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Feasibility Study of Energy Price Dependent Consumption in Nordic Countries

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Title
Feasibility of Energy Price-Dependent Consumption in Nordic Countries
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This thesis investigates the feasibility of shifting household energy consumption in response to real-time pricing in Nordic countries, with a focus on Finland. Utilizing data from Nord Pool for electricity prices, household consumption patterns, and external temperatures, the study evaluates the potential savings and practicality of adjusting energy usage to coincide with periods of lower energy prices. Through a mixed-methods approach, both quantitative and qualitative analyses reveal a strong correlation between electricity prices, consumption, and temperatures, demonstrating substantial opportunities for cost savings.

The research also assesses the impact of smart grid technologies on enhancing time-shifted consumption, highlighting the critical role of consumer adaptability and technology in achieving energy efficiency. Despite challenges such as the initial investment in smart technologies, findings indicate that time-shifted consumption is a viable strategy for reducing energy costs and promoting grid stability.

The thesis contributes to the discourse on sustainable energy management and suggests further research into the scalability of these strategies and their long-term financial impacts. This work offers insights for policymakers, energy providers, and consumers on leveraging real-time pricing for economic and environmental benefits.

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real-time energy pricing, home automation, demand management, household energy consumption, grid balance, solar power

Contents

1 Introduction

Time-shifted electricity consumption refers to the practice of adjusting electricity usage based on fluctuating energy prices throughout the day, which is often published by grid operators like Nord Pool or NordGrid (nordpoolgroup.com 2024). The approach mentioned is part of a larger strategy called demand-side management. Its goal is to encourage consumers to use electricity during times when it is less expensive. By doing so, consumers can save money on their energy bills, while grid operators can maintain a more stable and efficient energy system.

Nord Pool provides electricity price data and predictions to help consumers and businesses decide when to use electricity. These prices can vary based on supply and demand dynamics, with renewable energy availability, weather conditions, and market trends playing significant roles. Regions with substantial solar power generation often have lower prices during periods of low demand, such as overnight or midday.

The ongoing energy transition involves reducing the use of fossil fuels and increasing the shift to renewable energy sources. This shift is impacting society as a whole, and consumers are becoming more active participants. (Karelia UAS 2022.)

This thesis evaluates the impact of consumer adaptability to real-time pricing technology on energy consumption patterns. By analysing the changes in energy consumption before and after the implementation of this technology, the economic viability of shifting energy use to more cost-effective times can be assessed.

Furthermore, this investigation extends to evaluating the potential cost savings. This research tries to confirm the financial benefits of flexible consumption through a comparative analysis of energy bills under different consumption scenarios. The goal is to determine whether these savings are significant enough to justify the investment from both the consumers' and the operational company's perspectives.

This research initially focuses on Finland, with the intention of later expanding to encompass the broader Nordic region. Official statistical data will be leveraged to project the scale of possible adoption. The fixed-term contracts are for comparison.

According to Energy Minister Kai Mykkänen, when electricity is physically infrequent, price controls will lead to nothing more than running out of electricity altogether. The main lesson from this is that Finland needs more nuclear power, adjustable power generation, consumer automation, and storage (Yle 2023).

2 Literature review

This introduction sets the stage for the thesis by framing the current energy transition, the role of consumers, the research objectives, and the potential. This segment will explore various dimensions of energy management, particularly focusing on the consumer's role in energy consumption patterns influenced by fluctuating electricity prices. This approach ensures a thorough understanding of the landscape within which this thesis operates, setting the stage for a critical analysis of how real-time pricing models can effectively drive consumer behaviour towards more sustainable energy usage.

2.1 Overview of time-shifted electricity consumption

Consumption flexibility in Finland allows for adjusting electricity use based on price changes, moving from high-cost periods to more affordable ones, or even selling flexibility back to the market. With an increasing share of inflexible, weather-dependent energy sources like wind and solar, maintaining a balance between consumption and production becomes crucial.

This concept has traditionally been utilised by large industries but is now expanding through aggregators and small-scale productions, offering cost savings and efficiency. Investments in consumption flexibility can support long-term benefits for consumers and society, reducing the need for expensive peak power generation and promoting a balanced, cost-effective energy market. (Fingrid, 2021.)

In September 2016, the Ministry of Economic Affairs and Employment of Finland formed a group to explore how an intelligent electricity grid could empower consumers to engage with the energy market and enhance supply security. This group recommended designing systems to respond to demand elasticity and is advocating for adopting smart energy infrastructures and connected buildings to support a smart grid by the early 2020s. These efforts include establishing the functions of smart meters, creating legislative frameworks, and integrating smart automation in buildings during renovations. Further, the role of buildings in energy networks is examined in the project “Optimal Transformation Pathway Towards the 2050 Low-Carbon Target”, as outlined by the Smart Grid Working Group (Fingrid 2018).

2.2 Previous studies on household energy savings

The cost of producing electricity varies widely by source and technology, and the electricity demand fluctuates, leading to periods of high demand. It is best to mix energy sources, even those with higher costs, during these peaks to effectively meet demand. Consumer prices that do not reflect these cost fluctuations can lead to consumption not aligned with the most efficient market operations. Governments are, therefore, shifting policy from fixed to dynamic pricing, accelerated by the growing share of unpredictable renewable energy sources. Dynamic pricing's success hinges on the specific pricing strategy and whether market barriers or miscommunications exist. For example, a pricing system that adjusts prices every hour for the next day could be less effective if consumers are not fully informed or if changing their usage habits is costly. Introducing technologies that automatically adjust when devices use power could help achieve the desired shift in demand (Enrich, Li, Mizrahi & Reguant 2024).

Demand response pilot projects

FinGrid has collaborated with There Corporation Oy to conduct demand response pilot projects. The aim of these projects was to shift electricity consumption from peak to off-peak periods in order to improve grid balance and reduce energy costs. Demand response was previously limited to large industrial and public sector entities, but it is now expanding and requires collaboration among all market participants. This development is driven by changes in the energy production landscape, where a significant portion of generation comes from less flexible or economically adjustable sources such as wind, solar, and nuclear power.

The pilot projects focused on integrating household consumers into the demand response market by using smart technologies to manage heating loads. The results of these projects suggest that residential demand response has promising potential, especially by aggregating smaller consumer loads for a more significant market impact. The study primarily focuses on the implementation, results, and technical aspects of these pilot projects rather than quantifying potential savings in a numerical format. (FinGrid & There Corporation 2016.)

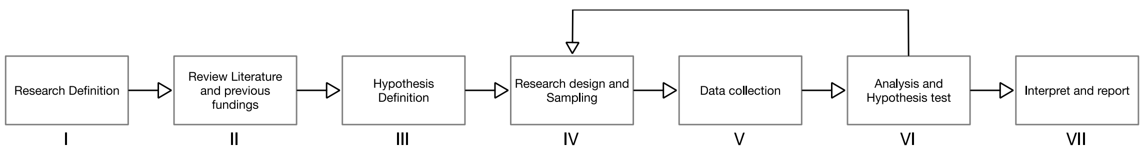
Long-term renovation strategy

The Long-term Renovation Strategy 2020–2050 report from Finland emphasises the pivotal role of smart grid technologies and automation in balancing the electricity grid and enhancing electric heating efficiency. In 2016, the Ministry of Economic Affairs and Employment in Finland initiated a working group focused on how an intelligent electricity grid can empower consumers to actively engage in electricity markets, thereby reinforcing the security of electricity supply. The group highlighted the importance of designing technical systems to support demand flexibility. To integrate a smart energy system with smart buildings and connect them to the smart grid, action needs to be taken.

This includes defining the functionalities of electricity meters and making the necessary changes to the legislation to enable this transition.
In line with these initiatives, the report underscores the installation of smart automation systems in buildings during renovations. This approach contributes to the direct control and optimisation of electric heating systems and aligns with efforts to decarbonise heating solutions. By harnessing innovative technologies, Finland aims to improve the energy efficiency of buildings, ensuring they play an active role in the electricity grid and promoting a balanced and sustainable energy ecosystem. This strategic focus on automation and smart grid integration is instrumental in advancing electric heating efficiency, demonstrating Finland's commitment to achieving a highly energy-efficient and decarbonised building stock by 2050. (Ministry of the Environment, Finland 2020).

2.3 Thesis structure

The following steps of the universally applicable central thesis structure were inspired by a course on research methods (Kothari 2004). The steps contain a detailed description of the thesis content.



I **Research Definition** establishes the study's foundation by defining the research problem, objectives, and scope. It also provides context for the research question and outlines the study's importance.

II **Review of Literature and Previous Findings** shows literature and previous research related to the study. This helps to position the research within the current knowledge base, identify gaps in the praxis, and justify the need for calculations.

III **Hypothesis Definition** formulates a hypothesis based on the research definition and literature review. It outlines the predictions to test through the research, setting the stage for the practical part of the study.

IV **Research Design and Sampling** presents the methods and techniques used to analyse the collected data, including the research design, the sampling strategy, and the criteria for selecting participants or data sources. It ensures that the research approach is transparent and replicable. This section also provides additional information for the overall orientation of the mentioned areas in the research.

V **Data Collection** describes the procedures for collecting data and its source, including the instruments used and the data collection process. It provides the foundation for the analysis phase.

VI **Analysis and Hypothesis Test** presents calculations used to analyse the collected data. It will also report whether the data supports or debunks the hypothesis, offering statistical evidence and interpretations of the findings. In this section, a summary of savings can be found, together with a comparison of the contract options.

VII **Interpret and Report** interprets the results in the context of the research hypothesis and existing approach. It also discusses the implications of the findings, limitations of the study, and suggestions for future research. This section concludes the thesis by summarising the essential findings and their relevance to the field.

3 Research hypothesis

The thesis sets out to define the scope of energy price-dependent consumption, positing that shifted consumption can function similarly to stored energy. The hypothesis will explore the target category and describe the data from Finland as a primary source for the research, with the possibility of potential application for Sweden and Norway. The core question it addresses is whether the savings and benefits for the customer and operators substantiate a viable business model. This includes examining energy costs for customers due to time-shifted consumption with variable price electricity contracts and assessing operators' motivations to implement technology solutions. In addition, they look to the customers with a fixed price contract and application of the technology, even without direct benefits except for contributing to environmental conservation. This hypothesis tries to connect the dots between consumer behaviour, technology adoption, and the economic implications for both the consumer and the service provider, with consideration for commercial application.

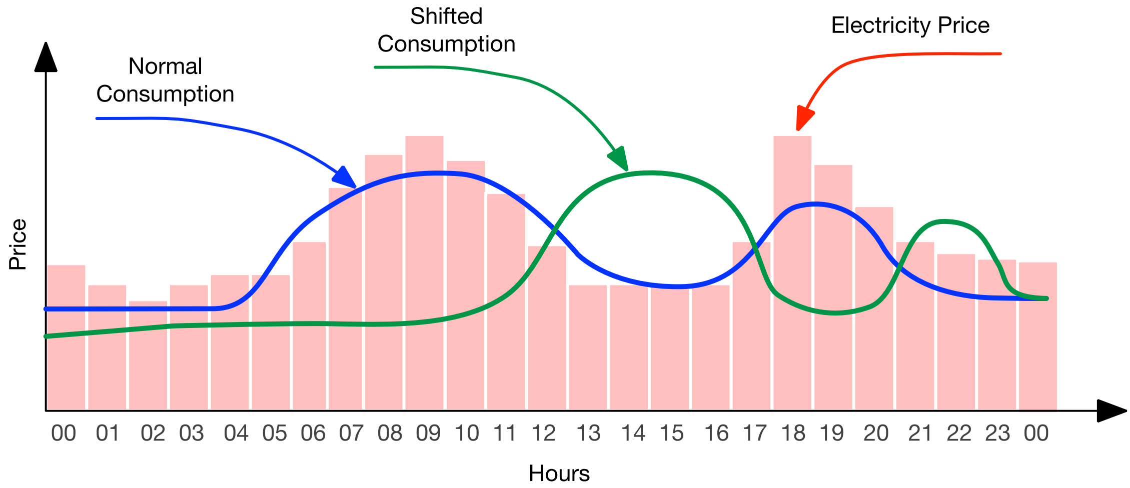


Figure 1. The working principle of the shifted electricity consumption.

The "Shifted Consumption Overview" (Figure 1) isplays the idea of a time-shifting function. It illustrates the contrast between normal and shifted consumption against the backdrop of hourly electricity prices. The visualisation emphasises reduced electricity use during peak price hours and increases during lower-priced hours. This representation aligns with the thesis’s focus on cost-saving opportunities and clearly illustrates how consumers can adapt their consumption.

3.1 Impact of real-time pricing on consumer behaviour

Real-time pricing presents a dynamic approach to energy billing that can significantly influence consumer behaviour and provide financial motivation for consumers to shift their electricity usage to off-peak periods, where rates are lower, potentially leading to substantial cost savings and more efficient energy use.

Through data collected from NordGrid or FinGrid open databases, this thesis will explore the correlation between pricing fluctuations and consumer usage and compare users with fixed and variable contracts. Attention will be given to the cost of the tools and applications facilitating consumer engagement, which will be justified with monthly savings. Free mobile apps provide price forecasts and allow for manual adjustment of consumption. An unfavourable aspect of manual adaptation is its dependency on human presence, which may not be practicable for all circumstances.

3.2 Cost savings from time-shifted energy consumption

This section quantifies the economic advantages achievable through adjusting household energy consumption patterns. It emphasises the delicate balance between initial technology investments and energy cost reductions. By analysing Nordic households, the proportion of energy usage that can be feasibly shifted can be identified, offering a perspective on the potential cost savings.

3.3 Feasibility of flexible energy usage in Nordic countries

The positive findings from the previous section provide the financial space for business implementations. The cost savings for the customers should justify the one-time technical investment or subscription to the supported service so that it can be an example for the bigger scale of energy use such as industry. The operators could gain technical profit from the suggested technology.

4 Research design and methodology

The success of energy price-driven consumption strategies largely depends on the strength of the research design and the data collection and analysis methods used. This section will describe the comprehensive approach to evaluate the practicality of changing household energy consumption patterns in response to real-time pricing in Nordic countries. The research methodology is designed to capture a wide range of data, including energy consumption patterns, billing information, weather patterns, and other relevant factors.

4.1 Methodological choices of the thesis

To conduct a thorough analysis of the viability of energy price-based consumption in Nordic countries, researchers can leverage a combination of quantitative and qualitative methods. This approach can provide a comprehensive understanding of the subject matter, allowing for more informed decision-making.

Quantitative analysis is used to evaluate real-time energy price data from NordGrid, consumption patterns, and potential cost savings. Quantitative data will provide measurable evidence of the relationship between energy prices and consumption patterns. It allows statistical analysis and can help forecast potential savings for consumers.

Qualitative research can explore the subjective factors affecting consumer behaviour, industry adoption, and perceptions of real-time pricing. It can provide insights into market dynamics and the practicalities of implementing flexible consumption models.

For best results, a **mixed**-methods approach is applied. Quantitative methods are used to establish general patterns and trends, and qualitative methods are used to add context and explanation to those patterns. This approach allows for a well-rounded analysis of the numerical data and the underlying reasons behind the figures. Quantitative data will provide the numbers, while qualitative insights will provide the narrative behind those numbers (Kothari 2004).

4.2 The price of the electricity invoice

The structure of an electricity bill, particularly in the context of Finland, details the various components that make up the total price of a bill, which include:

- The **Price of electricity** refers to the actual cost of energy per kilowatt-hour (kWh) consumed by the consumer. This price may be fixed or variable, possibly linked to the price of electricity on an energy exchange such as Nordpool, which fluctuates according to supply and demand.
- The **Price of electricity transmission** is a key factor in the Finnish consumer's electricity bill. It includes the cost of maintaining the electrical grid, transporting electricity from power plants to consumers, and other infrastructure expenses. It is calculated by multiplying a fixed price by the amount of energy used. It can be added to the kilowatt price, but this cost cannot be reduced with a proposed shifting approach, and the amount of kWh used remains the same even if it is shifted. The transfer price has increased significantly in recent years and varies depending on the contract and location in a country.

Year	2016	2017	2018	2019	2020	2021	2022	2023	
High-rise apartment Use 20.000 kWh/p.a.	7,83	8,64	9,35	9,79	10,02	10,11	9,96	10,31	c/kWh
Small house Use 20.000 kWh/p.a.	3,40	3,71	3,81	3,98	4,09	4,30	7,14	7,34	c/kWh

Table 1. The electricity transfer prices in cents per kilowatt-hour for both a high-rise apartment with an annual consumption of 20,000 kWh and a small house with 20,000 kWh.

- **The monthly basic** payment is likely to be a fixed charge that applies regardless of the amount of electricity consumed and covers part of the fixed costs associated with providing electricity services, such as metering, billing and customer service.
- **Taxes** are the official government charges that are applied to electricity usage. In Finland, the electricity tax rate is 24%.

For the cost reduction calculation in the coming section 6.3, the following end invoice calculation will be applied:

EXAMPLE			Sum Before €	Sum After €	Difference %
Consum	kWh	500			
Price Before *	c/kWh	15,00	75,00		
Price After *	c/kWh	13,00		65,00	15,38 %
Transfer Cost	c/kWh	7,00	35,00	35,00	0,00 %
Sum Netto	€		**110,00**	**100,00**	10,00 %
Tax	%	24 %	26,40	24,00	
Total Brutto	€		**136,40**	**124,00**	**10,00 %**
* accumulated from the netto price from Shifted and Normal consumption					

Table 2. Example calculation for electricity invoice, before and after including saving in percentages.

4.3 Process function

The suggested approach for the shifted energy use requires technical installation, which reflects a one-time investment, but it is extendable for wider use and needs to be justified for the customer financially. Figure 2 provides an overview of the actors in the process to compare the automation and integrity levels.

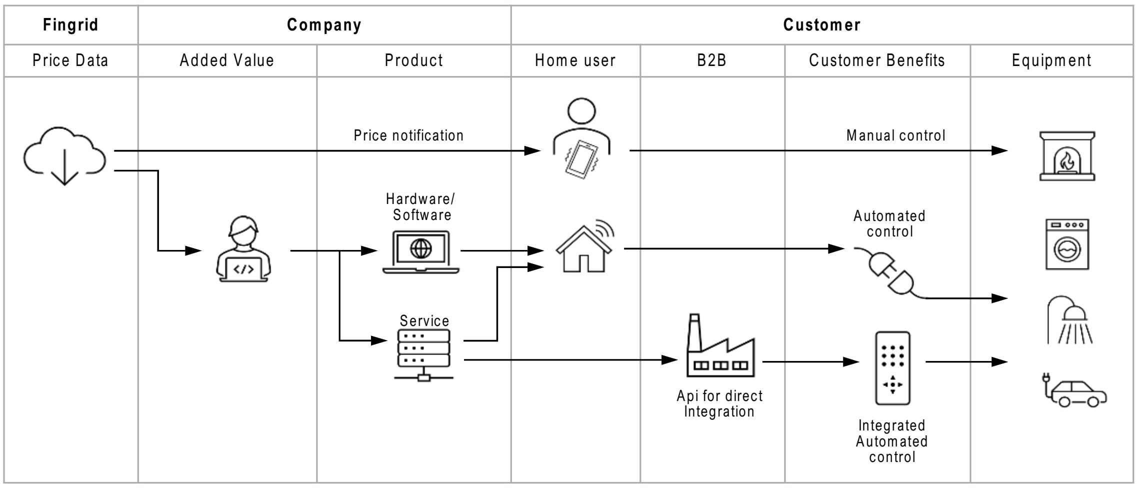


Figure 2. The functions for time-shifted use for manual and technical solutions

Figure 2 shows the possible use of electricity according to the lower price and the actions required to execute the process. The process involves two key components: the manual control of energy usage and automated control through smart systems. Both versions have benefits but differ in how they are executed.

The manual use process has no installation costs and is free for everyone with a flexible price contract but it requires consumer engagement. Consumers must be informed about current and forecasted energy prices and willing to adjust their usage accordingly. This can be facilitated by apps and services that provide real-time pricing information, allowing consumers to decide when to use electricity-intensive devices.

Automated control utilises smart home technology. Smart meters, thermostats, and appliances can adjust their operations based on energy prices, reducing the need for consumer intervention. These devices can optimise energy usage for both cost and efficiency, reacting to price notifications to turn on or off at the most advantageous times.

For the transition to be effective, consumers must understand the cost-saving potential and environmental benefits of time-shifted energy consumption. Campaigns are needed to encourage the adoption of new technologies and practices. In addition, a user-friendly management solution will play a critical role in their widespread adoption. Enhancing the flexibility of the grid and enabling consumers to become active participants in energy markets supports achieving a balance between energy supply and demand, contributing to grid stability and the efficient functioning of the electricity markets.

A smart building is defined by its ability to collect environmental data through sensors, process this information using management systems, and execute actions via actuators. Users looking to install such a system must equip their building with the necessary sensors to monitor conditions like temperature or occupancy. A central management system should analyse and decide based on the sensor data. Finally, actuators are required to execute commands, adjusting building operations like heating and other energy savings.

Installation spectrum

To implement the proposed consumption plan, customers are required to invest in the installation of necessary components. This information is crucial in order to outline the reasonable installation costs that energy savings can offset. The product description highlights an affordable solution designed to decrease household energy expenses through intelligent energy management. The approach combines hardware with ongoing support to guarantee peak performance and user satisfaction. With a financial model prioritising customer savings, the solution is an appealing choice for those seeking to lower their energy costs. The leverage business strategy is the initial sale of hardware and installation services as an entry point into a long-term customer relationship through the subscription model.

Product	**Description**	**Costs Creation**
Service Subscription 	The main product is a subscription for electricity price-based energy consumption.	**Subscription** The amount is defined by the amount of savings for the customer. These costs are part of customer monthly savings
Hardware and Software 	A smart home hub. The brain of the system communicates with the server for data and controls and executes the energy-consuming devices.	**One-time cost** The price for Brain Hardware. Usually, the price of a mini-computer.
Installation Service 	Qualified personnel for the physical installation of the hardware and commissioning the customer required configuration.	**One-time cost** The installation costs considered the working personnel, delivery and commissioning.
Additional support 	Extended support services include remote system and component updates, as well as device management.	**Subscription** This is an additional cost to the Main service for a price subscription; together, the sum must be lower than customer savings.

Figure 3. The installation limits needed for the suggested technology function and the key selling points.

- **Service subscription -** This is the core product, a subscription service that allows customers to manage their energy consumption according to fluctuating electricity prices. The cost of this subscription is offset by the savings it generates for customers, implying that the service should be financially beneficial by reducing their energy bills more than the subscription cost.
- **Hardware and software -** The system includes a smart home hub, described as the "brain" of the operation. This device communicates with a server to manage and control energy-consuming devices within the home. The cost for this hardware is a one-time expense, typically reflecting the

price of a mini-computer. The software, in this case, is the most cost-intensive activity for the service provider.

- **Installation service -** professional installation is required to set up the hardware, involving qualified personnel who handle the physical installation and configuration according to customer needs. This is also a one-time cost, including labour, delivery, and setup. This is also the most expensive activity for the customers, especially if the technique needs to be upgraded in order to participate in energy-shifted consumption. Another cost factor for the customer is the replacement of the equipment. From the beginning this can be implemented into the modern energy solution, but the costs are likely not justifiable for the energy savings.
- **Additional support -** An extended support service is an additional monthly subscription. This service covers remote system updates, component management, and device troubleshooting. The total cost for this support, when combined with the primary subscription, is designed to remain below the total savings the customer achieves through reduced energy costs.

4.4 Current technology and solutions

Despite the individual company solutions, a standard for technical implementation into the appliances and devices does not really exist. The proposed solution needs to be widely available to understand each other and be a part of the central home energy management. The first and most important step is the free availability of real-time price data, which can be implemented in many technical solutions.

Customer Manager Niko Malvela at Pohjois-Karjalan Sähkö Oy (PKS) presented the OmaPKS service, allowing PKS customers to view their electricity consumption on a longer-term trend level and at the most accurate hourly level. The service also provides information on the forms of energy production used (Karelia UAS 2022). The PKS data provide not only consumption statistics but also the outside temperature in a region. Together with electricity, price data for 2023 will be used in a time-shifted calculation.

The delivered usage information is also a combination of technically renewed electricity measurement instruments. Therefore, the next-generation electricity meters can support the suggested shifted consumption, so the consumer already has a preinstalled interface. The goal is to determine whether real-time pricing models are financially attractive to consumers who want to become active users in energy management.

There is a decrease in days with free market electricity in Finland. Plans to construct large battery storages to stabilise the variations in renewable electricity production are in place. This aligns with the thesis by highlighting the direct response to the volatility of electricity prices influenced by the inconsistent nature of renewable energy sources, such as wind and solar. The development and utilisation of battery storage provide evidence for the thesis and show the practical steps being taken to implement time-shifted energy consumption on an industrial and national scale. (Tanskanen 2023.)

In 2023, the Home Connectivity Alliance announced the HCA Interface Specification for establishing industry-standard interoperability across long-life appliances, HVAC systems and TVs within the connected home ecosystem and setting the stage for Energy Management. The First Interface Specification was announced at CES 2024, and it could be a missing link for efficient shifted energy consumption. The organisation is dedicated to developing and promoting secure interoperability and energy savings across long-life appliances, HVAC systems and TVs within the connected home ecosystem. The demonstration of smart energy consumption might not be easily adaptable by society, but it will find a wide range of users as soon as big player companies become a part of this alliance (Home Connectivity Alliance 2023).

Connectivity standards alliance

The Zigbee and Matter standards, as well as a number of others, are maintained and published by a consortium of businesses known as the Connectivity Standards Alliance, formerly the Zigbee Alliance. The alliance announced highly important futures into the standard and the impact on water and energy consumption in the most recent release candidate, version 1.3. The ensuing features will be put into practice:

- Electrical Power Measurement
- Electrical Energy Measurement
- Water Heater Management
- Water Flow Measurement

The extras listed are naturally made for the suggested technology in the thesis. The possible data collection for analysis and system optimisation plays a significant role in the process, and it could provide the perfect measurement of past consumption in the coming calculation in section 6.3 (Project CHIP 2023).

The trends observed in the listed activities indicate a significant movement in a large-scale industry, which is driving the adoption of new and advanced technologies. Considering the technical requirements for implementation, standardisation becomes crucial for ensuring interchangeability. With the support of legislation and financial savings, small end customers have greater opportunities to benefit from smart technology and keep up with the latest tech trends.

4.4.1 Free software and hardware compatibility

Free software solutions are gaining traction in the energy management and home automation market due to their flexibility and community-driven support. Open-source platforms like Home Assistant and OpenHAB stand out for their wide compatibility with various hardware devices, from smart meters to intelligent thermostats and switches. These platforms serve as central hubs for home energy management, allowing users to monitor, control, and automate their energy consumption in response to dynamic pricing signals.
GitHub repositories and community forums offer extensive resources to support these open-source systems. They also offer shared user experiences and customisations for specific regions and personal energy consumption needs.

A potential concern for consumers considering free software for home energy management is the substantial time investment required for self-installation and system maintenance. Despite cost-effective software, the hardware for operation in the form of always running a mini-computer or server is required.

In conclusion, free software solutions to reduce energy consumption dependent on price are oriented to the significant do-it-yourself (DIY) community and self-made enthusiasts. However, there is a need for technical expertise and the time required for setup and ongoing adjustments. Future development could focus on solutions that are more accessible to the average consumer.

4.4.2 Commercial software and hardware solutions

Time-shifted electricity consumption is not a recent concept; it has been practised for decades, traditionally manifesting as simple day and night tariffs. Back then, it was about basic timer devices set up to specific times, an approach that has long been on the market. The problem with electricity prices was not as critical as in current years after the pandemic, largely influenced by environmental considerations. With the surge in renewable energy adoption, particularly solar panels, there is a push to generate and smartly consume energy. While the technology for such nuanced consumption is accessible, it is often tied to sophisticated systems that come with a substantial price tag, like the Bosch Energy Manager, which can cost up to 400 euro but supports a broad array of devices compatible with a suggested technology.

Embedding such technology into homes involves significant financial and professional installation considerations based on economic efficiency and sustainable living. However, this investment speaks to a future where energy use is as intelligent as the grid, combining cost savings with sustainability. Furthermore, in terms of availability and cost, the installation also includes free software, but it still comes with hardware costs, amounting to hundreds of euros. This is in stark contrast to professional commercial solutions, which require investments of thousands of euros for implementation.

4.5 Data collection, preparation, and analysis

This section outlines the essential datasets for analysing the feasibility of energy price-dependent consumption in Nordic countries. By examining electricity price data, household energy consumption patterns, and the corresponding outside temperature data, the financial and environmental benefits of shifting energy consumption can be uncovered. Each dataset will undergo preparations, including cleaning, categorisation, and analysis. Below is an overview of the datasets essential for this study:

- **Electricity price data (source: Nord pool)**
  To understand hourly fluctuations in electricity prices and identify periods of low and high prices conducive to time-shifted consumption.
- **Household energy consumption data (source: stat.fi)**
  To identify the energy usage patterns in different types of residences, focusing on heating, appliances, and other major energy consumers. Calculate the proportion of household energy consumption that can be adjusted.
- **Outside temperature data (source: pks.fi)**
  To correlate energy consumption with temperature variations, particularly for heating needs.
- **Household consumption data (source: pks.fi)**
  Data from real-life scenarios that offer the most significant opportunities for time-shifting should be used, and calculations should be made using a method that allows the representation of the possibly real picture.

Employing software tools suitable for handling datasets efficiently. The purpose is to combine these diverse data sources into an analysis that validates the thesis hypothesis: shifting energy consumption according to real-time pricing can lead to economic benefits and contribute to a more sustainable energy system.

The following software was used for calculations and support:

- **Word** for the Thesis.
- **Excel** as the main tool for calculations.

- **ChatGPT data analyst** for cross check and calculation support.
- **Grammarly** for grammatical check.

4.6 Analytical methods for data interpretation

This section outlines the methodological approach taken to interpret the collected data, focusing on the impact of time-shifted energy consumption on household electricity costs.

Cost Calculation for Time-Shifted Consumption

$$Shifted\ Cost = \sum (Use\ Shifted \times Tariffoffpeak) + \sum (Base\ Use \times Tarif)$$

Where “Use Shifted” is the energy consumption shifted to off-peak hours (lowest price during the day), and “Base” is the permanent house consumption. The cost for normal consumption is described in section 4.2 of the electricity bill.

Savings Estimation from time-shifted consumption can be done by comparison as follows:

$$Savings = (Costwithoutshifting - Costwithshifting)$$

“Costwithoutshifting” is the cost if consumption were not shifted and “Costwithshifting” is the cost after shifting consumption to off-peak hours. The sum (∑) is calculated over the billing period before and after taxation.

Calculation of the **energy consumption profile** is created using the summary:

$$Total\ Use = Base\ Use + Exceed\ Use$$

Where:
“Total Use” is the total energy consumption for a set period (kWh),
“Base Use” is the baseline energy consumption that remains constant (kWh),
“Exceed Use” is the additional consumption that can be shifted (kWh).

The formula applies to both situations, before and after shifting. To simplify the possible amount of shifting, the manual approach is suggested and used.

Interpreting data with correlation analysis: Correlation analysis will be conducted to determine the relationship between electricity pricing, consumption, and external temperature factors using the Pearson correlation coefficient (r). This analysis will help identify patterns that are not immediately evident through casual observation and can interpret the complex interplay between consumption behaviour and real-time pricing. The Excel CORREL function was used to analyse the monthly correlation between the price, consumption, and outside temperature.

This research does not touch on the prediction of the price since the 24-hour prediction from the grid operator is provided and does not require additional calculation. (Kahawala, De Silva, Sierla, Alahakoon, Nawaratne, Osipov, Jennings & Vyatkin 2021)

5 Data collection

The optimal scenario for data collection involves detailed tracking of usage times and amounts for each high-energy-consuming appliance over the past year, but such comprehensive consumption data is not always available. Therefore, this study estimates consumption by scaling up from statistical data on household energy usage, applying a factor that represents the potential savings from the time-shifting calculation.

5.1 Electricity price historical data

The electricity price overview information is relevant for motivating investment in future energy consumption. To archive this, the overview of energy prices on a monthly average can indicate extreme cost explosions in the past six years.

