

**Bachelor's Programme in International Business**

# Competitiveness of spot electricity compared to other electricity contracts for the consumer

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**Ella Suoninen**

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**Author** Ella Suoninen

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**Abstract**

The main objectives of this study were to discover whether spot price electricity contracts are as competitive as fixed price electricity contracts, which are in favour of the Finnish consumers. The price volatility of the market is also covered and analysed. In addition, a forecast about the future of the power market and which contract types may be created in the near future is created.

The primary data was gathered by a qualitative research method interviewing market specialists and experts from the electricity market. Interviewees represented different Finnish electricity retailers, as well as UPM energy was represented. By this method real life examples and experiences can be utilised to support claims and give different perspectives of topics covered.

The volatility of the power market seems to not be able to become more stabilized, mainly due to the dependence of wind and solar power, in which the production cannot be controlled. In addition, the internationalisation and integration of the market affects price volatility. The popularity of spot price contracts is believed to grow as younger generations with more technical knowledge take over and make their own electricity contracts. Although, the growth is not expected to be rapid, due to Finland's old housing and population rate, with less knowledge and willingness to change their habits. For now, a hybrid contract is a new product for most retailers.

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**Keywords** spot market, electricity contracts, electricity market, price volatility

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**Työn nimi** Spot sähkösopimusten kilpailukyky muihin sähkösopimukseen verrattuna kuluttajan näkökulmasta

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### **Tiivistelmä**

Tämän tutkimuksen päätavoitteet olivat selvittää, ovatko pörssihintaiset sähkösopimukset yhtä kilpailukykyisiä kuin kiinteähintaiset sähkösopimukset, jotka ovat suosittuja suomalaisten kuluttajien keskuudessa. Markkinan hintavaihtelua tarkastellaan ja analysoidaan. Lisäksi luodaan keskustelu sähkömarkkinoiden tulevaisuudesta sekä siitä mitkä eri sähkösopimukset saattavat yleistyä.

Ensisijaiset lähteet kerättiin laadullisen tutkimusmenetelmän avulla haastatteleamalla markkina-asiantuntijoita ja alan ammattilaisia. Haastateltavat edustivat eri suomalaisia sähköntoimittajia sekä UPM Energia oli myös edustettuna. Tällä menetelmällä voidaan hyödyntää todellisia esimerkkejä ja kokemuksia väitteiden tukemiseksi ja erilaisten näkökulmien esilletuomiseksi käsiteltäviin aiheisiin.

Sähkömarkkinan volatiliteetin uskotaan pysyvän uutena markkinakäytäntönä, johtuen markkinan riippuvuudesta tuuli ja aurinkovoimaan, joka tekee sähkön tuotannosta entistä enemmän sääriippuvaista. Lisäksi markkinoiden kansainvälistyminen ja integraatio vaikuttavat markkinan volatiliteettiin. Pörssihintaisten sopimusten suosion uskotaan kasvavan uudempien sukupolvien solmiessa omia sähkösopimuksiaan, sillä heillä on enemmän teknistä osaamista. Kasvun odotetaan kuitenkin olevan hidasta johtuen Suomen vanhasta asuntokannasta ja väestöstä, jolla on vähemmän tietoa ja halua muuttaa tottumuksiaan. Tällä hetkellä hybridisopimus on useimpien sähköntoimittajien uusin tuote.

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**Avainsanat** pörssisähkö, sähkösopimukset, sähkömarkkina, hinnan volatiilisuus

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### **Sammandrag**

Huvudmålen med denna studie var att ta reda på om spotprisavtal för elektricitet är lika konkurrenskraftiga som fasta prisavtal, vilka är populära bland finländska konsumenter. Marknadens prisvolatilitet behandlas och analyseras också. Dessutom diskuteras en prognos för framtida elmarknaden och vilka kontraktstyper som förväntas öka i popularitet inom en snar framtid.

Primärdata samlades in med hjälp av en kvalitativ forskningsmetod genom intervjuer med marknadsspecialister och experter inom elbranschen. De som intervjuades representerade olika finländska elbolag, och även UPM Energy var representerat. Med denna metod kan verkliga exempel och erfarenheter användas för att stödja påståenden och ge olika perspektiv på behandlade ämnen.

Elmarknadens volatilitet tycks inte kunna stabiliseras mer, på grund av beroendet av vind- och solkraft, där produktionen inte kan kontrolleras. Utöver, påverkar internationaliseringen och integrationen av marknaden volatiliteten på marknaden. Populariteten för spotprisavtal förväntas öka parallellt med att nya generationer med mer teknisk kunskap tar över och gör sina egna elavtal. Trots detta förväntas tillväxten inte vara snabb, på grund av Finlands gamla bostadsbestånd och befolkning, med mindre kunskap och vilja att ändra sina vanor. För tillfället är ett hybridavtal en ny produkt för de flesta återförsäljare av el.

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**Nyckelord** spotpriselicitet, elleveransavtal, elmarknaden, prisvolatilitet

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## Table of contents

Preface and acknowledgements .....	8
1 Introduction .....	9
1.1 Background .....	9
1.2 Research Problem .....	9
1.3 Research Questions .....	10
1.4 Research Objectives .....	10
1.5 Outline.....	11
2 Literature Review .....	12
2.1 The European Electricity Market .....	12
2.2 Nord Pool .....	14
2.3 What Factors Affect the Price of Electricity? .....	15
2.4 Finnish Consumers' Preferences in Electricity Contracts .....	16
2.5 Which Electricity Contract is the Smartest? .....	18
2.6 Conceptual Framework.....	20
3 Methodology.....	22
3.1 Rationale .....	22
3.2 Sampling .....	22
3.3 Data Collection.....	22
3.4 Data Analysis .....	24
3.5 Limitations of Methodology .....	24
4 Findings .....	26
4.1 The Electricity Market Today .....	26
4.1.1 Spot Price Versus Fixed Price .....	26
4.1.2 How can Price Volatility be Stabilized? .....	27
4.2 The Electricity Market in the Future.....	28
4.2.1 The Future of Spot Price Contracts.....	28
4.2.2 Are There New Contract Types in the Making? .....	30
4.3 Themes of the Electricity Market .....	31
5 Discussion and Analysis.....	33
5.1 Most Suitable Contract in Regards of Consumer Profile .....	33
5.2 Development of Contract Types .....	34

5.3	Future of the Electricity Market .....	35
6	Conclusions .....	38
6.1	Main Findings .....	38
6.2	Implications for International Business .....	39
6.3	Possible Limitations .....	39
6.4	Suggestions for Further Research .....	40
	References.....	41
	Appendices.....	45
6.5	Appendix A: Interview Questions.....	45
6.6	Appendix B: Interview Transcripts .....	48

## **Preface and acknowledgements**

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This process has been very insightful, and it has taught me a lot about an interesting and constantly evolving field.

Mikkeli, 15 April 2024  
Ella Jasmin Suoninen, Student

# 1 Introduction

## 1.1 Background

The energy market has been a popular topic on the news during the recent years, especially after Russia invaded Ukraine, which led to an energy crisis in Europe with record high prices for energy during 2022. The main reason for the high prices is that Europe imported roughly 40% of its gas from Russia, which led to a gas shortage on the continent (Fabra, 2023; Farghali et al., 2023). This has also commenced a discussion on how Europe is quite dependent on energy imports and shows economic vulnerability (Hille, 2023). The crisis reminded of the 1970's oil crisis, which also shows how dependent the society is on fossil fuels, but it also reminds of the risks it withholds (Hille, 2023; Korhonen, 2023).

When it comes to Finland, Korhonen (2023) mentions that Finland did well during the crisis compared to other European countries since the electricity prices stayed the second lowest, because Finland is not as dependent on fossil energy as other European countries. Albeit Finland managed the crisis fairly well, the Finnish state granted some financial aid to Finnish households due to the high electricity prices (valtioneuvosto.fi, n.d.). This shows that even though Finland did well during the crisis, the financial aid shows how large the issue still was. All in all, the energy crisis shows how interconnected and integrated the whole energy system and electricity market are, although all countries have their own regulations.

Despite the high prices, the demand for electricity seems to only become more popular over time, for instance with the growing interest for electric vehicles, which is a high power, in other words, high electricity consuming product, as well as overall electrification of various industries (Wang et al., 2023). All these trends indicate a societal shift towards electricity-based solutions over fossil fuels, emphasizing the importance of the electricity contract type chosen by the consumers, since it could result in most economically beneficial solutions.

## 1.2 Research Problem

The issue with rising electricity costs and the rising demand of electricity due to the movement toward electricity-based solutions has been quite significant on the consumer and households. It may have affected how and when they decide to consume a vast amount of electricity, some days it may be too costly to put on the electric sauna, and another day the prices can drop to negative, and the consumption of electricity is practically free or may even generate income for electricity users. All these factors depend on the electricity spot price as well as what type of electricity contract the consumer has made at the moment. With the growing usage of electricity in the households,

the importance of having the correct and the most economically sustainable electricity contract is crucial.

There has been a lot of studies done on the electricity markets on a more general basis for instance; how they should and have changed, and which type of electricity contract is the smartest choice for large corporations. But there has not been a significant amount of research done from the consumer matter and point of view, with the focus on the Finnish market. With reference to the popularity of the matter in the news and media, it would be interesting to research this topic from the consumers' perspectives.

This thesis aims to analyse which electricity contract is the smartest choice for the consumer, according to the literature presented in the upcoming chapter, as well as interviews conducted when gathering data. More specifically, the focus will be on the competitiveness of spot electricity pricing compared to other electricity contracts i.e. fixed-term contract or mixed-term contract. As a result, from the discussion and analysis of the primary and secondary sources, attributes of a consumer for whom the spot price contract is the most suitable one will be highlighted. The definition of a most suitable contract is in the means of most economically beneficial, other consumer decision factors are not highlighted to an extent. The thesis will also focus on the future and aims to get some predictions of what kind of trends and how electricity contract types may develop in the near future.

### **1.3 Research Questions**

The main area of study is on how competitive spot contracts are compared to other contracts. The research questions (RQ) are the following:

RQ1: What is the current state of the electricity market?

RQ2: Which consumer profile best aligns with the suitability of a spot price contract?

RQ3: What will the future market and contracts insinuate?

### **1.4 Research Objectives**

The research objectives (RO) of the study are the following:

RO1: To elucidate how the electricity market works.

RO2: To describe the optimal consumer profile for a spot price contract, supported by comprehensive justifications.

RO3: To explore potential trends and changes in the electricity market over the upcoming years.

By specifying above mentioned research questions and objectives coherence and simplicity can be confirmed, which will enhance the functionality and effectiveness of the study. Firstly, it is valuable to understand the overview of the current electricity market. This is done by investigating major indicators, such as how the market has developed during the recent years in regards of market structure, pricing dynamics and current trends as well as highlighting any potential regulatory frameworks.

The second aim is to create a comprehensive understanding of the ideal consumer profile for whom the spot price is most suitable and economically advantageous. This can be done by analysing the current popularity of spot price contracts and assessing the competitiveness of spot price to other electricity contracts. The data gathered for this part is both from secondary and primary sources.

The third goal is to create a forecast and a discussion of changes in market dynamics and where electricity retailers may lay their focus on in regards of research and development. Another aim is to discuss future trends in the market and how the development of spot price contracts' popularity may rise or stabilize. In addition, the volatility of the market is discussed and possible solutions for market stabilization are listed.

## **1.5 Outline**

The first part of the thesis is a literature review, which aims to answer RQ1 and RQ2. It introduces, and analyses previous research made about the electricity market as a whole and drills down to focus on the Finnish market. The review will introduce relevant facts and concepts about the market, forming the conceptual framework that will guide the successive analysis. This framework will serve as the basis for conducting the primary research of the thesis.

After the literature review, the methodology section will define the rationale and interview design conducted in this study. The findings section will present the interview responses, following an analysis comparing the different answers. The discussion section will inspect the relationship between the conducted data to the existing literature and identify any limitations of the research. At the findings and discussion sections, the aim is to answer RQ2 and RQ3. Lastly, a conclusion is made by discussing the implications of the research findings. Furthermore, the research's significance to the field of international business, as well as suggestions for further research, are alluded to.

## 2 Literature Review

The objective for this literature review is to gain an oversight of the academic literature that is available about the energy market and how it currently appears. The first aim is to construct a structured analysis and an in-depth explanation of the electricity market and answer RQ1 as well as fulfil RO1. The second aim is to answer RQ2 and find relevant scholarly sources about the differences between spot price contracts and fixed price contracts.

Firstly, the literature review will define and explain the current state of the electricity market in Europe, with a brief explanation on how it has developed during the recent years. Secondly, a more geographically targeted explanation about the Nord Pool electricity market is made, with a more specific discussion about the Nord Pool Spot market, since the focus is on the competitiveness of the spot market compared to fixed price contracts. A discussion about what causes the price fluctuations is also included. Third, a more specific focus on the Finnish electricity consumers and what their preferences are is made. Lastly, a conceptual framework will summarize and illustrate the conclusions from the literature review.

