INTEGRATED SMART GRID CROSS-FUNCTIONAL SOLUTIONS FOR OPTIMIZED SYNERGETIC ENERGY DISTRIBUTION, UTILIZATION STORAGE TECHNOLOGIES

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inteGRIDy Business Models: Validation Highlights

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ARTICLE INFORMATION	ABSTRACT
Published May 2021 Keywords: Business model development, business model validation, financial analysis, cash-flow analysis, business model replicability, inteGRIDy Business Modelling Tool, inteGRIDy Business Model Replicability Tool	In this whitepaper, we present a summary of the results of business model validation and business model replicability analysis conducted for inteGRIDy business models. Overall, depending on an inteGRIDy solution and its business model, the financial analysis performed to validate the developed business models showed that the cash flow would be likely positive in the range between the first 6 months to the first 1,5 year of operations. Furthermore, we investigated the replicability potential of the developed business models across Europe. The analysis helped assess the market readiness for inteGRIDy solutions and their business models across 17 European countries.

Introduction

During the last three years, our team at SCIL has been working closely with partners across all 10 inteGRIDy pilot sites to develop and validate business models for solutions enabled by inteGRIDy tools.

The objective of the activity was two-fold. First of all, to understand how (potential) providers of technological solutions developed by inteGRIDy pilots can create, deliver and capture value in the market. And secondly, to investigate the replicability potential of the developed business models across Europe. For this second objective, dedicated modules – Feasibility Check and Business Model Replication Tool – were developed as part of the inteGRIDy Business Modelling Platform. These tools help identify the market readiness for innovative solutions in the home country, and in other European countries. Some examples of such technological solutions would include the ones that enable the implementation of energy communities, DER and DR aggregation, local flexibility markets, and local microgrids. With support of the tool, together with pilot partners, we analysed what is the replicability potential of inteGRIDy business models across 17 European countries.

inteGRIDy Business Model Validation : Results

In inteGRIDy, the objective of business model validation activities was to analyse how financially viable the developed business models are from the perspective of potential solution providers. Business models developed for inteGRIDy solutions all represent some variation of a Product-Service System, where the focus is on delivering a combination of products and services. To analyse their viability, we performed a cash flow analysis per business model taking into account such aspects as a potential number of customers that can be served in the first several years, costs associated with product and service provision per customer, and expected revenue streams. Each cash flow analysis was further supported by a number of solution-specific assumptions, which were validated by inteGRIDy technology providers.

Overall, depending on an inteGRIDy solution and its business model, the cash flow analysis turned out to be likely positive in the range between the first 6 months to the first 1,5 year of operations.

However, some interesting challenges and insights came up in the validation process. One of the most common challenges was high upfront equipment costs per customer. These costs are usually associated with obtaining and installing the required physical infrastructure, such as sensors, meters, or heat pumps.

Let`s take an example of the solution developed by the St Jean pilot, to see how such a challenge can be addressed. The St Jean pilot has been exploring the use of DR with commercial and residential customers and researching on its benefits for both the grid and the customer.

The solution that is proposed and partially demonstrated by the pilot is the Smart Home Service Platform. It enables residential consumers and commercial building operators to participate in DR programs and take advantage of the related financial benefits without compromising their level of comfort. Moreover, additional functionalities are offered to allow customers to understand their energy consumption through detailed analytics. The solution is enabled by necessary IoT devices (gateways, sensors, meters, actuators etc.), which must be installed onsite, as well as software applications developed by TREK (Demand Side Energy Profiling & Visual Analytics Engine).

From a service perspective, the customer can choose between a Basic and Premium package. The Basic package would include such functionalities as generation of the consumption profile; real time consumption monitoring (weekly, monthly); visual analytics; smart control of HVAC, water heater, lighting, plugged devices; several modes; and eligibility to participate in DR schemes (flat discount/discount linked to DR signals). In addition to these, the Premium package enables consumption optimization towards different scenarios, such as comfort and savings, based on profiles; and suggestions on what to do with achieved savings (i.e. offering ticket discounts linked to hobbies and favourite recreational activities). All in all, customers would be able to optimize their consumption while also enjoy smart home services.

In this scheme, SOREA would offer the Smart Home Service Platform to its residential and commercial clients and play the role of an aggregator. TREK would be their technology provider performing all necessary software updates.