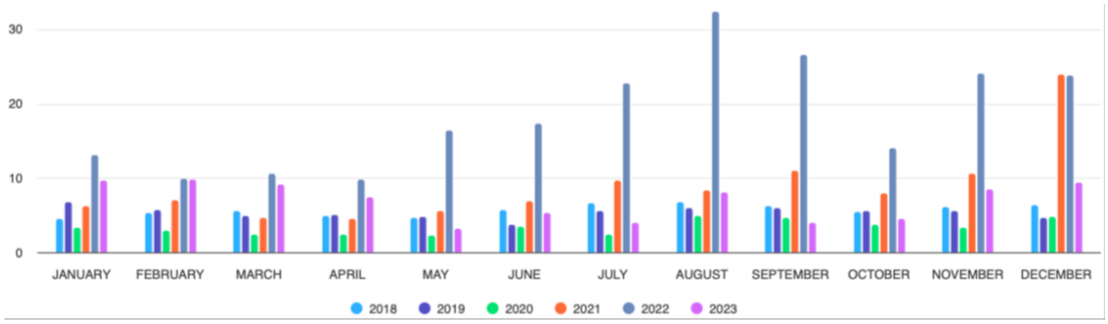


Figure 4. The monthly (sähkösopimukset.com 2024).

Figure 4 showcases the historical spot prices of electricity in Finland from 2018 to 2023. The graphical representation of monthly price trends highlights the volatility and seasonal fluctuations in energy costs. The data illustrates periods of peak pricing, which correlate with colder months, likely due to increased heating demands, due to presumably warmer months displaying lower prices (Pesonen 2023).

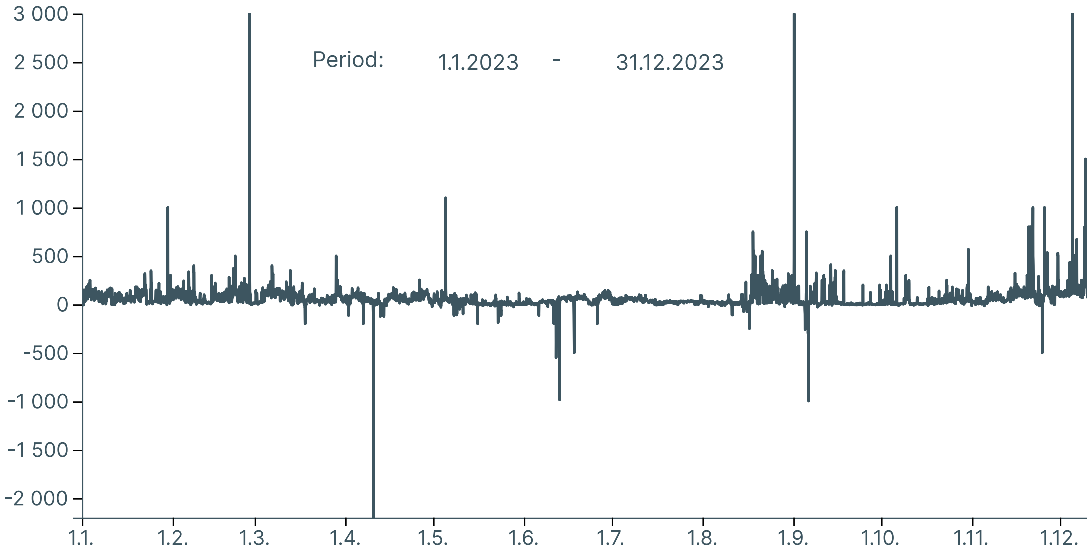
This fluctuating price data is a main factor for evaluating the viability of time-shifted electricity consumption, as it indicates the potential for cost savings if consumers shift their usage to times of lower prices. The percentage savings applied to the estimated scaled consumption provide an approximation of the financial benefits achievable through modified energy use.

For this study, data about electricity prices is provided by the “oomi.fi” online service over the year 2023 on an hourly basis and will be merged with house consumption data (Oomi 2024).

5.2 Grid electricity balance price

While not commonly known to the general public, the grid electricity balance price is an important concept in energy markets, influencing costs for both consumers and providers. The information should be an additional reason for system implementation and profitable support from the site of the electricity provider and not be used for calculation. It represents the cost of correcting imbalances between forecasted and actual electricity usage or production. For businesses, it acts as a balancing charge - when consumption diverges from the forecast, they face higher costs to compensate for the imbalance.

This price is particularly relevant during periods of high demand when providers may have to procure energy at elevated rates, often translating to higher prices for consumers. This mechanism supports the investment in technologies that enable time-shifted consumption, even under fixed-price contracts. The idea is to maintain a stable grid and avoid costly purchases of additional energy during peak times. In the information provided by FinGrid (Figure 5), the minimum and maximum costs in the year 2023, vary from - 2200 €/MWh to 3000 €/MWh on critical days, as reported by FinGrid (2023).



Name	Minimum	Maximum	Average
Imbalance price	-2200.00	3000.00	59.98 €/MWh

Figure 5. Price variations over the year 2023.

Energy providers are investing in storage solutions and innovative technologies to mitigate imbalances. This indicates that time-shifted consumption is not only a consumer convenience, but also a move towards a balanced and cost-effective energy grid. In addition, the possibility for private owners to rent their own solar production with a home battery to operate and control by FinGrid or similar energy providers indicates that investments for energy storage also happen on a smaller scale since the battery renting operates in a range between 10 and 20 kWh. Therefore, the suggested solution for time-shifted consumption is the next level of precision grid balancing.

Figure 6 shows the price jumping during the randomly chosen day. From the first overlook to the yearly data, each randomly chosen day often shows double the price difference between the lowest and highest (Figure 6).

Name	Minimum	Maximum	Average
Imbalance price	-4.02	63.65	34.08 €/MWh

Figure 6. shows the price fluctuations for the imbalance price during the day.

5.3 Electrical device identification

For the selection of the dwellings considered for the suggested technology, the first step would be to identify the devices that are valid for shifted consumption and the selection of the most feasible implementations for the end user category. The housing statistical data provides the list of consumption by kind of equipment. With a closer look into this selection, it is possible to select potential device categories. The selection provided herein lays the base data for assessing the feasibility of large-scale implementation of real-time pricing and consumption shifting strategies. The resulting data will be used for selection from the household energy consumption by the source to identify the percentage of energy use that can be shifted to cheaper periods.

Device	Validity for Time-Shifted Use	Comments	House	Flat
Electric Vehicle	High		X	X
Dishwasher	High	Noise in a night time	X	X
Washing Machine	High	Noise in a night time	X	X
Clothes Dryer	High	Noise in a night time	X	X
Electric Water Heater	High		X	-
Heating of Spaces	High		X	X
Heating of Saunas	Medium	Consuming time point is defining	X	X
Fridge	Low	Always on required	X	X
Lighting	Low	Consuming time point is defining	X	X
Cooking Appliances	Low	Consuming time point is defining	X	X

Table 3. The device validity for time-shifted consumption.

After identifying the devices to use in the calculation, "saving for time-shifted consumption" is applied. As a result, there will be a time slot for device tasks to shift into cheaper periods. For adjustment and visualisation, the graph and table were used in a 48h frame for the selection of the High consumption periods. The approach will identify the exceeded consumption of electricity, which is measurable by over 1kWh, which also supports the simplicity of calculation. The listed valid devices are also responsible for the high pick consumption, which is visible from the house consumption data. The electricity use can be directly addressed by shifting into different time frames during the day with cheaper energy costs.

Opportunities to improve energy efficiency through technology-driven time-shifting methods can be identified by analysing the energy usage patterns of different types of homes.

5.4 Housing and energy consumption statistics

Household energy consumption statistics in Finland are meticulously collected, mainly from energy suppliers. The core statistical unit is the dwelling or residential building, including the surrounding yard, and the data are categorised by energy source with sector-specific accuracy and have been consistently available since 2008 (Statistics Finland 2024).

Housing statistic

A combination of two tables of “total countrywide amount of dwelling categorised by kind” and “heating consumption” is also for all households categorised by the source of heating. The two tables provide different groupings for household categories, so the approach to merge and accumulate the average data is used.

Total Dwellings in a whole country in Year 2022	Number of dwellings	%	Heating consumption by source in % Year 2022	District heat %	Direct electric heating %	Oil heating %	Geothermal heat %	Air source heat pump %	Other (Wood) %	All methods of heating
Total	**3187210**	**100,00 %**	**All types of buildings**	53,90	**19,40**	4,60	9,00	**4,00**	9,10	100 %
(1)One-dwelling and (2)two-dwelling houses	1187393	37,25 %	(1)Single-dwelling house	6,40	**35,20**	10,80	15,50	**9,90**	22,20	100 %
(3)Terraced houses	422268	13,25 %	(3)Terraced house, (2)two-dwelling house & (4)other	50,70	**28,50**	4,00	11,40	**3,10**	2,40	100 %
(4)Other buildings	57715	1,81 %								
Sum of top 4 points (main Customer)	**1667376**	**52,31 %**	**Accumulated % of top 4 points(sum/2)**	28,55	**31,85**	7,40	13,45	**6,50**	12,30	100 %
Blocks of flats	1519834	47,69 %	Block of flats	88,90	**4,60**	0,30	3,40	**0,30**	2,50	100 %

Table 4. The total suitable number of dwellings in Finland in the year 2023 and heating consumption by source in per cent.

Table 4 details the total number of dwellings in a country for the year 2022, breaking them down by type and their respective heating consumption by source. The data for 2023 is currently unavailable. However, the upcoming "Energy consumption by source" data will indicate minimal year-on-year differences, so a similar approach can be applied to this statistic, too. The table suggests a cumulative approach to data representation. The categories of heating include district heat, direct electric heating, oil heating, and various forms of heat pumps. By analysing statistical data, the focus lies on identifying the percentage of flexible energy usage theoretically possible and forecasting the scalability of such practices. The percentage of energy that can be shifted can be compared to the different data sources.

From the table, it follows that 32% of more than half of the selected (1- 4) dwellings are heated by direct electrical heating and 6.5% heated by heat pumps. Both categories are potentially valid for time-controllable consumption. This table also provides the direct numbers for the calculation in Section 6.3

Energy consumption by source

Opportunities for time-shifting and the impact on both consumer behaviour and grid stability can be identified by analysing the percentage breakdown of energy consumption by source. The energy sources are diversified, ranging from traditional fuels such as wood to more modern sources like ambient energy, district heat, and electricity. The data details various consumption categories, including heating of spaces, household appliances, lighting, cooking, and other electrical equipment, as well as heating of saunas and domestic water.

The approach here is to identify the percentage of average household capability for shifting. The data for 2023 has yet to be available, so to identify the amounts, a comparison of the two previous years can be used.

		Wood	Peat	Coal	Heavy fuel oil	Light fuel oil	Natural gas	Ambient energy	District heat	Electricity	Total	Electricity percent from total
2022	Total	**13 561**	**39**	**0**	**3**	**1 683**	**286**	**8 009**	**18 386**	**31 502**	**73 471**	
	Heating of spaces	11 334	26		2	1 275	170	6 790	12 764	10 384	42 746	14,13 %
	Household appliances						34			8 789	8 823	11,96 %
	Lighting									1 373	1 373	
	Cooking						34			738	773	
	Other electrical equipment									6 678	6 679	9,09 %
	Heating of saunas	1 839								1 203	3 041	1,64 %
	Heating of domestic water	388	13		1	408	48	1 219	5 622	2 337	10 036	3,18 %
											SUM	**30,91 %**

		Wood	Peat	Coal	Heavy fuel oil	Light fuel oil	Natural gas	Ambient energy	District heat	Electricity	Total	Electricity percent from total
2021	Total	**14 753**	**46**	**0**	**8**	**2 345**	**406**	**7 345**	**19 688**	**33 405**	**77 996**	
	Heating of spaces	12 508	33		6	1 906	265	6 258	14 019	11 428	46 423	14,65 %
	Household appliances						42			9 143	9 185	11,72 %
	Lighting									1 482	1 482	
	Cooking						42			790	833	
	Other electrical equipment									6 871	6 871	8,81 %
	Heating of saunas	1 836								1 233	3 069	1,58 %
	Heating of domestic water	409	13		2	439	57	1 087	5 669	2 458	10 133	3,15 %
											SUM	**31,11 %**

Table 5. Energy consumption in households by energy consumption information, year, and energy source in GWh.

Table 5 presents a comprehensive breakdown of Finnish household energy consumption by end use and energy source, measured in gigawatt-hours (GWh) for the years 2022 and 2021. The significant reliance on electricity across both years is evident.

The selection first falls on the electricity consumption row and the end-use category. End-use devices are selected according to the findings in a previous section and their validity for time-shifted use. The red market end usage was selected for the shift. The “Other electrical equipment” category consumed up to 9% and speaks more about always on equipment for technical or HVAC needs, like pumps or fans. The “Always on” fridge can also be considered in this percentage of house consumption. For simplicity in the calculation, the result can be rounded to 30%, meaning the “up to” percentage of energy from all households potentially able to shift consumption for calculation and scale.

Together with the data from housing and dwellings, the comparison could provide a more realistic cost-saving scenario.

For scale and comparison, the amount of energy used in normal versus shifted consumption in percentages and the price difference resulted in possible savings, as well as the identification of the most suitable housing for the technology implementation. According to the table in this section, heating is the biggest energy consumer and is typically installed in detached households. The second largest consumer of energy is hot water preparation. In contrast, blocks of flats are usually supplied by district heating, which is also used for hot water. In this scenario, users do not require separate heating technology, nor do they have the possibility to implement one.

5.5 Real house data collection

The following dataset is the main base for the following calculation in Section 6.3. It merges electricity price data, house consumption, and the outside temperature to identify manually and, with the help of calculation programmes, the financial benefits of the suggested technology. After adding the price data, the list for 2023 was created. It can be found as Figure 6.

Date	**Time**	**Electricity Price**	**Energy Consumption**	**Outside Temp.**
Day	Hour	c/kWh	(kWh)	t (°C))

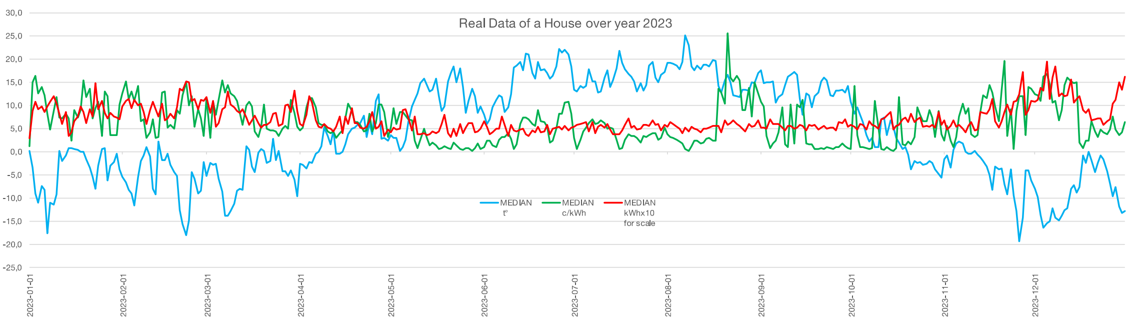


Figure 6. Graphically represents the daily average over the year 2023 for outdoor temperature, electricity price and house electricity consumption.

Figure 6 shows house consumption in Joensuu, defined as an optimal end-user (Section 5.3) of the suggested technology over the year 2023. The house has wood as the primary heating source and direct electric heaters as an additional support, a water boiler, appliances like a dishwasher, and a washing machine with a dryer. Those devices are the leading candidates for extensive energy usage and are validated for time-shifted consumption.

The data indicates an average low price in summer, where the savings might not even be relevant. Still, the extreme case on 5 January 2024 shows the enormous saving potential over a year combined. The electricity bill that day was valued at 73,84 €.

Date	Time	Price c/kWh	Use (kWh)	Use (kWh)x10	t (°C)	Cost (€) Price x Use
2024-01-05	00:00	11,70	1,37	13,70	-34,8	0,16
2024-01-05	01:00	17,59	1,46	14,60	-35,0	0,26
2024-01-05	02:00	15,60	1,35	13,50	-34,9	0,21
2024-01-05	03:00	15,60	1,34	13,40	-35,5	0,21
2024-01-05	04:00	15,60	1,59	15,90	-35,1	0,25
2024-01-05	05:00	15,60	2,15	21,50	-35,6	0,34
2024-01-05	06:00	35,59	2,21	22,10	-34,2	0,79
2024-01-05	07:00	100,58	2,42	24,20	-35,3	2,43
2024-01-05	08:00	148,48	2,36	23,60	-34,8	3,50
2024-01-05	09:00	125,76	3,82	38,20	-34,2	4,80
2024-01-05	10:00	100,59	4,07	40,70	-34,5	4,09
2024-01-05	11:00	100,59	3,22	32,20	-34,1	3,24
2024-01-05	12:00	80,59	3,18	31,80	-31,4	2,56
2024-01-05	13:00	100,58	3,34	33,40	-32,3	3,36
2024-01-05	14:00	90,50	2,96	29,60	-32,3	2,68
2024-01-05	15:00	100,59	1,67	16,70	-33,1	1,68
2024-01-05	16:00	170,22	1,64	16,40	-32,5	2,79
2024-01-05	17:00	176,39	3,84	38,40	-32,2	6,77
2024-01-05	18:00	148,49	2,08	20,80	-31,9	3,09
2024-01-05	19:00	190,19	2,68	26,80	-31,6	5,10
2024-01-05	20:00	175,99	1,68	16,80	-30,4	2,96
2024-01-05	21:00	99,60	3,84	38,40	-27,7	3,82
2024-01-05	22:00	75,59	1,66	16,60	-26,0	1,25
2024-01-05	23:00	30,59	1,45	14,50	-25,1	0,44

Sum of consumption for the critical day excluding transfer costs and Tax	56,79 €	
Electricity consumtion for a day	57,38	kWh
Delivery Price	4,80	c/Kwh
+ ransfer cost	2,75 €	€
SUM	59,55 €	
+ VAT 24 %	14,29 €	
END SUM for a day of extensive prices	73,84 €	

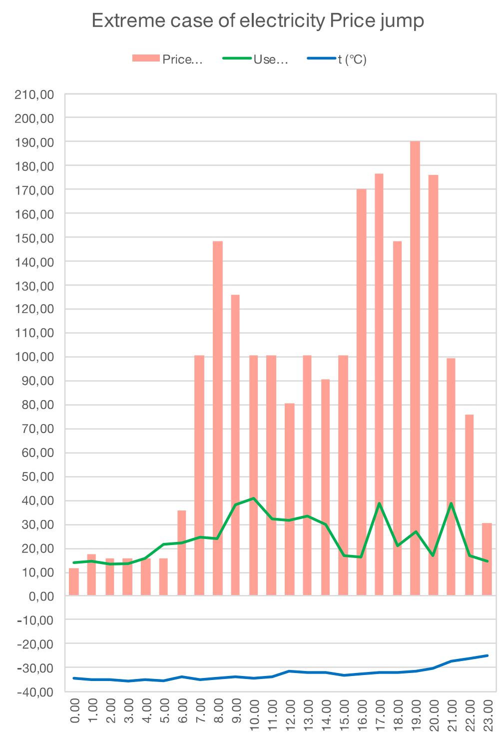


Table 6. The extreme case of price fluctuation. The column “Use x 10” is used for a better visual representation of consumption in the diagram, where consumption is multiplied by ten.

6 Data analysis and interpretation

This section examines the data gathered using the listed research methodology. The potential benefits and limitations of consumer-based energy-shifting strategies will be determined by using statistical techniques and factual evaluations, providing valuable insights into the impact of time-shifting on electricity consumption and cost savings. The goal is to test the research hypotheses and better understand how dynamic pricing can influence household energy management.

The entire dataset will be studied first, followed by a more detailed examination of specific variables and their relationships, as explained in the following sections. To ensure accuracy, actual data from a house in Joensuu, identified as an optimal end-user in previous sections, will be used. The given formula allows for easy updates of the housing or consumption data, making the findings adaptable to different situations.

6.1 Consumption patterns

For this section to archive the most realistic result, the actual consumption data of the house will be used, which is, per definition, valid as an optimal consumer object for the proposed technological adaptation. This makes it possible to calculate real-case possible savings.

Since the focus of the study is on price-controlled consumption, by analysing the correlation situation between the three datasets of consumption behaviour.

Month	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Price vs Consumption	0,243	0,252	0,194	0,230	0,150	0,052	0,097	0,103	0,078	-0,138	0,182	0,401
Price vs Temperature	-0,212	-0,275	-0,386	-0,022	-0,495	0,586	-0,133	-0,295	0,099	-0,458	-0,090	-0,605
Consumption vs Temperature	-0,153	-0,175	-0,103	0,136	-0,051	0,028	0,108	0,069	0,131	0,032	-0,302	-0,373

Table 7. The monthly Pearson Correlation Coefficient for 2023.

The detailed monthly correlations (Table 7) for 2023 reveal the following trends:

Calculating Correlations analyse the monthly correlations between price, consumption, and outside temperature.

- **Price and Energy Consumption**: A strong positive correlation of 0.82 indicates that energy consumption also tends to increase as the price increases, suggesting that higher prices are affected by peak consumption periods.
- **Price and Outside Temperature**: A strong negative correlation of -0.74 suggests as the temperature decreases the price tends to increase. This could be due to higher demand for heating, driving up prices during colder months.
- **Energy Consumption and Outside Temperature**: There is a strong negative correlation of -0.90, indicating that as the temperature decreases, energy consumption increases significantly. This suggests that colder temperatures drive higher energy consumption, likely due to heating needs.

These correlations indicate a strong relationship between these variables, with temperature being a key factor influencing energy consumption and price. However, these relationships could be influenced by various factors, but basically confirm the overall trends related to electricity consumption. The adaptation of time-shifted technology can be considered a consumption pattern change; however, it may be adjusted in a one-day time frame.

Overall Trends:

- Colder months show a stronger negative correlation between temperature and both price and consumption, indicating increased energy use and potentially higher prices due to heating demands.
- Transitional months like April and October show unique patterns, possibly reflecting the changing energy needs as seasons change.
- Trends highlight the significant impact of seasonal changes on energy dynamics, including how weather conditions influence energy demand and pricing.

6.2 Impact of seasonality on energy pricing

Electricity demand is subject to fluctuations on a seasonal basis, across the week, and during the day. Demand can also be influenced by irregular events, such as particularly extreme weather conditions. They can also be swayed by television programmes or televised events called “TV pick-ups”. Typically, demand is higher in the winter than in the summer. Electricity demand also tends to fluctuate over the day, as determined by human activity, as outlined by Gavin (2014).

2023 Month	Median Price (c/kWh)	Average Price (c/kWh)
JAN	8,055	8,458
FEB	7,805	8,610
MAR	7,210	8,007
APR	5,860	6,646
MAY	1,515	3,256
JUN	5,125	4,922
JUL	3,655	3,885
AUG	3,215	7,225
SEP	1,480	3,884
OCT	1,755	4,354
NOV	7,765	7,550
DEC	7,505	8,219

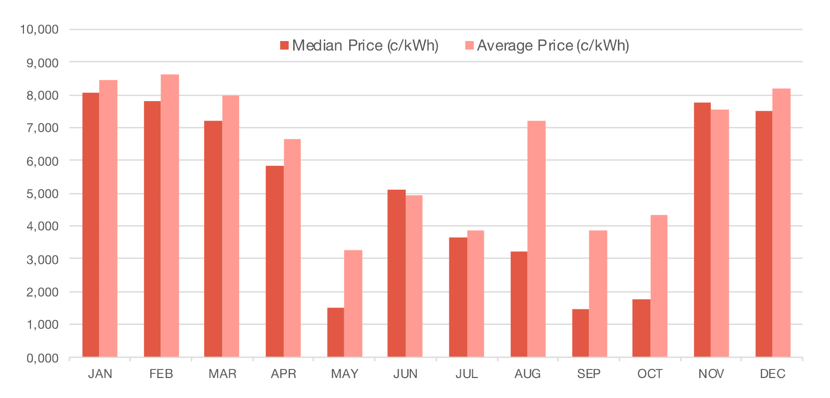


Table 8. The average and median price, monthly, over the year 2023

Table 8, with data from 2023, demonstrates how seasonal differences can significantly impact prices. It is worth considering the profitability of shifting consumption during warmer months, particularly if the savings reflected in the invoice are minimal. This speaks against the profitability, and the savings should be considered over a year.

In assessing the impact of seasonality on energy pricing, it becomes evident that consumer energy costs and consumption behaviours are clearly affected by seasonal fluctuations in energy demand. During winter months, when energy demand peaks due to heating needs, electricity prices typically rise, underscoring a critical period where time-shifting strategies could provide significant cost savings. The summer months often present a different challenge with lower overall energy prices but reduced opportunities for savings through time-shifting due to generally lower consumption levels. This pattern highlights the dual necessity for consumers to adapt their energy usage strategically throughout the year and for energy providers to manage supply efficiently to accommodate these fluctuations. The introduction of smart technologies and dynamic pricing models can, therefore, be seen as pivotal in enabling both consumers and providers to respond more agilely to seasonal demand changes. Ultimately, the goal is to create a more robust and financially efficient energy system.

6.3 Time shifting calculation

The main purpose of the following calculation, based on randomly chosen days of the example house, is to identify the relationship between the amount of possible shifted consumption (kWh) and the percentage of the electricity price savings (€ cent). The proportion from selected days will be averaged and proportionally replicated into the housing statistic data; the amount of suitable energy consumption will indicate the percentage of the savings on the monthly bill. The resulting number provided for cost savings is defined as “Up to” per cent during the day and defines the profitability of the concept.

To identify the possible savings from the consumption and price data for the selected household, the graph for visualisation needs 48 hours. This amount is selected for the current and next day as predicted energy costs. This time frame is chosen for the best possibility of shifting consumption during the day or into the next day for optimised consumption. The main high energy-consuming equipment, like water boilers, heating, and appliances for dishes and clothes, are considered for implementation by consumers in power use in kWh and for a suitable duration.

- For example, the washing machine consumes 2 kWh during the washing and drying process; since the drying is normally executed straight after the washing process, it will be indicated as one device with a combined duration of use, in this case, 1kWh x 4 hours (2 washing + 2 drying) =4 kWh for a single task. This definition is needed, as defined in section 5.4, to select manually, in this calculation, the needed time slot for energy consumption and the best time period.

To the datasets defined in section 4.5, additional rows are added to the available historical data for Price, Consumption, and Outside Temperature, and the necessary calculations are required.

The selection of specific days and criteria is mainly based on days with consumption, as savings can only be achieved through consumption. There were 24 samples taken, with two from each month and around 2-3 weeks in between. Days with price fluctuations have a higher potential for cost savings.

Date	2023-05-01		
Median price		7,13	€ Cent
Price	Selected	8,00	€ Cent
Use		28,66	kWh
Temperatur	Average	3,75	t (°C)
End Costs Norm.	Price x Use	**230,95**	€ Cent
Base use	=MIN of Use + 10%	0,29	kWh
Exceed use All	Use (kWh) - Base use		kWh
Shifted Minus	> 1 kWh	3,18	kWh
Shifted Plus	> 1 kWh	1,44	kWh
Shifted Use	kWh	26,93	kWh
End cost shifted	c/kWh x Sh.Use (kWh)	**204,75**	€ Cent
Saving (Netto)	Noprm. Use - Shift. Use	26,20	€ Cent
Saving (Netto)	Noprm. Use - Shift. Use	**11,34**	**%**
Transfer Cost	USE kWh x 4,80 c/kWh	1,29	€
Sum Netto Before		**2,32**	€
Tax	24 %	0,56	€
Sum Brutto Before		**2,88**	€
Sum Netto After	End cost shifted + Transfer Cost	**2,06**	€
Tax	24 %	0,49	€
Sum Brutto After		**2,55**	€
Saving Brutto	**Sum Brutto Before - After**	**0,32**	€

Table 9. The resulting data example from the chosen sample day

- **Median Price** calculated from the row **Price** during the day period. The field for the selection of the price can be manually adjusted for better representation of the expensive and cheaper periods.
- **End Cost Normal** usage - End price Net (€ Cent) = Price x Use
- **Base Use** - (kWh) – minimal usage per hour +10% for identification of the permanent consumption of the household for the HVAC, fridge, security and internet devices and other always-on equipment. This amount of energy cannot be shifted.
- **Exceed Use** (kWh) - the amount of consumption over a “Base Use” that exceeds at least 1kWh, to be declared valid for shifted consumption. Defined by subtracting the “Base Use” from the total use per hour. The sum defines the next section, “Shifted Minus”.

- **Shifted Minus** (kWh) is a sum that subtractions the consumer from the high price period to the cheaper one. The moved amount defines the next topic, “Shifted Plus.”
- **Shifted Plus** (kWh) – the same amount as previously used but used in addition to the “Use” in the cheaper periods. Both this and previous topics are used to recalculate the adjusted consumption, which is defined as a ”Shifted Use”.
- **Shifted Use** (kWh) defines the adjusted consumption created by adding the “Base Use” and repositioned “Exceed Use” to the given data to calculate the “new” consumer for cost-saving identification.
- **End Cost Shifted** shows the new end price for 48h use after the readjustment of consumption.
- **Saving** Net result from the differences in a before and after proposal adaptation in € cents and percentages.
- **Use x 10,** and **Shifted Use x 10** are the lines which show multiplied **Use** Data multiplied by 10 for more dynamic graph representation only and are not included in the calculation.

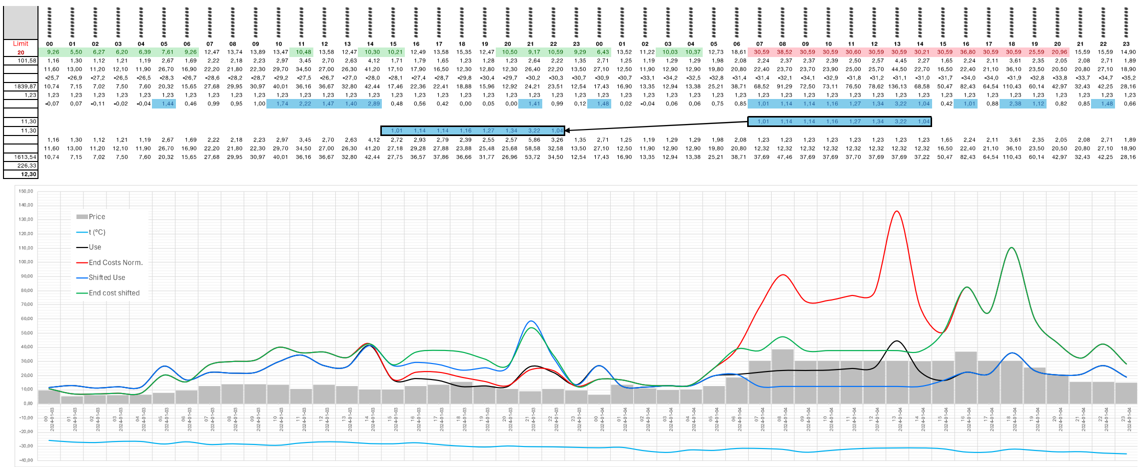


Table 10. Visual indication of the fluctuations during the day.

The lines in Table 10 provide a direct view of consumption before (Black) and after (Blue). Most of the time, they overlap each other fully, except for a moment of shifting, which directly indicates the cost difference between before (Red) and after (Green). The moments of shifting resulted in smoother and balanced costs during the 48-hour period.

When determining the amount of energy that can be shifted and the times for shifting, consider the base energy usage as the permanent household consumption plus a 10% reserve. Any energy used beyond this amount is considered excess usage, but not all of it can be shifted. As a result, the precision of the calculations may be lower. This approach prevents overestimation of the benefits of the technology. New time slots for shifting are manually selected based on actual household data, resulting in more realistic outcomes. It is important to note that the times for shifting the excess energy may not always align with the most convenient times for the user. In addition, there is a need to implement additional techniques, such as overheating for room temperature control or preparing hot water at a higher temperature during cheaper periods to build up more reserves. For example, the room temperature could be allowed to increase by 3 degrees before the system turns off, and the water boiler could prepare water that is ten °C warmer during off-peak periods.

