Task 25 D2 report Switzerland

Swiss 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. The 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 to be more sustainable. We have found that there is no canon yet in relevant literature on how and at which level business models can contribute to such processes of shifts, or how to make them come about. And we are convinced that these questions are essential as part of a "theory of policy" or policy approach 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 to maximise profit margins through efficient production and distribution. Consequently, in this perspective, the user has a passive (consuming) role and service is an add-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 Task 25 work plan to be found on our task website http://www.ieadsm.org/task/task-25-business-models-for-a-more-effective-uptake/

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

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

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. Our analysis shows that 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 then 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. 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, eceee 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.

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 Energy Efficiency.
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 Switzerland

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 Swiss Subtask 2 final deliverable for Task 25. The report first provides a short description of the analysis framework for the Swiss context and cases. Then the analysis of the Swiss 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 Swiss cases we refer to Deliverable 4 of Task 25.

Switzerland – 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, Donelly, & 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

Switzerland's energy supply depends very highly (around 80%) on imports of fossil fuels and combustibles, and on imported nuclear fuels. Electricity supply is mostly autonomous, except during some periods in winter.

Switzerland's priority is to maintain its position on the European energy market. Switzerland has been negotiating an electricity agreement with the EU since 2007. The ultimate objective of these negotiations is to conclude a comprehensive energy agreement with the EU that encompasses not only electricity, but also aspects such as energy infrastructure, energy efficiency and gas. So far, a bilateral agreement with the EU could not be concluded. Although Switzerland is not bound by the European legislation, Switzerland follows the EU energy policy very closely and establishes measures similar to the ones in place in the EU, such as car emissions standards, emission trading scheme, building passport and building and appliance performance standards as well as the shift towards renewable heating systems. Switzerland has also an electricity saving schemes based on a competitive tender. About 40 million Swiss francs are available annually for funding electricity savings projects and programs.

Switzerland has low greenhouse gas (GHG) emissions per capita compared to other countries, which reflects its strong reliance on low-emissions energy sources in the power sector, especially nuclear and hydroelectricity, and its lack of heavy industry. GHG emissions have remained almost unchanged since 1990, as increases from the transport sector have been offset by reductions in the residential and industrial sectors.

In 2013, transport accounted for 31% of emissions, ahead of industry (22%) and buildings (29%; 20% from residential sector).

Given Switzerland's already low emissions levels, its estimated marginal abatement costs are relatively high, and so meeting its 2020 target of a 20% emissions reduction below the 1990 level and at least 30% reduction by 2030 will not be easy. The bulk of the emission cuts are expected to come from buildings. One of the main measures is a CO2 levy on thermal fuels (heating oil and natural gas), the revenues of which are redistributed to the households and the business community. One third (max. CHF 300 million) is earmarked for a buildings programme, which promotes refurbishments and renewable energies. CO2 intensive industries are exempt from the CO2 levy, if they commit to reducing emissions in return. Large installations are covered by an emissions-trading scheme. Measures regarding transport fuels are CO2 limits for passenger cars and duties on imports of transport fuels.

Raising the cost of CO2 emissions in the household sector is necessary, but the impact can be limited if information is not easily available and the dwelling ownership structure inhibits the incentive effects of price signals. Existing regulations concerning energy-saving renovations of rented dwellings could be better designed, including redefining how costs should be passed on to renters and the compulsory provision of information on the energy efficiency of rental properties (SFOE and SFOH, 2015).

About 60% of the Swiss population are tenants and only about 40% of people are homeowners. 80% of the residential building stock belongs to private home owners and the remaining 20% to institutional investors such as pension schemes or housing cooperatives. In general, the residential buildings owned by institutional investors are professionally managed while this is not true for all privately owned buildings. Very often, these private owners lack the expertise for long term building maintenance and refurbishment. Facility managers already employed by the client could play a crucial role in the the field of energy efficiency business models. Their daily work on site in close contact with the building's technical equipment brings a valuable understanding of the technical conditions of the infrastructure. In addition, they are familiar with the daily operation including special situations under which the energy demand might deviate significantly from the normal conditions.

Structural elements

Switzerland's energy intensity is the second-lowest among IEA countries.[1] In 2010, the country needed 0.09 toe of primary energy per each 1 000 USD of GDP, compared to an IEA average of 0.15 toe of primary energy per each 1 000 USD of GDP. The energy intensity is low partly because the Swiss economy has a large component of high value-added services and a low level of heavy industry. Its economic structure and energy consumption patterns have been fairly stable from 1990 to 2010. Energy intensity, adjusted for purchasing power parity (PPP), improved on average 1.0% per year over the two decades. A contributing factor to this improvement in final energy intensity has been increased energy efficiency.

In 2011 after the Fukushima incident, the government took a decision to gradually phase-out nuclear power as the existing plants reach the end of their lifetimes. In order to narrow the projected supply/demand gap (nuclear power currently generates 40% of electricity), Switzerland is implementing the Energy Strategy 2050, aiming at reducing per capita energy consumption by 43% between 2000 and 2035 and electricity consumption by 13% in the same time period

Established Industry

The economy is dominated by services (71% of GDP in 2011). Industry (28% of GDP) is concentrated, among others, on pharmaceuticals and customised engineering products, such as machines, precision instruments and watches. Owing to a lack of mineral resources, heavy industry is scarce. Agriculture accounts for only 1% of GDP. Almost half of all employees in Switzerland work in areas requiring highly skilled workers. High-tech products form the cornerstone of the country's economic success and exceptional reputation. Around one quarter of all high-tech products are exported.

Engineering consulting firms and large energy customers are already working closely together in the field of energy efficiency. These firms have gained a lot of experience regarding the planning and implementation of such measures.
With the Swiss energy strategy 2050 and it's refocusing on energy supply and energy demand, new business models also for utilities become interesting.

1 Energy intensity is calculated as the ratio of total primary energy supply per unit of gross domestic product adjusted by purchasing power parities. It measures how much energy is required to produce a unit of gross domestic product (GDP).

For example, the Bernese utility BKW has decided to shut down its nuclear power plant by 2019 and start to offer more services to final customers which go beyond delivering electricity only. [2] BKW now offers consulting services to building owners on how to make their buildings small power plants.

Policy Context

Switzerland is a highly decentralised federal state. Energy efficiency efforts are generally in close co-operation between the federal government, the 26 cantons, municipalities, industry and consumers. The Energy Law of 1998 is the principal legal foundation for energy efficiency. It gives the federal government responsibility for energy labelling and the right to set minimum energy performance standards for vehicles, systems and appliances. Cantons are entrusted with building regulations, and must create favourable conditions for increasing energy efficiency and use of renewable energy in buildings. Generally, the federal government emphasises broad public information campaigns, whereas the cantons focus on advice. The federal government finances R&D and promotes professional training in energy efficiency as well as advice, in co-operation with the cantons.

Energy efficiency programmes concentrate on the priority areas of building modernisation; efficient appliances and motors; rational use of energy and waste heat in industry and efficient and low-emission mobility. The most important cross-sectoral measure is the CO_2 tax on stationary fuels. The SwissEnergy programme plays a crucial role regarding information, professional training and counselling. The programme's impact and effectiveness are evaluated regularly.

Energy efficiency improvements have a central role in the Energy Strategy 2050, which the government has been developing to prepare for the loss of electricity from the gradual phase-out of nuclear power. The following measures regarding energy efficiency are part of the Energy Strategy 2050 supposedly entering into force in 2018:

- Continuation of the tenders for electricity savings
- Increased funding for the building refurbishment programme
- Tightening energy standards for electric appliances in line with the EU regulation
- CO2 emission standards for cars and light trucks in line with the EU regulation
- Fiscal measures for building refurbishment

Energy efficiency obligations for utilities were proposed by the Government but rejected by the Parliament.

The main institutions for energy efficiency are the Swiss Federal Office of Energy (SFOE) through the SwissEnergy programme and the cantons for the building sector. The Federal Office for the Environment (FOEN) is responsible for the CO2 tax and the Swiss Emissions Trading System. The Federal Office for Spatial Development has responsibilities regarding overall planning in the transport area while the Federal Offices of public transportation and roads are in charge of the respective implementation.

Program for electricity saving: tender calls (ProKilowatt)

Tender calls for projects and programmes for more efficient use of electricity in industry and households is a new measure launched by SFOE in 2010 with a budget of CHF 9 million. Tender-winning projects and programmes are financed via the grid levy on electricity that is also used to fund the feed-in tariffs. In the eighth tender launched in October 2016, CHF 45 million are available for electricity saving projects and programs.

National Master Plan for Cleantech

In September 2011, after thorough stocktaking and broad public consultations, the government adopted the Cleantech Masterplan, a strategy to promote resource efficiency and renewable energies. It aims at strengthening cleantech businesses through greater coordination of science, business, government and policymaking so as to achieve a strong position in the global growth market for resource-efficient technologies, products and services by 2020. It identifies five areas of action: research, knowledge and technology transfer; regulation and market-based promotion programmes; international markets and export promotion; policy to encourage innovation; skills and training.

2 https://bkw-portal-static.s3.amazonaws.com/Webcontent/bkw.ch/fileadmin/user_upload/4_Ueber_BKW/Downloadcenter/UEber_BKW_Gruppe/Halbjahresbericht_2016/BKW_Half-year_Results_2016_final.pdf

Market and user practice

According to Numbeo[3], cost of living in Switzerland is 57.91% higher than in **United States** (aggregate data for all cities, rent is not taken into account). Rent in **Switzerland** is 37.77% higher than in United States (average data for all cities).

The following figure shows the distribution of expenses by Swiss households. Clearly, the spending for electricity (utilities) is one of the smallest items.

The following Figure 1 shows the consumer expenses in Switzerland according to the Office of Statistics. Living and energy make up almost one quarter of household expenses, but the energy cost for heating makes up only a share of about a tenth of the living expenses or 2.5% of total household expenses.

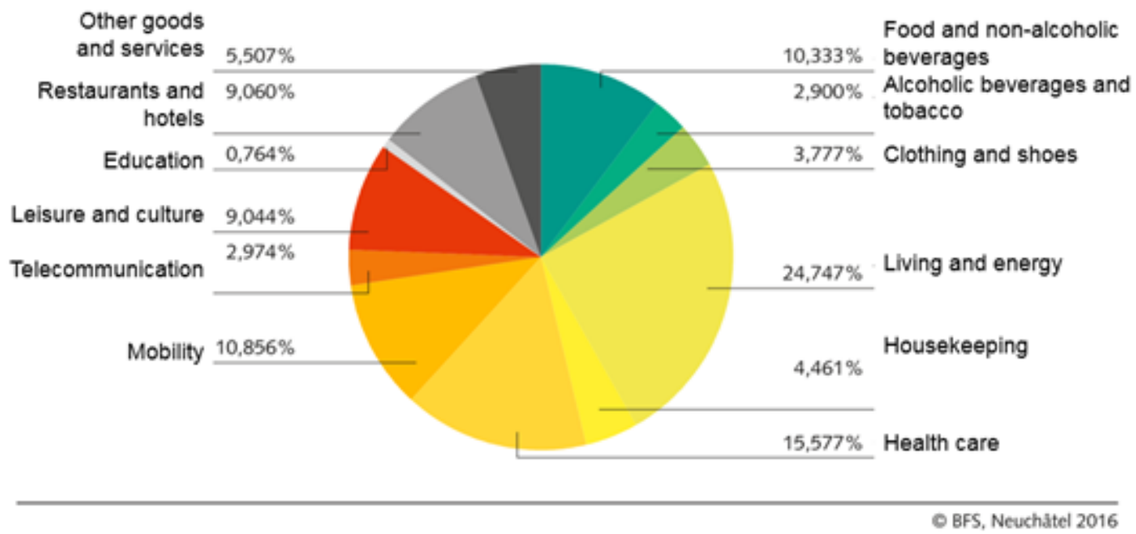

Figure 1: Consumer expenses in Switzerland according to the Office of Statistics BFS[4].

In order to design and implement effective energy policy measures it is important for policy makers and utilities to have information on the response of consumers to an increase in electricity prices as well as on the impact of current and past energy efficiency programmes on the electricity demand. In a recent study mandated by SFOE[5] , the price elasticities have been assessed for households. Due to the relatively high purchasing power of Swiss households, the end consumers are not very sensitive to price signals and the price elasticities are relatively low.

The estimates of the above study indicate that, from the point of view of policy makers, pricing policy as an instrument may have a small impact in the short run. However, since the estimates of the long-run price elasticity of electricity consumption are generally higher this indicates that households will be influenced by pricing policy even though the impact may not be as substantial as needed and a combination of policies may be necessary to affect long-term electricity demand.

