

# USER-CENTRED BUSINESS MODEL INNOVATION FOR ENERGY EFFICIENCY: A LITERATURE REVIEW

**Joost Tolkamp**

Eindhoven University of Technology: Department of Industrial Engineering & Innovation Sciences.

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**Abstract:** The market for energy efficiency and demand side management, as part of the transition to a sustainable energy system, needs to see a more effective uptake. The end-user can play an important role as the use-phase often determines the success of an energy efficient measure and the user plays a crucial part in the uptake of these measures. When a business goes to the market it implicitly or explicitly operates a business model which describes how it intends to create, capture and deliver value. I argue the market uptake can be improved through the creation of user-centred business models. Furthermore the business model should not be seen as positioned in a vacuum; the sociotechnical context, be it policy or practice related, has a prominent effect. How to deal with user involvement and the policy context in terms of business model dimensions is knowledge that still lacks. The link between these topics seems to be insufficiently made.

*Key words: energy efficiency, user-centred design, business models, sociotechnical systems*

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## **1. Introduction**

Amongst scholars it has become generally accepted that a transition towards a sustainable low carbon energy system is required. Pressing climate issues have turned the eyes of many towards renewable energy sources. Besides greening the supply side a significant part of the transition is found at the demand side, where reduced and more efficient use of energy is aimed for. Energy efficiency measures, which aim to decrease energy demand, have shown to have great potential. Energy efficiency measures are defined as measures that reduce the amount of energy required for products and services (Behrangrad, 2015). In fact, energy use avoided through energy efficiency by member countries of the International Energy Agency was larger than actual demand met by any other single supply-side resource, making it the 'first fuel' in 2010 (IEA, 2014). Within industry as well as the residential sector there are enough options available to reduce energy demand, all profitable well within the lifetime of the measure taken (IEA, 2014). Despite this the untapped potential is still huge. For some reason the market uptake of these energy efficiency measures is not going as fast as desired and needed to sufficiently mitigate climate change. Not enough effort is put to reach the goal of limiting global warming to two degrees (IEA, 2014). It looks like proven and novel technologies are not sufficiently brought to the market.

Boons and Ludeke-Freund (2013) argue that the development of business models could help to tackle this issue. They frame a business model as a means to bring a technology to the market (Boons & Ludeke-Freund, 2013). Business models are traditionally used in marketing to conceptualize the way a firm organizes his business and how the firm creates and captures value (De Reuver, Bouwman, & Haaker, 2013). In this literature review the business model will be framed as a rationale of how an organization intends to create, deliver and capture value (Osterwalder & Pigneur, 2010). Value can be created by finding a customer pain and solving it or delivering a better solution than currently exists. A firm has to capture parts of this value to be able to compete, for instance by minimising costs or passing them on to the user. In order to make a product or service more valuable for the end-user one could argue that the firm should aim to create more value than it captures. Vargo and Lusch quote Gummesson in their argument that no value can be created without the user as “an unsold good has no value, and a service provider without customers cannot produce anything” (Vargo & Lusch, 2004, p. 11). Business models can explicitly aim for value creation or capture, resulting in different types of business models (figure 1) (Al-Saleh & Mahroum, 2014). In this way the business model can be seen as a means to differentiate your firm and technology from competitors (Teece, 2010). Chesbrough (2010, p.354) states that “a mediocre technology pursued with a great business model may be more valuable than a great technology exploited via a mediocre business model”.

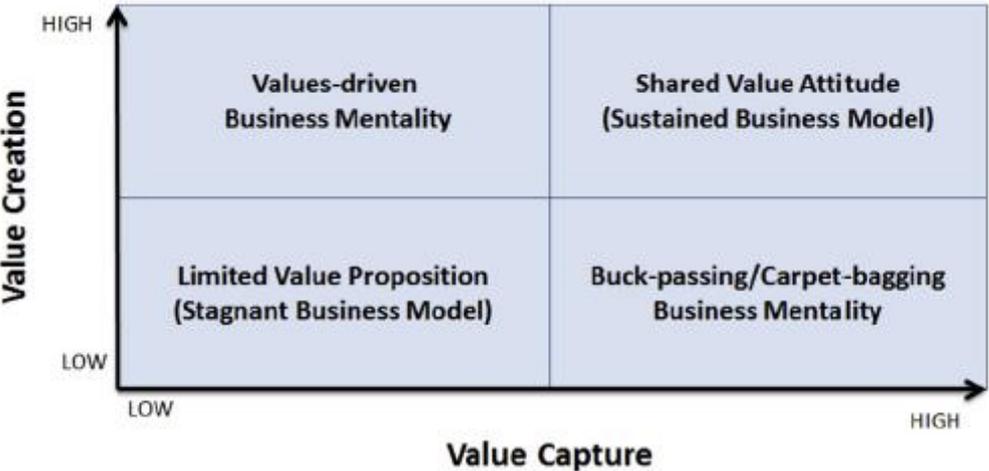


Figure 1: business model quadrant (Al-Saleh & Mahroum, 2014)

However, the firm and business model cannot be understood in a vacuum (Provance, Donnelly, & Carayannis, 2011); this is why contextual factors and their influence on the business model have to be addressed and accounted for. Especially the policy context can have an effect on entrepreneurs and the business model they operate (Huijben & Verbong, 2013), this will be discussed more thoroughly. Specifically in relation to the wanted transition towards a low carbon energy system, the need for innovative niche solutions and their upscaling, applying a systems perspective like the multi-level perspective (MLP) (Geels F. , 2010) and positioning the business model in it could be useful. Strategic niche management (SNM) is a framework that is closely related to the MLP. This framework might provide useful insights on the development of innovations and business models in the niche, which is an often protected space that allows for experimentation with policy measures, user-

practices and shows the co-shaping effect of innovations (Geels & Schot, 2008). In niches novelty can be grown, nurtured and empowered. Most business model innovations take place in the niche as well (Bidmon & Knab, 2014).

