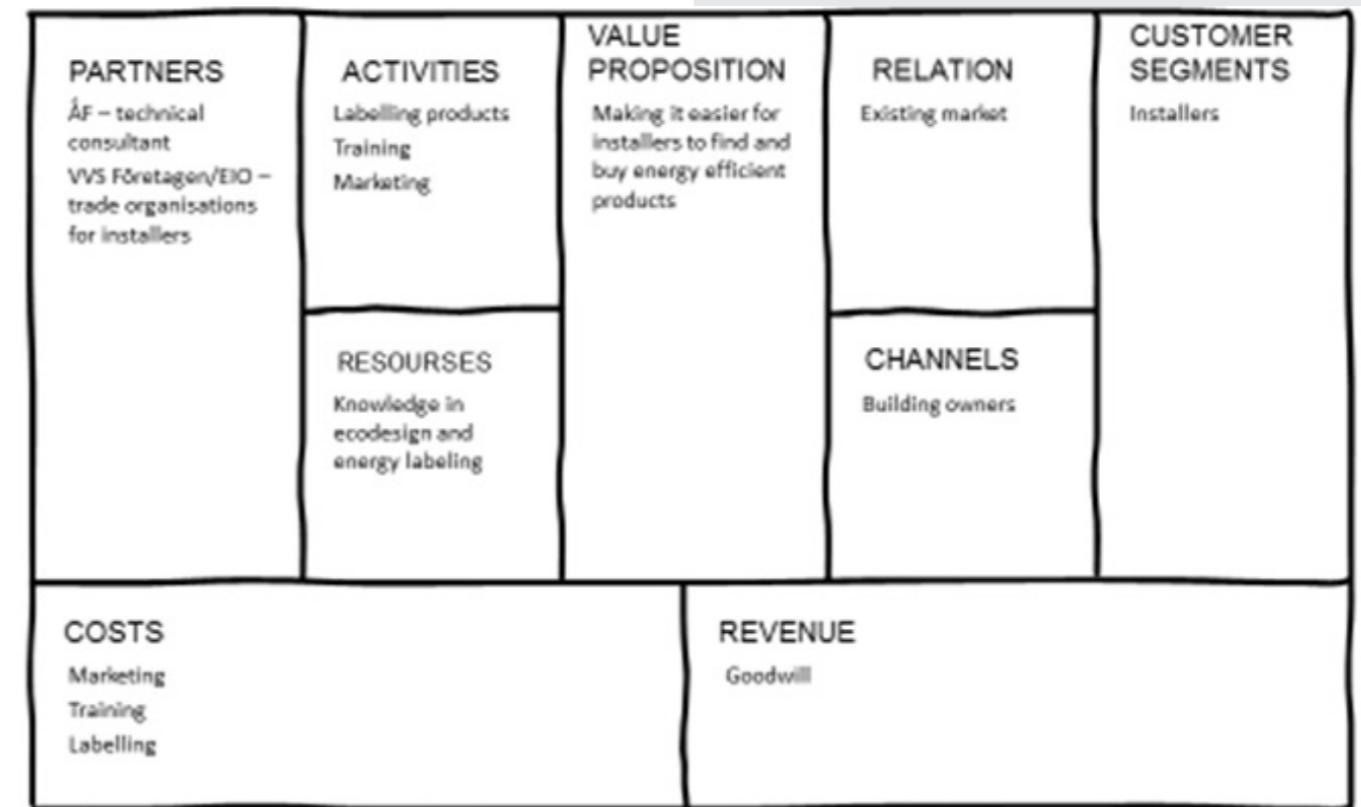


Figure 23: the business model of Ahlsell. Template based on Osterwalder and Pigneur (2010)

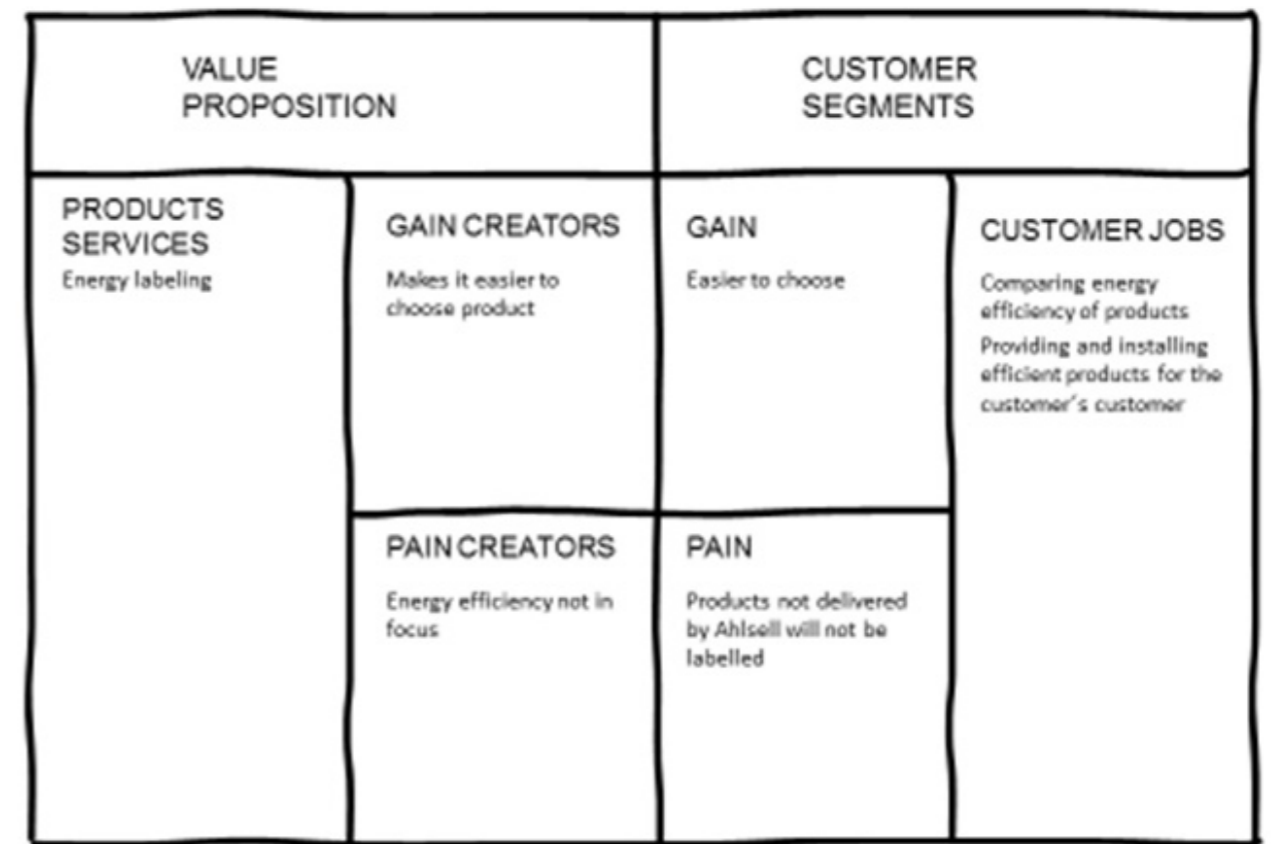


Figure 24: the customer value canvas of Ahlsell. Template based on Osterwalder and Pigneur (2010)