Next, the table with other days and the results next to each other where The following dates have been selected:

10.1.2023	05.4.2023	05.7.2023	09.10.2023
26.1.2023	25.4.2023	29.7.2023	30.10.2023
14.2.2023	03.5.2023	18.8.2023	06.11.2023
27.2.2023	19.5.2023	29.8.2023	26.11.2023
09.3.2023	10.6.2023	07.9.2023	13.12.2023
20.3.2023	22.6.2023	21.9.2023	29.12.2023

The calculation for each day is in Appendix 1 (24 pages)

			1	2	3	4	5	6	7	8	9	10	11	12
		Date	2023-01-10	2023-01-26	2023-02-14	2023-02-27	2023-03-09	2023-03-20	2023-04-05	2023-04-25	2023-05-03	2023-05-19	2023-06-10	2023-06-22
Median price		€ Cent	8,60	12,57	12,74	4,36	12,32	6,25	10,55	5,02	7,27	1,03	1,94	4,23
Price	Selected	€ Cent	10,00	10,00	13,00	10,00	13,00	5,00	12,00	6,00	8,00	1,00	2,00	5,00
Use		kWh	58,53	44,77	51,00	66,06	64,71	39,20	53,67	41,75	41,93	40,27	36,25	33,51
Temperatur	Average	t (°C)	-4,74	-3,43	-1,56	-5,58	-13,08	-1,23	-0,43	7,63	1,90	12,43	13,01	17,17
End Costs Norm.	Price x Use	€ Cent	585,86	531,06	720,65	435,84	834,97	287,25	601,25	241,15	353,85	72,78	73,84	133,93
Base use	=MIN of Use + 10%	kWh	0,55	0,34	0,40	0,78	0,79	0,41	0,31	0,34	0,31	0,28	0,30	0,40
Exceed use All	Use - Base use (For selection)	kWh												
Shifted Minus	> 1 kWh	kWh	9,73	11,14	11,12	6,41	10,66	9,20	8,31	9,73	12,06	7,26	6,06	7,09
Shifted Plus	> 1 kWh	kWh	9,73	11,14	11,12	6,41	10,66	9,20	8,31	9,73	12,06	7,26	6,06	7,09
Shifted Amount %		**%**	**16,62**	**24,89**	**21,80**	**9,70**	**16,48**	**23,46**	**15,48**	**23,30**	**28,77**	**18,03**	**16,71**	**21,15**
Shifted Use	kWh	kWh	58,53	44,77	51,00	66,06	64,71	39,20	53,67	41,75	41,93	40,27	36,25	33,51
End cost shifted	c/kWh x Sh.Use (kWh)	€ Cent	534,34	443,94	643,22	371,43	802,70	242,45	582,03	206,75	306,84	67,98	65,69	112,42
Saving (Netto)	Noprm. Use - Shift. Use	€ Cent	51,52	87,12	77,43	64,41	32,26	44,80	19,22	34,40	47,01	4,80	8,14	21,51
Saving (Netto) %	**Noprm. Use - Shift. Use**	**%**	**8,79**	**16,40**	**10,74**	**14,78**	**3,86**	**15,60**	**3,20**	**14,27**	**13,29**	**6,59**	**11,03**	**16,06**
Transfer Cost	USE kWh x 4,80 c/kWh	€	2,81	2,15	2,45	3,17	3,11	1,88	2,58	2,00	2,01	1,93	1,74	1,61
Sum Netto Before		€	5,89	5,33	7,23	4,39	8,38	2,89	6,04	2,43	3,56	0,75	0,76	1,36
Tax	24 %	€	1,41	1,28	1,74	1,05	2,01	0,69	1,45	0,58	0,85	0,18	0,18	0,33
Sum Brutto Before		**€**	**7,30**	**6,61**	**8,97**	**5,44**	**10,39**	**3,59**	**7,49**	**3,02**	**4,41**	**0,93**	**0,94**	**1,68**
Sum Netto After	End cost shifted + Transfer Cost	€	5,37	4,46	6,46	3,75	8,06	2,44	5,85	2,09	3,09	0,70	0,67	1,14
Tax	24 %	€	1,29	1,07	1,55	0,90	1,93	0,59	1,40	0,50	0,74	0,17	0,16	0,27
Sum Brutto After		**€**	**6,66**	**5,53**	**8,01**	**4,65**	**9,99**	**3,03**	**7,25**	**2,59**	**3,83**	**0,87**	**0,84**	**1,41**
Saving Brutto	**Sum Brutto Before - After**	**€**	**0,64**	**1,08**	**0,96**	**0,80**	**0,40**	**0,56**	**0,24**	**0,43**	**0,58**	**0,06**	**0,10**	**0,27**

			13	14	15	16	17	18	19	20	21	22	23	24
		Date	2023-07-05	2023-07-29	2023-08-18	2023-08-29	2023-09-07	2023-09-21	2023-10-09	2023-10-30	2023-11-06	2023-11-26	2023-12-13	2023-12-29
Median price		€ Cent	5,94	2,90	13,08	10,13	5,73	0,72	10,32	6,06	8,55	12,00	15,10	3,68
Price	Selected	€ Cent	5,94	2,90	13,08	11,00	5,73	0,72	10,32	6,06	8,55	12,00	15,10	3,68
Use		kWh	38,45	38,57	42,54	37,44	42,16	39,22	36,42	36,70	33,81	73,10	70,74	76,25
Temperatur	Average	t (°C)	15,68	16,09	13,38	15,03	12,48	15,27	1,07	-5,83	2,06	-17,20	-7,87	-11,97
End Costs Norm.	Price x Use	€ Cent	226,22	102,67	531,65	420,15	316,51	29,09	373,14	307,07	357,67	896,90	1002,92	311,82
Base use	=MIN of Use + 10%	kWh	0,37	0,39	0,40	0,41	0,42	0,39	0,37	0,33	0,29	0,72	0,72	0,72
Exceed use All	Use - Base use (For selection)	kWh												
Shifted Minus	> 1 kWh	kWh	8,60	7,79	11,00	7,28	10,26	10,61	8,61	6,84	9,63	15,63	22,53	20,24
Shifted Plus	> 1 kWh	kWh	8,60	7,79	11,00	7,28	10,26	10,61	8,61	6,84	6,64	15,63	22,53	20,24
Shifted Amount %		**%**	**22,38**	**20,20**	**25,87**	**19,45**	**24,34**	**27,04**	**23,64**	**18,64**	**21,53**	**21,37**	**31,84**	**26,54**
Shifted Use	kWh	kWh	38,45	38,57	42,54	37,44	42,16	39,22	36,42	36,70	30,82	73,10	70,74	76,25
End cost shifted	c/kWh x Sh.Use (kWh)	€ Cent	218,58	88,23	442,56	369,66	259,36	27,08	259,77	256,62	280,19	835,48	882,08	291,65
Saving (Netto)	Noprm. Use - Shift. Use	€ Cent	7,65	14,44	89,09	50,49	57,15	2,01	113,37	50,45	77,48	61,42	120,84	20,16
Saving (Netto) %	**Noprm. Use - Shift. Use**	**%**	**3,38**	**14,06**	**16,76**	**12,02**	**18,05**	**6,91**	**30,38**	**16,43**	**21,66**	**6,85**	**12,05**	**6,47**
Transfer Cost	USE kWh x 4,80 c/kWh	€	1,85	1,85	2,04	1,80	2,02	1,88	1,75	1,76	1,48	3,51	3,40	3,66
Sum Netto Before		€	2,28	1,05	5,34	4,22	3,19	0,31	3,75	3,09	3,59	9,00	10,06	3,15
Tax	24 %	€	0,55	0,25	1,28	1,01	0,76	0,07	0,90	0,74	0,86	2,16	2,42	0,76
Sum Brutto Before		**€**	**2,83**	**1,30**	**6,62**	**5,23**	**3,95**	**0,38**	**4,65**	**3,83**	**4,45**	**11,17**	**12,48**	**3,91**
Sum Netto After	End cost shifted + Transfer Cost	€	2,20	0,90	4,45	3,71	2,61	0,29	2,62	2,58	2,82	8,39	8,85	2,95
Tax	24 %	€	0,53	0,22	1,07	0,89	0,63	0,07	0,63	0,62	0,68	2,01	2,13	0,71
Sum Brutto After		**€**	**2,73**	**1,12**	**5,51**	**4,61**	**3,24**	**0,36**	**3,24**	**3,20**	**3,49**	**10,40**	**10,98**	**3,66**
Saving Brutto	**Sum Brutto Before - After**	**€**	**0,09**	**0,18**	**1,10**	**0,63**	**0,71**	**0,02**	**1,41**	**0,63**	**0,96**	**0,76**	**1,50**	**0,25**

Table 11. Overview of the 24 sample days for data comparison (full table available in Appendix 2).

After the average definition and the factor created from the two parameters, saving to answer the question “how much could the percentage of shifted energy be seen in an invoice?” If the prices are lower and there is a significant shift in energy usage per day, the savings percentage may appear high, but the actual cost difference is often just a few cents. It relates to seasonal price and consumption development. This will be a coefficient for the amplification of household data and identification of the percentage of savings for different household types. Personalised recommendations for consumers can be developed using this data, enabling them to identify the ideal time and amount of energy to shift in order to maximise their net savings. The calculated averages are critical inputs for designing dynamic pricing models that can motivate consumers to adapt their energy usage in response to price signals.

6.4 Comparative analysis of pre and post-time-shifting

Outcomes manifest from implementing time-shifting practices, primarily the comparative analysis of savings and investment considerations for both customers and businesses. Based on the data on residential energy consumption and real-world scenarios, the quantitative baseline for evaluating the effectiveness of intelligent energy management systems is established. The analysis of data before and after the implementation of such systems allows the determination of the average monetary savings that customers can achieve over time, as well as the potential investment opportunities that they can take advantage of. This provides valuable insight into the financial benefits of subscribing to these systems, which use advanced algorithms to shift consumption patterns in response to changing energy prices.

Sample	SUM €	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Normal Use Cost	**97,48**	5,86	5,31	7,21	4,36	8,35	2,87	6,01	2,41	3,54	0,73	0,74	1,34	2,26	1,03	5,32	4,20	3,17	0,29	3,73	3,07	3,58	8,97	10,03	3,12
Shifted Use Costs	**85,91**	5,34	4,44	6,43	3,71	8,03	2,42	5,82	2,07	3,07	0,68	0,66	1,12	2,19	0,88	4,43	3,70	2,59	0,27	2,60	2,57	2,80	8,35	8,82	2,92
Shifted Amount %	**21,63**	16,62	24,89	21,80	9,70	16,48	23,46	15,48	23,30	28,77	18,03	16,71	21,15	22,38	20,20	25,87	19,45	24,34	27,04	23,64	18,64	21,53	21,37	31,84	26,54
Saving (Netto) %	**12,48**	8,79	16,40	10,74	14,78	3,86	15,60	3,20	14,27	13,29	6,59	11,03	16,06	3,38	14,06	16,76	12,02	18,05	6,91	30,38	16,43	21,66	6,85	12,05	6,47
	Average %																								

Table 12. The net result for the sampling dates before and after the shifting of consumption, as well as the percentage of the shifted energy and the amount of the net savings.

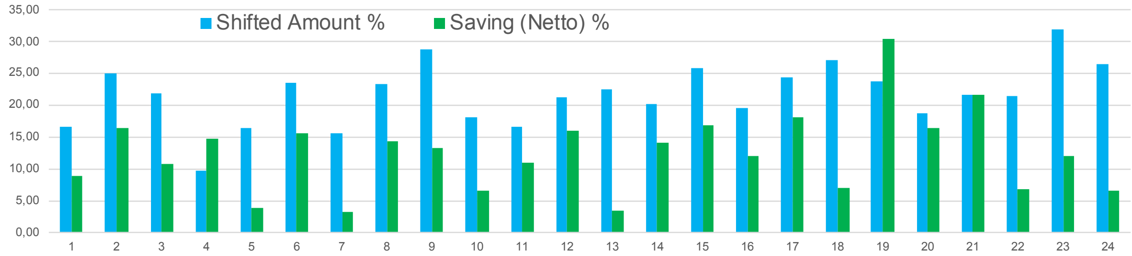


Figure 7. The variations in the correlation between the shifted consumption amount and the percentage of the savings for a better understanding.

Figure 7 does not show any recognisable pattern of correlation. Due to various factors, such as fluctuations in prices during the day, the amount of savings varies even when the energy shift is similar. Additionally, the overall average price plays a significant role in the final outcome. Generally, electricity prices that are higher in value tend to result in more significant invoice reductions when using the suggested technology.

- Average Net savings 12.48 %
- The average amount of the shifted energy 21.63 %

For better comparison, it is recommended to include a fixed price contract as an additional point along with the other two, and the result of the comparison shows some real net numbers from the sample dates.

Sample		SUM €	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Fix Price (Cent)	7	79,59	4,10	3,13	3,57	4,62	4,53	2,74	3,76	2,92	2,94	2,82	2,54	2,35	2,69	2,70	2,98	2,62	2,95	2,75	2,55	2,57	2,37	5,12	4,95	5,34
Normal Use Cost		97,48	5,86	5,31	7,21	4,36	8,35	2,87	6,01	2,41	3,54	0,73	0,74	1,34	2,26	1,03	5,32	4,20	3,17	0,29	3,73	3,07	3,58	8,97	10,03	3,12
Shifted Use Costs		85,91	5,34	4,44	6,43	3,71	8,03	2,42	5,82	2,07	3,07	0,68	0,66	1,12	2,19	0,88	4,43	3,70	2,59	0,27	2,60	2,57	2,80	8,35	8,82	2,92

Sample		SUM €	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Fix Price (Cent)	8	90,96	4,68	3,58	4,08	5,28	5,18	3,14	4,29	3,34	3,35	3,22	2,90	2,68	3,08	3,09	3,40	3,00	3,37	3,14	2,91	2,94	2,70	5,85	5,66	6,10
Normal Use Cost		97,48	5,86	5,31	7,21	4,36	8,35	2,87	6,01	2,41	3,54	0,73	0,74	1,34	2,26	1,03	5,32	4,20	3,17	0,29	3,73	3,07	3,58	8,97	10,03	3,12
Shifted Use Costs		85,91	5,34	4,44	6,43	3,71	8,03	2,42	5,82	2,07	3,07	0,68	0,66	1,12	2,19	0,88	4,43	3,70	2,59	0,27	2,60	2,57	2,80	8,35	8,82	2,92

Sample		SUM €	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Fix Price (Cent)	9	102,33	5,27	4,03	4,59	5,95	5,82	3,53	4,83	3,76	3,77	3,62	3,26	3,02	3,46	3,47	3,83	3,37	3,79	3,53	3,28	3,30	3,04	6,58	6,37	6,86
Normal Use Cost		97,48	5,86	5,31	7,21	4,36	8,35	2,87	6,01	2,41	3,54	0,73	0,74	1,34	2,26	1,03	5,32	4,20	3,17	0,29	3,73	3,07	3,58	8,97	10,03	3,12
Shifted Use Costs		85,91	5,34	4,44	6,43	3,71	8,03	2,42	5,82	2,07	3,07	0,68	0,66	1,12	2,19	0,88	4,43	3,70	2,59	0,27	2,60	2,57	2,80	8,35	8,82	2,92

Table 13. The comparative data for the different fixed-price models and the normal and shifted consumption.

The fixed price for 24 samples has been calculated by multiplying the amount of energy used on the selected day by the price per kilowatt hour for the fixed-term contract. Already, 7 c/kWh contracts are cheaper than the shifted end sum. However, the change is turning around with a price increase to 8 c/kWh, and the shift in consumption already looks more profitable than a fixed-term contract. By a 9 c/kWh fixed price, the normal consumption with a flex price contract is more profitable.

The same prinzip for comparison between the Flex and Fix prices is used for the one-year Net costs. The following table shows the monthly data for 2023, where the real electricity price is applied to the consumption on an hourly basis and for the fixed term, the amount of used energy over the year 2023 is multiplied by the suggested fixed price in this case, the confirmation of the previous finding with a fix contract range between 6-9 c/kWh.

Tarif	SUM € Netto	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
6 Cent/kWh	514,84	49,81	55,05	49,59	40,46	35,30	32,85	34,91	36,34	35,31	38,42	45,64	61,15
7 Cent/kWh	572,04	55,35	61,17	55,10	44,96	39,22	36,50	38,79	40,38	39,23	42,69	50,71	67,94
Flex Price	589,30	72,80	81,50	67,20	46,46	20,61	26,41	22,42	45,25	23,61	28,34	63,66	91,06
8 Cent/kWh	653,76	63,25	69,91	62,98	51,38	44,82	41,71	44,34	46,15	44,83	48,79	57,96	77,65
9 Cent/kWh	735,48	71,16	78,65	70,85	57,81	50,43	46,93	49,88	51,92	50,44	54,89	65,20	87,35

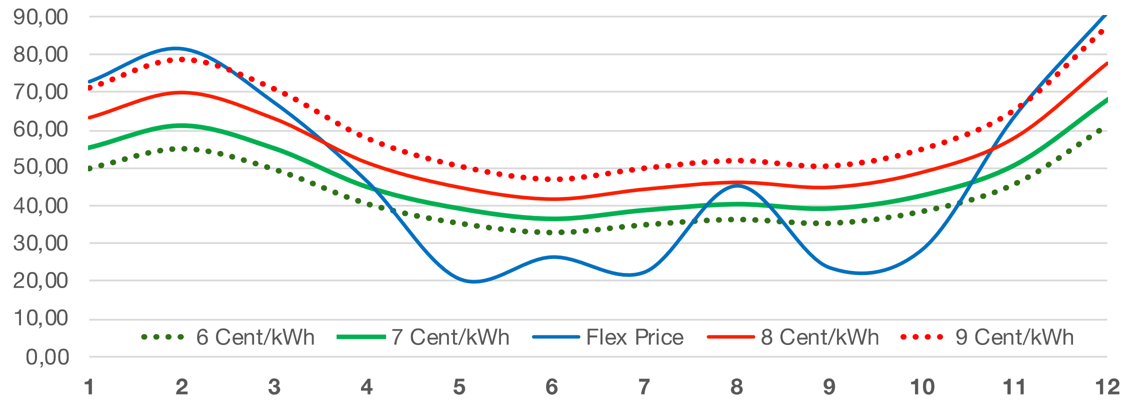


Table 14. The 2023 Net price from real consumption with a flexible price and fixed price for 6, 7, 8, and 9 euro cents.

The results almost confirm the previous findings about the profitable limit of the fixed-term contract, with the only difference being that the 8 c/kWh price is more expensive compared to the end cost for normal unmodified energy usage.

The resulting number from the shifted calculation is 12.5% multiplied by the amount of consumed energy over the year 2023 from the selected household. The possible savings over the year can be calculated and compared to the price range of a fixed-price contract. The flex price for the full year 2023 with normal usage is 589.30 € by applying the suggested factor resulting from the sampling calculation of 12.48%.

589.30 € – 12.48% = 515.76 €

This is 73.54 € net savings, which is also not taxed. Herewith, it is visible that the shifted technology could compete almost with an even lower price, suggested as 6 cents per kilowatt hour, as Table 14 visualises.

Shifted consumption under a flexible price contract can be more profitable than a fixed-term contract, especially with a very high consumption. This suggests that businesses should consider the advantages of a flexible price contract, as it can potentially result in increased profits. However, it is important to note that the profitability of a flexible price contract may vary depending on the specific consumption patterns and energy needs of each business. It is recommended that the energy usage patterns of the business be analysed before selecting an appropriate pricing plan.

7 Conclusion and report

The research findings suggest that smart grid technologies can enable significant cost savings and improved grid stability by facilitating the time-shifted consumption of energy. By leveraging advanced technologies such as demand response management, energy storage systems, and automated load control, utilities can better manage the variability of renewable energy sources and reduce the need for expensive peaking power plants. This can lead to a more sustainable and resilient power grid with lower overall costs for both utilities and consumers. Moreover, the adoption of smart grid technologies can enable greater integration of distributed energy resources, such as solar panels and battery storage, which can further enhance the efficiency and reliability of the grid.

7.1 Summary of findings

The research in this thesis shows that using real-time pricing and smart grid technologies for time-shifted energy consumption can reduce household energy costs while stabilising the grid in Nordic countries, especially in Finland. Key findings from the study follow.

Consumer behaviour indicates a strong correlation between electricity prices and household energy consumption, with data indicating that consumers could tend to adjust their usage in response to price signals. Additionally, a strong negative correlation between price and outside temperature suggests that higher prices correspond with colder periods, possibly due to increased heating demands. This adaptability not only leads to cost savings but also aids in balancing the grid during peak and off-peak periods.

The impact of smart technologies is required to facilitate the shift in energy consumption patterns. The adoption of these technologies not only automates the energy-saving process but also enhances the efficiency and effectiveness of real-time pricing strategies.

Time-shifting calculations are an approach to calculating the potential cost savings from time-shifted consumption. By considering the median price and identifying the base and excess use, it provides a clear picture of how consumption can be adjusted to leverage lower prices. The manual suggestion for cheaper consumption times is, in reality, the job of an intelligent system, which, together with real-time price information, provides the principle of the **product for the commercial operation of the time-shifted technology**.

Economic analysis underscores that the benefits of reduced energy costs could outweigh the initial investments in smart technologies over time. The integration into the new technical smartness level of a single participating device requires, depending on the complexity, investment varying in the price range of 10€ from a smart plug up to over 1000€ for a heat pump. Wider smart devices' compatibility and functions often positively result in an end price. Acquiring new appliances can be a costly investment, and it is important to consider whether the price-dependent consumption technology justifies the expense. However, if a new purchase is already being planned, it is worth taking into account the device's compatibility with existing appliances.

Fix Price comparison is a significant factor that affects the suggestion of shifting the time of energy consumption. It eliminates the inconvenience and financial investment required for time-shifted energy consumption by providing competitive pricing. Time-shifted energy consumption may find it difficult to compete with more competitive fixed-price contracts without the need for additional investments.

Evaluation of the comparative analysis offers a look at pre- and post-shifting scenarios, justifying the argument that time-shifted consumption is not only feasible but also economically beneficial. The resulting amount of the savings can be cross-checked and compared with household energy usage data. The resulting amount of shifted energy around 20% in a sampling comparison can be scaled up to 30%, as indicated as a candidate for the suggested technology in Tables 4 and 5, which is a proportional amount of savings.

Scalability is a crucial factor to consider when implementing technology to manage electricity usage. It is important to note that scalability is more relevant for a single house than for a flat. This is because a single house typically consumes a higher amount of electricity than a flat, which can lead to a greater need for scalability measures to be implemented. Therefore, it is essential to carefully consider scalability when implementing technology solutions for managing electricity usage in a single house and the cost for each upgrade of the device for compatibility.

The environmental impact created by shifting consumption is justified by reducing the need for expensive peak power generation. This, in turn, is caused by an imbalanced grid and allowing the customers to operate the electrical equipment to the times of the abandonment of renewable power generation, which aligns with a broader sustainability pursuit.

Seasonal impact notes the influence on energy pricing, with colder months showing higher prices due to increased heating demands. This seasonality underscores the potential benefits of time-shifted consumption strategies, particularly during high-demand periods.

During the **summer months,** the availability of solar power is present, and the prices can be as low as around 0€. The overall savings may not be as significant even if a big amount of energy is shifted. At the same time, the same kind of technology is used to efficiently utilise the overload of solar energy by implementing the smart control of electrical equipment.

Time-shifted energy consumption technology is an excellent complement to **solar power generation**. It optimises the use of locally generated energy and reduces reliance on the grid during peak price periods. Households can store the extra solar energy produced during the day and use it during high-demand periods, avoiding higher costs. Additionally, households with solar installations can adjust their energy usage based on real-time pricing, storing or sending excess energy back to the grid. This combination is considered an optimal solution for the shifted technology, which profits from the technical installations as a part of the solar-powered systems.

Policy and market dynamics are essential for the widespread adoption of time-shifted consumption. Policy recommendations include incentives for smart technology adoption and clearer information on energy pricing. All this is mainly pushed by environmental factors and renewable energy sources.

7.2 Financial aspects

Customers consider the cost of investment to be a crucial aspect when observing the adoption of new technology. After analysing real household data, it is evident that substantial savings can only be attained if the overall energy consumption is high. Providers are forced to purchase energy at exorbitant prices during times of high electricity demand to meet the demand.

The findings demonstrate that while initial investments in smart technology, such as smart thermostats and home energy management systems, can be substantial in the long term, they can also bring possible discomfort caused by usage pattern changes. Saving on energy bills offers a compelling return on investment (ROI), but shifting consumption across all devices could lead to an unprofitable return period, especially when renewing appliances.

Installation investment

Assuming that households have remotely controllable devices, the focus shifts to investing in smart technology. This can range from a simple 20€ smart plug for heaters to a more advanced water heating controller. Such investments mark a crucial turning point in the commercialisation of time-shifting technology, providing lucrative selling points for businesses. However, the best solution is to combine these investments with a solar power panel installation. This would manage two criteria with one system: cheaper electricity due to price variations and the excess of self-produced electricity.

When examining financial aspects, it is important to consider the economic attractiveness of **fixed-priced** energy contracts. These contracts offer a consistent and predictable billing structure to consumers, which protects them from the volatility associated with variable-rate plans. From a financial perspective, fixed-price contracts provide budget stability, which is especially appealing to households that prioritise predictable expenses during the contract period. Unlike dynamic pricing models that require investments in smart technologies to maximise savings, fixed-price contracts do not require any initial financial outlay. This lack of upfront investment removes a significant barrier to entry for many consumers, making these contracts an attractive option for those who prefer simplicity and financial predictability. Additionally, fixed-price contracts can prove financially advantageous over time, especially in markets where energy prices are expected to rise. By locking in a rate that remains constant regardless of market fluctuations, consumers can save a considerable amount of money if prices increase in the broader energy market. This makes fixed-price contracts not only a safe financial choice but also a potentially shrewd economic strategy in the face of rising energy costs.

Commercial application

A company can improve its products efficiently by focusing on software development and integrating available components without the need for costly hardware development. This approach will save time and resources while ensuring that the company stays competitive in the market. The main product, in the form of an intelligent solution, is scalable and can be spread by integration into the available hardware offerings. Cooperation with solar technology installation companies can address customer concerns about investment since the suggested shifted technology would allow squeezing the most efficiency in energy consumption.

7.3 Future research directions

By analysing the trends and patterns in the listed activities, it becomes possible to gain a deeper understanding of the industry's current state and future direction. This information can then be used to inform decision-making processes and guide the development of new technologies that are better suited to the needs of the industry and its customers.

The fixed price contracts serve as an example of a significant problem when it comes to convincing customers to invest in technology. The usage pattern changes that come with new technology should not complicate the customer's life. Instead, technology should make humans' everyday lives easier, which is only possible with efficient and developed technology. From a technical standpoint, the development of energy control intelligence is a way to make the product more attractive to potential customers in the future.

For a more robust and accurate implementation of this research, it is essential to obtain reliable end-device consumption data. By benchmarking this data to more efficient building automation practices, better energy efficiency in buildings can be achieved. It is important to collect accurate and reliable data when conducting research on building automation in order to gain a better understanding.

The data related to housing and energy consumption can help to understand a country's capabilities, including those of neighbouring Nordic countries. The shift in electricity usage to off-peak hours can significantly minimise the need for less efficient and more polluting peaker-plants, leading to a more comprehensive environmental advantage.

Therefore, it is essential for policymakers to consider incentives that could reduce the burden of initial costs for consumers, thereby accelerating the adoption of time-shifting practices. Similarly, energy providers can leverage these technologies to offer differentiated pricing plans that encourage off-peak consumption, enhancing overall energy market efficiency.

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Appendix 1

2023-01-26

Date Time			2023-01-26 00:00	2023-01-26 01:00	2023-01-26 02:00	2023-01-26 03:00	2023-01-26 04:00	2023-01-26 05:00	2023-01-26 06:00	2023-01-26 07:00	2023-01-26 08:00	2023-01-26 09:00	2023-01-26 10:00	2023-01-26 11:00	2023-01-26 12:00	2023-01-26 13:00	2023-01-26 14:00	2023-01-26 15:00
	12,57	€ Cent																
Selected	10,00	€ Cent	3,59	4,47	4,59	4,59	4,56	4,59	5,09	10,08	13,28	13,61	13,55	13,71	13,71	13,76	13,21	13,02
	44,77	kWh	0,44	0,33	0,31	1,83	0,33	0,35	0,40	1,25	3,23	1,68	0,66	0,61	0,92	1,10	0,65	1,13
Average	-3,43	t (°C)	2,7	2,9	2,9	2,7	2,5	2,3	2,0	1,9	1,5	1,3	1,2	1,0	0,5	0,4	0,3	0,0
Price x Use	531,06	€ Cent	1,58	1,48	1,42	8,40	1,50	1,61	2,04	12,60	42,89	22,86	8,94	8,36	12,61	15,14	8,59	14,71
=MIN of Use + 10%	0,34	kWh	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34
Use (kWh) - Base use		kWh	0,10	-0,01	-0,03	1,49	-0,01	0,01	0,06	0,91	2,89	1,34	0,32	0,27	0,58	0,76	0,31	0,79
> 1 kWh	11,14	kWh									2,89	1,34						
> 1 kWh	11,14	kWh			2,89	1,34												
kWh	44,77	kWh	0,44	0,33	3,20	3,17	0,33	0,35	0,40	1,25	0,34	0,34	0,66	0,61	0,92	1,10	0,65	1,13
c/kWh x Sh.Use (kWh)	443,94	€ Cent	1,58	1,48	14,68	14,55	1,50	1,61	2,04	12,60	4,53	4,64	8,94	8,36	12,61	15,14	8,59	14,71
Noprm. Use - Shift. Use	87,12	€ Cent																
Noprm. Use - Shift. Use	16,40	%																

Date Time	2023-01-26 16:00	2023-01-26 17:00	2023-01-26 18:00	2023-01-26 19:00	2023-01-26 20:00	2023-01-26 21:00	2023-01-26 22:00	2023-01-26 23:00	2023-01-27 00:00	2023-01-27 01:00	2023-01-27 02:00	2023-01-27 03:00	2023-01-27 04:00	2023-01-27 05:00	2023-01-27 06:00	2023-01-27 07:00
Selected	13,67	13,89	14,02	14,07	13,59	11,62	11,24	7,49	6,70	8,45	8,78	9,75	10,09	11,53	12,91	15,33
	1,16	0,82	0,88	0,69	1,44	2,64	2,20	0,81	0,35	0,47	0,45	0,44	0,39	0,40	0,52	0,51
Average	-1,5	-1,7	-2,8	-3,0	-3,6	-4,2	-4,8	-5,6	-6,3	-6,2	-5,8	-5,4	-5,4	-5,6	-5,5	-5,8
Price x Use	15,86	11,39	12,34	9,71	19,57	30,68	24,73	6,07	2,35	3,97	3,95	4,29	3,94	4,61	6,71	7,82
=MIN of Use + 10%	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34
Use (kWh) - Base use	0,82	0,48	0,54	0,35	1,10	2,30	1,86	0,47	0,01	0,13	0,11	0,10	0,05	0,06	0,18	0,17
> 1 kWh					1,10	2,30	1,86									
> 1 kWh																
kWh	1,16	0,82	0,88	0,69	0,34	0,34	0,34	0,81	0,35	0,47	0,45	0,44	0,39	0,40	0,52	0,51
c/kWh x Sh.Use (kWh)	15,86	11,39	12,34	9,71	4,63	3,96	3,83	6,07	2,35	3,97	3,95	4,29	3,94	4,61	6,71	7,82
Noprm. Use - Shift. Use																
Noprm. Use - Shift. Use																