### 2.1 The European Electricity Market

The electricity market has been under a lot of change and development since 1990, mainly by the market's liberalization and multiple deregulations (Junttila et al., 2018). The deregulation of a formerly regulated electricity industry started in England and Wales at the end of 1980s when Margaret Thatcher won the elections for the third time. After a few years other European countries saw that the deregulation was a success and started adopting similar deregulations. For instance, after the electricity industry was deregulated in Norway, their market expanded to neighboring countries Sweden and later Finland (Green, 2006). In 1997 the European Union (EU) decided that the market for energy supply, in other words the energy and gas market, should be liberalized. This led to that businesses could freely choose their supplier in 2004 and private consumers could decide their supplier in 2007. Some European countries decided to liberalize their markets earlier, such as Finland that had their market liberalized in 1997, whereas other countries such as France were more cautious with the new regulations (Ringel, 2003). The goal was to create an integrated European electricity market (Sikoriska-Pastuszka and Papiez, 2023).

The reasons for market liberalization were mainly to provide fair competition on the market, to enhance system operations efficiency, to attract new infrastructure investments, and to reduce electricity prices for the consumers (Fatras et al., 2022). The price reduction can be seen as a result from electricity being a low-interest product, in other words, it is considered as a homogeneous product. So, for electricity providers to attract new customers

they need to compete by low-end pricing (Ringel, 2003). In addition of different pricing, the customer has a possibility to choose from a wider variety of product differentiation, in other words, in what way the electricity is produced (e.g. wind, nuclear, coal, hydro) as well as the time for how long fixed electricity price is agreed to (e.g. one- or two-year contracts). According to Hast et al. (2015) the most popular marketing strategy for contracts is sustainably produced green electricity.

Before the market liberalization, the market was very closed and had monopolistic traits, since large state-owned companies dominated the market, for instance Electricite de France. The trade across borders was not easy either, there were a lot of tariffs and other regulatory restrictions that did not enable an open market (Sioshansi, 2001). There are still some natural monopolies when it comes to the distribution networks of electricity (Junttila et al., 2018).

Fast forward to today, the energy crisis in 2022 reflects the issues Europe still faces with their electricity markets, by being too dependent on gas, which was mostly imported from Russia. When the gas prices went up, it was reflected on high electricity market prices as well (Hille, 2023; Fabra 2023). In addition, Fabra (2023) mentions that the President of the European Commission, Ursula von der Leyen has stated that the European electricity market needs a reform, during a speech in September 2022. Fabra (2023) cites Von der Leyen (2022), who states that the electricity market "...is not doing justice to the consumers anymore." due to the influential position gas has on the electricity price. This was said at the time when the energy crisis was at its peak. In March 2022, the European Commission published their electricity market reform proposal. The main goals in the reform are to give "Better protection for consumers, more stability for companies and increase green electricity." In practice, this means consumers will have more options when signing electricity contracts and companies will have more stable prices for long-term contracts, especially from green energy. Additionally, it will be easier to combine renewable electricity in the system. The objective is to avoid similar types of price chocks that occurred across the EU in 2022. In December 2023, there was a provisional political agreement on the reform (consilium.europa.eu, n.d.).

How this has changed in practice can be analysed from the European Commission's electricity market analysis for 2023. The electricity prices have dropped by 53% compared to the crisis years, the largest price fall compared to a year-on-year price was in Finland by a 63% price drop. As Europe is moving towards greener electricity, the fossil fuel generation fell by 21% in the second quarter of 2023. This shows that the changes have been somewhat positive and helpful, but the drop in electricity prices might not only be due to the new reform, but also other factors for instance, lower demand and sustained renewables generation (energy.ec.europa.eu, n.d.).

Thus, it seems that the EU has been able to pull itself from the energy crisis quite successfully, although Fabra (2023) suggests another market reform because the risk of further market spikes still exist. Mainly because most of the proposed market reform suggestions were already in some of the Member States. These statements are worth considering when looking at the EU's reform and whether or not it would be successful. Fabra's suggestion for the electricity market has two main changes, which are:

- “1. A liquid and transparent short-term energy market, which contributes to short-run efficiency in product and consumption; and
2. A set of auctions for long-term regulator-backed contracts, which promote efficient investment decisions while providing a competitive mechanism to determine reasonable profitability to the investors.”

These changes would make it easier to achieve a carbon free and a diverse electricity market for the consumers and the society. The changes would support innovations that will have a big impact in the future and contribute to cost reductions. By passing on the savings from using cheaper renewable electricity to consumers and keeping short-term price signals intact, electricity bills could become lower, which would also encourage people to see the benefits of using electricity more widely in society.

All in all, the European electricity market has been a current topic, mainly due to the energy crisis, which did in fact initiate a market reform proposal. Although the energy crisis shock has slowly fallen back to normal, its effects were substantial, and worth taking into account.

## **2.2 Nord Pool**

The liberalization of the electricity market has created the spot market of buying and selling electricity (Streimikiene, Bruneckiene and Cibinskiene, 2013). The spot market was created because electricity is difficult to store, and electricity must be produced and consumed at the same time. With the help of a spot market, the objectives are to change consumers electricity consumption behavior during peak hours and to balance the power system (Campillo et al., 2016). Despite the EU's efforts in making a single competitive electricity market Chen et al. (2021) notes that the market is still quite fragmented. The Nordic countries, which are Norway, Sweden, Finland, Denmark, and Iceland, could be called as an exception, since all except for Iceland have grid interconnection in-between each other and thus created a joint Nordic electricity market, in other words Nord Pool (Zhao et al., 2023). This was the world's first international power exchange, which was created in 1996, beginning with Norway and Sweden (Weron and Zator, 2014). The area has also grown to the Baltics over the years (Campillo et al., 2016).

Nord Pool has two separate markets for electricity, the first one is Elspot and the second one is called Eltermin. Elspot is the daily spot market, where market participants can give in offers to sell or bids to buy electricity for the next day (Botterud et al., 2010). The price is set on supply and demand on an hourly basis on the Elspot market. Because of physical blockage or bottleneck in the transmission network, the electricity market is divided into different bidding areas, called Elspot areas (Campillo et al., 2016). The Eltermin market is made of financial futures and forward contracts, where the specified volume, price and delivery period is determined. The duration of the futures contracts traded have been under multiple adjustments, the weekly futures contracts have been traded since its inception, but it is also possible to have contracts with delivery up to five years (Botterud et al., 2010).

### **2.3 What Factors Affect the Price of Electricity?**

The desire to develop a competitive electricity market with same electricity prices in the integrated market has created a lot of research among scientists about the price dispersion and volatility, with the focus on the causes. There are many factors that may affect the price volatility of electricity, but this thesis will focus only on the main causes.

The current liberalized market is based on supply and demand, and it is an efficient way to ensure sustainable and affordable electricity for Europeans. In spite of that, Jääskeläinen et al. (2022) critique the market structure, because there is a risk that prices may rise to a level that concerns consumers, especially in cold countries such as Finland. The high price volatility makes it difficult to predict future prices. Mayer and Trück (2018) examine in their study 28 different power markets around the world. The findings suggest that almost all markets, except for the Russian ATS and Nord Pool, suffer from frequent price jumps or spikes, which is a bit contradicting with what Jääskeläinen et al. (2022) claims. This may suggest that the research done by Mayer and Trück is not applicable in today's situation and may highlight how much indeed the market volatility has changed during the recent years.

One of the key factors that makes electricity so volatile is due to fossil fuels, mainly natural gas. Zakeri et al. (2023), claim that in 2021, gas determined the price of electricity for more than 80% of the hours in many of Europe's countries. Natural gas markets become quite volatile, since it is costly to store and transport natural gas (Hailemariam and Smyth, 2019). Europe depended on Russian gas import of 40% share. This shows us how vulnerable Europe is to geopolitical risks towards gas supply and natural gas price changes. The consequences of the above-mentioned risks can be seen during the Russia-Ukraine war, which changed the way the EU imports natural gas through pipelines, but it also impacted global Liquid Natural Gas (LNG) trade (Farghali et al., 2023). This underlines how a highly integrated and globalized market can face sudden changes with mainly consumers facing the consequences of the high prices.

In addition, Jääskeläinen et al. (2022) mention that Germany has a large impact on Nordic power prices due to its direct trade and transmission links with Norway, Sweden and Denmark. Germany has also the power to affect the price indirectly by setting opportunity costs for Nordic producers with large hydro reservoirs. To put things in perspective, Germany's power market is larger than the Nordics combined, which shows how they impact on the price formation in other regions. Also, Germany's power prices are directly linked to thermal generation costs, which include natural gas, or coal for instance.

Another major factor is the weather condition including seasonal factors and extreme temperatures which may cause spikes in demand. This has for instance been studied by Li et al. (2019) where they examine the influence of calendar effects (such as certain days, months or times of year) on the electricity prices and found that the impact exists. Rintamäki et al. (2017) studied how renewable energy (wind- and solar power), which has zero marginal costs may affect the price volatility. Both wind and solar power generation relies solely on weather conditions and due to lack of viable energy storage the production directly effects the day-ahead price volatility. This aligns with other studies to conclude that weather condition is a key factor to price volatility. Mosquera-Lopéz and Nursimulu (2019) show via their study that factors impacting the spot market are renewable power generation and electricity demand, whereas factors impacting in the future markets are natural gas, coal, and carbon prices.

The effect of high electricity price due to weather conditions has recently happened for instance on January 5<sup>th</sup> in 2024, when the price of electricity spiked record high in Finland due to a long period of historically cold days, even Fingrid recommended consumers to minimize their electricity consumption during peak hours (valtioneuvosto.fi, 2024). Due to the unpredictable nature of weather, forecasting electricity prices becomes increasingly challenging. Furthermore, the Nordic region is very dependent on renewable energy including hydro and wind, which highlights how much the price depends on weather conditions (Sugiyama, 2023). Shortly, there are multiple factors that affect the price of electricity, which partly elucidates why the market is so volatile.

## **2.4 Finnish Consumers' Preferences in Electricity Contracts**

Finland is an electricity intensive country compared to the EU average. Finland consumes around 7800 kWh/year per capita compared to the EU average of 3700kWh/year per capita. A large amount of electricity consumption goes to heating, 47% compared to the EU the average of 13% (Numminen et al. 2022). This may highlight the significance of which electricity contract the Finnish consumer chooses. Although Numminen et al. (2022) claim that the electricity bill represents only 4% of an average household's incomes, but if

there are surprising electricity price increases, this may not be the case. Since electricity is a necessity in everyday life, it is not a product a person can completely cut off because of price surges.

The Finnish consumers have many electricity contracts to choose from. There are two main types including 1) fixed price contracts, where prices are set the same throughout the contract period and market changes will not impact the price and 2) spot price contracts, where prices will fluctuate based on the day-ahead market price (Sugiyama 2023). Almost every electricity retail company offers spot price contracts. Moreover, there are also other alternatives, for instance, “price-caps” for the spot price customers, so that prices cannot surge above the cap limit. These contracts with price caps have not been successful in bringing customers towards the dynamic pricing option (Numminen et al. 2022). This shows that Finnish consumers seem to be a little bit pessimistic and do not rely on the spot price contracts despite the price cap as much as the fixed price contracts. There are many more contracts to choose from depending on the electricity provider, but this thesis will mainly focus on the two main ones, fixed price, and spot price.

Almost half of the Finnish consumers have a fixed price contract, with a 48% share, according to Vattenfall’s Energy Saving Barometer made in-between October and November of 2023. When it comes to the popularity of the spot price contracts, there seems to be some changes during the years. For example, in 2020, 8% of Finns had a spot price contract, in 2022 the popularity rose up to 14%, and in 2023 according to Vattenfall’s survey the share is up to 30% (Numminen et al. 2023; Paananen, 2024). Some weaknesses in these sources include 1) no mention of how many respondents participated in the surveys and 2) how they have calculated the share of respondents. So, it is worth remembering that these numbers are just estimates. Either way, there seems to be a growing popularity with spot price contracts, although the fixed price contract still is the most common choice among consumers. It is worth taking into consideration that the high prices that happened during January 5<sup>th</sup> in 2024, may have affected consumers’ preferences about the spot price electricity contracts and resulted in a faster shift towards fixed price contracts (Hämäläinen, 2024).

The reasoning behind why consumers choose a specific type of contract is multifaceted. Overall, it depends a lot on in what type of household the consumer lives in, because the amount of electricity consumed is very different. To illustrate there is a huge difference between a person who lives in a detached house, which is heated with electricity compared to a consumer who lives in an apartment, whose building block is heated with district heating as part of a large network. The difference can be seen on different electricity providers’ websites, for example, Fortum.fi, where there are calculations on the amount of electricity used each year according to the house type.