One has to be aware that making this transition towards a low carbon energy system is a complex challenge. Given this complexity this research will focus on the role for business modelling in the sociotechnical context. More specifically the role for user-centred business models to effectively and flexibly deal with this context will be the theoretical focus to contribute to this sustainability challenge. The focus on the user is taken as contemporary business logic is seeing a switch from a traditional goods-centred towards a service-centred dominant logic (Vargo & Lusch, 2004). The traditional logic, centred on the product, does not seem to be able to result in the required market uptake of energy efficiency. The switch in logic is a result of growing consensus that value is created in use. The value is thus not found in the product itself, but in the job or service it fulfils (Vargo & Lusch, 2004). In this emerging logic the customer is the one experiencing the use and value of a service and in that sense is always a co-producer of service, he or she takes up a more important role than merely being a recipient of goods (Vargo & Lusch, 2004). Furthermore, user needs and social practices have to be understood when you want to solve a problem for the user. These needs and practices can become more visible when involving the user. This can also lead to more trust and this might increase the likelihood to do business too (Edelman Berland, 2015). Finally it has been shown that the success of energy efficient measures is often determined by users, in the use-phase (Wever, van Kuijk, & Boks, 2008). These findings emphasise a potentially important role for users and user-centred design. However, detailed knowledge regarding the role of the user and how to involve them in the firm through a business models still lacks (Hienerth, Keinz, & Lettl, 2011). Firms like Dell and Threadless have clearly shown the potential of user-centred approaches (Hienerth, Keinz, & Lettl, 2011). However, despite acknowledged benefits of user-centred business model design not much seems to be known about the subject. This leads to the main question this review tries to answer:

*What is the role user-centred business model design could play in the transition towards a sustainable energy system?*

This question will be divided into three sub-questions, which will be dealt with individually:

- a) *What is the role of business models in sustainability transitions?*
- b) *How is the importance and role of the user described in business model, transition and other literature?*
- c) *In which ways does policy enable or inhibit the development of a user-centred business model?*

Next, the used method for data collection will be discussed after which the main results are presented. In section 3.1 an overview of the MLP and SNM will be given and as mentioned above, the business model will be placed in this context. Afterwards the impact policy as part of the complex system has on business model design will be highlighted. Sections 3.4 and 3.5 will be devoted to the importance of user-involvement and will link this to the business model. The paper will end with a discussion and conclusion section which will give directions for future research.

## **2. Method**

To conduct this study multiple steps were taken. A starting point was a number of papers in the topics transition studies, business models and user-centred design. Furthermore, articles combining these areas of research were of main interest. To widen the scope articles in related leading academic journals were searched for. These include Energy Policy, Energy Efficiency, Long Range Planning, Journal of management, Research Policy and Journal of Cleaner Production among others. Articles mentioning “business models”, “energy efficiency”, “demand side management”, “transitions”, “niche management”, “user-centred design” and “co-creation” or combinations of these were selected for a first scan. Relevant papers were then read and summarized. The articles were divided based on subject such as: general business model literature, user-centred literature, transition literature, but also combined topics such as user-centred design of business models. This initial search already showed that demand side management related papers often had a technical orientation. Furthermore, relevant organizations, such as the European Council for an Energy Efficient Economy (ECEEE), were kept track of. This led to some interesting insights and papers added to the list. After this process papers were found that cited these relevant papers or were cited by them. The selection of papers however was an iterative process; as the analysis progressed more papers were still added.

### **3.1 Sociotechnical transitions**

Sociotechnical approaches to transitions look at the role that technology and technological innovation plays in fulfilling a societal function. These approaches also emphasize that other, social factors, play a significant role in the sociotechnical system (Geels F. , 2004). As stated above, developments in the field of energy efficiency occur in a complex system. Especially the development of novel business models in the niche level and the tension between this novelty and the dominant logic in the regime can be understood well when applying a more holistic view. Applying a holistic systems perspective such as the MLP could thus prove to be a useful instrument to analyse a transition and the multiple dimensions related to it. This section will discuss the multi-level perspective and the corresponding framework called strategic niche management to frame and give the necessary understanding of the complex situation we are dealing with.

The multi-level perspective divides a sociotechnical system into three levels; the macro-level called the landscape, a meso-level called the regime, which is the contemporary system and a micro-level, called the niche. For a transition in the system to occur large-scale changes in the way societal functions are fulfilled have to be made (Geels F. , 2010). Pressures can lead to changes in the way a societal function is fulfilled. These pressures can come from the landscape, which consists of a set of deep, structural trends and developments in the sociotechnical environment. When these trends are not aligned with the existing regime they potentially open up windows for change, opportunities for niche actors. The trends and developments present in the landscape are presumed to be beyond the reach and influence of single actors in the meso and micro level (Geels F. , 2002) & (Kemp & Rotmans, 2004). In the case of energy efficiency macro political targets and guidelines, such as the energy efficiency directive (EU, 2012), can steer firms in a certain direction. As defined by Geels (2002), ‘the sociotechnical regime refers to a semi-coherent set of rules carried by different social groups’ (Geels F. , 2002, p. 1260). By providing orientation and co-ordination to the activities of other social actors these rules account for the regime’s dynamic stability (Bidmon & Knab, 2014). In essence it represents the dominant way that a societal function is fulfilled and how this works in a

self-supporting way; it is resistant to change. This resistance is embedded in several functional units within the regime (i.e. industry, policy, science, markets, user preferences, culture and technology) which are tuned for a specific system (Geels F. , 2002). This ensures a lock-in to this situation as novelty does not align as well with the other functional units. The user preferences and practices which are tuned to a certain system can be taken as an example. For instance energy users in the Netherlands are accustomed to have an energy contract based on a price per kilowatt-hour and energy that can be used freely at whatever moment the user pleases. Energy is something taken for granted and almost no attention is paid to it at all, the Dutch energy user is disengaged. Even though energy use is part of many practices it remains unnoticed (Gram-Hanssen, 2011). On average the western citizen spends only 9 minutes per year actively thinking about their energy use (Opower, 2015). One has to be aware of this, as you have to either align your proposition to these practices or change them. The firm can try to change these practices, for instance through user-involvement, along with other functional units to achieve any form of change. This emphasizes that within the regime merely incremental innovations occur, while radical and regime contradicting innovation comes from the niche level, which is a protected space where novelty is created and nurtured (Geels & Schot, 2008). Projects in this micro-level are often subject of research as it is more suitable for experimentation than the regime (Raven, 2005). After experimentation a dominant design could emerge that tries to compete with the existing regime and potentially create new user practices within it.

An analysis of the landscape, regime and niche tells you how much pressure is being put on the current situation. Different levels of landscape pressures, regimes stability and niche development lead to different transition pathways when occurring at the same time (Geels & Schot, 2007). The way a transition takes shape has a big influence for niche and regime players. Niche firms can break through and replace the regime players or cause incremental changes within the regime, for instance in the way regime firms do business. The first case is a radical shift in the regime, while the latter does not actually change anything in the way the regime is structured or operated. The same can hold for business models operating in these levels; they either change the regime incrementally or radically. Even though incremental changes do not fundamentally change the regime, the direction of the regime can be slightly changed by these transformations (Geels & Schot, 2007).

How to create the most favourable conditions for a niche technology to mature and escape the niche level is a question addressed by strategic niche management. The niche is a protective space which is needed to shield the niche innovation from regime selection pressures and nurture and empower the innovation (Smith & Raven, 2012). Experiments within the niche should be designed to establish and strengthen new social networks that include regime outsiders, provoke actors to negotiate and articulate their expectations and stimulate a good learning process. The learning process should be broad, interactive and focussed on second order learning. In this way underlying assumptions can also be questioned and changed (Geels & Schot, 2008). This is a process of experimentation that also takes place when defining a business model (McGrath, 2010). The next section will delve deeper into the concept of business models and discuss how a business model can be positioned within the multi-level framework.