3 https://www.numbeo.com/cost-of-living/country_result.jsp?country=Switzerland

4 https://www.bfs.admin.ch/bfs/en/home/statistics/prices.assetdetail.335158.html

5 www.bfe.admin.ch/php/modules/enet/streamfile.php?file=000000011289.pdf

Culture

Well-being and happiness indicators are high, with several major Swiss cities regularly ranking among the world's best places to live according to the 2015 OECD Economic Survey. In the OECD Better Life Index[6], all but one of Switzerland's component scores exceeds the OECD average, with particularly high scores in life satisfaction and health. Although Switzerland ranks highly in the provision of basic housing facilities, the high cost of housing drags down the aggregate score. While the redistributive impact of taxes and transfers is comparatively small, Switzerland remains in the more equal half of OECD countries after taxes and transfers. Even so, inequality in GDP per capita across the regions is high by OECD standards (Demmou et al., 2015). The dynamic and open Swiss economy is continuing to attract immigrants, and as pointed out in the previous *Survey of 2013*[7], this accounts for a significant part of Switzerland's robust economic growth.

The household sector accounts for a substantial portion of energy consumed. In achieving a reduction in energy consumption, it is thus worthwhile to take measures at household level. In order to develop target group tailored measures regarding energy efficiency, it is important to address consumers' individual needs and desires. The identification and differentiated description of energy consumer types is a prerequisite. In a study mandated by SFOE[8], energy consumers were differentiated according to their social value orientations.

Results of this study show that pro-socials exhibit more curtailment behaviours in the housing, mobility, and food domains than competitors and individualists. Energy-efficiency measures, however, which require no change in use patterns and provide financial benefit, were equally adopted by the three social value orientation classes. In a survey, based on types of conservation behaviours and energy-related psychosocial factors, six energy consumer types were identified: idealistic, selfless inconsequent, thrifty, materialistic, convenience-oriented indifferent, and problem-aware well-being-oriented energy consumers. They all showed different behavioural patterns regarding adopted energy conservation measures. It was found that even consumer types with less pronounced saving efforts were willing to adopt energy conservation measures – at least the measures that entail no reduction in benefits – and that they dispose of supportive energy-related belief structures. Moreover, energy savers, who show considerable saving efforts but do not engage in purchase-related saving behaviours, were identified.

According to the same study, interventions need to clear up consumers' misperceptions about the energy use involved in specific actions, which are often caused by the application of heuristics and may represent barriers to efficient energy conservation behaviours. Therefore, a second aim of this research was to examine a newly postulated heuristic, called the symbolic significance heuristic, and its misleading effects. Findings provide evidence that individuals rely on symbolic significant behavioural attributes (e.g., car type) while neglecting less symbolic behaviours (e.g., covered distance). It was found that individuals were likely to overestimate the energy-consciousness of persons engaged in behaviours that were symbolic significant for energy-friendliness, and to underestimate the energy-consciousness of persons engaged in behaviours that were symbolic significant for energy-unfriendliness. This effect was found to be remarkably stable, and to be generalizable to different energy consumption domains.

Technology

Switzerland is top in the world when it comes to innovation, according to an index by the World Intellectual Property Organization (WIPO). It's the sixth year in a row that the Alpine nation's come out on top. This year Sweden came in second place, followed by the UK. The index looks at institutions, human capital and research, infrastructure, market sophistication, and business sophistication –Switzerland is particularly strong in the last of these. Knowledge, technology and creative outputs, such as patents, trademarks and creative exports, like films, also play a role in the rankings.

Switzerland scored particularly high in the category 'knowledge and technology outputs'. One measure of this is patent applications – and the Swiss have the highest ratio of European patent applications to population. In 2015, Switzerland had 873 applications per million inhabitants, followed by the Netherlands with 419 per million and Sweden with 392 per million.

6 http://www.oecd.org/switzerland/economic-survey-switzerland.htm

7 http://www.oecd-ilibrary.org/economics/oecd-economic-surveys-switzerland-2013_eco_surveys-che-2013-en;jsessionid=1ttk7n585pwss.x-oecd-live-02

8 www.bfe.admin.ch/php/modules/enet/streamfile.php?file=000000011122.pdfphp?file=000000011289.pdf

Universities in Switzerland regularly score high in various rankings: in 2016 the Swiss federal technology institute ETH Zurich came 4th in Europe behind three British universities: Oxford, Cambridge and Imperial College London (and 19th overall) in the Times Higher Education World Reputation Rankings. The universities are involved in projects such as an innovation park in the Swiss city of Fribourg which aims to create 200 jobs, and provide a space where scientists and entrepreneurs can meet.

The Swiss solar-powered plane Solar Impulse, a university led sustainability project, has drawn worldwide and long-lasting attention to finding sustainable solutions for travel. Solar Impulse is one of a kind, but there are also more down-to-earth projects focusing on sustainability.

Scientific knowledge and technology transfer

The SFOE Energy-Economy-Society research programme focuses on economic, social and environmental issues relating to the extraction, distribution and use of energy. Energy markets are characterised by a variety of deficiencies, and this often means that economically efficient results can only be achieved through state intervention. According to the programme web site, gaps in the market can have a variety of origins [9]:

- Energy is an essential commodity: it is required for every economic activity. This means that it is not only the price that is important, but also supply security and public services.
- Networked energy has the character of a natural monopoly, since the construction of parallel pipelines and networks is not economically viable.
- Many decisions are only taken after lengthy periods of investment and use. This calls for long-term forecasts, and the associated problems concern dealing effectively with uncertainties and comparing present-day and future cash flows.
- Many energy systems conceal the risk of major incidents – e.g. accidents, the costs of which cannot be borne by the operator of the facility, and which can have a significant influence on public safety. Governments want to do everything they can to minimise these risks.
- The consumption of many forms of energy results in the emission of pollutants. At present, the harmful impacts of these emissions are not reflected in energy prices, and this means that the various players do not have adequate incentives to reduce these emissions.
- The problems of pollutant emissions and growing scarcity of fossil fuels are giving rise to questions regarding the supply of energy for future generations.

The CTI is the federal innovation promotion agency responsible for encouraging science-based innovation in Switzerland by providing financing, professional advice and networks, especially for SMEs . The CTI operates on the principle of subsidiarity, supporting innovation projects which, due to lack of funding, would not otherwise be possible, or whose market potential could not be realised. It is active in cases where initiatives in the private sector can be supported by state measures. By helping to transfer research results into concrete marketable products, the CTI helps to improve the competitiveness of Swiss businesses, particularly SMEs [10], thereby contributing to a strong, innovative economy in Switzerland.

The CTI provides support for innovation projects which would not be implemented or which would come to a halt without support. Unused ideas from companies should be transformed into marketable innovation with the support of public research competence.

Another relevant programme is called Energy start-up solutions for 2050 (www.saft2050.com/#intro). SAFT challenges early stage start-ups to accelerate Switzerland's transition to a sustainable energy system by 2050. Five winning teams will take part in an intense start-up boot camp, including an international market expedition to the San Francisco Bay Area. Entrepreneurs in the field of smart cities, energy efficiency, and distributed generation are invited to apply. SAFT is for Switzerland-based entrepreneurs who are Sustainably Advancing Future Technologies in the fields smart cities, energy efficiency and distributed generation. SAFT allows start-ups to take it to the next level by going abroad to Silicon Valley.

9 http://www.bfe.admin.ch/forschungewg/index.html?lang=en

10 https://www.kti.admin.ch/kti/en/home/ueber-uns/auftrag.html

Conclusions

Context analysis

Industry structures	*Key players energy regime* Utilities: around 600 companies in a market that is only partially liberalized. Energy services becomes more and more part of their business model. Buildings: 80% of residential buildings are owned by individuals not companies. This leads to sub-optimal building management, since not very professionalised. Engineering consulting firms and large energy customers are already working closely together in the field of energy efficiency. ESCOs: relatively undeveloped in Switzerland, but new initiative launched by SFOE regarding energy savings contracts. *shares of final energy demand* (SFOE statistics) Large firms/industry: 18% of final energy use Service sector (tertiary): 17% Transport: 36% Households: 28%
Policy context	The following measures regarding energy efficiency are part of the Energy Strategy 2050 supposedly entering into force in 2018: • continuation of the tenders for electricity savings • increased funding for the building refurbishment programme • tightening energy standards for electric appliances in line with the EU regulation • CO_2 emission standards for cars and light trucks in line with the EU regulation • fiscal measures for building refurbishment
Market and User practices	Energy Efficiency itself is not appealing Energy costs not perceived as painful or high; do not create urgency The use of energy is an invisible practice Consumers like "fancy" and innovative products such as electric cars. Due to the high purchasing power of the Swiss population, Switzerland is an ideal market for testing innovative technologies.

Context analysis

Technology and Infrastructure	Most energy efficiency measures are well developed R&D still plays a role, especially for smart services Roll-out of the smart meter is not expected to affect consumer behaviour significantly, due to the relatively low prices and the fact, that Switzerland has been applying differentiated day-night tariffs for several decades. Integrating measures and creating value in a systematic solution still a key issue (see example of BKW)
Culture	In a study, six energy consumer types were identified: idealistic, selfless inconsequent, thrifty, materialistic, convenience-oriented indifferent and problem-aware well-being-oriented energy consumers. They all showed different behavioural patterns regarding adopted energy conservation measures.
Scientific knowledge	Research has broadened from a focus on technological innovation towards social innovations, with a special research program lead by SFOE: http://www.bfe.admin.ch/forschungewg/index.html?lang=en

References:

Large parts of the text was taken from the Ministry and other websites, see footnotes and references given in the text.

The Swiss case studies

The initial longlist for Switzerland contained 38 potentially interesting businesses/ energy efficiency services. These services represented a nice mix of visualising energy use for homes, buildings and industry, storage, auditing, total solutions, lighting and heating.
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. The table below highlights the selected cases.

Category of Energy Efficiency service	Name of business	Description of proposition	Success Declining – Stable o Growing +
Retrofitting	Evalo	eVALO is an analysis-tool for house energetic renovations. It presents renovation measures and calculates the potential of energy savings.	+
Smart management systems (home/industry)	Ben Energy	A B2B2C software allowing for customer insight and actionable advice for product development and energy efficiency	++
Total (one stop shop) solutions	SIG	Éco-social has the goal to improve the energy efficiency of low income house holds by proposing energy saving measures	+
	SIG	The program "Commun d'immeuble" has the goal to reduce the energy consumption in the public areas of multifamily buildings. These are for example the lighting in the staircase, the collective washing machine etc.	+
	GroupeE-Tygr-Ench	Provide a whole and simple package to get subsidies for energy efficiency measures in companies, including an audit	+
Renewable waste energy	Julia Dusche	Recovering heat waste and waste water with a new shower channel	++
Lighting	GroupeE	Public lighting for communities	++

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

Smart Management Services

The Story of BEN Energy Switzerland

BEN Energy is a software tool that combines predictive data analytics and behavioural psychology to help utility companies to provide services to their residential clients. BEN Energy can establish very precise customers' profiles for the utility and offer various channels to reach the customers of the utility (incl. website) in the right form with the right information. BEN Energy is a B2B2C company The software tool analyses behaviour of customers and then predicts future behaviour or identifies drivers. In addition the tool can be used with or without smart meter. The tools can be used on all platforms, website, SMS, email or mobile. The Swiss start-up is a spin-off from ETH Zurich, founded in 2011. A few years later they already provides their customer engagement solution to 32 utilities in Switzerland, covering 25% of the Swiss market. Initially BEN Energy was financed by the founders working at ETH Zurich and a subsidy from the Swiss Federal Office of Energy (SFOE) and later of course by its customers.

Next to utilities that are partner and customers, BEN Energy also works with Universities (especially ETH Zurich from which it is a spin-off) for further conceptualising, and with smart meter providers. The main activities of BEN Energy are the development of the platform but increasingly of course the data analysis. As such the resources are also mainly the developers, the data and the software. BEN Energy entered a new market in Switzerland, which was not yet progressing much with either smart meters or feedback displays, but smart meter roll out will start when the Energy Strategy 2050 will enter into force in 2018. The costs are therefore also not material but related to salaries (90%) of which 60% goes into product development and 40% into sales and marketing. In the beginning the plan was to generate revenues for BEN Energy consisting of a bonus due to energy savings realized for the utilities, or avoiding of a penalty in light of the energy saving obligation scheme by the EU. But since that context did not come into existence BEN Energy changed its revenue system into a 50%/50% mix of product and service orientation, with both a one-off sale of products and the licensing of the software.