An apartment for two persons uses around 2000 kWh/year, and if the apartment has an electric sauna that is used regularly the consumption rises

up to 2600 kWh/year. A rowhouse with three people consumes around 3200 kWh/year without a sauna and with a sauna 4000 kWh/year. Detached houses consume the most electricity, if the house is around 120 m<sup>2</sup> and it is warmed with district heating the yearly consumption is around 7300 kWh/year and if it is warmed with electricity the consumption goes up to 19 700 kWh/year, which means that almost half of the electricity consumed goes to the heating.

One expensive day on the spot market will naturally affect much more on the households that consume a lot of electricity than ones living in an apartment. This may also indicate that there is not one specific electricity contract that is the most beneficial to all different house types and consumer profiles. Numminen et al. (2023) make a point that nowadays many households do not rely solely on a single heating source. Instead they utilise a hybrid model, incorporating multiple different heating sources, for instance electric heating, wood, and air-source heat pumps.

Another point mentioned by Einolander et al. (2024) is the amount of decision-making power the consumer has on their household energy consumption; it varies on the type of the building and the type of ownership. For instance, detached households tend to have the largest decision-making power. These households can affect their own electricity usage and heating type. To illustrate, detached households can choose when to charge their electric vehicles, which is more lucrative since they can decide to charge during cheap hours. This may make spot-priced contracts more valuable to consumers who have the possibility to control most of their energy usage.

According to Numminen et al. (2022) the reason why dynamic pricing is not so popular is because of low motivation due to the market and electricity bill structures, and because of the low price of electricity bills in Finland. This shows that Finnish consumers do not seem to have the interest in thinking of when to use electricity, in order to gain the most economic profit from spot price contracts. A solution provided by Numminen et al. (2022) would be to increase the level of transparency and awareness of the electricity price production. This could result in more public engagement and understanding of energy usage. A question that needs to be asked, however, is whether some electricity companies already provide transparency and awareness to their customers, for instance with the help of a mobile application that visually shows the spot price and the household's electricity usage.

## **2.5 Which Electricity Contract is the Smartest?**

There have been some studies made about the competitiveness of spot prices compared to fixed, futures prices. Some newer ones have been done by Finnish news journals, which are also included, because they provide the newest information and are relevant for this topic. These sources have also included the most recent price surges and discusses overall the higher electricity prices.

Hämäläinen (2024) did research on whether spot price contracts or fixed price contracts were cheaper even if the consumer did not time their electricity usage, the effects of January 5<sup>th</sup> were calculated. This test was done on four different households, three of them had a fixed price contract and they did not time their usage depending on the hourly electricity prices, the fourth household had a spot contract and timed the usage by for instance not heating the sauna during peak hours. In all the examples, whether the households were warmed with electricity and the usage was high, or not, the spot price contract was the cheaper alternative with the savings differed from 30€ to 400€ per year.

A larger similar study was made in Sweden by Campillo et al. (2016) where 400 households were studied for seven years and the results were the same, spot price contracts were the cheaper alternative, despite price fluctuations, winter months, and without people needing to change their electricity usage patterns. This shows that spot price contracts tend to be the cheaper alternative, although the prices can surge, but the popularity is still lower than fixed price contracts.

Similar findings have been made by Botterud et al. (2010), where they analysed spot and futures prices in Nord pool for 11 years, and the results were the same that futures prices are higher than spot prices. They claim that the price is closely correlated with the physical state of the system such as hydro inflow and reservoir levels. On the other hand, Weron and Zator (2014) question the findings, about if higher water levels mean higher risk premiums. Furthermore, they discuss the potential risks when applying mathematical linear regression models when trying to understand how electricity prices are formed. However, they do not question or critique whether the findings of futures prices and spot prices are invalid. So, one can only assume that the findings about spot pricing tending to be cheaper than fixed pricing is valid.

There are several reasons as to why spot pricing tends to be the cheaper alternative. Many experts mention that the high price spikes will be evened out by time, with mutually low prices. The fixed prices contracts must be more expensive because the electricity provider must include the risks with price volatility when making the contract (Hämäläinen, 2024). In addition, fixed-price contracts are formed by price fluctuations in the spot market, and will remain the same for the contract period, which is usually at least a year. With spot price contracts the price may fluctuate and skyrocket, but it will go down eventually, which will result in lower prices in a longer period of time (Campillo et al. 2016). What this shows is that although spot pricing can have large price spikes and via that get a lot of negative media attention it is according to many studies the more affordable alternative, even without the need to change electricity consumption.

## 2.6 Conceptual Framework

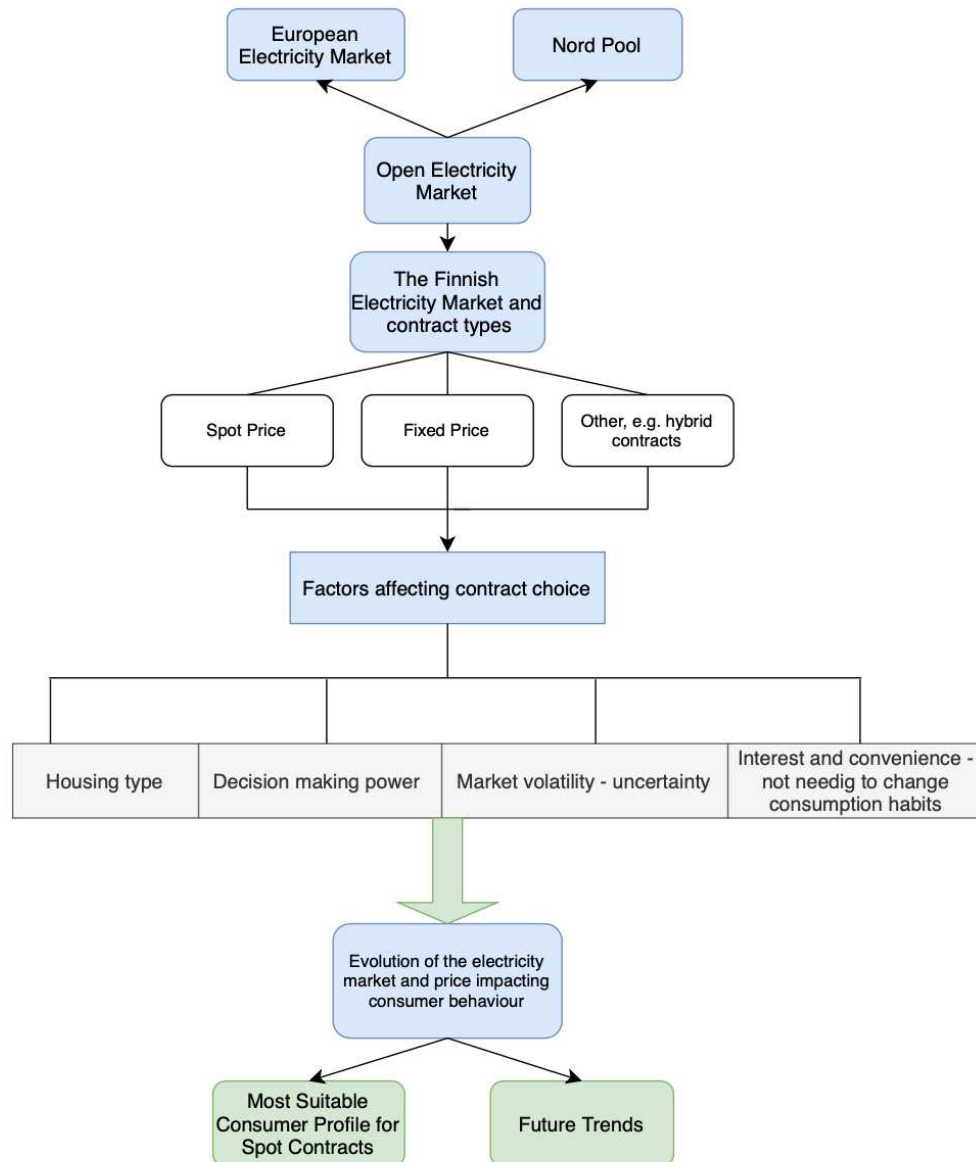


Figure 1 - Conceptual Framework on the Electricity market and its contracts (Suoninen, 2024)

This conceptual framework displayed in Figure 1 aims to visualize the concepts and themes discussed in the literature review. In addition, it aims to show the links between the international electricity market, but also how market liberalization is connected to the different electricity contracts provided on the market. It should serve as a starting point for the empirical analysis conducted in the further research of this thesis.

To illustrate what Figure 1 displays; the liberalization of the electricity market in Europe opened the free trade and minimized previous tariffs, although Nord Pool was created prior to the market liberalization in Europe. The liberalization of the market introduced new electricity contract options for consumers in the Nordic countries, primarily consisting of fixed-price and spot-price contracts, where the focus lies in this research. There are also other contracts available depending on the electricity retailer, for example hybrid contracts, which will be discussed in the future chapters of this thesis. The future research and discussions of this thesis have been visualized by using the colour green in the boxes in Figure 1. It will further investigate, and study future trend predictions, and the overall competitiveness of for whom the spot price contract is the most suitable.

### **3 Methodology**

The third part of this thesis will outline the methodology used in the gathering of the primary data for this study. Based on the conceptual framework created in the literature review, the methodology was designed to investigate whether spot priced contract is more competitive, and what the future of the power market may look like.

#### **3.1 Rationale**

A qualitative approach was chosen to conduct the primary research for this study. Interviews from energy markets specialists from different Finnish electricity companies were planned. Conducting interviews with individuals from various companies offers this study new and diverse perspectives. This was also done to ensure that the information obtained from the interviews was as applicable as possible to the specific topic at hand. Utilising interviews in qualitative research is an excellent and efficient way to gain a lot of valuable in-depth information from professionals from the field. The purpose is to compare the answers from the interviews with each other, but also some of the secondary sources represented in the literature review.

#### **3.2 Sampling**

The interviews made for this thesis were elected through carefully selecting suitable candidates with practical knowledge and various insights to this thesis topic as well as provide answers to research questions. Since the research method is qualitative, it is important to select candidates with as much relevance in their work field to the topic as possible. With the help of valid and relevant interviewees a deep dive into the electricity market can be made. The specific criteria for the interview candidates were that they have knowledge in the power market, retail electricity contract sales, and/or proficiency of the customer base. By not having too specific interviewee criteria, multiple people with diverse insights and different opinions could be documented and contacted.

#### **3.3 Data Collection**

The interviews were semi-structured which enabled some flexibility during the data collection process. If there was something that needed a deeper elucidation or insight, it was possible to do so. It may have also made the interviewees more comfortable during the process, since the interview obtained a conversational element to it. There were still some questions that ideally all respondents would answer, in order to be able to compare the responses. The permission to use the interviewee's names has been provided.

The interview had a pre-set of nine questions and was conducted in a one-on-one setting using Microsoft Teams. The interviews lasted for about 20-30

minutes and were held in English or Finnish. The interviews were voice recorded and after completion transcribed, if necessary translated, and lastly analysed (interview transcripts listed in Appendix B). Not all questions were the same for each person being interviewed due to the nature of the electricity retail company or the role the person had (interview questions listed in Appendix A).

The structure of the interview was the following, it started with an introductory question about the person being interviewed, such as what their role is and what they do in terms of market analysis or selling electricity contracts. Moreover, a brief introduction about the electricity retailer was asked. The second part was about the electricity market today, such as main challenges and trends in today's market. Lastly, the interviews moved towards a discussion about the future of the electricity market and electricity contracts. For instance, questions about what types of contracts may be created and the future role of electricity retailers in a consumer's everyday life were asked. Additionally, the market volatility and how it may develop in the future was discussed.

Through personal connections an interview with an energy market analyst from UPM energy, Nelli Nigmatulina, was possible. Although UPM does not sell electricity to consumers, an energy market analyst's insights are valuable for this research since they know how the market operates and they obtain expertise about market trends. The interview questions asked for Nigmatulina were directed more towards the electricity market and whether it is well functioning or not, instead of focusing on different electricity contracts.

In addition, multiple people from different Finnish electricity retail companies who completed the interviewee criteria were contacted via email explaining the topic of the thesis and the aim of the study. Not all answered, but thankfully many people were willing to help to collect this data. The second interview was held with Harry Sjöberg, who operates as a sales director at Nordic Green Energy, which is an electricity retail company that only sells spot price contracts. The third interview was with Katja Piipponen, who is the head of customer service operations at Nurmijärven sähkö, which is a smaller local enterprise. Lastly, the fourth interview was conducted with Antti Manninen from Väre, who operates as the Business Manager for the quite new, 2019 founded company.

