Professional MBA

Entrepreneurship & Innovation

Smart Energy Networks: New Business Opportunities

A Master's Thesis submitted for the degree of

"Master of Business Administration"

Supervised by

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Preface, Abstract, Overview

1. Affidavit

I, **Richard Hubatka**, hereby declare,

1. that I am the sole author of the present master's thesis **Smart Energy Networks: New Business Opportunities**, 62 pages, bound, and that I have not used any source or tool other than those referenced or any other illicit aid or tool, and
2. that I have not prior to this date submitted this master's thesis as an examination paper in any form in Austria or abroad.

_____ _____

Date Signature

2. Abstract

All member states of the European Union are currently implementing the so-called “third energy market package” to improve efficiency and reliability of the European energy systems and networks. The national grids have to evolve from national managed systems to a high performance European “smart” grid prepared for the challenges of the 21st century.

Austria is currently in an advanced stage implementing the European framework into national regulations. Some parts are already implemented (e.g. smart meter requirements) other important parts (e.g. data format and handling) are under development. The national energy authority is implementing this legal framework and exercising market oversight. One of the main goals is to liberalize the energy market and provide the customers more choices to buy energy for a better price/service ratio.

In the first part of the thesis, the European and Austrian electrical energy market is analysed. This reflects the status of the current regulations and the market players. Then the impact of smart metering has been analysed with consideration on technical and legal requirements. The second part has focus on the new venture and how the assets can be transformed to a competitive advantage. The main asset of the venture is a cloud-based billing system developed in Europe.

The outcome of the analysis is that in an increasingly competitive market a new venture with flat cost structure and new and unique, innovative services has a potential niche. The market entry barriers are low but careful planning is required due to a highly dynamic environment.

3. Preface

The implementation of smart energy meters is the basis for a liberalised, deregulated electrical energy market. It is the most visible change for the energy end-customers. The master's thesis describes the foundation for the formation of a new company entering an energy market in transition. Depending on characteristics of the market and tangible and intangible assets from a group of investors from Scandinavia, several business opportunities will be evaluated and discussed.

A wide-ranging R&D effort is required to increase the efficiency, safety, reliability and quality of European energy systems and networks to facilitate the transition to a more sustainable energy system. Due to the regulatory push by the European Union's Third Energy Market Package, EU Member States have or are about to implement some form of legal framework for the installation of smart meters. Moreover, in some Member States electronic meters with advanced feature sets have been installed for economic reasons even without any specific legal requirements. Due to the liberalisation of the markets for grid-bound energy and the efforts of market actors, the development of legislation and regulation for smart metering in Europe is highly dynamic.

The smart metering infrastructure needs to be coupled with innovative services in order to reach better energy management by means of cost benefits, automation and information. Customers have now the possibility to change the energy provider and switch to a competitor. Innovative companies can profit from this opportunity and provide new energy products and services based on the "intelligent" metering devices.

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2. List of Abbreviations

AMM	Automated Meter Management
AMR	Automated Meter Reading
APCS	Austrian Power Clearing and Settlement
APG	Austrian Power Grid
BSS	Billing Support System
CIS	Customer Information System
ELITE-SW	Code name of the NUCO for the billing software suite
LDC	Local Distribution Company
NUCO	New Cooperation, Start-up
OTC	Over the counter trading
SAAS	Software as a Service

Part 2: Main Part

1. Introduction

1.1. Motivation

There are several reasons the author has chosen this topic. The main reason is a group of serial entrepreneurs from Scandinavia (The Management). This group is looking for business opportunities in the DACH-region (Germany, Austria and Switzerland) because of former and actual collaborations.

The group has invested in two software companies. One is a take-over, has developed a billing software suite for energy utilities and is active on the Nordic market for over 30 years. The other one, a start-up, is a Boston based software company for cloud computing with a branch in Austria (GDM Software). An internal assessment identified the opportunity to develop a cloud based billing system. The advantage for a client is to outsource IT and related services and to reduce costs.

Scandinavia is in an advanced transition stage to from fixed, hierarchical energy networks to smart energy networks and therefor of high interest of the European Union (Unger & Rydén, 2008). The EU monitors the changes in the Scandinavian countries very carefully and has an impact on its on framework. In addition, the rate of renewable energy is well about average and comparable to Austria (Eurostat: Share of renewable energy, 2012). The European countries are now implementing the framework to national law. This also means that there are slightly different requirements (technically and legally) in every country.

The energy market in Austria is very interesting to observe. E-control, the national regulator, has the mandate to lower entry barriers for companies entering the Austrian energy market for the benefit of the end customer who should profit from a larger number of energy providers and lower costs.

2.1. Objectives of the Master's Thesis

The implementation of smart energy meters is the basis for a liberalised, deregulated electrical energy market. This analysis will be the foundation for a future business based on processing data records from smart power meters. In addition, the extension of the billing business as energy trading on the central energy exchange board is of interest. Using selected analysing methods the results will have an influence on current products from companies of the investors.

The following topics will be covered:

- General energy market overview,
- Willingness to switch the energy provider,
- Selection of the target addressable market segment based on the assets within the investors group,
- Product overview and advantages for the customer to choose the new service,
- Business opportunity assessment,
- Basic implementation roadmap

The expected outcome is to gain information on the status of the Austrian energy market. Based on the market and potential of the product a roadmap for a new venture will be outlined.

3.1. Course of Investigation

In the first part an analysis of the current market situation is performed. Due to dynamics of the market, the following areas will be analysed in detail:

- General European energy market research
- Status of the Austrian smart meter regulation
- Overview and technical setup of smart metering
- An overview of the structure of the Austrian energy market and participants

After the market environment has been analysed the focus will be on the new venture

- Description of the start-up company
- Assets of the new company
- Business orientation

Based on the status of the smart meter integration and the competitive environment a business opportunity assessment will be performed.

- What is the value proposition(s) that the new entity (NUCO) will provide and to whom – consumers, providers, regulators etc. Who in fact are the customers and what will they pay for and how?
- Target market definition and approach
- A business model or variants are developed and discussed. Risk, opportunities, timing etc. are just a few important parameters

The findings of the assessment will be at the end discussed and the steps for the new corporation will be outlined

2. Opportunity Research

1.2. Current European Status

The directive on energy end-use efficiency and energy services (ESD) sets 9 % energy saving target by 2016, and EU has set itself an objective to reduce energy consumption by 20 % by 2020. In addition, the ESD Article 13 sets the basic community legislation for energy metering and informative billing (The Council of the European Union, 2009). Yet the EC has estimated that the use of new energy metering and billing systems should grow at a faster rate to fulfil the requirements of the ESD.

A wide-ranging R&D effort is required to increase the efficiency, safety, reliability and quality of the European energy systems and networks to facilitate the transition to a more sustainable energy grid. The smart metering infrastructure is only an enabler, which needs to be coupled with innovative services in order to reach better energy management by means of rewards, automation and information. At the end user point, traditional analogue power meters are currently being replaced by smart meters. Instead of reading the meter on site once a year the meter sends load information to a central aggregation point. This data is the basis for accurate billing.

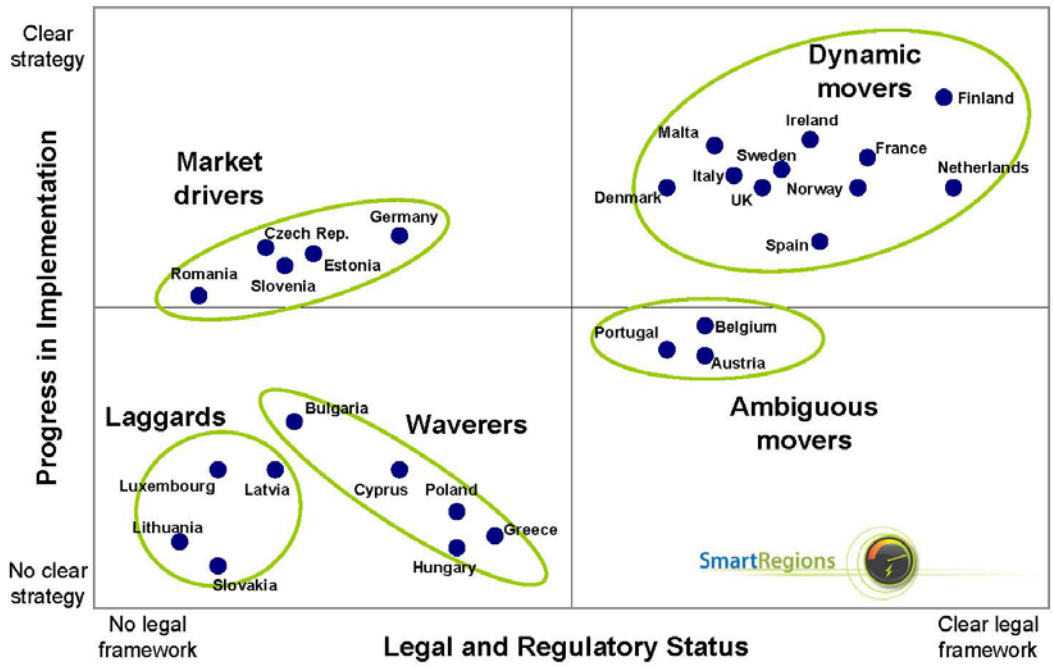


Figure 1: Smart meter implementation status in Europe
Source: SmartRegions

The SmartRegions project published in February 2011 its European Smart Metering Landscape Report (Unterpertinger, 2011). The graphical overview is shown in Figure 1

The Report is a deliverable of the project “SmartRegions – Promoting best practices of innovative smart metering services to European regions”. Member states of the European Union have been analysed about the implementation status of smart meters. The graphic gives a good understanding about the different approaches. Details from the report also reveal that Germany and Austria do not follow a common strategy implementing smart meters and the national markets must be handled individually.

Innovative smart metering services (such as informative billing and feedback, variable tariffs and load control services) are most promising in supporting energy savings and peak load reduction. The development in services offered to end-users is the key to achieve actual energy savings and peak-load shifting to realise the alleged smart metering potential. (ESMA: European Smart Metering Alliance)

Due to the regulatory push by the European Union’s third energy market package, most EU member states have, or are about to implement some form of legal framework for the installation of smart meters. Moreover, in some member states electronic meters with bidirectional communication are installed for economic reasons even without any specific legal requirements. Due to the regulatory push and the efforts of market actors, the development of legislation and regulation for smart metering in Europe is highly dynamic.

Players that want to become “early movers” in this market must take some risks and assume the specifications of many details that will be used in the new generation of smart meters and “smart infrastructure” to handle the huge increase in transactions and details produced in the new generation of utility solutions.

However, the new business opportunities are evolving in the area of developing and providing the existing and new players in the energy & utility market with the right type, agile software solutions and services needed to serve all parties in the marketplace.

In the Nordic countries (NO, SE, DK, FI) where the open energy market has been active for two decades the tendency is clear: The old vertical “energy company” owned by the state or the communities/municipalities, serving a number of customers with the grid and the meters as well as the electricity, handling both distribution, measurement and sales will lose their central position. The “end users” – the customers want to see new solutions to handle their energy needs to keep control over own consumption and CO2 footprint. New players with “real” customer care, thinking in new ways in combining electricity with other utilities and services, are coming into the arena. This means that the old “Energy Company” probably will be reduced to only handle the distribution networks from production sites to end consumers, with load balancing and consumption balancing between the “power retailers”.

There is now coming up a new generation of “power retailers” thinking new ways in customer care and simplicity. They are currently working in many ways as the new mobile telephone companies, selling their energy services to a lower price and with additional services to the market, using the grid owners/distributors network for distribution and measurement of consumption at the endpoints.

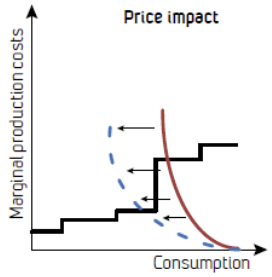
Authorities in all Nordic (and EU-countries) want to raise competition in the energy markets to lower prices as well as to better utilize the energy networks. A common goal for the environment and the economy! These are very strong motivational factors to support smart networks!