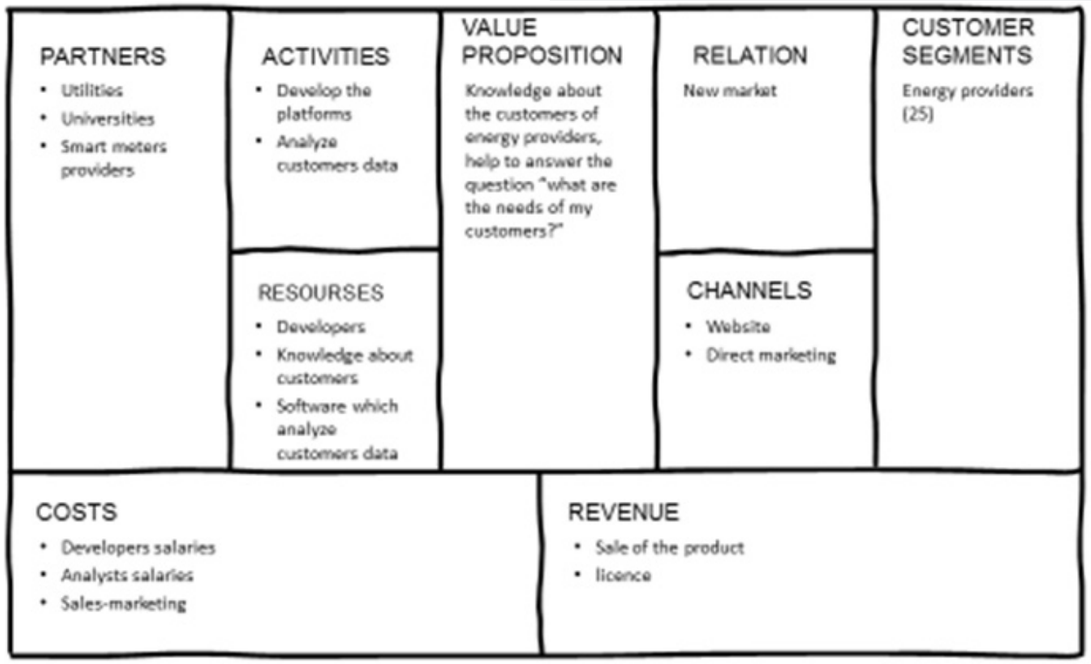

Figure 1. The Business Model Canvas of BEN Energy. Template based on Osterwalder and Pigneur (2010).

The value proposition of BEN Energy is multi fold and delivers value to the utilities and to their residential customers. On the one hand Ben Energy promises increased revenue because the software tool can predict interest in the products and services that the utilities would like to provide to their customers. In addition the service delivers higher customer loyalty because the software identifies customer that might be at risk to switch utility and predicts what might motivate them to stay. The tool also promises aid with the smart meter roll-out because it to some extent prepares the customer for the insight a smart meter might provide. Finally the software tool helps utilities identify potential for product development, increased campaign effectives and finally increased energy efficiency. BEN Energy also quantified this value, promising 108% increased sales, 58% reduction on service costs and 23% increased customer satisfaction.

Sensing user needs

The software is continuously improved based on the interaction of customers and feedback from the utility companies. Contact with these customers range from once a week to once every three months. In addition, the partner universities help improving the software on a constant base. The sensing of user needs also occurs with the word to mouth marketing and the door to door sales approach that BEN Energy follows. In the words of BEN Energy: "With every customer you find out new things on how to improve your BM. The BM is reflected after every meeting. There is a continuous check."

As such, BEN Energy not only is strong in terms of sensing user needs, but also in terms of conceptualization. 40% of the personnel costs goes into new product and service development in reaction to the knowledge generated with the customer interaction.
In terms of orchestration Ben Energy is indirectly working with this skill. BEN Energy does not need to orchestrate its experience to the utilities, but it is orchestrating the customer experience for the utilities. Potentially this skill is of key importance for its relationship with the primary customers; the utilities.

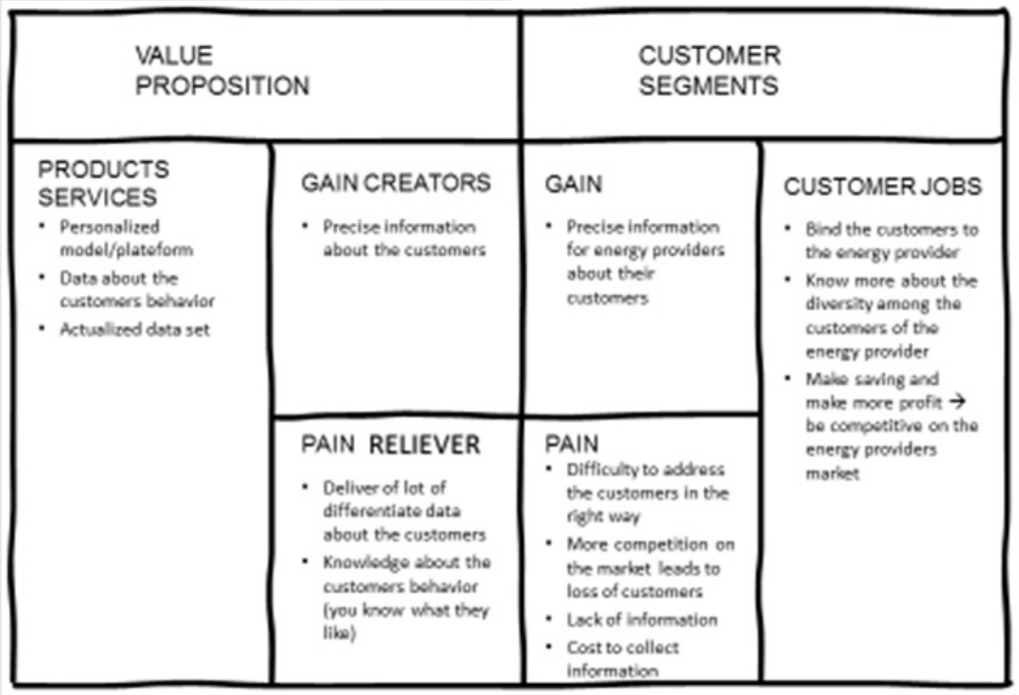

Figure 2: The customer value canvas of Ben Energy. Based on Osterwalder and Pigneur (2010)

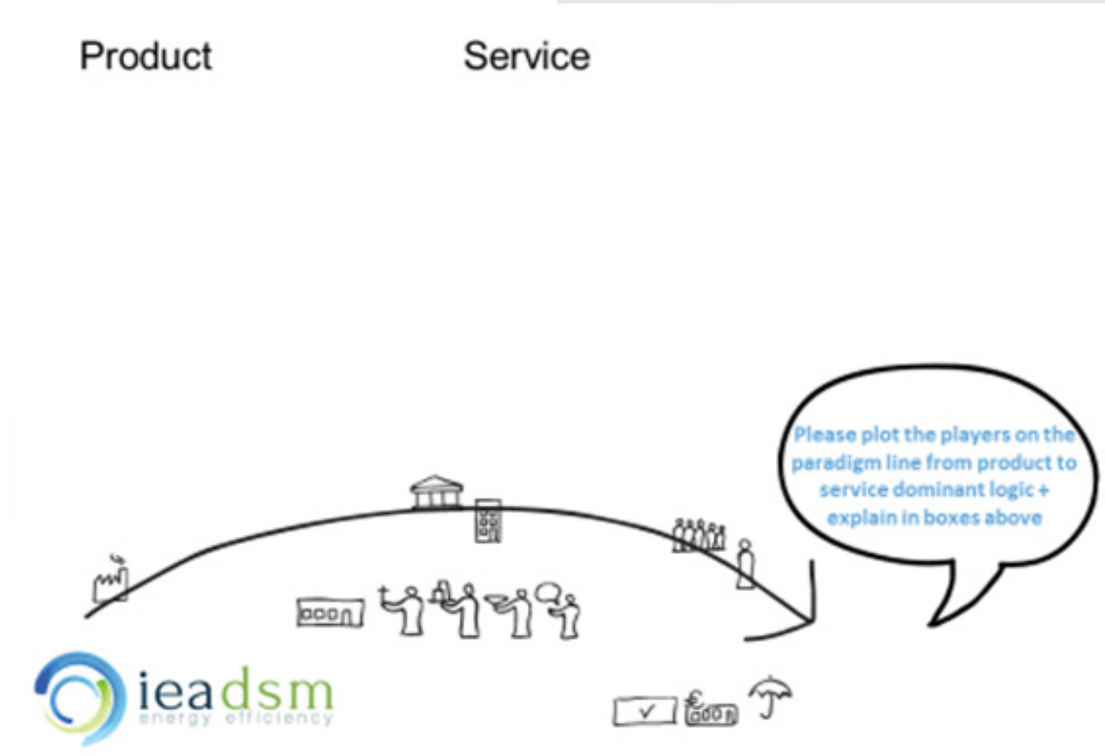

Figure 3: The position of BEN Energy and her stakeholders on the paradigm shift from product to service delivery

In terms of the scaling skill: BEN Energy is exploring expansion in Germany and Austria other new territories where the framework conditions are more favourable. A direct competitor of BEN Energy is Opower, but this actor is mainly active in the USA. Ben Energy experienced several hindering issues from the context. Some policy developments that would have been very conducive did not come into existence in Switzerland, for example the energy efficiency obligation scheme for energy providers, creating the 'pain' of necessary insight in energy consumption and action, and the liberalisation of the market, which would create the 'pain' of customer to switch the utility if electricity service is not in line with customer needs. In reaction to this BEN Energy changed some elements of its business model, and started to think about expanding to those countries in Europe where these policy conditions did exist.

Retrofitting cases

The Story of EVALO Switzerland

EVALO is an analysis-tool for building refurbishments. It presents renovation measures and calculates the potential of energy savings. The tool is available for free on the internet. The association members, which are providers of renovation technologies, financed the development of the tool. At the end of the evaluation through the tool, the measures proposed are associated with providers offering the service/product. The idea came from a professor for building physics at ZHAW (Zürich University for Applied Sciences). Her idea was to create something that could motivate students for building physics. The idea for this decision making tool emerged but there was no funding for a prototype. The professor started a road tour amongst industrial companies for fund raising. No subsidies were available. Three big companies provided first funding and soon more followed. The main customers are B2C single family house, multifamily building owners who aim to retrofit. In principle customers consist of people under 70 year old, since computer skills are necessary, EVALO also has some B2B customers for building refurbishment measures, but this client segment is secondary. The partners EVALO work with are the members of the association funding the tool, all providers of measures from the building industry.

In addition the tool is developed in collaboration with Universities. The main activities of EVALO consist of programming and marketing and the main resource is obviously software and data. The relationship with the end-customers is distant. These home owners are using the digital tool which is a self-help tool. However, in essence potentially, the real users of the tool are the energy efficiency or retrofitting companies which the tool points at after the self-check. That relationship is clearly more direct since they have to provide information on their services to the tool developers. EVALO is well known in the field through the association delivering the tool. In addition EVALO and the overarching association is extremely active at trade fairs.

The costs of this tool consist mainly of marketing costs and development. The exact cost is flexible and depends on what the members decide. In addition the maintenance of the tool and development of the tool in reaction to changing building standards contributes to the costs. The revenue system is a full service format, with members contributing a fee. The home owners can use the tool for free. The tool is being used more than 10.000 times a year, 900 times a month. Theoretically, if all suggested refurbishment measures had been realised, a sum of 300 million CHF could have been invested and CHF 19 Mio of financial support (subsidies) could have been used. However, no follow up of real uptake takes place.

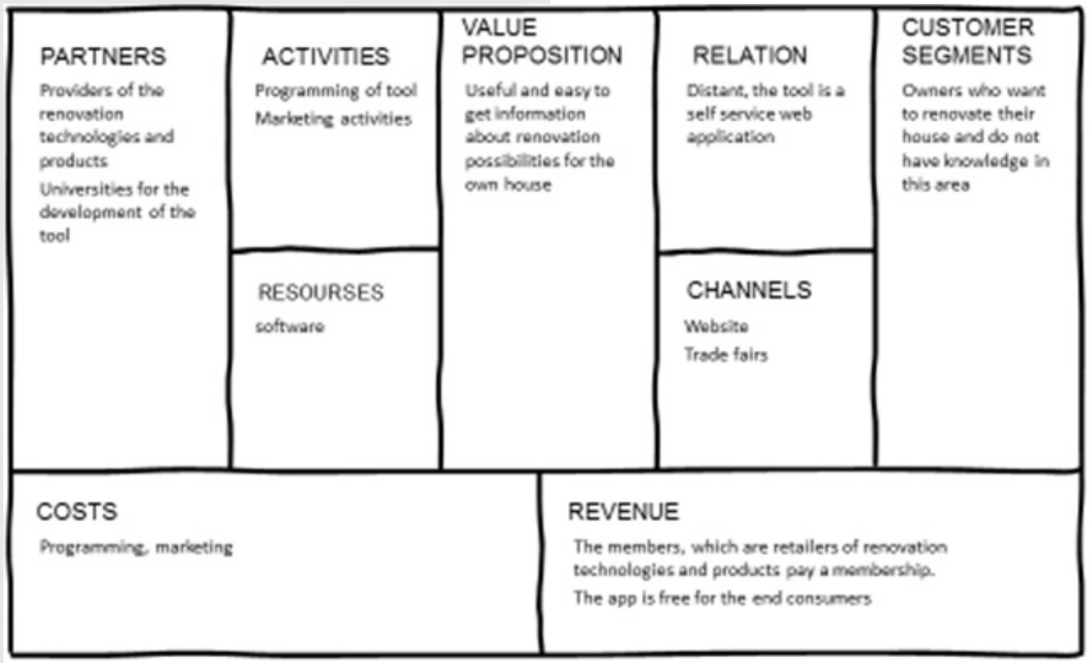

Figure 4: The Business Model Canvas of EVALO. Template based on Osterwalder and Pigneur (2010).