Table 1. A summary of the interviewees

Interviewee	Positional Role	Industry Specialization
Nelli Nigmatulina	UPM: Energy Market Analyst at UPM Energy	Forecasting the electricity prices in the Nordic countries up to five years
Harry Sjöberg	Nordic Green Energy: Sales Director	Electricity contracts and sales

Katja Piipponen	Nurmijärven sähkö: Head of Customer Service Operations	Customer base and expertise of different electricity contracts
Antti Manninen	Väre: Business Manager	Commercial operations for consumers, sales, and pricing

Interviews were analysed by documenting central themes and phrases, which occurred in multiple interviews. Remarkable individual references were hand-picked and compared between the interviews, to contrast and add dimensions, or support a claim. Common topics between the information gained are compared and analysed together with some scholarly sources. The conceptual framework will be utilised as a starting point. By recording and comparing information over the interviews, patterns could be found. A few topics were repeated several times. Their noteworthiness is inspected with existing literature to distinguish commonalities. Analysing these topics permits for the conclusions drawn between the correlations and inconsistencies of interview data and literature review.

### 3.4 Data Analysis

The primary method of data analysis used is thematic analysis, which implies that the answers conducted from the interviews will be compared with each other to see if the interviewees have the same or similar answers, or else completely different points of views. The aim is to see if there are any patterns or not. Based on the thematic analysis, grounded theory analysis is or might be utilised.

### 3.5 Limitations of Methodology

There are some limitations in using a qualitative research and semi-structured interviews when gathering data. The primary limitation arises from the fact that not all contacted interview candidates answered, potentially resulting in insights and opinions that may have been missed. In addition, the largest Finnish electricity retailers, Fortum, Helen and Vattenfall were not a part of the research. Fortum chose not to be a part of the research due to a concern of sharing confidential information when discussing about consumer profiles. It would have been ideal to compare smaller enterprises to larger ones, to see if there are differences or similarities. In other words, a possibility of data loss is present.

Kakilla (2021) mentions another possibility of data loss in semi-structured interviews is when the interview is conducted on an online platform instead of in a face-to-face setting. A second limitation is the possible language barrier, although to minimize the risk most of the interviews were held in Finnish. Although the potential loss of information during the translation process is an existing restraint. Three of the four interviews were conducted in

Finnish, which means that most of the interview transcripts needed to be translated into English.

## 4 Findings

In the following section the main information gained from the interviews are quoted, compared, and analysed.

### 4.1 The Electricity Market Today

#### 4.1.1 Spot Price Versus Fixed Price

One of the questions asked the interviewees is whether they find it realistic that studies claim spot price contracts to be the cheaper alternative compared to fixed price. There are some differences in the answers and opinions.

Harry Sjöberg from Nordic Green Energy claims that it is a quite realistic accusation, although it may not be applicable to people with certain consumer profiles. What Sjöberg means by that is when people with high usage do not time their electricity consumption to cheaper hours, for them the spot price alternative may not be the most applicable. To support Sjöberg's claim that spot price may be the best alternative, does changing prices entail possibilities for savings, especially now that it is relatively easy to influence one's own electricity consumption.

*“But nowadays you can influence quite well, so you don't have to go to the sauna exactly at 6:00 PM every week. But it's also about how electricity contracts are structured. With a spot contract, you pay for consumption, whereas with a fixed contract, you pay for consumption plus a premium, which is kind of the risk calculated by the electricity company.” (Harry Sjöberg, 2024)*

Manninen mentions the importance of different factors to consider, so providing a single answer is challenging. Factors may be the time frame that is regarded and other influential factors that affect the price of the bill, not solely the price of electricity.

*“Regarding this specific question, historically and over the long term, a market-priced electricity contract has generally been the most cost-effective way to procure electricity for many.” (Antti Manninen, 2024)*

To counterargue this claim Katja Piipponen from Nurmijärven sähkö mentions issues with this claim. The first issue is that although spot price may be cheaper in the long run, for instance the duration of one-year. The issue occurs when ordinary people do not have the possibility to pay the bills in the cycle that they come in. Volatile spot pricing means that summer months tend to be cheap but winter months are notably pricier. This implies that everyone does not have the possibility to pay for many winter months in

a row, due to regular income and low savings. One solution could be to put money into savings during the summer months in order to pay for the electricity bill for the winter months, but this is quite unrealistic. Piipponen also mentions the fact that not everyone has the possibility to adjust their electricity consumption automatically and would have to do it manually. The question arises, what does the customer prioritise, peace of mind or savings?

*“If they choose a fixed-term contract, they're buying peace of mind, in the sense that it's at most x price, and if they want to save, they can turn off devices. In the end, many also choose peace of mind; it's not just about finding the cheapest option.” (Katja Piipponen, 2024)*

All respondents agree that spot price is the cheaper alternative, although it may not be the most realistic approach according to Piipponen. Manninen mentions the difference between different housing types, detached houses have a higher power to affect their power consumption, which means that they have a higher possibility to benefit more from price changes. Sjöberg on the other hand claims that managing own's electricity consumption has been made easier in today's world, and that this can be seen as a realistic attainable claim. It is worth mentioning that Sjöberg works for Nordic Green Energy that solely sell spot price contracts, which may naturally bias their preference towards spot price.

#### **4.1.2 How can Price Volatility be Stabilized?**

All respondents mention “weather” as the largest indicator of the price volatility of electricity:

*“The volatility of electricity prices comes from the lack of flexibility, so we can't really get the stabilization since we don't have that many flexible sources. In addition, we have, if you look at the statistics for the past two or three years, especially, we have the wind power installed and its capacity is rapidly increasing, but the problem is that we don't have the energy where to store it.” (Nelli Nigmatulina, 2024)*

*“At the moment, I see it as quite difficult because with more renewable sources coming in. We often say that if you want to know the price of spot electricity, you should check the weather forecast, see how windy it is. With wind power and others, it's difficult to predict.” (Harry Sjöberg, 2024)*

*“It's due to current production technologies. So practically, if there's a coal power plant, it can be regulated quite well. But people can't regulate how much the sun shines or the wind blows.” (Katja Piipponen, 2024)*

*“I believe this is more of a new normal. The price of electricity will fluctuate. The background to this is the changing production structure, meaning as the capacity of renewable energy increases or as the role of renewable energy grows over the years, it is weather-dependent.” (Antti Manninen, 2024)*

Sjöberg, Manninen and Piipponen finds it difficult to find a solution to stabilize the volatility, due to the nature of production. The more the production is moving towards a greener solution and becoming more dependent on renewable sources, the more volatile the market is going to develop and become. Manninen mentions one solution that would be to focus more on base power, such as nuclear power. As we have already seen how Olkiluoto 3 has lowered and stabilized Finnish power prices a bit. Nigmatulina sees the solution to stabilize the market via energy storage systems, but the existing technology is not there yet as well as the funding for it.

Another factor that affects prices, mentioned by Piipponen, is the internationalisation of the market. Now that there is a plan to expand the market to a European-wide electricity market, the prices will depend on what specific country may provide to the market. In addition, the transmission lines that moves around the electricity bought or sold in Finland play a vital part in the whole system. If a transmission line is down the electricity bought from another country cannot come to Finland and it will affect prices as well.

All in all, weather is the main factor of the volatile market that has become the new norm in the Finnish society. Possible solutions for stabilization are challenging to obtain due to the nature of the production, but for instance by developing energy storage systems the market could become more stabilized.

## **4.2 The Electricity Market in the Future**

### **4.2.1 The Future of Spot Price Contracts**

Another question posed the interviewees was whether a growth in popularity of spot price would represent a positive shift for the market. All the interviewees would see the growth of popularity in spot price contracts as a positive change, in sake of the market. Sjöberg mentions that if everyone would change to a spot price contract the tabu of talking about saving electricity and timing the usage to cheaper hours would diminish. In addition, it could also reduce the electricity prices overall, because the timed usage of electricity would help reduce pressure from the market. Piipponen would see this as a positive change as well:

*“I would say it would be good in that sense for everyone to have a spot electricity contract because it forces people to think about how and when to use that electricity. The same phenomenon occurs in situations like when a*

*person has lived in an apartment building and there's a water meter, then they automatically start saving consumption. In a way, it would also be fair that those who use less also pay less.”*

*“The argument for why it would be a good thing is that it creates motivation for customers, or end-users, to participate in demand response. Demand response is important because it balances the energy market. The more electricity users participate in demand response the better. For instance during price peaks or situations where there may be a risk when consumption exceeds production.” (Antti Manninen, 2024)*

Nigmatulina mentions the challenges in the change would be the accessibility of the price calculations to the consumers. Piipponen mentions the same challenge as well, due to the population in Finland is on the older side, which entails that they may not have the technical knowledge or willingness to change their habits. In addition, Finns tend to change their habits quite slowly. However, Piipponen says that she sees a change in the newer generations who do not want to pay extra for a more stable electricity price, which means that the trend may be seen in the future, but not in the next few years. Sjöberg and Manninen also strongly believe that the trend in Finland is going towards the other Nordic countries, such as Sweden with 70-75% of its contracts being spot, and Norway with 90-95% of its contracts being spot. There might be many different factors influencing this trend:

*“There were likely several factors influencing this change at the time, one of which was probably the reduction in product variations, as many companies may not have offered other options than spot electricity. Then, the price levels of these fixed-rate products, from those companies that offered them, were so high due to circumstances that many consumers avoided them for that reason alone. A third influencing factor might be that which is positive, this interest in electricity prices generally has also increased significantly.” (Antti Manninen, 2024)*

Another challenge mentioned with whether the change would be realistic is the changing consumer profiles, according to Nigmatulina. This makes it more difficult to forecast how much electricity consumers are going to use, due to the electrification of everyday life, for instance, electric vehicles incorporated in the lifestyle changes the consumer profile naturally quite significantly.

All in all, a shift towards a market with most contracts being spot or hybrid would affect the market positively; by balancing the market, reduced prices and forcing people to think about utilizing electricity correctly. Whether the change is realistic or not is up to debate, but according to most of the interviewees, they believe that spot contracts are going to increase in popularity.

#### 4.2.2 Are There New Contract Types in the Making?

All of the interviewees mention similar changes that have been recently developed in each respected electricity retailer company. Väre was the first retail company that released the new hybrid contract. Nordic Green Energy also provide the hybrid contract, with half of its price being a fixed price and half of it being a part of the spot price. In practice, the contract contains a starting price, but customers can adjust their electricity bill by utilising the market during cheap hours, but they can also grow their bill by consuming more during expensive hours.

*“This type of contract could be called a transition product, so if the consumer isn't quite ready to fully switch to spot price, this could be a good first step.” (Harry Sjöberg, 2024)*

Nurmijärven sähkö is about to incorporate a similar hybrid contract, but it is not on the market yet. Piipponen states that the hybrid contract was a wish from the customers, suggesting that some customers desire a shift towards real time pricing products or are at least willing to investigate it. It is worth mentioning that not all electricity retailers have the possibility to fund in piloting new dynamic products, which large retailer such as Fortum and Helen may have the capacity to do so. In other words, Nurmijärven sähkö is not a company that will be developing new products, due to its size and nature.

*“Nurmijärven sähkö is a municipality-owned company, so it's kind of different in its own hands compared to if it's in the hands of foreign investment companies, as they just want money or return on their investment. But yeah, fixed-term contracts will surely remain because people and building stock and habits affect the type of electricity contract.” (Katja Piipponen, 2024)*

Nigmatulina believes that new contracts will naturally develop due to the constantly changing market. An example of a possibility to develop an area would be to incorporate small consumers more into the stabilization of the market, for instance, by integrating customers' small solar panels or battery storage systems into the market. This would provide more flexibility for the consumers.

*“I think that there is a room for development for sure and I think that the new solutions will perform in the future and that there are all the basic fundamentals, which lay on the ground, which gives the greater ground for development of the new electricity contracts.” (Nelli Nigmatulina, 2024)*

None of the companies provide a contract with a price cap, or a 6-month fixed price for cold winter months and a possibility to move to spot price during summer. Nordic Green Energy used to have a contract with the price cap, but due to the difficulty to predict the future price and what the cap should be, the hybrid model is the best solution. Nurmijärven sähkö also used to provide a 6-month fixed term contract but mentioned that the contract type was not especially profitable.

In addition, Sjöberg mentions an overall trend of a new role of the electricity retailer. The role of the retailer is becoming multifaceted because new technologies are coming and being integrated to the system all the time, this provides people to monitor their usage and forecast when to use electricity. For instance, nowadays many companies have an application where the customers can follow their usage and Sjöberg underlines that new technologies and features are incorporated on those platforms all the time. This was also mentioned by Manninen:

*“We are moving more towards the idea that if previously the kilowatt-hour price and decimals of the electricity contract were adjusted, now the idea originates from that the greatest savings are reducing electricity consumption. If it can still be timed when the electricity price is cheaper, then it certainly requires assistance and tools for end-users; it is made easy.” (Antti Manninen, 2024)*

### **4.3 Themes of the Electricity Market**

A general conclusion from the interviews that can be drawn is that spot pricing is gaining popularity and is a competitive solution for most consumers, but not all. As Piipponen reinforced, spot price contracts may not be the best solution for people who do not have the technical knowledge in monitoring the price changes, ability to pay changing electricity bills as well as willingness to change their consumption habits. As both Sjöberg and Piipponen mentions the trend is moving towards growth in popularity of spot, especially with younger generations, who have the technical knowledge and may have the willingness to change the habits. But a trend as strong as Norway and Sweden’s may not be seen in the few next 5-10 years, according to Piipponen.