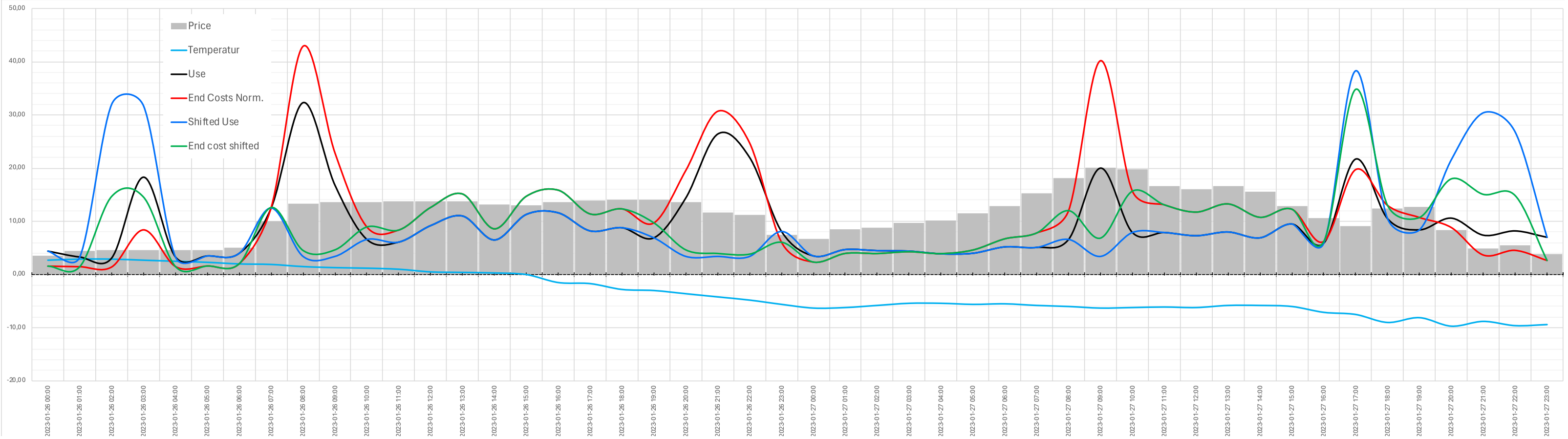
Date Time	2023-01-27 08:00	2023-01-27 09:00	2023-01-27 10:00	2023-01-27 11:00	2023-01-27 12:00	2023-01-27 13:00	2023-01-27 14:00	2023-01-27 15:00	2023-01-27 16:00	2023-01-27 17:00	2023-01-27 18:00	2023-01-27 19:00	2023-01-27 20:00	2023-01-27 21:00	2023-01-27 22:00	2023-01-27 23:00
Selected	18,20	20,09	19,84	16,59	16,08	16,59	15,59	12,92	10,54	9,09	12,37	12,76	8,33	4,96	5,54	3,78
	0,66	2,00	0,79	0,79	0,73	0,80	0,69	0,95	0,59	2,17	1,05	0,84	1,06	0,74	0,82	0,70
Average	-6,0	-6,3	-6,2	-6,1	-6,2	-5,8	-5,8	-6,0	-7,1	-7,5	-9,0	-8,1	-9,7	-8,8	-9,6	-9,4
Price x Use	12,01	40,18	15,67	13,11	11,74	13,27	10,76	12,27	6,22	19,73	12,99	10,72	8,83	3,67	4,54	2,65
=MIN of Use + 10%	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34
Use (kWh) - Base use	0,32	1,66	0,45	0,45	0,39	0,46	0,35	0,61	0,25	1,83	0,71	0,50	0,72	0,40	0,48	0,36
> 1 kWh		1,66														
> 1 kWh										1,66			1,10	2,30	1,86	
kWh	0,66	0,34	0,79	0,79	0,73	0,80	0,69	0,95	0,59	3,83	1,05	0,84	2,16	3,04	2,68	0,70
c/kWh x Sh.Use (kWh)	12,01	6,85	15,67	13,11	11,74	13,27	10,76	12,27	6,22	34,81	12,99	10,72	17,98	15,07	14,84	2,65
Noprm. Use - Shift. Use																
Noprm. Use - Shift. Use																

USE kWh x 4,80 c/kWh	2,15	€

	5,33	€
24 %	1,28	€
	6,61	€

End cost shifted + Transfer Cost	4,46	€
24 %	1,07	€
	5,53	€

Sum Brutto Before - After	1,08	€

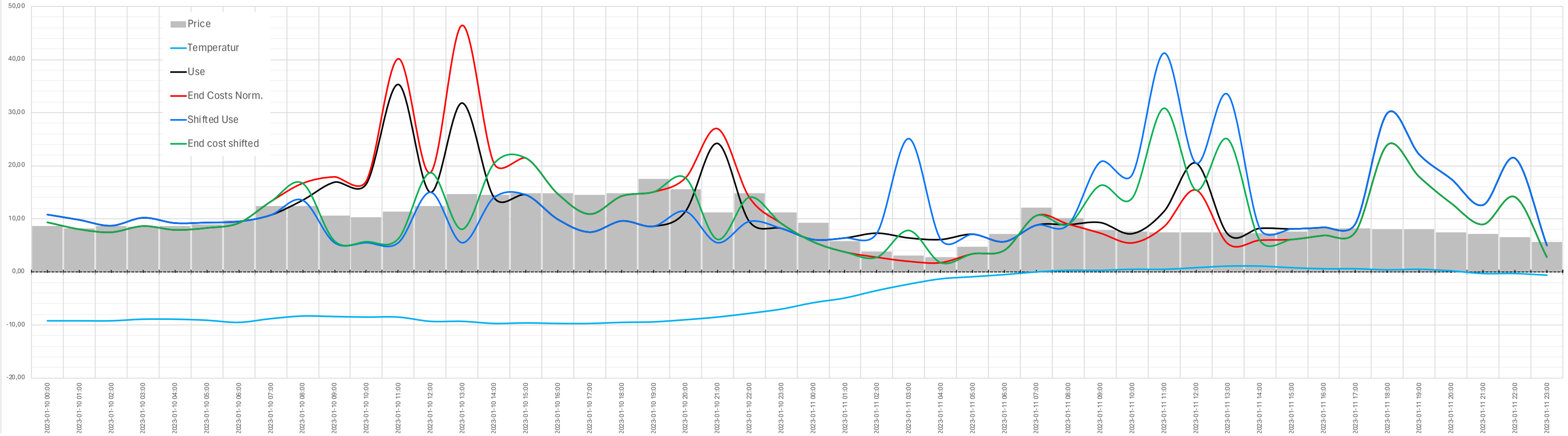


2023-01-10

			Date Time	2023-01-10 00:00	2023-01-10 01:00	2023-01-10 02:00	2023-01-10 03:00	2023-01-10 04:00	2023-01-10 05:00	2023-01-10 06:00	2023-01-10 07:00	2023-01-10 08:00	2023-01-10 09:00	2023-01-10 10:00	2023-01-10 11:00	2023-01-10 12:00	2023-01-10 13:00	2023-01-10 14:00	2023-01-10 15:00	2023-01-10 16:00	2023-01-10 17:00	2023-01-10 18:00	2023-01-10 19:00	2023-01-10 20:00	2023-01-10 21:00	2023-01-10 22:00	2023-01-10 23:00
	8,60	€ Cent																									
Selected	10,00	€ Cent		8,65	8,20	8,59	8,47	8,60	8,91	9,69	12,37	12,36	10,59	10,34	11,37	12,45	14,60	14,59	14,78	14,83	14,52	14,87	17,51	15,53	11,15	14,79	11,16
	58,53	kWh		1,08	0,98	0,87	1,02	0,92	0,93	0,95	1,07	1,35	1,69	1,66	3,53	1,50	3,18	1,40	1,45	0,99	0,75	0,96	0,86	1,14	2,42	0,95	0,82
Average	-4,74	t (°C)		-9,2	-9,2	-9,2	-8,9	-8,9	-9,1	-9,5	-8,8	-8,3	-8,4	-8,5	-8,5	-9,3	-9,3	-9,7	-9,6	-9,7	-9,7	-9,5	-9,4	-9,0	-8,5	-7,8	-7,0
Price x Use	585,86	€ Cent		9,34	8,04	7,47	8,64	7,91	8,29	9,21	13,24	16,69	17,90	17,16	40,14	18,68	46,43	20,43	21,43	14,68	10,89	14,28	15,06	17,70	26,98	14,05	9,15
=MIN of Use + 10%	0,55	kWh		0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55
Use (kWh) - Base use		kWh		0,53	0,43	0,32	0,47	0,37	0,38	0,40	0,52	0,80	1,14	1,11	2,98	0,95	2,63	0,85	0,90	0,44	0,20	0,41	0,31	0,59	1,87	0,40	0,27
> 1 kWh	9,73	kWh											1,14	1,11	2,98		2,63								1,87		
> 1 kWh	9,73	kWh																									
kWh	58,53	kWh		1,08	0,98	0,87	1,02	0,92	0,93	0,95	1,07	1,35	0,55	0,55	0,55	1,50	0,55	1,40	1,45	0,99	0,75	0,96	0,86	1,14	0,55	0,95	0,82
c/kWh x Sh.Use (kWh)	534,34	€ Cent		9,34	8,04	7,47	8,64	7,91	8,29	9,21	13,24	16,69	5,82	5,69	6,25	18,68	8,03	20,43	21,43	14,68	10,89	14,28	15,06	17,70	6,13	14,05	9,15
Nopm. Use - Shift. Use	51,52	€ Cent																									
Nopm. Use - Shift. Use	8,79	%																									

	2023-01-11 00:00	2023-01-11 01:00	2023-01-11 02:00	2023-01-11 03:00	2023-01-11 04:00	2023-01-11 05:00	2023-01-11 06:00	2023-01-11 07:00	2023-01-11 08:00	2023-01-11 09:00	2023-01-11 10:00	2023-01-11 11:00	2023-01-11 12:00	2023-01-11 13:00	2023-01-11 14:00	2023-01-11 15:00	2023-01-11 16:00	2023-01-11 17:00	2023-01-11 18:00	2023-01-11 19:00	2023-01-11 20:00	2023-01-11 21:00	2023-01-11 22:00	2023-01-11 23:00
Selected	9,30	5,86	3,78	3,11	2,85	4,79	7,17	12,05	10,10	7,86	7,59	7,48	7,52	7,48	7,27	7,54	8,18	8,27	8,00	8,10	7,39	7,11	6,59	5,58
	0,61	0,64	0,73	0,64	0,61	0,71	0,57	0,88	0,89	0,93	0,72	1,14	2,05	0,71	0,82	0,81	0,84	0,91	2,99	2,21	1,75	1,26	2,14	0,50
Average	-5,8	-4,9	-3,5	-2,3	-1,3	-0,9	-0,5	0,0	0,3	0,3	0,5	0,5	0,8	1,1	1,1	0,8	0,6	0,6	0,4	0,5	0,2	-0,3	-0,3	-0,6
Price x Use	5,67	3,75	2,76	1,99	1,74	3,40	4,09	10,60	8,99	7,31	5,46	8,53	15,42	5,31	5,96	6,11	6,87	7,53	23,92	17,90	12,93	8,96	14,10	2,79
=MIN of Use + 10%	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55	0,55
Use (kWh) - Base use	0,06	0,09	0,18	0,09	0,06	0,16	0,02	0,33	0,34	0,38	0,17	0,59	1,50	0,16	0,27	0,26	0,29	0,36	2,44	1,66	1,20	0,71	1,59	-0,05
> 1 kWh																								
> 1 kWh				1,87						1,14	1,11	2,98		2,63										
kWh	0,61	0,64	0,73	2,51	0,61	0,71	0,57	0,88	0,89	2,07	1,83	4,12	2,05	3,34	0,82	0,81	0,84	0,91	2,99	2,21	1,75	1,26	2,14	0,50
c/kWh x Sh.Use (kWh)	5,67	3,75	2,76	7,81	1,74	3,40	4,09	10,60	8,99	16,27	13,89	30,82	15,42	24,98	5,96	6,11	6,87	7,53	23,92	17,90	12,93	8,96	14,10	2,79
Nopm. Use - Shift. Use																								
Nopm. Use - Shift. Use																								

USE kWh x 4,80 c/kWh	2,81	€
	5,89	€
24 %	1,41	€
	7,30	€
End cost shifted + Transfer Cost	5,37	€
24 %	1,29	€
	6,66	€
Sum Brutto Before - After	**0,64**	€



2023-02-14

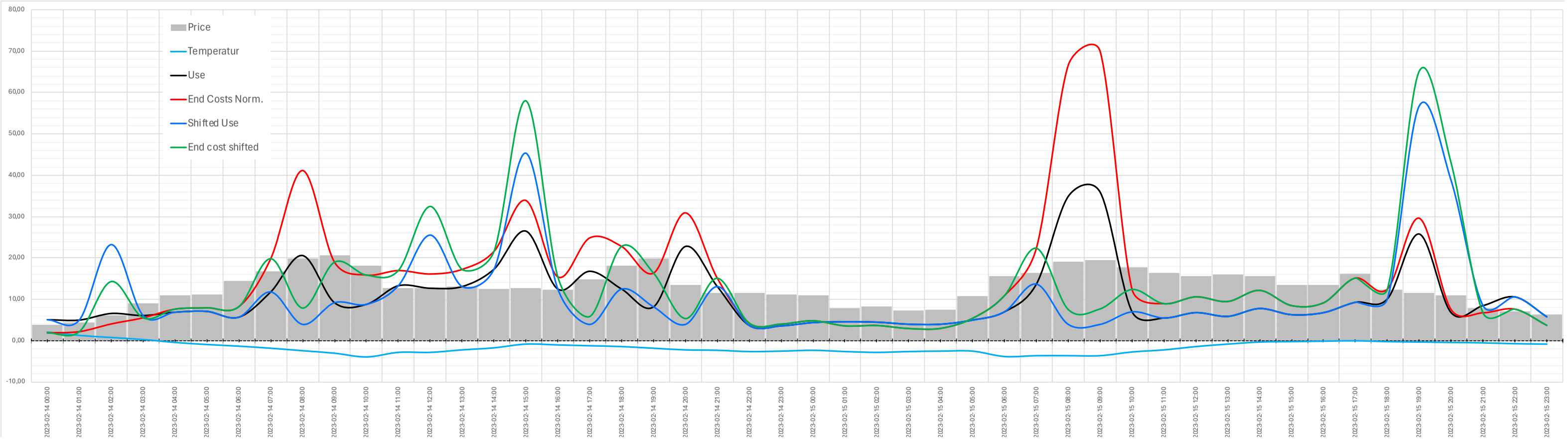
	12,74	€ Cent
Selected	13,00	€ Cent
	51,00	kWh
Average	-1,56	t (°C)
Price x Use	720,65	€ Cent
=MIN of Use + 10%	0,40	kWh
Use (kWh) - Base use		kWh
> 1 kWh	11,12	kWh
> 1 kWh	11,12	kWh
kWh	51,00	kWh
c/kWh x Sh.Use (kWh)	643,22	€ Cent
Noprm. Use - Shift. Use	77,43	€ Cent
Noprm. Use - Shift. Use	10,74	%
USE kWh x 4,80 c/kWh	2,45	€
	7,23	€
24 %	1,74	€
	8,97	€
End cost shifted + Transfer Cost	6,46	€
24 %	1,55	€
	8,01	€
Sum Brutto Before - After	0,96	€

Date Time	2023-02-14 00:00	2023-02-14 01:00	2023-02-14 02:00	2023-02-14 03:00	2023-02-14 04:00	2023-02-14 05:00	2023-02-14 06:00	2023-02-14 07:00	2023-02-14 08:00	2023-02-14 09:00	2023-02-14 10:00	2023-02-14 11:00
Selected (€ Cent)	3,76	4,41	6,16	9,10	11,08	11,22	14,44	16,81	19,97	20,65	18,05	12,76
kWh	0,51	0,50	0,66	0,61	0,69	0,71	0,57	1,18	2,06	0,92	0,88	1,33
t (°C)	2,1	1,3	0,8	0,3	-0,4	-0,9	-1,3	-1,8	-2,4	-3,0	-3,9	-2,8
Price x Use	1,92	2,21	4,07	5,55	7,65	7,97	8,23	19,84	41,14	19,00	15,88	16,97
=MIN of Use + 10%	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40
Use (kWh) - Base use	0,11	0,10	0,26	0,21	0,29	0,31	0,17	0,78	1,66	0,52	0,48	0,93
> 1 kWh									1,66			
> 1 kWh			1,66									
kWh	0,51	0,50	2,32	0,61	0,69	0,71	0,57	1,18	0,40	0,92	0,88	1,33
c/kWh x Sh.Use (kWh)	1,92	2,21	14,32	5,55	7,65	7,97	8,23	19,84	7,91	19,00	15,88	16,97

Date Time	2023-02-14 12:00	2023-02-14 13:00	2023-02-14 14:00	2023-02-14 15:00	2023-02-14 16:00	2023-02-14 17:00	2023-02-14 18:00	2023-02-14 19:00	2023-02-14 20:00	2023-02-14 21:00	2023-02-14 22:00	2023-02-14 23:00
Selected (€ Cent)	12,71	13,17	12,49	12,79	12,35	14,80	18,24	19,95	13,56	11,53	11,49	11,20
kWh	1,27	1,31	1,73	2,65	1,25	1,68	1,25	0,82	2,28	1,31	0,37	0,36
t (°C)	-2,8	-2,2	-1,7	-0,8	-1,0	-1,2	-1,4	-1,8	-2,2	-2,3	-2,6	-2,5
Price x Use	16,14	17,25	21,61	33,89	15,44	24,86	22,80	16,36	30,92	15,10	4,25	4,03
=MIN of Use + 10%	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40
Use (kWh) - Base use	0,87	0,91	1,33	2,25	0,85	1,28	0,85	0,42	1,88	0,91	-0,03	-0,04
> 1 kWh						1,28			1,88			
> 1 kWh	1,28			1,88								
kWh	2,55	1,31	1,73	4,53	1,25	0,40	1,25	0,82	0,40	1,31	0,37	0,36
c/kWh x Sh.Use (kWh)	32,46	17,25	21,61	57,99	15,44	5,86	22,80	16,36	5,37	15,10	4,25	4,03

Date Time	2023-02-15 00:00	2023-02-15 01:00	2023-02-15 02:00	2023-02-15 03:00	2023-02-15 04:00	2023-02-15 05:00	2023-02-15 06:00	2023-02-15 07:00	2023-02-15 08:00	2023-02-15 09:00	2023-02-15 10:00	2023-02-15 11:00
Selected (€ Cent)	11,00	7,81	8,20	7,40	7,50	10,86	15,59	16,32	19,09	19,47	17,71	16,31
kWh	0,44	0,46	0,45	0,40	0,40	0,50	0,70	1,37	3,49	3,59	0,70	0,55
t (°C)	-2,3	-2,6	-2,8	-2,6	-2,5	-2,5	-3,8	-3,6	-3,6	-3,6	-2,7	-2,2
Price x Use	4,84	3,59	3,69	2,96	3,00	5,43	10,91	22,36	66,62	69,90	12,40	8,97
=MIN of Use + 10%	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40
Use (kWh) - Base use	0,04	0,06	0,05	0,00	0,00	0,10	0,30	0,97	3,09	3,19	0,30	0,15
> 1 kWh									3,09	3,19		
> 1 kWh												
kWh	0,44	0,46	0,45	0,40	0,40	0,50	0,70	1,37	0,40	0,40	0,70	0,55
c/kWh x Sh.Use (kWh)	4,84	3,59	3,69	2,96	3,00	5,43	10,91	22,36	7,56	7,71	12,40	8,97

Date Time	2023-02-15 12:00	2023-02-15 13:00	2023-02-15 14:00	2023-02-15 15:00	2023-02-15 16:00	2023-02-15 17:00	2023-02-15 18:00	2023-02-15 19:00	2023-02-15 20:00	2023-02-15 21:00	2023-02-15 22:00	2023-02-15 23:00
Selected (€ Cent)	15,62	16,09	15,62	13,49	13,49	16,30	12,36	11,48	11,09	7,96	7,21	6,42
kWh	0,68	0,59	0,78	0,63	0,68	0,93	1,01	2,58	0,68	0,85	1,06	0,58
t (°C)	-1,4	-0,8	-0,3	-0,2	-0,1	0,0	-0,2	-0,3	-0,4	-0,5	-0,7	-0,8
Price x Use	10,62	9,49	12,18	8,50	9,17	15,16	12,48	29,62	7,54	6,77	7,64	3,72
=MIN of Use + 10%	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40
Use (kWh) - Base use	0,28	0,19	0,38	0,23	0,28	0,53	0,61	2,18	0,28	0,45	0,66	0,18
> 1 kWh												
> 1 kWh								3,09	3,19			
kWh	0,68	0,59	0,78	0,63	0,68	0,93	1,01	5,67	3,87	0,85	1,06	0,58
c/kWh x Sh.Use (kWh)	10,62	9,49	12,18	8,50	9,17	15,16	12,48	65,14	42,96	6,77	7,64	3,72



2023-02-27

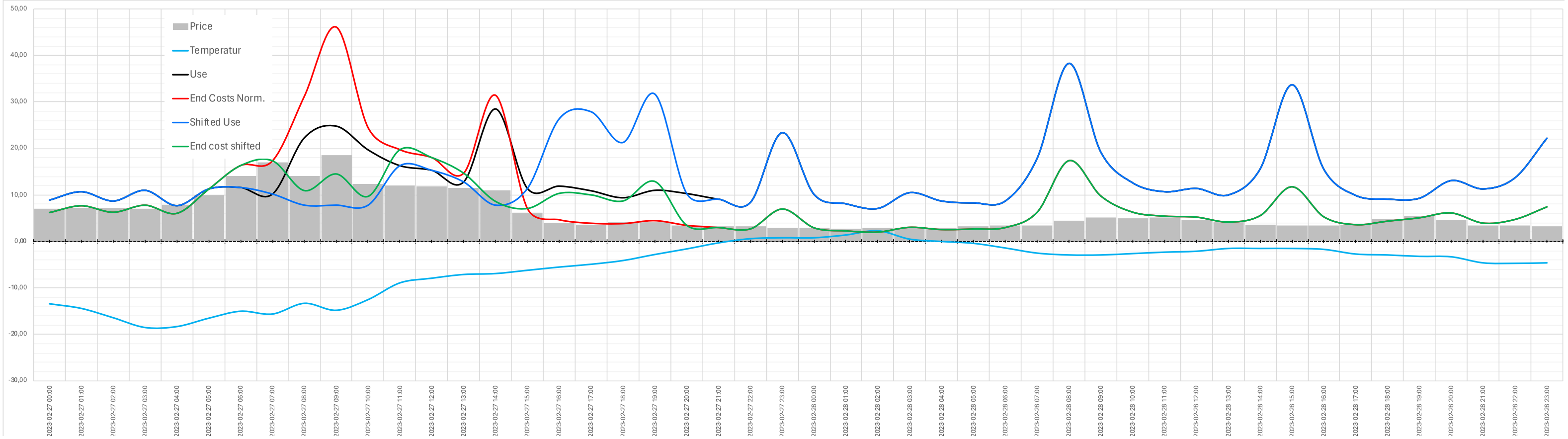
	4,36	€ Cent
Selected	10,00	€ Cent
	66,06	kWh
Average	-5,58	t (°C)
Price x Use	**435,84**	€ Cent
=MIN of Use + 10%	0,78	kWh
Use (kWh) - Base use		kWh
> 1 kWh	6,41	kWh
> 1 kWh	6,41	kWh
kWh	66,06	kWh
c/kWh x Sh.Use (kWh)	**371,43**	€ Cent
Noprm. Use - Shift. Use	64,41	€ Cent
Noprm. Use - Shift. Use	**14,78**	%
USE kWh x 4,80 c/kWh	3,17	€
	4,39	€
24 %	1,05	€
	5,44	€
End cost shifted + Transfer Cost	**3,75**	€
24 %	0,90	€
	4,65	€
Sum Brutto Before - After	**0,80**	€

Date Time	2023-02-27 00:00	2023-02-27 01:00	2023-02-27 02:00	2023-02-27 03:00	2023-02-27 04:00	2023-02-27 05:00	2023-02-27 06:00	2023-02-27 07:00	2023-02-27 08:00	2023-02-27 09:00	2023-02-27 10:00	2023-02-27 11:00
Selected (€ Cent)	6,99	7,18	7,22	7,09	7,86	9,96	14,08	17,01	14,01	18,59	12,42	12,11
kWh	0,89	1,07	0,87	1,10	0,77	1,13	1,16	1,02	2,23	2,48	1,97	1,63
t (°C)	-13,4	-14,4	-16,4	-18,5	-18,3	-16,5	-15,0	-15,6	-13,3	-14,8	-12,5	-8,9
Price x Use	6,22	7,68	6,28	7,80	6,05	11,25	16,33	17,35	31,24	46,10	24,47	19,74
=MIN of Use + 10%	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78
Use (kWh) - Base use	0,11	0,29	0,09	0,32	-0,01	0,35	0,38	0,24	1,45	1,70	1,19	0,85
> 1 kWh									1,45	1,70	1,19	
> 1 kWh												
kWh	0,89	1,07	0,87	1,10	0,77	1,13	1,16	1,02	0,78	0,78	0,78	1,63
c/kWh x Sh.Use (kWh)	6,22	7,68	6,28	7,80	6,05	11,25	16,33	17,35	10,94	14,52	9,70	19,74

Date Time	2023-02-27 12:00	2023-02-27 13:00	2023-02-27 14:00	2023-02-27 15:00	2023-02-27 16:00	2023-02-27 17:00	2023-02-27 18:00	2023-02-27 19:00	2023-02-27 20:00	2023-02-27 21:00	2023-02-27 22:00	2023-02-27 23:00
Selected (€ Cent)	11,79	11,47	11,03	6,22	3,92	3,59	4,09	4,07	3,37	3,29	3,22	2,98
kWh	1,53	1,28	2,85	1,14	1,19	1,09	0,94	1,10	1,03	0,91	0,84	2,34
t (°C)	-7,9	-7,1	-6,9	-6,2	-5,5	-4,9	-4,1	-2,8	-1,6	-0,3	0,6	0,8
Price x Use	18,04	14,68	31,44	7,09	4,66	3,91	3,84	4,48	3,47	2,99	2,70	6,97
=MIN of Use + 10%	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78
Use (kWh) - Base use	0,75	0,50	2,07	0,36	0,41	0,31	0,16	0,32	0,25	0,13	0,06	1,56
> 1 kWh			2,07									
> 1 kWh					1,45	1,70	1,19	2,07				
kWh	1,53	1,28	0,78	1,14	2,64	2,79	2,13	3,17	1,03	0,91	0,84	2,34
c/kWh x Sh.Use (kWh)	18,04	14,68	8,61	7,09	10,34	10,01	8,71	12,90	3,47	2,99	2,70	6,97

Date Time	2023-02-28 00:00	2023-02-28 01:00	2023-02-28 02:00	2023-02-28 03:00	2023-02-28 04:00	2023-02-28 05:00	2023-02-28 06:00	2023-02-28 07:00	2023-02-28 08:00	2023-02-28 09:00	2023-02-28 10:00	2023-02-28 11:00
Selected (€ Cent)	2,90	2,80	2,84	2,90	2,94	3,23	3,44	3,51	4,54	5,09	5,00	5,09
kWh	1,01	0,81	0,71	1,05	0,87	0,83	0,87	1,79	3,83	1,92	1,26	1,07
t (°C)	0,8	1,4	2,3	0,5	0,0	-0,4	-1,4	-2,5	-2,9	-2,9	-2,6	-2,3
Price x Use	2,93	2,27	2,02	3,05	2,56	2,68	2,99	6,28	17,39	9,77	6,30	5,45
=MIN of Use + 10%	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78
Use (kWh) - Base use	0,23	0,03	-0,07	0,27	0,09	0,05	0,09	1,01	3,05	1,14	0,48	0,29
> 1 kWh												
> 1 kWh												
kWh	1,01	0,81	0,71	1,05	0,87	0,83	0,87	1,79	3,83	1,92	1,26	1,07
c/kWh x Sh.Use (kWh)	2,93	2,27	2,02	3,05	2,56	2,68	2,99	6,28	17,39	9,77	6,30	5,45

Date Time	2023-02-28 12:00	2023-02-28 13:00	2023-02-28 14:00	2023-02-28 15:00	2023-02-28 16:00	2023-02-28 17:00	2023-02-28 18:00	2023-02-28 19:00	2023-02-28 20:00	2023-02-28 21:00	2023-02-28 22:00	2023-02-28 23:00
Selected (€ Cent)	4,59	4,18	3,56	3,49	3,41	3,65	4,80	5,48	4,68	3,49	3,46	3,35
kWh	1,14	1,00	1,56	3,37	1,55	0,99	0,91	0,93	1,31	1,13	1,37	2,22
t (°C)	-2,1	-1,5	-1,5	-1,5	-1,7	-2,7	-2,9	-3,2	-3,3	-4,6	-4,7	-4,6
Price x Use	5,23	4,18	5,55	11,76	5,29	3,61	4,37	5,10	6,13	3,94	4,74	7,44
=MIN of Use + 10%	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78	0,78
Use (kWh) - Base use	0,36	0,22	0,78	2,59	0,77	0,21	0,13	0,15	0,53	0,35	0,59	1,44
> 1 kWh												
> 1 kWh												
kWh	1,14	1,00	1,56	3,37	1,55	0,99	0,91	0,93	1,31	1,13	1,37	2,22
c/kWh x Sh.Use (kWh)	5,23	4,18	5,55	11,76	5,29	3,61	4,37	5,10	6,13	3,94	4,74	7,44

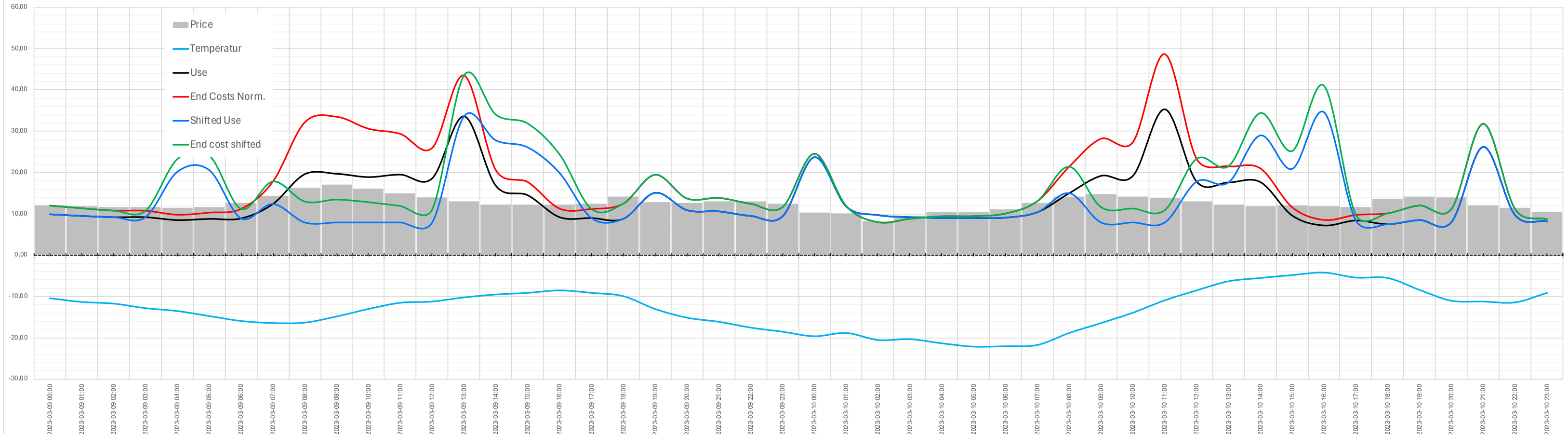


2023-03-09

			Date Time	2023-03-09 00:00	2023-03-09 01:00	2023-03-09 02:00	2023-03-09 03:00	2023-03-09 04:00	2023-03-09 05:00	2023-03-09 06:00	2023-03-09 07:00	2023-03-09 08:00	2023-03-09 09:00	2023-03-09 10:00	2023-03-09 11:00	2023-03-09 12:00	2023-03-09 13:00	2023-03-09 14:00	2023-03-09 15:00	2023-03-09 16:00	2023-03-09 17:00	2023-03-09 18:00	2023-03-09 19:00	2023-03-09 20:00	2023-03-09 21:00	2023-03-09 22:00	2023-03-09 23:00
	12,32	€ Cent																									
Selected	13,00	€ Cent		12,12	11,96	11,73	11,69	11,53	11,71	12,59	14,38	16,40	17,00	16,19	15,05	13,96	12,94	12,24	12,21	12,26	12,43	14,18	12,89	12,59	13,08	13,10	12,37
	64,71	kWh		0,99	0,95	0,92	0,92	0,85	0,88	0,89	1,24	1,96	1,97	1,89	1,95	1,86	3,36	1,68	1,45	0,92	0,90	0,88	1,51	1,09	1,06	0,95	0,94
Average	-13,08	t (°C)		-10,4	-11,3	-11,7	-12,8	-13,5	-14,7	-15,9	-16,4	-16,3	-14,8	-13,0	-11,5	-11,2	-10,2	-9,5	-9,1	-8,5	-9,1	-9,9	-13,0	-15,1	-16,1	-17,5	-18,5
Price x Use	834,97	€ Cent		12,00	11,36	10,79	10,75	9,80	10,30	11,21	17,83	32,14	33,49	30,60	29,35	25,97	43,48	20,56	17,70	11,28	11,19	12,48	19,46	13,72	13,86	12,45	11,63
=MIN of Use + 10%	0,79	kWh		0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79
Use (kWh) - Base use		kWh		0,20	0,16	0,13	0,13	0,06	0,09	0,10	0,45	1,17	1,18	1,10	1,16	1,07	2,57	0,89	0,66	0,13	0,11	0,09	0,72	0,30	0,27	0,16	0,15
> 1 kWh	10,66	kWh										1,17	1,18	1,10	1,16	1,07											
> 1 kWh	10,66	kWh						1,17	1,18									1,10	1,16	1,07							
kWh	64,71	kWh		0,99	0,95	0,92	0,92	2,02	2,06	0,89	1,24	0,79	0,79	0,79	0,79	0,79	3,36	2,78	2,61	1,99	0,90	0,88	1,51	1,09	1,06	0,95	0,94
c/kWh x Sh.Use (kWh)	802,70	€ Cent		12,00	11,36	10,79	10,75	23,27	24,10	11,21	17,83	12,99	13,46	12,82	11,92	11,06	43,48	34,00	31,84	24,37	11,19	12,48	19,46	13,72	13,86	12,45	11,63
Noprm. Use - Shift. Use	32,26	€ Cent																									
Noprm. Use - Shift. Use	3,86	%																									

