*local **E**lectricity retail **M**arkets for **P**rosumer smart grid p**OWER** services*

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Executive summary

This document presents deliverable 2.1. First, we uncovered a framework that depicts five generic business models, which are particularly likely to provide flexibility through timing. We refer to these business models as follows: trading and storage, power plant optimization, large-scale demand response, virtual power plants and small scale demand response. In a second step, we point to four different forces that shape timing-based business models for flexibility creation: local regulations, local technical system-set-up, local patterns of social acceptance, and local ownership claims.

Second, and in order to develop an understanding of the development of timing-based business models for flexibility creation, we build on the idea of business modelling. Business modelling refers to the process through which manager use simple rules to configure different types of services that are supported by a platform and easy-to-use. It also involves local fitting, that is, the process through which managers ensure that the configuration of services fit local regulations, local technical system-set-up, local patterns of social acceptance, and local ownership claims. This EMPOWER specific process of business modelling is tested in different settings, specifically with executives in start-ups, utilities, as well as with executives enrolled in various executive education programs. It is continuously being refined and optimized in different workshops. Based on these findings, we present a set of guiding rules for the development of flexibility-based business models in EMPOWER.

Third, and in preparation of the forthcoming business model acceptance studies, we have developed business model test-prototype that later in the project allows to test the acceptance of EMPOWER based business models and the process of business modelling within EMPOWER with different stakeholders. Fourth, we report the status of the acceptance studies of EMPOWER business models with incumbent utilities. Overall, the document at hand is a summary of the work being done. It is complemented by a research paper on timing-based business models (authored by Helms, Loock & Bohnsack and currently under review in Energy Policy, the paper is available on request and will be made accessible once the review process is finished) and a case study (authored by Loock, Bohnsack, Reuter and Kunze, the case study is intended to be published in thecasecentre.org), and two research conference papers on the acceptance of EMPOWER business models by incumbents (which are available on request).

1 The work package 2.1

1.1 Goal of work package 2.1

The timing of supply, trading and demand is crucial to provide and exploit flexibility in the energy grid. Effective timing is becoming even more relevant when fluctuating energies increase their share. However, the logics of value creation and capture (the core activities of each business model) have not yet been understood in this particular setting. We have identified relevant company cases and interview partners in the field of decentralized smart grids to compile a unique sample of companies and their respective business models to study. Overall, the work at hand develops knowledge about what business model archetypes provide flexibility to the grid, how local factors shape these business models and how managers can succeed in developing such business models.

1.2 What are business models and business modelling in EMPOWER?

Business models are conceptual tools or models that specify how to create and capture value. For a review of the literature on business models and of the basic foundations of business models in EMPOWER, we refer to recent work published by the researchers in the working package at hand (Loock & Hacklin, 2015; Loock, Hinnen, & Spiegelberg, 2015; Oschlies & Loock, 2015). An important notion is that a business model not only concerns tangible assets, structures or artefacts (such as the Osterwalder canvas), but also mental models and cognitive processes and structures (Loock & Hacklin, 2015). There are different ways for describing business models. Although the template by Osterwalder is broadly used, we refer to a newer template suggested by leading business model researchers from the Cass business school, to whom a close cooperation has been established (Baden-Fuller & Haefliger, 2013a). In that regard, business models are described through specifying:

- Customer identification: Business models describe and outline who the customers are
- Customer engagement: Business models specify the engagement with customers, e.g. if it is individually designed like the services of a taxi in individual transportation or if it is designed for many, like the services of busses for mass transportation

- Value chain linkages: Business models specify how the value is actually delivered, e.g. how a value chain or a value network is organized
- Monetization: Business model specify who pays for the services and how the value is captured and profits are distributed

Extensive prior research advances the view of "business models" as something "cognitive" – a conceptual tool that resides in managers' heads. These conceptual tools are composed of simple rules for structuring value creation and value capture mechanisms. These conceptual tools, in turn, drive the types of strategic choices that managers make, the types of investments that they undertake.

In the particular EMPOWER context; there is also the notion that business models are service-based. In such – we will elaborate on that point later in this document – the simple rules that underlie a business models are also conceptualized as "service"-guiding simple rules. A business model in this regard is a specific configuration or a bundle of service-related simple rules. Business modelling is the process of choosing and configuring these (service-related) simple rules.

1.3 One-sided and more-sided business models

1.3.1 Value and money flow may be decoupled

Following the seminal work on two sided markets (Rochet & Tirole, 2006) business model scholars increasingly refer to the fact that value and money flows may be decoupled, and that in fact the consumer not necessarily pays for a service he uses, but someone else would pay (Baden-Fuller & Haefliger, 2013b). Business model researchers for instance refer to search engine such as google, where the consumer that uses Google does not pay, but an advertising company that eventually would like to reach the consumer pays (ibid). The idea of such multi-sided business models and the potential to decouple value and money flow provides interesting opportunities to business model development for EMPOWER. It basically extends opportunities for revenue models beyond developing and bundling multiple and additional income streams. In such a key element of Empower will be to develop new concepts of monetization.

1.3.2 Prosumption as co-creation

One important aspect of more-sided business models is the process of co-creating value. The co-creation already finds some reference in the term prosumption to which we refer in the EMPOWER project as joint processes of producing and consuming electricity (and/ or flexibility). In such a private household with a PV system on its rooftop is a prosumer, as it produces energy (with the PV system), but also consumes energy (with its regular household appliances etc.). However, from a business model perspective the process of co-creation is more complex. The complexity arises as co-creation speaks of multiple actors (rather than one household alone, which could theoretically be an independent prosumer on its own). Furthermore the co-creation does not only comprise co-creation among many actors, but also different actors with potentially different interests in value creation (such as the interests of private or commercial actors might differ in their expectations of what kind of value they want to create), and different backgrounds (such as different knowledge about local energy markets). Co-creation in that sense requires being specific about the stakeholders that engage in the co-creation. In such the stakeholder-map, which is produced in WP 8 is of profound importance to guide the process of co-creation.

1.3.3 Sharing business models

Co-creation with customers has already been referred to in the business modelling literature (e.g. Teece, 2010) or in the strategy literature, which speaks about value creation with customers and especially refers to the concept of “consumer benefit experienced” (Priem, 2007). Also the marketing literature points to the role of consumer as a co-producer (Vargo & Lusch, 2004). However, what is decisively different with more-sided business models that might become core to the EMPOWER project is, that not only an understanding of products or services is shared, negotiated and co-produced among producers and consumers, but moreover the business model itself. This requires a new process of sharing business models among prosumers and other actors of the SESP. This new process of sharing among prosumers and the SESP has several consequences: First, such business models require an optimal level of knowledge and have an optimal level of complexity. They mustn´t be too complex, so that also non-experts (e.g. prosumers) can participate in the process of sharing. But they also must not be too frugal, so that they still cover the technical requirements of local energy markets. In such EMPOWER business models may need to achieve a balance between asymmetric distribution of knowledge and preferences among different actors. Second, the efficient sharing of business models requires empowering consumers or prosumers, which are not energy experts. In that sense the sharing requires translation (and even physical assistance) to establish an efficient process of co-creation. Finally, the efficient sharing of business models requires producers and energy professionals to partly give-up established preferences or beliefs to learn to accommodate the emerging influence of their value-co-creation partners.

1.4 The difference between business models and market design

Throughout the work in EMPOWER so far it became evident how close market design and business model design are linked. Deliverable 6.1. provides important aspects of an EMPOWER based market design to which the work in WP2 directly refers to. Much of the references for business modelling so far refer to a centralized market design. In the further work of WP2 an essential challenge will be to fit business models and business modelling to the distinct contingencies of a local energy market, rather than – as most business model approaches do today – refer to a centralized market design. The two concepts of a business model on the one hand and a market design on the other hand are complementary but distinct from each other. In a first step, it is important to recognize that at core EMPOWER (short for local Electricity retail Markets for Prosumer smart grid pOWER services) is a market design (see WP6 for more details, especially D6.1). This market design is different from centralized market designs that are already enacted today, as it for instance focuses on locally-bound services, on prosumer smart grid power services, and enables local trading or exchange of these services. An important aspect is also that EMPOWER looks at a service-based market design, a market as a service, which is provided through an IT cloud. Out of the many references that put services centre stage, we refer especially to the service-dominant logic, which has been introduced into the marketing literature (Vargo & Lusch, 2004). However, while energy and energy related services provide the foundations of such markets, the prosumer is the final driving force in freely choosing which services to pick and which service bundles to request. Overall the value of the preferred service bundles is assumed to provide more value than “only energy” services alone.

Business models are models of value creation and value capture that mutually work within and also shape a specific market design. There can be many business models within a specific market design. In regard to dynamics, this understanding features two perspectives on dynamics: First, if we imagine what happens to business models when the market design changes, we submit that there might be some business models that could be not be affected. The nature of the market change is not critical to their model; however, there might be other models that are required to change along the change in the market design. Other dynamics could even lead to business models that cannot be operated anymore, or in turn there might be new opportunities for completely new business models. Second, business models enact a market design. This practice view submits that the dynamics among business models, and the respective services they provide, induce change in the market design.

For business model innovation in EMPOWER now the challenge is twofold: One avenue for business model innovation is to clarify the market design first, to specify the boundary conditions for business modelling and then engage in developing business models that fit the new EMPOWER market design. Another avenue however would be to also leave the market design a bit heuristic, or open. In such, one would first develop business models and then study what kind of market design elements (e.g. regulations) will be enacted through the novel business model. Throughout the business modelling in EMPOWER which we have conducted with executives and students so far, we have learned that maybe an integrated way is recommendable and we advise to follow both avenues in an iterative manner to constantly reshape the envisioned market design and the proposed business models.