The value proposition of EVALO to the home owners is actually the offer of navigation through the complex information available on potential measures to retrofit your home and tailoring the technologies and products to the specifics of the home, providing the best fit. In addition the potential savings are calculated andthe final list can then be discussed with a buildings expert. The software tool EVALO offers two options: 1) quick check in a few minutes with energy efficiency class assessment or 2) a one hour in-depth check with detailed measures proposed. In Switzerland possibilities for subsidies are available up to 10% of the total investment, and income tax deduction can be had, and EVALO calculates the payback time of the measures. In addition, once the measures have been chosen, the customer can click onto google maps to find a nearby technician or company recommended by the association.

The relationship with the end-users being home owners is very distant. And the skill of sensing user needs is not fully developed. EVALO is a self-service web application.

The customers register to use the tool, but there is no follow up of what is happening with the results. The developers do think on behalf of the users. For example, further development of the tool aims to deliver display of financial support schemes on the cantonal or even community level. Moreover, an app has been developed now[11].

In terms of conceptualising, the tool is focused on improvement, but more with respect to updating the tool and algorithms to match new building and other technology norms and or certifications.

The orchestration skill however is very strongly developed in this start-up. Orchestrating is in essence the value proposition to the actual end-users (the home or building owners) and also the technology and product companies funding the tool. Providing a seamless experience to the user, from design to transaction is the key element of the tool.

11 http://www.evalo.ch/

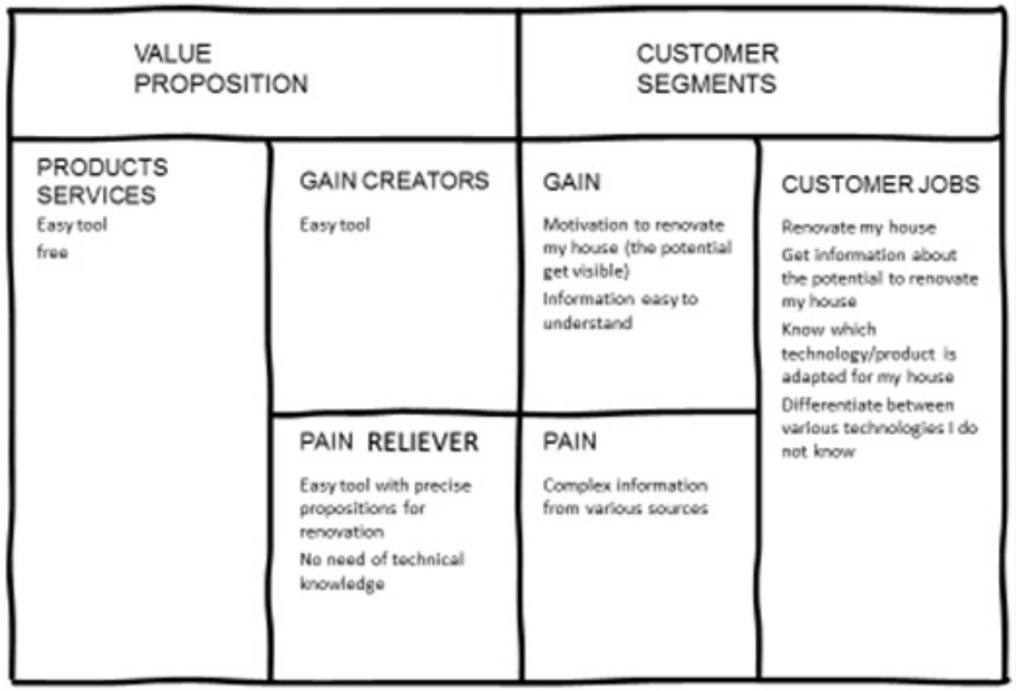

Figure 5:The customer value canvas of EVALO. Based on Osterwalder and Pigneur (2010)

In terms of scaling, the developers of the tool are looking into upscaling it to also be launched in Germany, and Italy. The start-up is developed around the tool and as such, the stretching capability is present.

EVALO is an association with 5 member companies and a strong working partnership with the applied university of Zurich, whose department is constantly aiming at improving the tool.

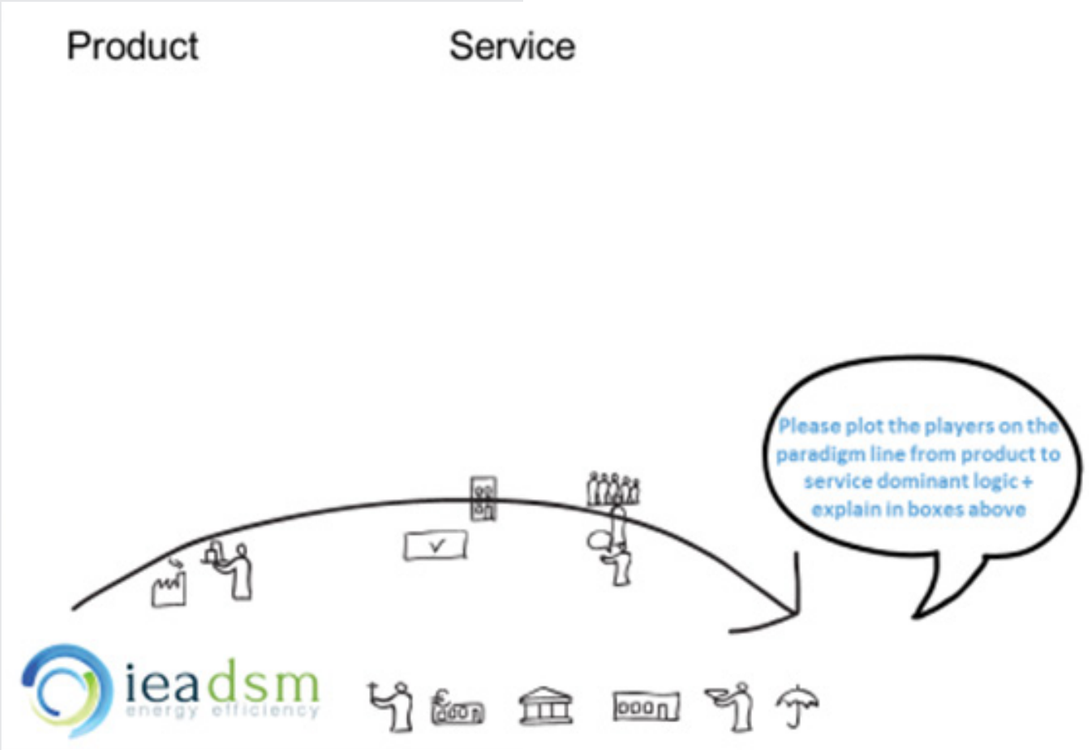

Figure 6: The position of Evalo and her stakeholders on the paradigm shift from product to service.

Total solutions cases

The Story of GroupeE Tygr-Ench Switzerland

GroupeE is an energy supplier active in several Cantons of Switzerland, with approximately 500.000 clients. It is a public company. The energy supplied comes mainly from Hydro, and other renewable sources as well as some electricity from thermal plants. GroupeE has been active for more than 100 years and for the past 5 years it became active in the Swiss field of energy efficiency. In this study, two projects of GroupeE are analysed, TygrEnch in this chapter and the Lighting Programme in the next chapter.

The Tygr-Ench concept is a very innovative service which aims at supporting companies (both SMEs and multinationals) to identify potential for energy efficiency in their company, and help them implement these measures based on available state or regional subsidies. This is combined to an auction with four rounds of bids taking place for a whole day, where the companies can bid for subsidies for measures with a return on investment of more than 3 years, for which legal options already existed. This innovative element was implemented as part of a larger programme already running, called ProKilowatt where subsidies of up to 40% can be obtained for measures with a return on investment of more than 3 years not being viable without support (see chapter "context").

Groupe E provides the total solutions, from the audit and subsidy acquisition to the implementation.

The customer of GroupeE are already existing clients, taking energy from GroupeE. As such there is a long standing relationship with the client. More than 70 companies have expressed interest in this service, of which 35 wanted to enter the programme and have an audit performed. Of these 28 did retain funds and complete the programme including the auction. The costs per kWh of electricity saved by the measures got significantly lowered because of the auction, from an average of 4.10ct/kWh to 2.02ct/kWh (CHF). The measures implemented ranged from lighting to heating, cooling, ventilation and equipment.

The reasons for GroupeE to do this were multiple. It did so to acquire auditing skills, to better understand needs of companies with respect to energy efficiency implementation, but also to gain and retain the larger customers, for which the electricity market is liberalized in Switzerland. GroupeE belongs largely to the state (canton), but has to be market-oriented and sell products which are economically viable. And large customers can freely choose which energy suppliers they would like to contract so Groupe E needed additional services to contract these companies.

The partners of GroupeE in this service are the subsidy programme developers, i.e. authorities. The activities performed all relate to the offering of a one-stop-shop experience. The resources used relate to this total solution and thus range from acquisition skills to management and technical support. The clients are existing clients and potential new clients, and the means to reach them were through a large scale marketing campaign, directed at both groups. No tailoring took place to the individual companies.

The cost and revenue system are still very much product oriented, which is partly also logical because the service is a means to acquire and retain clients, not a service on its own. *(Figure 7)*

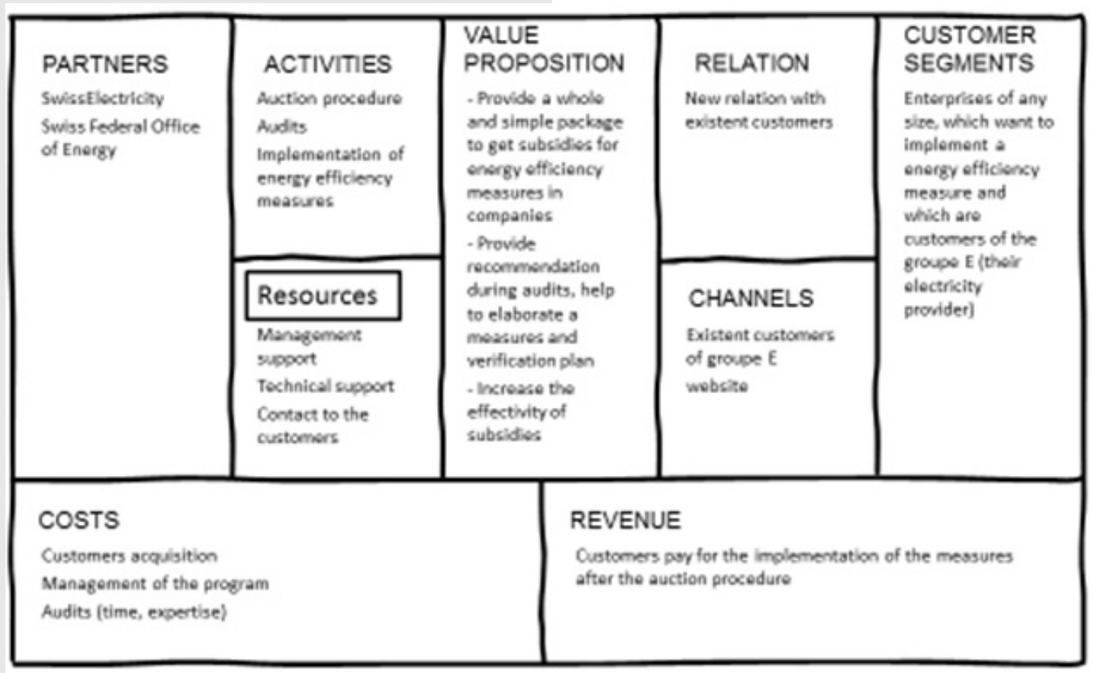

Figure 7: The business model canvas of GroupeE Tygr-Ench. Based on Osterwalder and Pigneur (2010)