In the process of validating the above described business model together with partners from SOREA and TREK, high upfront equipment costs (sensors, meters, actuators) per customer was identified as a key challenge. On average, the cost amounts to 450€ per residential customer and 1800€ per commercial customer. As benefits for customers (i.e. savings) become evident only as they are accumulated over time, such upfront costs are considered to be too high for local customers, and thus can affect the overall attractiveness of the offer. After trying different approaches, partners came up with the following scheme that tries to address this challenge. To support customers, it was suggested to offer all IoT equipment (sensors, meters, actuators) under a rent-to-own agreement. The contract would be offered in consent with the IoT equipment supplier and would be offered for 1,5 years with a 3% interest rate. Payments to the IoT supplier would be done by SOREA every 6 months. It is assumed here that the equipment provider would consider the offer attractive, as it would allow them to have a) a long-term contract with SOREA as their key provider of IoT equipment, and b) a new income stream. The exact contract conditions would of course need to be negotiated with the supplier. Under this scheme, SOREA would also contribute to

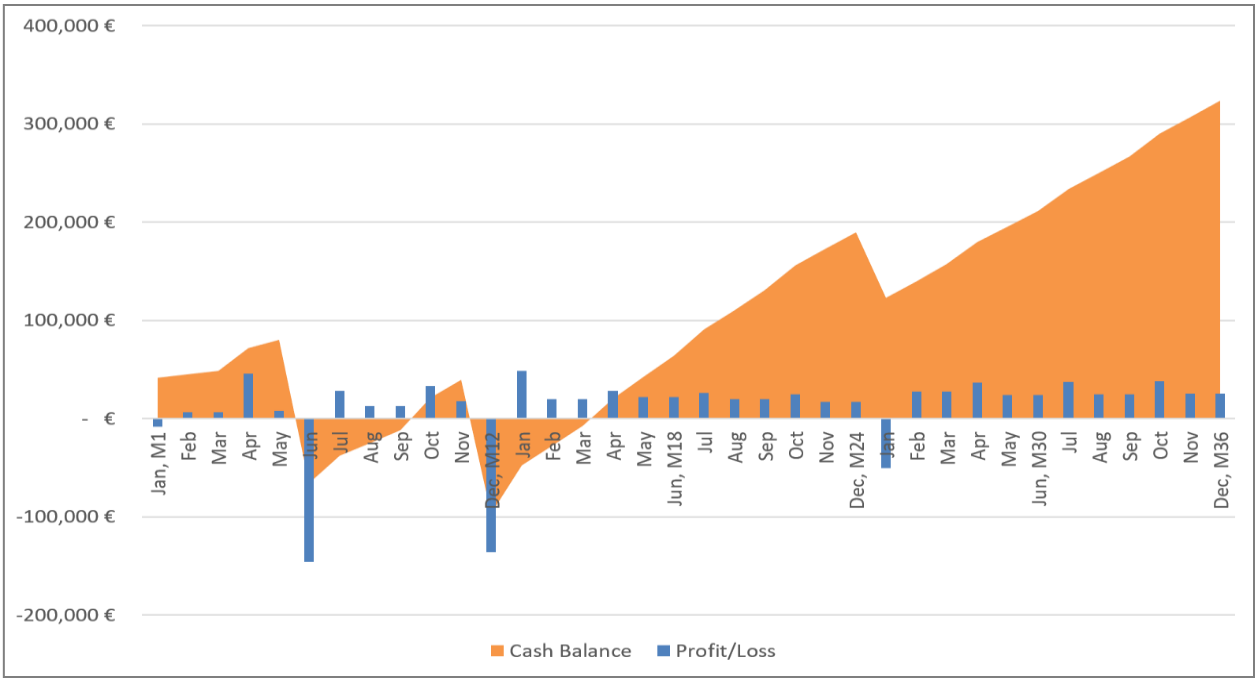

Figure 1. Projected profit & cash balance (first 3 years of operations)

high. As for the service enabled by the solution, customers would pay a subscription fee (monthly, every 6 months, annually) for the chosen package (Basic/Premium). Considering this approach, the cash flow analysis for the solution provider turned out to be likely positive from M16 of operations (Figure 1). For more details on the developed and validated business models for this and other inteGRIDy solutions, we encourage to stay tuned for the final project report on this topic to be published later this year – D8.5 «Business Models Assessment and Replication Feasibility Analysis».