### **3.2 Non-technological innovation: business models**

Traditionally, emerging technological innovations are subject of analysis in the multi-level perspective. However, especially in a field where technology is sufficiently developed yet still not seeing any breakthroughs, non-technical innovation such as business model innovation has more leverage on achieving radical societal changes (Vandevyvere & Nevens, 2015). This kind of innovation engages with networks and involves supply as well as the demand side (figure 2), enabling it to influence or change both (Bidmon & Knab, 2014). Business models are an interesting area of research to combine with transitions as research on transitions “is in search of more detailed causal mechanisms, whereas the concept of a business model is in search of a more structured contextual explanation” (Wells, 2013, p.42). De Reuver et al. (2013), who created a roadmap for business model design, also suggest placing the business model in the wider context, as analysing a single firm gives a narrow view of how success can be explained (De Reuver, Bouwman, & Haaker, 2013). How the business model can be framed in the context of the sociotechnical system will be discussed. First however, the business model and its contents will have to be explained more thoroughly.

#### *What are business models?*

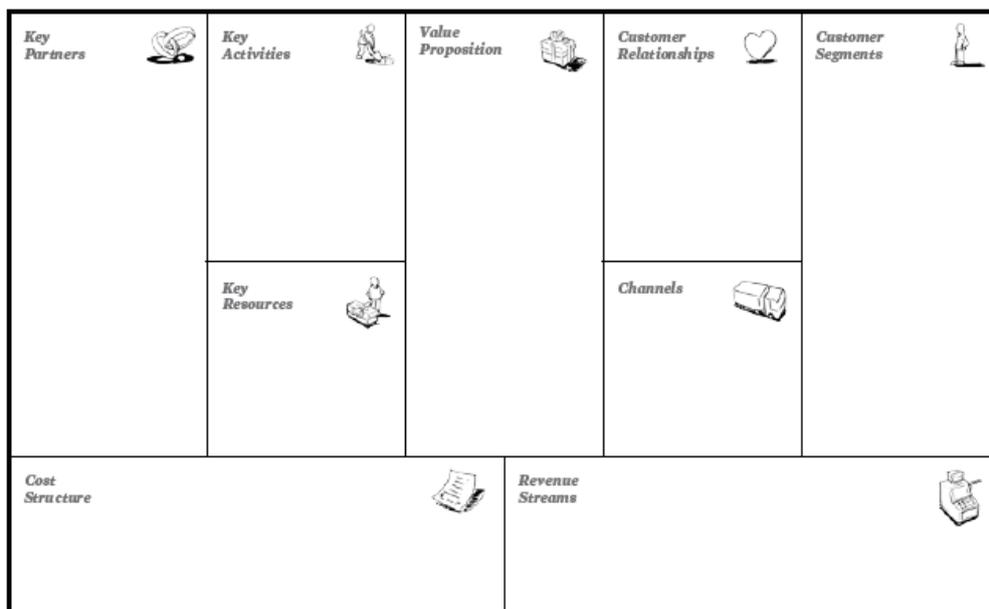
Business models have become a mainstream concept to describe how companies or organizations intend to create and capture value from providing a service or product for customers (Zott, Amit, & Massa, 2011). Furthermore, a business model can be used to create a competitive advantage as it is one of the aspects that can differentiate firms serving the same customer segment. This is for instance done by experimenting and learning about the user (Zott, Amit, & Massa, 2011). Linking business models to innovation is a relatively new area of research and the topic still has a lack of consensus on its concepts (Zott, Amit, & Massa, 2011). For example, the business model has been referred to as an architecture, design, pattern, plan, method, assumption or statement (Morris, Schindehutte, & Allen, 2005). The definition of a business model by Osterwalder and Pigneur, as their definition and business model canvas are widely used scientific literature and businesses, will be taken as a starting point. As mentioned above they pose that “a business model describes the rationale of how an organization creates, delivers and captures value” (Osterwalder & Pigneur, 2010). A definition that is derived from Osterwalder’s well cited ‘business model ontology’ (2004).

The business model canvas (figure 2) is a framework used to analyse the business model of a firm (Osterwalder & Pigneur, 2010). As for the term business model, there does not seem to be full consensus on the elements of which the business model and thus such framework should exist; different articles have a good deal of overlap in their definitions, but differences exist as to which factors are included. Whereas McGrath (2010) speaks of a business model that consists of a central unit of business and other ‘key metrics’, Osterwalder and Pigneur (2010) are more explicit in opening up the black box, a reason why it can be more suitable for academic research. Osterwalder and Pigneur define nine building blocks of the business model (Osterwalder & Pigneur, 2010). Boons and Ludeke-Freund (2013) describe in their review of business model literature that there is consensus on the four main parts of the business model: the value proposition, supply chain, customer interface and financial model (Boons & Ludeke-Freund, 2013). The business model canvas not only describes the commonly mentioned four parts, but continuous to make the model more concrete. Osterwalder and Pigneur propose the following: as a technology or service is inherently linked to an end-user the firm needs to define a customer segment which it will serve. The needs of the customers are satisfied by a certain value proposition which states the bundle of products and services that actually create

value (Osterwalder & Pigneur, 2010). Value is not present in a product or technology, but in the generated experience of using it (Vargo & Lusch, 2004). A value proposition should thus describe a job to be done and how this creates value for the end-user. The user wants more than just a product, rather a solution to a perceived need (Teece, 2010). This value proposition is delivered to the customer segment through communication, distribution and sales channels as visible in figure 2. This interaction builds up a customer relationship, which can be maintained in a strong manner or neglected depending on the firm's choices (Osterwalder & Pigneur, 2010).

When a value proposition is successfully delivered it generates revenue streams. However, a firm needs to be aware of the key resources it will need to deliver its proposition. These resources can be physical, intellectual, human or financial (Osterwalder & Pigneur, 2010). Furthermore the key activities describe the most important activities engaged in to make the business model work. The model also needs partnerships that are carefully chosen and created to reduce risk and be able to appropriate scale benefits; this can also help to acquire missing key resources or key activities that cannot be done by the firm itself. After all blocks are defined the cost structure is easier to define as all costs incurred to operate the business model should be clear (Osterwalder & Pigneur, 2010).

**The Business Model Canvas**



**Figure 2: The Business Model Canvas (Osterwalder & Pigneur, 2010)**

The forming of key-partnerships and explicit mentioning of the customer relationship and channels through which the proposition is delivered show the difference between a business model and firms strategy; whereas a strategy focusses on competition, competitive advantage and value capture by the firm, the business model also emphasizes cooperation, forming of partnerships and joint value creation (Zott, Amit, & Massa, 2011). As mentioned earlier, Wever et al. suggest that including user-needs and knowledge in the design phase can contribute significantly to the success of especially environmental interventions as this is often determined in the use-phase (Wever, van Kuijk, & Boks, 2008).