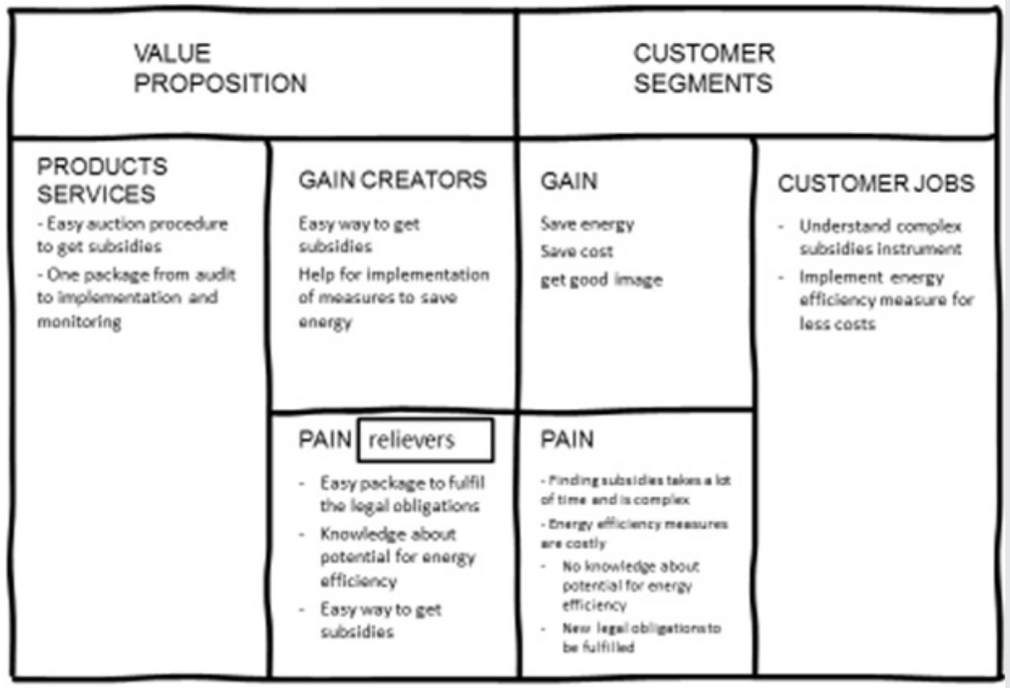

Figure 8: The customer value canvas of GroupeE Tygr-Ench. Based on Osterwalder and Pigneur (2010)

The value GroupeE aimed to provide to the companies was a financial support programme based on the existing subsidy schemes at the national level. GroupeE acts like an intermediary to facilitate the access to the nation energy saving tender scheme . Some of the companies were under legal obligation to implement energy efficiency measures and GroupeE offered them a total one-stop-shop experience and solution. To be enticing, GroupeE aimed to make the service as easy as possible and to "sell" other benefits such as cost benefits and process optimisation. *(Figure 8)*

In terms of sensing user needs, GroupeE relied completely on its knowledge of its customers and from this knowledge starting thinking about potential needs. The service is however not so much developed with the needs of the customers as a starting point, but from the need of GroupeE to retain and gain new customers in competition with other energy suppliers. Conceptualising did not take place extensively. The service was designed and piloted with the first 75 companies, of which approximately half completed/ participated at the auctioning programme.

It is not clear if GroupeE aimed to learn why the other half did not complete the programme. No adjustments were made to the service or business model. The orchestrating capability is clearly very well developed, with GroupeE aiming at delivering a seamless one-stop-shop experience to its clients. Stretching is taking place extensively in the company since, after a repositioning this year which led the energy efficiency and renewable energies departments now to be in the same administrative unit, which allows a global approach to the customer. A structured package of products is presented to the customer.

Scaling however is a problem for this service since the federal subsidies are limited and new ideas have to comply with the federal rules of the Pro Kilowatt auctioning scheme[12]. The business model is experiencing constraints from politics, since it is a partly state owned company that has not the same flexibility offering new services as a private company would have. State aid rules gain importance in the Swiss policy context. *(Figure 9)*

12 http://www.bfe.admin.ch/prokilowatt/

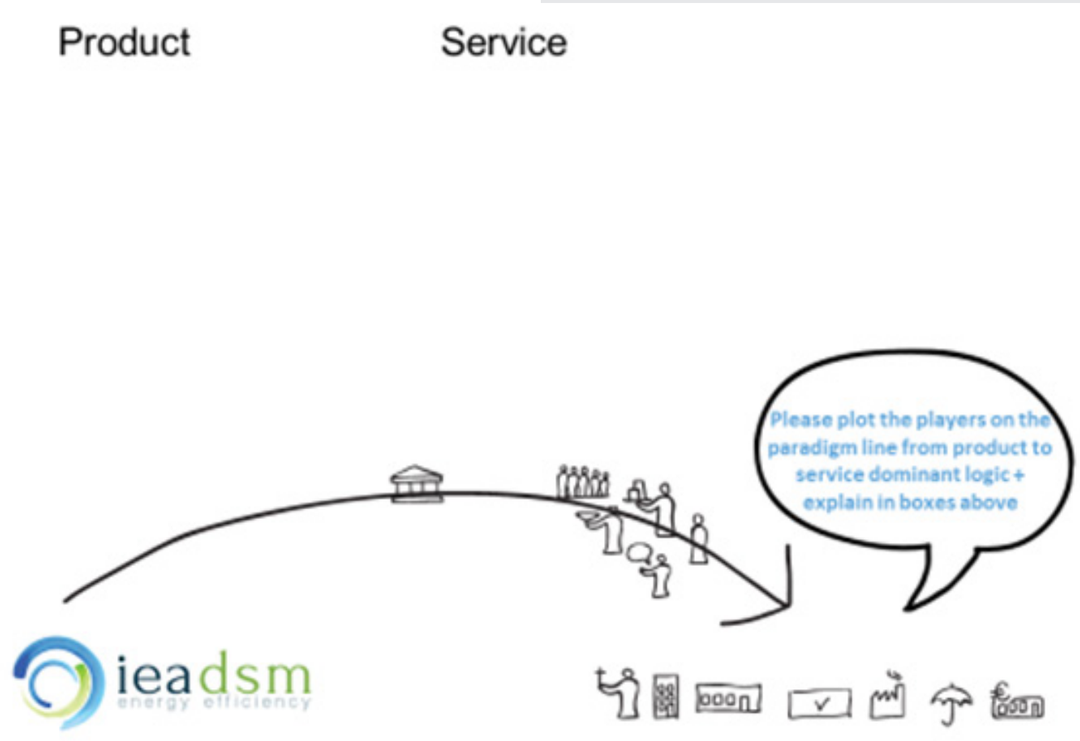

Figure 9: the position of Groupe E Tygr-Ench and its stakeholders on the paradigm shift from product to service.

The Story of SIG éco21-Ecosocial Switzerland

The project éco21 is an energy efficiency program of Service Industriel de Genève SIG, the energy distributor of the canton of Geneva. Within éco21 several measures are implemented to reduce energy in households, real estate, SMEs and large consumers. éco21 was established in 2009 and has had a starter budget of 53 million CHF which allows more than 100GWh/y of electricity savings (approx. 4% of Geneva's consumption). Today the budget is around 10 million CHF/year for 20 GWh/y of additional electrical savings plus an objective of reducing the emissions of 825'000 tonnes equivalent of CO2 by 2020. In this research project, two sub-proramms, the ecosocial and "commun d'immeuble" are analysed and discussed. This chapter focuses on the ecosocial, the next chapter on "commun d'immeuble".

Écosocial is a sub programme under éco21, which has the goal to improve the energy efficiency of low income households which otherwise cannot afford to buy energy efficiency products.

SIG needs to work with multiple partners in this programme. In cooperation with the municipalities and the social workers active in Geneva, SIG hires local, unemployed people and trains them in basic energy efficiency measures. These partners are also essential in finding the low income households that can be targeted. Suppliers of energy efficient products provide the products and aim to increase their sales. There is a label developed by SIG called "éco21" that is delivered to distributors that sell the energy efficient products, and where the low income households can go to if they need more energy efficiency products.

SIG provides the training to the unemployed persons. These people will go from door to door of low income households and improves their energy efficiency by changing light bulbs, provide vouchers for new, efficient appliances (e.g. washing machines) and give energy efficiency advice. The programme has social, ecological and economical aspects.
The measures are paid by means of a public budget, SIG pays half and municipalities the other half.

The main goal and the main value proposition is to reduce the energy consumption in low income households. The side effects or multiple benefits or values are that these household save money, learn more about energy efficiency and unemployed people get some work to do and all this reduces CO2 emitted. In the beginning the action performed consisted only of changing the light bulbs, but in the meanwhile the programme expanded and now water and thermal aspects are taken into account too, Because the programme addresses environmental issues in general, not only electricity saving.

There is no competition. It is a programme financed by the public budget and no commercial element exists.

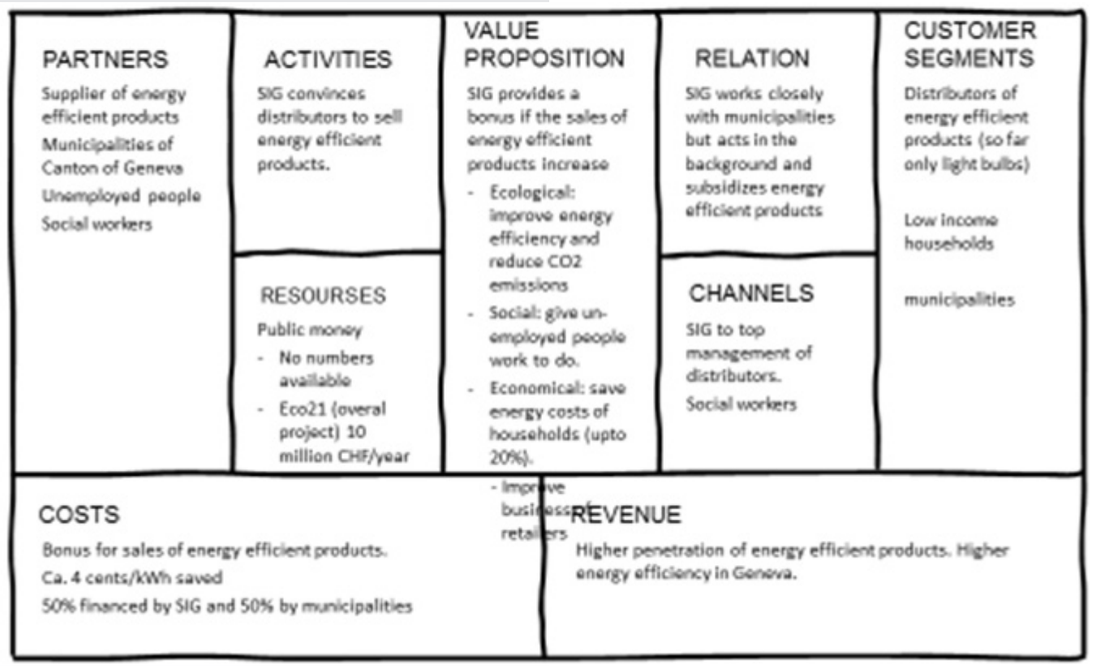

Figure 10: Business model canvas of SIG ecosocial. Based on Osterwalder and Pigneur (2010)

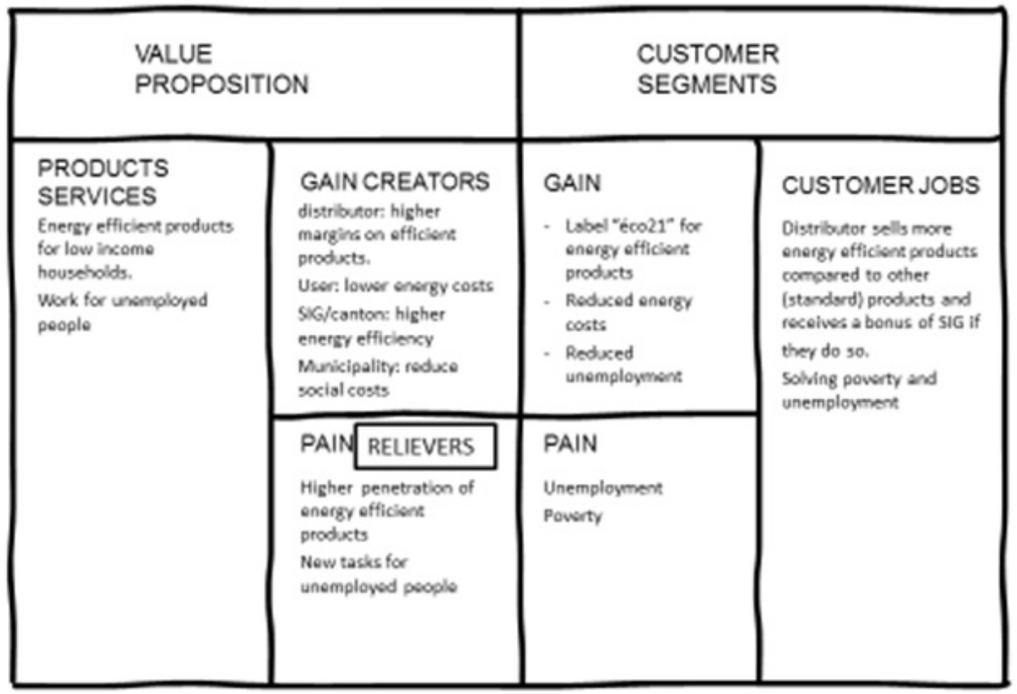

Figure 11: the customer value canvas for SIG ecosocial. Based on Osterwalder and Pigneur (2010)

The idea was to combine the need for energy efficiency with a social aid programme. Although energy poverty does not exist, low income household are not eager to change to more efficient appliances. With the lighting technology available, the "rich" city of Geneva set up this programme to push energy efficiency. It would not have been politically sensible to address the programme to all households (also the wealthy ones).In terms of sensing user needs, feedback from the users demonstrates that 90% of all households agreed that somebody comes into their house and gives tips on energy efficiency improvements. The low income household normally buy the cheapest products in the shop, which are not the most efficient. They were very happy to receive efficient light bulbs and other products for free.