	2023-03-10 00:00	2023-03-10 01:00	2023-03-10 02:00	2023-03-10 03:00	2023-03-10 04:00	2023-03-10 05:00	2023-03-10 06:00	2023-03-10 07:00	2023-03-10 08:00	2023-03-10 09:00	2023-03-10 10:00	2023-03-10 11:00	2023-03-10 12:00	2023-03-10 13:00	2023-03-10 14:00	2023-03-10 15:00	2023-03-10 16:00	2023-03-10 17:00	2023-03-10 18:00	2023-03-10 19:00	2023-03-10 20:00	2023-03-10 21:00	2023-03-10 22:00	2023-03-10 23:00
Selected	10,36	10,06	8,23	9,59	10,47	10,50	11,09	12,57	14,28	14,68	14,25	13,78	13,10	12,23	11,87	12,08	11,85	11,60	13,52	14,14	13,98	12,13	11,49	10,59
kWh	2,37	1,18	0,97	0,92	0,90	0,90	0,91	1,04	1,50	1,92	1,92	3,53	1,78	1,76	1,77	0,96	0,72	0,84	0,75	0,85	0,80	2,62	0,97	0,82
Average t (°C)	-19,6	-18,8	-20,5	-20,3	-21,3	-22,1	-22,0	-21,7	-18,8	-16,4	-13,9	-10,9	-8,5	-6,3	-5,5	-4,8	-4,2	-5,4	-5,5	-8,4	-11,0	-11,2	-11,4	-9,1
Price x Use	24,55	11,87	7,98	8,82	9,42	9,45	10,09	13,07	21,42	28,19	27,36	48,64	23,32	21,52	21,01	11,60	8,53	9,74	10,14	12,02	11,18	31,78	11,15	8,68
=MIN of Use + 10%	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79	0,79
Use (kWh) - Base use	1,58	0,39	0,18	0,13	0,11	0,11	0,12	0,25	0,71	1,13	1,13	2,74	0,99	0,97	0,98	0,17	-0,07	0,05	-0,04	0,06	0,01	1,83	0,18	0,03
> 1 kWh										1,13	1,13	2,74												
> 1 kWh															1,13	1,13	2,74							
kWh	2,37	1,18	0,97	0,92	0,90	0,90	0,91	1,04	1,50	0,79	0,79	0,79	1,78	1,76	2,90	2,09	3,46	0,84	0,75	0,85	0,80	2,62	0,97	0,82
c/kWh x Sh.Use (kWh)	24,55	11,87	7,98	8,82	9,42	9,45	10,09	13,07	21,42	11,63	11,29	10,91	23,32	21,52	34,40	25,22	40,98	9,74	10,14	12,02	11,18	31,78	11,15	8,68

USE kWh x 4,80 c/kWh	3,11	€
	8,38	€
24 %	2,01	€
	10,39	€
End cost shifted + Transfer Cost	8,06	€
24 %	1,93	€
	9,99	€
Sum Brutto Before - After	**0,40**	€



2023-03-20

			Date Time	2023-03-20 00:00	2023-03-20 01:00	2023-03-20 02:00	2023-03-20 03:00	2023-03-20 04:00	2023-03-20 05:00	2023-03-20 06:00	2023-03-20 07:00	2023-03-20 08:00	2023-03-20 09:00	2023-03-20 10:00	2023-03-20 11:00	2023-03-20 12:00	2023-03-20 13:00	2023-03-20 14:00	2023-03-20 15:00	2023-03-20 16:00	2023-03-20 17:00	2023-03-20 18:00	2023-03-20 19:00	2023-03-20 20:00	2023-03-20 21:00	2023-03-20 22:00	2023-03-20 23:00
	6,25	€ Cent																									
Selected	**5,00**	€ Cent		3,08	3,18	3,17	3,22	3,46	3,94	4,49	4,69	8,39	11,03	10,95	10,92	10,73	10,27	10,11	10,11	10,27	10,54	11,07	11,47	12,62	11,39	11,29	10,93
	39,20	kWh		0,47	0,42	0,43	0,41	0,40	0,91	1,25	0,64	0,43	0,53	0,63	2,76	3,23	1,81	0,46	0,65	0,52	0,64	0,53	0,64	0,66	0,88	0,51	0,46
Average	-1,23	t (°C)		0,1	0,1	0,2	0,3	0,2	-0,3	-0,5	-0,4	-0,1	0,4	0,8	1,4	1,8	1,6	0,9	0,6	0,3	0,3	0,2	0,1	0,0	0,1	-0,1	-0,6
Price x Use	**287,25**	€ Cent		1,45	1,34	1,36	1,32	1,38	3,59	5,61	3,00	3,61	5,85	6,90	30,14	34,66	18,59	4,65	6,57	5,34	6,75	5,87	7,34	8,33	10,02	5,76	5,03
=MIN of Use + 10%	0,41	kWh		0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41
Use (kWh) - Base use		kWh		0,06	0,01	0,02	0,00	-0,01	0,50	0,84	0,23	0,02	0,12	0,22	2,35	2,82	1,40	0,05	0,24	0,11	0,23	0,12	0,23	0,25	0,47	0,10	0,05
> 1 kWh	9,20	kWh													2,35	2,82	1,40										
> 1 kWh	9,20	kWh							2,35	2,82	1,40																
kWh	39,20	kWh		0,47	0,42	0,43	0,41	0,40	3,26	4,07	2,04	0,43	0,53	0,63	0,41	0,41	0,41	0,46	0,65	0,52	0,64	0,53	0,64	0,66	0,88	0,51	0,46
c/kWh x Sh.Use (kWh)	**242,45**	€ Cent		1,45	1,34	1,36	1,32	1,38	12,86	18,29	9,58	3,61	5,85	6,90	4,44	4,37	4,18	4,65	6,57	5,34	6,75	5,87	7,34	8,33	10,02	5,76	5,03
Nopm. Use - Shift. Use	44,80	€ Cent																									
Nopm. Use - Shift. Use	**15,60**	%																									

Date Time	2023-03-21 00:00	2023-03-21 01:00	2023-03-21 02:00	2023-03-21 03:00	2023-03-21 04:00	2023-03-21 05:00	2023-03-21 06:00	2023-03-21 07:00	2023-03-21 08:00	2023-03-21 09:00	2023-03-21 10:00	2023-03-21 11:00	2023-03-21 12:00	2023-03-21 13:00	2023-03-21 14:00	2023-03-21 15:00	2023-03-21 16:00	2023-03-21 17:00	2023-03-21 18:00	2023-03-21 19:00	2023-03-21 20:00	2023-03-21 21:00	2023-03-21 22:00	2023-03-21 23:00
Selected	8,49	7,10	6,08	4,42	4,15	4,27	6,06	6,42	7,14	8,22	7,21	6,45	6,63	4,53	4,38	4,37	4,55	4,83	5,15	5,03	4,93	4,88	5,12	4,99
kWh	0,49	0,55	1,77	0,78	0,37	0,49	0,55	0,38	0,50	0,47	0,71	0,52	0,52	0,52	2,09	1,06	0,49	0,69	0,63	0,70	0,68	0,66	1,66	1,65
Average t (°C)	-0,3	-1,8	-3,6	-5,0	-7,2	-6,2	-7,1	-6,0	-5,0	-3,7	-2,2	-1,7	-1,5	-0,1	1,0	1,1	-0,7	-0,4	-1,0	-2,2	-2,5	-2,7	-3,5	-4,2
Price x Use	4,16	3,91	10,76	3,45	1,54	2,09	3,33	2,44	3,57	3,86	5,12	3,35	3,45	2,36	9,15	4,63	2,23	3,33	3,24	3,52	3,35	3,22	8,50	8,23
=MIN of Use + 10%	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41
Use (kWh) - Base use	0,08	0,14	1,36	0,37	-0,04	0,08	0,14	-0,03	0,09	0,06	0,30	0,11	0,11	0,11	1,68	0,65	0,08	0,28	0,22	0,29	0,27	0,25	1,25	1,24
> 1 kWh			1,36																				1,25	
> 1 kWh					1,36																	1,25		
kWh	0,49	0,55	0,41	0,78	1,73	0,49	0,55	0,38	0,50	0,47	0,71	0,52	0,52	0,52	2,09	1,06	0,49	0,69	0,63	0,70	0,68	1,91	0,41	1,65
c/kWh x Sh.Use (kWh)	4,16	3,91	2,47	3,45	7,19	2,09	3,33	2,44	3,57	3,86	5,12	3,35	3,45	2,36	9,15	4,63	2,23	3,33	3,24	3,52	3,35	9,34	2,08	8,23

USE kWh x 4,80 c/kWh	1,88	€

	2,89	€
24 %	0,69	€
	3,59	€

End cost shifted + Transfer Cost	**2,44**	€
24 %	0,59	€
	3,03	€

Sum Brutto Before - After	**0,56**	€

2023-04-05

			Date Time	2023-04-05 00:00	2023-04-05 01:00	2023-04-05 02:00	2023-04-05 03:00	2023-04-05 04:00	2023-04-05 05:00	2023-04-05 06:00	2023-04-05 07:00	2023-04-05 08:00	2023-04-05 09:00	2023-04-05 10:00	2023-04-05 11:00	2023-04-05 12:00	2023-04-05 13:00	2023-04-05 14:00	2023-04-05 15:00	2023-04-05 16:00	2023-04-05 17:00	2023-04-05 18:00	2023-04-05 19:00	2023-04-05 20:00	2023-04-05 21:00	2023-04-05 22:00	2023-04-05 23:00
	10,55	€ Cent																									
Selected	**12,00**	€ Cent		11,57	10,63	10,46	10,33	10,33	11,54	11,92	12,41	15,59	17,74	13,83	12,18	11,73	11,60	11,62	11,58	11,58	11,59	11,74	11,75	11,62	10,07	8,63	7,37
	53,67	kWh		1,01	1,01	0,97	0,97	0,96	0,99	1,12	3,20	2,56	1,18	1,21	1,07	1,34	1,04	1,91	1,06	0,54	1,10	1,18	3,17	1,28	0,73	0,65	0,39
Average	-0,43	t (°C)		-2,5	-3,6	-4,3	-5,4	-6,7	-8,1	-8,8	-8,6	-6,9	-5,2	-2,7	-0,6	1,5	2,5	3,8	4,9	5,4	5,8	5,7	5,1	3,0	-0,7	-2,2	-4,1
Price x Use	**601,25**	€ Cent		11,69	10,74	10,15	10,02	9,92	11,42	13,35	39,71	39,91	20,93	16,73	13,03	15,72	12,06	22,19	12,27	6,25	12,75	13,85	37,25	14,87	7,35	5,61	2,87
=MIN of Use + 10%	0,31	kWh		0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31
Use (kWh) - Base use		kWh		0,70	0,70	0,66	0,66	0,65	0,68	0,81	2,89	2,25	0,87	0,90	0,76	1,03	0,73	1,60	0,75	0,23	0,79	0,87	2,86	0,97	0,42	0,34	0,08
> 1 kWh	8,31	kWh									2,89	2,25															
> 1 kWh	8,31	kWh																	2,89	2,25							
kWh	53,67	kWh		1,01	1,01	0,97	0,97	0,96	0,99	1,12	0,31	0,31	1,18	1,21	1,07	1,34	1,04	1,91	3,95	2,79	1,10	1,18	3,17	1,28	0,73	0,65	0,39
c/kWh x Sh.Use (kWh)	**582,03**	€ Cent		11,69	10,74	10,15	10,02	9,92	11,42	13,35	3,82	4,80	20,93	16,73	13,03	15,72	12,06	22,19	45,76	32,33	12,75	13,85	37,25	14,87	7,35	5,61	2,87
Noprm. Use - Shift. Use	19,22	€ Cent																									
Noprm. Use - Shift. Use	**3,20**	%																									

			Date Time	2023-04-06 00:00	2023-04-06 01:00	2023-04-06 02:00	2023-04-06 03:00	2023-04-06 04:00	2023-04-06 05:00	2023-04-06 06:00	2023-04-06 07:00	2023-04-06 08:00	2023-04-06 09:00	2023-04-06 10:00	2023-04-06 11:00	2023-04-06 12:00	2023-04-06 13:00	2023-04-06 14:00	2023-04-06 15:00	2023-04-06 16:00	2023-04-06 17:00	2023-04-06 18:00	2023-04-06 19:00	2023-04-06 20:00	2023-04-06 21:00	2023-04-06 22:00	2023-04-06 23:00
	10,55	€ Cent																									
Selected	**12,00**	€ Cent		6,60	8,10	8,31	8,91	9,13	9,53	9,79	12,07	12,35	12,40	12,32	11,78	10,85	10,28	9,69	9,40	9,54	9,85	10,32	10,27	9,53	9,32	8,89	7,60
	53,67	kWh		0,33	0,34	0,38	0,34	0,30	0,31	0,28	0,50	0,71	1,35	2,43	0,98	0,92	1,07	1,00	2,42	0,35	0,34	0,59	1,24	0,65	2,11	1,65	2,44
Average	-0,43	t (°C)		-1,2	-1,4	-5,5	-5,4	-5,7	-6,9	-8,2	-7,2	-2,7	-1,0	1,1	3,0	4,9	5,1	6,5	6,3	8,0	8,2	8,3	6,2	2,5	-0,2	-0,5	-2,2
Price x Use	**601,25**	€ Cent		2,18	2,75	3,16	3,03	2,74	2,95	2,74	6,04	8,77	16,74	29,94	11,54	9,98	11,00	9,69	22,75	3,34	3,35	6,09	12,73	6,19	19,67	14,67	18,54
=MIN of Use + 10%	0,31	kWh		0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31
Use (kWh) - Base use		kWh		0,02	0,03	0,07	0,03	-0,01	0,00	-0,03	0,19	0,40	1,04	2,12	0,67	0,61	0,76	0,69	2,11	0,04	0,03	0,28	0,93	0,34	1,80	1,34	2,13
> 1 kWh	8,31	kWh											1,04	2,12													
> 1 kWh	8,31	kWh															1,04	2,12									
kWh	53,67	kWh		0,33	0,34	0,38	0,34	0,30	0,31	0,28	0,50	0,71	0,31	0,31	0,98	0,92	2,11	3,12	2,42	0,35	0,34	0,59	1,24	0,65	2,11	1,65	2,44
c/kWh x Sh.Use (kWh)	**582,03**	€ Cent		2,18	2,75	3,16	3,03	2,74	2,95	2,74	6,04	8,77	3,82	3,79	11,54	9,98	21,71	30,25	22,75	3,34	3,35	6,09	12,73	6,19	19,67	14,67	18,54
Noprm. Use - Shift. Use	19,22	€ Cent																									
Noprm. Use - Shift. Use	**3,20**	%																									

USE kWh x 4,80 c/kWh	2,58	€
	6,04	€
24 %	1,45	€
	7,49	€
End cost shifted + Transfer Cost	**5,85**	€
24 %	1,40	€
	7,25	€
Sum Brutto Before - After	**0,24**	€

2023-04-25

		Date Time	2023-04-25 00:00	2023-04-25 01:00	2023-04-25 02:00	2023-04-25 03:00	2023-04-25 04:00	2023-04-25 05:00	2023-04-25 06:00	2023-04-25 07:00	2023-04-25 08:00	2023-04-25 09:00	2023-04-25 10:00	2023-04-25 11:00	2023-04-25 12:00	2023-04-25 13:00	2023-04-25 14:00	2023-04-25 15:00
	5,02	€ Cent																
Selected	**6,00**	€ Cent	5,18	6,45	5,62	5,03	4,82	4,88	5,01	6,44	7,76	7,87	6,32	5,05	4,14	4,08	3,08	1,98
	41,75	kWh	0,54	0,38	0,36	0,37	0,35	0,35	0,31	0,52	0,47	3,16	1,61	0,83	0,82	0,90	0,97	0,90
Average	7,63	t (°C)	2,9	2,6	2,1	2,0	2,0	1,9	1,9	1,8	2,5	3,4	3,6	3,9	3,7	4,1	4,3	5,8
Price x Use	**241,15**	€ Cent	2,80	2,45	2,02	1,86	1,69	1,71	1,55	3,35	3,65	24,87	10,18	4,19	3,39	3,67	2,99	1,78
=MIN of Use + 10%	0,34	kWh	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34
Use (kWh) - Base use		kWh	0,20	0,04	0,02	0,03	0,01	0,01	-0,03	0,18	0,13	2,82	1,27	0,49	0,48	0,56	0,63	0,56
> 1 kWh	9,73	kWh										2,82	1,27					
> 1 kWh	9,73	kWh													2,82	1,27		
kWh	41,75	kWh	0,54	0,38	0,36	0,37	0,35	0,35	0,31	0,52	0,47	0,34	0,34	0,83	3,64	2,17	0,97	0,90
c/kWh x Sh.Use (kWh)	**206,75**	€ Cent	2,80	2,45	2,02	1,86	1,69	1,71	1,55	3,35	3,65	2,68	2,16	4,19	15,07	8,85	2,99	1,78
Noprm. Use - Shift. Use	34,40	€ Cent																
Noprm. Use - Shift. Use	**14,27**	%																

		Date Time	2023-04-25 16:00	2023-04-25 17:00	2023-04-25 18:00	2023-04-25 19:00	2023-04-25 20:00	2023-04-25 21:00	2023-04-25 22:00	2023-04-25 23:00	2023-04-26 00:00	2023-04-26 01:00	2023-04-26 02:00	2023-04-26 03:00	2023-04-26 04:00	2023-04-26 05:00	2023-04-26 06:00	2023-04-26 07:00
	5,02	€ Cent																
Selected	**6,00**	€ Cent	2,01	2,66	3,84	4,17	4,16	4,10	3,95	2,62	1,61	4,60	4,54	4,52	4,44	4,47	5,02	6,67
	41,75	kWh	1,09	1,32	0,89	0,98	1,38	1,92	1,69	0,51	0,38	0,38	0,38	0,35	0,31	0,31	0,33	0,52
Average	7,63	t (°C)	7,1	7,4	7,4	7,0	7,2	6,1	5,6	5,6	5,2	5,0	3,6	4,2	3,8	3,9	3,5	4,4
Price x Use	**241,15**	€ Cent	2,19	3,51	3,42	4,09	5,74	7,87	6,68	1,34	0,61	1,75	1,73	1,58	1,38	1,39	1,66	3,47
=MIN of Use + 10%	0,34	kWh	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34
Use (kWh) - Base use		kWh	0,75	0,98	0,55	0,64	1,04	1,58	1,35	0,17	0,04	0,04	0,04	0,01	-0,03	-0,03	-0,01	0,18
> 1 kWh	9,73	kWh																
> 1 kWh	9,73	kWh																
kWh	41,75	kWh	1,09	1,32	0,89	0,98	1,38	1,92	1,69	0,51	0,38	0,38	0,38	0,35	0,31	0,31	0,33	0,52
c/kWh x Sh.Use (kWh)	**206,75**	€ Cent	2,19	3,51	3,42	4,09	5,74	7,87	6,68	1,34	0,61	1,75	1,73	1,58	1,38	1,39	1,66	3,47
Noprm. Use - Shift. Use	34,40	€ Cent																
Noprm. Use - Shift. Use	**14,27**	%																

		Date Time	2023-04-26 08:00	2023-04-26 09:00	2023-04-26 10:00	2023-04-26 11:00	2023-04-26 12:00	2023-04-26 13:00	2023-04-26 14:00	2023-04-26 15:00	2023-04-26 16:00	2023-04-26 17:00	2023-04-26 18:00	2023-04-26 19:00	2023-04-26 20:00	2023-04-26 21:00	2023-04-26 22:00	2023-04-26 23:00
	5,02	€ Cent																
Selected	**6,00**	€ Cent	8,40	8,81	8,25	8,18	6,48	5,89	5,05	4,70	4,31	4,83	7,38	7,68	8,05	8,23	8,22	7,32
	41,75	kWh	0,61	3,59	1,29	0,91	0,91	0,90	0,90	0,90	0,43	0,48	0,34	0,68	2,73	0,50	0,55	0,45
Average	7,63	t (°C)	7,0	10,0	12,8	14,7	16,9	18,4	18,8	19,2	18,1	17,6	16,4	14,9	14,0	10,3	11,6	10,0
Price x Use	**241,15**	€ Cent	5,12	31,63	10,64	7,44	5,90	5,30	4,55	4,23	1,85	2,32	2,51	5,22	21,98	4,12	4,52	3,29
=MIN of Use + 10%	0,34	kWh	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34	0,34
Use (kWh) - Base use		kWh	0,27	3,25	0,95	0,57	0,57	0,56	0,56	0,56	0,09	0,14	0,00	0,34	2,39	0,16	0,21	0,11
> 1 kWh	9,73	kWh		3,25											2,39			
> 1 kWh	9,73	kWh								3,25		2,39						
kWh	41,75	kWh	0,61	0,34	1,29	0,91	0,91	0,90	0,90	4,15	0,43	2,87	0,34	0,68	0,34	0,50	0,55	0,45
c/kWh x Sh.Use (kWh)	**206,75**	€ Cent	5,12	3,00	10,64	7,44	5,90	5,30	4,55	19,50	1,85	13,86	2,51	5,22	2,75	4,12	4,52	3,29
Noprm. Use - Shift. Use	34,40	€ Cent																
Noprm. Use - Shift. Use	**14,27**	%																

USE kWh x 4,80 c/kWh	2,00	€
	2,43	€
24 %	0,58	€
	3,02	€
End cost shifted + Transfer Cost	**2,09**	€
24 %	0,50	€
	2,59	€
Sum Brutto Before - After	**0,43**	€

2023-05-03

Date Time			2023-05-03 00:00	2023-05-03 01:00	2023-05-03 02:00	2023-05-03 03:00	2023-05-03 04:00	2023-05-03 05:00	2023-05-03 06:00	2023-05-03 07:00	2023-05-03 08:00	2023-05-03 09:00	2023-05-03 10:00	2023-05-03 11:00	2023-05-03 12:00	2023-05-03 13:00	2023-05-03 14:00	2023-05-03 15:00
	7,27	€ Cent																
Selected	8,00	€ Cent	5,49	1,65	1,34	1,59	2,33	3,58	5,57	5,93	7,35	8,59	7,66	7,01	6,59	6,13	5,87	5,75
	41,93	kWh	0,51	0,52	0,47	0,32	0,32	0,28	0,32	0,33	0,41	0,45	2,03	0,52	0,62	0,93	1,03	0,47
Average	1,90	t (°C)	4,5	4,1	2,9	2,3	1,2	0,6	0,1	0,5	0,8	1,3	2,1	2,8	3,3	4,5	4,8	5,1
Price x Use	353,85	€ Cent	2,80	0,86	0,63	0,51	0,75	1,00	1,78	1,96	3,01	3,87	15,55	3,65	4,09	5,70	6,05	2,70
=MIN of Use + 10%	0,31	kWh	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31
Use (kWh) - Base use		kWh	0,20	0,21	0,16	0,01	0,01	-0,03	0,01	0,02	0,10	0,14	1,72	0,21	0,31	0,62	0,72	0,16
> 1 kWh	12,06	kWh																
> 1 kWh	12,06	kWh																
kWh	41,93	kWh	0,51	0,52	0,47	0,32	0,32	0,28	0,32	0,33	0,41	0,45	2,03	0,52	0,62	0,93	1,03	0,47
c/kWh x Sh.Use (kWh)	306,84	€ Cent	2,80	0,86	0,63	0,51	0,75	1,00	1,78	1,96	3,01	3,87	15,55	3,65	4,09	5,70	6,05	2,70
Noprm. Use - Shift. Use	47,01	€ Cent																
Noprm. Use - Shift. Use	13,29	%																

Date Time			2023-05-03 16:00	2023-05-03 17:00	2023-05-03 18:00	2023-05-03 19:00	2023-05-03 20:00	2023-05-03 21:00	2023-05-03 22:00	2023-05-03 23:00	2023-05-04 00:00	2023-05-04 01:00	2023-05-04 02:00	2023-05-04 03:00	2023-05-04 04:00	2023-05-04 05:00	2023-05-04 06:00	2023-05-04 07:00
	7,27	€ Cent																
Selected	8,00	€ Cent	5,78	5,88	6,10	7,22	8,59	8,82	8,63	7,34	5,93	7,26	7,26	7,07	7,26	7,31	8,24	10,74
	41,93	kWh	0,51	0,40	0,43	0,43	1,09	1,41	2,23	1,77	0,36	0,37	0,32	0,38	0,33	0,39	0,37	0,37
Average	1,90	t (°C)	4,8	6,0	6,9	6,0	5,2	4,0	2,5	1,9	1,3	1,0	0,0	-0,6	-0,9	-1,4	-1,5	-1,1
Price x Use	353,85	€ Cent	2,95	2,35	2,62	3,10	9,36	12,44	19,24	12,99	2,13	2,69	2,32	2,69	2,40	2,85	3,05	3,97
=MIN of Use + 10%	0,31	kWh	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31
Use (kWh) - Base use		kWh	0,20	0,09	0,12	0,12	0,78	1,10	1,92	1,46	0,05	0,06	0,01	0,07	0,02	0,08	0,06	0,06
> 1 kWh	12,06	kWh						1,10	1,92									
> 1 kWh	12,06	kWh			1,10	1,92												
kWh	41,93	kWh	0,51	0,40	1,53	2,35	1,09	0,31	0,31	1,77	0,36	0,37	0,32	0,38	0,33	0,39	0,37	0,37
c/kWh x Sh.Use (kWh)	306,84	€ Cent	2,95	2,35	9,35	16,98	9,36	2,72	2,66	12,99	2,13	2,69	2,32	2,69	2,40	2,85	3,05	3,97
Noprm. Use - Shift. Use	47,01	€ Cent																
Noprm. Use - Shift. Use	13,29	%																

Date Time			2023-05-04 08:00	2023-05-04 09:00	2023-05-04 10:00	2023-05-04 11:00	2023-05-04 12:00	2023-05-04 13:00	2023-05-04 14:00	2023-05-04 15:00	2023-05-04 16:00	2023-05-04 17:00	2023-05-04 18:00	2023-05-04 19:00	2023-05-04 20:00	2023-05-04 21:00	2023-05-04 22:00	2023-05-04 23:00
	7,27	€ Cent																
Selected	8,00	€ Cent	13,08	12,32	11,03	9,59	8,55	7,77	6,80	6,45	7,28	8,49	10,49	11,21	12,06	12,29	11,66	10,78
	41,93	kWh	0,40	0,47	0,56	1,04	1,77	2,61	1,60	1,28	0,91	0,75	0,44	0,39	2,76	3,61	2,13	0,52
Average	1,90	t (°C)	-0,2	0,8	2,3	2,2	2,9	2,4	2,8	2,0	0,0	0,4	0,5	0,3	0,2	-0,4	0,1	-0,1
Price x Use	353,85	€ Cent	5,23	5,79	6,18	9,97	15,13	20,28	10,88	8,26	6,62	6,37	4,62	4,37	33,29	44,37	24,84	5,61
=MIN of Use + 10%	0,31	kWh	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31	0,31
Use (kWh) - Base use		kWh	0,09	0,16	0,25	0,73	1,46	2,30	1,29	0,97	0,60	0,44	0,13	0,08	2,45	3,30	1,82	0,21
> 1 kWh	12,06	kWh					1,46								2,45	3,30	1,82	
> 1 kWh	12,06	kWh						1,46	2,45	3,30	1,82							
kWh	41,93	kWh	0,40	0,47	0,56	1,04	0,31	4,07	4,05	4,58	2,73	0,75	0,44	0,39	0,31	0,31	0,31	0,52
c/kWh x Sh.Use (kWh)	306,84	€ Cent	5,23	5,79	6,18	9,97	2,63	31,64	27,55	29,55	19,89	6,37	4,62	4,37	3,71	3,79	3,59	5,61
Noprm. Use - Shift. Use	47,01	€ Cent																
Noprm. Use - Shift. Use	13,29	%																

USE kWh x 4,80 c/kWh	2,01	€

	3,56	€
24 %	0,85	€
	4,41	€

End cost shifted + Transfer Cost	**3,09**	€
24 %	0,74	€
	3,83	€

Sum Brutto Before - After	**0,58**	€

2023-05-19		Date Time	2023-05-19 00:00	2023-05-19 01:00	2023-05-19 02:00	2023-05-19 03:00	2023-05-19 04:00	2023-05-19 05:00	2023-05-19 06:00	2023-05-19 07:00	2023-05-19 08:00	2023-05-19 09:00	2023-05-19 10:00	2023-05-19 11:00	2023-05-19 12:00	2023-05-19 13:00	2023-05-19 14:00	2023-05-19 15:00	2023-05-19 16:00	2023-05-19 17:00	2023-05-19 18:00	2023-05-19 19:00	2023-05-19 20:00	2023-05-19 21:00	2023-05-19 22:00	2023-05-19 23:00
	1,03	€ Cent																								
Selected	**1,00**	€ Cent	1,18	1,13	1,04	1,00	1,01	0,98	1,04	8,91	10,87	10,78	9,40	4,58	2,18	1,59	1,32	1,07	1,05	1,19	1,40	1,59	1,43	1,06	0,92	0,77
	40,27	kWh	0,49	0,52	0,29	0,31	0,28	0,28	0,30	0,33	0,61	1,21	0,92	0,88	2,99	0,84	0,86	0,86	0,87	0,82	0,73	0,84	0,80	0,34	2,00	0,82
Average	12,43	t (°C)	6,3	6,0	6,0	5,5	4,9	4,4	5,0	6,6	7,0	8,6	9,3	11,3	11,5	13,6	14,3	15,3	15,1	15,9	16,0	16,0	15,5	14,3	10,2	8,1
Price x Use	**72,78**	€ Cent	0,58	0,59	0,30	0,31	0,28	0,27	0,31	2,94	6,63	13,04	8,65	4,03	6,52	1,34	1,14	0,92	0,91	0,98	1,02	1,34	1,14	0,36	1,84	0,63
=MIN of Use + 10%	0,28	kWh	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28
Use (kWh) - Base use		kWh	0,22	0,25	0,02	0,04	0,01	0,01	0,03	0,06	0,34	0,94	0,65	0,61	2,72	0,57	0,59	0,59	0,60	0,55	0,46	0,57	0,53	0,07	1,73	0,55
> 1 kWh	7,26	kWh													2,72											
> 1 kWh	7,26	kWh																							2,72	
kWh	40,27	kWh	0,49	0,52	0,29	0,31	0,28	0,28	0,30	0,33	0,61	1,21	0,92	0,88	0,28	0,84	0,86	0,86	0,87	0,82	0,73	0,84	0,80	0,34	4,72	0,82
c/kWh x Sh.Use (kWh)	**67,98**	€ Cent	0,58	0,59	0,30	0,31	0,28	0,27	0,31	2,94	6,63	13,04	8,65	4,03	0,60	1,34	1,14	0,92	0,91	0,98	1,02	1,34	1,14	0,36	4,34	0,63
Noprm. Use - Shift. Use	4,80	€ Cent																								
Noprm. Use - Shift. Use	**6,59**	**%**																								