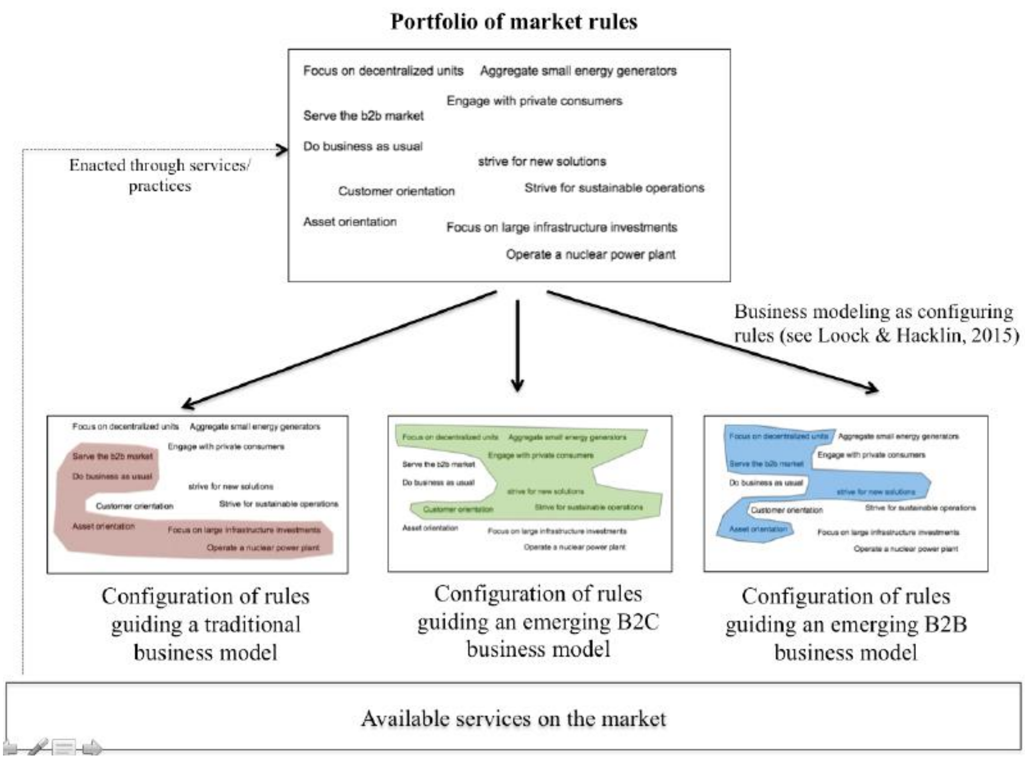

Figure 1: The relation of market rules and business model rules

A profound approach – that allows for flexibility but still aligns and forms unity and a common understanding – is to look at rules that are guiding the market and the respective business models. In that sense, starting point is the collection of a portfolio of market rules. Figure 1 depicts an example. However, the distinct market rules for EMPOWER still have to be developed in close cooperation with WP6, which already has provide important foundations within its work on the market cloud. Then business modelling would follow as a process of configuring (sensing, selecting, form-giving) rules (Loock & Hacklin, 2015). As a result business models appear as configurations of a sub-sets of market rules, which guide the provision of services. The sum of the services, that are virtually provided by all business models in turn shape and enact the market design. Figure 1 depicts the process. It is one of the remaining tasks in EMPOWER to specify and spell out the distinct rules for local electricity retail markets for prosumer smart grid power services.

2 Timing-based business models for local flexibility[1]

The creation and provision of flexibility becomes a valuable service on local electricity retail markets. Deliverable 2.1. has revealed generic business models that provide this service (see Helms, Loock and Bohnsack (2015), also referred to as technical paper). As we reveal in the technical paper, there are several contingencies that drive the development of timing-based business models for local flexibility creation: among the most important there is the required system stability, storage limitations (e.g. in regard to physical or economic availability) and fluctuating demand and supply. In regard to the latter an increase of prosumers on energy markets is an important driver of the increasing value of flexibility provision.

2.1 Five business models archetypes

The paper reveals two cost structures that help classify the business models. Business models for local flexibility provisions differ in regard to intervention costs (directly

[1] Note that the material from this sections has been taken from Helms, T.; Loock, M and Bohnsack, R (2015): Timing-based business models for flexibility creation in the electric power sector (under review at Energy Policy) and Loock, M; Bohnsack, R.; Reuter, E. and Christian Kunze (2015): Empowering local electricity retail markets through business modelling (in preparation for submission at thecasecentre.org).

controllable processes such as production vs. indirectly controllable processes such as demand) and in regard to transactions costs (single-large activities vs. the aggregation and coordination of multiple process). Based on this analytic frame we are able to describe five generic business models in more detail: power plant optimization, virtual power plants, large-scale demand-response, small-scale demand-response and trading and storage. For the description we now provide larger quotes from the technical paper.

2.1.1 Power plant optimization

The power plant optimization business model is maybe the most traditional energy industry model within the framework of timing-based business models for flexibility creation. It is a supply-side business model and looks at single processes. Basically it concerns the temporal optimization of larger power plants.

"At the core of a power plant optimization business model is a program that determines when to run a power plant and at what capacity, representing a timing activity. The following excerpt from the interview with the head of optimization of the utility company B underlines the importance of optimizing a power plant: "Time is one of the most important variables in the market. Everything is related to time… If your timing is correct, you make money. If you are late, you have no profits. Timing occurs over different time scales, starting years ahead of delivery, as well as on a short-term time horizon, e.g., on power exchanges where volumes are traded down to 15 minutes before physical delivery, and to real-time balancing services." The following excerpt from the interview with a manager of the demand response aggregator company C indicates the different time horizons of power plant optimization: "Power plant operators have a long-term planning [activity]… they have to decide whether they [should] build a power plant or not… on the demand side you want to hedge your power prices. Then, in the medium-term, you have a[nother] planning [activity]. You have financial markets and the spot markets… and then you slide in the balancing services market… and all along this chain, it's about timing, [which is] highly interesting." (Helms, Loock & Bohnsack, 2015).

It is debatable whether and how larger power plants can or should be integrated into local electricity-markets. However, from a business model perspective the power plant optimization model marks an opportunity through which business models can create and capture value through flexibility provision.

2.1.2 Virtual power plants

"The business model of a "virtual power plant" (VPP) represents the distributed equivalent of centralized power plant optimization (Asmus, 2010). A high number of small generation units (often in combination with manageable demand) such as CHP plants and emergency power supply units together with fluctuating producers such as wind and solar power plants are aggregated and interconnected to achieve sufficient capacity, which can be marketed on the wholesale markets, thereby allowing the utilization of flexibility (Eurelectric, 2014)." (Helms, Loock & Bohnsack, 2015).

Within the analysis of the technical paper, we have studied two particular companies from Germany: First, Lichtblick with its "home power plants," and the aggregator model of the "Schwarmdirigent". Second, Next Kraftwerke with its next-box. Overall the business model of virtual power plants allows

"smaller producers to participate in synchronization activities, allowing them to earn a fee by offering their flexibility. The following excerpts from the interviews we conducted show that timing activities are crucial for VPPs, with the utilization of additional sources of flexibility being the major value proposition: "The provision of flexibility is in the course of the energy transition just necessary. Their only question is: who can provide this flexibility? That should come from the market… and the winner is the one with lowest transaction costs" (head of portfolio management of company H, a VPP operator). The managing director of a VPP platform provider (company I) adds: "It is not [only] about using single flexibilities but also about using different flexibilities on different markets…" (see Helms, Loock & Bohnsack, 2015).

Especially the business model of Next Kraftwerke (next-kraftwerke.de) is interesting in regard of the monetization of flexibility. One central bundle of services of the business model is the aggregation of decentralized production, the capability of steering the decentralized production and the monetization of the flexibility, for instance through trading on intraday markets.

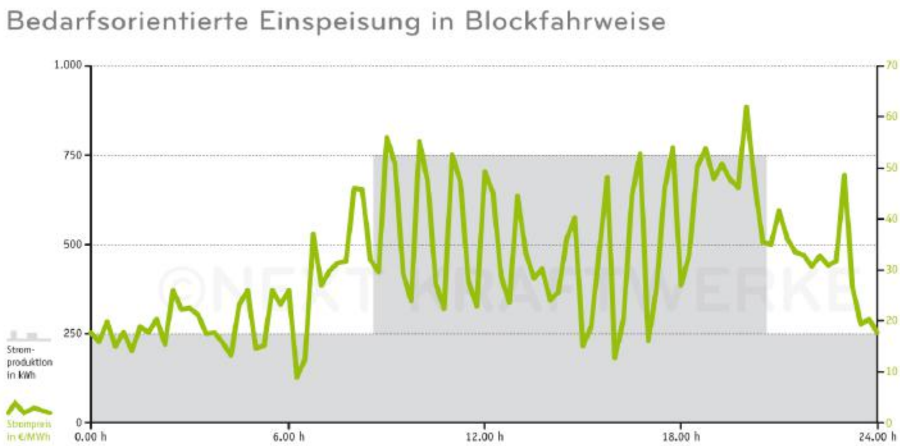

Figure 2: Example of remote controlled bio gas unit production for the intra-day market; source: https://www.next-kraftwerke.de/virtuelles-kraftwerk-next-pool/biogas#modalimg13

2.1.3 Large-scale demand response

There are various benchmark business models for large-scale demand response models. As large-scale demand response, we refer to business models that target large energy consuming agents. We have, in particular, studied the business model of Enernoc, as it seems to be one of the largest, well-developed demand response business models and because one can also see how demand-response business models scale and further develop to broaden their scope and for instance engaging in trading. Often a first motivation in engaging in demand response is peak-shaving in order to avoid additional investments in the current infrastructure. However, in a second step large-scale demand response optimize energy consumption in regard to variances in price. Then, in a consequent step, large-scale demand-response models also engage in marketing (hence trading) flexibility.

“The manager of the demand response aggregator company C explained that timing is a crucial driver of value creation in demand response activities: “Everything is about timing here.” Demand response aggregators allow consumers to utilize their flexibility in the markets. The manager of company C adds, “We ensure that this balancing power is available, and the network can be balanced.” (see Helms, Loock & Bohnsack, 2015).