A change for customers moving over to spot contracts would be a positive change for the market, according to all the interviewees. It could reduce prices by encouraging consumption during cheaper hours and minimizing pressure during expensive hours. Piipponen agrees; it would be fairer if everyone paid the same price, primarily based on their consumption.

*“For example, during the energy crisis, those who had fixed-rate contracts, they didn't have to think about high electricity prices, so spot electricity guides customers to use electricity correctly. At the same time, even if you don't necessarily think environmentally, young people do. You have to think*

*about electricity usage because it directly affects your own wallet. So, in that sense, it would be a good thing if electricity consumption shifted to spot electricity. When it's expensive, everyone would save electricity.” (Katja Piipponen, 2024)*

The most recent new contract in the market provided by most companies is the hybrid contract, which is a combination of fixed price and spot price contracts. The contract is a way for the consumers to test whether they find the spot market a suitable system or not, but there is still the security of having a starting price for the electricity. When the customer has a spot price contract, they carry the risk of market volatility, whereas when the customer has a fixed price contract, the electricity retailer carries the risk of market volatility. Nigmatulina emphasises that there is room for new innovations for different contract types, due to the constantly changing market making it natural to innovate and change the contracts as well.

Lastly, the stabilization of volatility is seen as a difficult task to uphold due to production increasingly moving towards renewable sources. In other words, the price will become progressively more dependent on weather, which cannot be controlled. Another major factor is the internationalisation of the market since everything is tightly integrated with each other, for instance the transmission lines between Finland's neighbouring countries that move the imported or exported electricity. If one of the lines would be down the prices would be affected instantly.

## 5 Discussion and Analysis

In this section the scholarly sources previously provided in the literature review and the findings gained from interviews will be compared and analysed. The goal is to answer RQ2 and RQ3 and fulfil their respected research objectives.

### 5.1 Most Suitable Contract in Regards of Consumer Profile

Determining the best contract for each household is not as black and white as some of the literature suggests. It is not only about choosing spot price contracts because they are considered as the cheapest solution, regardless of household type and altering electricity consumption to the cheapest hours (Hämäläinen 2024; Campillo et al. 2016; and Botterud et al. 2010). Although this was supported by all the interviewees and it might be the case in the long run and in theory, in practice it is not as easy as it might be displayed.

According to Piipponen from Nurmijärven sähkö, it is not very realistic for a person living in a detached house with a high consumption to be able to manage the bills in the cycles they may come in, especially the winter months that tend to be expensive. One solution would be to put aside money during cheap summer months to pay for the expensive winter months, but perhaps not all families have that kind of possibility to put a high amount of money aside. Sjöberg mentions a similar limitation with the spot contracts, if a person does not adjust their usage at all and the consumption is high, the possibility of an expensive bill is very much likely. Manninen has a similar note that people who live in apartment buildings may not benefit as much from low prices as people who live in detached houses, due to the low consumption.

To counterargue, Sjöberg and Manninen mention that nowadays, following the consumption has been made as easy as possible because retailers provide applications where it is easy to follow personal consumption and price changes. In addition, some easy consumption habits can be changed, such as to turn on the electrically heated sauna after peak hours. Although this might be the case, according to Piipponen a large part of the Finnish population is on the older side, which may indicate that people are not as willing nor have the needed technical knowledge to understand the spot market. Therefore, when younger generations begin to sign their own contracts, the trend might move towards spot becoming more popular and the smarter choice, due to technological knowledge and interest.

Einolander et al. (2024) underline the importance of understanding of how the dynamic pricing model works and how consumers own behaviour affects the electricity bill. A survey was made in Sweden, where 70-75% of its consumers have a spot price contract. The result was that 3,8-8,5% of the respondents had enough knowledge or understanding of the real time pricing

model to fully adjust their behaviour based on price volatility. Detached household residents were more likely to understand better the ability to change consumption compared to apartment residents.

Nigmatulina mentions another point about the contract type depending on the consumers possibility and willingness to incorporate a flexible lifestyle. A person with a newborn baby may not be able to time the electricity usage for the cheap hours compared to a person living alone. This underlines the importance of understanding how volatile the market may be. Although many studies have shown that spot price is the cheapest alternative in the long run, it is not an applicable contract type for everyone.

To conclude, there are multiple factors to take into consideration when analysing which electricity contract is the smartest choice, which depends on the consumer profile. On the basis of the primary and secondary data, in general, a person who is the most suitable for a spot contract:

- 1) is willing or has the possibility to change their consumption habits
- 2) maintains the technological knowledge needed
- 3) understands where to track the price forecasts and how the bill is created
- 4) has the possibility to pay changing bills.

A person willing to try the dynamic pricing type can utilise hybrid contracts, which will be discussed in the next section. Fixed term contracts are the most suitable for people who do not fulfil the criteria presented for a person suitable for spot priced models.

## **5.2 Development of Contract Types**

As shown by the literature, the most common contract type in Finland is the fixed price, although spot contracts have been steadily gaining popularity. According to Vattenfall's survey, approximately 30% of Finnish consumers now utilise spot price contracts. Sjöberg and Manninen believe that Finland is following Sweden's and Norway's footsteps, where in both respected countries spot contract is clearly the most common contract type. Manninen lists reasons as for why this may be the case. For instance, during the energy crisis the product variation reduced, and some companies only provided spot contracts. In addition, the fixed price contracts that were provided may have had a high price and for that reason pushed people to move over to the spot contracts.

Numminen et al. (2022) mentions price-caps in spot price contracts as an example of a product where the aim is to move people towards spot price contracts, with a smaller risk. None of the electricity retailers that were interviewed provided this product anymore. Instead, the newest product that already is on Nordic Green Energy's as well as Väre's assortment and soon to be provided by Nurmijärven sähkö as well, is the hybrid electricity contract. The contract could be called a transition product where people have the possibility to try and adjust the consumption for the cheap hours in order to

minimize the electricity bill. The contract has traits of a fixed price contract, but the bill may be adjusted, to be either cheaper or more expensive depending on the spot market and for when the consumption is timed. The issue with contracts featuring price caps originates from the market's volatility, which introduces risks. Consequently, and accurately estimating the appropriate price cap becomes demanding.

This new contract type may show that people are interested in becoming more familiar with the spot market. Perhaps they are willing to change their consumption habits for the sake of minimizing the electricity bill, and simultaneously reduce strain on the market during peak hours. Piipponen still points out that there will be consumers who will purchase the fixed price contract as long as these are available, mostly due to comfort and not wanting to bear the risk of surging prices. When a person has a fixed price contract the electricity retailer carries the risk of the price volatility.

To summarize, new contract types are in the making, with the hybrid contract being the most recent addition. Incorporating new contracts for customers who are not 100% ready to move over to spot contracts is an indicator of customers becoming more open to new ways of living. But this may be applicable for mostly the people who check the criteria for being suitable for a spot price contract in the first place.

### **5.3 Future of the Electricity Market**

There has been discussion about the Finnish electricity market being broken, due to the surging prices and high volatility. Although it may not be as stable and cheap as before, according to Ollus (2024) the market is not broken when considering that the electricity prices are competitive and the energy crisis in 2022 was managed without power cuts. The drawbacks in the Finnish power market are the higher volatility and the decline in number of investments.

All interviewees emphasize the growing reliance on wind and solar-based power. Given its nature of dependency on weather conditions for electricity production, this trend suggests that the power market will remain volatile. Sjöberg, Manninen and Piipponen sees the stabilization of the market very unlikely because of the way the market is changing. For instance, powerplants in Germany have been shut down and windmill parks are gaining popularity. This coordinates with claims made by Li et al. (2019) and Rintamäki et al. (2017).

Piipponen mentions the internationalisation of the market as another factor that will keep the market volatile. This aligns with the article made by Jääskeläinen et al. (2022), where especially Germany's position in the power market is highlighted, as it plays a crucial role in the formation of prices in the Nordic countries. Although the stabilization of power prices may not be seen as very realistic in the near future, Nigmatulina emphasizes that through energy storage solution this issue could be solved, the main limitation is the

funding of these projects. Another point discussed is that the market could become more stabilized by incorporating consumers in the power market.

If spot contracts were to become the most popular contract type it would have a positive impact on the electricity market according to all the interviewees. Valid viewpoints of a future with spot being the most popular contract form were made. The results might be decreasing electricity bills, not only through optimized usage timing, but also by alleviating market pressure during peak hours, which could in turn lower overall electricity prices. Furthermore, implementing same prices for everyone would contribute to fairness. For example, during the energy crisis in 2022, individuals with affordable fixed-price contracts did not need to pay attention to their consumption habits. This led to increased economic inequality, with some not needing to worry about the electricity price and usage whereas someone's bill could have increased ten times (Einolander et al. 2024). Another opportunity with mass real time pricing incorporation would be a possibility to an adoption of technology-based solution, with the purpose of taking advantage of price fluctuations, on a large scale (Campillo et al. 2016).

To contrast, both in the interviews and according to Campillo et al. (2016) this may not be the most profitable contract type for retailers, due to its small profit margins from selling electricity, since the customer bears the risk themselves. Hence, fixed term and priced contracts tend to be the more profitable contract type for retailers, albeit depending on the risk margins. Although, spot contracts contain less risks for the retailer. Thus, both contracts containing their strengths and weaknesses for retailers.

During the energy crisis, some retailers bore losses due to customers with inexpensive contracts. Nevertheless, a change advances new possibilities for retailers to develop different value-adding services for customers that have the real time pricing contract, such as Sjöberg mentions as a main area for room to grow and develop. For instance, features in applications and in-home displays that provide users market information and guides usage, would help customers to make informed decisions (Campillo et al. 2016). Although, a problem arises of the accessibility of these technological advances, for instance for the older population. In addition, in one of the interviews there was discussion of an increased difficulty in forecasting consumer profiles, due to large shifts towards electrically based solutions in everyday life, which changes the consumption rapidly.

To summarize, the market will stay volatile due to a shift towards renewable energy sources, which leads to a high dependence on weather conditions. In addition to the internationalisation and integration of the market, meaning different world events affecting electricity prices. A possible solution would be to invest in energy storage systems, but the issue lays in the funding of it. When it comes to market changes, if spot contracts were the norm, such as in Sweden and Norway, it would be seen as a positive shift for the market. Mainly due to people being encouraged to consume electricity

correctly and obtaining fair pricing for everyone, which may lead to financial benefits as well. The issues arise for the retailers, by profit loss compared to fixed pricing models, and challenges to provide all customers technological advancements. Although, this gives retailers room to improve and innovate the accessibility of information about prices and usage pattern-based technologies.

## 6 Conclusions

The last section of this thesis will address and summarize the main findings gained throughout the research process. Additionally, importance for international business, possible limitations and suggestions for future research are introduced to frame the research done and where there still is room to grow and develop further research.

### 6.1 Main Findings

The primary objective of this study was to identify the competitiveness of spot price contracts compared to other electricity contracts, by taking into consideration that what kind of consumer profile is most suitable for a spot contract. The focus was on comparing spot with fixed price contracts, although other contracts are on the market. In addition, a look into future predictions were made as well.

The primary data analysis, when compared and contrasted with the secondary data, resulted in diverse conclusions that can be categorized into:

1. Spot price contracts may be the cheapest electricity contract type in the long run, regardless of consumer profile, but it does not mean that the adaptation is possible for everyone. Major factors are for instance: lifestyle situation, knowledge and accessibility to the hourly pricing, willingness to adapt electricity usage for the cheaper hours and possibility to pay changing bills. Overall, a person with a more flexible lifestyle is more suitable to adapt the needed lifestyle change, in exchange to gain economic profitability from a spot-based contract.
2. Retailers are evolving and incorporating new contract types, the newest being a hybrid of including elements of both fixed price and spot price contracts. This could be considered as a transitional product for consumers not yet ready to commit fully to a spot contract. Transitioning towards spot contracts gives retailers new possibilities and room to grow by gaining customers' knowledge of the market and their own consumption habits. New features may be added to applications or in home displays, for instance. All in all, spot or hybrid contracts are a competitive alternative for consumers to choose from.
3. Experts believe that spot contracts will gain popularity in Finland, but the change may be slow. A shift to many consumers utilising the spot market correctly would be a positive change for the electricity market. It could lead to fairer market practices and economic

equality as well as encouraging an open discussion on electricity usage savings. Challenges may rise to retailers, due to smaller profit margins, but it also implies room for development in other services provided to support a sustainable consumption of the spot market.

4. The volatile market can be seen as the new norm. The prices stay volatile due to the shift towards renewable energy sources, which indicates that production is weather dependent. Another factor is the internationalization of the market and countries becoming more integrated than before. The volatile market is not necessarily a threat since high price changes can also be seen as an opportunity to benefit economically when the prices go low.