Ahlsell decided that what the market and their clients apparently needed was a label for energy efficiency products. So they developed the Ahlsell label, with their own capital. They saw this as a continuous market considering the constant development of new products that would need to be labelled and the constant need for reevaluating the label with the further energy efficiency improvements allowing for continuous conceptualization, innovation of their service. They made sure that within the company the focus on delivering this service was established, or stretched beyond the store. So they first outsourced the expertise to label products to external consultants but soon decided that they needed to have these resources in-house and hired a team of expert people in eco-design and labelling.

However they soon experienced simply providing the label in their stores was not sufficient. Although final customers were interested in the energy efficiency of products, the installers, the actual clients of Ahlsell were less interested. They needed to orchestrate the service more, and very early on already started delivering an additional activity: seminars for installers to train them in making easier buying decisions around energy efficient products.

They further built up their in-house resources on sales and marketing and put a lot of effort in marketing both the label and these seminars, both nationally on the tele but also more personal through telephone calls. A large part of their costs are related to marketing, training through the seminars and labelling, next of course to costs for their stores and personnel.

What Ahlsell did not do is co-create with either partners (suppliers, trade organisations for installers and technical consultants) clients (installers) or the final customers getting the energy efficient products installed. Ahlsell does however use for example the networks of building owners to create demand for the label, thus influencing the buying decision of their direct clients, the installers.

Ahlsell did not measure the successfulness of the label and the training but they still exist, have 210 stores across Sweden, Estonia, Poland and Russia and are actually the only store providing the labelling service and as such deliver a differentiating element. For them the revenue is thus goodwill from the installers and their final customers, e.g. building owners, and gaining a competitive advantage vis-à-vis the other store chains. The Ahlsell -group has a turn over of 2,4 billion Euro per year.

The story of Cremab Sweden

Cremab, a privately owned company, delivers insulation services. Or, rather, they install insulation for businesses and homeowners. They are not a market leader in Sweden, but are fairly large in the greater Stockholm and Uppsala region. They deliver a fairly traditional value proposition, their core message being: "you are going to save energy and money". They also refer to increased comfort by providing more even temperature and the associated environmental benefits as value added.

In addition to selling directly to homeowners (B2C), to be effective they partner with large property owners and management companies, and with Energy Service Companies such as Schneider Electric and Siemens. This allows them to work in a B2B market and receive 'repeat' business from these large project developers. Their business is also organized in a rather traditional product oriented manner. They have a traditional cost model with materials taking up to 40% of their costs, with personnel costs being second largest and rent for their premises third. They invested in relationships with municipal and commercial housing companies, large developers and private home owners because they saw them not only as clients but also as a marketing or sales resource and channel.

Thus, a large part of their activities are now focused on developing demand amongst large development and construction companies.

The insulation market is well-established in Sweden, partly also due to the building energy performance regulations which drive the need for insulation services. The value proposition is pretty straight-forward and the insulation products are not seeing a lot of innovation. There are many firms who offer insulation products and services. As such the insulation market is quite competitive. Cremab felt the need to create a competitive edge. Their solution was manifold. The first differentiating element they developed was the before and after sales work. So instead of only delivering a product and installing it, they focused on improving the quality of the process of delivering this product. So they decided to be really out there, deliver personal visits, perform door to door sales, deliver on time and perform follow-up satisfaction surveys. That said, the customer is not very involved in creating the business value. Cremab procures the product (insulation) and installs it. The customer then reaps the benefit and Cremab's work is done.