However, engaging with consumers requires a different set of capabilities and is associated with different kinds of costs as compared to supply side business models:

“Conducting timing activities on the demand side would require firms to disrupt established consumption processes and patterns. Behavioral adaptations are undesirable for consumers as they are associated with costs, which we term “intervention costs”. These intervention costs are primarily rooted in the fact that consumers were traditionally not foreseen, and they were not used to dynamically and temporally adapting their consumption processes, in contrast to the supply side. According to the manager of company C, “we control generation plants easily. More difficult are consumers. Because they have another use.” (see Helms, Loock & Bohnsack, 2015).

Especially demand-side business models require revenue models that differ from traditional revenue models stemming from the supply side. Overall, we see revenue models that are more based on partnership, cooperation or co-producing, which for instance requires new models of profit-sharing and transparency of the revenue model. Beside the revenue model alone, demand-based business models also need to target the right incentives to motivate consumers to engage in demand response. While that is maybe still a manageable task for large-scale demand response, as the economic incentive might be sufficient, it becomes a challenge in regard to small-scale demand response.

“Prompting consumers to dynamically modify their consumption behaviors requires incentives or compensations. “So my [companies’] main task is then to develop a revenue share or participation of the flexibility (value) for the asset owner, the factory” (manager of the board of executives of company C, a demand response aggregator). Moreover, the heterogeneity and the difficulty in capturing the flexibility of different consumptions processes would increase the intervention costs for this business model. Therefore, demand response activities and corresponding business models that aim to influence the timing of demand need to consider and minimize such intervention costs by developing smart intervention measures. The representative of the VPP company H highlights the importance of the incentive system for the business model: “The smaller the customer, the smaller the motivation. You need an intelligent incentive system. I think the intrinsic motivation is smaller there [on the demand side], so you have to influence the customer and motivate him.” (see Helms, Loock & Bohnsack, 2015).

However, compensation may not be only about money and reward mechanisms can be cover also non-monetary rewards and incentives, such as individual or social heuristics. For an overview see (Gamma, Loock, & Cometta, 2014).

2.1.4 Small-scale demand response

Small-scale demand response is a business model that looks at the demand side and the management and aggregation of many agents. We have studied the configuration of this business model along the case of tiko (www.tiko.ch).

"Business models that control small-scale consumers such as private households involve additional challenges compared to optimizing industrial consumers. The increasing need to exploit additional sources of flexibility (particularly in distribution grids) together with the advances in ICT have paved the way for numerous pilot projects and preliminary ventures aimed at involving smaller consumers in demand response programs. They are often linked to the development of a smart grid infrastructure." (see Helms, Loock & Bohnsack, 2015).

There is an interesting difference across business models in regard to the treatment and processing of the data within this business model. Some business models (e.g. tiko) are about to develop core capabilities of data-analytics (see for instance the trend of big data). These business models intend to develop new and complementary services to the initial set of services, for instance they identify load profiles from the individual-households as a value-able asset in identifying further business opportunities (in fact this energy consumption data is quasi real-time behavioural data and indeed can be used to accurately predict household behaviour). On the other hand, other models rely on smart algorithms that not necessarily rely on heavy data processing and apply simple but powerful algorithms. An interesting case in our case-study portfolio is a project by the Swiss utility Alpiq, Gridsense, which measures power profiles of the grid to steer devices. More intermediate models – e.g. such as models based on the Home Energy Controller (HEC) as applied for instance by Lechwerke (LEW), a large utility mostly owned by RWE – combine data-analytics and heuristic algorithms. However, the bottleneck for most of these models is to achieve customer acceptance.

"As the project leader of the demand response and smart grid pilot project company K points out, high transaction and intervention costs can be expected: "the customer wants to have something, so that he changes his behavior. He doesn't do anything for free. And it needs to be a noticeable amount, so that he says: 'Okay, there are at least 50 Euros of earnings per annum for me'." (see Helms, Loock & Bohnsack, 2015).

Small-scale demand response business models also differ from traditional energy business models, for instance in terms of costs:

" (…) the bidirectional communication with small customers increases the transaction costs. According to the representative of company K, "When I have to equip a large number of participants, it is a great financial burden, simply because these corresponding bi-directional communication channels must be in place. The measurements must be there, must be transported back and forth, must be evaluated, you need control strategies, algorithms to drive the system. I think this is very, very fragmented, relatively expensive. And it is not yet clear whether the customer is willing to bear at least part of the investment." Consequently, some market observers are critical about the value creation potential of small-scale demand response business models; instead, they consider large-scale demand response business models to be valuable." (see Helms, Loock & Bohnsack, 2015).

Despite the distinct challenges of developing and implementing such business models, the basic concept is straightforward as the CEO of a demand response platform stated in our interviews:

"Our idea is very simple. Controlling production is replaced by controlling demand. And demand is at the moment heat pump, electric heating storage devices, because they have a sufficient capacity... If you take a light bulb, the performance would be so small that it would not have any impact. We would then have to connect millions and the cost would be unreasonable." (see Helms, Loock & Bohnsack, 2015).

2.1.5 Trading

An important business model for creating and capturing value with flexibility is trading. Although trading or energy trading is already well-researched for national or international markets, the trading model sometimes complements the other business models within the framework at hand:

"Through energy trading or market timing activities, traders implicitly signal their expectations about rising or falling prices to the market. Price signals implicitly incentivize producers and consumers who engage in demand response activities to align and eventually adapt their operation schedules to that point in time. (…). Our interviews confirmed that trading activities affect the supply and demand in the market and influence market information. According to the head of trading of utility company B, his role is to signal: "My role is to give price signals to the market." Additionally, the head of trading of utility company G highlights the importance of trading to the market: "The central effect is the price information." (see Helms, Loock & Bohnsack, 2015).

However, as conventional energy trading business models look at traditional power markets, such as EPEX Spot, trading in EMPWOER is different. It seeks to establish a local price (or value) signal. While mechanisms of how to deliver a service of local or neighbourhood energy trading have already been proposed by some early work (Ilic, Silva, Karnouskos, & Griesemer, 2012), a particular cloud-based approach is new. Cloud-based and platform business models differ in important aspects, and one essential difference in EMPOWER is that EMPOWER provides the service of local energy trading and exchange as a service, that potentially also can be used by new-entrants to the energy industry, and in that new business model will be available for a broader set of interested individuals and organizations. In such, trading from an EMPOWER business model perspective would also look at alternative models of organizing exchange, such as peer-to-peer sharing models (e.g. https://vandebron.nl or http://buzzn.de). Overall, trading from an EMPOWER perspective requires scope in regard to geographical proximity (in contrast to traditional national or international energy markets, or in contrast to social/peer-communities). At the same time, and opposed to pure energy trading models, EMPOWER looks also at the exchange of further "prosumer smart grid power services".

2.2 Local forces that shape EMPOWER business models

The five business model archetypes, presented above, provide important guidance for the business modelling process in EMPOWER. The ideal-types and the respective company cases are subject to study and a starting point to compile the services and their respective guiding rules, required for EMPOWER. However, it is also important to note that EMPOWER business models are shaped by different forces, that will make the distinct EMPOWER business models unique at the local level. Figure 3 depicts the model and we will elaborate on the forces in the following in more detail. The respective text has been taken as a direct quote from the case study, which complements this report.

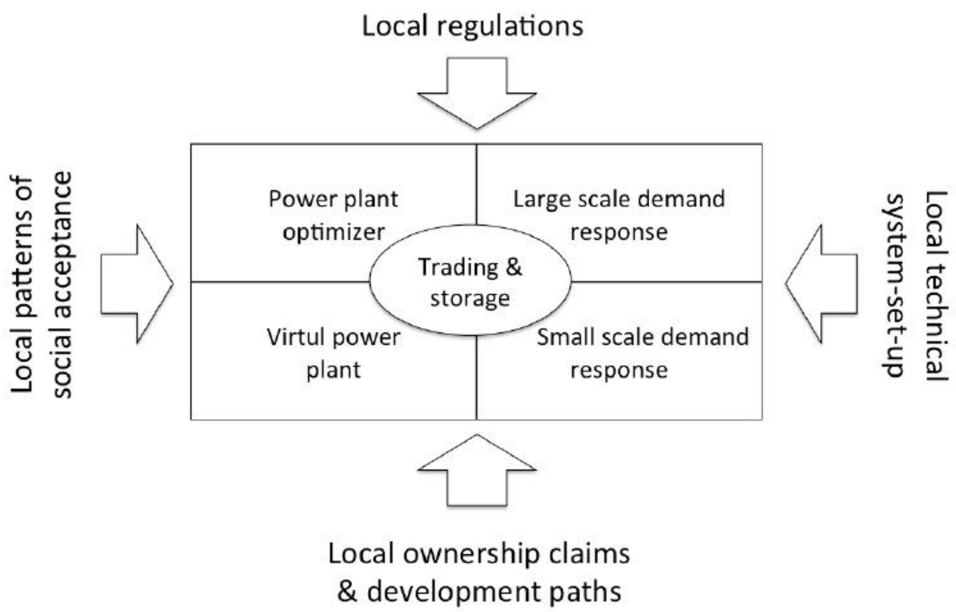

Figure 3: Timing-based business model ideal types and the impact of local forces; source: partly taken from Helms, Loock & Bohnsack (2015)

2.2.1 Local regulations[2]

A wide variety of issues relating to local electricity retail markets are likely to be subject to regulation. Moreover, they importantly differ across jurisdictions. In specific, four broad categories of policies are likely to have the biggest potential impact on stimulating the transformation toward local electricity retail markets (Eurelectric, 2013). First, funding for demonstration projects and R&D (instruments, such as: tax cuts, R&D risk, etc.) is likely to stimulate or "push" increased innovation efforts. It is particularly critical in the energy sector, as the gap between local pilots and large-scale deployment is larger than in most other industries. Second, support for commercialization (e.g. IP rights, product-to-market support, public procurement, public VC, end-use support, etc.) is another important area of local regulation that helps spur business model innovation and to create market demand. In particular, data ownership and access constitutes a big concern. Who owns the data? While consumers may have paid for the system, the utility might have offered a subsidy. What happens if the utility needs the data, in order to secure the system's stability? While these issues can be managed through contractual agreements, they involve the upfront clarification of privacy protection and of data ownership issues for smart grids to gain in social acceptance (Baars, Lassche, Massink, & Pille, 2014; Giordano et al., 2013). In turn, attractive environments for capital investments can benefit financially-constrained utilities, by making capital investments, taking control and a share of the profit pool. Third, since in the power sector, business models are highly dependent on the architecture of the entire market place, market regulations aiming at creating effective competition, and supportive market infrastructures, are central considerations to a firm's business model innovation endeavours. Fourth, local regulations vary in the extent to which they foster collaboration and learning among industry, research and financing networks and by promoting common standards and agreements. In such it is important to map and clarify local regulations for any EMPOWER business modeling process.