2023-05-19		Date Time	2023-05-20 00:00	2023-05-20 01:00	2023-05-20 02:00	2023-05-20 03:00	2023-05-20 04:00	2023-05-20 05:00	2023-05-20 06:00	2023-05-20 07:00	2023-05-20 08:00	2023-05-20 09:00	2023-05-20 10:00	2023-05-20 11:00	2023-05-20 12:00	2023-05-20 13:00	2023-05-20 14:00	2023-05-20 15:00	2023-05-20 16:00	2023-05-20 17:00	2023-05-20 18:00	2023-05-20 19:00	2023-05-20 20:00	2023-05-20 21:00	2023-05-20 22:00	2023-05-20 23:00
	1,03	€ Cent																								
Selected	**1,00**	€ Cent	0,63	0,71	0,71	0,62	0,60	0,68	0,72	0,83	1,03	1,08	1,09	1,02	0,63	0,58	0,54	0,58	0,59	0,72	1,01	1,06	1,06	1,01	0,96	0,83
	40,27	kWh	0,90	0,35	0,33	0,32	0,30	0,31	0,32	0,49	1,50	0,25	0,26	0,46	0,37	0,42	0,54	3,07	2,02	3,17	1,81	0,97	2,06	0,27	0,28	0,31
Average	12,43	t (°C)	9,5	9,3	9,6	9,2	9,2	9,3	10,6	11,4	12,7	14,5	15,8	17,2	17,5	18,7	18,0	19,4	19,8	20,5	20,4	19,3	18,6	16,8	12,4	10,1
Price x Use	**72,78**	€ Cent	0,57	0,25	0,23	0,20	0,18	0,21	0,23	0,41	1,55	0,27	0,28	0,47	0,23	0,24	0,29	1,78	1,19	2,28	1,83	1,03	2,18	0,27	0,27	0,26
=MIN of Use + 10%	0,28	kWh	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28	0,28
Use (kWh) - Base use		kWh	0,63	0,08	0,06	0,05	0,03	0,04	0,05	0,22	1,23	-0,03	-0,02	0,19	0,10	0,15	0,27	2,80	1,75	2,90	1,54	0,70	1,79	-0,01	0,01	0,04
> 1 kWh	7,26	kWh									1,23										1,54		1,79			
> 1 kWh	7,26	kWh														1,23			1,54						1,79	
kWh	40,27	kWh	0,90	0,35	0,33	0,32	0,30	0,31	0,32	0,49	0,28	0,25	0,26	0,46	0,37	1,65	0,54	3,07	3,56	3,17	0,28	0,97	0,28	0,27	2,07	0,31
c/kWh x Sh.Use (kWh)	**67,98**	€ Cent	0,57	0,25	0,23	0,20	0,18	0,21	0,23	0,41	0,28	0,27	0,28	0,47	0,23	0,95	0,29	1,78	2,10	2,28	0,28	1,03	0,29	0,27	1,98	0,26
Noprm. Use - Shift. Use	4,80	€ Cent																								
Noprm. Use - Shift. Use	**6,59**	**%**																								

USE kWh x 4,80 c/kWh	1,93	€

	0,75	€
24 %	0,18	€
	0,93	€

End cost shifted + Transfer Cost	**0,70**	€
24 %	0,17	€
	0,87	€

Sum Brutto Before - After	**0,06**	€

2023-06-10

Date Time			2023-06-10 00:00	2023-06-10 01:00	2023-06-10 02:00	2023-06-10 03:00	2023-06-10 04:00	2023-06-10 05:00	2023-06-10 06:00	2023-06-10 07:00	2023-06-10 08:00	2023-06-10 09:00	2023-06-10 10:00	2023-06-10 11:00	2023-06-10 12:00	2023-06-10 13:00	2023-06-10 14:00	2023-06-10 15:00	2023-06-10 16:00	2023-06-10 17:00	2023-06-10 18:00	2023-06-10 19:00	2023-06-10 20:00	2023-06-10 21:00	2023-06-10 22:00	2023-06-10 23:00
	1,94	€ Cent																								
Selected	**2,00**	€ Cent	3,05	2,67	2,62	2,59	2,60	2,63	2,69	3,26	4,20	4,58	4,54	3,15	1,88	1,05	1,92	1,45	1,63	1,96	3,93	4,83	4,88	4,74	4,09	2,99
	36,25	kWh	2,08	0,40	0,29	0,36	0,41	0,53	0,85	0,70	0,70	0,53	0,54	0,50	0,52	1,84	0,66	0,43	0,53	0,62	1,07	1,57	0,44	0,64	0,69	0,71
Average	13,01	t (°C)	3,4	5,2	4,2	3,7	4,9	5,8	7,1	8,5	10,4	11,2	11,8	13,0	12,9	13,3	13,9	14,8	14,9	16,3	16,6	16,0	15,7	15,0	12,9	8,5
Price x Use	**73,84**	€ Cent	6,34	1,07	0,76	0,93	1,07	1,39	2,29	2,28	2,94	2,43	2,45	1,58	0,98	1,93	1,27	0,62	0,86	1,22	4,21	7,58	2,15	3,03	2,82	2,12
=MIN of Use + 10%	0,30	kWh	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30
Use (kWh) - Base use		kWh	1,78	0,10	-0,01	0,06	0,11	0,23	0,55	0,40	0,40	0,23	0,24	0,20	0,22	1,54	0,36	0,13	0,23	0,32	0,77	1,27	0,14	0,34	0,39	0,41
> 1 kWh	6,06	kWh	1,78																			1,27				
> 1 kWh	6,06	kWh													1,78				1,27							
kWh	36,25	kWh	0,30	0,40	0,29	0,36	0,41	0,53	0,85	0,70	0,70	0,53	0,54	0,50	2,30	1,84	0,66	0,43	1,80	0,62	1,07	0,30	0,44	0,64	0,69	0,71
c/kWh x Sh.Use (kWh)	**65,69**	€ Cent	0,91	1,07	0,76	0,93	1,07	1,39	2,29	2,28	2,94	2,43	2,45	1,58	4,33	1,93	1,27	0,62	2,94	1,22	4,21	1,43	2,15	3,03	2,82	2,12
Noprm. Use - Shift. Use	8,14	€ Cent																								
Noprm. Use - Shift. Use	**11,03**	%																								

Date Time			2023-06-11 00:00	2023-06-11 01:00	2023-06-11 02:00	2023-06-11 03:00	2023-06-11 04:00	2023-06-11 05:00	2023-06-11 06:00	2023-06-11 07:00	2023-06-11 08:00	2023-06-11 09:00	2023-06-11 10:00	2023-06-11 11:00	2023-06-11 12:00	2023-06-11 13:00	2023-06-11 14:00	2023-06-11 15:00	2023-06-11 16:00	2023-06-11 17:00	2023-06-11 18:00	2023-06-11 19:00	2023-06-11 20:00	2023-06-11 21:00	2023-06-11 22:00	2023-06-11 23:00
	1,94	€ Cent																								
Selected	**2,00**	€ Cent	2,34	1,68	0,63	0,59	0,59	0,59	0,59	0,60	2,64	3,43	2,18	0,59	0,42	0,24	0,08	0,08	0,07	0,58	0,81	2,50	1,04	0,59	0,59	0,59
	36,25	kWh	3,30	0,87	0,86	2,87	0,74	0,37	0,47	0,45	0,45	0,32	0,38	0,27	0,33	0,41	0,43	0,33	2,16	0,89	0,32	0,39	0,50	0,51	0,51	0,51
Average	13,01	t (°C)	7,9	6,4	5,9	5,0	4,6	6,1	10,0	12,7	14,3	15,6	16,5	18,4	18,5	19,8	19,8	21,0	20,8	21,0	21,3	21,1	21,0	19,9	19,0	17,9
Price x Use	**73,84**	€ Cent	7,72	1,46	0,54	1,69	0,44	0,22	0,28	0,27	1,19	1,10	0,83	0,16	0,14	0,10	0,03	0,03	0,15	0,52	0,26	0,98	0,52	0,30	0,30	0,30
=MIN of Use + 10%	0,30	kWh	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30
Use (kWh) - Base use		kWh	3,00	0,57	0,56	2,57	0,44	0,07	0,17	0,15	0,15	0,02	0,08	-0,03	0,03	0,11	0,13	0,03	1,86	0,59	0,02	0,09	0,20	0,21	0,21	0,21
> 1 kWh	6,06	kWh	3,00																							
> 1 kWh	6,06	kWh		3,00																						
kWh	36,25	kWh	0,30	3,87	0,86	2,87	0,74	0,37	0,47	0,45	0,45	0,32	0,38	0,27	0,33	0,41	0,43	0,33	2,16	0,89	0,32	0,39	0,50	0,51	0,51	0,51
c/kWh x Sh.Use (kWh)	**65,69**	€ Cent	0,69	6,51	0,54	1,69	0,44	0,22	0,28	0,27	1,19	1,10	0,83	0,16	0,14	0,10	0,03	0,03	0,15	0,52	0,26	0,98	0,52	0,30	0,30	0,30
Noprm. Use - Shift. Use	8,14	€ Cent																								
Noprm. Use - Shift. Use	**11,03**	%																								

USE kWh x 4,80 c/kWh	1,74	€
	0,76	€
24 %	0,18	€
	0,94	€
End cost shifted + Transfer Cost	**0,67**	€
24 %	0,16	€
	0,84	€
Sum Brutto Before - After	**0,10**	€

2023-06-22

			2023-06-22 00:00	2023-06-22 01:00	2023-06-22 02:00	2023-06-22 03:00	2023-06-22 04:00	2023-06-22 05:00	2023-06-22 06:00	2023-06-22 07:00	2023-06-22 08:00	2023-06-22 09:00	2023-06-22 10:00	2023-06-22 11:00	2023-06-22 12:00	2023-06-22 13:00	2023-06-22 14:00	2023-06-22 15:00	2023-06-22 16:00	2023-06-22 17:00	2023-06-22 18:00	2023-06-22 19:00	2023-06-22 20:00	2023-06-22 21:00	2023-06-22 22:00	2023-06-22 23:00
Date Time																										
	4,23	€ Cent																								
Selected	5,00	€ Cent	5,13	5,37	5,12	4,74	4,70	5,13	5,58	5,65	6,11	6,54	6,51	5,88	5,73	5,60	5,45	5,39	5,26	4,80	5,05	5,41	5,48	5,48	5,49	5,29
	33,51	kWh	0,62	0,57	0,47	0,38	0,38	0,37	0,39	0,40	0,36	0,72	0,61	0,67	0,68	0,63	2,39	0,69	1,84	1,23	3,00	1,44	0,45	0,40	0,40	0,56
Average	17,17	t (°C)	15,8	15,3	15,0	15,3	14,4	13,0	14,2	15,2	17,0	16,6	17,7	19,9	21,6	23,0	24,2	24,2	24,3	23,0	22,8	22,2	18,4	17,1	16,9	15,8
Price x Use	**133,93**	€ Cent	3,18	3,06	2,41	1,80	1,79	1,90	2,18	2,26	2,20	4,71	3,97	3,94	3,90	3,53	13,03	3,72	9,68	5,90	15,15	7,79	2,47	2,19	2,20	2,96
=MIN of Use + 10%	0,40	kWh	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40
Use (kWh) - Base use		kWh	0,22	0,17	0,07	-0,02	-0,02	-0,03	-0,01	0,00	-0,04	0,32	0,21	0,27	0,28	0,23	1,99	0,29	1,44	0,83	2,60	1,04	0,05	0,00	0,00	0,16
> 1 kWh	7,09	kWh															1,99		1,44		2,60	1,04				
> 1 kWh	7,09	kWh																								
kWh	33,51	kWh	0,62	0,57	0,47	0,38	0,38	0,37	0,39	0,40	0,36	0,72	0,61	0,67	0,68	0,63	0,40	0,69	0,40	1,23	0,40	0,40	0,45	0,40	0,40	0,56
c/kWh x Sh.Use (kWh)	**112,42**	€ Cent	3,18	3,06	2,41	1,80	1,79	1,90	2,18	2,26	2,20	4,71	3,97	3,94	3,90	3,53	2,16	3,72	2,08	5,90	2,00	2,14	2,47	2,19	2,20	2,96
Noprm. Use - Shift. Use	21,51	€ Cent																								
Noprm. Use - Shift. Use	**16,06**	%																								

	2023-06-23 00:00	2023-06-23 01:00	2023-06-23 02:00	2023-06-23 03:00	2023-06-23 04:00	2023-06-23 05:00	2023-06-23 06:00	2023-06-23 07:00	2023-06-23 08:00	2023-06-23 09:00	2023-06-23 10:00	2023-06-23 11:00	2023-06-23 12:00	2023-06-23 13:00	2023-06-23 14:00	2023-06-23 15:00	2023-06-23 16:00	2023-06-23 17:00	2023-06-23 18:00	2023-06-23 19:00	2023-06-23 20:00	2023-06-23 21:00	2023-06-23 22:00	2023-06-23 23:00
Selected	2,82	2,22	1,58	0,96	0,82	0,93	1,63	2,34	3,75	2,53	2,33	2,21	1,61	1,13	0,85	0,82	0,81	0,93	1,80	2,29	2,27	2,22	2,20	2,08
	0,57	0,60	0,54	0,39	0,38	0,39	0,38	0,38	0,58	2,85	1,01	0,38	0,38	0,37	0,38	0,38	0,38	0,37	0,37	0,38	0,47	0,67	0,64	0,62
Average	15,7	15,8	15,6	15,0	14,5	14,5	14,6	14,8	15,1	15,1	15,4	16,0	16,5	16,7	17,0	17,3	17,4	17,1	16,6	16,3	16,2	16,2	15,9	15,9
Price x Use	1,61	1,33	0,85	0,37	0,31	0,36	0,62	0,89	2,18	7,21	2,35	0,84	0,61	0,42	0,32	0,31	0,31	0,34	0,67	0,87	1,07	1,49	1,41	1,29
=MIN of Use + 10%	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40
Use (kWh) - Base use	0,17	0,20	0,14	-0,01	-0,02	-0,01	-0,02	-0,02	0,18	2,45	0,61	-0,02	-0,02	-0,03	-0,02	-0,02	-0,02	-0,03	-0,03	-0,02	0,07	0,27	0,24	0,22
> 1 kWh																								
> 1 kWh								1,99		1,44		2,60	1,04											
kWh	0,57	0,60	0,54	0,39	0,38	0,39	0,38	2,37	0,58	4,29	1,01	2,98	1,42	0,37	0,38	0,38	0,38	0,37	0,37	0,38	0,47	0,67	0,64	0,62
c/kWh x Sh.Use (kWh)	1,61	1,33	0,85	0,37	0,31	0,36	0,62	5,56	2,18	10,86	2,35	6,59	2,29	0,42	0,32	0,31	0,31	0,34	0,67	0,87	1,07	1,49	1,41	1,29

USE kWh x 4,80 c/kWh	1,61	€

	1,36	€
24 %	0,33	€
	1,68	€

End cost shifted + Transfer Cost	**1,14**	€
24 %	0,27	€
	1,41	€

Sum Brutto Before - After	**0,27**	€

2023-07-05

		Date Time	2023-07-05 00:00	2023-07-05 01:00	2023-07-05 02:00	2023-07-05 03:00	2023-07-05 04:00	2023-07-05 05:00	2023-07-05 06:00	2023-07-05 07:00	2023-07-05 08:00	2023-07-05 09:00	2023-07-05 10:00	2023-07-05 11:00	2023-07-05 12:00	2023-07-05 13:00	2023-07-05 14:00	2023-07-05 15:00
	5,94	€ Cent																
Selected	5,94	€ Cent	5,59	4,95	4,05	3,66	3,59	3,78	4,46	5,24	6,10	6,41	6,82	6,80	5,54	5,17	5,09	4,90
	38,45	kWh	0,43	0,40	0,41	0,41	0,40	0,34	0,34	0,49	0,67	0,54	1,34	1,49	0,68	0,95	0,96	0,66
Average	15,68	t (°C)	14,4	12,5	11,9	12,0	12,4	12,5	12,6	13,1	13,0	14,2	15,2	13,5	15,8	15,2	15,9	13,9
Price x Use	226,22	€ Cent	2,40	1,98	1,66	1,50	1,44	1,29	1,52	2,57	4,09	3,46	9,14	10,13	3,77	4,91	4,89	3,23
=MIN of Use + 10%	0,37	kWh	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37
Use (kWh) - Base use		kWh	0,06	0,03	0,04	0,04	0,03	-0,03	-0,03	0,12	0,30	0,17	0,97	1,12	0,31	0,58	0,59	0,29
> 1 kWh	8,60	kWh												1,12				
> 1 kWh	8,60	kWh													1,12			
kWh	38,45	kWh	0,43	0,40	0,41	0,41	0,40	0,34	0,34	0,49	0,67	0,54	1,34	0,37	1,80	0,95	0,96	0,66
c/kWh x Sh.Use (kWh)	218,58	€ Cent	2,40	1,98	1,66	1,50	1,44	1,29	1,52	2,57	4,09	3,46	9,14	2,54	9,95	4,91	4,89	3,23
Noprm. Use - Shift. Use	7,65	€ Cent																
Noprm. Use - Shift. Use	3,38	%																

		Date Time	2023-07-05 16:00	2023-07-05 17:00	2023-07-05 18:00	2023-07-05 19:00	2023-07-05 20:00	2023-07-05 21:00	2023-07-05 22:00	2023-07-05 23:00	2023-07-06 00:00	2023-07-06 01:00	2023-07-06 02:00	2023-07-06 03:00	2023-07-06 04:00	2023-07-06 05:00	2023-07-06 06:00	2023-07-06 07:00
	5,94	€ Cent																
Selected	5,94	€ Cent	4,74	4,51	5,35	6,48	7,33	6,84	6,19	5,79	5,19	4,64	4,32	4,27	4,29	4,73	5,27	6,10
	38,45	kWh	0,62	2,31	2,35	1,09	0,48	3,02	2,46	0,60	0,43	0,40	0,41	0,42	0,42	0,39	0,41	0,51
Average	15,68	t (°C)	14,6	14,2	14,8	15,3	15,1	14,5	14,4	14,2	14,3	14,1	13,6	13,5	13,5	13,3	13,4	14,6
Price x Use	226,22	€ Cent	2,94	10,42	12,57	7,06	3,52	20,66	15,23	3,47	2,23	1,86	1,77	1,79	1,80	1,84	2,16	3,11
=MIN of Use + 10%	0,37	kWh	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37
Use (kWh) - Base use		kWh	0,25	1,94	1,98	0,72	0,11	2,65	2,09	0,23	0,06	0,03	0,04	0,05	0,05	0,02	0,04	0,14
> 1 kWh	8,60	kWh						2,65	2,09									
> 1 kWh	8,60	kWh								2,65	2,09							
kWh	38,45	kWh	0,62	2,31	2,35	1,09	0,48	0,37	0,37	3,25	2,52	0,40	0,41	0,42	0,42	0,39	0,41	0,51
c/kWh x Sh.Use (kWh)	218,58	€ Cent	2,94	10,42	12,57	7,06	3,52	2,56	2,32	18,79	13,06	1,86	1,77	1,79	1,80	1,84	2,16	3,11
Noprm. Use - Shift. Use	7,65	€ Cent																
Noprm. Use - Shift. Use	3,38	%																

		Date Time	2023-07-06 08:00	2023-07-06 09:00	2023-07-06 10:00	2023-07-06 11:00	2023-07-06 12:00	2023-07-06 13:00	2023-07-06 14:00	2023-07-06 15:00	2023-07-06 16:00	2023-07-06 17:00	2023-07-06 18:00	2023-07-06 19:00	2023-07-06 20:00	2023-07-06 21:00	2023-07-06 22:00	2023-07-06 23:00
	5,94	€ Cent																
Selected	5,94	€ Cent	6,79	7,02	6,93	6,86	6,62	6,24	6,28	6,17	6,09	5,78	6,72	6,98	7,01	6,96	6,72	6,55
	38,45	kWh	0,41	0,68	0,63	0,75	0,78	0,78	3,13	0,91	0,39	0,43	0,41	0,41	0,44	0,44	0,44	0,59
Average	15,68	t (°C)	15,4	16,9	17,6	18,8	18,9	19,6	20,2	20,5	21,0	21,1	21,7	21,1	20,0	18,9	18,2	17,4
Price x Use	226,22	€ Cent	2,78	4,77	4,37	5,15	5,16	4,87	19,66	5,61	2,38	2,49	2,76	2,86	3,08	3,06	2,96	3,86
=MIN of Use + 10%	0,37	kWh	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37
Use (kWh) - Base use		kWh	0,04	0,31	0,26	0,38	0,41	0,41	2,76	0,54	0,02	0,06	0,04	0,04	0,07	0,07	0,07	0,22
> 1 kWh	8,60	kWh							2,76									
> 1 kWh	8,60	kWh										2,76						
kWh	38,45	kWh	0,41	0,68	0,63	0,75	0,78	0,78	0,37	0,91	0,39	3,19	0,41	0,41	0,44	0,44	0,44	0,59
c/kWh x Sh.Use (kWh)	218,58	€ Cent	2,78	4,77	4,37	5,15	5,16	4,87	2,35	5,61	2,38	18,42	2,76	2,86	3,08	3,06	2,96	3,86
Noprm. Use - Shift. Use	7,65	€ Cent																
Noprm. Use - Shift. Use	3,38	%																

USE kWh x 4,80 c/kWh	1,85	€

	2,28	€
24 %	0,55	€
	2,83	€

End cost shifted + Transfer Cost	2,20	€
24 %	0,53	€
	2,73	€

Sum Brutto Before - After	**0,09**	€

2023-07-29

		Date Time	2023-07-29 00:00	2023-07-29 01:00	2023-07-29 02:00	2023-07-29 03:00	2023-07-29 04:00	2023-07-29 05:00	2023-07-29 06:00	2023-07-29 07:00	2023-07-29 08:00	2023-07-29 09:00	2023-07-29 10:00	2023-07-29 11:00
	2,90	€ Cent												
Selected	**2,90**	€ Cent	3,43	2,49	1,67	0,84	0,74	0,69	0,67	1,19	2,09	2,49	2,66	2,73
	38,57	kWh	0,53	0,37	0,38	0,38	0,38	0,35	0,37	0,37	0,37	0,35	1,66	0,47
Average	16,09	t (°C)	13,7	13,6	13,5	13,5	13,7	13,5	13,9	14,6	15,1	15,9	16,4	17,0
Price x Use	**102,67**	€ Cent	1,82	0,92	0,63	0,32	0,28	0,24	0,25	0,44	0,77	0,87	4,42	1,28
=MIN of Use + 10%	0,39	kWh	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39
Use (kWh) - Base use		kWh	0,15	-0,02	-0,01	-0,01	-0,01	-0,04	-0,02	-0,02	-0,02	-0,04	1,28	0,09
> 1 kWh	7,79	kWh												
> 1 kWh	7,79	kWh								2,37		1,26		1,45
kWh	38,57	kWh	0,53	0,37	0,38	0,38	0,38	0,35	0,37	2,74	0,37	1,61	1,66	1,92
c/kWh x Sh.Use (kWh)	**88,23**	€ Cent	1,82	0,92	0,63	0,32	0,28	0,24	0,25	3,25	0,77	4,00	4,42	5,23
Noprm. Use - Shift. Use	14,44	€ Cent												
Noprm. Use - Shift. Use	**14,06**	%												

		Date Time	2023-07-29 12:00	2023-07-29 13:00	2023-07-29 14:00	2023-07-29 15:00	2023-07-29 16:00	2023-07-29 17:00	2023-07-29 18:00	2023-07-29 19:00	2023-07-29 20:00	2023-07-29 21:00	2023-07-29 22:00	2023-07-29 23:00
	2,90	€ Cent												
Selected	**2,90**	€ Cent	2,81	2,82	2,97	2,41	2,56	3,28	3,46	3,49	3,50	3,37	3,28	3,19
	38,57	kWh	0,58	0,68	1,64	0,95	1,36	1,83	1,31	1,09	0,63	0,65	0,63	2,75
Average	16,09	t (°C)	18,5	18,8	18,7	15,4	15,4	14,2	14,8	15,1	14,9	15,2	15,1	14,2
Price x Use	**102,67**	€ Cent	1,63	1,92	4,87	2,29	3,48	6,00	4,53	3,80	2,21	2,19	2,07	8,77
=MIN of Use + 10%	0,39	kWh	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39
Use (kWh) - Base use		kWh	0,20	0,30	1,26	0,57	0,98	1,45	0,93	0,71	0,25	0,27	0,25	2,37
> 1 kWh	7,79	kWh			1,26			1,45						2,37
> 1 kWh	7,79	kWh												
kWh	38,57	kWh	0,58	0,68	0,39	0,95	1,36	0,39	1,31	1,09	0,63	0,65	0,63	0,39
c/kWh x Sh.Use (kWh)	**88,23**	€ Cent	1,63	1,92	1,14	2,29	3,48	1,26	4,53	3,80	2,21	2,19	2,07	1,23
Noprm. Use - Shift. Use	14,44	€ Cent												
Noprm. Use - Shift. Use	**14,06**	%												

		Date Time	2023-07-30 00:00	2023-07-30 01:00	2023-07-30 02:00	2023-07-30 03:00	2023-07-30 04:00	2023-07-30 05:00	2023-07-30 06:00	2023-07-30 07:00	2023-07-30 08:00	2023-07-30 09:00	2023-07-30 10:00	2023-07-30 11:00
	2,90	€ Cent												
Selected	**2,90**	€ Cent	3,04	3,09	3,06	3,04	3,08	3,08	3,04	3,19	3,26	3,31	1,65	0,60
	38,57	kWh	0,93	0,42	0,41	0,38	0,40	0,40	0,39	0,36	0,37	0,38	1,19	0,99
Average	16,09	t (°C)	15,0	15,1	14,4	14,3	14,2	14,3	14,6	14,7	15,1	15,2	16,3	16,5
Price x Use	**102,67**	€ Cent	2,83	1,30	1,25	1,16	1,23	1,23	1,19	1,15	1,21	1,26	1,96	0,59
=MIN of Use + 10%	0,39	kWh	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39
Use (kWh) - Base use		kWh	0,55	0,04	0,03	-0,01	0,02	0,02	0,01	-0,03	-0,02	-0,01	0,81	0,61
> 1 kWh	7,79	kWh												
> 1 kWh	7,79	kWh												
kWh	38,57	kWh	0,93	0,42	0,41	0,38	0,40	0,40	0,39	0,36	0,37	0,38	1,19	0,99
c/kWh x Sh.Use (kWh)	**88,23**	€ Cent	2,83	1,30	1,25	1,16	1,23	1,23	1,19	1,15	1,21	1,26	1,96	0,59
Noprm. Use - Shift. Use	14,44	€ Cent												
Noprm. Use - Shift. Use	**14,06**	%												

		Date Time	2023-07-30 12:00	2023-07-30 13:00	2023-07-30 14:00	2023-07-30 15:00	2023-07-30 16:00	2023-07-30 17:00	2023-07-30 18:00	2023-07-30 19:00	2023-07-30 20:00	2023-07-30 21:00	2023-07-30 22:00	2023-07-30 23:00
	2,90	€ Cent												
Selected	**2,90**	€ Cent	0,58	0,52	0,59	0,59	0,60	0,85	2,22	3,33	3,96	3,90	3,83	3,72
	38,57	kWh	0,37	0,38	0,58	0,72	0,56	0,47	3,29	0,46	0,77	3,11	0,57	0,59
Average	16,09	t (°C)	17,4	18,1	18,3	19,3	20,6	20,6	20,9	20,7	20,8	17,3	17,4	16,7
Price x Use	**102,67**	€ Cent	0,21	0,20	0,34	0,42	0,34	0,40	7,30	1,53	3,05	12,13	2,18	2,19
=MIN of Use + 10%	0,39	kWh	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39
Use (kWh) - Base use		kWh	-0,02	-0,01	0,20	0,34	0,18	0,09	2,91	0,08	0,39	2,73	0,19	0,21
> 1 kWh	7,79	kWh										2,73		
> 1 kWh	7,79	kWh						2,73						
kWh	38,57	kWh	0,37	0,38	0,58	0,72	0,56	3,20	3,29	0,46	0,77	0,39	0,57	0,59
c/kWh x Sh.Use (kWh)	**88,23**	€ Cent	0,21	0,20	0,34	0,42	0,34	2,72	7,30	1,53	3,05	1,50	2,18	2,19
Noprm. Use - Shift. Use	14,44	€ Cent												
Noprm. Use - Shift. Use	**14,06**	%												

USE kWh x 4,80 c/kWh	1,85	€

	1,05	€
24 %	0,25	€
	1,30	€

End cost shifted + Transfer Cost	**0,90**	€
24 %	0,22	€
	1,12	€

Sum Brutto Before - After	**0,18**	€

2023-08-18

			Date Time	2023-08-18 00:00	2023-08-18 01:00	2023-08-18 02:00	2023-08-18 03:00	2023-08-18 04:00	2023-08-18 05:00	2023-08-18 06:00	2023-08-18 07:00	2023-08-18 08:00	2023-08-18 09:00	2023-08-18 10:00	2023-08-18 11:00	2023-08-18 12:00	2023-08-18 13:00	2023-08-18 14:00	2023-08-18 15:00
	13,08	€ Cent																	
Selected	13,08	€ Cent		2,36	2,40	2,35	2,30	2,21	2,23	2,70	12,52	21,45	27,64	19,39	15,38	14,09	25,59	15,55	9,54
	42,54	kWh		0,56	0,58	0,57	0,56	0,58	0,46	0,39	0,37	0,38	0,38	0,39	0,50	1,21	0,50	1,02	2,92
Average	13,38	t (°C)		15,2	15,1	14,3	14,1	13,5	12,3	12,5	12,7	13,1	12,8	12,8	13,3	14,5	14,6	15,9	16,4
Price x Use	**531,65**	€ Cent		1,32	1,39	1,34	1,29	1,28	1,03	1,05	4,63	8,15	10,50	7,56	7,69	17,05	12,80	15,86	27,86
=MIN of Use + 10%	0,40	kWh		0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40
Use (kWh) - Base use		kWh		0,16	0,18	0,17	0,16	0,18	0,06	-0,01	-0,03	-0,02	-0,02	-0,01	0,10	0,81	0,10	0,62	2,52
> 1 kWh	11,00	kWh																	
> 1 kWh	11,00	kWh																	
kWh	42,54	kWh		0,56	0,58	0,57	0,56	0,58	0,46	0,39	0,37	0,38	0,38	0,39	0,50	1,21	0,50	1,02	2,92
c/kWh x Sh.Use (kWh)	**442,56**	€ Cent		1,32	1,39	1,34	1,29	1,28	1,03	1,05	4,63	8,15	10,50	7,56	7,69	17,05	12,80	15,86	27,86
Noprm. Use - Shift. Use	89,09	€ Cent																	
Noprm. Use - Shift. Use	**16,76**	%																	

			2023-08-18 16:00	2023-08-18 17:00	2023-08-18 18:00	2023-08-18 19:00	2023-08-18 20:00	2023-08-18 21:00	2023-08-18 22:00	2023-08-18 23:00	2023-08-19 00:00	2023-08-19 01:00	2023-08-19 02:00	2023-08-19 03:00	2023-08-19 04:00	2023-08-19 05:00	2023-08-19 06:00	2023-08-19 07:00
Selected	13,08	€ Cent	10,13	14,09	25,59	20,59	19,25	16,13	13,33	2,15	2,03	10,96	7,05	6,99	7,99	9,91	10,80	11,07
	42,54	kWh	1,21	0,48	0,43	1,25	3,82	1,74	0,97	0,97	3,63	0,39	0,39	0,38	0,39	0,36	0,38	0,38
Average	13,38	t (°C)	16,6	17,0	16,8	16,7	14,9	13,3	11,1	9,8	10,1	9,7	8,8	8,0	7,1	6,8	6,9	10,2
Price x Use	**531,65**	€ Cent	12,26	6,76	11,00	25,74	73,54	28,07	12,93	2,09	7,37	4,27	2,75	2,66	3,12	3,57	4,10	4,21
=MIN of Use + 10%	0,40	kWh	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40
Use (kWh) - Base use		kWh	0,81	0,08	0,03	0,85	3,42	1,34	0,57	0,57	3,23	-0,01	-0,01	-0,02	-0,01	-0,04	-0,02	-0,02
> 1 kWh	11,00	kWh					3,42	1,34										
> 1 kWh	11,00	kWh								3,42	1,34							
kWh	42,54	kWh	1,21	0,48	0,43	1,25	0,40	0,40	0,97	4,39	4,97	0,39	0,39	0,38	0,39	0,36	0,38	0,38
c/kWh x Sh.Use (kWh)	**442,56**	€ Cent	12,26	6,76	11,00	25,74	7,62	6,39	12,93	9,45	10,10	4,27	2,75	2,66	3,12	3,57	4,10	4,21