### *Business models in the sociotechnical system*

Foxon and Steinberger (2013) argue that business model innovation could be necessary to overcome the ominous 'rebound effect' which is often argued to diminish actual climate saving potential of energy efficiency. They argue this rebound effect is caused by a positive feedback loop set in motion by reduced costs after energy efficiency, leading to an absolute rise in energy use when considering the whole system. Moving away from the current energy system and business model logic based on selling as much energy as possible, could also lead us away from this rebound effect (Foxon & Steinberger, 2013). Systemic changes in the way the regime operates regarding energy efficiency are thus needed. Furthermore, as argued above, framing the business model in the wider context might give an analysis more explanatory power. This section will discuss the role of business models in the sociotechnical system.

Boons et al. mention that the business models should be framed as part of the complex sociotechnical system. They argue the business model moves beyond the strategic perspective of one firm as it 'links the firm with the wider production and consumption system in which it operates' (Boons, Montalvo, Quist, & Wagner, 2013). If we want to change our current energy system and steer for an increased market uptake of energy efficient services we need to consider current markets infrastructures, regulation and support mechanism in place as well since they directly influence the business model opportunities (Huijben & Verbong, 2013). This link towards sustainability transitions is only starting to be explored as combining these fields has only recently been done (Boons & Ludeke-Freund, 2013) (Boons, Montalvo, Quist, & Wagner, 2013). Bidmon and Knab have been the first to analyse the role of business models in transitions. They argue that the business model is integrated into the MLP on three different levels. It plays a role as a non-technological niche innovation, is part of the current sociotechnical regime as dominant business logic and plays a role as a vehicle to commercialize radical innovation (Bidmon & Knab, 2014). In this way employing a new business model can drive technological change, but innovative business models can also be the result of technological change (Zott, Amit, & Massa, 2011).

The niche is, unlike the regime, not locked-in to routines and its functional units are not aligned yet. Projects in the niche often still lack a developed network of actors and expectations of stakeholders are often not aligned yet as the future and future use of a technology might still be unclear. As stated above, SNM emphasizes the building of a social network, alignment of expectations and management of the learning process as three main functions of the niche that require attention before it can compete with market competition (Geels & Schot, 2008) (Raven, 2005). Niche experiments should be designed to aid in these functions. Experimentation is also key in business model innovation; the business model itself can be framed as an everlasting experiment that should be open to learning and improving (Teece, 2010) (McGrath, 2010) (Morris, Schindehutte, & Allen, 2005). It is in this process of experimenting and learning about the business model that otherwise undiscovered technological and market opportunities can be found. Chesbrough and Rosenbloom (2002) found that successful Xerox start-ups engaged in a journey of experimentation with the business model; they all operated a business model that had changed significantly by the time their viability was demonstrated (Chesbrough & Rosenbloom, 2002). This could mean that either capability to experiment or to adapt to changing contexts can be fundamental to the success of a start-up. By defining and experimenting with the business model, an entrepreneur can formulate and construct a network of stakeholders and align their activities within a network. The entrepreneur can articulate

the value creation and –capture mechanism envisioned for a technology. Doing this theoretical exercise and communicating it to relevant stakeholders can facilitate collective sense making (Bidmon & Knab, 2014) (Doganova & Eyquem-Renault, 2009). Besides formulating the network of stakeholders and expectations of the business and its technology the firm can also learn from designing the business model. In the process of defining a business model the firm engages in a process of trial and errors. If relevant lessons are learnt this might lead to a business model that is more successful in the sense that it can provide more adequate solutions to customer needs (Teece, 2010). In this way the three fundamental points of attention (learning, aligning expectations, creation of networks) according to SNM are incorporated in the business model logic. Whether business model experimentation leads to second order learning or a network as broad and heterogeneous as SNM suggests remains the question. In this sense SNM could help business developers with guidelines on how to formulate these elements in their business model. Later in this review we will focus on learning from the user to make a more compelling business case and how a business model can be adapted to do so.

In order to maintain any generated competitive advantage, business models must morph over time as changing markets, technologies and legislation dictates or allows (Teece, 2010). Some elements of a novel business model might be easy to replicate by incumbents; ensuring sustainable competitive advantage is a challenge many firms face. According to Teece (2010) three measures can make a new business model more competitive in the long run. First one should operate an opaque model to the outside; this makes it hard for competitors to understand in detail what the source of consumer acceptance is. Secondly a firm that is the frontrunner with a model that requires systems, processes or assets that are hard to replicate is hard to imitate. An example is Wal-Mart; the retailer specifically selects locations for its stores that can only sustain one retailer of this kind. After their store opens the market is in essence saturated, making it hard for competition to compete at this location. Finally a model is less likely to be imitated by incumbents if it would upset their current business, supply chain or other partnerships they rely on (Teece, 2010).

However, novelty does not have to come from the niche alone; more incremental innovation can also occur in the regime, also in the business model. Within the regime business models are apparent as a dominant logic of doing business (Bidmon & Knab, 2014). It refers to the generic scheme of value creation and capture which is shared by the industry (Sabatier, Craig-Kennard, & Mangematin, 2012). In this way the business model is an integral part of the sociotechnical regime and an essential element in replicating and sustaining its functional elements. It is aligned with the other functional elements and is in turn a vehicle that can provide for their alignment. A successful business model can be seen as a heuristic logic connecting technical potential with economic potential. A successful business model unlocks unfound value from a technology in the first place. However, its logic constrains the search for alternative, possibly more successful, models for other technologies later on (Chesbrough & Rosenbloom, 2002). This way the dominant logic present in the regime acts as a strong internal barrier to business model innovation for the incumbent firms.

Knowledge about barriers, for instance for user acceptance, and overcoming them is considered to be important from a multi-level perspective. Firms might for instance offer to take the risk of a high investment in lease based propositions, removing a well-known market failure (Sauter & Watson, 2007). These kinds of strategies of the firm are described in its business model. Several business models are currently used in the demand side management market by actors ranging from energy

generation to firms directly engaging with domestic energy use. For system operators energy efficiency can be seen as a capacity resource. A business model could aim for more efficiency, allowing the system operator to sell the capacity it freed up with the measures (Behrangrad, 2015). Furthermore certain European actors need to follow the energy efficiency directive. Becoming even more efficient than the directive requires allows a firm to trade its 'extra' efficiency in terms of white certificates (Behrangrad, 2015). How this kind of policy context shapes the business model will be discussed later. Within the load-reduction segment Behrangrad (2015) argues that in essence every business model could be reduced to either an energy saving performance contract or the sales of energy efficient services and devices, which eventually pay for themselves by reduction of energy use. As stated above, he sees more diverse models possible for stakeholders like system operators or retailers with propositions creating value through demand response and energy efficiency measures (Behrangrad, 2015). This research will focus specifically on the segment aiming at a reduction of the energy load and delve more deeply into it. Analysing the whole spectrum of energy efficiency value propositions that for instance engage in white certificate trading is too diverse and falls outside of the scope of this research.