[2] The following text is a direct quote from the case study Loock et al. 2015, which complements this report.

2.2.2 Local technical system-set-up[3]

Beyond the regulatory infrastructure of the electrical system, further technological and non-technological aspects impact firms' business model innovation on the local level. First, a number of technological infrastructures underlie effective local system infrastructure. The *smart metering infrastructure* enables the communication and data processing equipment to collect smart meter data and to deliver it to the grid. The *demand response* techniques enable the local system to avoid electric system overload and to balance flexibility in the grid. *Distributed automation* control techniques help optimize the system's overall performance, as they interact with most other smart grid applications. *Renewable resource forecasting* infrastructures can help alleviate cost and operational challenges of the system. *Distributed storage* technologies (e.g. batteries, electric vehicles, etc.) can add flexibility to the grid. Finally, *microgrids (and virtual power plants)* constitute sections of the electric grid that can temporarily be disconnected from the grid and operate in isolation as an aggregator (virtual power plants) or specifically at the level of local neighborhoods (microgrids), thereby enhancing the reliability of the grid and the renewable resources to continue operating even during grid outages.

Secondly, a number of non-technological aspects, such as systems for managing grid security or the control over distributed resources, matter in local infrastructures. With the "opening" of the grid system, access to electronic grid data might become a victim for malicious attacks. As such, recent work advances recommendations for effectively designing secure electric grids (see also: Baars et al., 2014; Kempener, Komor, & Hoke, 2013). In addition, the control over distributed resources may become an issue of intensive conflict between parties with divergent interests. While the owner of a distributed power source may have a financial incentive to maximize its output, the utility in turn may want to limit the output to maintain the system's load level, or to shift the energy production to its own facilities. An upfront clarification of the system's control may spur innovation efforts. Finally, the existing local system infrastructure may largely vary in the extent to which it is already opened up to new companies and producers.

[3] The following text is a direct quote from the case study Loock et al. 2015, which complements this report.

2.2.3 Local patterns of social acceptance[4]

Although the participation of the demand side in smart grid systems is critical for the success of such systems, the motivations for participating is not always fully appreciated and taken into consideration when designing smart grid-related business models. However, the social acceptance of smart grid related technology seems to be one of the most critical issues for the deployment modern, distributed energy systems (Wolsink, 2011). Moreover, if we look at acceptance studies of some clean energy technology, there are indications, that some stakeholders assign value to the locality of power generation (Tabi & Wüstenhagen, 2015). However, we acknowledge that social acceptance – although important in general – can differ on the local level. The level and structure of social acceptance in one region might be different then in another region, and seems to be important to account for these differences when designing novel business models.

Among others, for instance advanced metering infrastructures that enable real-time ore near real-time consumption data ("smart meters") have increased connectivity between consumers and utilities. Thereby smart meters constitute a smart grid technology that enables two-way communication between the utility and the customer. They have spawned a host of new programs and techniques: real-time pricing, linking price signals to "smart" appliances, consumer information based on electricity consumption patterns, etc. How do the technological potential represented by these and the respective customer acceptance vary on the local level?

Although from a theoretic point of view *demand response programs* with the associated predictions of energy consumption can help solve the problem of peak loads in the electric grid, they also might require behavioural changes from customers. They may require either voluntary curtailment at peak load times, for instance, in response to real-time alerts, or direct control, which involves utilities' remote control of the home equipment (Sintov & Schultz, 2015). Current demand response program participation rates are estimated to locate below a level of 10% (FERC, 2009). Related, *smart automation* technologies can offer more than only feedback by offering scheduling capabilities and demand-response signal automation. They can thereby reduce effort on the part of customers and contribute to conservation efforts. Despite their potential for significant load reductions, customers' concerns for privacy and autonomy

[4] The following text is a direct quote from the case study Loock et al. 2015, which complements this report.

constitute major barriers to a wide-spread adoption. *Time-of-use pricing* plans have been put forward to discourage energy use during peak times, by charging higher prices in high-use than in off-peak periods. Despite the benefits of incentive-based strategies, they have been shown to apply for the time of the reward only, to quickly wear off thereafter (McClelland & Cook, 1980) and even be at times counterproductive to customers' intrinsic motivation (Sintov & Schultz, 2015).

2.2.4 Local ownership claims[5]

There exists significant variation across jurisdictions and geographical territories in terms of ownership. If we look at single technological components and their respective services, for instance smart meters often are owned by Distributions System Operators (DSOs). *Distribution system operators* are largely constituted of market players who operate electricity networks. A DSO is a natural or legal person that is responsible for operating, ensuring the maintenance of and for developing the secure and reliable distribution system in a given area. Some DSOs have sensed business opportunities in metering. For this reason, they have built alliances to procure smart meters and encourage competition between suppliers of meters. While in some regions DSOs are expected to fulfill the same tasks as they do today, others seek to reduce the roles of DSOs to a minimum. However, aside from more traditional sponsors of new business models, such as a DSO that intends to tap into new market potential or respond to some of the challenges on the existing business model, there are also new owners emerging.

An important example is that of *energy cooperatives,* thus private, independent, and non-profit organizations that are owned by the customers who they serve. They are established for instance to provide at-cost energy services. Energy cooperatives sometimes are governed by a board of directors, which is elected from the membership, which sets policies and procedures that are implemented by the coop's management. In Germany in particular, the number of emerging new players that might want to develop new business models such as energy cooperatives has drastically risen over the last 5 to 6 years, as the illustration shows below. Other examples are new prosumers, such as private individuals, farms or small and medium sized companies, or even new forms of organizations, such as virtual communities, that

[5] The following text is a direct quote from the case study Loock et al. 2015, which complements this report.

organize the presumption of energy within their community. Examples are the business models of Buzzn or Vandebron, which are discussed in the case study. In such the development of local markets could eventually be seen on a continuum between clear differentiation between supply and demand on the one hand, the emergence of prosumers in the middle of the spectrum, and the organization of local energy markets on the other hand.

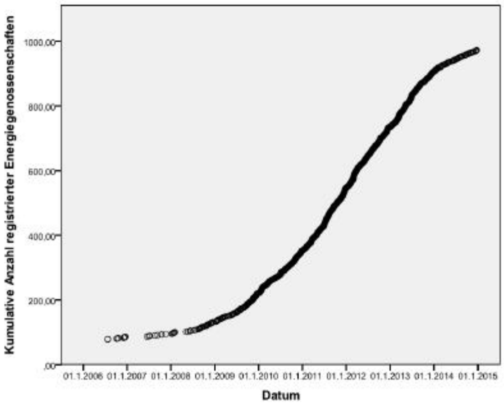

Figure 4: The rise of energy cooperatives in Germany (Müller and Holstenkamo, 2015)

One of the most important factors that drives variance in business models are different ownerships of business models. Business models will look different whether they are owned by a DSO, by energy cooperatives etc. Within WP8 we compile a stakeholder map, to classify potential ownerships and the consequences for business modelling. This stakeholder map will provide important guidance to further specify the business modelling process for EMPOWER. Based on the stakeholder mapping we will be able to study the different acceptance levels and the different needs of different stakeholders when designing EMPOWER based business models. Two powerful narratives that illustrate the potential differences in stakeholder preferences in regard to EMPOWER business models can be found in the EMPOWER case study, that has been produced for D2.1 and is attached to this report.

2.2.5 Business model development paths

Where do novel business models come from? An important contingency factor for business modeling for EMPOWER is to account for the dynamics and directions from where novel business models are developed. Assumingly business modeling and business models will vary depending on the starting point of their development. Within the work of WP8 currently a stakeholder map is developed to monitor the salient stakeholders for EMPOWER and to also prepare the acceptance studies to come and the dissemination activities. The stakeholder map will also inform the directions and dynamics of business model development. Figure 5 depicts a first draft of different development paths of EMPOWER business models.