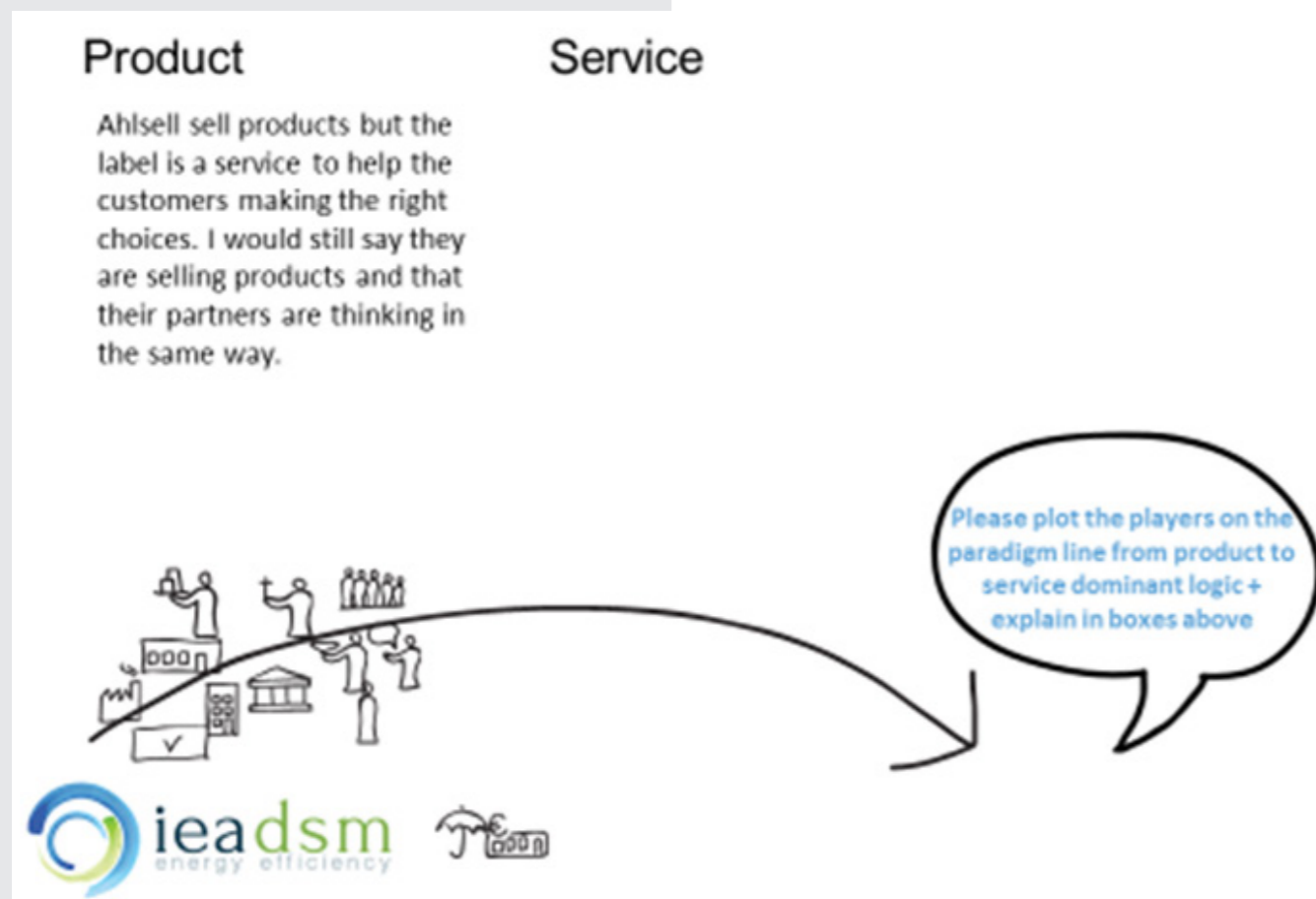


Figure 25: where does Ahlsell and her stakeholders stand in the paradigm shift from product to services?

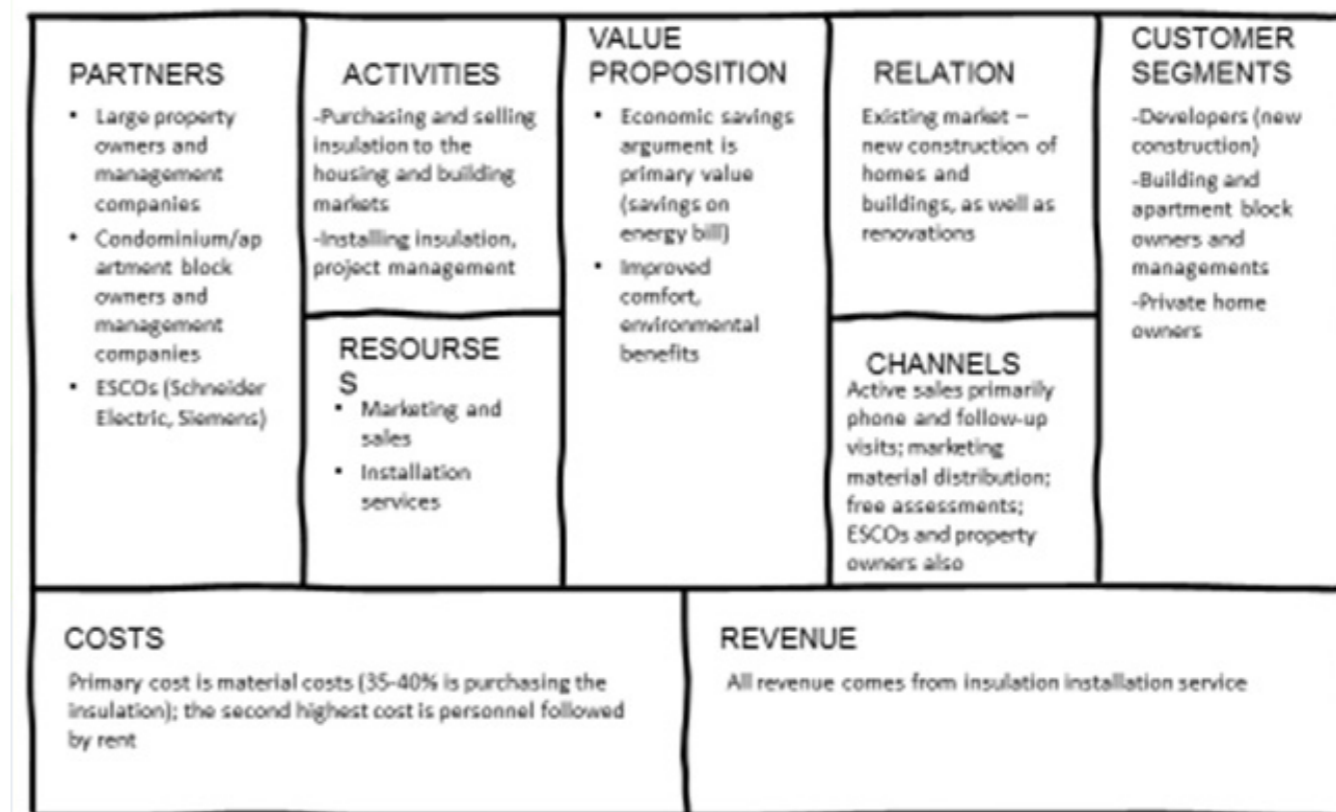


Figure 26: The business model of Cremab. Template based on Osterwalder and Pigneur (2010)

Cremab's business model has been stable since the inception of the business. However, to become more competitive they decided to explore other options and started building up a very active, customer focused sales approach, hiring 11 people for the sales team. As such Cremab is really embedding or stretching the capabilities for delivering this additional service in the company. This sales team is organized around the different target groups, recognizing the fact that different target groups require different sales skills. Until recently Cremab orchestrated very well, having everything in house and acting as one towards customers.

However, Cremab also felt that what might be needed was thinking more systemically, seeing that insulation is only one small part of what matters to homeowners. Beyond their traditional municipal and commercial housing company partners, they are working to develop other professional partners such as roof, heat pump and window installers. Their ambition would be for the energy efficiency branch organisation in Sweden, EEF, to help orchestrate cooperation between these stakeholders, facilitating the one-stop shop type of solutions around new construction and renovations/retrofitting.

Cremab is not there yet however. At present they have a decent-sized network, and they have between 2000 and 2500 customers per year. They work with larger real estate companies (e.g. owners/managers like HSB) as well as major construction firms and ESCOs (e.g., Skanska, Siemens) to get "referral" work, i.e., these firms construct new buildings or perform renovations and therefore bring in Cremab to do the insulation.