## **6.2 Implications for International Business**

Spot contracts are not the most common electricity contract type, when looking at an international level. In 2019 real time pricing contracts were only available in eight European countries: Finland, Estonia, Sweden, Spain, Netherlands, Denmark, UK, and Norway. This only means that there is growth potential, and that the contract type is becoming more common in other countries as well (Einolander et al. 2024). This implies the significance of international businesses understanding the potential and challenges spot pricing models may imply for its customers, which can be gained from this study.

In addition, since the power market is moving more towards a joint market approach, international businesses and governments can take inspiration from Nord Pool on how to effectively operate in an open electricity market. The insights gained from this research may help companies in international business settings to understand the trends and consumer preferences when choosing electricity contracts. Furthermore, the discussion of future trends and development of contract types may give stakeholders in international businesses a picture of how the market is constantly evolving and the nature of a volatile market.

## **6.3 Possible Limitations**

While the investigation and outcomes of this thesis offer a broad spectrum of findings, there remains some limitations to consider. Potential limitations of the listed research questions and objectives may include the level of generalization that has to be done due to the scale of the study, resulting in some consumer profiles not being fully addressed. A challenge occurred when statistics of different housing types and what contracts they had, could not be found, which also contributed to the level of generalisation.

Another point to underline is the quite limited scope of the study since the main focus lies on financial factors when comparing electricity contracts. Although other factors may influence consumer choices as well, for instance,

environmental considerations and regulatory policies, these factors are not substantially addressed in the study. Therefore, the focus lies on highlighting attributes of a consumer for whom the spot contract may be the most economically beneficial.

Additionally, a primary dataset of four interviewees is a quite limited set of results, when analysing a huge industry. None of the larger Finnish retailers (Fortum, Helen, Vattenfall) were represented, in which the companies may have had different viewpoints to the questions posed. Thankfully, the interviewees who participated in the study had different positions and areas of expertise as well as represented a variety of different retailers, which naturally gives the study a wide range of opinions. But it may leave an inherent bias, because of the primary data being collected on opinions drawn from personal experiences. Lastly, since the nature of the market is volatile and evolving constantly, the conclusions drawn in this study may become outdated within a short timeframe.

#### **6.4 Suggestions for Further Research**

Future research on the topic of competitiveness of different electricity contracts for the consumer are becoming increasingly current topics since the market has evolved and changed rapidly during the recent years. This has led to increased discussions in news and other media outlets, which shows the increased interest in the topic. Further research could analyse the significance of enlarged economic benefits for consumers when deciding between electricity contracts. In other words, how much do people value the freedom of not needing to time their electricity usage.

Moreover, a further analysis on specific areas retailers may focus on to develop and evolve in could be done. For instance, how retailers can develop customer satisfaction and provide more comprehension of electricity usage. Research on what customers want and need from their electricity retailer in the future could be studied, such as features in applications to make the tracking of price changes and consumption as easy as possible.

This study focused mainly on spot electricity contracts, and on the new hybrid contracts to an extent. Further research on the impact and competitiveness of the hybrid contract, which is the newest contract type, can be made. It would be interesting to see how the hybrid contract compares to spot contracts and how the popularity may grow in the upcoming years.

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## Appendices

### 6.5 Appendix A: Interview Questions

#### **General matters:**

- Would you like to remain anonymous, or may I use your name?
- Is it okay if I record the interview?

#### **Introduction:**

- Could you give an overview of your role within the company you work for and how it relates to analyzing or selling electricity contracts to consumers?
- Could you tell us a bit about your company that you work for and what products you offer?
- How do the electricity contracts offered by your company compare in terms of competitiveness to spot electricity prices from the consumer's perspective?

#### **The electricity market today:**

- Several studies have concluded that spot electricity contracts are the most profitable regardless of household type, and without the need to time electricity consumption. Would you say this is realistic/true, or is there clearly a certain type of electricity contract that is more profitable for certain household types?
- Are there specific consumer profiles for which fixed-rate contracts are most popular? Certain consumer profiles for which spot contracts are most popular?
- In the articles I've read, there is also some discussion about the volatility of electricity and what factors affect electricity prices. Would you say it's possible to keep electricity prices stable?

#### **The electricity market in the future:**

- What would happen if all consumers switched to spot contracts? Would this be a good or bad thing?

- How do you see the future development of energy markets and what impact this might have on the competitiveness of electricity contracts offered to consumers? For example, does a volatile market attract more people to fixed-rate contracts?
- Do companies have plans for new types of contracts so that customers have the opportunity to benefit from cheap wind power, other than just through a spot contract? Is there anything for solar power?

### **Question for UPM Energy market analyst, Nelli Nigmatulina**

#### **Practical matters:**

- Would you like to remain anonymous, or is it okay to use your name in the thesis?
- Is it okay if I record the audio so that I don't have to take too many notes at this moment?

#### **Introduction:**

- Firstly, could you introduce yourself and provide an overview of your role at UPM?

#### **Power market today:**

- There is quite a lot of price volatility in the electricity market. What should be done for the price volatility to stabilize, or is it even possible?
- What challenges do you face in managing electricity market volatility and how do you address these challenges?
- What are your main views on the effects of electricity market volatility on industrial players and consumers?

#### **Power market in the future:**

- What would happen if all consumers would change over to spot-price contracts? Would it be a good or a bad thing?
- How do you see the future of the electricity market evolving? Will there be more price volatility or stabilization?

- Do you think there will be developed new types of electricity contracts so that consumers, for instance, can benefit from cheaper wind power outside of having a spot price contract?

## 6.6 Appendix B: Interview Transcripts

### 1st Interview

**Interviewer:** Ella Suoninen

**Interviewee:** Nelli Nigmatulina, Energy market analyst, UPM energy

**Location:** Microsoft Teams

**Date & Time:** March 1, 2024. 12:30 onwards. UCT+2H (Finnish time)

**Original Language:** English

Ella: Firstly, could you introduce yourself and provide an overview of your role at UPM?

Nelli: My name is Nelli Nigmatulina, and I'm an energy market analyst in UPM energy. My main responsibility is forecasting the electricity prices in the Nordic countries up to the five years' time period and analyzing how the price can change under different circumstances and how the price can develop under different circumstances and fundamental changes. I also do a bit of analyzing of the carbon market. And before that, have been working with spot price electricity forecasting for the horizon of 60 days and now I'm focusing on up to five years.

Ella: There is quite a lot of price volatility in the electricity market. What should be done for the price volatility to stabilize, or is it even possible?

Nelli: The volatility of electricity prices comes from the lack of flexibility, so we can't really get the stabilization since we don't have that many flexible sources. In addition, we have, if you look at the statistics for the past two or three years, especially, we have the wind power installed and its capacity is rapidly increasing, but the problem is that we don't have the energy where to store it. So, I think these are options to stabilize the prices, bringing some stability to it. I think that the volatility of electricity prices is a good indication that the investments could be done, and some projects can be developed in the fields of flexibility. So, we can store when there is a lot of electricity produced which is cheap and then we can use it afterwards. So, I think this is definitely one of the solutions, but I think that cost is the problem at the moment.

Ella: What challenges do you face in managing electricity market volatility and how do you address these challenges?

Nelli: I think the high integration of renewable energy sources is definitely bringing the challenges to forecasting electricity prices, and I think that one of the problems is of course that when you have such high integration of renewable energy sources it is hard to forecast what will be the wind or what will be the actual sun. I mean of course there are models for it and so on, but then we are talking about like weather for the mantels which I mean it's not like they're going to change overnight but the forecast maybe quite viable let's say. Or something looking solid it I don't know the upcoming like 3 days I would say like 5 days, of course like there's like the forecast that's provided by different services for different types of horizons, but then afterwards it may be not really that. It's not really possible to say what's going to be the wind next week, so you have only like the scenarios; it it's either blowing a lot or it's not blowing at all. Either we are going to have like high prices or low prices, but I think that one of the things is just analyzing, as I already said my job is to analyze how the situation will change and what price risks are we talking about. So, it's just to look what could be the price when the wind is high or when the wind is low so that's just there up to the analysis and understanding how much price changes will be. For instance, how high will be the price volatility. I think that the with the gate is I just said that with the the possibility if there would be like the storage for example that it would be like the main differentiating factor.

Ella: What are your main views on the effects of electricity market volatility on industrial players and consumers?

Nelli: I think this has been mentioned in different news outlets that there has been increase and interest towards the spot contracts in the past years, but I also understand that it brings the risk. Because I myself as a person that also has this contract and I check every day and that the prices may be quite volatile. It can be like very low today, but it will be extremely high tomorrow and not everyone I guess is ready. Well, I can access this short analysis based on my friends and family not everyone is just created to jump into such flexible style of life. Because for instance the dishwasher can be turned for me during the nighttime, but for example for my brother who has a new baby well he is three years already they rather you like you know sleep calmly over the night, not having anything running at all. So, they rather have a fixed price contract with more security. In conclusion, not everyone's lifestyle can be adjusted for such flexibility that the spot priced contract may entail.

From an industrial perspective that is quite difficult for me to say, because I think that the industrial production is not as flexible as just the basic consumer household. So that definitely brings for product the cost because, well if some production can be changed whereas some production may not be. For instance, some production with industrial ovens which should run all day long, no matter what the price, I don't think that this is like an option to use

for them the electricity contracts. But maybe to just improve the energy efficiency or the equipment which they're using for example and enhance their efficiency when looking something into this.

Ella: What would happen if all consumers would change over to spot-price contracts? Would it be a good or a bad thing?

Nelli: I think that that this is a very good question because I have also been thinking about what the situation could be. I think that if you look at the statistics and historical data, already we can notice how the consumption is moving depending on the price. So once the price is going lower the consumption is increasing quite naturally, because people are trying to use this volatility. We are going to talk about the demand change and the consumption change as well as the behavior change of the people, but that would be an interesting question of forecasting the consumption.

The problem is that it is hard to access to for the consumers is what's going to be the price for example even the day after tomorrow, will it go high, or will it go low? That's also an interesting question to elaborate on that whether the forecast will be accessible for anyone. In general, that's what happens to be the challenge to the system of like moving consumption and even the challenges in forecasting the consumption profile itself, which is already a problem. Forecasting the consumption profile at the moment is challenging because under different circumstances there are integration of electrical vehicles to the system so it's already changing the profile because people are trying to use this process for their own benefit and that will bring challenges in the future. Because even when there is a forecast in the future there is still an assumption of what is going to be the wind was going to be the consumption, so that's going to be the challenge for balancing the market afterwards when all people will change over to the spot market. So, it may cause some issues in balancing the market in order to bring the stability to the power market.

Ella: How do you see the future of the electricity market evolving. Will there be more price volatility or stabilization?

Nelli: I think that that will be up to the flexibility sources and what kind of and how this can be used in the future. For example, even like the small consumers because, that has been the topic of my PhD (which is still ongoing), we research how the integration of consumers into the power market. So, because we are the power grid is likely like the storages, but then for example the consumers have a little solar panel and that that they have also for instance either an electrical vehicle or a battery energy storage system. That can be used already, with the right price people will be willing to you provide their sources to the market and which would bring some stability to the grid. I think that there will be higher integration of renewable energy resources

that this work will continue. The question is up to the investments into the flexibility sources, and it will be already like existing flexibility sources like the little and like electrical vehicles and better energy sources from these households for example into the power grid markets because the power markets because then it will definitely feel it would help with the stability and decreasing the volatility and improving the social economic welfare for example as well.

Ella: Do you think there will be developed new types of electricity contracts, so that consumers for instance that consumers can benefit from cheaper wind power outside of having a spot price contract?

Nelli: I think that the new solutions will be developed in the future because the electricity markets change themselves, they change itself and the power balance so there should be new solutions from that also as already mentioned there is flexibility increasing even from the consumers perspective, purchase of like electrical vehicles and the little battery to storage systems and so on. So, there should be new contracts developed in the future to integrate the and provide more flexibility to the single consumers. I'm not really that aware of like how the situation will continue with like industries and we work for because they have their own electricity contracts in that sense. Yes, I think that's there is already work of going and the two articles in Helsingin Sanomat that mention that even with the spot contract there has been something different provided from a company, I don't remember it was it Helen or someone else that there was some freedom provided beside of the spot contract, some type of productivity, all in all something else. This is a test version, so I think that there is a room for development for sure and I think that the new solutions will perform in the future and that there are all the basic fundamentals, which lay on the ground, which gives the greater ground for development of the new electricity contracts.

## 2nd Interview

**Interviewer:** Ella Suoninen

**Interviewee:** Harry Sjöberg, sales director, Nordic Green Energy

**Location:** Microsoft Teams

**Date & time:** March 1, 2024. 14:00 onwards UCT 2+ (Finnish time)

**Original language:** Finnish (translated March 12, 2024)

Ella: Could you give an overview of your role in the company you work for and how it relates to the analysis or sales of electricity contracts to consumers?