			2023-08-19 08:00	2023-08-19 09:00	2023-08-19 10:00	2023-08-19 11:00	2023-08-19 12:00	2023-08-19 13:00	2023-08-19 14:00	2023-08-19 15:00	2023-08-19 16:00	2023-08-19 17:00	2023-08-19 18:00	2023-08-19 19:00	2023-08-19 20:00	2023-08-19 21:00	2023-08-19 22:00	2023-08-19 23:00
Selected	13,08	€ Cent	12,39	12,68	15,59	21,82	12,31	10,82	13,63	13,19	13,90	15,59	13,99	17,20	19,31	14,07	14,51	12,96
	42,54	kWh	0,39	0,48	0,52	0,39	0,40	0,40	0,36	0,51	3,05	1,71	0,46	0,51	1,14	1,61	1,45	0,62
Average	13,38	t (°C)	11,8	13,7	14,5	15,1	15,7	15,9	16,6	16,6	17,3	16,9	17,0	16,9	16,7	11,7	9,8	9,3
Price x Use	**531,65**	€ Cent	4,83	6,09	8,11	8,51	4,92	4,33	4,91	6,73	42,40	26,66	6,44	8,77	22,01	22,65	21,04	8,04
=MIN of Use + 10%	0,40	kWh	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40	0,40
Use (kWh) - Base use		kWh	-0,01	0,08	0,12	-0,01	0,00	0,00	-0,04	0,11	2,65	1,31	0,06	0,11	0,74	1,21	1,05	0,22
> 1 kWh	11,00	kWh									2,65	1,31				1,21	1,05	
> 1 kWh	11,00	kWh					2,65	1,31									1,21	1,05
kWh	42,54	kWh	0,39	0,48	0,52	0,39	3,05	1,71	0,36	0,51	0,40	0,40	0,46	0,51	1,14	0,40	1,61	1,67
c/kWh x Sh.Use (kWh)	**442,56**	€ Cent	4,83	6,09	8,11	8,51	37,59	18,55	4,91	6,73	5,50	6,17	6,44	8,77	22,01	5,57	23,36	21,70

USE kWh x 4,80 c/kWh	2,04	€

	5,34	€
24 %	1,28	€
	6,62	€

End cost shifted + Transfer Cost	**4,45**	€
24 %	1,07	€
	5,51	€

Sum Brutto Before - After	**1,10**	€

2023-08-29

			Date Time	2023-08-29 00:00	2023-08-29 01:00	2023-08-29 02:00	2023-08-29 03:00	2023-08-29 04:00	2023-08-29 05:00	2023-08-29 06:00	2023-08-29 07:00	2023-08-29 08:00	2023-08-29 09:00	2023-08-29 10:00	2023-08-29 11:00	2023-08-29 12:00	2023-08-29 13:00	2023-08-29 14:00	2023-08-29 15:00
	10,13	€ Cent																	
Selected	**11,00**	€ Cent		3,35	2,21	2,10	2,04	2,04	2,11	2,96	3,43	3,94	10,13	8,59	7,59	10,71	8,62	8,59	7,59
	37,44	kWh		0,65	0,63	0,52	0,44	0,44	0,41	0,51	0,66	0,54	0,53	0,68	3,51	0,98	0,53	0,54	0,50
Average	15,03	t (°C)		12,1	12,9	14,4	15,0	13,9	14,4	13,9	13,6	14,1	13,9	15,1	15,5	16,1	15,6	16,3	17,7
Price x Use	**420,15**	€ Cent		2,18	1,39	1,09	0,90	0,90	0,87	1,51	2,26	2,13	5,37	5,84	26,64	10,50	4,57	4,64	3,80
=MIN of Use + 10%	0,41	kWh		0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41
Use (kWh) - Base use		kWh		0,24	0,22	0,11	0,03	0,03	0,00	0,10	0,25	0,13	0,12	0,27	3,10	0,57	0,12	0,13	0,09
> 1 kWh	7,28	kWh																	
> 1 kWh	7,28	kWh																	
kWh	37,44	kWh		0,65	0,63	0,52	0,44	0,44	0,41	0,51	0,66	0,54	0,53	0,68	3,51	0,98	0,53	0,54	0,50
c/kWh x Sh.Use (kWh)	**369,66**	€ Cent		2,18	1,39	1,09	0,90	0,90	0,87	1,51	2,26	2,13	5,37	5,84	26,64	10,50	4,57	4,64	3,80
Noprm. Use - Shift. Use	50,49	€ Cent																	
Noprm. Use - Shift. Use	**12,02**	%																	

	2023-08-29 16:00	2023-08-29 17:00	2023-08-29 18:00	2023-08-29 19:00	2023-08-29 20:00	2023-08-29 21:00	2023-08-29 22:00	2023-08-29 23:00	2023-08-30 00:00	2023-08-30 01:00	2023-08-30 02:00	2023-08-30 03:00	2023-08-30 04:00	2023-08-30 05:00	2023-08-30 06:00	2023-08-30 07:00
Selected	6,70	9,07	14,41	16,18	17,59	16,45	11,79	3,50	3,29	5,19	3,89	4,00	4,39	6,59	10,12	13,31
	0,51	0,51	1,23	0,44	1,42	1,89	0,69	0,65	0,63	0,60	0,44	0,41	0,38	0,39	0,65	2,87
Average	18,4	18,7	18,4	17,8	16,7	15,4	14,9	14,5	13,4	11,3	12,8	9,9	10,4	10,3	10,9	10,4
Price x Use	3,42	4,63	17,72	7,12	24,98	31,09	8,14	2,28	2,07	3,11	1,71	1,64	1,67	2,57	6,58	38,20
=MIN of Use + 10%	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41
Use (kWh) - Base use	0,10	0,10	0,82	0,03	1,01	1,48	0,28	0,24	0,22	0,19	0,03	0,00	-0,03	-0,02	0,24	2,46
> 1 kWh					1,01	1,48										2,46
> 1 kWh	1,01	1,48												2,46		
kWh	1,52	1,99	1,23	0,44	0,41	0,41	0,69	0,65	0,63	0,60	0,44	0,41	0,38	2,85	0,65	0,41
c/kWh x Sh.Use (kWh)	10,20	18,08	17,72	7,12	7,16	6,70	8,14	2,28	2,07	3,11	1,71	1,64	1,67	18,80	6,58	5,42
Noprm. Use - Shift. Use																
Noprm. Use - Shift. Use																

	2023-08-30 08:00	2023-08-30 09:00	2023-08-30 10:00	2023-08-30 11:00	2023-08-30 12:00	2023-08-30 13:00	2023-08-30 14:00	2023-08-30 15:00	2023-08-30 16:00	2023-08-30 17:00	2023-08-30 18:00	2023-08-30 19:00	2023-08-30 20:00	2023-08-30 21:00	2023-08-30 22:00	2023-08-30 23:00
Selected	15,00	17,59	16,76	16,59	14,50	15,30	15,30	16,53	15,29	17,10	14,91	15,00	18,82	17,40	14,03	12,25
	1,27	0,76	0,72	0,73	0,37	0,41	0,44	0,37	0,45	0,58	0,55	0,53	0,70	2,73	0,61	0,44
Average	11,6	14,0	15,7	16,9	17,9	19,4	19,7	19,0	18,5	18,1	17,1	15,3	14,9	14,9	14,9	14,9
Price x Use	19,05	13,37	12,07	12,11	5,37	6,27	6,73	6,12	6,88	9,92	8,20	7,95	13,17	47,50	8,56	5,39
=MIN of Use + 10%	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41	0,41
Use (kWh) - Base use	0,86	0,35	0,31	0,32	-0,04	0,00	0,03	-0,04	0,04	0,17	0,14	0,12	0,29	2,32	0,20	0,03
> 1 kWh														2,32		
> 1 kWh																2,32
kWh	1,27	0,76	0,72	0,73	0,37	0,41	0,44	0,37	0,45	0,58	0,55	0,53	0,70	0,41	0,61	2,76
c/kWh x Sh.Use (kWh)	19,05	13,37	12,07	12,11	5,37	6,27	6,73	6,12	6,88	9,92	8,20	7,95	13,17	7,08	8,56	33,85
Noprm. Use - Shift. Use																
Noprm. Use - Shift. Use																

USE kWh x 4,80 c/kWh	1,80	€

	4,22	€
24 %	1,01	€
	5,23	€

End cost shifted + Transfer Cost	**3,71**	€
24 %	0,89	€
	4,61	€

Sum Brutto Before - After	**0,63**	€

2023-09-07

Date Time			2023-09-07 00:00	2023-09-07 01:00	2023-09-07 02:00	2023-09-07 03:00	2023-09-07 04:00	2023-09-07 05:00	2023-09-07 06:00	2023-09-07 07:00	2023-09-07 08:00	2023-09-07 09:00	2023-09-07 10:00	2023-09-07 11:00	2023-09-07 12:00	2023-09-07 13:00	2023-09-07 14:00	2023-09-07 15:00
	5,73	€ Cent																
Selected	5,73	€ Cent	2,31	2,01	1,88	1,85	1,85	1,86	2,02	2,88	13,59	13,19	16,14	10,77	7,65	7,53	5,38	4,42
	42,16	kWh	0,63	0,59	0,39	0,39	1,67	0,38	0,60	0,57	0,55	0,52	0,48	1,84	1,59	0,50	0,52	0,44
Average	12,48	t (°C)	9,4	7,9	7,6	6,9	7,5	5,5	7,1	7,9	9,2	10,7	12,0	13,6	14,7	15,4	15,1	15,7
Price x Use	316,51	€ Cent	1,46	1,19	0,73	0,72	3,09	0,71	1,21	1,64	7,47	6,86	7,75	19,82	12,16	3,77	2,80	1,94
=MIN of Use + 10%	0,42	kWh	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42
Use (kWh) - Base use		kWh	0,21	0,17	-0,03	-0,03	1,25	-0,04	0,18	0,15	0,13	0,10	0,06	1,42	1,17	0,08	0,10	0,02
> 1 kWh	10,26	kWh												1,42	1,17			
> 1 kWh	10,26	kWh															1,42	1,17
kWh	42,16	kWh	0,63	0,59	0,39	0,39	1,67	0,38	0,60	0,57	0,55	0,52	0,48	0,42	0,42	0,50	1,94	1,61
c/kWh x Sh.Use (kWh)	259,36	€ Cent	1,46	1,19	0,73	0,72	3,09	0,71	1,21	1,64	7,47	6,86	7,75	4,50	3,20	3,77	10,45	7,13
Noprm. Use - Shift. Use	57,15	€ Cent																
Noprm. Use - Shift. Use	18,05	%																

Date Time	2023-09-07 16:00	2023-09-07 17:00	2023-09-07 18:00	2023-09-07 19:00	2023-09-07 20:00	2023-09-07 21:00	2023-09-07 22:00	2023-09-07 23:00	2023-09-08 00:00	2023-09-08 01:00	2023-09-08 02:00	2023-09-08 03:00	2023-09-08 04:00	2023-09-08 05:00	2023-09-08 06:00	2023-09-08 07:00
Selected	3,89	5,39	6,06	9,11	5,39	3,42	2,65	2,15	1,88	2,80	2,48	2,38	2,34	2,87	9,92	12,69
kWh	0,38	2,56	1,90	1,39	1,29	0,62	0,61	0,60	0,59	0,52	0,42	0,38	0,52	0,38	2,00	0,52
Average	15,1	15,4	14,4	13,9	13,3	12,5	11,7	11,6	11,8	12,3	11,5	10,1	10,1	9,1	9,3	10,4
Price x Use	1,48	13,80	11,51	12,66	6,95	2,12	1,62	1,29	1,11	1,46	1,04	0,90	1,22	1,09	19,84	6,60
=MIN of Use + 10%	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42
Use (kWh) - Base use	-0,04	2,14	1,48	0,97	0,87	0,20	0,19	0,18	0,17	0,10	0,00	-0,04	0,10	-0,04	1,58	0,10
> 1 kWh			1,48												1,58	
> 1 kWh	1,48												1,58			
kWh	1,86	2,56	0,42	1,39	1,29	0,62	0,61	0,60	0,59	0,52	0,42	0,38	2,10	0,38	0,42	0,52
c/kWh x Sh.Use (kWh)	7,24	13,80	2,53	12,66	6,95	2,12	1,62	1,29	1,11	1,46	1,04	0,90	4,92	1,09	4,15	6,60

Date Time	2023-09-08 08:00	2023-09-08 09:00	2023-09-08 10:00	2023-09-08 11:00	2023-09-08 12:00	2023-09-08 13:00	2023-09-08 14:00	2023-09-08 15:00	2023-09-08 16:00	2023-09-08 17:00	2023-09-08 18:00	2023-09-08 19:00	2023-09-08 20:00	2023-09-08 21:00	2023-09-08 22:00	2023-09-08 23:00
Selected	21,84	22,60	12,93	10,76	15,12	12,03	7,69	7,85	8,61	9,43	11,38	17,57	22,95	19,96	3,15	1,77
kWh	0,52	0,48	0,77	0,96	0,55	0,62	0,61	0,45	2,59	2,85	0,50	0,44	0,44	0,50	2,23	1,31
Average	12,0	14,3	14,2	15,5	16,4	16,7	16,8	18,1	18,6	18,0	17,5	16,6	12,5	11,7	10,7	10,9
Price x Use	11,36	10,85	9,96	10,33	8,32	7,46	4,69	3,53	22,30	26,88	5,69	7,73	10,10	9,98	7,02	2,32
=MIN of Use + 10%	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42	0,42
Use (kWh) - Base use	0,10	0,06	0,35	0,54	0,13	0,20	0,19	0,03	2,17	2,43	0,08	0,02	0,02	0,08	1,81	0,89
> 1 kWh									2,17	2,43						
> 1 kWh															2,17	2,43
kWh	0,52	0,48	0,77	0,96	0,55	0,62	0,61	0,45	0,42	0,42	0,50	0,44	0,44	0,50	4,40	3,74
c/kWh x Sh.Use (kWh)	11,36	10,85	9,96	10,33	8,32	7,46	4,69	3,53	3,60	3,94	5,69	7,73	10,10	9,98	13,87	6,62

USE kWh x 4,80 c/kWh	2,02	€

	3,19	€
24 %	0,76	€
	3,95	€

End cost shifted + Transfer Cost	**2,61**	€
24 %	0,63	€
	3,24	€

Sum Brutto Before - After	**0,71**	€

2023-09-21

	0,72	€ Cent
Selected	0,72	€ Cent
	39,22	kWh
Average	15,27	t (°C)
Price x Use	29,09	€ Cent
=MIN of Use + 10%	0,39	kWh
Use (kWh) - Base use		kWh
> 1 kWh	10,61	kWh
> 1 kWh	10,61	kWh
kWh	39,22	kWh
c/kWh x Sh.Use (kWh)	27,08	€ Cent
Noprm. Use - Shift. Use	2,01	€ Cent
Noprm. Use - Shift. Use	6,91	%

Date Time	2023-09-21 00:00	2023-09-21 01:00	2023-09-21 02:00	2023-09-21 03:00	2023-09-21 04:00	2023-09-21 05:00	2023-09-21 06:00	2023-09-21 07:00	2023-09-21 08:00	2023-09-21 09:00	2023-09-21 10:00	2023-09-21 11:00	2023-09-21 12:00	2023-09-21 13:00	2023-09-21 14:00	2023-09-21 15:00
Selected (€ Cent)	0,72	0,65	0,60	0,59	0,59	0,59	0,65	0,78	0,99	1,09	0,91	0,82	0,77	0,77	0,73	0,72
kWh	0,40	0,41	0,41	0,41	0,39	0,41	0,49	0,57	0,58	0,60	0,53	0,52	0,59	0,50	2,02	0,38
t (°C)	11,4	10,8	10,4	9,4	9,6	9,5	10,0	10,5	11,6	12,7	13,9	14,9	15,5	16,3	17,5	17,5
Price x Use	0,29	0,27	0,25	0,24	0,23	0,24	0,32	0,44	0,57	0,65	0,48	0,43	0,45	0,39	1,47	0,27
=MIN of Use + 10%	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39
Use (kWh) - Base use	0,02	0,03	0,03	0,03	0,01	0,03	0,11	0,19	0,20	0,22	0,15	0,14	0,21	0,12	1,64	-0,01
> 1 kWh															1,64	
> 1 kWh							1,64									
kWh	0,40	0,41	0,41	0,41	0,39	0,41	2,13	0,57	0,58	0,60	0,53	0,52	0,59	0,50	0,39	0,38
c/kWh x Sh.Use (kWh)	0,29	0,27	0,25	0,24	0,23	0,24	1,38	0,44	0,57	0,65	0,48	0,43	0,45	0,39	0,28	0,27

Date Time	2023-09-21 16:00	2023-09-21 17:00	2023-09-21 18:00	2023-09-21 19:00	2023-09-21 20:00	2023-09-21 21:00	2023-09-21 22:00	2023-09-21 23:00	2023-09-22 00:00	2023-09-22 01:00	2023-09-22 02:00	2023-09-22 03:00	2023-09-22 04:00	2023-09-22 05:00	2023-09-22 06:00	2023-09-22 07:00
Selected (€ Cent)	0,75	0,78	0,80	0,80	0,78	0,73	0,64	0,59	0,53	0,43	0,43	0,44	0,47	0,52	0,59	0,69
kWh	0,48	0,90	1,76	2,56	1,47	0,65	0,65	0,49	0,42	0,35	0,35	0,41	0,41	0,37	0,42	0,56
t (°C)	17,6	17,9	17,5	16,7	16,3	16,4	16,3	16,0	16,2	16,1	15,9	15,5	14,8	15,1	14,7	14,5
Price x Use	0,36	0,70	1,41	2,05	1,15	0,47	0,42	0,29	0,22	0,15	0,15	0,18	0,19	0,19	0,25	0,39
=MIN of Use + 10%	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39
Use (kWh) - Base use	0,10	0,52	1,38	2,18	1,09	0,27	0,27	0,11	0,04	-0,04	-0,04	0,03	0,03	-0,02	0,04	0,18
> 1 kWh			1,38	2,18	1,09											
> 1 kWh							1,38	2,18	1,09						1,84	1,13
kWh	0,48	0,90	0,39	0,39	0,39	0,65	2,03	2,67	1,51	0,35	0,35	0,41	0,41	0,37	2,26	1,69
c/kWh x Sh.Use (kWh)	0,36	0,70	0,31	0,31	0,30	0,47	1,30	1,57	0,80	0,15	0,15	0,18	0,19	0,19	1,33	1,16

Date Time	2023-09-22 08:00	2023-09-22 09:00	2023-09-22 10:00	2023-09-22 11:00	2023-09-22 12:00	2023-09-22 13:00	2023-09-22 14:00	2023-09-22 15:00	2023-09-22 16:00	2023-09-22 17:00	2023-09-22 18:00	2023-09-22 19:00	2023-09-22 20:00	2023-09-22 21:00	2023-09-22 22:00	2023-09-22 23:00
Selected (€ Cent)	0,79	0,89	0,98	0,94	0,82	0,81	0,77	0,76	0,74	0,72	0,69	0,70	0,69	0,65	0,60	0,59
kWh	0,64	0,60	2,22	1,07	1,51	1,30	0,83	0,50	1,76	0,38	0,48	0,55	0,53	2,27	1,22	1,90
t (°C)	14,7	15,1	15,9	17,0	17,8	18,3	18,8	19,7	19,1	18,4	18,0	17,4	16,6	15,9	15,6	15,5
Price x Use	0,51	0,53	2,18	1,01	1,24	1,05	0,64	0,38	1,30	0,27	0,33	0,39	0,37	1,48	0,73	1,12
=MIN of Use + 10%	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39	0,39
Use (kWh) - Base use	0,26	0,22	1,84	0,69	1,13	0,92	0,45	0,12	1,38	-0,01	0,10	0,17	0,15	1,89	0,84	1,52
> 1 kWh			1,84		1,13				1,38							
> 1 kWh											1,38					
kWh	0,64	0,60	0,39	1,07	0,39	1,30	0,83	0,50	0,39	0,38	1,86	0,55	0,53	2,27	1,22	1,90
c/kWh x Sh.Use (kWh)	0,51	0,53	0,38	1,01	0,32	1,05	0,64	0,38	0,28	0,27	1,28	0,39	0,37	1,48	0,73	1,12

USE kWh x 4,80 c/kWh	1,88	€

	0,31	€
24 %	0,07	€
	0,38	€

End cost shifted + Transfer Cost	0,29	€
24 %	0,07	€
	0,36	€

Sum Brutto Before - After	**0,02**	€

2023-10-09

Date Time			2023-10-09 00:00	2023-10-09 01:00	2023-10-09 02:00	2023-10-09 03:00	2023-10-09 04:00	2023-10-09 05:00	2023-10-09 06:00	2023-10-09 07:00	2023-10-09 08:00	2023-10-09 09:00	2023-10-09 10:00	2023-10-09 11:00	2023-10-09 12:00	2023-10-09 13:00	2023-10-09 14:00	2023-10-09 15:00	2023-10-09 16:00	2023-10-09 17:00	2023-10-09 18:00	2023-10-09 19:00	2023-10-09 20:00	2023-10-09 21:00	2023-10-09 22:00	2023-10-09 23:00
	10,32	€ Cent																								
Selected	10,32	€ Cent	1,09	1,06	0,97	0,98	1,01	1,09	1,34	5,92	11,77	13,28	12,73	11,75	11,13	10,49	10,41	10,89	11,32	11,62	13,52	19,51	22,76	18,60	13,55	5,80
	36,42	kWh	0,45	0,38	0,39	0,34	0,41	0,35	0,44	0,45	0,47	0,54	1,86	0,84	0,57	0,76	0,60	0,54	0,50	1,49	1,38	3,36	0,86	0,74	0,64	0,61
Average	1,07	t (°C)	1,5	1,5	1,3	1,2	1,0	0,9	0,7	0,5	0,4	0,3	0,2	0,6	0,6	1,2	1,8	1,7	1,4	1,3	1,0	1,2	1,2	0,8	-0,4	-0,9
Price x Use	**373,14**	€ Cent	0,49	0,40	0,38	0,33	0,41	0,38	0,59	2,66	5,53	7,17	23,68	9,87	6,34	7,97	6,25	5,88	5,66	17,31	18,66	65,55	19,57	13,76	8,67	3,54
=MIN of Use + 10%	0,37	kWh	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37
Use (kWh) - Base use		kWh	0,08	0,01	0,02	-0,03	0,04	-0,02	0,07	0,08	0,10	0,17	1,49	0,47	0,20	0,39	0,23	0,17	0,13	1,12	1,01	2,99	0,49	0,37	0,27	0,24
> 1 kWh	8,61	kWh											1,49							1,12	1,01	2,99				
> 1 kWh	8,61	kWh							1,49																	1,12
kWh	36,42	kWh	0,45	0,38	0,39	0,34	0,41	0,35	1,93	0,45	0,47	0,54	0,37	0,84	0,57	0,76	0,60	0,54	0,50	0,37	0,37	0,37	0,86	0,74	0,64	1,73
c/kWh x Sh.Use (kWh)	**259,77**	€ Cent	0,49	0,40	0,38	0,33	0,41	0,38	2,58	2,66	5,53	7,17	4,76	9,87	6,34	7,97	6,25	5,88	5,66	4,35	5,06	7,30	19,57	13,76	8,67	10,01
Noprm. Use - Shift. Use	113,37	€ Cent																								
Noprm. Use - Shift. Use	**30,38**	%																								

Date Time	2023-10-10 00:00	2023-10-10 01:00	2023-10-10 02:00	2023-10-10 03:00	2023-10-10 04:00	2023-10-10 05:00	2023-10-10 06:00	2023-10-10 07:00	2023-10-10 08:00	2023-10-10 09:00	2023-10-10 10:00	2023-10-10 11:00	2023-10-10 12:00	2023-10-10 13:00	2023-10-10 14:00	2023-10-10 15:00	2023-10-10 16:00	2023-10-10 17:00	2023-10-10 18:00	2023-10-10 19:00	2023-10-10 20:00	2023-10-10 21:00	2023-10-10 22:00	2023-10-10 23:00
Selected	1,65	3,41	1,47	1,41	1,45	2,30	5,60	13,28	20,78	20,45	14,78	12,30	11,43	10,62	10,23	10,82	13,01	5,67	4,86	3,23	1,08	0,80	0,59	0,42
	0,43	0,40	0,40	0,40	0,40	0,38	0,38	0,49	0,66	2,39	0,47	0,51	0,50	0,48	0,42	0,41	1,04	0,72	1,20	2,43	0,70	0,68	0,84	0,72
Average	-1,2	-0,6	-1,0	-0,6	-0,2	0,1	0,2	-0,2	-0,4	-0,2	0,7	1,7	2,6	2,9	4,2	3,7	4,0	2,7	1,5	0,6	1,4	2,8	2,6	3,0
Price x Use	0,71	1,36	0,59	0,56	0,58	0,87	2,13	6,51	13,71	48,88	6,95	6,27	5,72	5,10	4,30	4,44	13,53	4,08	5,83	7,85	0,76	0,54	0,50	0,30
=MIN of Use + 10%	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37	0,37
Use (kWh) - Base use	0,06	0,03	0,03	0,03	0,03	0,01	0,01	0,12	0,29	2,02	0,10	0,14	0,13	0,11	0,05	0,04	0,67	0,35	0,83	2,06	0,33	0,31	0,47	0,35
> 1 kWh										2,02														
> 1 kWh	1,01	2,99					2,02																	
kWh	1,44	3,39	0,40	0,40	0,40	0,38	2,40	0,49	0,66	0,37	0,47	0,51	0,50	0,48	0,42	0,41	1,04	0,72	1,20	2,43	0,70	0,68	0,84	0,72
c/kWh x Sh.Use (kWh)	2,37	11,55	0,59	0,56	0,58	0,87	13,42	6,51	13,71	7,65	6,95	6,27	5,72	5,10	4,30	4,44	13,53	4,08	5,83	7,85	0,76	0,54	0,50	0,30
Noprm. Use - Shift. Use																								
Noprm. Use - Shift. Use																								

USE kWh x 4,80 c/kWh	1,75	€

	3,75	€
24 %	0,90	€
	4,65	€

End cost shifted + Transfer Cost	**2,62**	€
24 %	0,63	€
	3,24	€

Sum Brutto Before - After	1,41	€

2023-10-30		Date Time	2023-10-30 00:00	2023-10-30 01:00	2023-10-30 02:00	2023-10-30 03:00	2023-10-30 04:00	2023-10-30 05:00	2023-10-30 06:00	2023-10-30 07:00	2023-10-30 08:00	2023-10-30 09:00	2023-10-30 10:00	2023-10-30 11:00	2023-10-30 12:00	2023-10-30 13:00	2023-10-30 14:00	2023-10-30 15:00	2023-10-30 16:00	2023-10-30 17:00	2023-10-30 18:00	2023-10-30 19:00	2023-10-30 20:00	2023-10-30 21:00	2023-10-30 22:00	2023-10-30 23:00
	6,06	€ Cent																								
Selected	**6,06**	€ Cent	3,05	2,45	1,85	1,78	1,75	2,32	4,33	8,36	8,30	11,69	10,89	9,59	10,21	10,84	12,05	12,99	13,58	13,59	13,59	13,58	9,24	6,80	5,19	4,02
	36,70	kWh	0,50	0,51	0,46	0,30	0,40	0,34	0,42	1,74	1,02	0,70	1,19	1,08	1,02	1,14	1,15	1,38	2,24	1,15	1,26	1,62	0,62	0,52	0,50	0,50
Average	-5,83	t (°C)	-3,1	-2,8	-2,9	-3,3	-4,0	-5,2	-7,7	-7,6	-8,2	-6,0	-5,5	-4,8	-3,9	-3,6	-3,3	-3,3	-3,9	-4,4	-4,8	-6,3	-7,1	-7,5	-8,6	-8,2
Price x Use	**307,07**	€ Cent	1,53	1,25	0,85	0,53	0,70	0,79	1,82	14,55	8,47	8,18	12,96	10,36	10,41	12,36	13,86	17,93	30,42	15,63	17,12	22,00	5,73	3,54	2,60	2,01
=MIN of Use + 10%	0,33	kWh	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33
Use (kWh) - Base use		kWh	0,17	0,18	0,13	-0,03	0,07	0,01	0,09	1,41	0,69	0,37	0,86	0,75	0,69	0,81	0,82	1,05	1,91	0,82	0,93	1,29	0,29	0,19	0,17	0,17
> 1 kWh	6,84	kWh								1,41								1,05	1,91			1,29				
> 1 kWh	6,84	kWh						1,41																	1,05	1,91
kWh	36,70	kWh	0,50	0,51	0,46	0,30	0,40	1,75	0,42	0,33	1,02	0,70	1,19	1,08	1,02	1,14	1,15	0,33	0,33	1,15	1,26	0,33	0,62	0,52	1,55	2,41
c/kWh x Sh.Use (kWh)	**256,62**	€ Cent	1,53	1,25	0,85	0,53	0,70	4,06	1,82	2,76	8,47	8,18	12,96	10,36	10,41	12,36	13,86	4,29	4,48	15,63	17,12	4,48	5,73	3,54	8,04	9,69
Noprm. Use - Shift. Use	50,45	€ Cent																								
Noprm. Use - Shift. Use	**16,43**	%																								

2023-10-30		Date Time	2023-10-31 00:00	2023-10-31 01:00	2023-10-31 02:00	2023-10-31 03:00	2023-10-31 04:00	2023-10-31 05:00	2023-10-31 06:00	2023-10-31 07:00	2023-10-31 08:00	2023-10-31 09:00	2023-10-31 10:00	2023-10-31 11:00	2023-10-31 12:00	2023-10-31 13:00	2023-10-31 14:00	2023-10-31 15:00	2023-10-31 16:00	2023-10-31 17:00	2023-10-31 18:00	2023-10-31 19:00	2023-10-31 20:00	2023-10-31 21:00	2023-10-31 22:00	2023-10-31 23:00
	6,06	€ Cent																								
Selected	**6,06**	€ Cent	3,38	3,55	3,55	3,58	3,64	3,59	4,03	8,58	11,00	11,06	10,33	9,60	10,47	10,43	10,00	6,64	5,48	4,67	3,28	3,09	2,81	2,57	2,36	1,92
	36,70	kWh	0,50	0,48	0,41	0,43	0,43	0,45	0,60	0,61	0,68	0,57	0,71	0,55	0,62	0,68	0,66	1,51	0,88	0,66	0,71	0,90	0,50	0,52	0,50	0,38
Average	-5,83	t (°C)	-8,8	-9,4	-9,1	-10,0	-9,1	-9,4	-9,2	-8,9	-8,5	-7,7	-6,5	-5,8	-5,3	-4,9	-4,5	-4,3	-4,2	-4,1	-4,0	-3,9	-4,0	-3,9	-4,0	-4,1
Price x Use	**307,07**	€ Cent	1,69	1,70	1,46	1,54	1,57	1,62	2,42	5,23	7,48	6,30	7,33	5,28	6,49	7,09	6,60	10,03	4,82	3,08	2,33	2,78	1,41	1,34	1,18	0,73
=MIN of Use + 10%	0,33	kWh	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33	0,33
Use (kWh) - Base use		kWh	0,17	0,15	0,08	0,10	0,10	0,12	0,27	0,28	0,35	0,24	0,38	0,22	0,29	0,35	0,33	1,18	0,55	0,33	0,38	0,57	0,17	0,19	0,17	0,05
> 1 kWh	6,84	kWh																1,18								
> 1 kWh	6,84	kWh	1,29																	1,18						
kWh	36,70	kWh	1,79	0,48	0,41	0,43	0,43	0,45	0,60	0,61	0,68	0,57	0,71	0,55	0,62	0,68	0,66	0,33	0,88	1,84	0,71	0,90	0,50	0,52	0,50	0,38
c/kWh x Sh.Use (kWh)	**256,62**	€ Cent	6,05	1,70	1,46	1,54	1,57	1,62	2,42	5,23	7,48	6,30	7,33	5,28	6,49	7,09	6,60	2,19	4,82	8,59	2,33	2,78	1,41	1,34	1,18	0,73
Noprm. Use - Shift. Use	50,45	€ Cent																								
Noprm. Use - Shift. Use	**16,43**	%																								