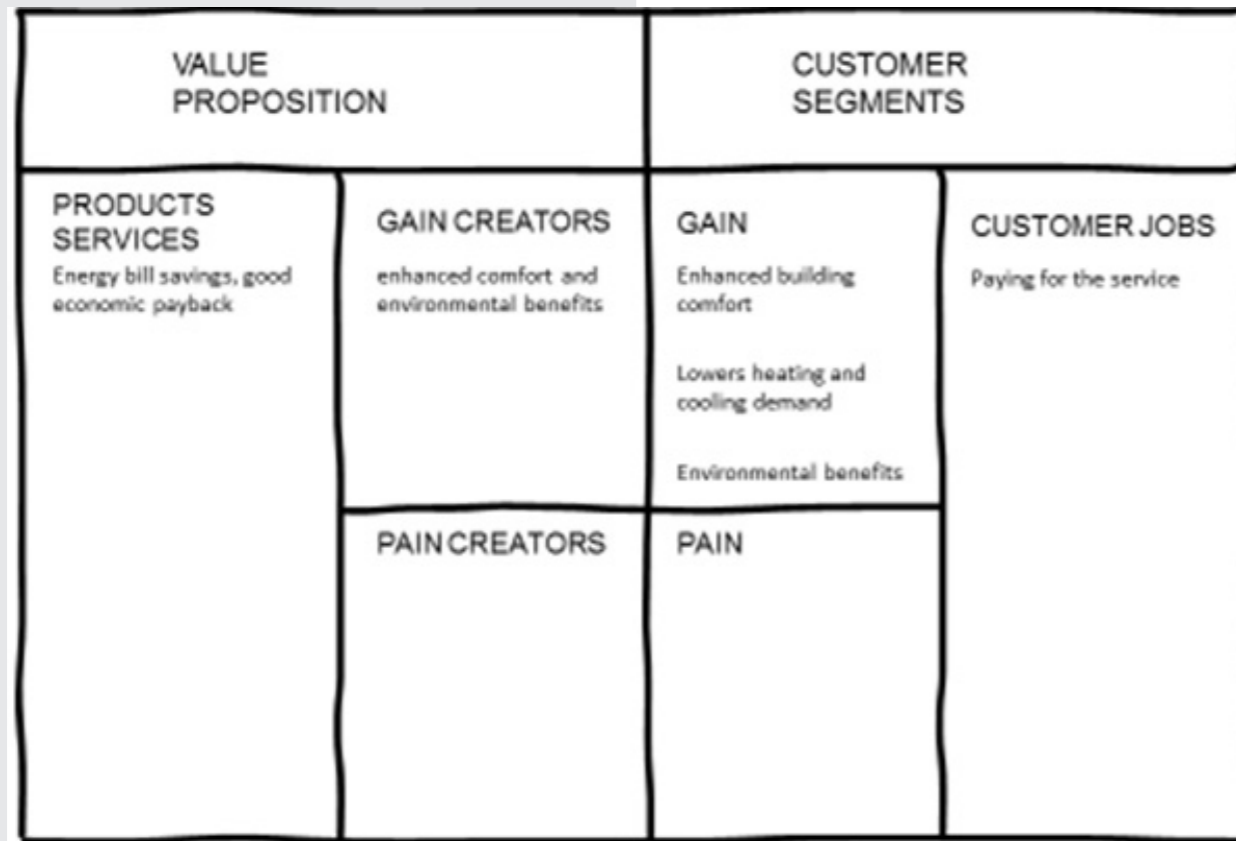


Figure 27: the customer value canvas of Cremab. Template based on Osterwalder and Pigneur (2010)

Product

Product focused business focused on developing customer need (sales), installation, follow up and billing

Service

Some network with ESCOs and larger property management companies and owners provides new work

However, once a customer attic is insulated then there is no follow-on service or work to be done

Please plot the players on the paradigm line from product to service dominant logic + explain in boxes above



Figure 28: where does Cremab and her stakeholders stand in the paradigm shift from product to services?

Total solutions cases

The Story of ETC Varuhus Sweden

ETC Varuhuset is at first glance an online retail shop. But there is a very interesting story behind this retail shop. ETC is a media company selling magazines in Sweden. A few years ago ETC responded to a specific need of their readers of a special magazine focused on writing about new energy technologies and climate change. The readers started asking what products they could best buy in response to articles about for example LED lights, or electric bikes. ETC is a company that is fully oriented towards servicing, which implies that the readers drive what the corporation does. The readers are typical engaged political customers, very much like the reputable owner who gives a lot of seminars and talks on climate challenges. The magazine has 300.000 readers weekly and these readers are beating down the doors at ETC with requests. In response to the request of readers ETC did a crowdsourcing campaign amongst readers to start a new business in delivering technologies to readers because otherwise "readers would be really upset". This demand is identified by ETC as the result of a very specific context change: the prosumers debate.

In the beginning ETC decided it needed to test different products before advising them to their readers. The testing was not standardised but took place at employees' homes and at the office. A few years later ETC owns a solar park to test new equipment and new configuration in

a more standardised manner. Based on these tests advice was issued. It started mainly with solar technologies, but ETC decided that energy efficiency is about much more than solar but that solar can spark interest in energy efficiency, and initiate demand for more efficient heat pumps, insulation etcetera. As such the partners of ETC are suppliers of the technologies sold in the retail shop. But ETC also sees heavy involvement from non-profits environmental groups who share ETCs solar energy goals.

The activities include design, sales and even installation of solar systems and other systems. ETC is a total solution for their readers. ETCs value proposition is varied. It however, in the end, provides readers with the opportunity to produce and take control of their own energy, it empowers readers. Especially in the face of a relatively not yet mature market, especially concerning solar technologies. The cost structure of ETC is a mix of material costs, marketing costs and costs for delivering the total solution: testing, installing systems and performing project management. A new demand for support around financing prompted ETC to consider starting a banking service.

The online retail shop does not earn ECT money. Every earning is reinvested in the company which has a not for profit ambition but is philosophically driven. The revenue is felt in the form of increased sales of the magazines and newspapers and goodwill and a rewarding sense of responsible behaviour.