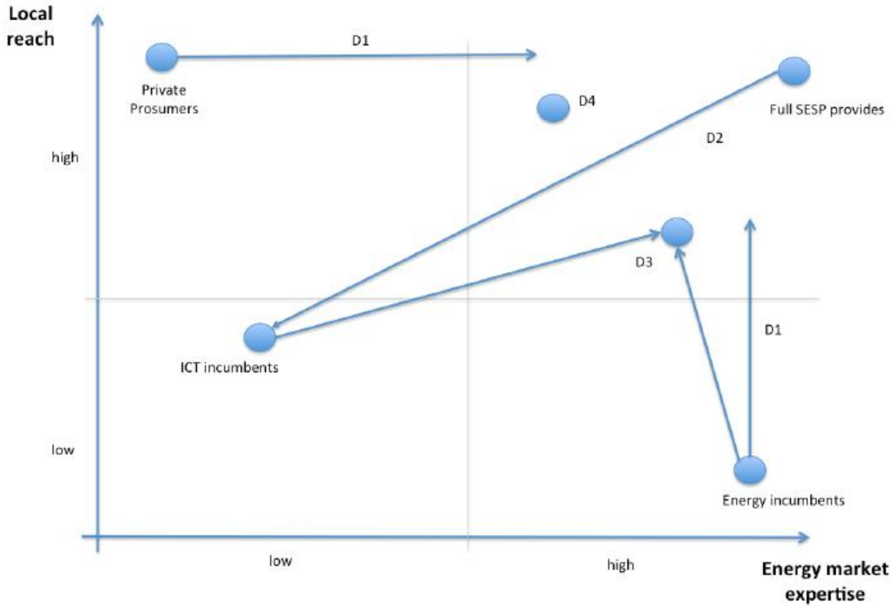

Figure 5: Different development path for business modeling

First, as indicated in the development path D1, business models will be developed in a rather linear development and/or transformation process of existing models. Already existing actors would then transform their existing business model towards an EMPOWER based business model. Second, as shown in the development path D2, business models will be developed based on sourcing activities. In that sense existing players could extend their business model by sourcing relevant products or services, hence buy the business model innovation. Third, new business models will be developed through integration and/or alliance formation. Examples are joint ventures of complementary companies (e.g. https://tiko.ch as a joint endeavour of Repower and Swisscom). Finally, new business models will be developed from new entrants. It is important to note that business modeling within these different development paths differ in many ways, such as the available cognitive and non-cognitive capabilities, resources, government structures and strategies.

3 Guiding rules for the development of business models in EMPOWER[6]

Business modeling is an important process for market participants to identify new means of creating and capturing value.[7] However, for business modeling within local retail energy markets some further specifics need to be considered. In the following we outline these specifics, as service-based business modeling and suggest a process for empowering local electricity retail markets through business modeling.

3.1 EMPOWER business models are service based

In this section, we present a set of guiding rules for the development of flexibility-based business models in EMPOWER. The first guiding rule is that EMPOWER business models are service-based.

Based on the conceptualization of business modelling as the configuration of simple rules, also business models for local electricity retail markets involve distinctive configurations of simple rules, specifically of service-related simple rules as the micro-foundations of a business model. As such, the deconstruction of business models into its single component simple rules is a central starting activity in business model innovation (e.g. Loock & Hacklin, 2015 look at heuristics).

Business modeling involves a focus on distinct service-related simple rules. A good model to imagine such single services-related simple rules is an app. In that sense, service based business modeling would first look at distinct apps. In a next step of the service based business modeling process, business modellers select single apps and compile a collection of apps. This collection works by looking at benchmark cases. Table 1 compiles a first list of cases that are relevant for EMPOWER. However, the cases provide a starting point for collecting ideas on services that provide foundations for EMPOWER-based business models.

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[6] Note that the material from this sections has been taken from Loock, M; Bohnsack, R.; Reuter, E. and Christian Kunze (2015): Empowering local electricity retail markets through business modelling (in preparation for submission at thecasecentre.org).

[7] Various tools support the process of business modeling, such as the business model canvas by Osterwalder. A new, IT-based tool that captures latest research insights is the www.businessmodelcomposer.com The business model composer complements this case study and can students are invited to use it. However, the case also can be worked out without the businessmodelcomposer.

Company	Business Model Core	Further information
Next Kraftwerke	Operator of a large-scale virtual power plant (VPP) and a certified power trader on the EPEX energy exchange's spot market.	https://www.next-kraftwerke.com
Enernoc	Demand response and energy management solutions for commercial end-users, utilities, and wholesale suppliers.	www.enernoc.com
Restore	An electricity demand response aggregator	http://www.restore.eu
Strombank	A power bank with a local community battery	https://www.mvv-energie.de/strombank
Mosaic	Peer-2-peer lending platform for financing solar energy	https://joinmosaic.com
Buzzn	Platform which allows individuals to buy electricity straight from another private person with excess production.	https://www.buzzn.net/
Vandenbron	a platform that allows individuals to buy electricity straight from a local farmer with excess electricity production from solar panels or biogas-to-power installations	https://vandebron.nl/
Local pool	A system to sell electricity from CHP or PV installations in multi-tenant buildings directly to the occupant.	http://localpool.de

Table 1: Draft case collection for identify relevant services

A step-wise process for business modelling for local electricity retail markets

The following steps need to be taken into account when developing business models for local electricity retail markets:

1. Clarifying the envisioned market design: Business models for EMPOWER are likely to differ in regard to their interpretation of the market design of a local electricity retail market. So clarify the market design you envision (e.g. use the EMPOWER market design).
2. Collecting services for local electricity retail markets: Analyse cases and collect data of what is already out there. Complement that with your own ideas and compile potential services for local electricity retail markets (e.g. look at the case studies provided and modify them a bit).
3. Selecting services for business modeling: Choose a selection of services that is of your interest.
4. Configuring services for business modeling: Configure the services, so that they fit to each other. Make sure you cover relevant aspects of a business model (e.g. look at Baden-Fuller & Haefliger framework of a business model).

5. Local fitting: Make sure your business modeling fits local regulations, local system infrastructure, local social acceptance levels, local ownership claims.
6. Go from internal to external: Clarify your business model internally within your team first. Use a business model template for that (e.g. Baden-Fuller & Haefliger). Design the "App" version of your business model for external communication after you have jointly developed your model.

3.2 EMPOWER business models are supported by a joint platform

As a second rule for business modeling in EMPOWER, we propose that EMPOWER business models are supported by a joint platform. Our understanding of a platform is double-edged: On the one hand the platform is a joint idea, a joint (cognitive) model of how EMPOWER business models should look like. In the course of the project we need to define a process of how to achieve this shared understanding of EMPOWER business models. This allows us to infer which business models are EMPOWER business models and which are not, and to spell out the distinct boundaries of EMPOWER based business model innovation. On the other hand the platform is literally a (IT based) stock of compatible service, a business model innovator can choose to develop a business model (hence, to configure the respective services). This double-edged definition has important consequences.

3.2.1 The EMPOWER market provides a collection of services

We need to establish a stock of compatible services. This overall task requires several sub-tasks. First, it is important to actually collect the services. In that, it is important to define selection criteria (e.g. based on the iterative market design-business model development process) and then collect the respective services. An important benchmark could be for instance Google Play that already offers multiple overlapping apps (however, there might also be other alternatives). While we foresee that eventually also new services might be created or existing services might be adapted for the use in EMPOWER, we submit that most of the services can be collected by studying and analysing existing services. In that regard, the conceptual work on the timing-based business models, the initial cases in the case study and in particular the forthcoming work of work package 2.2. will provide this collection of services. Second, it is important to define a physical platform on which the services can be stored and later used. This is most likely an IT environment, similar to an App-store or a software programming language. Third, it requires establishing interfaces between the distinct services that enable a possible integration of the distinct services. Finally, as depicted in Figure 4. and developed for the forthcoming acceptance studies, it requires an interface that can be used to choose the required services. It is important to note that this idea refers to the EMPOWER market as a service (or a stock of respective services). In such, the complete stock of services would equal all services that one would need to cover every aspect of the EMPOWER market design. However, as outlined above, we foresee that the single business models only cover a selection out of all EMPOWER market services. The following slides depict a collection of services and a respective design of the collection, which we are currently developing in preparation of our acceptance studies.

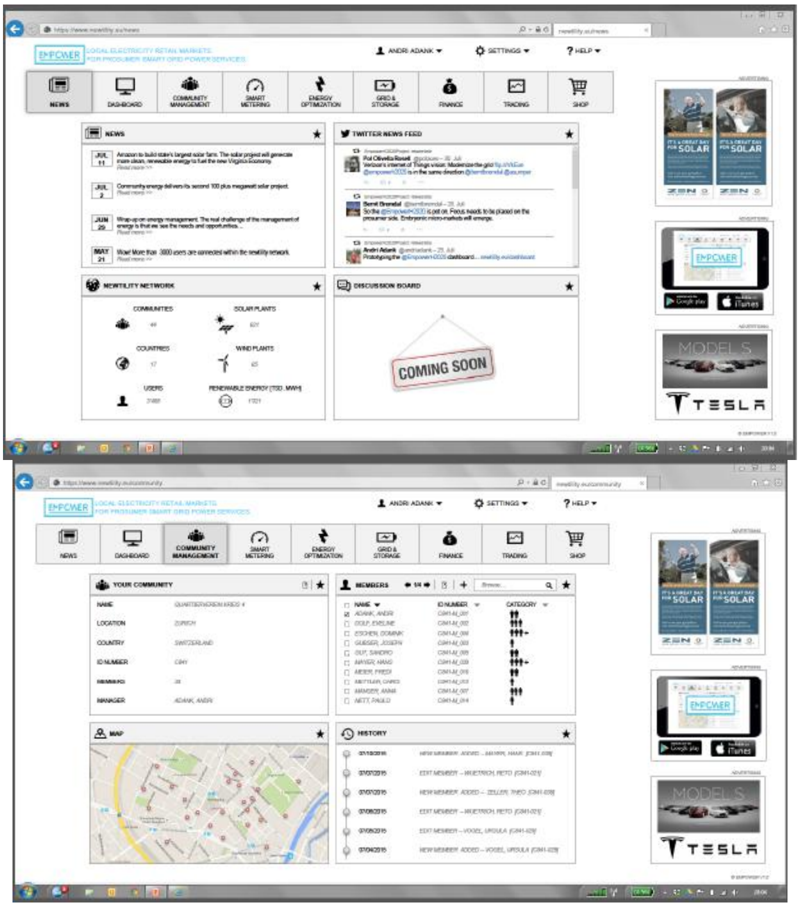

Figure 6: An IT-based stock of EMPOWER market services

3.2.3 EMPOWER business models are managed by dashboard

A business model is a selection and individual configuration of EMPOWER market services (simple rules). For supporting the task of selecting and configuring services, we suggest a “business model cockpit”. This business model cockpit guides the implementation of the business model and supports the process of development. We imagine this business model cockpit as a dashboard, on which the selected services can be displayed. An important precondition of such a dashboard is the interface between the different services, which need to ensure that the services work together and can be compiled and configured according to the needs of the local manager.