To ensure equal opportunities for new players in the market, a new generation of Information and communication solutions (ICT) must be developed. Today the “old” CIS-systems (Customer Information Systems) are huge, expensive, legacy solutions and are mainly built on traditional technology. These systems are handling the typical “old energy company” and the only interface to the end consumer is the final invoice/electricity bill.

If new players shall find their way into this market, new software services with a low implementation threshold and a low initial investment is needed. At the same time these solutions must have the capacity to handle a large number of market transactions (consumption transactions, customer changes, address changes…) and to communicate with the smart meters in a two-way communication infrastructure.

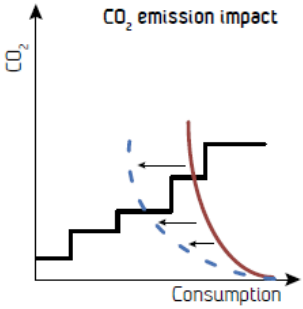
2.2. Economic, environmental and societal impacts

With the introduction of variable tariffs and services, the consuming behaviour will also change over time. One of the goals of the European Union is the increase energy efficiency to better utilize the networks (Smart Regions, 2012).



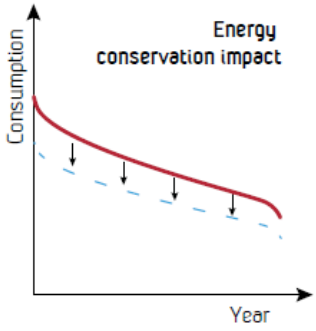
Price impacts

Demand response will result in reduced peak prices due to avoided use of expensive peak load production.



CO_2 emission impacts

Demand response will result in reduced CO2 emissions due to avoided use of caloric power plants.



Energy conservation

Load management and feedback regarding energy consumption will result in reduced consumption due to customers' awareness.

Figure 2: Economic, environmental and societal impacts

3.2. The Austrian Energy Market

3.2.1. Overview and basic setup of the Austrian energy market

Before the liberalisation of the energy market in Austria 2001, customers did not have the free choice of the energy supplier. From a European view of open and competitive markets, this had to change to the benefit of the end customer (Elektrizitätswirtschafts- und Organisationsgesetz (ElWOG), 1998):

- The Operation of networks (transmission and distribution) is independent from competitive tiers as production or trade. (Figure 13: Market segmentation)
- Operators of the transmission and distribution tier are mainly responsible for the secure and continuous operation as well as metering of network parameters and customers responsible.
- The regulated tiers must be subject to load balancing as well as to provide enough capacity for supply and demand.
- To enable all users of the network (producers, distributors, traders and end customers) to do business dedicated “balance groups” have been established. Every participant of the energy market must be in a balance group
- All players (producers or consumers) have to have a contract with a network provider for the use of the transmission and distribution networks and an additional contract for the suppliers or traders of energy.
- The energy flow is calculated and metered in *15-minute* periods. Before the national regulation for smart meters, end consumers with consumption under 50kW of producers with less than 100.000 kWh have been metered annually. To have a model to calculate the energy load a standard load profile has been applied to the customer. With the introduction of smart meters, metering becomes much more accurate as with the annual metering method.

3.2.2. Market Participants

There are many different parties involved to operate the Austrian electricity market. This has become even more complex after the opening of the energy market. Together they ensure
190 the operation and support of the network 24/7 (Figure 3).

Abbreviations:

CSA: Clearing and settlement agent
CAM: Control area manager
BRP: Balance responsible party
NB: Network Provider

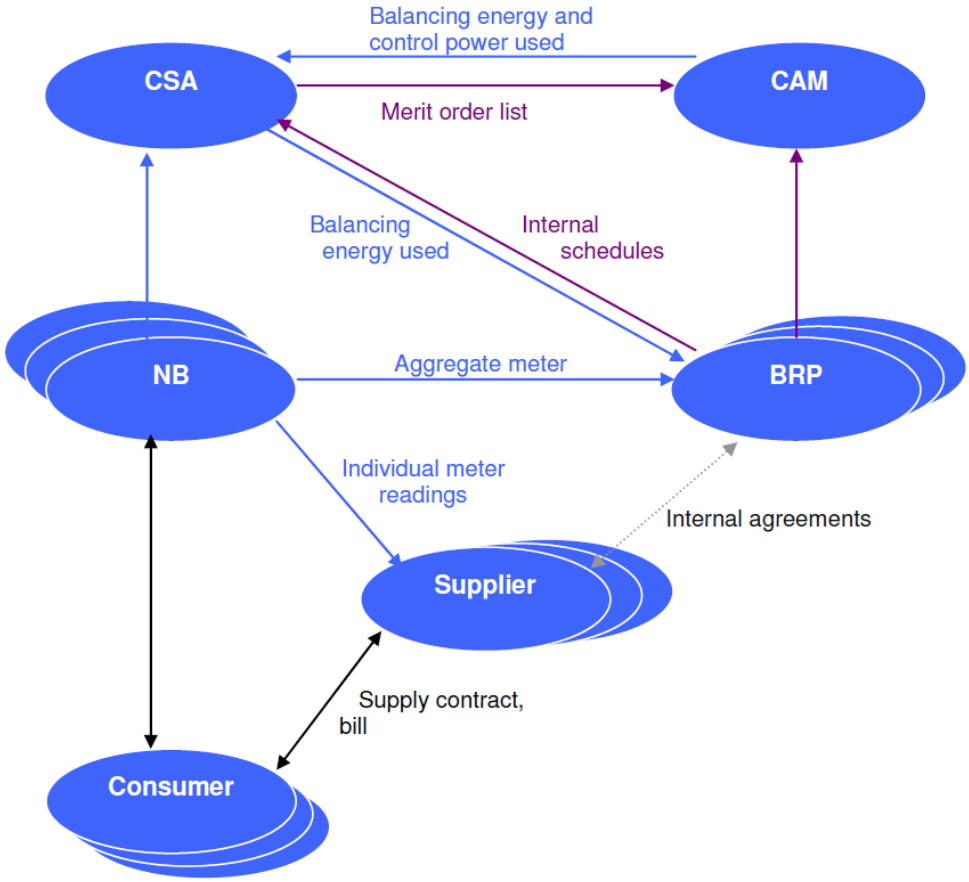


Figure 3: Dependencies among market players
source: E-Control

3.2.3. Energy mix

Austria is one of the top five countries in the European Union with the highest rates of "green" energy (Eurostat: Share of renewable energy, 2012). No nuclear power plants exist in Austria and imports from nuclear sources are limited.

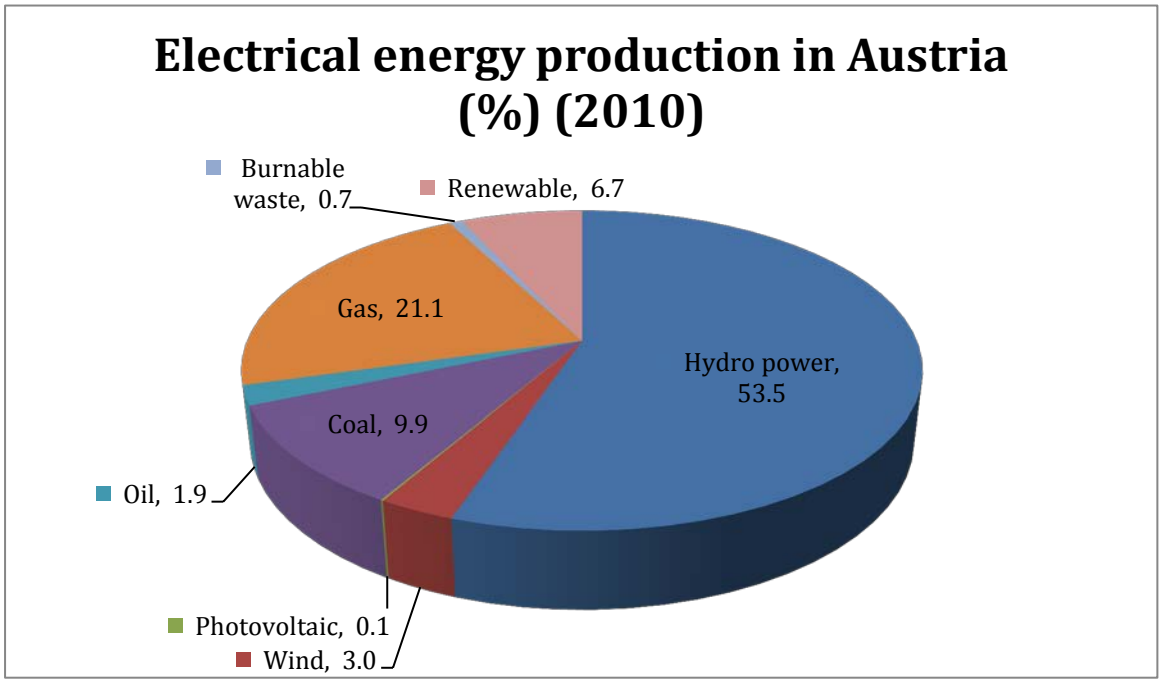


Table 1: Electrical energy production in Austria (%) (2010)
source: Statistic Austria

In 2010, energy from renewable sources was estimated1 to have contributed 12.4% of gross final energy consumption in the EU27, compared with 11.7% in 2009 and 10.5% in 2008. The 2009 Directive on renewable energy2 set individual targets for all Member States, such that the EU will reach a 20% share of total energy consumption from renewable sources by 2020. These targets take into account the Member States' different starting points, renewable energy potential and economic performance.

Austria is one of the countries with the highest share on renewable energy (30.1%)

3.2.4. Spot Market

With the full liberalization of the Austrian electricity market in 2001 and the introduction of the balance group model, the framework conditions for the establishment of an electricity exchange were completed. The Energy Exchange Austria (EXAA) provides full spot market services. Over 70 traders from 14 countries are members of the energy exchange. In addition the EXXA is also responsible for the settlement of financial transactions (clearing) and assumes the counterparty risk for all trades executed (EXXA - Energy Exchange Austria)

Trading concept

The orders placed by each market participant are collected in a closed order book. Afterwards, the daily auction is conducted. Market participants are informed of the prices determined at the auction (market clearing price = MCP) and the volumes allocated to the individual market participants immediately after the auction. The physical fulfilment of the trades takes place on the day after the trade (day-ahead trade).

Placing the bid is performed electronically over a secured platform. No additional investments are required except of a computer and an internet connection.

To become a member a number of legal and financial requirements must be fulfilled. The applicant must provide evidence about surficial financial liquidity and has to deposit a collateral of €100.000 minimum. The membership fees are maximum €15.000 per year. Per MWh a transaction fee of 0.075 is charged.

Trading days	365
Products	24 single hours and 14 block products
Minimum / maximum prices	0,01 – 3000,00 €/MWh
Minimum trading volume	0,1 MWh/h
Volume interval	0,01 MWh/h
Price interval (tick size)	0,01 €/MWh
Physical fulfilment	+24h
Financial settlement	+48h

240 Table 2: EXAA spot market conditions

Once a bid is placed for a product, the price depends on the intersection point of the aggregated supply- and the aggregated demand curve. At peak times (Figure 4) the prices will be at a maximum and off peak times at a minimum.