The orchestration skill is well developed, considering that SIG aligns the interests of the Canton of Geneva, the municipalities, the social workers, unemployed people to deliver a seamless experience to the low income households.

In terms of stretching, the programme is part of a larger programme of SIG and as such well embedded within the organisation institutionally. The programme covers the whole area of the Canton of Geneva. Once most low income households are equipped with the latest technology, the programme will run into saturation. The launch of the programme in 2009 was key to trigger energy efficiency through awareness rising. There is no need for scale up, rather phase out once the programme has reached its goals. This is a general principle for federal subsidy programme, also to minimize free riding.

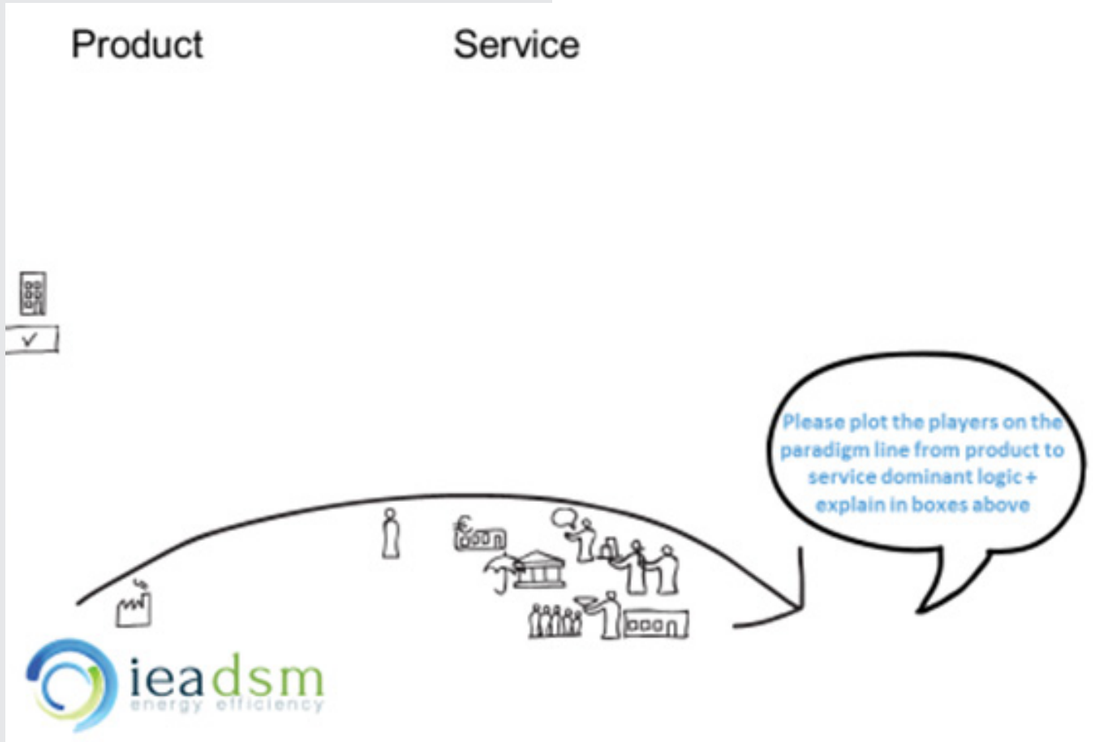

Figure 12: the position of SIG eco-social and its stakeholders on the paradigm shift of product to service

The program is a big success and will be continued. The allocated money in 2009 draws to a close and new sources must be found. A plan for the future is to provide bags with energy efficient products. These can be used as gifts for example. The program shall also be implemented in other cantons.

The next implementation will take place in Lausanne.

The achieved savings are 1 GWh/year (~3000 Households), and the cost efficiency is 15 cents/kWh.

The Story of SIG Eco21-Commun d'immeuble Switzerland

The program "Commun d'immeuble" has the goal to reduce the energy consumption in the public areas of multifamily buildings. So, multifamily houses administrated by a building administration (régie in French) are the main target group. Before 2005 it was an obligation to keep the light on 24h hours a day in the common parts of buildings. Now this is not the case anymore. However, out of habit, it is still common in many buildings and the programme "Commun d'immeuble" shall help to improve the efficiency and reduce consumption.

The measures focus on for example the lighting in the staircase, the collective washing machine etc. The building administration can ask for an offer to improve the energy efficiency in its building(s). Energy Service Companies (electricians, etc.), which are certified by SIG, are ivited to offer energy improvements.

SIG facilitates between the electricians and the client and offers a bonus of 15ct/kWh saved to reduce the investment cost of the client in the first year.

SIG does the marketing and offers an online tool. SIG informs the building administrations about the possibility to join this program via key account managers which already have these building administrations as clients, so the client relationship is warm and direct channels are used. SIG also offers short trainings for electricians in order to increase their know-how about pay-back time etc. and for building administration about energy saving potentials in public areas. The project is mainly (apart from the bonus) paid by the client. The measures have normally a pay-back time of less than 7 years.

The key players are SIG, the building administrations and the ESCOs (electricians, etc.)

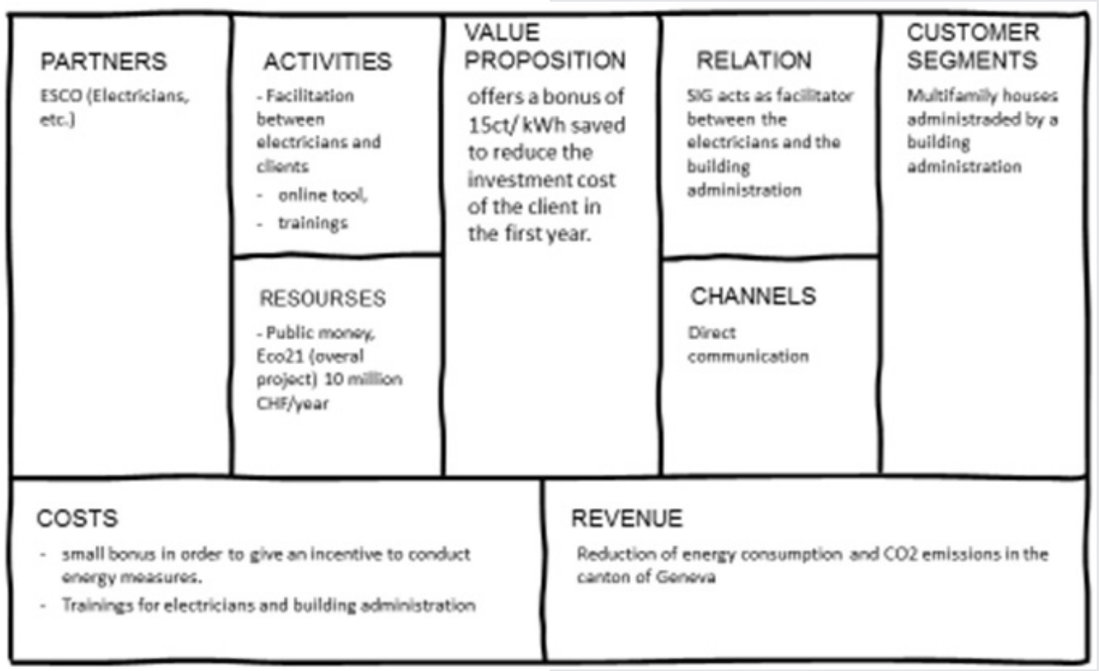

Figure 13: the business model canvas of Sig eco 21- commun d'immeuble. Based on Osterwalder and Pigneur (2010)

SIG belongs to the canton of Geneva. They have the mandate for energy security in the canton and goals to improve energy efficiency. Therefore, SIGs goal is to increase the energy efficiency in Geneva. The value proposition for the building administration is to save energy and money, and furthermore the improvement of energy efficiency and as such the experience of comfort in the public areas of the building. E.g. the light in the staircase switches on and off automatically. In addition, although there is no direct certification in the model, building owner can obtain (independently of "commun d'immeuble") a green label (USPI) if the building is energy efficient. This acts as an incentive to participate. It is a so-called eco-trophy for efficient buildings. With this trophy, building administrations can show that they act ecological and have a competitive advantage. As such, the revenue system focuses most on the value exchange and the reduction of energy consumption, an indicator used to ascertain whether SIG is performing well. *(Figure 14)*

SIG came up with this service in reaction to its own needs to increase energy efficiency in the canton of Geneva. It did not source the needs of the building administrations before launching the service, or discuss with the electricians they hoped would implement the measures. The initial value proposition was not well understood by the building administrator. They thought that all measures would be paid by SIG. There was consequently an overwhelming reaction in the beginning. SIG consequently had to conclude it had to improve the communication. But now the reactions are very good because the pay-back times are short, also partly due to the bonus offered. Initial feedback from first electrician users furthermore indicated that the online tools to learn more about energy savings and payback times needed to be improved. *(Figure 15)*

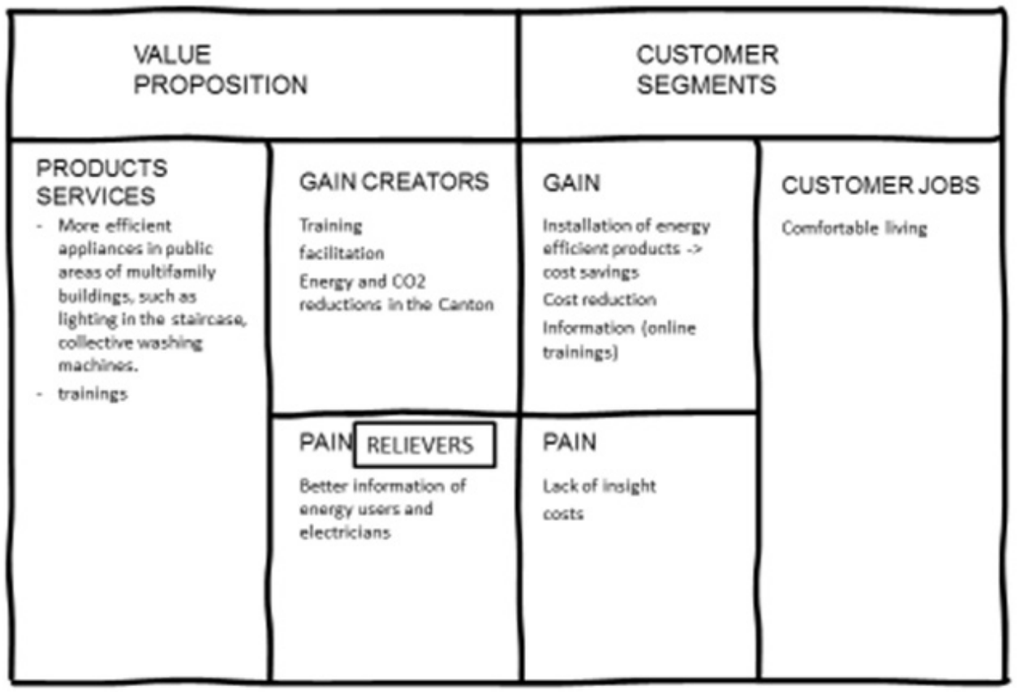

Figure 14: the customer value canvas of SIG eco21, commun d'immeuble. Based on Osterwalder and Pigneur (2010)

Figure 15: the position of SIG eco21- commun d'immeuble on the paradigm shift from product to service

Today, the program is seen by SIG as a big success and will be continued. See also the evaluation for the first phase carried out by the University of Geneva[13] . The allocated money in 2009 draws to a close and new sources must be found. The program shall be extended to further appliances such as drying machines, elevators and circulation pumps. Energy performance contracting on heat will be also added to reduce CO2 emissions, a decision based on political needs. The orchestration capability of SIG is clearly well developed, with this programme also well designed to offer a seamless experience to the building administration, even including training of the implementing companies to make sure their know-how is up to date. The programme covers the whole area of the Canton of Geneva. Once most residential buildings are equipped with the latest technology, the programme will run into saturation. The launch of the programme in 2009 was key to trigger energy efficiency through awareness rising. There is no need for scale up, rather phase out once the programme has reached its goals. This is a general principle for federal subsidy programme, also to minimize free riding.