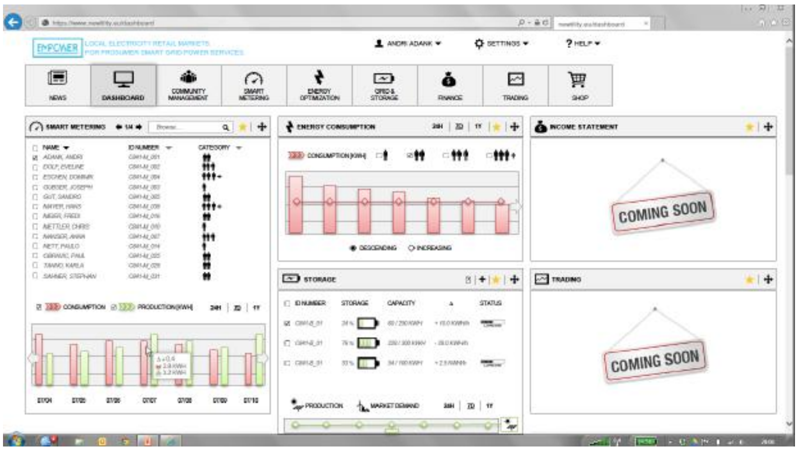

Figure 7: An IT-backed dashboard as a "business model cockpit"

3.3 EMPOWER business models provide market entry to non-experts

An important contingency factor of business models for EMPOWER is the question of ownership. Different forms of ownership potentially lead to the development of different business models. We expect for instance that business models that are owned by traditional actors in the energy industry (e.g. utilities) might look different compared to business models that are owned by emerging new players, such as energy cooperatives or other private or commercial prosumers. While the difference potentially concerns several aspects, such as different goals or expectations in value or profit creation, we focus especially on the role of expertise. Within the current development and the rise of prosumers, we foresee that aside energy experts also non-experts increasingly become interested in further aspects of the energy market. An important benchmark business model in following this business model development rule is https://pagecloud.com. Page Cloud provides a new set of services that empowers also non-technical skilled individuals to create and change homepages. Overall, we submit that EMPOWER also should empower non-experts to be able to engage in profound EMPOWER business model development. This transfers into the guiding rule that EMPOWER business models shall provide market entry also to non-experts. We discuss three implications form this rule.

3.3.1 Energy managers from the hood

As a role model of a local agent that actually drives EMPOWER business modeling at the local level, we developed the notion of "energy managers from the hood". Central to this role model is that the starting point, or the core capability, is not expertise in the energy industry, but the capability or the distinct resources to assess a local community, a neighbourhood and create and maintain a local market structure. This could work either through local ties (such as the local agent is part of the community) or through specific skills or reputation that enable and facilitate aggregation on the local level. It is important to note that the connection to the energy industry, or the required expertise, only comes in a second step and is provided by the EMPOWER market services. In such EMPOWER "empowers" energy managers from the hood to set-up and maintain local electricity retail markets for prosumer smart grid power services.

3.3.2 Ease-of use

An important aspect of the process of empowering is the "ease-of-use". In such, EMPOWER based services (simple rules) are to be easy to use, and in such can also be used by new-entrants to the energy industry. A nice example of depicting ease-of-use is to imagine traditional energy industry SCADA systems. While these SCADA systems are often very detailed in covering the single aspects that need to be controlled for in order to keep an energy system up and running, they also provide market entry-barriers: from the perspective of a non-expert, they look complicated and require special training. The requirement of ease-of-use is a guiding principle that seeks to constantly look for opportunities to lower such entry-barriers and provide solutions that are easier to use. However, important to note is that this development of ease-of-use must not jeopardise functionality and robustness of the system. Optimizing ease-of-use and functionality and robustness at the same time with that appears to be a challenging process. However, we submit that this can even become one of the key success factors within the concept of business modeling for EMPOWER. We also submit that this process might be at important parts software driven, as we have learned from other industries that similar challenges have been solved through the development of software (e.g. like for instance software for private investors etc.).

3.3.3 Apps and App store as a role model

As a role model for covering the distinct aspects of business modeling for EMPOWER (e.g. selection and configuration of compatible services, ease-of use), we refer to apps that provide distinct isolated services (or sets of services). Individuals can select from a central stock of apps, an app store, and choose among a broad variety of services. The app store even provides a distinct role model for monetization. On his mobile device the individual collects and managers his personal selection and configuration of services. Although we acknowledge that the provision, potential integration and management of the distinct services of EMPOWER might be more complex then single apps within an app store, we find apps and the idea of an app store a value able role model for the further guidance of the business model developments in EMPOWER. In such we look at single services, as the (modular) micro-structure of the market design and the business modeling. These single services should be fully operational – like apps. It should be feasible to select and configure many of these apps, like the processes of compiling and choosing apps in an app store. Finally it should be feasible to integrate the apps on a single dashboard to organize a convenient and holistic work-flow – like the individual storage of apps at an individual mobile device.

3.4 EMPOWER business models are unique in regard to local fitting

Many instances of business model composition work in one context but not in another. In such business model composition is dependent on various contingency factors. This is especially true for business models for local electricity retail markets. Although the generic products and services that can be distilled in the EMPOWER market cloud are – each on its own – applicable in a variety of contexts, business models for local energy markets need to be fitted to the one specific context they are embedded in. Business models need to look different in Switzerland than in Norway, or different in an island-like rural area compared to the urban structure of a city. As discussed earlier regulation, technical infrastructure, social acceptance and ownership claims are such important contingency factors. Business model composition needs to account for the context at least along these dimensions. Consequently business modeling should account for and specify both, how the single products and services of the business model fit to these contingencies and how the overall configuration of these products and services, hence the whole business model fit to these contingencies.

3.5 EMPOWER business models have a graphical representation

3.5.1 Methodology end empirical approach

One challenge for business modelling is to establish a link between more graphical based business modelling approaches that seem to have closer ties to other modelling practices in the technical domain on the one hand, and more "narrative" based business modelling that can be found in social science and business on the other hand. WP 2 intends to bridge the gap and provide a rigor business modelling framework that can translate between these two worlds. An important reference in this regard is a methodology that already been used for depicting business models for distributed generation (Gordijn & Akkermans, 2007). We refer to a simplified version of this methodology; figure 8 depicts the basic components. It is important to note, that the value activity also can be depicted as a service. The service however, is already a further specification of a value activity.

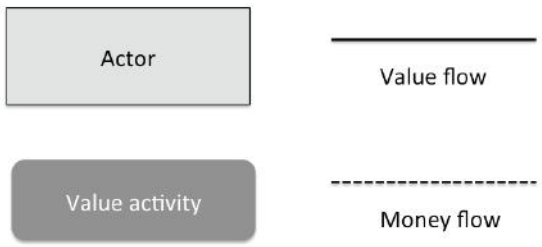

Figure 8: Legend based on (Gordijn & Akkermans, 2007)

3.5.2 Embryonic EMPOWER business models

Business modelling is a social process of sharing, discussing and jointly enacting a business model (Doganova & Eyquem-Renault, 2009). Thus, in line with state-of-the-art literature on business modelling this deliverable has produced a process framework that guides the joint development of business models within EMPOWER, rather than providing "ready-to-go"-business models. An important starting point to guide business modelling is to start with "embryonic" business models. Embryonic business models mark a starting point and will be re-shaped and complemented during a joint communication process between the project partners. Based on the work of D2.1 and in line with work of WP6, WP2 has produced different embryonic business models, as a starting point for initiating the joint discussion on business models.

The first embryonic business models is the "SESP no more" business model (see figure 9). The basic business model of the SESP no more is from a model perspective the most simple business model. It comes in two variations. In a first variation a prosumer is the customer, which is engaged through a high degree of automatization that requires only low individual customer involvement. The service is delivered and organized through the SESP, the smart energy service provider. The SESP basically provides all the services a prosumer requires. The monetization in this business model is simple, the prosumer pays an overall member fee to assess the services, and a service fee for the respective services. However, the complexity is "only" in the organization of the SESP, does it make or buy all the services, what services does it provide at which costs, etc. These are important challenges, but the overall model is simple. In the second variation the customer is a regular consumer with an interest in becoming a prosumer. The SESP provides the services that enable presumption, but the initial model structure is similar (see below).

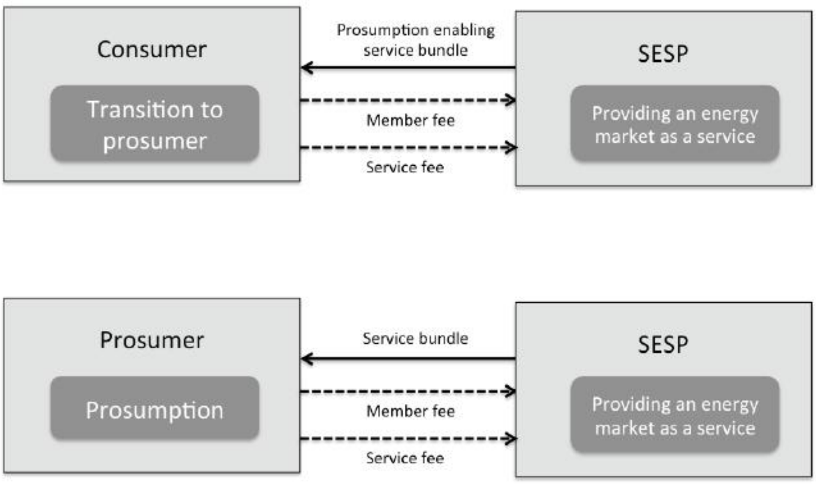

Figure 9: Embryonic business model of "SESP no more"

The second embryonic business model is "our power" (see figure 10). This business model is already more complex in different dimensions. For instance it involves more actors. The customer is again the prosumer, but we also have a local SESP, that provides a bundle of individual-local services. The standard SESP supplies the local SESP but also provides standard services to the prosumer. Revenues streams flow only to and from the local SESP. The dominant value proposition is the "local", which allows for a more active engagement of prosumers. The local SESP delivers the services to the prosumer through sourcing from the standard SESP. However in regard to the revenue model this business model is more complex. The local SESP exploits a value-added through providing a "local" service. This model points to further developments path, that could illustrate how business models at the three EMPOWER demo sides differ, or the potential development of a “franchise-like” EMPOWER business model.