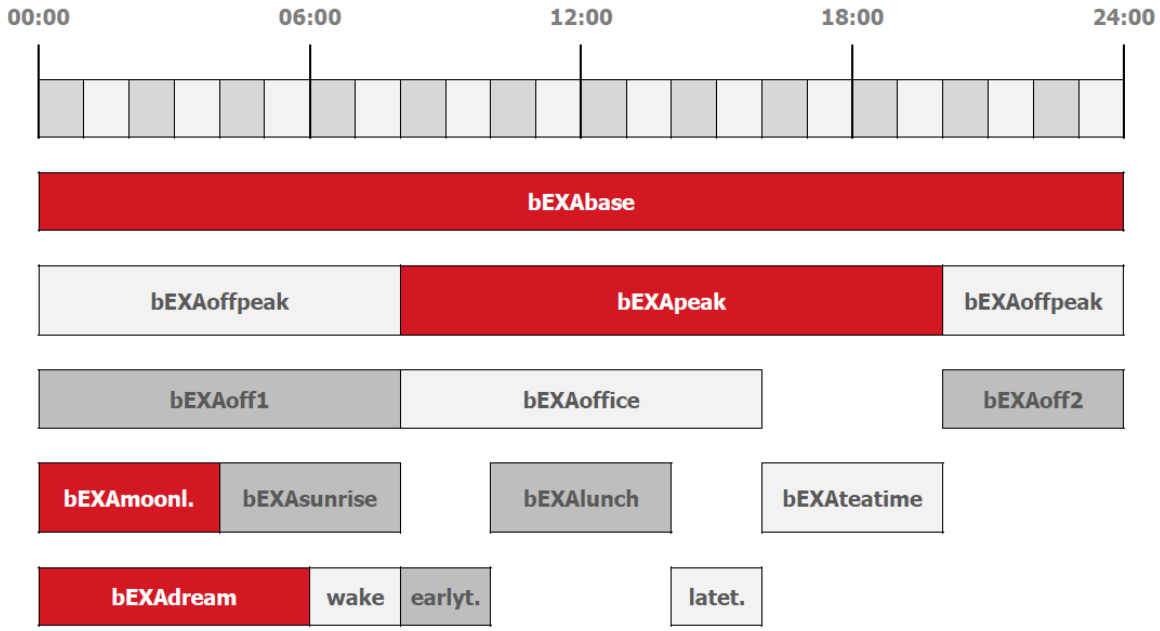


Figure 4: Traded products of the EXAA

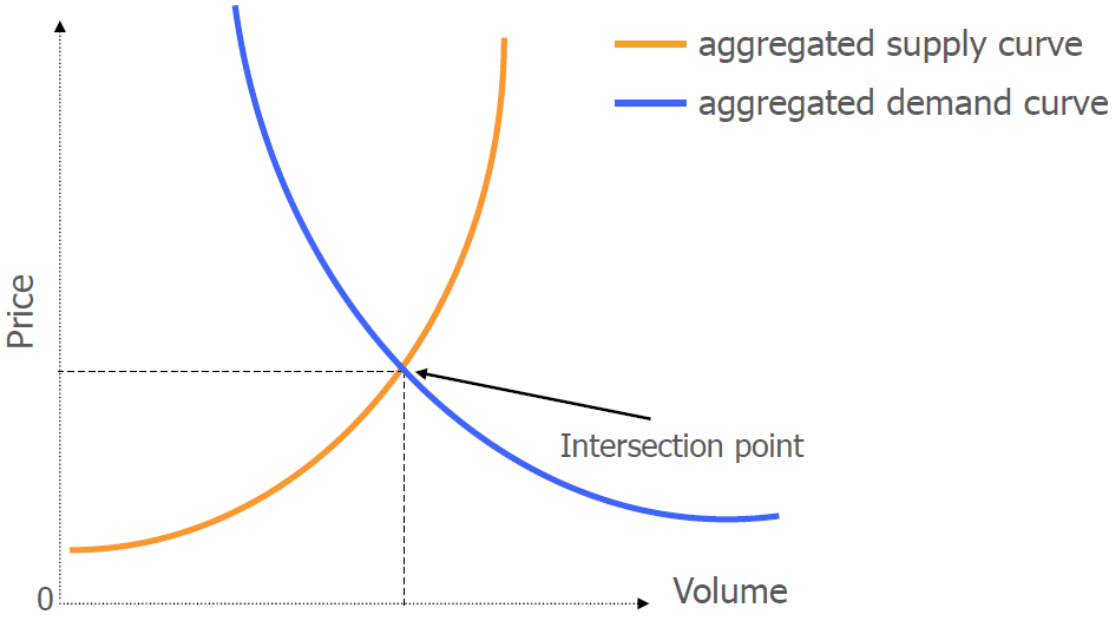


Figure 5: EXAA price fixing

3.2.5. Smart Meters - Legal requirements

The actual electricity directive of the third EU internal market package requires the introduction of "intelligent metering systems" for all consumers. At least 80% of all electricity customers should receive a smart meter by 2020.

At the end of December 2010 a modified amendment to the energy industry and utilities act (ElWOG) was released that includes for the first time a framework for an Austria-wide implementation of smart metering to ensure that the implementation of the directions of the above-mentioned third Package of EU directives are achieved (Elektrizitätswirtschafts-und-organisationsgesetz (ElWOG), 2012).

It was specified that the Federal Minister of Economy, Family and Youth will release a regulatory framework for the deployment of smart meters after carrying out a feasibility study. This study was created by PriceWaterhouseCoopers (PwC PricewaterhouseCoopers, 2010).

E-Control, as regulatory instance, has also received certain regulative power to issue further, detailed regulations. In future detailed requirements for smart metering e.g. type and extent of the functional requirements, data content and format or the type of communication to the end customer will be issued by decree. To achieve these goals E-Control will issue two regulations. One stipulates that the minimum technical requirements of equipment and the second in which time periods consumers have access to the measured data.

The first regulation of E-Control to the "Smart meters requirement regulation 2011 (IMA-VO 2011) was issued at the 25th October 2011 and promulgated (Intelligente Messgeräte-AnforderungsVO 2011 – IMA-VO 2011, 2011). The regulation of the Minister of Economy, Family and Youth, which defines the introduction of smart meters is (Smart meter introduction regulation - IME-VO), was promulgated on 24 April 2012 (Einführung intelligenter Messgeräte („smart meters“), 2012).

3.2.6. Smart Networks – Value Creation Chain

6.2.2.1. Overview

The European Union’s Third Energy Market Package is the reason to implement smart meters in a certain timeframe to a full coverage in 2020. In some member states, electronic meters with bidirectional communication are installed for economic reasons even without any specific legal requirements.

The development of legislation and regulation for smart metering in Europe is highly dynamic also because of the market players with similar products and little service segregation. The Austrian government made recently important progress in transforming European regulations to a national framework.

There are two dimensions, which describe the actual situation:

(1) Legal and regulatory status:

A general legal framework has been created and regulations that are more detailed are now developed based on the framework. The details will include e.g. clear guidelines to utilities for the installation of meters but to do so with the goal of achieving energy savings and/or peak load shifting. As the regulator, E-Control is responsible for drawing up and enforcing these rules. On 3 March 2011, E-Control was transformed into a public authority. Its tasks and duties are laid down in the E-Control Gesetz (E-Control Act).

(2) Progress in implementation:

All network operators and power distribution companies had smart meter field trials long before the legal framework was established. Nationwide energy distribution companies have also developed a clear and realistic implementation roadmap for metering technologies that enable metering services with, once again, the goal of achieving energy savings and/or peak load shifting. The implementation plan starts 2015 and includes significant preparation time for the operators to set up the infrastructure. For time being 200 000 of 5.7 million meters are already smart meters.

Given that smart electricity meters in Austria will likely provide a utility with meter readings every 15 minutes, to align with the time blocks in which electricity is traded on the wholesale market, there will no longer be a requirement to estimate a customer's usage.

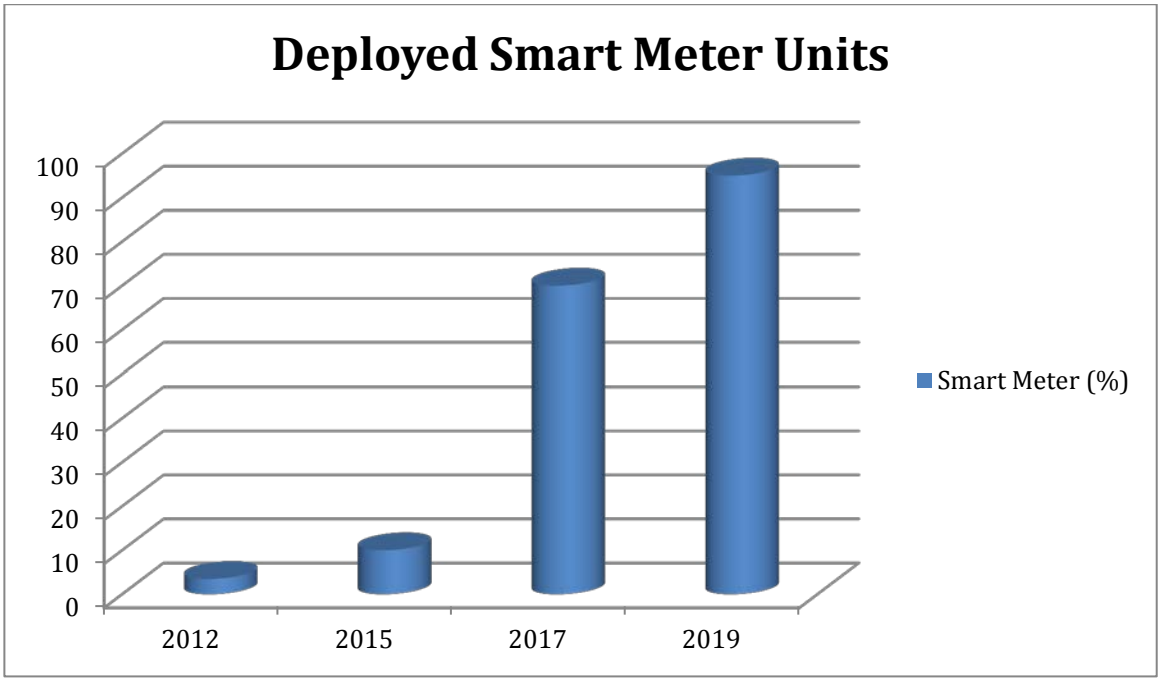


Table 3: Installed smart meter units

6.2.2.2. Energy Information Loop

Smart Meters

On a periodical basis (e.g. every 15 min), the amount of electricity a household consumes is tracked by the smart meter. Some households also produce energy when they have their own energy sources as e.g. wind, solar etc. Excess energy from these alternative sources are supplied back to the grid and part of the energy bill.

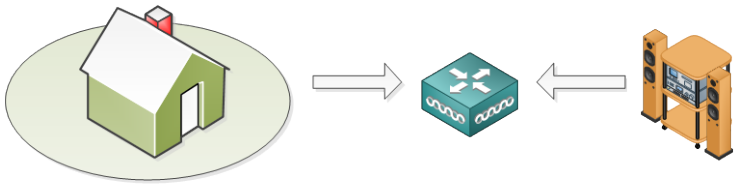


Figure 6, Smart Meter

Smart meter specifications according to ***Austrian*** standards:

- Bi-directional communication
- Capable of storing measurements
  - Measurements every 15min (consumption/timestamp/additional interfaces)
  - Daily record history
  - 60 days storage of the above measurements in the device
- Data delivery (to the next collector) from midnight to next day noon of all single daily measurements
- Four additional interfaces for quantitative measurements
- All data has to be secured and signed with a digital key
- Remote on/off and limit of maximum energy consumption
- Internal clock and calendar with sync option
- Log- and pamper capability

These specifications have been released by the regulatory body E-Control (Intelligente Messgeräte-AnforderungsVO 2011 – IMA-VO 2011, 2011).

The deployment schedule is also defined by the ministry of economy with a target deployment rate. The national goal is to be fully compliant with the EU goals for full smart meter coverage by 2020 (Einführung intelligenter Messgeräte („smart meters“), 2012)

Deployment schedule:

2015: 10%

2017: 70%

2019: 95%

350

Collectors

Each day the energy measurements are sent by wireless connection or through telephone or power lines to a data collector located in the district. This data is still in a secure system maintained by the network provider.