13 https://archive-ouverte.unige.ch/unige:39958

In terms of stretching, less than one person is actively working on this programme, SIG hopes that one day this plan will live its own life, without SIG's support (=public support). SIG mentioned that some electrician implement efficient lights without asking any support anymore and some building managers are willing to pay for them without the support of public funding under the éco21 incentives. Although it might mean that less efficiency measures are implemented. The results achieved so far are impressive: 6 GWh per year -> 30 accumulated GWh/year in total (1% of electricity consumption in Geneva canton); 700 buildings per year (5000 buildings in total). The cost efficiency is 3 cents/kWh.

In terms of alignment with context actors and factors, SIG is experiencing a lot of alignment clearly with the building administrations and electricians involved. But the fact that a training scheme is needed to make sure there is a level playing field in terms of know-how and the fact that the programme is still very much dependent on public funding to scale up is a clear indication that the alignment in the paradigm shift from product to service orientation still is developing. SIG clearly states that there is a lack of conducive governmental support. A national obligation scheme for energy saving would help to finance the program.

Lighting Cases

The Story of GroupeE Lighting

GroupeE is an energy supplier active in several Cantons of Switzerland, with approximately 500.000 clients. It is a public company. The energy supplied comes mainly from Hydro, Thermal and other renewable sources. GroupeE has been active for more then 100 years and for the past 5 years it became active in the Swiss field of energy efficiency.

The idea for the public lighting total solution service programme for municipalities and its business model emerged in reaction to several issues. First a legal obligation from the Swiss government for communities to deliver public lighting at lower costs. Also the obligation for GroupeE to reinvest part of its public money into provision of services to the public. GroupeE aimed for cost optimisation internally and for the municipalities it served (decreasing energy consumption) and GroupeE aimed to maximise use of tax exemption/or tax avoidance, and using subsidies from the state. In addition, a driver was the need to also increase its own role in sustainable development to improve the corporate image.

Another context related issue influencing the emergence of this service is that the state uses a ranking list to highlight best and worst performing communities. This performance ranking drove municipalities to start looking for cost optimisation and necessarily also for return on investment. This return on investment had to be shorter then 4 years because of the unpredictability of state policy and election cycles of 4 years.

GroupeE's partners for Lumino are the municipalities who are already connected to GroupeE through the grid. The activities GroupeE had to perform most are related to marketing and awareness raising. The company reported that it had to invest strongly in awareness raising and creating a market. Organisation of information workshops is one of the main activities and channels used. Of course activities also consist of the actual auditing, installation and maintenance of the lighting. The costs are for a large part also related to the marketing issues and of course the equipment and personnel costs. The revenue system is mostly service oriented with the service fee.

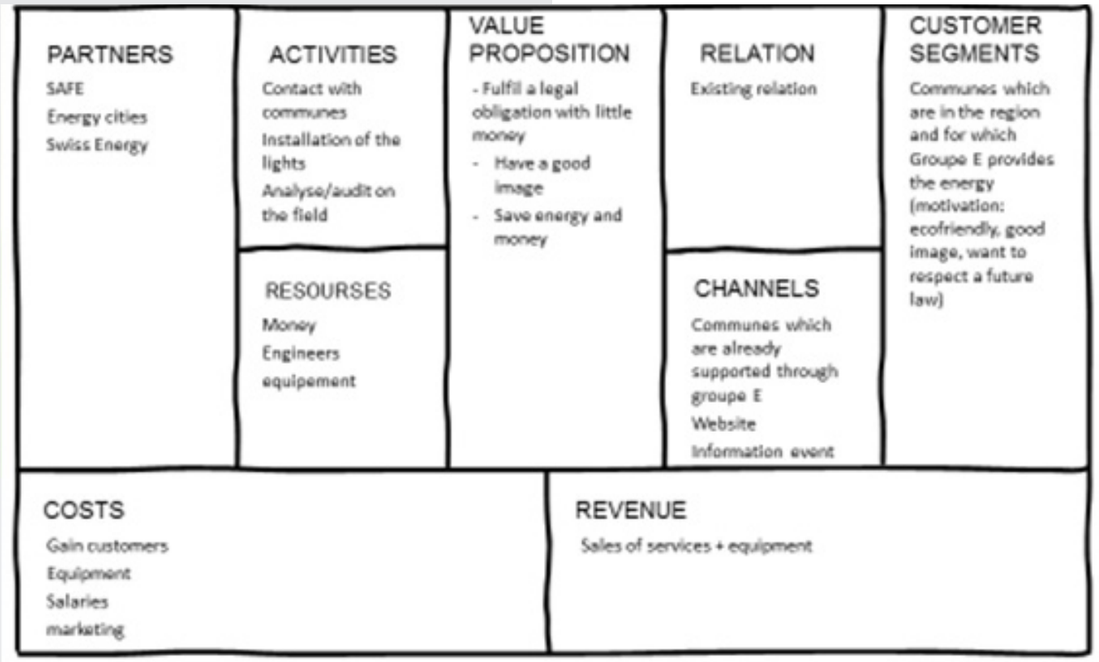

Figure 16. The business model canvas for GroupeE Lumino. Based on Osterwalder and Pigneur (2010)

Lumino is a total package service, from audit to conceptualization and implementation to maintenance. The value provided to the public authorities that are responsible for public lighting is then to take away fragmentation of the process from audit to maintenance, provide a clear and tailored insight in energy efficiency gains and economic aspects, and the value provided is assurance that the public lighting does meet the energy efficiency and public (e.g. road) security needs and obligations, and keeps working, with an emergency helpdesk.

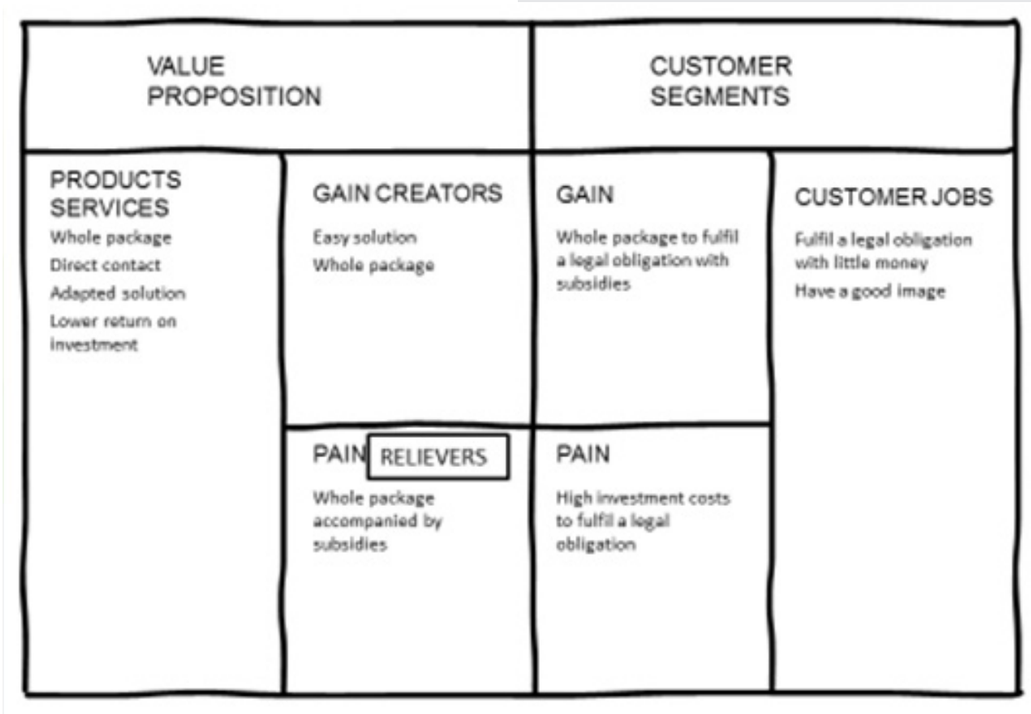

Figure 17: the customer value canvas for GroupeE Lumino. Based on Osterwalder and Pigneur (2010

In terms of entrepreneurial capabilities, GroupeE demonstrates a good understanding of the need for orchestrating, offering a clear and seamless customer experience to their clients. In terms of sensing user needs, GroupeE is making a real effort at sensing the user needs on a continuous base, in the sense that they provide a real service that goes beyond the transaction phase. GroupeE keeps involved, even in terms of solving issues and maintenance. In addition, GroupeE is using continuous information workshop for clients and potential clients to keep informed about the needs of clients. In addition, it is clear from the offer that GroupeE is focused on keeping the service updated to meet changes in the context, for example in terms of regulation compliance, and available subsidies. As such the conceptualising capability is well developed. An internal repositioning occurred this year: energy efficiency and renewable energies are now in the same administrative unit, which allows a global approach to the customer. A structured package of products is presented to the customer. GroupeE has phased out the programme at the end of 2015.

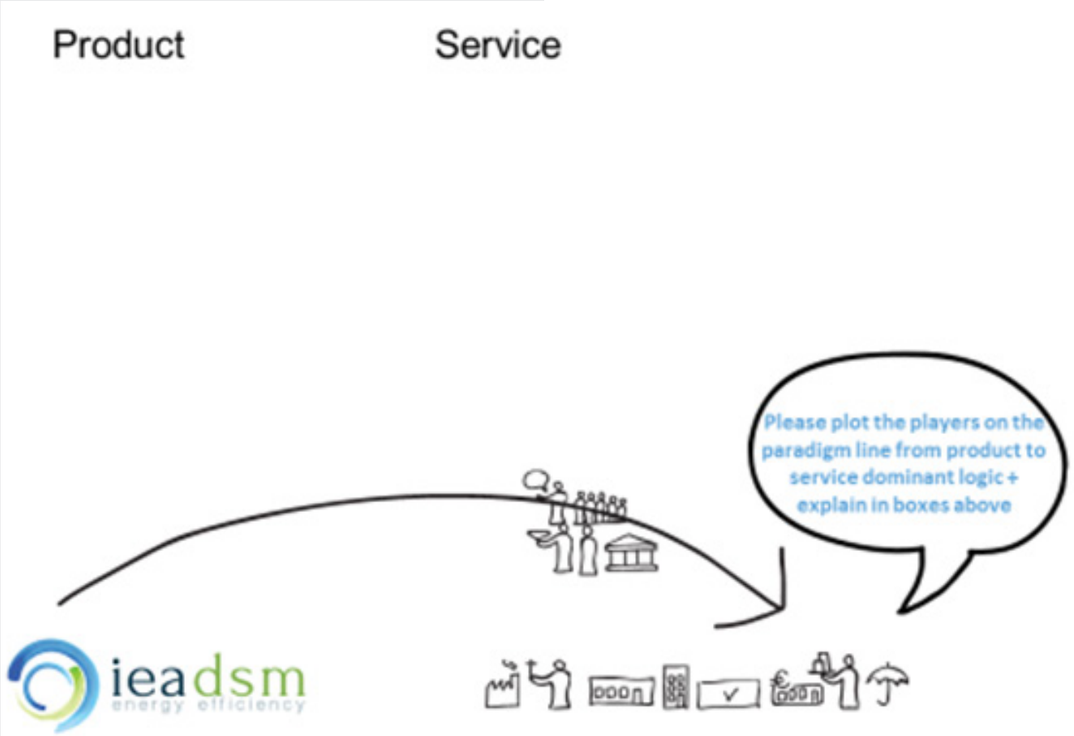

Figure 18: Expansion to municipalities in other cantons in the near future)

Heating cases

The Story of Joulia Dusche Switzerland

Joulia shower SA is an independent stock company, founded on 1. July 2010 after a three year period in which a group of people working at Creaholic experimented and tested different technological solutions to recover heat from shower waste water in their own homes.

Creaholic was founded in 1986 by Elmar Mock, one of the inventors of the Swatch. His vision was to establish a team of creative and technically minded individuals with the skills, knowledge and enthusiasm to deliver ground breaking projects. It took almost two years after that before the first solutions could be bought from the shelf. The heat recovering shower tray has been available on the market since September 2012. The cold water is routed on the underside of a special aluminium shower tray, and thus achieves very efficient heat recovery. A second more flexible and adaptable solution came into existence in 2015.