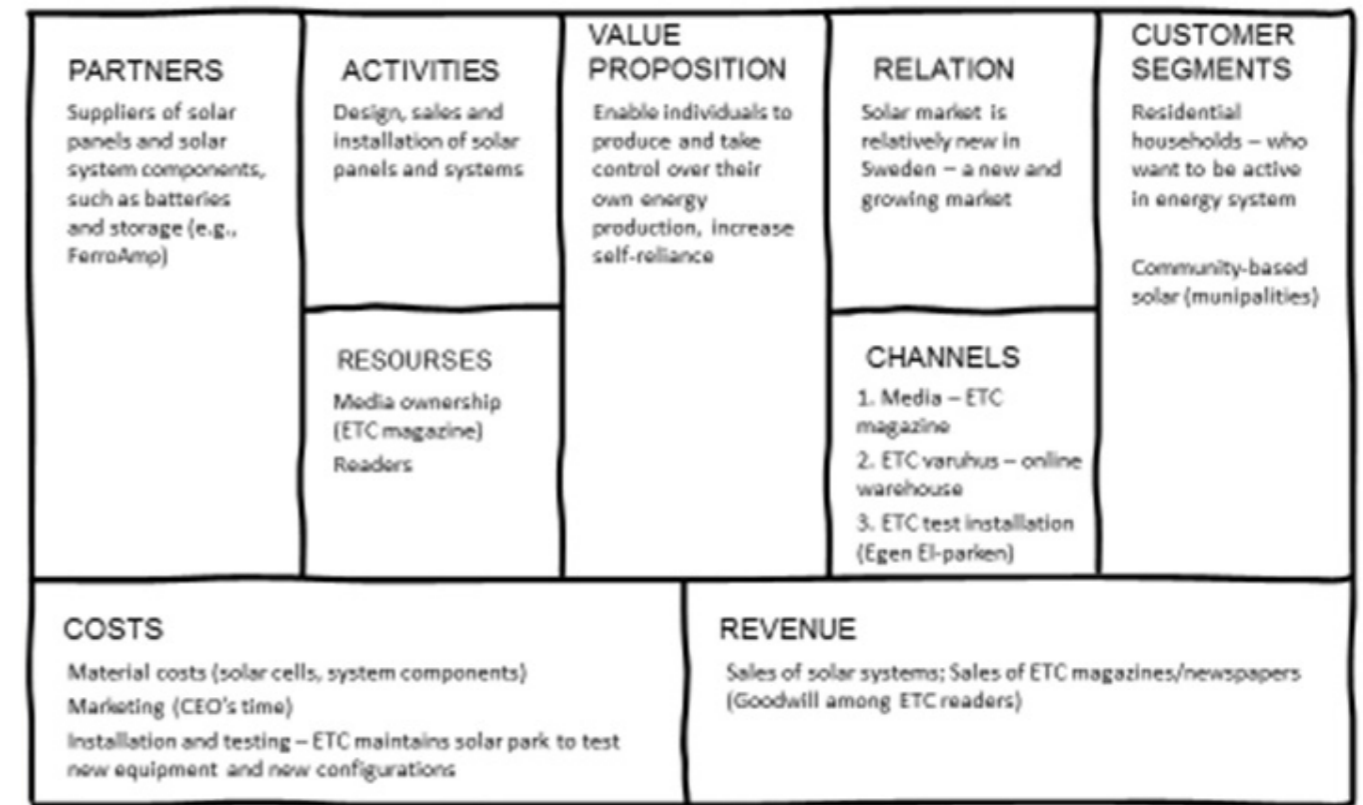


Figure 29: the business model of ETC. Template based on Osterwalder and Pigneur (2010)

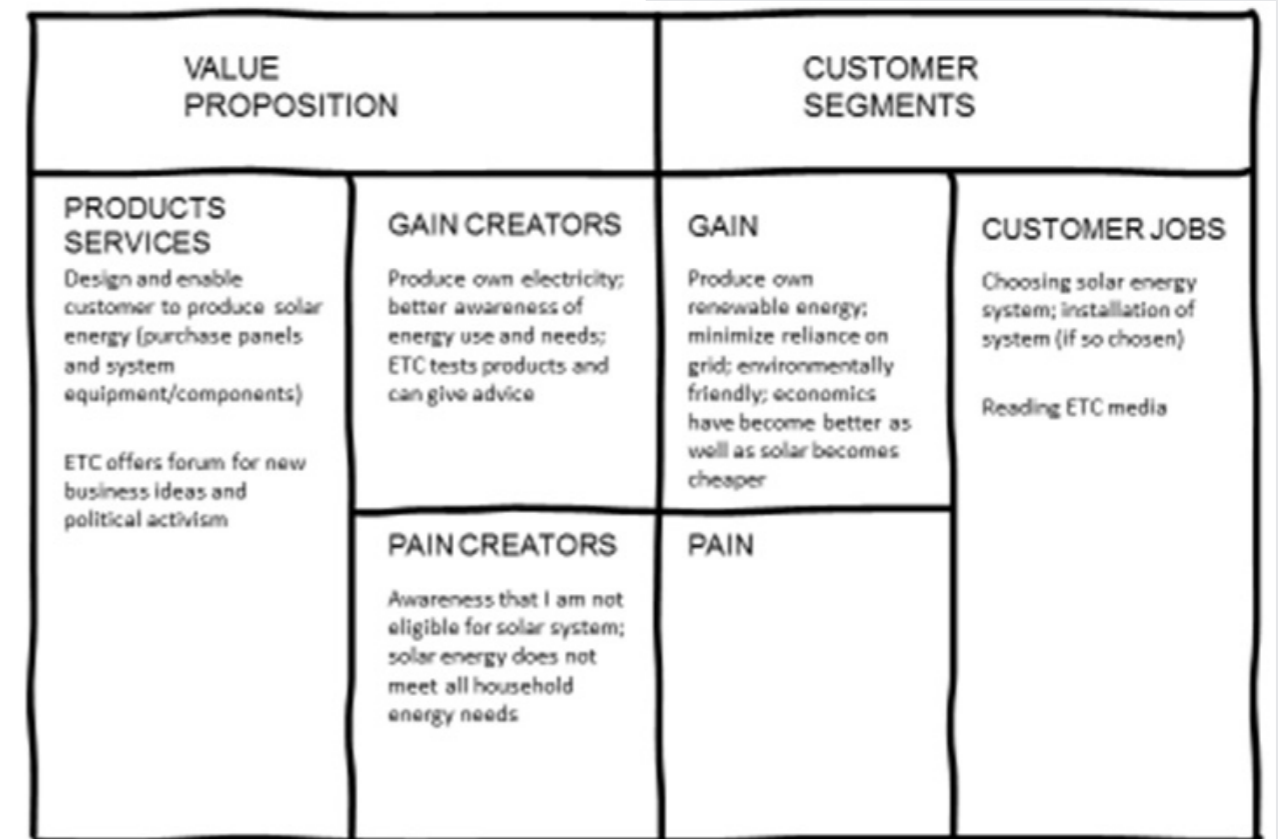


Figure 30: the customer value canvas of ETC. Template based on Osterwalder and Pigneur (2010)

ETC clearly has value to other businesses, such as FerroAmp, which uses ETC as a referral or reseller. Egen EI purchases systems from a variety of OEMs and tests them. If product works well then ETC becomes a channel partner. If it does not then ETC does not sell it (pain point). At the same time ETC explicitly aims at opening up the market for mature technologies in Sweden, and participates in pilots to that end. Once the market gets going ETC retracts its action, something they did for example around the E-bike. As such ETC is explicitly responding to a low level of social engagement with energy efficiency in Sweden in general. Energy efficiency as a stand-alone topic/discussion is perceived as people becoming worse off (having to do with less). Providing/selling renewable solar energy is a gateway to EE. It enables customers to take control of energy production and become participants in the greater energy system. Producing energy can lead to great appreciation for how energy is used and then how to reduce or better utilise energy to increase the effectiveness of the locally produced solar energy.