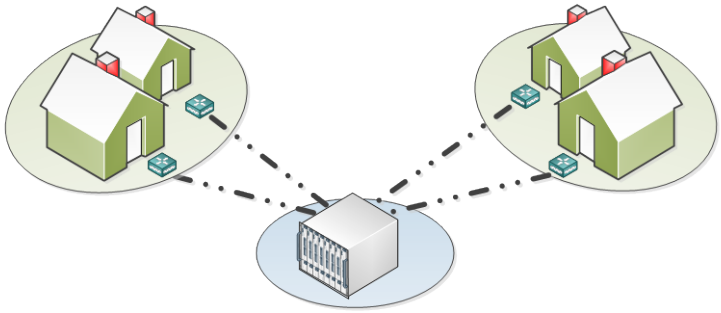


Figure 7, Local Data Collector

The data collected and aggregated in this step is not yet verified and needs to be processed by the network operator.

360

Meter Data Collection

These collectors relay energy usage information to larger control computers operated by the Local Distribution Company (**LDC**), which ensures that all the meters have been read and all the necessary information has been captured. The data collected at this point is accurate, verified and ready to be delivered to the national energy authority.

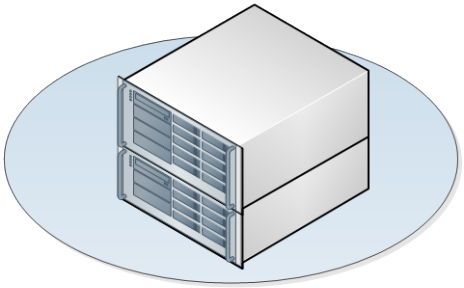


Figure 8, Central Data Aggregation

Smart Meter Data Repository

The LDC then sends this information to the designated smart meter data repository, which calculates how much electricity was used during on-peak, mid-peak and off-peak hours. In its role as interim Smart Metering Entity, *E-Control* is responsible for managing this repository. This energy use information will also help in the development of electricity forecasts and will help the National Energy Board determine future time-of-use prices. Only authorized parties, such as LDCs, will have access to the highly secure database.

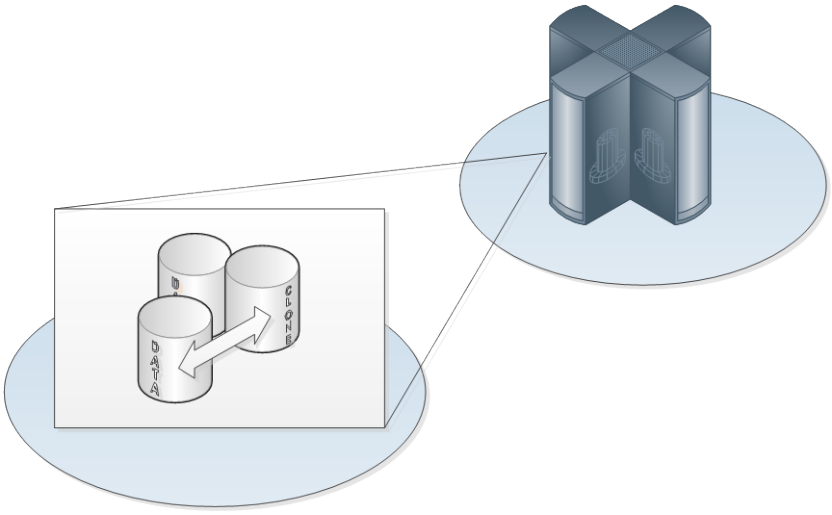


Figure 9, Central Smart Meter Data Repository

380 **Customer Information and Billing**

Information from the data repository is sent back to LDCs and other billing agents so it can be used to prepare invoices.

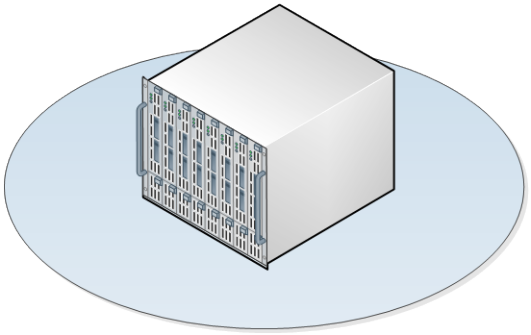


Figure 10, Billing and Invoicing

At this point parties from the fourth tier (trade and services) can have access to this data. Mandatory is that the end customer gives these utilities the explicit permission to access this data

390 **Home Energy Management**

Homeowners will have access to their energy use data in two ways: LDC invoices will provide consumption data each billing cycle; and in many communities, the previous day's energy consumption information will be available each morning on a secure personalized web page. This information allows managing energy use based on time-of-use prices.

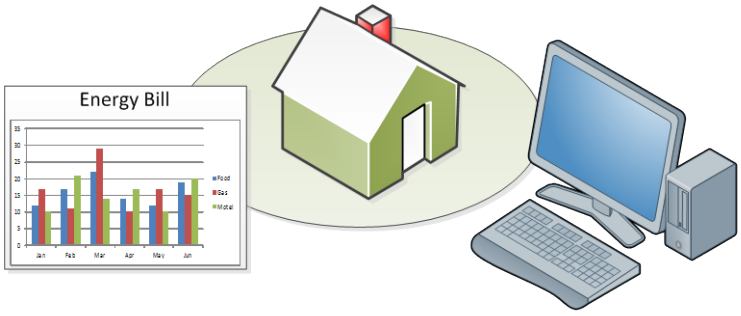


Figure 11, Home Energy Management

400 There are still some regulations missing and they will be put in power as soon as the regulations are officially announced by E-Control. As the Austrian energy market is already liberated many different parties are exchanging billing relevant data to settle payments between entities.

The Parties in Figure 3 exchange data in the following formats:

Process	Involved parties	Data format	Transmission
Network schedule	Producer, Supplier, Balance group authority	ESS (xml)	Email attachment
Change of supplier Balance Group change	network operator, Producer	Excel (xls)	Email attachment
Metering data exchange	network operator, Supplier, Producer, Customer, Trader	MSCONS	Email attachment
Exchange of network usage data	Supplier, network operator	ebUtillities (xml)	Email attachment

Table 4: Billing data exchange between entities

6.2.2.3. Summary

410 This is a generic workflow. Details can and will change because just a basic EU and national framework has yet been developed. In the next few months, the missing details will be published in Austria by the regulator E-Control.

The mission is to break-up energy monopolies and the tight connection between infrastructure (network) provider and Energy resellers. Consumers get more possibilities to save energy. Overall, the energy networks should become more flexible and ready for future challenges.

4.2. New venture (NUCO)

The initiative for a new venture with focus on the energy service business comes from a group of Scandinavian investors (The Management). These investors have many years of experience in the IT-industry and are active in many different fields as software, consulting, management etc. Frequently new opportunities are evaluated to invest in future products or trends. The reason to establish a start-up in Austria is to invest in a good business opportunity and take advantage of synergy effects with some of their current projects.

Two international companies the investors are involved will be the basis for the Austrian start-up. One is a Norwegian based software company specialized in Billing Support System Software (BSS). It was acquired in 2011 by the investors and the product line is currently being refreshed and updated to meet current standards. The other company is a Boston based start-up with a branch in Austria (GDM Software). They are successful with cloud computing platforms.

4.2.1. Organisational overview

The company will have at the beginning a flat setup with few hierarchical layers. As the investors are financing the company, they also will establish the business at the beginning. This way they can ensure that they can bring in their experience, network, financial investment and intangible assets.

From the experience of setting up a comparable start-up (IT, software, cloud computing) the organisational form for the new venture will be similar.

The Chief Executive Officer (CEO) will be a person with experience and a proven success record in developing start-up's in the IT or energy business. The CEO will be responsible to drive the business and fulfil all legal requirements for the legal operation of the firm.

The investors will hold the positions of the Chief Operating Officer (COO) and Board Executive Director (ED). The Chief Technical Officer (CTO) either will come from earlier business cooperation or selected from candidates with a specific skillset.

The aim is to keep the numbers of local staff low. Having the investors personally involved in the start-up the initial costs for personnel can be kept low. Additional staff in the first phase will be provided a standard working contract.

4.2.2. Financing, assets and ownership

A major advantage of the start-up is the advantage not to start from scratch and profit from experience managers. Furthermore, the investors are not only providing the financial funding but also bring in intangible assets to the new company. These are software and service solutions as well as service agreements with third party companies.

The shares of the company will reflect the investment of the individual investors. The CEO or CTO will receive a defined number of shares over time for their commitment (vesting).

It is important to state that the investors want to keep the majority over the company in order to secure their investment.

4.2.3. Existing product and service description

The main reason to evaluate the DACH-region and especially Austria as entry market for a start-up is the long-term knowledge of the energy industry and first hand energy billing experience. This knowledge has grown over 30 years in the Nordics.

In this thesis the software is named “ELITE -Software” as a descriptive code name for the product. The software suite will be named and branded after the product is ready for the market launch.

The ELITE Portfolio provides the energy & utilities industry with integrated solutions for handling of all customer related processes: Smart Grid integration, consumption measurements, exchange of energy marked electronic messages, customer services, billing, collection, risk analysis and advanced reporting to governmental authorities.

With long field experience, deployed in “open” energy markets, ELITE can deliver turn-key projects to grid-owners and sales/distribution companies through highly scalable software solutions designed to be used in a wide variety of energy & utility companies, from small turn-key projects through special development and complex major projects at larger utilities.

Target customers are energy utilities e.g. producers, providers, traders etc. These cooperation’s also have the environment to run the software on high performance servers. Their own specialists also maintain these servers and billing software. If there are any problems with the billing software the specialists are well trained and can address the problems to the 3rd level maintenance at the manufacturer’s side.

3.2.2.1. Software portfolio overview:

The software exists of a core module and several subsystems. This provides the flexibility to tailor the software solution to the needs of the customer.

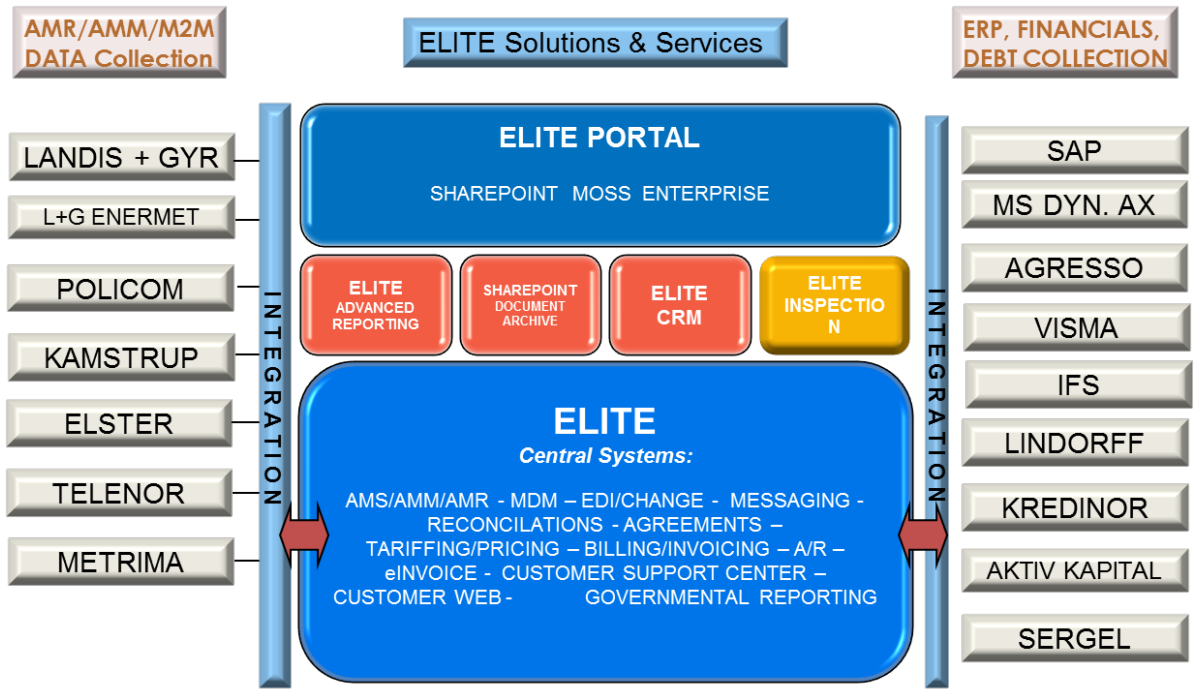


Figure 12: ELITE Solutions & Services

Europe is far from being a homogenous energy market, particularly when it comes to electricity. There are huge differences in how electricity is produced, consumed and taxed in different countries. The regulatory framework for the European energy markets is defined within the EU. Each of the member states is responsible for implementing commonly agreed policies to national regulation. The software solution must be so flexible to cover most common billing scenarios from scratch.