inteGRIDy Business Model Replicability Analysis : Results

In inteGRIDy, beyond financial viability of the developed business models, we also aimed at identifying to what extent the European countries are ready for their implementation in the market. To achieve this objective, together with project partners, we investigated the replicability potential of the developed business models across eight pilot countries (Cyprus, France, Greece, Italy, Portugal, Romania, Spain, the UK) and nine additional European countries (Belgium, Denmark, Germany, Ireland, Latvia, the Netherlands, Norway, Slovenia, Switzerland). This analysis was performed with support of the Business Model Replication Tool developed for this purpose within the project. For each country, we considered the latest status of the regulatory and legal conditions, relevant economic conditions (incl. available support schemes), current user practices (i.e. available energy community projects, V2G projects), and technology enablers. These helped us to make conclusions on the current market readiness for inteGRIDy solutions and their business models across 17 European countries (see Figure 2 for an example).

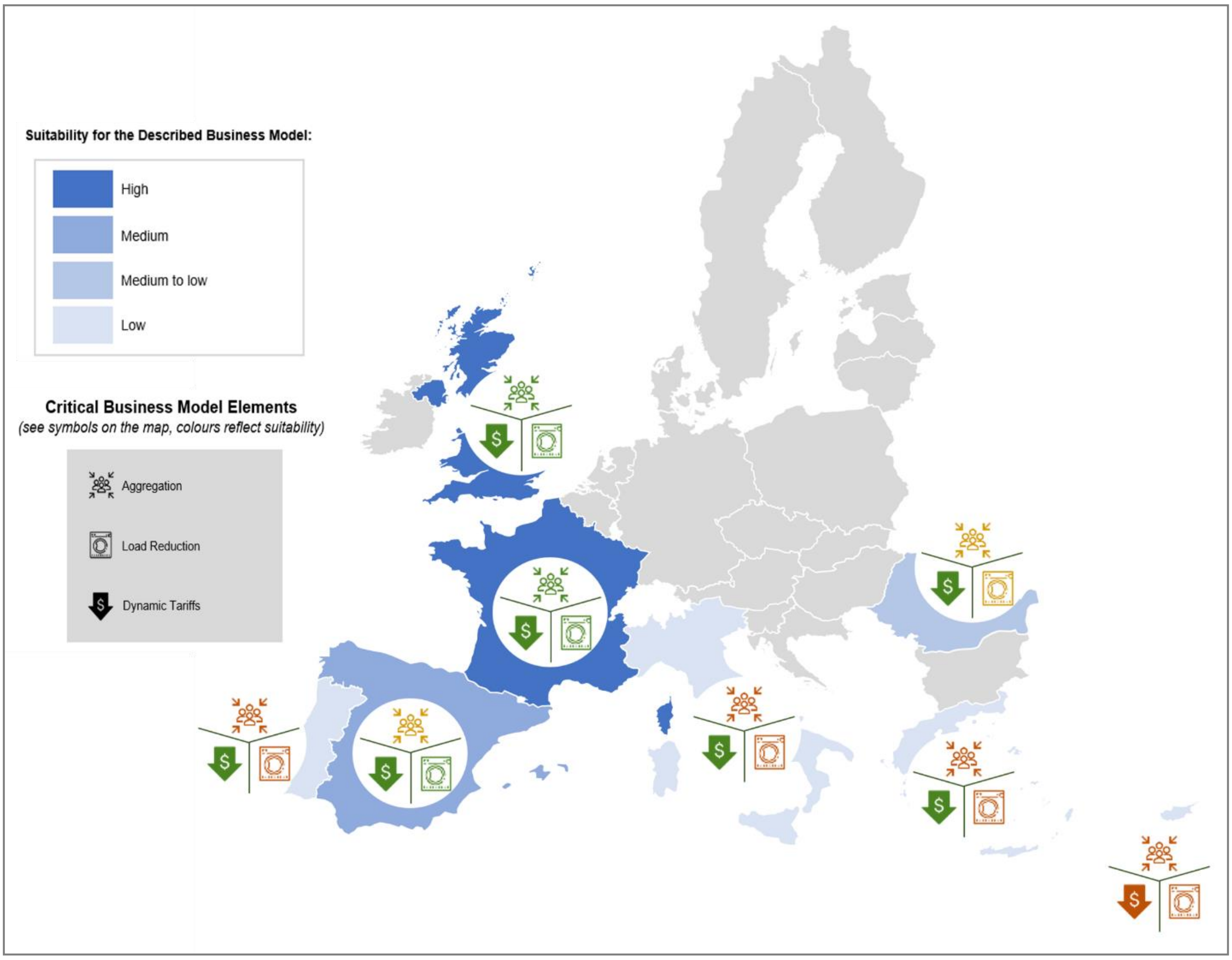

Figure 2. Results of the Business Model Replicability Analysis for the Smart Home Service Platform and its business model across pilot countries (original country of the analysed business model is France)

Overall, the analysis revealed that among inteGRIDy pilot countries the UK and France have the most favourable regulatory and market conditions for the implementation of the developed business models. In both countries, aggregation is legalised, and independent service providers (not involved in energy supply) are permitted, although the UK has some restrictions in place regarding the latter. In the UK, independent providers may access only some parts of the market, while some markets are closed to participation except via a supplier. In France, independent aggregators do not need to obtain a consent from the retailer/BRP to access the markets. In both countries, balancing market is open to Demand Response and Distributed Energy Resources in a range of products, and independent aggregators have access to these markets. 22 different independent aggregators are currently offering their balancing services in the UK, and around 10 independent DR aggregators are participating in the French balancing market. Explicit demand response is also practised in both countries. For example, in the UK, major participants in demand response programmes are industrial and commercial sites. The UK and France seem also to have the most favourable regulatory and market conditions for implementation of microgrid projects, particularly when it comes to interaction with the grid and the markets.

It is important to note that relevant developments are happening at their own pace in all inteGRIDy pilot countries. For example, in terms of the overall market readiness, the UK and France are closely followed by Spain. There, the regulatory framework for aggregation is currently under development, which allows to expect that the implementation of DR-related solutions will become possible in the very near future (as soon as the market rules, including DR-sensible tariffication systems, are further detailed and clarified).