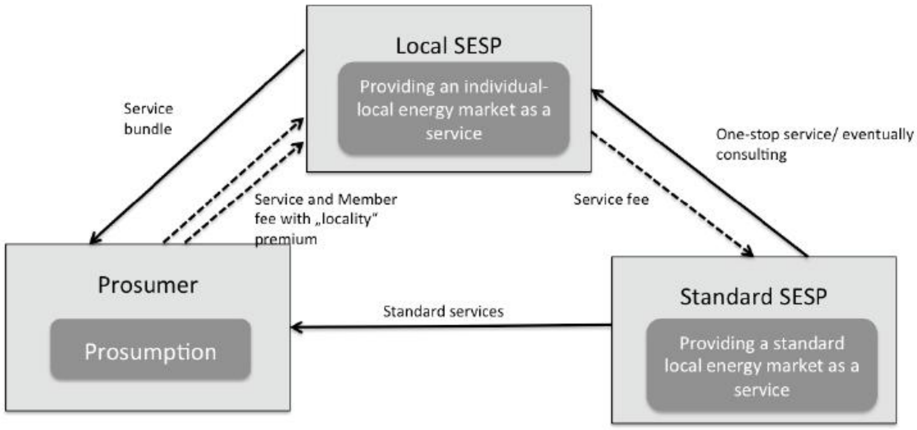

Figure 10: Embryonic business model of “our power”

The third embryonic business model is “DSO local” (see figure 11). In this model a DSO is an important supplier of the SESP. However, it is important to note that only the SESP has direct relationships to the prosumer. As we expect that some DSOs might be interested in exploring their role within EMPOWER business models, the DSO local model features a mediating role of the SESP that supports the DSO in going local energy markets. Throughout the supply of the SESP the DSO can leverage existing resources and capabilities, although the SESP will provide a new logic of aggregating and delivering services. Thus, the SESP mediation might also be suitable in overcoming organizational boundaries that would hinder a DSO to directly establish or participate in local energy markets. Basically, but that again would be another transformation, this model also works with other suppliers, such as Telco companies, energy cooperatives, investment companies etc.

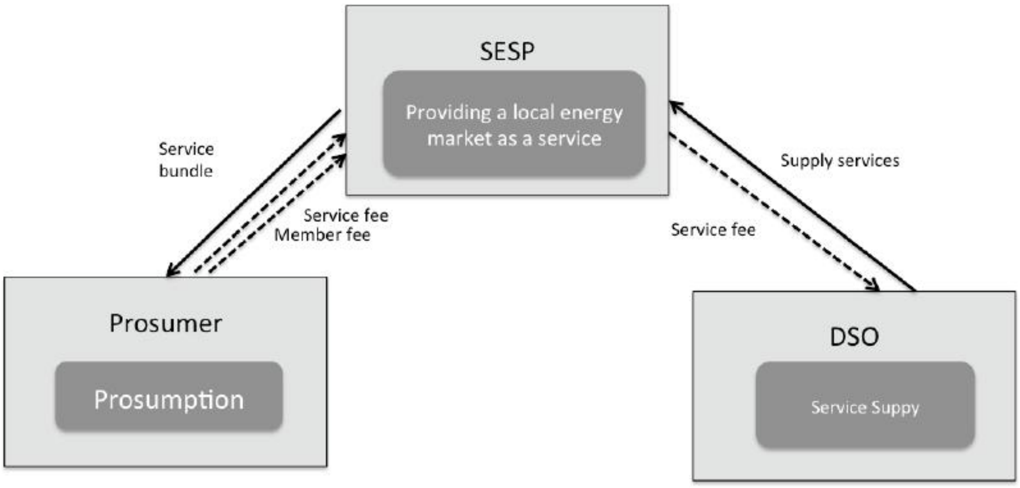

Figure 11: Embryonic business model of "DSO local"

A last, slightly different embryonic business model focuses on the revenue model. This model is associated with multi-sided markets and the respective business models, which have been discussed earlier in this report. An important aspect is that the value flows and the money flows are decoupled. Basically the member fee, which the prosumer pays (eventually consisting of an activation and ongoing fee) to the SESP for his service is lower than the (perceived) value of the service. It will be subject to the further development of the business model to specify how the "lower" comes about. One option however would be that the services are financed through a partner of the SESP. The SESP would provide exclusive access to prosumers that is of value to the partners (see figure 12).

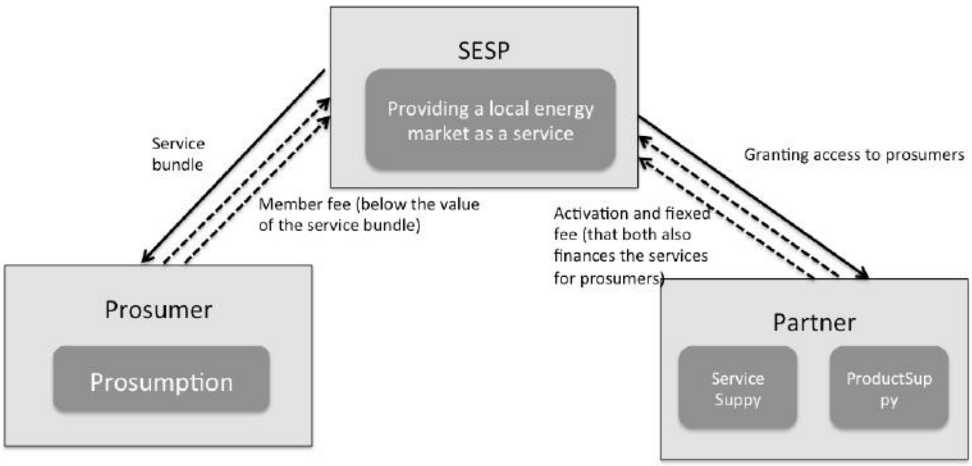

Figure 12: Embryonic business model of "Member-fee only"

4 Acceptance of EMPOWER-based business models by incumbents

As stated previously, prior research provides extensive support for the view that “business models” are in essence something “cognitive” – a conceptual tool in managers’ heads. With this conceptual tool, managers come up with a model of how their business should look like, of what their mechanisms of value creation and value capture effectively are (Loock & Hacklin, 2015). With this premise, the development or innovation of business models refers to a set of cognitive processes through which managers engage in “business modelling”. They can do so individually or collectively. Furthermore, the aspects in the organizational context that facilitate or constrain managers’ business modelling activity. With our purpose of better understanding the social acceptance and adoption of business models for local electricity markets, this conceptualization has a number of important implications for our future research efforts.

4.1 The role of cognition

First, we need to understand how individual managers engage in the cognitive activity of business modelling, in order to successfully develop business models for local electricity markets. Business modelling or business model innovation is not static but a dynamic process of selecting and configuring simple rules of value creation and value capture (such as customer identification, customer engagement, value chain linkages and monetization). Within this process, managers “configure” the building blocks of a business model, so that they best fit to each other. From prior research, we know that the types of cognitive models that managers develop in this process importantly shape the types, the magnitude and scope of the strategic choices they make. As such, a focus on managers’ cognitive models of their business model is an important research emphasis that is of primary strategic relevance and that importantly predicts the success of business models for local electricity markets.

Prior research uncovered that the success of companies and even entire industries rests on the cognitive models of their managers. This is important to consider for EMPOWER as such knowledge will help to design business models that are more likely to be accepted by markets and will make the diffusion of EMPOWER technology and business models more successful. Among others, some of the critical success factors in this respect are the extent to which the models are cognitively complex, the extent to which the models reflect the local contingencies at hand, and the extent to which the models are updated in light of important changes in the technological, regulatory or demand areas. In turn, some of the biggest sources of business model failure are the extent to which the cognitive models fail to incorporate changes in the technological, regulatory or demand sides, or the extent to which these cognitive models rest on outdated assumptions. As such, there is some knowledge on the success factors of how these cognitive models of business models should look like.

In turn, much less is known about how managers actually develop cognitive models of successful business models. This process is referred to as business modelling. In order to address this shortcoming in prior literature and in order to uncover successful business modelling practices for EMPOWER, a next step is to research into the types of cognitive processes at play when managers engage in business modelling activity. We specifically look at business modelling practice in the context of EMPOWER business models. We seek to uncover how managers develop cognitive models of successful business models and what the factors are that successfully facilitate this process.

The purpose of this research is twofold: A first purpose is to derive best-practices and insights into the types of competences that are necessary for developing EMPOWER business models. This goal is critical to understanding the social acceptance of EMPOWER business models and to develop formats for their successful dissemination. A second purpose is also to address shortcomings in prior academic research on the topic through publications in top-tier academic journals in the strategic management field. For this purpose, we have started to establish academic collaborations to research into the individual competences necessary for business modelling and into the organizational context factors that driver the competence development process.

4.2 The role of context

Second, and in line with the first goal, we need to understand how the social context in organizations facilitates or constrains business modelling in the context of local electricity markets. From this perspective, business modelling is not only an individual phenomenon, but also a collective phenomenon inside and beyond organizations. A number of stakeholders are critically involved in the development of new business models both inside the organization, but also beyond its boundaries (e.g. through partnerships, the regulator, etc.).