The various interfaces have been developed over years to ensure interoperability between systems. Not only billing relevant data is processed, also operational data for provisioning is managed and passed through the systems.

The already defined, tested and certified interfaces are a big competitive advantage. From the authors own experience as senior project manager for the implementation of a flight information system on one of the Europe's big airports, system integration can be a mission critical task.

500 *3.2.2.2. Portfolio and Module overview*

The following table of modules are certified and tested for the use of energy billing in the Nordics. Existing interfaces for a certain system can easily be adapted to other suppliers if the interface has a similar setup and is fully documented.

Module	**Description**
ELITE CS	ELITE Central Systems basic module: Customers, installations, agreements, pricing/tariffing, billing, accounting, receivables
ELITE MPM	Meter park management, components
ELITE MVP	EDM – Energy Data Management
ELITE Messaging	EDI –message exchange, supplier change handling
ELITE AMS	Integration to AMS/AMM/Smart Meters (Kamstrup, Landis+Gyr, Policom...) Automatic Meter Management
ELITE CRM	CRM –solution integrated with all modules
ELITE WEB	Customer portal, customer self-service module
ELITE DOKUMENTARKIV	Document archive based on MS SharePoint integrated with all modules
ELITE SMS	SMS communication module for customer communication
ELITE Inspection	Inspection module for following up governmental fire & security controls
ELITE PORTAL	Intranet Portal for access to all modules (based on SharePoint (MOSS)

The data is managed by an Oracle database system and is fully compatible to existing enterprise storage and backup solutions.

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3.2.2.3. Purchase, licensing and service

As for many enterprise software systems, there is no “shelf” price. The price of the software depends on multiple factors as:

- Number of modules to the core system
- Customization
- Developments and adaptations for existing systems
- Migration efforts
- Support and Service
- Personalized documentation
- Variable 3rd party costs (e.g. Oracle dB priced on hardware performance)
- …

The pricing is dependent on the customer, available budget of the customer and competition. A major factor is also service and a service level agreement to ensure that the software is properly maintained and in an emergency specialists will take care of the problem

5.2. Business opportunity assessment

The highly competitive environment of the European energy markets, with low product differentiation and poor customer affinity, creates a market in which price becomes one of the most important factors. Like any price sensitive industry, companies must manage their internal costs very carefully to maintain their competitiveness. By managing customer satisfaction especially with value added services such as an advanced billing process these companies can keep their costs down and reduce customer-switching rates.

5.2.1. Target market

As already analysed in 3.2.1. (Market overview) some critical parts of the market are exempt from competition and regulated. The first tier has a big market entry barrier hence it is time and resource intensive to build new power plants.

All efforts to enter the market and provide services will happen in tier 4. This has the advantage that for services to utilities no special requirements have to be fulfilled. Even to be an active player in the energy market (e.g. energy trading) the entry barriers are clear regulated and defined. Just the requirements have to be met. They are based on financial and legal terms.

Because of the defined environment, just the interfaces to other entities will be investigated if the basic requirements are fulfilled.

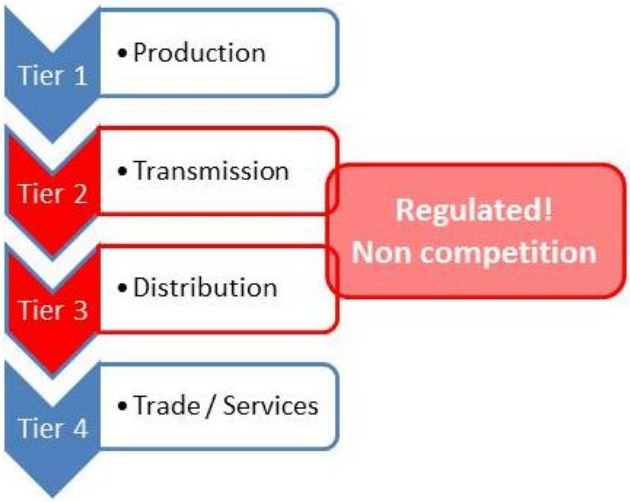

Figure 13: Market segmentation

550 5.2.2. Austrian electricity market overview (public grid)

Consumption structure					
		Supply to consumers			
Consumer category	**Unit**	**2009**	**2010**	**Average (*)**	**Share (*)**
Households	GWh	13131	13432	13036	23.90%
Small business and other small consumers	GWh	9104	9235	9069	16.60%
Agriculture	GWh	1510	1472	1468	2.70%
Small industry	GWh	9311	9646	8879	16.20%
Medium-sized industry	GWh	9171	9447	9532	17.40%
Large industry	GWh	11254	11987	12657	23.20%
Statistical difference	GWh	190	234	—	—
Total supply to consumers	**GWh**	**53291**	**54985**	**54642**	**100.00%**
		Number of metering points (MP)			
Consumer category	**Unit**	**2009**	**2010**	**Average (*)**	**Share (*)**
Households	1000	4122	4162	4092	71.00%
Small business and other small consumers	1000	1444	1450	1442	25.00%
Agriculture	1000	194	195	195	3.40%
Small industry	1000	31	32	30	0.50%
Medium-sized industry	1000	2	2	2	0.00%
Large industry	1000	0	0	0	0.00%
Total number of metering points	**1000**	**5794**	**5839**	**5761**	**100.00%**
		Average consumption			
Consumer category	**Unit**	**2009**	**2010**	**Average (*)**	
Households	kWh/MP	3186	3227	3186	
Small business and other small consumers	kWh/MP	6305	6371	6289	
Agriculture	kWh/MP	7767	7645	7524	
Small industry	kWh/MP	296317	302861	299390	
Medium-sized industry	kWh/MP	4732399	4930480	4691932	
Large industry	kWh/MP	57126296	59049184	62165990	
Total	**kWh/MP**	**9198**	**9417**	**9485**	

(*) 2006 – 2010 average

Table 6: Austrian electricity market overview (public grid)

5.2.3. Software positioning

The next illustration (Figure 14) shows to which areas the billing software is linked to handle billing- and operational data. .

The fields in red handle the billing data and the operational data is in blue

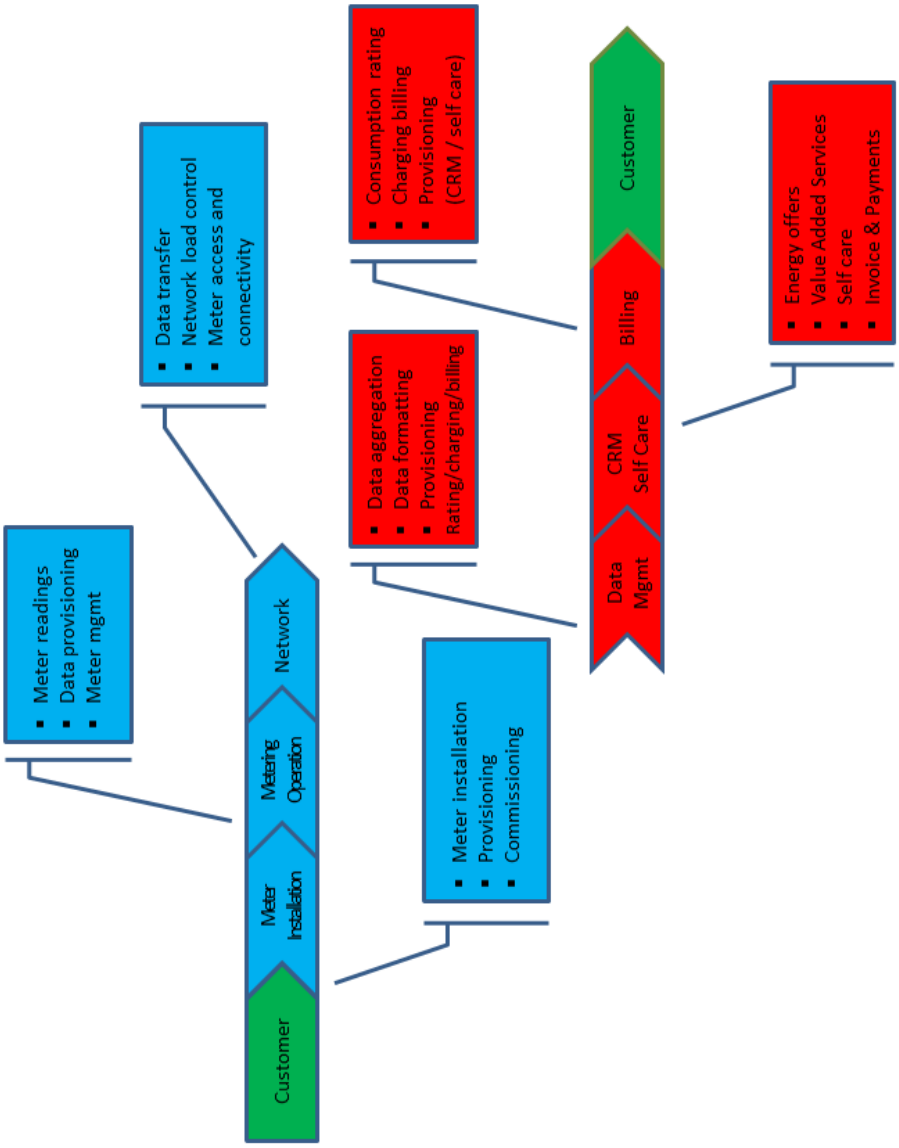

Figure 14: Billing software positioning

560 5.2.4. Billing Provider

As already described in earlier chapters energy billing with smart meters will become much more challenging as with traditional analogue power meters.

With the introduction of smart meters to the energy end customers new requirements and customer demands have to be fulfilled. Legacy energy billing systems need to change from a simple annual bill (Part 4: 4. *Conventional Electrical Energy Invoice*) to an accurate and fully featured energy invoice. Innovative smart metering services (such as informative billing and feedback, variable tariffs and load control services) have to be enabled and supported in operating support systems (OSS) and billing support systems (BSS).

570 *4.2.2.1. Product and service description*

The software suite described in chapter 314.2.3. is a successful deployed product with many installation sites. For new challenges in electricity billing a new and fresh approach could have more impact on the market as a software suite with a long history.

One of the trends with major impact on the industry is *cloud computing* (GDM Software).

Cloud computing is the delivery of computing and storage capacity as a service to a heterogeneous community of end-recipients. The name comes from the use of a cloud-shaped symbol as an abstraction for the complex infrastructure it contains in system diagrams. Cloud computing entrusts services with a user's data, software and computation over a network.

580 There are three basic types of cloud computing:

- Infrastructure as a Service (IaaS),
- Platform as a Service (PaaS), and
- Software as a Service (SaaS).

Using Infrastructure as a Service, users rent use of servers (as many as needed during the rental period) provided by one or more cloud providers. Using Platform as a Service, users rent use of servers and the system software to use in them. Using Software as a Service, users also rent application software and databases. The cloud providers manage the infrastructure and platforms on which the applications run.