In terms of capabilities, ETC demonstrates strong capabilities such as sensing technological options and sensing user needs. ETC explicitly aims to create a solution to a demand for which there is not yet a solution. Users are very involved in the management and direction of ETC, as a larger firm. Readers drive new initiatives and businesses and are involved heavily both in ideation and financing. Users seem integral to the process. Conceptualising is explicitly aimed for with the test lab and the design of new products and systems. Stretching is also a strong capability within the company, witnessed by the building of new business units to meet the readers demand. Scaling and especially branding capabilities are strong as can be expected in a media company. Marketing is part and parcel to business. ETC online media and ETC paper are used to convey overall corporate messages and news. And Egen EI enlists ETC corporate (the CEO) for marketing and sales support



What changed?

ETC readers starting to become "pro-sumers". Want to be more active and engaged in energy system and creating their own energy. ETC readers were driving force behind creation of solar energy company (Egen EI).

What caused the change?

Changing attitudes about energy system – shift towards being "prosumers" instead of passive consumers.

Figure 31: the entrepreneurial journey of ETC

Product

Business proposition seems product focused. Sell and install the solar system for the customer.

Service

Egen EI does offer services including purchasing excell solar power produced by customers.

ETC is a media company so they are providing media services.

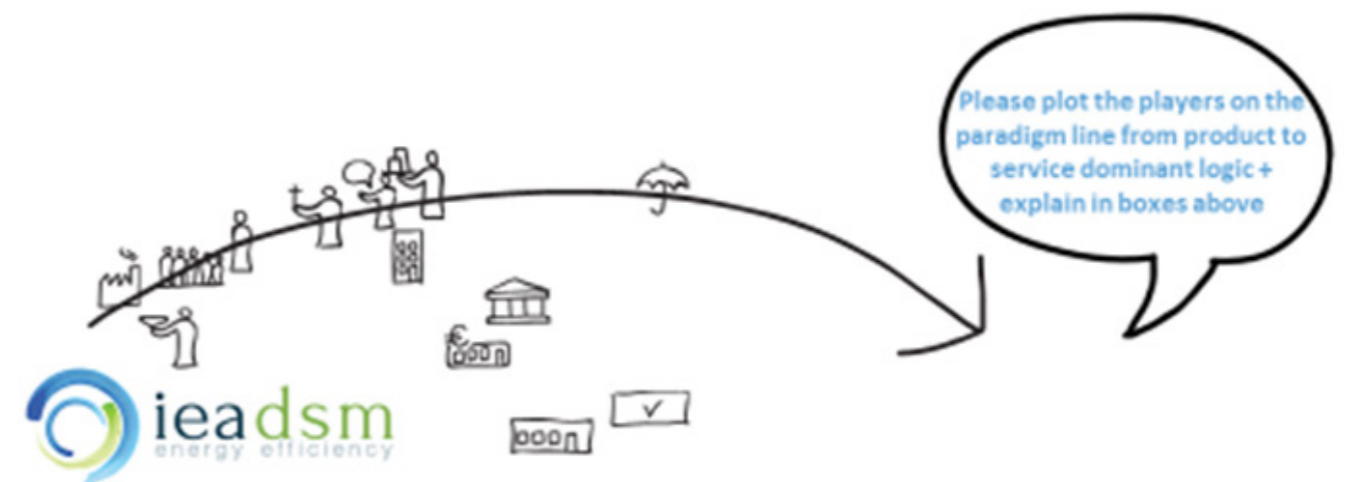


Figure 32: where does ETC and its stakeholders stand in the paradigm shift from product to services?

The Story of Friendly Buildings Sweden

Friendly Buildings builds homes, they deliver a product: really efficient, or even near energy zero homes. These pre-fabricated homes represent a relatively new market in the very mature Swedish home building market. Friendly Buildings is a private company that started small in 2010 with one entrepreneur/sole employee. Initially start-up capital was very hard to generate. The CEO was forced to “scrape” together capital, though she did receive a little funding through public sources (ALMI).

The CEO has a background in building management and development, and is an engineer. She knew that the capability of conceptualizing, innovating, and partnering was key to success in this market. Given her background, she understood that large construction firms had already attempted to develop nearly zero energy homes, but she wanted to do it cheaper and better. Her experience was that these firms failed because they “bit off” very large projects, sinking large investments in planning that created high expenses.

So Friendly Buildings decided to “just do”. She started with small projects, found capable partners, learned through trial-and-error, tested and improved from project-to-project. The biggest change in the business model was witnessed in the marketing and sales proposition.

The low-energy design, and Friendly Buildings’s partnership with an architecture firm, has in principle not seen much change. Friendly Buildings orchestrates to the max. The company’s activities include land acquisition, the design of the home or building, the module fabrication (in factory), project management and marketing and sales. This requires quite some expertise resources around architecture, assembly, project management and marketing and sales.

Friendly Buildings spent quite some effort on stretching a key element of its brand across its partnerships: quality. It is very complicated to deliver a passive house. One of the first messages on the Friendly Buildings website is that they deliver the highest performance quality thanks to their partners. Partners include the architectural firm, but also a firm that installs the modules, a metering and measurement firm, and then solar system providers and installers. As such Friendly Buildings demonstrates great orchestration capability. They buy the land, set up the condo structure for ownership, and manage the project with all their diverse partners. Friendly Buildings developed a complete ecosystem around its product.

In terms of costs and revenues this company is very old school. The building and material costs is far and away the largest cost center and revenues only include the sale of homes and buildings. There is no service delivery after sale of the home.

The sale occur through regular sales channels for selling homes and through professional, knowledgeable purchasers. At first the sale was a disaster. Friendly Buildings started by marketing its homes by stressing “zero energy home”. They got zero buyers. So, Friendly Buildings removed all of the advertising and waited 2 months. Then they showed and marketed the interior designs, showed a lot of interior pictures etc. They pitched the houses as well designed, attractive homes/buildings with high-quality, air tight construction with uniform quality. They sold all the houses in 2 hours.