Whereas the multi-level perspective reveals relevant context in which the business model operates, strategic niche management sees a great deal of overlap in concepts and emphasis. The business model can facilitate in several of the key-activities and processes that SNM suggests to be of importance. The SNM framework can in turn prove to be useful as it provides more guidelines how business developers can organize these activities and processes. Engaging in these processes of experimentation and learning in terms of the business model might be necessary to survive and grow in the niche level. In this way the business model can be seen as a bridge between the niche and regime. The next section will provide more detail on the relevant policy context the business model operates in and is affected by in the niche and regime level.

### **3.3 The shaping influence of policy on business models**

A business model, as any model, is only a simplified version of reality; certain things fall out of its scope. By focussing on the firm and its business model used to reach value capture and creation it misses the context in which the firm operates (Wells, 2013)s. An important factor is the internal context of the firm which has to be taken into account as capabilities and ambitions of the entrepreneur define the goals and capabilities of the firm as well (Morris, Schindehutte, & Allen, 2005). Furthermore, the external context, be it legislation, politics, policy or landscape trends, has a significant impact on the success of a firm as it affects the conditions in which it starts, grows and competes (Provance, Donnelly, & Carayannis, 2011). These contextual factors receive more attention when combining business model approaches with the broader societal context. The next example illustrates that policy can be an important determinant for a projects' success or failure. An unfitting institutional and policy context was found to be an obstacle for business models that had proven success in Western-Europe but due to policy context differences were not applicable in Russia. In a cold region in Russia renovations were not successful because of the previously existing district heating system and policies oriented at this system (Paiho, Abdurafikov, Hoang, & Kuusito, 2015). The situation required renovation of the whole heating system, which in turn requires completely different policy compared to the situation where single households profit from energy saving measures (Paiho, Abdurafikov, Hoang, & Kuusito, 2015). This illustrates contextual factors like policy can be an important determinant for a business model's applicability. The last decades a range of policy instruments and business models have been employed to create lucrative green markets.

However, the interplay between policy and business models does not seem to be sufficiently addressed in academic literature (Al-Saleh & Mahroum, 2014).

Research has shown that policy has a great influence on the development of a sector and the business models employed in that sector (Huijben & Verbong, 2013) (Provance, Donnelly, & Carayannis, 2011). Policy has a distinct and different effect on two levels in the sociotechnical system; the regime and the niche level. First of all, policy is aligned to the regime and its other functional units (Geels F. , 2002). This means that contemporary policy is supporting the regime and likely provides a barrier towards a break from this dominant logic. At the same time however, policy is used at the niche level. In first instance policy aimed at the niche is aiming to protect an innovative new product from the harsh regime selection forces (Geels & Schot, 2008). Besides that policy might need to see change to protect the regime from or prepare it for disruptive business models, as is happening right now with the taxi-service Uber (Rathenau Instituut, 2014). The fact that niche focussed policies try to protect the niche while the regime is also reinforced by certain policies potentially creates inherent contradictions. For a specific firm a policy can be either advantageous or disadvantageous, as policy per definition has a discriminating character; it supports one thing while it might not support another. One can imagine that policies aiming for energy efficiency do not match with policy goals which aim to strengthen heavy industry. This industry receives advantages on energy taxes, resulting in energy taxes which are a factor 240 lower compared to households (Belastingdienst, 2015). This potentially removes any incentive, besides moral ones, to invest in energy efficiency by industry. Even though different sectors and departments might try to align policies might act as a barrier as well as an opportunity for novel businesses.

Huijben and Verbong (2013) found that policy context can also constrain entrepreneurs and their business model choice. Even though the business developer might be constrained, he is not in a situation without any room for strategic movement. In the Netherlands the absence of steady support for PV led to creativity among entrepreneurs and development of new business models. With these business models they tried to work with or around the existing policy regime, applying either a fit or stretch perspective (Smith & Raven, 2012). In essence, some business developers try to fit with existing policy while others seek and sometimes cross legal boundaries and lobby for changing policy. Doing so, business developers can try to re-establish the boundary conditions within the legal frameworks they work in (Huijben & Verbong, 2013). Research linking the practical influence of policy measures, such as the Dutch 'postcode-roos', on business model design has not been found. This 'postcode-roos' defines and limits the type of households that can reap the benefits of having solar panels placed on for instance a public building. This could be framed as an influence on the way the user can be targeted by a business developer. In other cases when policy impacts are described the link to practical changes in the business model is not made either, while one can image it would have an effect on key-partnerships and the organizational structure when the firm needs to partner with or employ a policy expert (Nielsen, Reisch, & Thøgersen, 2014).

Simply put, the policy context influences business models. It can either support or constraint a firm in the choice for business model. Nevertheless, the entrepreneur is not powerless as it can decide to fit with the existing context or try to stretch it. Furthermore novel business models can show novel policy and legislation is needed as well. How policy practically influences the business model and the way the entrepreneur designs it however lacks discussion; mentioning of a possible effect of policy on user-centred design of business models has been even rarer. The sections above have shown that

contextual factors potentially have a shaping influence on business models and the way they compete as a new versus dominant logic. The next sections will discuss the relevance of user-involvement and how this can be done in relation to business model design.

### **3.4 User-centred perspective**

As mentioned earlier, there are reasons the market for energy efficiency has a need for user-centred business model design. This section will first give a recap on the reasons for a user-centred approach and will later on discuss barriers and ways to involve the user.

#### *The need for user-centred design*

As a technology cannot be separated from its intended use, it is inherently linked to the end-user. Research suggests that inclusion of, and interaction with possible future and contemporary users is an important, yet often missing link in innovation and the diffusion of technology (Raven, Mourik, Feenstra, & Heiskanen, 2009). This importance stems from the fact that consumers are not only recipients and users of a technology but can be involved much more thoroughly to gain knowledge or even act as a co-producer and add value (Verhees, 2014). The need for user-centred design is also made explicit by the International Energy Agency. They observed that the technocratic approach that is currently used to bring a multitude of energy efficiency technologies to the market faces an acceptability problem at the demand side (i.e. the end-user) (IEA, 2014). Therefore we might need business models that meet the demands of the end-user. Currently these seem to be insufficiently developed. Furthermore, even when viable business models target these needs, behavioural issues seem to impede market uptake (IEA, 2014). This lack of market-uptake of energy efficiency services might partially be explained by a mismatch in social practices in relation to the service offered (Hargreaves, Longhurst, & Seyfang, 2013). These social practices consist of a material component (i.e. technology used in the practice), the required know-how and meaning the practice has. These components of the social practices are locked-in the regime; they act as one of the functional elements and are reinforced by successfully executing the action (Hargreaves, Longhurst, & Seyfang, 2013). Besides that they are possibly inter-locked with other related habits (Shove & Walker, 2010). When a new technology does not match with the existing components of the social practice it is part of and the practice is not flexible towards a change in one of the components users might choose not to adopt it; they will not easily change their routines and how this is done best remains the question (Shove & Walker, 2010). Involving the user and finding out about relevant social practices and how these are build up can give insights on how to change them. It is suggested that engagement from the user and reflective, often tacit, knowledge about social practices is needed (Gram-Hanssen, 2011). Often one will find that a practice is related to a 'job to be done' which is related to values that go beyond those of energy efficiency. An energy management system might not be bought to gain insight on energy use, but rather to get a hold of expenses related to them or to be seen as a business professional (IEA, 2014).