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End users access cloud-based applications through a web browser or a lightweight desktop or mobile app while the business software and user's data are stored on servers at a remote location. Proponents claim that cloud computing allows enterprises to get their applications up and running faster, with improved manageability and less maintenance, and enables IT to more rapidly adjust resources to meet fluctuating and unpredictable business demand. (definition: cloud computing)

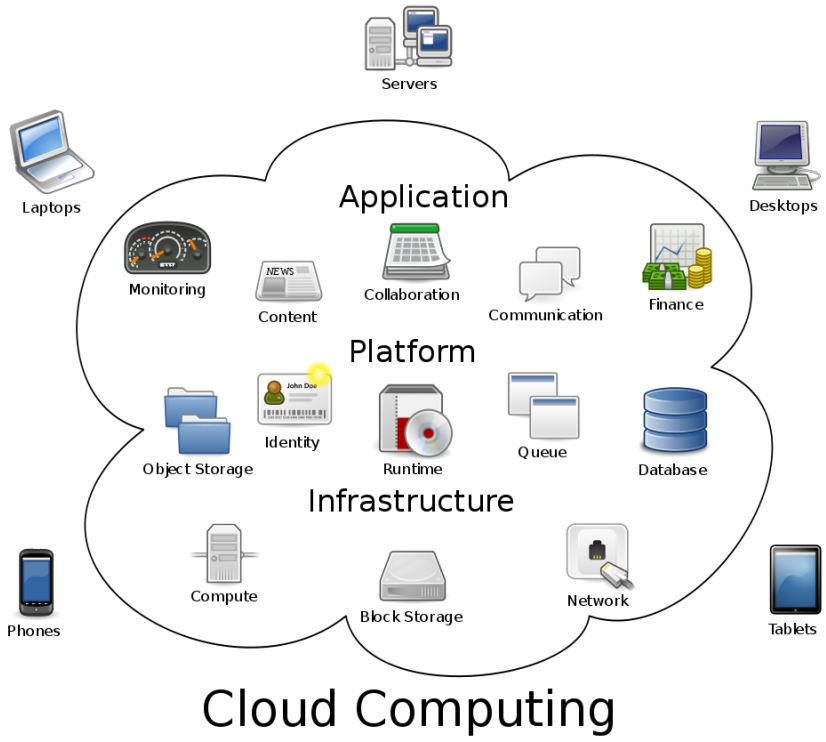

Figure 15: Cloud computing platform
Graphic Source: Sam Johnston

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Switching the location from the software from the end user to a cloud computing system is a fundamental change. For the software provider as well as for the client! Risks and opportunities must be carefully compared and evaluated. As a billing system is a mission critical system the revenue will quickly be impacted if invoicing or cash management is down.

Technology

Cloud computing and the new approach to software delivers cost effective and feature rich billing solutions without the traditional overhead of legacy, in-house systems. Customers changing to Software as a Service (SaaS) benefit from higher efficiency to lower costs.

The ELITE Software provides all functionally and modules for Billing, Rating, Mediation, Customer Care and more as a service.

Ease of use

Traditional enterprise software delivered in-house is resource intensive, costly and involves long and complex upgrade cycles. All ELITE solutions are delivered on demand over cloud-computing infrastructure. On demand software as a service delivery model simplifies implementing, maintaining and upgrading enterprise software. All upgrades of the ELITE software and platform is performed by the provider's system specialists. The customer just uses the latest software releases and does not have to care about service downtimes any more.

ELITE simplifies billing installations with:

- Zero infrastructure investment
- Zero IT resources
- Self-service configuration and integration tools
- Faster custom development cycles and on demand availability
- Instant background upgrades and new functionality

Reliability

The cloud-computing platform meets expectations for performance and reliability with integrated, fault tolerant and advanced hardware architecture. It delivers 99.99% up time by utilizing redundant hardware, software, and network infrastructure.

24x7 operation is realized by:

- True multi-tier, multi-tenant architecture
- Redundant network backbones
- Intelligent routing overlay
- Continuous system monitoring and notification
- Redundant power and cooling configuration
- Regular backups and disaster recovery planning
- Uninterruptible power supplies

Security

ELITE manages and controls all aspects of the security infrastructure that is integrated in the platform. All communication flowing through the system is subject to the strict security standards and protocols.

ELITE takes every precaution to maintain the security and integrity of your data and on-demand applications, designing a platform to provide:

- 100% SSL encryption
- Encrypted storage of all customer sensitive data
- Comprehensive data handling and network security policies
- Role based data and application access
- Proactive system monitoring
- Secure and controlled access to network and server infrastructure

Scalability

ELITE-software is a pioneer in delivering an integrated Billing and Customer Care solution as a Service. Selected cloud-computing components have been deployed to deliver the most advanced, instantly scalable billing solution in the industry. The customer does not have to care anymore for any upgrades of the system. Higher processing demands will be in much shorter times available as in traditional IT-models on the customer's site.

Economic effects

Elite software is designed for independent operation and expansion. It is flexible to adapt to changing business models, as the client needs to modify processes

The benefits for the customers are:

Reduced IT Cost: With no infrastructure or licensed software to install and maintain the customer can save on own valuable IT resources or redirect them to other projects.

Reduced Cost of Ownership: The cloud-computing platform with the full featured billing system reduces the total costs for the client over the life cycle of the business relationship. Development of new functionality, related to the business model of the customer, takes a fraction of the cost compared to a traditional software development approach.

Lower Risk — ELITE's proven enterprise infrastructure provides secure, scalable, reliable solutions for the most demanding organizations in the world.

Configuration on demand

Traditional software development projects often fail and cannot deliver fast enough. With a platform built to scale and customize, not only deployment cycles are reduced also more time and effort can be directed to the core business. Configuration of the platform and the software is performed directly buy the provider who has qualified and certified specialists.

Integration

The platform offers several integration options using open standards such as XML, Web Services, reusable components, standard APIs, and self-service tools. Most interfaces for the energy and utility sector are already developed and can easily be enabled in the system.

Standard interfaces:

- Synchronous and Asynchronous integration
- Multiple message formats
- Self-service monitoring and configuration tools
- Flexible import/export tools
- Bidirectional integration
- Multilingual support

4.2.2.2. Target industry and customers

The target market is the energy and utility industry as for the original product. The big difference is that the customer does not need to be a big enterprise anymore. A start-up in the energy industry (e.g. trader, provider, etc.) can immediately outsource billing and does not need to heavily invest in hard- and software. They just pay for the service the actually need.

Over 70 market participants are listed on the Austrian spot market (EXXA - Energy Exchange Austria), who are potential customers for the billing solution.

4.2.2.3. Competitive Advantages

Cloud computing is a rather new service model. The first platforms are operational and already serve a great number of customers Examples are online email (Gmail, Hotmail etc.) online collaboration suites where people around the world can log in and work together on documents and projects, dropbox for online storage and many more.

Currently there is no software as a service based cloud computing billing provider neither in Austria nor in the DACH-region!

Software Suite

- ELITE is a fully featured software suite for consumption measurement, billing & administration (CIS= Customer Information System)
- Developed in Norway over 22 years
- 30+ Clients in Norway, Sweden, Denmark and Netherlands
- Unique integrated modules for EDI messaging standard part of software, certified in Norway, Sweden, Denmark and more…
- Invoice generation with advanced presentation features.
- Customer self-care interface
- Technical expertise: Oracle & Microsoft certified technicians, MS .NET development skills

Advanced invoices

As the principal line of communication between a utility and its customers, utilities cannot underestimate the importance of billing. Regardless of whether a meter is smart or not, in terms of invoicing customers, clarity and accuracy are vital in keeping down cost-to-serve. An extra advantage is to utilize the invoice as an additional communication channel to improve their success in up-selling and cross-selling additional services.

While the accuracy of smart meters promises an end to bill estimation and associated customer complaints, smart meters will introduce a new level of complexity in residential billing.

Through the use of advanced bill presentment technologies, utilities can:

- Slowly introduce additional complexities to the bill to prepare customers for smart meter bills;
- Transition customers over to time-of-use billing once smart meters have been deployed by adopting a ‘dual tariff’ approach;
- Better manage the complexity of smart meter billing;
- Improve both marketing and presentation through personalisation;
- Exploit different channels for the delivery of bills.
- Simpler, easy to read energy bills
- Multiple tariffs as peak, off peak, low…
- Feed-in tariffs for self-produced electrical energy (wind, solar..)

- Common pricing and billing for energy and distribution (grid costs)
- Easy to use overview dashboard to see energy usage during day, week, month, year (Web, iPad, Smartphone, “Internal panel”) (General improved visibility of consumption)
- Select “green energy” and pay for that
- Smart appliances as e.g. washing machine
- See hourly usage of energy, charts of day, week, month, year
- Add in gas, heating, water, sewage ++ in same dashboard
- Analytics of “green footprint” related to type of energy (hydropower, wind, nuclear, gas, coal, oil…..)
- Energy roaming e.g. PHEV (Plug-in Hybrid Electric Vehicle)

In Annex Part 4: 4. (Conventional Electrical Energy Invoice) an actual full featured energy bill is presented. In Austria, the vast majority gets energy invoices like in the example. They contain all the legal necessary information and billing relevant data but are not easy to read. From the perspective of an ordinary customer, there is too much information and no graphs and guidelines at all

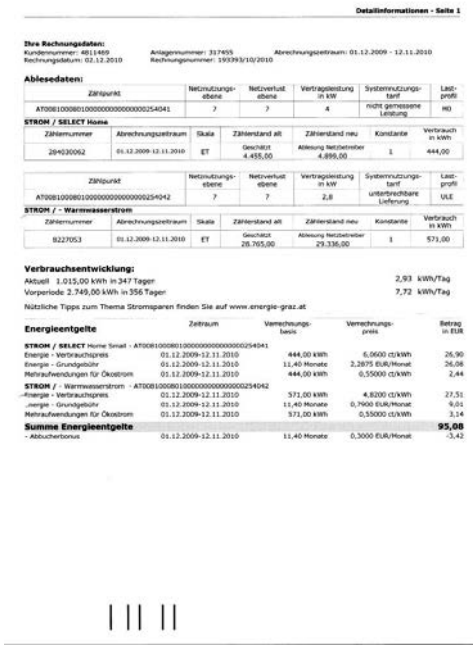

Figure 16: Electrical energy paper invoice

A better invoice can be designed by the introduction of graphs and as electronic version over the customer self-care portal:

Figure 17: Customer self-care snapshot
Source: Google PowerMeter

4.2.2.4. Adaptations, Modifications

As already mentioned the ELITE software is developed and deployed in the Nordics. The European Union is observing the advanced Scandinavian energy market and implements
770 many parts of their framework into the European model. Nevertheless, there are many different scenarios and requirements uniquely developed for the need of the European grids. Any billing (BSS) and other software have to be carefully adopted and tested before it can be used in a productive system.

The potential of smart metering and the commercial opportunities for utilities are immense. With the emerging smart metering technologies, valuable consumption data becomes available. ELITE will further utilize and build upon current clients and its vast recurrent revenue.

Before a ready cloud based billing solution can be offered to customers some modifications need to be done. Historically the software suite has been deployed at one site, one configuration and a set of modules. This software needs now to serve at one location multiple customers with different configurations.

- Adaptation of the software to fully work as SaaS solution
- The security design of the software has to be reviewed (Access from non-secure networks)
- Functionality- and load testing

Future plans and enhancements:

- Launching products for end-customers and / or companies who want to sell energy to end customers.
- White brand solution for companies: Just as the other start-up company, a white brand can be offered to customers. With this model they can offer billing services as an own brand powered by the NUCO billing cloud.
- Development of extra services for smart meters
    - Energy mix (fossil, green etc.)
    - Advanced customer energy panel with snap-ins of different products
    - One-bill invoice system (data can be integrated from different sources as water, gas, heat etc.)
    - Product mix change in online customer panel
    - Adaptations to regulation changes

4.2.2.5. Competition

The competition in the target market is dominated by SAP software. Traditionally the IT-Systems are deployed at the customer's premises and need to be maintained by trained specialists. SAP now also offers cloud computing but is now cloud computing provider. So the competitive advantages of a cloud based billing provider don't apply.

Currently there are no billing providers in the electrical energy market in Austria. Some larger electricity providers perform the billing for smaller connected electricity producers (Verbund AG).

International SaaS providers can also act on the Austrian market by default but the research could not identify any active company yet.

5.2.5. Spot market / Energy trading

A business portfolio enhancement for the NUCO is to be active in energy trading. With trading experience at the main spot market in the Nordics, Nord Pool Spot, the same can be performed at national and greater spot markets. (Nord Pool Spot).