Joulia Dusche consists of an interdisciplinary project team, composed of engineers, designers, sanitary- and energy specialists. Initial activities were aimed at developing, marketing and refining the product. And the initial partners for the team was the old network of Creaholic.

In the beginning the idea was that the product has to be sold by referrals, but this did not work well because the value proposition was not clear yet and these resellers did not fully understand what they had to sell. So the Joulia Dusche people did the selling themselves. In 2015 however, when the second round of development took place a new partnership with Laufen bathrooms was formed. This offered the possibility to sell the product or licence directly to the sanitary manufacturers which get in touch with the end customers. So from a B2C company, Joulia Dusche changed into a B2B2C company, using a retailer. So in the beginning the clients were mostly end-customers, but in time the real clients became the installers, the bathroom showrooms etc. the channels that Joulia Dusche is using to reach its clients consist of trade shows, fairs, magazines etc.

In terms of competitors, there are other companies, but the difference with these is that often their technology is a black box (not in the bathroom, but somewhere in the pipe systems of the house), and is not certified.

Joulia Dusche did not receive any financial support but it did win the Design Preis Schweiz 2015/16 in the category Investment goods saving up to 1,000 kWh per year in a 4-person household.

The cost and revenue system is very product focused. The revenue system is based on a one-off transaction.

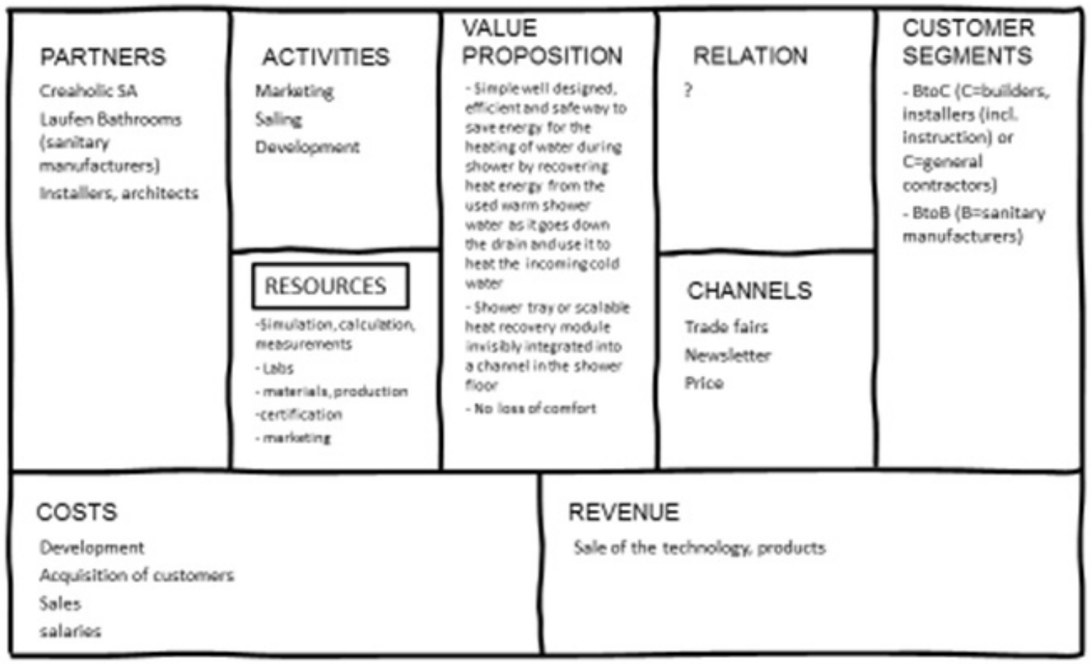

Figure 19: The business model canvas of Joulia Dusche. Based on Osterwalder and Pigneur (2010)

The value proposition of Joulia Dusche is focused at different levels: the company wants to develop a solutions which is “In-line with your cold water supply. In-line with an energy-efficient future. In-line with your personal needs.” In other words, a solution which is ecologically sound, which makes economic sense and wins over the planners as well as the craftsmen on the construction site. In the beginning the solution was a one size solution, but Joulia Dusche received many requests asking whether they could make Joulia products that could fit various sizes of shower areas and various situations. In response to this clear demand Joulia Dusche developed a second version.

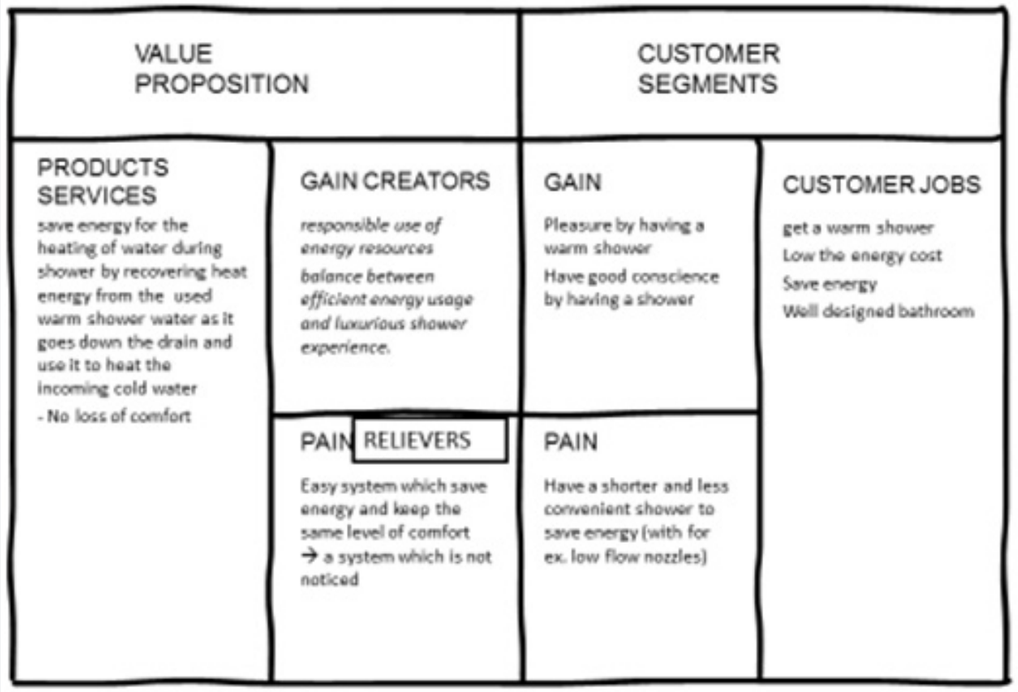

Figure 20: The customer value canvas of Joulia Dusche. Based on Osterwalder and Pigneur (2010)

In terms of sensing user needs, Joulia Dusche went all the way. They explicitly asked for feedback at trade shows, product presentations, from plumbing schools, during building site visits and more, and of course they tested the product at their own homes. In reaction to this feedback they developed a new technology: more flexible, for renovation as well, less expensive.

In terms of conceptualising the team is also effective, it took the feedback and designed the required much more tailorable solution.

Orchestration is not fully developed, although the partnership with the bathroom manufacturer, and the move from a B2C to a B2B2C company form is a step towards orchestration, or more specifically of becoming orchestrated.

As part of the orchestration skill of course Joulia is demonstrating clear capacity to work with the other context stakeholders and factors such as potable water regulations and certification. Joulia Dusche has the ambition to not be a product seller, but a competence centre for drain water heat recycling, working with patents, licensing etc. Joulia Dusche is still very much a technology developing company.

Stretching and scaling are skills that need further development.

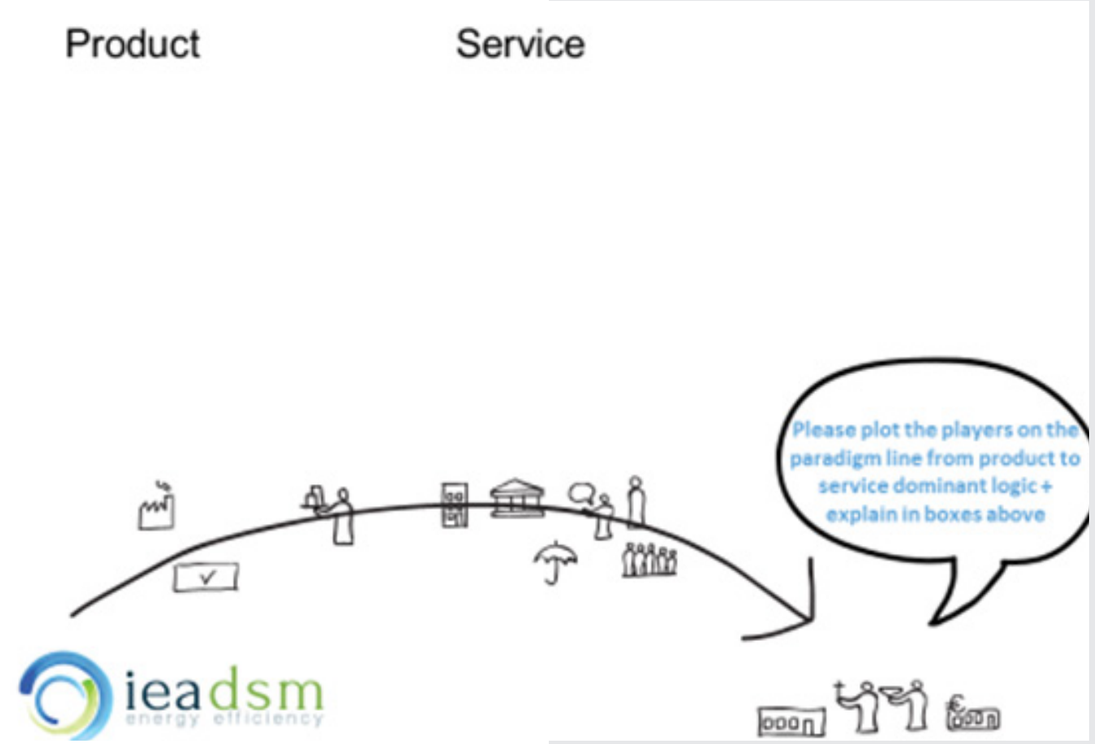

Figure 21: the position of Joulia Dusche and her stakeholders on the paradign shift from product to service.

Joulia Dusche is clearly battling with the context and its stakeholders. A first hurdle for them is certification, which is important because drinking water is concerned. But getting certification is difficult. It worked in Switzerland now, but is difficult to get in various countries because lack of harmonisation between laws. The value proposed by Julia Dusche furthermore is not yet recognised as value by multiple relevant stakeholders. Their value being “have a shower, use less energy, but have the same (or more) comfort”. Especially the combination with saving energy is new, because the most Business models out there try to save water and not to recover heat. So, the sanitary industry is rather passive at the moment. They are not yet convinced of the potential of heat recovery (rather they try to save water than recover heat). Customers using the showers are also not expressing a clear need for heat recovery when showering either.

They do not experience a problem and consequently there is no natural demand for the product. In Switzerland this partly has to do with the low energy price, and a lack of clear insight in the cost of heating water. Joulia Dusche is expecting this to change for the new homes to be build which require less heating and for which the costs for hot water are going to be proportionally higher.

Joulia Dusche summarised the above as follows: “Since the Joulia company is active in a new field and is considered as a unique solution, many actors (SFOE, energy consultants, the programme for competitive tenders ProKilowatt), that could provide federal support to this technology feel it's too early to support it because is could lead to market distortion, although there is no market competition yet."

Conclusions

To actually generate a change towards the much needed more user centred 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 Swiss business models we analysed demonstrate a great variety of doing business, and we have analysed the different strategies. The analysis shows that the Swiss business models are all designed around and even with the clients, having them even actively be part of the business model as resources and partners.

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). XXX 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. XX 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. XX 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. XX 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 Silvonen/Pertti Koski, Motiva, Finland

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

Seppo Kärkkäinen, Elektraflex Oy, Finland

Task 18 Demand Side Management and Climate Change - Completed

David Crossley, Energy Futures Australia Pty. Ltd, Australia

Task 19 Micro Demand Response and Energy Saving - Completed

Linda Hull, EA Technology Ltd, United Kingdom

Task 20 Branding of Energy Efficiency - Completed

Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 21 Standardisation of Energy Savings Calculations - Completed

Harry Vreuls, SenterNovem, Netherlands

Task 22 Energy Efficiency Portfolio Standards - Completed

Balawant Joshi, ABPS Infrastructure Private Limited, India

Task 23 The Role of Customers in Delivering Effective Smart Grids - Completed

Linda Hull. EA Technology Ltd, United Kingdom

Task 24 Closing the loop - Behaviour Change in DSM: From theory to policies and practice

Sea Rotmann, SEA, New Zealand and Ruth Mourik DuneWorks, Netherlands

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

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Task 25 D2 report Switzerland

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