The families that purchased the homes were families with young children - children under the age of 2 and even with kids on the way (pregnant). These families did not express much interest in being green or environmentally friendly, but were mildly interested (curious). After they purchased the homes then they were completely “sold” on energy savings and really went “all in” with respect to saving energy. Friendly Buildings had the same customer experience in two projects (Upplands Väsby and Örebro).

Interestingly enough, although Friendly Buildings delivers homes to single family and town home owners, there is no involvement at all from these users. The homes are modular and prefab designed upfront. Friendly Buildings develops the homes and takes care of all the details. Customers take it or leave it! Indeed, Friendly Buildings even states that as soon as users become too involved the building becomes non-efficient. There is however a high level of co-creation of the pre-fabricated homes business model by all partners. The architect is instrumental, as is the factory, installation firm and solar firm. There is active learning across the partners to increase efficiency in the process.

For larger and non-residential buildings this is different. Friendly Buildings for example also delivers to professional buyers who sells schools to municipalities, and school design requires more interaction with the users because of the complex use of the building.

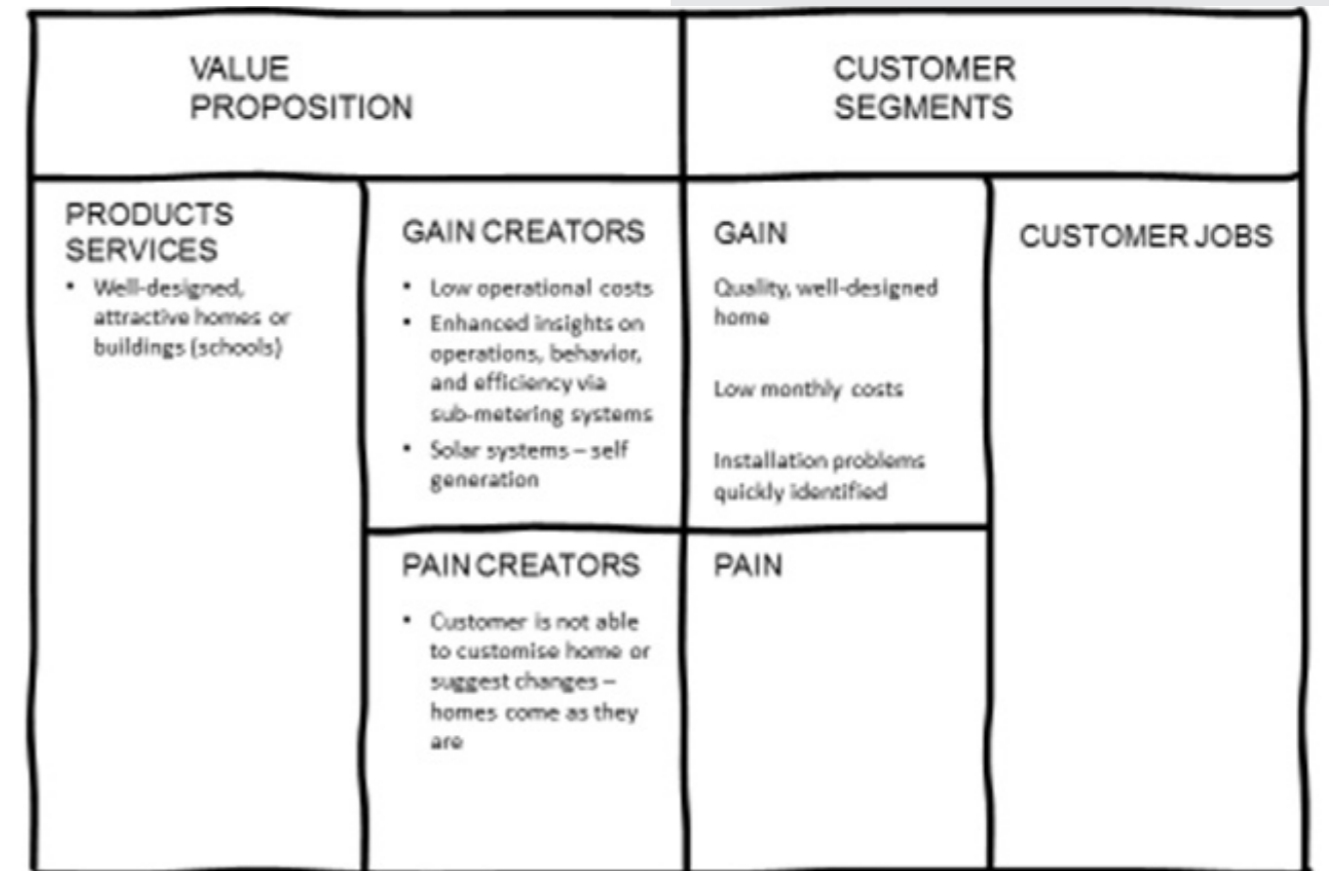
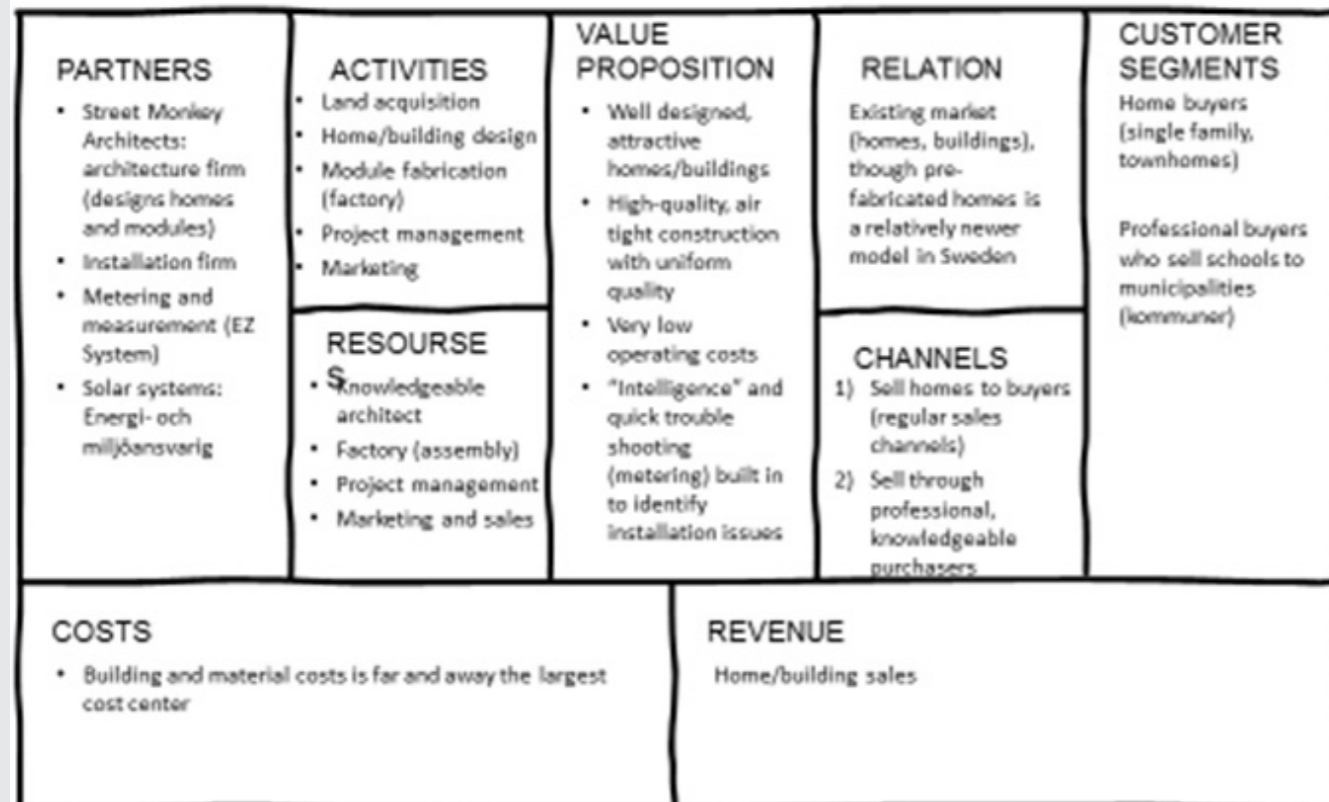