Mass-marketing energy efficiency also counters the logic of incumbent energy utilities, which finds its foundations in the economic system based on unconditional economic growth. This leads the business model of energy utilities to be based on selling as much energy as possible, which makes engaging in energy efficient measures seem paradoxal. This self-contradicting strategy for energy utilities possibly makes users distrust these firms (Foxon & Steinberger, 2013). All in all, there are reasons to abandon the current business model logic in which we are locked-in and focus on the user

while doing so. An example of a first step towards escaping this lock-in is taken by Energy Service Companies (Foxon & Steinberger, 2013), which focus more on the job energy is 'hired' to do than on the actual product (Mourik, 2015). In this way a business model can provide a solution to a problem; in essence it fulfils an often tacit need.

### *Influencing the user*

Finding these needs is important if you want to tailor your product or service to the end-user, who operates the 'script' of the product. These scripts exist everywhere and one should be aware that it can enable, but also disable users. If the script is incompatible or does not match the user's needs or abilities he or she might not be able to use it or will simply not want to do so (Rohracher, 2005). For example, simply offering a smart meter or energy management system alone will not likely lead to effective use or load-reduction (IEA, 2014). The technology would require regular attention, while this is not present in the 'script' we use energy with; in our daily life we pay little to no attention to our energy use at all (Gram-Hanssen, 2011). Furthermore these kinds of offerings need to fit in the social context and lifestyle of the user (Boork, et al., 2014), the direct benefits in that context need to be communicated. Otherwise the product might not be accepted and used at all, learning about the user is thus important (Crosbie & Baker, 2010). As stated above Wever et al. (2008) suggest it is especially likely for energy efficiency measures that knowledge about users' needs, desires and abilities plays a crucial role as its effectivity and impact of a product's life cycle is determined in the use-phase by user behaviour (Wever, van Kuijk, & Boks, 2008). Promoting energy efficiency interventions in terms of abstract environmental factors that are not aligned with the users' attitudes, needs and lifestyles proved to be ineffective (Crosbie & Baker, 2010). Knowledge about the way these technologies and measures are actually used can also give insight as to which extent the rebound effect occurs. For domestic micro generation Sauter and Watson found that active acceptance of the public is needed as it requires installing appliances in their homes and changing behaviour. Several barriers can prevent acceptance such as irrationality, lack of knowledge and the difficulty experienced when accounting for future savings. (Sauter & Watson, 2007) On these terms the case for energy efficiency might be very comparable. Research from 2007 in the UK suggested that only 8% of population felt it is responsible for a renewable energy supply and similar figures hold for the responsibility of having an energy efficient home and heating system (Sauter & Watson, 2007). Even though this is years ago, the lack of interest in energy use and market uptake of energy efficiency suggests that the feeling of responsibility will likely still be rather low. One solution that knowledge about attitudes enables is to target these attitudes, for instance through more informal interaction and immersion in the user community, which can be important complements to formal methods (Heiskanen, Johnson, & Vadovics, 2013). Giving the user information to create awareness of the environmental problem and the extent to which he or she can make a difference could lead to specific behavioural change (van der Werff & Steg, 2015). An alternative to changing behaviour is designing or changing the product or service and how it frames its value for the user.

Hienert et al. (2011) found that firms within niches are more likely to adopt innovative, user-centred, business models as these firms are still flexible. Norms and rules are not institutionalized yet and partner networks are still in construction (Hienert, Keinz, & Lettl, 2011). As mentioned, in order to break through in the regime the present user practices have to be worked with or changed. Sabatier et al. argue that in first instance firms should aim to align their business to some extent with existing user practices in order to overcome its selective force after which it can gain more

momentum (Sabatier, Craig-Kennard, & Mangematin, 2012). This poses a double dilemma to niche entrepreneurs using the business model as a vehicle to commercialize their technology: they have to comply with the existing logic in order for established actors to recognize an opportunity for value creation and at the same time they have to understand and invest in its ongoing transformation. This leads to more incremental changes at first when new technologies emerge as the niche entrepreneur is suggested to operate a hybrid model, trying to be efficient in today's market and adapt to tomorrow's changing demand as well (Sabatier, Craig-Kennard, & Mangematin, 2012). These hybrid models are thus open to novelty, while being compatible with the current regime. Sabatier et al. found that as technologies evolve, the firm gains momentum and uncertainty decreases more disruptive business models can be employed. These can challenge the dominant logic and reshape value chains and user practices (Sabatier, Craig-Kennard, & Mangematin, 2012). Several barriers however have to be overcome when taking a more user-centred approach.

### *Barriers for user-centred design*

As stated above niche firms are still more flexible and might find more opportunities to employ a user-centred business model. Such business models are often driven by a combination of expertise, knowledge and resources (Walters, Thurston, & Cawood, 2012); a combination of which an element might be missing in any firm. The costs that user-centred design incurs can for instance prove a barrier for niche firms, which might have to resort to crowd-funding or other external parties for financing. Regime firms however, which often have more abundant resources, are more locked-in to their business model logic. Even though some established firms try to support market changing spin offs as suggested by Sabatier et al. (2012) they face more challenges to redesign their business model. It is quite difficult for a challenging business model to become part of the regime, or at least scale up sufficiently from the niche level to own a significant market share. This can partly be explained by the fact that regime firms' dominant logic is resistant to change for several reasons (Hienerth, Keinz, & Lettl, 2011). A common barrier which can be found in the regime is the existence of organizational inertia. This inertia can occur because changes in processes are inconvenient and may pose a threat to existing business activities, furthermore employees do not want to become obsolete, or break traditions. Also managers might resist experiments that threaten their value to the company (Chesbrough, 2010). Especially when changing towards a more user-centred business model firms might be resistant (Hienerth, Keinz, & Lettl, 2011), but also face resistance from the user which seems to lack knowledge, understanding, trust, care and engagement (Mourik, Rotmann, & Mathijssen, 2014). When involving the user in the design phase employees might fear for a loss of control or experience the 'not invented here' syndrome, which is a prejudice that everything invented outside of the firm is inferior (Hienerth, Keinz, & Lettl, 2011). These barriers make it hard to change to user-centred business model for incumbent firms, but also for innovative firms with a user-centred business model to become a part of the established regime networks. Established firms can overcome these barriers by experimenting and establishing success stories (McGrath, 2010) (Chesbrough, 2010). Developing social software is also named a key factor to include users (Hienerth, Keinz, & Lettl, 2011).