Among other considered European countries, Switzerland, Germany and Ireland also seem to have rather favourable regulatory and market conditions for implementation of inteGRIDy business models.

Conclusions

The developed business models for inteGRIDy tools and components demonstrate how they can enable a variety of valuable solutions in the market while creating value for the grid, potential providers, customers, and a wide range of other stakeholders. This includes enabling benefits for local energy communities (see business model approaches for inteGRIDy technologies developed by the Nicosia and Isle of Wight pilots), local microgrids (see business model approaches developed for Terni and Xanthi pilots), commercial building operators and residential consumers (see business model approaches developed for St Jean, Ploiesti, Thessaloniki, Barcelona and Lisbon pilots).

More details on the developed business models and the business model replicability analysis will be available in D8.5 «Business Models Assessment and Replication Feasibility Analysis», which is to be published later this year.

In meantime, we invite everyone to check the inteGRIDy Business Modelling Tool for a set of useful business modelling tools designed to support researchers and practitioners in the electricity industry with developing business models for innovative solutions.

About UCP – SCIL

Universidade Católica Portuguesa (UCP) is among the best universities in Portugal and the business school is the number one business school in Portugal according to the Financial Times Ranking (ranked 26 in Europe). Its MBA programme is ranked 36th in the world. The business school has strong ties to Portuguese businesses, the national government and the city administration of Lisbon. UCP has a tradition of national and internationally funded research projects within innovation, strategy and organizational fields.

The Smart City Innovation Lab (SCIL) is a multi-disciplinary research group at Católica Lisbon School of Business and Economics. SCIL's mission is to empower businesses to create well-being in urban areas via digital technologies, novel business models and sustainable values. The research of the group focuses on business models, entrepreneurial strategy, internationalisation and digital innovation.

Information about the authors

Alina Margolina: Alina is a project manager representing SCIL in international R&D projects in the smart city domain (renewable energies, mobility, healthcare). In inteGRIDy, she has been leading the business model development and validation process for smart grid technologies demonstrated by 10 pilots in 8 countries, leading the business model replicability study, and representing the project in the BRIDGE initiative of the European Commission (Scalability & Replicability Task Force).

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