Harry: I'm Harry Sjöberg, the Sales Director for Nordic Green Energy Finland. I work closely with various sales contracts and consumer-side sales. I also handle the business aspect. But focusing on the consumer side, we were among the first in Finland to move away from fixed contracts and started investing solely in exchange contracts. On that side, we're trying to change the mindset of Finns regarding electricity, proposing spot price or other contracts. I've been in the electricity industry for about a year now. Before that, I was in investment at Lähitapiola. The electricity market is also quite volatile, as I've noticed in the past year.

Ella: Several studies have concluded that spot electricity contracts are the most profitable regardless of the economic type, without the need to time electricity usage. Would you say this is realistic or true, or is there clearly a specific electricity contract that is more profitable for certain economic types?

Harry: In general, I would say yes, it's smarter. Of course, if a person doesn't consider at all and has a poor usage profile, for example, charging their car when it's the most expensive or using the sauna during peak hours, then it can easily become costly, if a person can't influence in any way. But nowadays you can influence quite well, so you don't have to go to the sauna exactly at 6:00 PM every week. But it's also about how electricity contracts are structured. With a spot contract, you pay for consumption, whereas with a fixed contract, you pay for consumption plus a premium, which is kind of the risk calculated by the electricity company. This has been emphasized in recent years, especially during electricity crises. If someone had a cheap contract, they were very happy that the risk paid off in the other direction, but generally, spot electricity has always been cheaper, although there are exceptions.

Ella: How do the electricity contracts offered by your company compare to spot electricity prices in terms of competitiveness for consumers?

Harry: On the consumer side, we've only had spot electricity contracts since spring 2022. If we look at the background, we have a Norwegian stock exchange company that owns us, and in Norway, 90-95% of electricity is exchanged. Because of this, they don't understand the Finnish market and they want fixed-price contracts. As a result, they see very large risks, for example, looking at electricity crises, it cost a certain amount for all electricity companies. We've had spot price available for a couple of years now, and now we also have a consumption impact product, which is somewhat similar in that you can influence when you consume electricity. This is aimed at small consumers, essentially apartment buildings. I would say we have competitive products; price is one of the most important factors when considering competitiveness. Somehow, the margin has received too much attention; if the price is 0.45 cents per kWh or 0.48 cents per kWh, it's really small amounts of money we're talking about. What sets us apart is also that we only offer environmentally friendly electricity, produced by nuclear power or renewable means, which also adds to the cost. So not everyone necessarily understands what that means in practice.

Ella: In the articles I've read, there's also some talk about the volatility of electricity and what factors affect its price. Would you say it's possible to keep the price of electricity stable?

Harry: At the moment, I see it as quite difficult because with more renewable sources coming in, we often say that if you want to know the price of spot price, you should check the weather forecast, see how windy it is. With wind power and others, it's difficult to predict. Hydroelectric power can be somewhat controlled in Sweden and Norway. I would claim there will always be some fluctuation, unless there are new technologically innovative ideas, features. Fluctuation is also an opportunity; if one day is windy, you can focus your electricity usage on that day, and then reduce consumption on another day.

Ella: What would happen if all consumers switched to spot contracts? Would this be good or bad?

Harry: I would see it as a positive thing, but then of course, those who want that security wouldn't get it. But at the same time, it would become more commonplace, everyone would talk about it, it would become a general topic of conversation rather than the taboo it is now. I strongly believe we are following the trend of Sweden and Norway; I think Sweden has 70-75% spot electricity contracts now, and in Norway, it's 90-95%. Practically speaking, I think it could even lower the price because when prices rise, we consume less, which also reduces pressure.

The price ranges from the cheapest to the most expensive; there's competition. For example, it's not profitable to shut down nuclear power; they keep running essentially at zero euros. The more demand there is, the more wind and solar power plants are started, and if it's cold and there's higher demand, we also partially use coal power. As we move further to the right, prices increase. What's special about electricity markets is that we always pay according to the highest price. So even if a nuclear power plant sets its price at zero euros, they still get income according to the highest price, they get the same price. The price is determined by competition. If there are high prices and everyone consumes as before with fixed contracts, then it raises prices for others because we need more production. But if the price goes up, people automatically consume less (with spot contracts), and the price could stabilize.

Ella: How do you see the future development of energy markets and what impact might this have on the competitiveness of electricity contracts offered to consumers?

Harry: More and more smart technology is coming; you can monitor, manage your home smartly, charge your car intelligently, there are more and more such services coming. It's a consequence that if more moves to the exchange, there's also more need for this kind of monitoring how you consume electricity. If it's a fixed contract, you can plug in whenever you want and charge your electric car. If you have an electric car, there's quite a difference whether you charge it at night at a negative price or during the day. More and more, for risk reasons as well, this hybrid contract, this consumption impact contract, is the direction we've moved in. Also, all the applications and digital services, it's not just that the consumer only has the electricity contract nowadays, but the electricity company is more than just the supplier.

Ella: Hybrid contract?

Harry: In practice, a hybrid contract/consumption impact is another term, if you consume when spot price is cheaper, the price decreases. If you consume when it's more expensive, the price goes up. So the consumer has a fixed price  $x$ , but depending on the hours when the consumer uses electricity, they get a bonus or a penalty on top of that. The profile cost is paid to the customer. The price doesn't change, but depending on the hours (whether they are cheap or expensive), the consumer either gets paid or has to pay extra. It's like having the best of both worlds.

Ella: New, popular?

Harry: They've started to appear since last year. This type of contract could be called a transition product, so if the consumer isn't quite ready to fully switch to spot price, this could be a good first step.

Ella: Price cap?

Harry: There used to be one, but not anymore because it's difficult to predict what the limit should be, so now we only have spot price.

Ella: Are there any new types of contracts planned by companies to give customers the opportunity to benefit from cheap wind power, other than just exchange contracts? Anything related to solar power?

Harry: The hybrid contract is the newest, launched in January. Sold through a partner. There aren't any new contract types coming; first of all, ancillary products. For example, an spot price forecast, you can see forecasts for the next five days. Electricity as a product already exists, and we don't make it any more peculiar than it already is.

Ella: Application?

Harry: Yes, we have a really great application where you can see all kinds of things. For example, exchange prices, forecasts (for the upcoming days), green is cheap and gray is more expensive, and your own electricity consumption graphically. Everything you need and more is being developed all the time, so you can genuinely monitor, watch, and influence your own electricity consumption.

### **3rd interview**

**Interviewer:** Ella Suoninen

**Interviewee:** Katja Piipponen

**Location:** Microsoft Teams

**Date & time:** March 11, 2024. 10:00 onwards UCT 2+ (Finnish time)

**Original language:** Finnish (translated March 12, 2024)

Ella: Could you introduce yourself?

Katja: At Nurmijärven sähkö, I work as the head of customer service operations, and my responsibilities include customer service for electricity, electricity distribution, and district heating, as well as leading it. Additionally, there are system projects related to customer service, such as considering electricity contracts, customer information systems, and electronic services for both consumers and business customers. The network has its own customer service, but it's not within my area of responsibility. Many questions can be addressed by technical customer service, and many can be handled by regular customer service. I have a parallel colleague who is the head of electricity business, so we report directly to the CEO. Together, we work on pricing matters, with him primarily handling pricing and procurement of electricity while I implement it in customer service, selling at prices according to market conditions.

Ella: Could you tell us more about what Nurmijärven sähkö sells?

Katja: Generally, Nurmijärven sähkö has network operations, which involve electricity transmission. Essentially, this means that Nurmijärven sähkö owns the grids and meters and delivers electricity to customers. In Finland, the electricity bill consists of two components: mandatory electricity transmission, which depends on the place of residence. For example, if you live in an apartment building with Nurmijärven sähkö's meters, then Nurmijärven sähkö is the company, and it cannot be changed. The other half of the bill is electricity sales, which can be competitively priced and purchased from anywhere. So, electricity sales are another product we sell. The third is district heating, but the majority of customers are businesses, with very few private customers.

Regarding the types of electricity contracts we have, if we focus on electricity sales, we essentially have fixed-term contracts and indefinite-term contracts. In indefinite-term contracts, there are both fixed prices and variable prices, like spot price. In an indefinite-term contract, there is a 14-day notice period, and it includes price components such as the spot price product that Nurmijärven sähkö purchases from the electricity exchange, along with our margin and basic fee. Essentially, with spot price products, the customer bears the risk themselves compared to fixed-term products. We also

have a regular indefinite-term contract, which is clearly the highest-priced product from us, with a continuous price. It's not adjusted frequently, for example, we last updated the price last year. So, it's quite stable because not all customers want to commit to fixed-term contracts, and not everyone is interested in spot price because of its fluctuating prices and risk. They opt for this stable indefinite-term contract instead. But it's clearly the most expensive of our products. As for fixed-term products, we offer one- and two-year contracts. We also have a new variable product in the pipeline, currently being piloted with customers, which has gained popularity in the market. This contract is partly fixed-price and partly spot price, so customers can try it out in a way. It's not in our product range yet, but it's coming. Another specialty we have is our green aspect. We have wind power shares through ownership companies since we don't have our own parks as we're still relatively small players in the market. So, we participate in a larger group where several energy companies are involved, and we procure wind electricity through that. This way, we can also sell electricity produced by wind power with assurance, as part of our normal two-year fixed-term contract, with a slight increase in wind electricity.

Ella: Several studies have concluded that spot electricity contracts are the most profitable regardless of the economic type, without the need to time electricity usage. Would you say this is realistic or true, or is there clearly a specific electricity contract that is more profitable for certain economic types?

Katja: There are two issues here. In principle, spot price is cheaper in the long run, for example, over a year, at least with current prices. But the problem arises from the fact that people don't have the money to pay bills in the same cycle as they come. Consider that people have regular monthly income, and many live quite hand-to-mouth, so it's not like they have thousands of euros left over every month. Let's imagine someone living in an electrically heated detached house with spot price, plus some irregular additional load (many people, large electrical appliances, or a large house). The differences can be significant depending on the season. In summer, it might be €100/month, while winter months could be €600-900/month, so not everyone can afford such a large difference. Maybe they could manage for a month, but several consecutive winter months pose a problem. In principle, the curve shows that spot price is the cheapest, but it's not an option for everyone because they don't have that extra money, so, it's the role of electricity companies. For example, if an elderly person lives in a condominium, and their consumption is very low, the type of contract doesn't matter much because the usage is so minimal; for them, the cancellation fee matters more than the bill. On the other hand, for someone with electric heating, the load is much different, especially during winter months. There's also the possibility of saving money

during summer for the winter months and paying, for instance, €400/month throughout the year to afford the winter bills. Even that might be challenging.

Ella: Is it possible to use spot in summer and fixed in winter?

Katja: There are six-month fixed-term contracts; we've offered them occasionally too. The pricing needs to be much higher for those so that the electricity company can also make a profit; we're not a social welfare office. We need to earn from it, even after pricing it for the customer with a six-month contract. The pricing in these fixed-term two-year contracts, which are the most economical for us among the fixed-term contracts, is based on the idea that the customer can benefit from it in pricing for the entire two years. There are cheap summers and expensive winters. In fixed-term contracts, the electricity company bears the risk for the customer. And if the customer chooses an spot price contract, they bear the risk themselves. The idea is whether the customer has the ability to bear that risk themselves. For example, many times, when a customer asks which contract to choose, I use the example: do they want to monitor electricity consumption and price from some apps and adjust and optimize devices? Some have automation in newer buildings, which adjusts directly according to spot price; if it's expensive, it reduces heating. If electric heating is off for an hour, no one notices. Not everyone has these devices, so they need to check and adjust manually, for example, during nighttime hours. Does the customer want to do this? Or do they want to buy peace of mind? If they choose a fixed-term contract, they're buying peace of mind, in the sense that it's at most x price, and if they want to save, they can turn off devices. In the end, many also choose peace of mind; it's not just about finding the cheapest option. For example, if it's an older customer who doesn't understand these new spot price setups, it's difficult for them to understand and they don't want to change their consumption habits, so they often choose a fixed-term contract. Even I have low consumption; I certainly wouldn't want to buy spot price because I want to know in advance how much the electricity costs.

There are also dedicated customers who buy spot price and compare prices based on the electricity companies' margins. So, they may constantly switch electricity companies based on that, which is also a hobby. But not everyone want to do that; most people want peace of mind. So it doesn't go like customers only look at what's cheapest. At least I wouldn't want to do this. In the end, the margin is quite small, but the workload for electricity companies is large. We are also a reasonably small company, about medium-sized, we are not those big companies with new fancy automations. So it makes you think a lot about these spot electricity customers who constantly change, how much they employ and use our resources versus those who have fixed-rate contracts and don't call as often.

Ella: In the articles I've read, there's also some talk about the volatility of electricity and what factors affect its price. Would you say it's possible to keep the price of electricity stable?