### *Forms of user-centred design*

User involvement can be very diverse and for various reasons. Not only can it be done in various ways that fundamentally differ, its goals can also differ. The need for knowledge about the user and

intensity of user involvement differs with regard to those aspects. Whereas knowledge about user needs might help in product and service design the firm needs to be more aware of existing user practices when steering for behavioural change (Hargreaves, Longhurst, & Seyfang, 2013). This section will zoom in on the way users can be involved in a firm and how they potentially add value to energy efficient propositions.

Cui and Wu define three levels of user involvement through which the user can add value to a firms' proposition. These are customer involvement as an information source (CIS), involvement as a co-producer (CIC) and involvement as an innovator (CIN) (Cui & Wu, 2015). This emphasizes that users can be assigned or take up different roles in the diffusion of a technology and an eventual transition. These roles can range broadly from offering resistance and acting as a barrier or passively adopting to co-producing or even producing the innovation themselves (Verhees, 2014). Energy efficient measures seem to be involving the customer as a source of information and as invited co-producer most often, whereas user led innovations intuitively seem rare. User involvement as an information source will be positioned against the other two forms which will be reduced to the term co-creative involvement. There are several important distinctions between the two forms. For one, users can be involved in different phases, ranging from design to the use-phase. Especially for the latter it would be useful to involve the user as in this phase the effect of an energy efficient measure can become apparent (Wever, van Kuijk, & Boks, 2008). The two forms of user involvement and important distinctions will be mentioned below.

#### *User involvement as an information source*

By involving the user as an information source the firm learns about the market, it engages in market exploitation (Cui & Wu, 2015). When formulating a business model the firm implicitly defines a hypothetical user to whom it sells its product or service. A reason for businesses to be interested in learning from users is the need to have a refined user representation to avoid mismatches between the represented and the real user (Rohracher, 2005). This representation describes the needs, desires and abilities of the user that is targeted by the firm. Often these are defined up front and thus uncertain (Verhees, 2014). Besides this uncertainty it is likely that the representation is biased towards the entrepreneur's knowledge and skills which might differ significantly from the targeted user (Breukers, Heiskanen, Brohmann, Mourik, & Feenstra, 2011). 'The' user can be involved as an information source in the form of focus groups or test panels (CIS) to gain more knowledge and to refine the representation (Cui & Wu, 2015). How to approach user involvement can possibly have different effects on the business model and can be experimented with; this might help in finding user needs.

In first instance a firm can learn from the lead-users. These users form a user-group that is likely to innovate and aid in product or service development (Oliveira & von Hippel, 2011). It should be kept in mind that this group might differ significantly from the user group you would like to target, a more main stream segment (Rohracher, 2005). In terms of Rogers' diffusion model of innovation these lead users would compare to innovators and early adopters whilst the early and late majority have significantly different attributes which can be anticipated upon (Rogers, 1962). This supports Rohracher's argument that there is no such thing as 'the user', in reality one has to deal with a multitude of user groups. One of these is the end-user, taken as subject of interest in our research, but even within this user-group many differences can exist. In addition the same user can have

different identities throughout a lifetime, or sometimes even simultaneously that might even conflict (consumer, customer, citizen) (Boork, et al., 2014). And, when bringing an innovation to the market other groups, such as implicated users (e.g. installers and technicians), also have to be taken into account (Rohracher, 2005).

User-involvement can also have disadvantages. A disadvantage of gaining user-feedback on a high frequency can be that the firm may tailor its model too much towards its contemporary users. This could mean that opportunities for the development of solutions with a larger market potential are neglected (Janssen, 2015). This is especially the case for firms that tailor their service to a unique user. The user could possibly give information that helps in creating a good product or service for him- or herself, but it does not necessarily fit with other users or the sociotechnical transition that is aimed for. In this case having a strong sensing capability and receiving a high degree of user feedback can have a negative effect (Janssen, 2015). Therefore the firms should be aware that end-users can be engaged with the identity of smart consumer, but also as a smart customer and smart citizen, each having different needs, abilities and goals (Boork, et al., 2014).

Users can be involved in different phases, ranging from design to the use-phase. Especially for the latter it would be useful to involve the user as in this phase the effect of an energy efficient measure can become apparent (Wever, van Kuijk, & Boks, 2008). Involving the user as an information source provides knowledge about needs but makes him or her to a lesser extent involved with the firm, technology, product or service than a co-producer. Furthermore the locus of user-interaction is different: co-producing users are often interacted with at the firm while users that are involved as an information source are typically involved outside of the firm, this more often takes place at their own residence or via the internet (Cui & Wu, 2015). These differences imply that related business models are also different. Cui and Wu argue that firms do not have to alter their organization too much to implement user involvement as an information source as this is a more traditional way of engaging with the user (Cui & Wu, 2015). The next section will discuss a less traditional way of involving the end-user; through co-creation.

#### *The user as co-producer*

Rohracher states that users are often not mere passive recipients of technology. In the use phase they appropriate and often change the script that describes how to use it. Whereas the firm can learn from its user by interacting in the use phase, the user can also be involved earlier on, in the design process. When this is done a service or product is co-created by firm and user. Co-creation is more than a focus on the user; it is about joint value creation by the firm and customer and allowing the latter to construct it in a way that suits her context (Prahalad & Ramaswamy, 2004).

Co-creation is not something that rarely happens; according to research by Oliveira and von Hippel (2011) between 80 and 92% of banking and retail services were innovated by lead-users or user firms (Oliveira & von Hippel, 2011). There are multiple benefits to be gained from customer engagement at this stage. For one, you profit from their creativity when involving them in the design of a product and taking advantage from their best ideas. On the other hand the user will feel more appreciated and loyal towards the firm (Hienerth, Keinz, & Lettl, 2011). Involving the user as a co-producer of innovation requires another organizational setting as he can be involved directly in design. This often means that the user is situated internally and offered more direct communication with employees involved in design. This process requires a higher degree of coordination between functions, which

facilitates dissemination of external knowledge. Doing so, more tacit and heterogeneous needs can be uncovered and included in the design (Cui & Wu, 2015). This type of engagement makes a user feel more appreciated and more inclined to do business with the firm. Involvement of this kind could thus improve market-uptake through more engagement and trust in the firm. Because of the required changes in a firms' organizational setting a firm that tries to involve the user as co-producer would benefit to a great extent from strategic flexibility, which describes the firms' ability to reallocate and reconfigure its resources (Cui & Wu, 2015). These organizational changes could be translated to business model changes. On basis of observations above involving the user as a co-creator likely requires more significant changes in the business model.

One can conclude that user-centred design of a business is important in order to overcome resistant user-practices or align to be able to deliver a compelling value proposition that can lead to a better market-uptake of with them energy efficient services. Furthermore user knowledge and involvement should not be limited to design only, as the use-phase is where an energy efficiency measure sees its effect. To employ such a user-centred business model firms have to overcome several barriers. They need to have sufficient resources, the knowledge how to involve the user and could benefit from a more flexible organization. Beside that established firms and their employees often have to deal with organizational inertia, the fear that external innovations are inferior and a fear of becoming obsolete to the organization. Experimenting with business model innovations could help to overcome these barriers. When involving the user learning from lead-users should be emphasized as a starting point after which a broader customer segment should be aimed for. Including them in the design phase could also create multiple benefits for both the firm and user. We have seen that these two forms of user involvement will likely have different implications for business model design, a topic we will further analyse in the next paragraph.