Figure 34: Customer value canvas of friendly Buildings. Template based on Osterwalder and Pigneur (2010)

Although “low energy” is not the reason customers buy the homes, once in their metered homes, customers have really appreciated the ability to know how much energy they consume, and to be able to compare energy consumption with their neighbours and Friendly Buildings’s other projects. They are very engaged and really want to save energy, as long as doing so does not compromise comfort. Friendly Buildings now intends to install metering systems in all of their own projects going forward, as long as they are the decision-makers. They would be in a position to do this economically now. However, Friendly Buildings is also developing projects for other developers. The pricing is so competitive with these projects are so “squeezed” that metering will not be included. Buyers have not so far been interested in spending more for the metering, either.

Friendly Buildings is driven by ambition and wants to scale up, to grow. In the past years they have sold several dozen buildings and made substantial leaps in revenues, from 7 million SEK the first year, to 15 million the second year, up to 17 million Swedish Crowns last year. To scale up further, Friendly Buildings believes it needs to not only continue being the orchestrator of a high quality ecosystem, but also become part of an orchestrated ecosystem delivering a total solution. Therefore Friendly Buildings develop partnerships carefully with potential professional customers, municipalities or larger customers such as schools. Partners that can resell the product. Those that know how to specify pre-fabricated buildings and procure and or sell projects to for example municipalities.

Product

Homes sales and buildings sales - product focused

Service

Largely not a service focused business – once home or building is sold then the transaction is complete. There is some ongoing communications to help fix any installation issues (e.g., heat pumps)

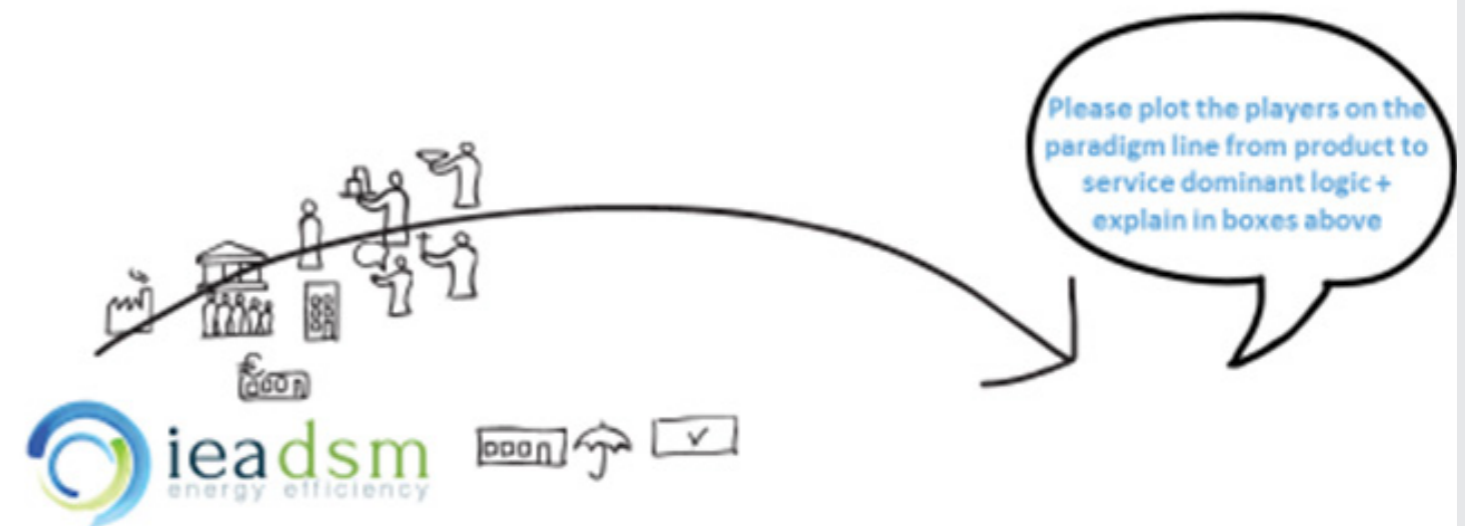


Figure 35: where do Friendly Buildings and her stakeholders stand in the paradigm shift from product to services?

Conclusions

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).

The Swedish business models we analysed demonstrate a great variety of doing business, and we have analysed the different strategies. Four strategies can be discerned, which are discussed in much more detail in Deliverable 4 of IEA DSM Task 25: the international comparative analysis of energy efficiency business models and services.

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). Megacon, Climacheck, eSmart and Ahlsell can be categorised under this strategy.

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. Humlegarden, Cremab and Friendly buildings can be categorised under this strategy.

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. FerroAmp and Exibea can be categorised under this strategy.

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. ETC can be categorised under this strategy.

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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 Silvonon/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

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<http://www.ieadsm.org>

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Operating Agents: Mourik, R.M.; Bouwknecht, R.;
National experts: Bangens, L.; Erwin, J.