Katja: It's the nature of it, and it's due to current production technologies. So practically, if there's a coal power plant, it can be regulated quite well. But people can't regulate how much the sun shines or the wind blows. Water flows can be regulated somewhat. But nowadays, because there are so many wind turbines compared to 20-10 years ago, so many more have been added, in principle, it's a good thing. But then there's the part that production is weather-dependent, when it's weather-dependent, it causes fluctuations. Currently, Olkiluoto 3 is under maintenance, which raises the price of spot electricity. It affects pricing in the way that we have to think about our two-year contracts, do we dare to take the risk, how long is it under maintenance, does the price rise? It also depends on these transmission capacities because electricity comes and goes through transmission companies abroad. If the transmission line is down, then we don't get electricity at a certain price that we normally get. How it's produced in Sweden or Norway, then how we get that electricity here, and whether it's cheaper and how it disrupts the market? So there are really a lot of moving prices in electricity pricing. I remember when there was the Fukushima nuclear accident in Japan, it affected the price of electricity in Finland. All the world events, also for example what Putin does, and if there's war elsewhere, unexpected things affect pricing. For example, the price of fuel in Central Europe also affects what electricity costs in Finland.

Ella: So the internationalisation is a factor of the volatility?

Katja: Exactly, currently there's the Finnish domestic market and the joint Nordic market, and now the aim is to expand it to a European-wide market. Then it would be even more sensitive, in Germany, many nuclear power plants have been shut down and a lot more wind power has been added, so it depends on what each country can produce for the market. That's why electricity meters have had to be changed so that we get them standardized across Europe. So it won't stabilize until we bring back coal power plants, which won't happen. Even nuclear power has been shut down, which means it will fluctuate because electricity production is so weather-dependent. Of course, if we think about how often it's windy in winter and summer, windy in winter is not very common, which means that electricity doesn't come, so it has to be produced with some more expensive system, and it will cost more.

Ella: What would happen if all consumers switched to spot contracts? Would this be good or bad?

Katja: In Norway, 90-95% of customers buy spot electricity, if you think about it, this is the same thing as water costs included in rent. How does it affect water consumption? Do you fill the bathtub every day when you have to pay for water consumption? No. When you're not responsible for your own usage, then the person is adaptable and likes to go where the fence is lowest, and on the comfort side. I would say it would be good in that sense for everyone to have a spot electricity contract because it forces people to think about how and when to use that electricity. The same phenomenon occurs in situations like when a person has lived in an apartment building and there's a water meter, then automatically starts saving consumption. In a way, it would also be fair that those who use less also pay less. For example, in two-year fixed-term contracts, the elderly lady in the apartment gets it at the same price as a four-member electrically heated detached house. Even though the usage profiles are completely different, she gets it at the same price. For example, in an energy crisis, those who had fixed-rate contracts, they didn't have to think about high electricity prices, so spot electricity guides customers to use electricity correctly. At the same time, even if you don't necessarily think environmentally, young people do, so you have to think about electricity use because it directly affects your own wallet. So in that sense, it would be a good thing if electricity consumption shifted to spot electricity. When it's expensive, everyone would save electricity.

Ella: Are there any new types of contracts planned by companies?

Katja: Let's put it this way, in Finland, habits change quite slowly. They buy fixed-term contracts as long as they are offered. At the same time, the margins for electricity companies are quite negligible in spot electricity contracts, compared to fixed-term contracts, even though I'm not saying that electricity companies earn a lot on those either. The pricing model consists of buying electricity from the exchange or producing it at a certain price on the electricity market. On top of that, you add your own margin, half of that business. It also depends on when we make the contract with the customer, then we commit to selling it to them for that year or two. We also have to protect that electricity for that time. It's kind of like playing poker in that sense that you have to guess and know and know through expertise at what point it's worth protecting and how much. Protections cost, and everything also depends on the company's risk policy, how much risk is taken, or whether they want to be on the safe side. Everything kind of affects future pricing, so fixed-term contracts have their place with customers as long as generations renew.

New generations are more critical, they don't want to pay any extras and they can optimize consumption. As the detached houses and buildings renew and the building technology advances, it then enables the use of spot electricity. If you think about it, there's quite a lot of old housing stock in Finland, and renovations cost something, so we're talking about quite a long period.

For example, in the same way as if you think about the Finnish car stock, it would be nice to buy an electric car, but they cost a lot compared to petrol cars, and Finland also has an old car stock. So this goes somewhat in the same line that not everyone has the opportunity to buy spot electricity because they don't want to start adjusting, because it also requires digital skills, because you have to be able to understand applications and their usage. And electricity is not the easiest to understand because it's not a concrete thing you buy, so just understanding these basics is difficult for some people, so they might not want it for that reason either. But there will certainly be more products on the market, especially Helen and Fortum and other large companies that have had various types of products for a long time. So even for us came this new one, which customers hoped for, we're not such a dynamic company in the sense that we want to resource developing new products upfront. It also has to be remembered that there have been a lot of consolidations in the electricity market, so that small companies have merged or sold to larger ones. It's not very nice if it goes in such a way in Finland that there's some S-group and Kesko, that there would be a few really large companies that pull and define supply and price. As long as there are small companies, Nurmijärvi electricity is a municipality-owned company, so it's kind of different in its own hands compared to if it's in the hands of foreign investment companies, as they just want money or return on their investment. But yeah, fixed-term contracts will surely remain because people and building stock and habits affect the type of electricity contract.

Ella: So, when new generations start taking their own electricity contracts, it may saturate?

Katja: Yeah, it will probably increase in the future, but we're not talking about 5-10 years but more. In the old world when the price of electricity was 4-5 cents, there's no going back to that. It's because of production and this renewable energy. It also must be remembered that electricity in Finland is really cheap compared to Central Europe, so in Finland, relatively less is paid.

#### **4th interview**

**Interviewer:** Ella Suoninen

**Interviewee:** Antti Manninen

**Location:** Microsoft Teams

**Date & time:** March 15, 2024. 9:00 onwards, UCT 2+ (Finnish time)

**Original language:** Finnish (translated March 18, 2024)

Ella: Can you provide an overview of your position at the company you're employed with and how it connects to the analysis or sales of electricity contracts to consumers?

Antti: As a business manager at Väre, I oversee the commercial operations for consumer customers, which includes sales, various sales processes, sales channels, products, and tariff pricing, among others.

Ella: Could you tell us a bit about your company that you work for and what products you offer?

Antti: Väre began its operations in 2019. The company's history involves four traditional energy companies deciding to form a single company focused on electricity retail sales, leading to the establishment of Väre. The parent companies include Jyväskylän Energy, Kuopion Energy, Lappeenrannan Energy, and Savon Voima, which previously operated as electricity retailers but decided to cease retail sales and establish a dedicated company, Väre, solely focused on this retail sales aspect. This year, part two has also come, Kymenlaakson Sähkö, so there have been business acquisitions in the recent past. As for the products, Väre offers a comprehensive range; almost all typical electricity contract options are covered. There are regular fixed-rate contracts, market-priced contracts, and notably, Väre was the first company on the consumer side to launch consumption-based contracts, where there is a fixed base price but the final price is also influenced by the customer's consumption in relation to the average market price of electricity. These have become more prevalent in the market over the past couple of years, especially last year.

Ella: Do you remember when it was introduced by your company?

Antti: If I recall correctly, it was exactly two years ago.

Ella: Several studies have concluded that spot electricity contracts are the most profitable regardless of the economic type, without the need to time

electricity usage. Would you say this is realistic or true, or is there clearly a specific electricity contract that is more profitable for certain economic types?

Antti: It's highly situation-dependent and time-dependent towards the end. For example, the time frame of observation matters; if this question refers to which type of contract option became the most cost-effective for the end-user, then providing a straightforward answer is indeed challenging. There are so many factors to consider, such as whether it's viewed over a ten-year perspective or a one-year perspective. This timeline is a significant factor in how it is assessed. Then, if we look at the absolute cost-effectiveness, it's not just the energy price alone that is the only influential factor. Electricity contract pricing includes other components that affect the contract's cost-effectiveness in the eyes of the consumer. Regarding this specific question, historically and over the long term, a market-priced electricity contract has generally been the most cost-effective way to procure electricity for many.

Ella: Does the housing type matter?

Antti: I would say the economic type matters in the sense that, for example, in apartment buildings or very low-consumption units, the question is how much they can benefit from the dynamics of market-priced electricity. Is there the ability and opportunity to emphasize one's consumption, or generally, in apartment buildings, electricity consumption is part of living and the resulting electricity usage. On the other hand, if it's an electrically heated detached house with the addition of an electric car that can be charged, there are many more opportunities to benefit from fluctuations in hourly prices. In such cases, I would say those who have the ability and opportunity to influence their own consumption benefit even more.

Ella: Would you say that older generations are not as open to adopting spot electricity contracts?

Antti: Well, to some extent, the slightly older population tends to favor more traditional fixed-rate contracts. And then, young adults, middle-aged individuals, and especially today's digitally oriented consumers have a lower threshold for transitioning to dynamically priced products.

Ella: In the articles I've read, there is also some discussion about the volatility of electricity and what factors affect electricity prices. Would you say it's possible to keep electricity prices stable?

Antti: It's difficult to see; I believe this is more of a new normal. The price of electricity will fluctuate. The background to this is the changing production

structure, meaning as the capacity of renewable energy increases or as the role of renewable energy grows over the years, it is weather-dependent. The wholesale market price is determined by supply and demand. For the price to stabilize or for a situation similar to what was on the market a few years ago, when price fluctuations were not as prominent, or at least not as much as now, it would require more base power, such as nuclear power, which is not weather-dependent.

Ella: What would happen if all consumers switched to spot contracts? Would this be a good or bad thing?

Antti: Yes, I personally see it as a good thing, whether it's a spot contract or a hybrid contract, where part of the price is determined by the market price, it's either one. In a way, the argument for why it would be a good thing is that it creates motivation for customers or end-users to participate in demand response. And demand response is important because it balances the energy market. The more electricity users participate in this demand response, or in other words, during price peaks or situations where there may be a risk when consumption exceeds production. It evens out and essentially lowers one's electricity price level if end-users participate significantly in price responsiveness. It balances and secures the entire market.

Ella: Are there any threats or downsides, for example, for electricity retailers?

Antti: I don't inherently see threats; from the market operator's perspective, dynamically priced products are also less risky for electricity companies, from a business perspective. For example, fully fixed-rate products involve greater risks. In a way, the market operator's incentive and benefit come from customers possibly transitioning to dynamically priced products.

Ella: How do you see the future development of energy markets and what impact this might have on the competitiveness of electricity contracts offered to consumers? For example, does a volatile market attract more people to fixed-rate contracts?

Antti: If we reflect on history, the demand for dynamically priced products, and especially for spot electricity, increased significantly in 2022 when the energy crisis was at its peak. There were likely several factors influencing this change at the time, one of which was probably the reduction in product variations, as many companies may not have offered other options than spot electricity. Then, the price levels of these fixed-rate products, from those companies that offered them, were so high due to circumstances that many consumers avoided them for that reason alone. A third influencing factor might be that, which is positive in itself, this interest in electricity prices generally also

increased significantly. Spot electricity may have been somewhat unclear or not very well-known to the average end-user a couple of years ago, how the price is determined and how it works. When the prices rose, it may have affected and concerned consumers more, perhaps awareness has increased, and in that sense, if we look back a few years, the popularity of spot-priced or partially spot-priced electricity products will remain high, perhaps even increase. I believe that market operators also have an impact, more of a new normal where we will see price fluctuations. It also somewhat provides a significant reason why price fluctuations need to be taken into account on the electricity contract side.

Ella: Is the popularity of spot contracts increasing?

Antti: Yes, probably, if you look at what's happening now, earlier there were two options, what kind of product end-users chose. Now, the pie is much more fragmented; there are different types of products, and currently, there are not one or two products to which the large mass is divided, but the pie is much more fragmented between different products. But in the future, certainly, technology will evolve, and the participation in demand response will become easier for consumers in many ways, which will also increase the demand for dynamically priced products. Electrification of transportation is certainly one factor, electric cars and plug-in hybrids will grow. It's a pretty significant benefit if there is a household where you can benefit from charging the car at a specific time.

Ella: Are there plans for new types of contracts?

Antti: We already have the hybrid contract, so in that sense, this change has already been made.

Ella: Are there new innovations in the application?

Antti: Yes, we have noticed that it is important to offer customers tools to help them save on electricity consumption, or more specifically, on the electricity bill. We are moving more towards the idea that if previously the kilowatt-hour price and decimals of the electricity contract were adjusted with the idea that the greatest savings would come from reducing electricity consumption. If it can still be timed when the electricity price is cheaper, then it certainly requires assistance and tools for end-users; it is made easy. Mobile applications are the way and means to do this. Other companies can also help customers, of course. This is somewhat application development as well; you have to constantly be able to improve and develop customer desires and make saving and timing electricity as easy as possible.

Ella: Has the role of electricity retailers changed?

Antti: Yes, partly, as the basic role of supplying electricity is still present, but the way has changed, there's a new dimension.