### **3.5 User-involvement in business model design**

A logic step to take after concluding that user-centred design is important is to assess how to do this, specifically in terms of the business model. As stated above, focussing on the user and involving him or her in the design process will likely require changes in the organization and its business model design process. This section will discuss how user-centred design can be facilitated in the business model and which building blocks are suggested to be of importance. Finally the implications that user interaction can have on the business model will be discussed.

User-interaction in business modelling can be facilitated and designed in several of the proposed nine building blocks. Depending on the way the user is involved, different parts of the business model possibly have to be redefined. Some relate directly to the user such as the customer segment that is served, customer relationship that is maintained and the value proposition that seeks to satisfy the user-needs and provide an adequate solution. Other factors have a more indirect impact on the business model. These less obvious impacts, based on the type of user involvement, will be discussed below.

Järvi and Pellinen argue that changing the nature of involvement also changes the way in which a user is communicated with. As you involve a user in the design or use-phase you will need to rethink the channels through which you communicate with them (Järvi & Pellinen, 2011). Furthermore, user-involvement is often driven by a combination of knowledge, expertise and resources (Walters, Thurston, & Cawood, 2012). This type of design can be time and capital intensive as you might need

experts gathering and analysing data. Beside that social software and an online environment are suggested to be a key-factor when involving the user (Hienerth, Keinz, & Lettl, 2011). If this is not done carefully the information provided by the user might not be incorporated well. New partnerships and resources thus likely have to be gained for user-centred design to be effective (Walters, Thurston, & Cawood, 2012). Beside that the employees that were initially involved in design have to actively incorporate external knowledge. Finally Hienerth et al. (2011) saw in their case-studies that key-activities had to change; LEGO, IBM and Coloplast had to actively organize meetings that could facilitate co-creative endeavours (Hienerth, Keinz, & Lettl, 2011). Requirements for efficient use of user-centred knowledge within an organization and positive or negative effects this has is a topic that has received some attention. Combining concepts and terms of business model literature with those of user-centred design in an effort to see how this affects the business model is however rarely done.

Such changes to an organization also have implications for the cost structure and revenue streams of the firm (Osterwalder & Pigneur, 2010). Co-creation is often seen as a costly endeavour, making this hard for smaller firms. Involving users in a co-creative setting can still lead to benefits. Implications of user-centred business models range from more trust in the firms and perceived value of its services to a greater likeliness to actually engage in business with the firm (Hienerth, Keinz, & Lettl, 2011). However more critical views exist. According to Konrad the development process often does not leave enough time for participation and learning processes, even if the user groups are clearly defined and user-centred design is promoted (Konrad, 2005).

Even though a lot of research is conducted to find out how and why the user should be involved in the design of a product or service, the link towards business model design is still largely missing. For example it is often mentioned that involving the user is costly as it might require face-to-face interactions which also consume time of company experts, however the link to business model elements is not made. None of the articles reviewed mentioned how a business model should change to provide for the requirements that are proposed, even though these required changes often fit well with elements of the business model canvas.

#### **4. Discussion & Conclusion**

This research started with the acknowledgement that the market for demand side management needs to see a better uptake. It set out to answer the question what role user-centred business model design can play in the transition towards sustainable energy system. The literature review brought us to several steps can facilitate this:

- Creation and use of user-centred business models as they are a means to bring better aligned services and technology to the market compared to traditional business models.
- Framing the business model in a wider societal context, as business model concepts often fail to give enough attention to this.
- Involving the user in design *and* use-phase, as during the use phase the effect of energy efficient measures becomes apparent.

The role business models have in the sociotechnical system was an important question that we started out with. A business model can be framed in the multi-level perspective as a logic, or way of thinking; whereas there is a dominant way of thinking in the regime, more radically new ways of

thinking can originate in the niche. These ways of thinking can be seen as the way a technology is brought to the market. In order to compete with incumbent firms and their business logic novel businesses need to be aware of regime's aligned functions, such as user needs and practices, embedded in the regime level when designing their business model. Possibly fitting with these needs and practices could be done in first instance in order to gain market share and momentum. Later on these practices can possibly be changed and more radically new business models can emerge and survive. In essence a hybrid model is suggested as a solution that balances the novel business logic coming from the niche with the present situation. This is merely one of the possible solutions for coping with existing social practices as one could also aim to change energy related attitudes and behaviour. Novel services can also be provided by incumbent firms in the regime. They have to overcome several barriers as they have routines and an established network, making them resistant to change. Also for regime players multiple benefits can be gained when switching to a more user-centred business model. However, how to deal with existing social practices or steer for user-centred design in the business model is rarely looked at, and if so, it is not related to terms of the business model.

When taking the proposed steps and designing the business model, entrepreneurs should be aware of the context they find themselves in. For instance, policy can either enable or inhibit business model design. Potentially it affects the way a user can be involved. The way in which policy practically affects the business model and the propensity to target the end-user is a topic that is so far untouched; answering the question as to how policy influences user-centred business model design is thus hard and rather suggestive. The review leads to think that policy can constraint business models, for instance by limiting a customer segment that can profit from policy measures. Policy can also make a situation more complex, creating the need for policy experts. Furthermore, the entrepreneur does not have to sit idly; he or she can either fit with the existing policy context or try to stretch it. The ways in which policy influences business model design and how entrepreneurs deal with this is an interesting topic for further research.

This review ended with a look at rationale for user-centred design and the way user involvement can be designed in the business model. Involving the user allows a firm to create a better service for the user, which will likely have more trust in the firm after interacting with it as well. Especially for energy efficiency services it is likely that user-centred design is important as the use-phase often determines its effect. When users are involved more directly the nature of communication between the user and firm changes. Knowledge, resources and expertise are often required to effectively organize user involvement. How a firm has access to these can differ, sometimes the firm needs an external party to facilitate in one of these elements. It thus seems that changes in channels, resources, partnerships and activities might be required to implement and change the nature of user involvement. This could in turn affect the revenue model of a firm. These findings however, are rather suggestive as no research actually combines its findings with business model dimensions. More research should be done to see how a business model can change to adopt a user-centred approach.

This leads to the observation that even though there is knowledge on user-centred design, influences of policy on the firm and how business models operate, these disciplines are rarely integrated. This is a potentially important gap that can be filled by future research. The research that will follow will try to fill parts of these gaps. It will analyse the process of formulating and re-formulating user-centred

business models and focus on the way users were involved and how this was organized. Furthermore, the business model will be placed in the broader societal context as this can be an important complement to the firm oriented business model when looking for an explanation for its success. Especially the influence of policy and social practices will be taken into account as these are topics closely related to user-centred business model design.

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