The advantage for the NUCO is that it is easier to attract energy end customers than clients who have the willingness to change their billing system. This additional business field can balance out the business risk for the new venture.

Mandatory requirements:

- Up- and running service as billing provider!
- Customer care outsourced
- Marketing campaign to address the end customers

Business & Industry:

- Energy Trading
- Data and information gathering
- Risk management

Starting point and challenges:

- Energy trading on European spot markets and over the counter trading (OTC)
- Providing customers with tailored energy mixes and delivering concepts
- Integration from gathered information of daily transactions into own mission critical billing products

Tasks – Overview:

- Design of attractive energy mixes
- Customer-demand based energy bundles
- Up to date information from online resources for settlement rating
- Transparent rating of market segments

Competitive Advantages

- Transparent rating of market segments
- Higher efficiency of rating of positions
- Customer self-care portal

Future plans and enhancements:

- Launching products for end-customers and / or companies who want to sell energy to end customers.
- White brand solution for companies
- Development of extra services for smart meters
    - Energy mix (fossil, green etc.)
    - Advanced customer energy panel with snap-ins of different products
    - One-bill invoice system
    - Product mix change in online customer panel
    - Adaptations to regulation changes

Cost overview at the Energy Exchange Austria (EXAA)

To become a member a number of legal and financial requirements must be fulfilled. The applicant must provide evidence about surficial financial liquidity and has to deposit a collateral of €100.000 minimum. The membership fees are maximum €15.000 per year. Per MWh a transaction fee of 0,075 is charged.

5.2.6. Willingness to change the electrical energy provider

In Austria, several institutions inform the energy end customers about energy prices and how to save energy in general. E-Control, the regulatory body, has a special website for customers where they can find the cheapest available provider.

Even with detailed information and active encouragement from the authority, the switching rate to a new and cheaper provider is low.

Supplier switches and switching rates (*)					
Consumer category	2006	2007	2008	2009	**2010**
	Number of supplier switches				
Households	40756	60665	54874	48245	**69485**
Other small consumers	26314	32111	39730	27606	**31360**
Load-metered consumers	2461	2488	2888	1613	**3253**
Total	**69531**	**95264**	**97492**	**77464**	**104098**
	Switching rates in %				
Households	1.0	1.5	1.3	1.2	1.7
Other small consumers	1.6	1.9	2.4	1.7	1.9
Load-metered consumers	8.5	8.1	9.0	4.8	9.7
Total	**1.2**	**1.7**	**1.7**	**1.3**	**1.8**

Table 7: Supplier switches and switching rates

Two main behaviours to change the energy provider:

Satisfiers switch

- –Price-Leadership: A better offer is on the market and the customer's switches the provider to take advantage of the better price.
- –Supplier Image: Especially the major players have invested huge amounts of money in big marketing campaigns over the years. All of them have been founded in the monopoly era and had no competition on the market.

Dissatisfieers switch (call-centre calls)

- –Unclear bills: Too complex and no valuable information for a standard customer (Part 4: 4. Sample Invoice)
- –Incorrect bills: Mistakes and flaws in an invoice. The numbers of problems in this area are likely to increase because of the introduction of smart metering.

6.2. Risks & Opportunities

In the previous chapters, many risks and opportunities have been listed. For a start-up company with limited resources this can be very complex and could have a negative impact for the economic success of the new venture.

6.2.1. Opportunities:

- **Universal Billing Provider:** Once the SaaS based electrical energy billing solution is on the market, the extension to other industries is easy to perform. E.g. water, gas, heating...
- **Cumulative Invoice:** A invoice can exist of more the one product and bundle offers become possible
- **Greenhouse Tax** is soon introduced to Austria: Energy gets in general more expensive for the end customers. With higher prices the customers are to switch providers more frequently and become more service oriented
- Regulative improvements: the process time to change the energy provider has been limited by law to three weeks. In this period, the whole change process must be completed.
- Energy utilities who want to minimize the risk of smart metering will most probably consider outsourcing a big cost-cutting factor (IT) and switch to billing providers with a high level of service and the ability to deliver this service.

6.2.2. Risks:

- Billing is a core service and some IT departments have a big influence on internal business decisions. There might be a resistance to change because of the own interest of stake holders
- Establish “big” market players
- Data model adaptation – Time & costs could be a challenge due to changes of the framework
- The willingness to change is still rather low due to the regulated and monopolistic history.
- Legislative adaptations have a level of uncertainty
- Mission critical software on a cloud has different risks to the billing process. It depends on weighting of the risks how critical they are. Example: Many outages

happen to unqualified personal in IT-centres. This risk is lower at SaaS solutions because software solution specialists maintain the software. A new risk to the service is the access over the internet to the cloud – A denial of service attack would delay business for a certain period.

7.2. Implementation outline

The market environment has a lot of potential to establish a start-up as cloud-based billing provider in Austria. Before legal activities are performed, there are important preparations to be made.

All stakeholders must come in person together and have a common understanding how the business will be set up.

- Investors
- CEO, CTO of ELITE Software
- CEO, CTO of Cloud based computing
- CEO, CTO of NUCO Austria

In this meeting, it must be a clear commitment from all parties to support the proposed business. The investors must be willing to take the financial and business risks and the companies must be convinced about the technical feasibility.

After this precondition the next steps could be:

- Fully featured business plan
- Time to market
- Change of name
- Nuco legal requirements
- Enhanced new web page
- Communicate a sophisticated product portfolio
- Establish alliances and partnerships in new EU territories + US

Interpretation, Discussion, Future prospects

8.2. Summary

The business models spot market trading and cloud based billing providing are a perfect match for a future venture. Covering billing and invoicing is the basic and spot market trading is an extension to billing to utilize all resources of the new company. Together both business opportunities minimize the risk of failure on the market. Furthermore, these opportunities can be offered to other companies as white brand – Meaning that the services can be sold transparent, without branding, to a third party.

The market will be accessed in a dual approach: As a billing provider for energy utilities and an own independent brand for energy wholesales.

9.2. Results, Conclusion

After reviewing the DACH- and especially the Austrian energy market, it is a good opportunity to enter the market as cloud-based billing provider for energy utilities. As this is yet a niche without competition, it could be challenging to attract first movers for the service. A practical approach to interest potential customers is to suggest a limited dual-billing approach. For a period of time and limited number of customers, billing will be performed on the billing platform of the customer and on the could-computing platform. The results will be compared and the customer can be convinced by the “look and feel” of the new service.

Entering the spot market for energy trading is easy and is not subject to market entry barriers. Energy trading and sales to end customers are already performed in the Nordics at a successful venture from the investor group. Forces between the two companies can be combined and the Austrian branch would just have to take care of marketing and invoicing. As spot trading is lower prioritized as the billing solution a separate opportunity analysis will be performed after the billing service has successfully started.

The potential of smart metering and the commercial opportunities for utilities are immense. With the emerging smart metering technologies, valuable consumption data becomes available.

ELITE will further utilize and build upon current clients and its vast recurrent revenue as well as to continue being the leader for the industry not only in the Norwegian market but also in Europe and USA.

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Part 4: Appendix

1. Abstract

Author: Richard Hubatka

Institution: Executive Academy Vienna

Title: Smart Energy Networks: New Business Opportunities

Pages: 62

Words: 10819

Abstract

All member states of the European Union are currently implementing the so-called “third energy market package” to improve efficiency and reliability of the European energy systems and networks. The national grids have to evolve from national managed systems to a high performance European “smart” grid prepared for the challenges of the 21st century.

Austria is currently in an advanced stage implementing the European framework into national regulations. Some parts are already implemented (e.g. smart meter requirements) other important parts (e.g. data format and handling) are under development. The national energy authority is implementing this legal framework and exercising market oversight. One of the main goals is to liberalize the energy market and provide the customers more choices to buy energy for a better price/service ratio.

In the first part of the thesis, the European and Austrian electrical energy market is analysed. This reflects the status of the current regulations and the market players. Then the impact of smart metering has been analysed with consideration on technical and legal requirements. The second part has focus on the new venture and how the assets can be transformed to a competitive advantage. The main asset of the venture is a cloud-based billing system developed in Europe.

The outcome of the analysis is that in an increasingly competitive market a new venture with flat cost structure and new and unique, innovative services has a potential niche. The market entry barriers are low but careful planning is required due to a highly dynamic environment.

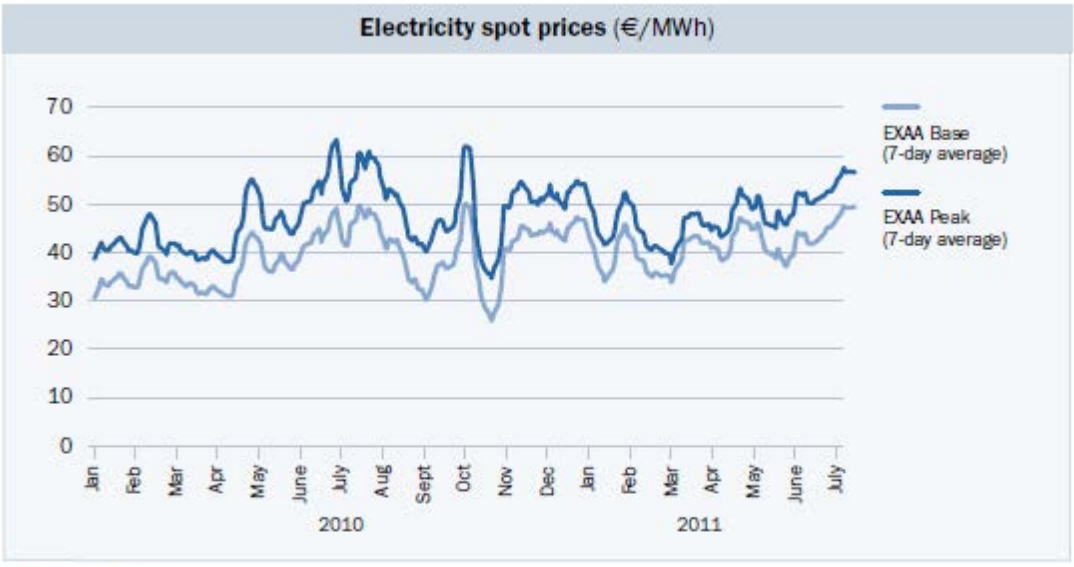
2. Wholesale electricity market

1.2. Electricity forward prices

Source: EEX

Table 8: Electricity forward prices

2.2. Electricity spot prices



Source: EXAA

Table 9: Electricity spot prices

3. Austrian electricity market (public grid)

Consumption structure					
		Supply to consumers			
Consumer category	**Unit**	**2009**	**2010**	**Average (*)**	**Share (*)**
Households	GWh	13131	13432	13036	23.90%
Small business and other small consumers	GWh	9104	9235	9069	16.60%
Agriculture	GWh	1510	1472	1468	2.70%
Small industry	GWh	9311	9646	8879	16.20%
Medium-sized industry	GWh	9171	9447	9532	17.40%
Large industry	GWh	11254	11987	12657	23.20%
Statistical difference	GWh	190	234	—	—
Total supply to consumers	**GWh**	**53291**	**54985**	**54642**	**100.00%**
		Number of metering points (MP)			
Consumer category	**Unit**	**2009**	**2010**	**Average (*)**	**Share (*)**
Households	1000	4122	4162	4092	71.00%
Small business and other small consumers	1000	1444	1450	1442	25.00%
Agriculture	1000	194	195	195	3.40%
Small industry	1000	31	32	30	0.50%
Medium-sized industry	1000	2	2	2	0.00%
Large industry	1000	0	0	0	0.00%
Total number of metering points	**1000**	**5794**	**5839**	**5761**	**100.00%**
		Average consumption			
Consumer category	**Unit**	**2009**	**2010**	**Average (*)**	
Households	kWh/MP	3186	3227	3186	
Small business and other small consumers	kWh/MP	6305	6371	6289	
Agriculture	kWh/MP	7767	7645	7524	
Small industry	kWh/MP	296317	302861	299390	
Medium-sized industry	kWh/MP	4732399	4930480	4691932	
Large industry	kWh/MP	57126296	59049184	62165990	
Total	**kWh/MP**	**9198**	**9417**	**9485**	

(*) 2006 – 2010 average

Table 10: Austrian electricity market (public grid)

4. Conventional Electrical Energy Invoice

: ENERGIE GRAZ

[redacted]

Kundennummer	**4811469**
Rechnungsnummer	193393/10/2010
Rechnungsdatum	02.12.2010
Fälligkeit	02.12.2010
Servicetelefon:	0316/8057-857
Fax:	0316/8057-796
E-Mail:	office@energie-graz.at
	www.energie-graz.at

JAHRESABRECHNUNG Strom
Abrechnungszeitraum 01.12.2009 - 12.11.2010
347 Tage, Gesamtstromverbrauch 1.015,00 kWh
Anlage: 317455, [redacted]
PESTALOZZISTRASSE 54/P/1, 8010 GRAZ

Energieentgelte	95,08 EUR
Rabatt/Bonus	-3,42 EUR
Netzentgelte	82,90 EUR
Steuern und Abgaben	43,73 EUR
Rechnungsbetrag exkl. USt.	218,29 EUR
Umsatzsteuer 20 %	43,66 EUR
Rechnungsbetrag inkl. USt.	**261,95 EUR**
- geleistete Zahlungen inkl. USt.	-506,00 EUR
Ihr Guthaben	**244,05 EUR**

Ihr Guthaben wird auf Ihr Konto Nr. 00481005574 / Bankleitzahl 17400 überwiesen.