On the one hand, business modelling is also a joint process of sense making and meaning-making brings with it a number of challenges. For instance, people with different backgrounds have different mind-sets, different backgrounds and different expectations as to the success of business models. In such, the joint development of a new business model follows involves negotiation of sometimes compatible and sometimes incompatible viewpoints. For instance, from our initial tests, we uncovered that there is important negotiation between more technical perspectives on the one hand and the more market, business or consumer-driven perspective on the other hand. How these perspectives get reconciled will be a focus of our ongoing research.

Another dimension of negotiation are the different geographical perspectives, such as Norway, Germany and Malta and the envisioned ideal-type EMPOWER business models. In other words, the interpretations of what successful business models for local electricity markets are and how they should look like has a strong context-specific component. They depend not only on the individual characteristics of the managers but also on the geographical characteristics of the region of focus.

On the other hand, other stakeholders also have a critical say when it comes to the social acceptance of business models. That is, when business models are considered to be legitimate or appropriate, they are more easily accepted and resources are committed to the business models. Political dynamics inside industries may facilitate or constrain the social acceptance of novel business models. This is the focus of research on corporate political activity. It suggests that for business models to be effectively accepted in an industry, it requires corporate political activity that legitimates the business model on the one hand, and that counteracts potentially competing forces (for instance by incumbent utilities) on the other hand. What the political dynamics are that EMPOWER business models are likely to face is one focus of this line of research. What the political strategies are through which EMPOWER business models can gain social acceptance in an industry is another focus of this line of research.

Having so far uncovered primarily the characteristics of the individual business modelling activity, we will in a next step concentrate on the types of influences that stakeholders inside and outside the organization have on the process of business modelling in the context of local electricity markets, before addressing the strategies that are needed for achieving greater acceptance of EMPOWER business models.

5 Implications for the EMPOWER project

D2.1 first of all produced a process framework for business modelling in EMPOWER. In such, for instance the guiding rules for business model development in EMPOWER have implications for the business models in the three demo-sites of the EMPOWER project, in Norway, Germany and Malta. One of the most important implication is the differentiation between business model archetypes and the ideal-type EMPOWER market design on the one hand, and their “real world” equivalents at the demo sites in Norway, Germany and Malta: While on a conceptual level the archetypes, such as the envisioned business models or the envisioned market design are clear or pure, the real-world demo-site face a variation of local disturbances, which make a 1:1 implementation of the idea-types unlikely. In the conceptual framework at hand, these external factors are modelled as the local forces that shape the business modelling. In that we expect that the realized market design and the realized business models in the different test regions differ from the ideal-type conceptual foundations, and also differ from each other. However, we regard this as an important aspect of the local business modelling process for EMPOWER, rather than a failure in the EMOWER project. An analogue way of supporting this argument is improvisation on the local level: Based on ideal-type guidance, the local market and business model enactment needs to improvise, negotiate with the local constraints and opportunities and thus create individual solutions. The process-perspective of business model development for EMPOWER, which has been produced in WP2.1 is supporting this process and provides strategic guidance (for meeting EMPOWER expectations) but also flexibility (for being able to accommodate the local factors).

5.1 Impact on the further work in WP 2

D2.1 is the first milestone in WP2. In that it marks the further development paths of WP2 and the presented concepts will be further developed as the process proceeds. However, as outlined in the project plan, the forthcoming tasks will also have complementary focus. In Task 2.2. we will further refine the ideal-type business models in local smart grids. As such Task 2.2. picks up the work of D2.1 but will especially explore the distinct and detailed features of business models in local smart grids. Some of the findings in D2.1 look at important mechanisms of relevant business models, but the detailed focus of specific EMPOWER business models hast to be developed in T2.2. For that especially the close cooperation with WP6 is essential. This next step

(T2.2.) will prepare the larges part of the endeavours: the acceptance studies (T2.3). D2.1 has already revealed the cognitive aspect as essential – especially for studying the acceptance in the managerial world. However, complementary (based on T2.1, T2.1, T6.1, T 6.2 and D8.2) it will also be essential to prepare acceptance studies of further stakeholders (consumers, prosumers energy cooperatives etc.). D2.1 has already tested a first methodology to study acceptance (conjoint study), but there are also other studies available. Finally, T2.4 will work our policy recommendations and D2.1 has produced the important foundations for the upcoming work in WP2.

5.2 Impact on the work in other WPs

Impact on WP6: In line with the work in WP6 D2.1 states the interwoven relationship between market design and business models. An important joint reference in this regard is earlier work on two-sided markets (Rochet & Tirole, 2006). Further, based on the service-dominant logic and the rules, that guide the respective services, further work is required, to spell out the distinct market rules for EMPOWER markets (basically WP 2 and 6 need to team up to develop a holistic portfolio of market rules, see figure 1). Business modelling then follows as a process of the selecting and configuring a sub-set of rules and the respective services. This mechanism has to be spelt out on a more micro-level to articulate the distinct rules and services that are suitable for attracting and involving consumers and prosumers. For this we need to establish a profound consumer/ prosumer insight, which eventually could be established through a survey (which also could be developed jointly with WP8).

Impact on WP8: The process of business modelling for EMPOWER which has been developed in D2.1 and the case study will guide dissemination, especially towards the business community. In such it is advisable to utilize the work of D2.1 for workshops and executive trainings, but also for educating the business school management community on their respective events (e.g. SMS conference in Berlin, conferences in Grenoble, Cass London etc.). Additionally a critical task for converging the work of WP2 and WP8 is the stakeholder map. D2.1 has pointed to the need for a profound understanding of stakeholder needs (e.g. different owners) as a starting point for business modelling in EMPOWER.

Impact on WP9: A major part of D2.1 was basically to prepare impactful publications. One publication has been submitted to Energy Policy, but requires major revisions, which need to be carried out from WP9. This publication will be one of the first high-level publications within the EMPOWER project. Additionally D2.1 has produced a case study, which also can be prepared for final publication. The case study complements this report and will be an important tool to reach out and disseminate the work within the EMPOWER project.

Impact on WP3 and WP7: Based on D2.1 we suggest different business model workshops within the EMPOWER project to transfer the knowledge on business models that has been created and to develop joint business models for the technical system set-up (WP3) and for the on-site implementation in Norway, Germany and Malta (WP7). For that we suggest two 1 ½ day business model workshops: one in Barcelona with the technical experts and one in Switzerland with representatives from WP7 and the different demo sites. The goal for both workshops is to jointly develop business models for EMPOWER that will further guide the technical development and the implementation at the sides. This will be also a further step to prepare T7.4 and will again be in close connection with WP 8 task 8.4.

6 Appendix

6.1 Timing-based business models for flexibility creation

This paper has been authored by Thorsten Helms, Moritz Loock and Rene Bohnsack, and is currently under revision at Energy Policy.

Abstract: Energy policies in many countries push for an increase in the generation of wind and solar power. Along these developments the balance between supply and demand becomes more challenging as the generation of wind and solar power is volatile, and flexibility of supply and demand becomes valuable. As a consequence companies in the electric power sector develop new business models that create flexibility through activities of timing supply and demand. Based on an extensive qualitative analysis of interviews and industry research in the energy industry, the paper at hand explores the role of timing in the power sector and sheds light on the mechanisms of flexibility creation through timing. In particular we distil five ideal-type business models of flexibility creation with timing and reveal how they can be classified along two dimensions, namely costs of multiplicity and intervention costs. Our findings have important implications for energy policy.

It is available upon request through moritz.loock@unisg.ch

6.2 Empowering local electricity retail markets through business modelling

This case study has been authored by Moritz Loock, Rene Bohnsack, Emmanuelle Reuter and Christian Kunze and is currently under preparation for publication at www.thecasecentre.org

Abstract: Energy markets are expected to change. One model of an emerging new market design points to local electricity retail markets for prosumers smart grid power services. Such local energy markets provide interesting opportunities to accommodate major opportunities and challenges in the energy industry. However, business modeling for such local electricity retail markets is a challenge. Not only that emerging local energy markets differ from established markets, but they are also likely to differ in regard to local regulations, local technical system set-ups or local patterns of social acceptance. New business models for these markets can be developed for different owners, such as utilities, start-ups or new entrants or even new forms of organizations such as energy cooperatives. Within this case study students explore the emergence of a decentralized energy world as a contingency factor for business modeling. Students learn about strategic issues in the energy business that shape current and future markets. They practice business modeling that accounts for the multi-level contingencies that follow from this market transition. The students, in particular engage in business model composition for local electricity markets and they compose new business models for empowering prosumers and energy managers from the hood.

It is available upon request through moritz.loock@unisg.ch

6.3 Scaling novel business models in incumbent energy firms

This sub-project and the respective papers in similar versions have been presented in different author configurations at the EGOS conference in Greece, and the Strategic Management Society Conference in Denver.

Abstract: In organizations, processes of scaling novel business models are core to rejuvenating mature businesses. However, these processes are not yet fully understood. Looking at a case study in action in which a sub-unit of the leading Swiss utility (Alpiq) acquires a new technology (GridSense) with disruptive innovation potential that eventually rejuvenates the traditional core business of the firm, we map distinct processes and practices of scaling a novel business model. We look at the case study from a combined justification / heuristic theory perspective, which together

inspire conceptualization of business model scaling as contextualized enactment of a portfolio of configured heuristics. In particular we observe controversial justification practices that enable two dimensions of business model scaling: (1) from single, generalized heuristics to multiple configured heuristics which we refer to as *business modelling*; and (2) from individual to shared accounts through justification processes which we refer to as *rationalizing*. Within both paths our preliminary findings point to a particular interplay between configurations of heuristics and the context they are embedded in. Our findings further leave us to theorize on the emergence, robustness and performance of business models by revealing that models, which are sufficiently attractive for justifications across multiple heterogeneous contexts become more robust and scale better than those only attractive for homogeneous contexts. This is counter-intuitive as traditional theory assumes a linear relationship between heterogeneity of justification and scaling. Implications for organizational theory and management apply.

It is available upon request through moritz.loock@unisg.ch

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