USE kWh x 4,80 c/kWh	1,76	€

	3,09	€
24 %	0,74	€
	3,83	€

End cost shifted + Transfer Cost	**2,58**	€
24 %	0,62	€
	3,20	€

Sum Brutto Before - After	**0,63**	€

2023-11-06		Date Time	2023-11-06 00:00	2023-11-06 01:00	2023-11-06 02:00	2023-11-06 03:00	2023-11-06 04:00	2023-11-06 05:00	2023-11-06 06:00	2023-11-06 07:00	2023-11-06 08:00	2023-11-06 09:00	2023-11-06 10:00	2023-11-06 11:00	2023-11-06 12:00	2023-11-06 13:00	2023-11-06 14:00	2023-11-06 15:00	2023-11-06 16:00	2023-11-06 17:00	2023-11-06 18:00	2023-11-06 19:00	2023-11-06 20:00	2023-11-06 21:00	2023-11-06 22:00	2023-11-06 23:00
	8,55	€ Cent																								
Selected	**8,55**	€ Cent	2,75	2,49	2,29	2,28	2,26	2,28	3,13	6,61	7,54	8,90	7,87	8,59	6,94	8,42	8,63	8,51	9,64	11,48	13,96	15,22	10,14	8,44	7,40	5,09
	33,81	kWh	0,30	0,31	0,28	0,26	0,31	0,32	0,31	0,39	1,69	0,76	0,59	0,65	0,63	0,62	0,51	0,73	1,35	3,28	1,09	2,68	1,36	0,58	0,52	0,49
Average	2,06	t (°C)	1,3	1,8	2,0	2,2	2,2	1,6	1,6	1,2	1,8	2,6	2,8	2,9	3,1	3,1	2,8	2,8	2,8	2,4	2,4	2,2	2,1	2,0	1,7	1,6
Price x Use	**357,67**	€ Cent	0,83	0,77	0,64	0,59	0,70	0,73	0,97	2,58	12,74	6,76	4,64	5,58	4,37	5,22	4,40	6,21	13,01	37,65	15,22	40,79	13,79	4,90	3,85	2,49
=MIN of Use + 10%	0,29	kWh	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29
Use (kWh) - Base use		kWh	0,01	0,02	-0,01	-0,03	0,02	0,03	0,02	0,10	1,40	0,47	0,30	0,36	0,34	0,33	0,22	0,44	1,06	2,99	0,80	2,39	1,07	0,29	0,23	0,20
> 1 kWh	9,63	kWh																	1,06	2,99		2,39	1,07			
> 1 kWh	6,64	kWh													1,06									2,39	1,07	
kWh	30,82	kWh	0,30	0,31	0,28	0,26	0,31	0,32	0,31	0,39	1,69	0,76	0,59	0,65	1,69	0,62	0,51	0,73	0,29	0,29	1,09	0,29	0,29	2,97	1,59	0,49
c/kWh x Sh.Use (kWh)	**280,19**	€ Cent	0,83	0,77	0,64	0,59	0,70	0,73	0,97	2,58	12,74	6,76	4,64	5,58	11,76	5,22	4,40	6,21	2,76	3,28	15,22	4,35	2,90	25,10	11,80	2,49
Noprm. Use - Shift. Use	77,48	€ Cent																								
Noprm. Use - Shift. Use	**21,66**	%																								

2023-11-06		Date Time	2023-11-07 00:00	2023-11-07 01:00	2023-11-07 02:00	2023-11-07 03:00	2023-11-07 04:00	2023-11-07 05:00	2023-11-07 06:00	2023-11-07 07:00	2023-11-07 08:00	2023-11-07 09:00	2023-11-07 10:00	2023-11-07 11:00	2023-11-07 12:00	2023-11-07 13:00	2023-11-07 14:00	2023-11-07 15:00	2023-11-07 16:00	2023-11-07 17:00	2023-11-07 18:00	2023-11-07 19:00	2023-11-07 20:00	2023-11-07 21:00	2023-11-07 22:00	2023-11-07 23:00
	8,55	€ Cent																								
Selected	**8,55**	€ Cent	4,10	4,62	4,35	4,06	4,15	4,60	7,59	10,10	14,57	17,60	18,16	17,60	12,70	17,59	12,99	11,98	10,56	11,55	13,88	15,06	10,41	9,07	8,68	6,81
	33,81	kWh	0,50	0,51	0,33	0,32	0,30	0,31	0,52	0,35	0,60	0,50	1,00	2,39	0,44	0,42	0,39	0,43	0,54	0,50	0,88	0,56	0,56	0,54	0,49	0,42
Average	2,06	t (°C)	1,7	1,9	2,1	1,8	1,8	2,0	1,5	1,6	0,8	1,1	1,7	2,3	2,9	3,1	3,0	2,9	2,5	2,1	1,8	1,9	1,8	1,4	1,2	1,1
Price x Use	**357,67**	€ Cent	2,05	2,36	1,44	1,30	1,25	1,43	3,95	3,54	8,74	8,80	18,16	42,06	5,59	7,39	5,07	5,15	5,70	5,78	12,21	8,43	5,83	4,90	4,25	2,86
=MIN of Use + 10%	0,29	kWh	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29	0,29
Use (kWh) - Base use		kWh	0,21	0,22	0,04	0,03	0,01	0,02	0,23	0,06	0,31	0,21	0,71	2,10	0,15	0,13	0,10	0,14	0,25	0,21	0,59	0,27	0,27	0,25	0,20	0,13
> 1 kWh	9,63	kWh												2,10												
> 1 kWh	6,64	kWh							2,10																	
kWh	30,82	kWh	0,50	0,51	0,33	0,32	0,30	0,31	2,62	0,35	0,60	0,50	1,00	0,29	0,44	0,42	0,39	0,43	0,54	0,50	0,88	0,56	0,56	0,54	0,49	0,42
c/kWh x Sh.Use (kWh)	**280,19**	€ Cent	2,05	2,36	1,44	1,30	1,25	1,43	19,92	3,54	8,74	8,80	18,16	5,03	5,59	7,39	5,07	5,15	5,70	5,78	12,21	8,43	5,83	4,90	4,25	2,86
Noprm. Use - Shift. Use	77,48	€ Cent																								
Noprm. Use - Shift. Use	**21,66**	%																								

USE kWh x 4,80 c/kWh	1,48	€

	3,59	€
24 %	0,86	€
	4,45	€

End cost shifted + Transfer Cost	**2,82**	€
24 %	0,68	€
	3,49	€

Sum Brutto Before - After	**0,96**	€

2023-11-26

	12,00	€ Cent
Selected	**12,00**	€ Cent
	73,10	kWh
Average	-17,20	t (°C)
Price x Use	**896,90**	€ Cent
=MIN of Use + 10%	0,72	kWh
Use (kWh) - Base use		kWh
> 1 kWh	15,63	kWh
> 1 kWh	15,63	kWh
kWh	73,10	kWh
c/kWh x Sh.Use (kWh)	**835,48**	€ Cent
Noprm. Use - Shift. Use	61,42	€ Cent
Noprm. Use - Shift. Use	**6,85**	%
USE kWh x 4,80 c/kWh	3,51	€
	9,00	€
24 %	2,16	€
	11,17	€
End cost shifted + Transfer Cost	**8,39**	€
24 %	2,01	€
	10,40	€
Sum Brutto Before - After	**0,76**	€

Date Time	2023-11-26 00:00	2023-11-26 01:00	2023-11-26 02:00	2023-11-26 03:00	2023-11-26 04:00	2023-11-26 05:00	2023-11-26 06:00	2023-11-26 07:00	2023-11-26 08:00	2023-11-26 09:00	2023-11-26 10:00	2023-11-26 11:00
Selected (€ Cent)	9,97	11,36	10,81	10,48	10,28	10,02	11,59	10,48	10,81	14,81	15,08	11,84
kWh	0,73	0,65	0,82	0,80	1,00	0,89	1,07	1,22	1,19	1,24	1,32	1,44
t (°C)	-18,7	-19,3	-19,7	-19,6	-19,6	-18,6	-18,8	-18,7	-20,3	-21,7	-20,4	-19,4
Price x Use (€ Cent)	7,28	7,38	8,86	8,38	10,28	8,92	12,40	12,79	12,86	18,36	19,91	17,05
=MIN of Use + 10%	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
Use (kWh) - Base use	0,01	-0,07	0,11	0,09	0,29	0,18	0,36	0,51	0,48	0,53	0,61	0,73
> 1 kWh												
> 1 kWh												
kWh	0,73	0,65	0,82	0,80	1,00	0,89	1,07	1,22	1,19	1,24	1,32	1,44
c/kWh x Sh.Use (kWh)	7,28	7,38	8,86	8,38	10,28	8,92	12,40	12,79	12,86	18,36	19,91	17,05

Date Time	2023-11-26 12:00	2023-11-26 13:00	2023-11-26 14:00	2023-11-26 15:00	2023-11-26 16:00	2023-11-26 17:00	2023-11-26 18:00	2023-11-26 19:00	2023-11-26 20:00	2023-11-26 21:00	2023-11-26 22:00	2023-11-26 23:00
Selected (€ Cent)	12,92	11,66	11,33	13,59	15,08	15,09	14,97	15,56	14,90	14,18	12,83	12,20
kWh	1,93	3,19	1,35	1,28	1,20	1,64	1,27	1,23	1,32	1,24	1,42	1,34
t (°C)	-18,1	-16,1	-17,0	-16,2	-17,3	-16,2	-19,4	-17,1	-21,2	-23,0	-22,3	-21,9
Price x Use (€ Cent)	24,94	37,20	15,30	17,40	18,10	24,75	19,01	19,14	19,67	17,58	18,22	16,35
=MIN of Use + 10%	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
Use (kWh) - Base use	1,22	2,48	0,64	0,57	0,49	0,93	0,56	0,52	0,61	0,53	0,71	0,63
> 1 kWh	1,22											
> 1 kWh			1,22									
kWh	0,72	3,19	2,57	1,28	1,20	1,64	1,27	1,23	1,32	1,24	1,42	1,34
c/kWh x Sh.Use (kWh)	9,24	37,20	29,06	17,40	18,10	24,75	19,01	19,14	19,67	17,58	18,22	16,35

Date Time	2023-11-27 00:00	2023-11-27 01:00	2023-11-27 02:00	2023-11-27 03:00	2023-11-27 04:00	2023-11-27 05:00	2023-11-27 06:00	2023-11-27 07:00	2023-11-27 08:00	2023-11-27 09:00	2023-11-27 10:00	2023-11-27 11:00
Selected (€ Cent)	10,54	10,21	9,71	9,36	9,26	9,17	10,00	12,79	14,48	15,09	14,53	14,39
kWh	1,25	1,16	1,25	1,26	1,27	1,44	1,70	2,32	3,67	2,19	2,03	2,00
t (°C)	-20,4	-21,0	-19,3	-19,6	-18,8	-18,9	-19,6	-18,2	-16,7	-15,8	-15,2	-14,6
Price x Use (€ Cent)	13,18	11,84	12,14	11,79	11,76	13,20	17,00	29,67	53,14	33,05	29,50	28,78
=MIN of Use + 10%	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
Use (kWh) - Base use	0,54	0,45	0,54	0,55	0,56	0,73	0,99	1,61	2,96	1,48	1,32	1,29
> 1 kWh								1,61	2,96	1,48	1,32	1,29
> 1 kWh	1,61	2,96	1,48	1,32	1,29	1,24	1,14					
kWh	2,86	4,12	2,73	2,58	2,56	2,68	2,84	0,72	0,72	0,72	0,72	0,72
c/kWh x Sh.Use (kWh)	30,09	42,01	26,46	24,10	23,66	24,53	28,35	9,14	10,35	10,79	10,39	10,29

Date Time	2023-11-27 12:00	2023-11-27 13:00	2023-11-27 14:00	2023-11-27 15:00	2023-11-27 16:00	2023-11-27 17:00	2023-11-27 18:00	2023-11-27 19:00	2023-11-27 20:00	2023-11-27 21:00	2023-11-27 22:00	2023-11-27 23:00
Selected (€ Cent)	14,28	13,57	13,45	13,15	12,34	11,90	12,74	12,09	10,81	6,31	6,48	4,59
kWh	1,95	1,85	1,80	1,74	1,19	3,32	1,30	2,01	2,33	1,55	0,89	0,85
t (°C)	-14,0	-13,7	-13,4	-13,1	-13,5	-14,0	-13,7	-12,9	-11,7	-10,5	-8,8	-7,4
Price x Use (€ Cent)	27,85	25,10	24,21	22,88	14,68	39,51	16,56	24,30	25,19	9,78	5,77	3,90
=MIN of Use + 10%	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
Use (kWh) - Base use	1,24	1,14	1,09	1,03	0,48	2,61	0,59	1,30	1,62	0,84	0,18	0,14
> 1 kWh	1,24	1,14	1,09	1,03				1,30				
> 1 kWh						1,09			1,03	1,30		
kWh	0,72	0,72	0,72	0,72	1,19	4,41	1,30	0,72	3,36	2,85	0,89	0,85
c/kWh x Sh.Use (kWh)	10,21	9,70	9,62	9,40	14,68	52,42	16,56	8,64	36,27	17,95	5,77	3,90

2023-12-13

			Date Time	2023-12-13 00:00	2023-12-13 01:00	2023-12-13 02:00	2023-12-13 03:00	2023-12-13 04:00	2023-12-13 05:00	2023-12-13 06:00	2023-12-13 07:00	2023-12-13 08:00	2023-12-13 09:00	2023-12-13 10:00	2023-12-13 11:00	2023-12-13 12:00	2023-12-13 13:00	2023-12-13 14:00	2023-12-13 15:00
	15,10	€ Cent																	
Selected	15,10	€ Cent		10,37	9,37	9,10	8,34	8,34	10,08	9,92	15,59	15,59	15,59	15,59	15,36	15,59	15,59	15,50	15,50
	70,74	kWh		1,06	2,84	1,11	1,06	1,10	1,04	1,24	1,87	1,96	2,04	2,02	1,93	3,36	3,71	1,86	2,37
Average	-7,87	t (°C)		-11,2	-11,0	-11,0	-11,1	-10,8	-10,5	-10,0	-9,8	-9,5	-9,1	-8,7	-8,3	-7,9	-7,5	-7,4	-7,3
Price x Use	**1002,92**	€ Cent		10,99	26,61	10,10	8,84	9,17	10,48	12,30	29,15	30,56	31,80	31,49	29,64	52,38	57,84	28,83	36,74
=MIN of Use + 10%	0,72	kWh		0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
Use (kWh) - Base use		kWh		0,35	2,13	0,40	0,35	0,39	0,33	0,53	1,16	1,25	1,33	1,31	1,22	2,65	3,00	1,15	1,66
> 1 kWh	22,53	kWh									1,16	1,25	1,33	1,31	1,22	2,65	3,00	1,15	1,66
> 1 kWh	22,53	kWh					1,16	1,25	1,33	1,31									
kWh	70,74	kWh		1,06	2,84	1,11	2,22	2,35	2,37	2,55	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
c/kWh x Sh.Use (kWh)	**882,08**	€ Cent		10,99	26,61	10,10	18,47	19,56	23,84	25,25	11,15	11,15	11,15	11,15	10,98	11,15	11,15	11,08	11,08
Noprm. Use - Shift. Use	120,84	€ Cent																	
Noprm. Use - Shift. Use	**12,05**	%																	

	2023-12-13 16:00	2023-12-13 17:00	2023-12-13 18:00	2023-12-13 19:00	2023-12-13 20:00	2023-12-13 21:00	2023-12-13 22:00	2023-12-13 23:00	2023-12-14 00:00	2023-12-14 01:00	2023-12-14 02:00	2023-12-14 03:00	2023-12-14 04:00	2023-12-14 05:00	2023-12-14 06:00	2023-12-14 07:00
Selected	15,16	15,68	15,43	15,59	13,58	11,86	10,66	11,01	9,69	8,39	8,22	8,28	8,39	9,09	11,60	15,99
(kWh)	1,25	1,13	3,96	2,20	0,83	0,88	0,85	0,90	0,74	0,65	0,78	0,74	0,82	0,68	0,80	0,95
Average	-7,1	-6,9	-6,8	-6,9	-7,0	-6,5	-6,2	-6,1	-6,2	-6,1	-6,1	-6,2	-6,3	-6,3	-6,5	-6,7
Price x Use	18,95	17,72	61,10	34,30	11,27	10,44	9,06	9,91	7,17	5,45	6,41	6,13	6,88	6,18	9,28	15,19
=MIN of Use + 10%	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
Use (kWh) - Base use	0,54	0,42	3,25	1,49	0,12	0,17	0,14	0,19	0,02	-0,07	0,06	0,02	0,11	-0,04	0,09	0,24
> 1 kWh			3,25	1,49												
> 1 kWh					1,22	2,65	3,00	1,15	1,66	3,25	1,49				2,10	
kWh	1,25	1,13	0,72	0,72	2,05	3,53	3,85	2,05	2,40	3,90	2,27	0,74	0,82	0,68	2,90	0,95
c/kWh x Sh.Use (kWh)	18,95	17,72	11,03	11,15	27,77	41,81	40,99	22,52	23,21	32,68	18,62	6,13	6,88	6,18	33,58	15,19

	2023-12-14 08:00	2023-12-14 09:00	2023-12-14 10:00	2023-12-14 11:00	2023-12-14 12:00	2023-12-14 13:00	2023-12-14 14:00	2023-12-14 15:00	2023-12-14 16:00	2023-12-14 17:00	2023-12-14 18:00	2023-12-14 19:00	2023-12-14 20:00	2023-12-14 21:00	2023-12-14 22:00	2023-12-14 23:00
Selected	18,99	17,40	17,39	16,09	18,56	16,09	14,63	16,09	19,43	19,39	18,65	15,03	12,89	11,58	12,09	10,04
(kWh)	1,35	1,01	1,66	2,81	1,73	1,50	1,85	1,27	1,07	0,96	1,06	1,08	1,05	1,62	0,89	1,10
Average	-6,8	-6,9	-7,0	-7,1	-7,2	-7,2	-7,3	-7,4	-7,5	-7,7	-7,8	-8,0	-8,3	-9,0	-8,9	-8,8
Price x Use	25,64	17,57	28,87	45,21	32,11	24,14	27,07	20,43	20,79	18,61	19,77	16,23	13,53	18,76	10,76	11,04
=MIN of Use + 10%	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
Use (kWh) - Base use	0,64	0,30	0,95	2,10	1,02	0,79	1,14	0,56	0,36	0,25	0,35	0,37	0,34	0,91	0,18	0,39
> 1 kWh				2,10	1,02											
> 1 kWh							1,02									
kWh	1,35	1,01	1,66	0,72	0,72	1,50	2,87	1,27	1,07	0,96	1,06	1,08	1,05	1,62	0,89	1,10
c/kWh x Sh.Use (kWh)	25,64	17,57	28,87	11,50	13,27	24,14	41,91	20,43	20,79	18,61	19,77	16,23	13,53	18,76	10,76	11,04

USE kWh x 4,80 c/kWh	3,40	€

	10,06	€
24 %	2,42	€
	12,48	€

End cost shifted + Transfer Cost	**8,85**	€
24 %	2,13	€
	10,98	€

Sum Brutto Before - After	**1,50**	€

2023-12-29

		Date Time	2023-12-29 00:00	2023-12-29 01:00	2023-12-29 02:00	2023-12-29 03:00	2023-12-29 04:00	2023-12-29 05:00	2023-12-29 06:00	2023-12-29 07:00	2023-12-29 08:00	2023-12-29 09:00	2023-12-29 10:00	2023-12-29 11:00	2023-12-29 12:00	2023-12-29 13:00	2023-12-29 14:00	2023-12-29 15:00
	3,68	€ Cent																
Selected	3,68	€ Cent	3,17	2,94	2,67	2,59	2,48	2,61	2,69	3,06	3,73	3,81	3,80	3,79	3,86	3,81	3,67	3,68
	76,25	kWh	1,50	0,95	0,84	0,68	0,79	0,78	0,98	1,49	1,16	1,83	1,39	1,84	3,66	3,20	4,29	1,06
Average	-11,97	t (°C)	-7,8	-7,9	-8,0	-7,8	-8,6	-10,2	-11,9	-10,4	-10,1	-12,2	-11,9	-11,8	-11,8	-11,6	-11,3	-12,3
Price x Use	311,82	€ Cent	4,76	2,79	2,24	1,76	1,96	2,04	2,64	4,56	4,33	6,97	5,28	6,97	14,13	12,19	15,74	3,90
=MIN of Use + 10%	0,72	kWh	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
Use (kWh) - Base use		kWh	0,79	0,24	0,13	-0,04	0,08	0,06	0,27	0,78	0,45	1,12	0,68	1,13	2,95	2,49	3,58	0,35
> 1 kWh	20,24	kWh										1,12		1,13	2,95	2,49		
> 1 kWh	20,24	kWh					1,12	1,13	2,95	2,49								
kWh	76,25	kWh	1,50	0,95	0,84	0,68	1,91	1,91	3,93	3,98	1,16	0,72	1,39	0,72	0,72	0,72	4,29	1,06
c/kWh x Sh.Use (kWh)	291,65	€ Cent	4,76	2,79	2,24	1,76	4,72	4,97	10,56	12,16	4,33	2,72	5,28	2,71	2,76	2,72	15,74	3,90
Noprm. Use - Shift. Use	20,16	€ Cent																
Noprm. Use - Shift. Use	**6,47**	%																

Date Time	2023-12-29 16:00	2023-12-29 17:00	2023-12-29 18:00	2023-12-29 19:00	2023-12-29 20:00	2023-12-29 21:00	2023-12-29 22:00	2023-12-29 23:00	2023-12-30 00:00	2023-12-30 01:00	2023-12-30 02:00	2023-12-30 03:00	2023-12-30 04:00	2023-12-30 05:00	2023-12-30 06:00	2023-12-30 07:00
Selected	3,66	3,89	4,18	4,00	3,67	3,59	3,40	3,12	2,53	2,67	2,59	2,40	2,40	2,40	2,61	2,79
	1,83	1,76	1,73	3,61	1,28	3,05	1,23	3,16	0,73	0,80	0,65	0,78	0,69	0,88	0,94	1,39
Average	-11,0	-11,7	-12,3	-12,6	-13,1	-13,5	-13,6	-12,1	-11,2	-10,7	-10,8	-10,9	-11,6	-12,1	-12,8	-13,4
Price x Use	6,70	6,85	7,23	14,44	4,70	10,95	4,18	9,86	1,85	2,14	1,68	1,87	1,66	2,11	2,45	3,88
=MIN of Use + 10%	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
Use (kWh) - Base use	1,12	1,05	1,02	2,90	0,57	2,34	0,52	2,45	0,01	0,09	-0,07	0,06	-0,03	0,17	0,23	0,68
> 1 kWh		1,05	1,02	2,90												
> 1 kWh					1,05	1,02	2,90							1,08	1,29	1,24
kWh	1,83	0,72	0,72	0,72	2,33	4,07	4,13	3,16	0,73	0,80	0,65	0,78	0,69	1,96	2,23	2,63
c/kWh x Sh.Use (kWh)	6,70	2,78	2,99	2,86	8,53	14,59	14,03	9,86	1,85	2,14	1,68	1,87	1,66	4,69	5,81	7,32
Noprm. Use - Shift. Use																
Noprm. Use - Shift. Use																

Date Time	2023-12-30 08:00	2023-12-30 09:00	2023-12-30 10:00	2023-12-30 11:00	2023-12-30 12:00	2023-12-30 13:00	2023-12-30 14:00	2023-12-30 15:00	2023-12-30 16:00	2023-12-30 17:00	2023-12-30 18:00	2023-12-30 19:00	2023-12-30 20:00	2023-12-30 21:00	2023-12-30 22:00	2023-12-30 23:00
Selected	3,12	3,47	4,16	4,51	4,55	4,23	3,92	4,79	6,22	7,59	8,58	8,59	7,70	6,79	6,10	5,60
	1,00	1,90	1,35	1,79	2,00	1,95	2,30	1,98	1,37	1,66	1,10	1,32	1,11	1,13	1,88	1,46
Average	-13,8	-14,2	-14,1	-13,8	-13,7	-12,9	-12,8	-12,8	-13,3	-13,8	-14,0	-13,4	-13,5	-13,1	-13,0	-13,2
Price x Use	3,12	6,59	5,62	8,07	9,10	8,25	9,02	9,48	8,52	12,60	9,44	11,34	8,55	7,67	11,47	8,18
=MIN of Use + 10%	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72	0,72
Use (kWh) - Base use	0,29	1,19	0,64	1,08	1,29	1,24	1,59	1,27	0,66	0,95	0,39	0,61	0,40	0,42	1,17	0,75
> 1 kWh				1,08	1,29	1,24	1,59	1,27							1,17	
> 1 kWh	1,59	1,27													1,17	
kWh	2,59	3,17	1,35	0,72	0,72	0,72	0,72	0,72	1,37	1,66	1,10	1,32	1,11	1,13	1,88	1,46
c/kWh x Sh.Use (kWh)	8,07	10,98	5,62	3,22	3,25	3,02	2,80	3,42	8,52	12,60	9,44	11,34	8,55	7,67	11,47	8,18
Noprm. Use - Shift. Use																
Noprm. Use - Shift. Use																

USE kWh x 4,80 c/kWh	3,66	€

	3,15	€
24 %	0,76	€
	3,91	€

End cost shifted + Transfer Cost	**2,95**	€
24 %	0,71	€
	3,66	€

Sum Brutto Before - After	**0,25**	€

Overview Shifted Calculation

This is the first and only page of a one-page appendix.

		Date	2023-01-10	2023-01-26	2023-02-14	2023-02-27	2023-03-09	2023-03-20	2023-04-05	2023-04-25	2023-05-03	2023-05-19	2023-06-10	2023-06-22	2023-07-05	2023-07-29	2023-08-18	2023-08-29	2023-09-07	2023-09-21	2023-10-09	2023-10-30	2023-11-06	2023-11-26	2023-12-13	2023-12-29
Median price		€ Cent	8,60	12,57	12,74	4,36	12,32	6,25	10,55	5,02	7,27	1,03	1,94	4,23	5,94	2,90	13,08	10,13	5,73	0,72	10,32	6,06	8,55	12,00	15,10	3,68
Price	Selected	€ Cent	10,00	10,00	13,00	10,00	13,00	5,00	12,00	6,00	8,00	1,00	2,00	5,00	5,94	2,90	13,08	11,00	5,73	0,72	10,32	6,06	8,55	12,00	15,10	3,68
Use		kWh	58,53	44,77	51,00	66,06	64,71	39,20	53,67	41,75	41,93	40,27	36,25	33,51	38,45	38,57	42,54	37,44	42,16	39,22	36,42	36,70	33,81	73,10	70,74	76,25
Temperatur	Average	t (°C)	-4,74	-3,43	-1,56	-5,58	-13,08	-1,23	-0,43	7,63	1,90	12,43	13,01	17,17	15,68	16,09	13,38	15,03	12,48	15,27	1,07	-5,83	2,06	-17,20	-7,87	-11,97
End Costs Norm.	Price x Use	€ Cent	585,86	531,06	720,65	435,84	834,97	287,25	601,25	241,15	353,85	72,78	73,84	133,93	226,22	102,67	531,65	420,15	316,51	29,09	373,14	307,07	357,67	896,90	1002,92	311,82
Base use	=MIN of Use + 10%	kWh	0,55	0,34	0,40	0,78	0,79	0,41	0,31	0,34	0,31	0,28	0,30	0,40	0,37	0,39	0,40	0,41	0,42	0,39	0,37	0,33	0,29	0,72	0,72	0,72
Exceed use All	Use - Base use (For selection)	kWh																								
Shifted Minus	> 1 kWh	kWh	9,73	11,14	11,12	6,41	10,66	9,20	8,31	9,73	12,06	7,26	6,06	7,09	8,60	7,79	11,00	7,28	10,26	10,61	8,61	6,84	9,63	15,63	22,53	20,24
Shifted Plus	> 1 kWh	kWh	9,73	11,14	11,12	6,41	10,66	9,20	8,31	9,73	12,06	7,26	6,06	7,09	8,60	7,79	11,00	7,28	10,26	10,61	8,61	6,84	6,64	15,63	22,53	20,24
Shifted Amount %		**%**	**16,62**	**24,89**	**21,80**	**9,70**	**16,48**	**23,46**	**15,48**	**23,30**	**28,77**	**18,03**	**16,71**	**21,15**	**22,38**	**20,20**	**25,87**	**19,45**	**24,34**	**27,04**	**23,64**	**18,64**	**21,53**	**21,37**	**31,84**	**26,54**
Shifted Use	kWh	kWh	58,53	44,77	51,00	66,06	64,71	39,20	53,67	41,75	41,93	40,27	36,25	33,51	38,45	38,57	42,54	37,44	42,16	39,22	36,42	36,70	30,82	73,10	70,74	76,25
End cost shifted	c/kWh x Sh.Use (kWh)	€ Cent	534,34	443,94	643,22	371,43	802,70	242,45	582,03	206,75	306,84	67,98	65,69	112,42	218,58	88,23	442,56	369,66	259,36	27,08	259,77	256,62	280,19	835,48	882,08	291,65
Saving (Netto)	Noprm. Use - Shift. Use	€ Cent	51,52	87,12	77,43	64,41	32,26	44,80	19,22	34,40	47,01	4,80	8,14	21,51	7,65	14,44	89,09	50,49	57,15	2,01	113,37	50,45	77,48	61,42	120,84	20,16
Saving (Netto) %	**Noprm. Use - Shift. Use**	**%**	**8,79**	**16,40**	**10,74**	**14,78**	**3,86**	**15,60**	**3,20**	**14,27**	**13,29**	**6,59**	**11,03**	**16,06**	**3,38**	**14,06**	**16,76**	**12,02**	**18,05**	**6,91**	**30,38**	**16,43**	**21,66**	**6,85**	**12,05**	**6,47**
Transfer Cost	USE kWh x 4,80 c/kWh	€	2,81	2,15	2,45	3,17	3,11	1,88	2,58	2,00	2,01	1,93	1,74	1,61	1,85	1,85	2,04	1,80	2,02	1,88	1,75	1,76	1,48	3,51	3,40	3,66
Sum Netto Before		€	5,89	5,33	7,23	4,39	8,38	2,89	6,04	2,43	3,56	0,75	0,76	1,36	2,28	1,05	5,34	4,22	3,19	0,31	3,75	3,09	3,59	9,00	10,06	3,15
Tax	24 %	€	1,41	1,28	1,74	1,05	2,01	0,69	1,45	0,58	0,85	0,18	0,18	0,33	0,55	0,25	1,28	1,01	0,76	0,07	0,90	0,74	0,86	2,16	2,42	0,76
Sum Brutto Before		**€**	**7,30**	**6,61**	**8,97**	**5,44**	**10,39**	**3,59**	**7,49**	**3,02**	**4,41**	**0,93**	**0,94**	**1,68**	**2,83**	**1,30**	**6,62**	**5,23**	**3,95**	**0,38**	**4,65**	**3,83**	**4,45**	**11,17**	**12,48**	**3,91**
Sum Netto After	End cost shifted + Transfer Cost	€	5,37	4,46	6,46	3,75	8,06	2,44	5,85	2,09	3,09	0,70	0,67	1,14	2,20	0,90	4,45	3,71	2,61	0,29	2,62	2,58	2,82	8,39	8,85	2,95
Tax	24 %	€	1,29	1,07	1,55	0,90	1,93	0,59	1,40	0,50	0,74	0,17	0,16	0,27	0,53	0,22	1,07	0,89	0,63	0,07	0,63	0,62	0,68	2,01	2,13	0,71
Sum Brutto After		**€**	**6,66**	**5,53**	**8,01**	**4,65**	**9,99**	**3,03**	**7,25**	**2,59**	**3,83**	**0,87**	**0,84**	**1,41**	**2,73**	**1,12**	**5,51**	**4,61**	**3,24**	**0,36**	**3,24**	**3,20**	**3,49**	**10,40**	**10,98**	**3,66**
Saving Brutto	**Sum Brutto Before - After**	**€**	**0,64**	**1,08**	**0,96**	**0,80**	**0,40**	**0,56**	**0,24**	**0,43**	**0,58**	**0,06**	**0,10**	**0,27**	**0,09**	**0,18**	**1,10**	**0,63**	**0,71**	**0,02**	**1,41**	**0,63**	**0,96**	**0,76**	**1,50**	**0,25**
Fix Price - 7 Cent	7	79,59	4,10	3,13	3,57	4,62	4,53	2,74	3,76	2,92	2,94	2,82	2,54	2,35	2,69	2,70	2,98	2,62	2,95	2,75	2,55	2,57	2,37	5,12	4,95	5,34
Fix Price - 8 Cent	8	90,96	4,68	3,58	4,08	5,28	5,18	3,14	4,29	3,34	3,35	3,22	2,90	2,68	3,08	3,09	3,40	3,00	3,37	3,14	2,91	2,94	2,70	5,85	5,66	6,10
Fix Price - 9 Cent	9	102,33	5,27	4,03	4,59	5,95	5,82	3,53	4,83	3,76	3,77	3,62	3,26	3,02	3,46	3,47	3,83	3,37	3,79	3,53	3,28	3,30	3,04	6,58	6,37	6,86
Normal Use Cost		97,48	5,86	5,31	7,21	4,36	8,35	2,87	6,01	2,41	3,54	0,73	0,74	1,34	2,26	1,03	5,32	4,20	3,17	0,29	3,73	3,07	3,58	8,97	10,03	3,12
Shifted Use Costs		85,91	5,34	4,44	6,43	3,71	8,03	2,42	5,82	2,07	3,07	0,68	0,66	1,12	2,19	0,88	4,43	3,70	2,59	0,27	2,60	2,57	2,80	8,35	8,82	2,92
Average Saving netto		12,48																								
Average Energy Amount shifted		21,63																								
Median Saving netto		12,67																								
Median Energy Amount shifted		21,67																								
Linear regression		0,1441	19,8353451																							