Neuer monatlicher Teilzahlungsbetrag ab 01/2011 **25,00 EUR**

Sofern nicht anders vereinbart, ist der Teilzahlungsbetrag bis zum 7. des Monats, einlangend auf dem Konto der Energie Graz fällig. Der Betrag wird von Ihrem Konto eingezogen.
Im Teilzahlungsbetrag sind 20 % Ust. (= EUR 4,17) enthalten.

Detailinformationen - Seite 1

Ihre Rechnungsdaten:
Kundennummer: 4811469 Anlagennummer: 317455 Abrechnungszeitraum: 01.12.2009 - 12.11.2010
Rechnungsdatum: 02.12.2010 Rechnungsnummer: 193393/10/2010

Ablesedaten:

Zählpunkt	Netznutzungs-ebene	Netzverlust ebene	Vertragsleistung in kW	Systemnutzungs-tarif	Last-profil
AT0081000801000000000000000254041	7	7	4	nicht gemessene Leistung	H0

STROM / SELECT Home

Zählernummer	Abrechnungszeitraum	Skala	Zählerstand alt	Zählerstand neu	Konstante	Verbrauch in kWh
284030062	01.12.2009-12.11.2010	ET	Geschätzt 4.455,00	Ablesung Netzbetreiber 4.899,00	1	444,00

Zählpunkt	Netznutzungs-ebene	Netzverlust ebene	Vertragsleistung in kW	Systemnutzungs-tarif	Last-profil
AT0081000801000000000000000254042	7	7	2,8	unterbrechbare Lieferung	ULE

STROM / - Warmwasserstrom

Zählernummer	Abrechnungszeitraum	Skala	Zählerstand alt	Zählerstand neu	Konstante	Verbrauch in kWh
8227053	01.12.2009-12.11.2010	ET	Geschätzt 28.765,00	Ablesung Netzbetreiber 29.336,00	1	571,00

Verbrauchsentwicklung:

Aktuell 1.015,00 kWh in 347 Tagen 2,93 kWh/Tag
Vorperiode 2.749,00 kWh in 356 Tagen 7,72 kWh/Tag

Nützliche Tipps zum Thema Stromsparen finden Sie auf www.energie-graz.at

Energieentgelte	Zeitraum	Verrechnungs-basis	Verrechnungs-preis	Betrag in EUR
STROM / SELECT Home Small - AT0081000801000000000000000254041				
Energie - Verbrauchspreis	01.12.2009-12.11.2010	444,00 kWh	6,0600 ct/kWh	26,90
Energie - Grundgebühr	01.12.2009-12.11.2010	11,40 Monate	2,2875 EUR/Monat	26,08
Mehraufwendungen für Ökostrom	01.12.2009-12.11.2010	444,00 kWh	0,55000 ct/kWh	2,44
STROM / - Warmwasserstrom - AT0081000801000000000000000254042				
Energie - Verbrauchspreis	01.12.2009-12.11.2010	571,00 kWh	4,8200 ct/kWh	27,51
Energie - Grundgebühr	01.12.2009-12.11.2010	11,40 Monate	0,7900 EUR/Monat	9,01
Mehraufwendungen für Ökostrom	01.12.2009-12.11.2010	571,00 kWh	0,55000 ct/kWh	3,14
Summe Energieentgelte				**95,08**
- Abbucherbonus	01.12.2009-12.11.2010	11,40 Monate	0,3000 EUR/Monat	-3,42

Detailinformationen - Seite 2

Ihre Rechnungsdaten:
Kundennummer: 4811469 Anlagennummer: 317455 Abrechnungszeitraum: 01.12.2009 - 12.11.2010
Rechnungsdatum: 02.12.2010 Rechnungsnummer: 193393/10/2010

Netzentgelte	Zeitraum	Verrechnungs-basis	Verrechnungs-preis	Betrag in EUR
STROM / SELECT Home Small - AT0081000801000000000000000254041				
Netzverlustentgelt	01.12.2009-31.12.2009	39,67 kWh	0,5000 ct/kWh	0,20
	01.01.2010-12.11.2010	404,33 kWh	0,4300 ct/kWh	1,74
Netznutzungsentgelt / Arbeitspreis	01.12.2009-31.12.2009	39,67 kWh	3,4700 ct/kWh	1,38
	01.01.2010-12.11.2010	404,33 kWh	3,6700 ct/kWh	14,84
Netznutzungsentgelt / Pauschale	01.12.2009-31.12.2009	1,00 Monate	1,5200 EUR/Monat	1,52
	01.01.2010-12.11.2010	10,40 Monate	1,3500 EUR/Monat	14,04
Messpreis	01.12.2009-12.11.2010	11,40 Monate	2,1000 EUR/Monat	23,94
STROM / - Warmwasserstrom - AT0081000801000000000000000254042				
Netzverlustentgelt	01.12.2009-31.12.2009	51,01 kWh	0,5000 ct/kWh	0,26
	01.01.2010-12.11.2010	519,99 kWh	0,4300 ct/kWh	2,24
Netznutzungsentgelt Niedertarif	01.12.2009-31.12.2009	51,01 kWh	1,9400 ct/kWh	0,99
	01.01.2010-12.11.2010	519,99 kWh	1,9900 ct/kWh	10,3
Messpreis	01.12.2009-12.11.2010	11,40 Monate	1,0000 EUR/Monat	11,40
Summe Netzentgelte				**82,90**

Vertrags- und Preisbestandteile gem. §45c Abs.1 und Abs.2 ElWOG:

Zählpunkt	Netznutzungs-ebene	Netzverlust-ebene	Vertragsleistung in kW	Systemnutzungs-tarif	Last-profil
AT.008100.08010.00000000000000254041	7	7	4,00	nicht gemessene Leistung	H0

Select HH-Home

Datum (von - bis)	Grundgebühr (EUR/Monat) bzw. Leistungspreis	Energiepreis (ct/kWh)		Kalkulatorische Mehrkosten Ökostrom (ct/kWh)	Energiepreis inkl. Kalkulatorische Mehrkosten Ökostrom (ct/kWh)	
		Hochtarif	Niedertarif		Hochtarif	Niedertarif
01.12.2009 - 12.11.2010	2,2875	6,0600		0,55000	6,61000	

Zählpunkt	Netznutzungs-ebene	Netzverlust-ebene	Vertragsleistung in kW	Systemnutzungs-tarif	Last-profil
AT.008100.08010.00000000000000254042	7	7	2,80	unterbrechbare Lieferung	ULE

SELECT Haushalt - Warmwasserstrom

Datum (von - bis)	Grundgebühr (EUR/Monat) bzw. Leistungspreis	Energiepreis (ct/kWh)		Kalkulatorische Mehrkosten Ökostrom (ct/kWh)	Energiepreis inkl. Kalkulatorische Mehrkosten Ökostrom (ct/kWh)	
		Hochtarif	Niedertarif		Hochtarif	Niedertarif
01.12.2009 - 12.11.2010	0,7900	4,8200		0,55000	5,37000	

Stromkennzeichnung gem. § 45 Abs. 2 ElWOG über den Anteil an verschiedenen Primärenergieträgern, auf Basis derer die gelieferte Energie im Zeitraum 01.01.2009 bis 31.12.2009 erzeugt wurde.

Energieträger	Ihr Strommix*	Versorgermix**
Wasserkraft	16,34%	29,38%
feste oder flüssige Biomasse	8,54%	3,71%
Windenergie	8,25%	3,58%
Biogas	2,25%	0,97%
Sonstige Ökoenergie	0,29%	0,13%
UCTE-Mix***	64,33%	62,23%
Summe	**100,00%**	**100,00%**

Umweltauswirkungen der Stromproduktion

CO2-Emissionen (in g/kWh)	277,80	268,72
Radioaktiver Abfall (in g/kWh)	0,0005	0,00049

* Zeigt die Zusammensetzung Ihres Strombezuges
** Versorgermix der an alle Endkunden abgegebenen Strommengen
*** UCTE-Mix (Strommix im internationalen Übertragungsverbundnetz) 12,58% Wasserkraft, 6,74% sonstige erneuerbare Energieträger, 28,89% Nuklearenegie, 51,41% fossile Brennstoffe, 0,38% sonstige Primärenergieträger

In unserem neuen - für Sie als select-Kunde kostenlosen - Energieeffizienz-Sammelordner "Energie sparen. Energie finden." erfahren Sie übersichtlich und informativ, wie Sie Energie noch effizienter nützen können. Fordern Sie Ihr Exemplar unter www.selectstrom.at oder unter der Energie Graz-Servicenummer 0316/8057-857 an.

Detailinformationen - Seite 3

Ihre Rechnungsdaten:
Kundennummer: 4811469 Anlagennummer: 317455 Abrechnungszeitraum: 01.12.2009 - 12.11.2010
Rechnungsdatum: 02.12.2010 Rechnungsnummer: 193393/10/2010

Steuern und Abgaben	Zeitraum	Verrechnungs-basis	Verrechnungs-preis	Betrag in EUR
STROM / SELECT Home - AT0081000801000000000000000254041				
Elektrizitätsabgabe	01.12.2009-12.11.2010	444,00 kWh	1,5000 ct/kWh	6,66
Zählpunktpauschale	01.12.2009-12.11.2010	11,40 Monate	1,2500 EUR/Monat	14,25
STROM / - Warmwasserstrom - AT0081000801000000000000000254042				
Elektrizitätsabgabe	01.12.2009-12.11.2010	571,00 kWh	1,5000 ct/kWh	8,57
Zählpunktpauschale	01.12.2009-12.11.2010	11,40 Monate	1,2500 EUR/Monat	14,25
Summe Steuern und Abgaben				**43,73**
Rechnungsbetrag exkl. USt.				218,29
Umsatzsteuer 20 %				43,66
Rechnungsbetrag inkl. USt.				**261,95**
- geleistete Zahlungen inkl. USt.				-506,00
Ihr Guthaben				**244,05**

Hinweis für Vorsteuerabzugsberechtigte:

Vorgeschriebene USt. im Abrechnungszeitraum: 84,33 EUR
Differenz gegenüber der USt. lt. Abrechnung: +40,68 EUR
Neuer monatlicher Teilzahlungsbetrag exkl. 20% USt.: 20,83 EUR; 20% USt.: 4,17 EUR
Neuer monatlicher Teilzahlungsbetrag inkl. 20% USt.: 25,00 EUR