Introducing a fair network tariff system in the Netherlands

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Preface

This thesis presents a research that has been conducted on fairness related to network tariffs. During this research a multi-actor decision making process took place to select a tariff model, the blueprint of a network tariff system. This research was set up before the process started. When the tariff model has been selected, the decision-making process will continue to implement the network tariff system in the upcoming years. The process started on 9 March 2021. I got involved in the process with the help of Alliander N.V. This research was conducted between 26 May and 2 November 2021.

This research was supported by my first supervisor Bauke Steenhuisen, my external supervisor Martijn Jonker and my second supervisor Laurens de Vries. The role of first supervisor was later fulfilled by Mark de Bruijne. The research was also set up with the help and advice of PhD student Roman Henning.

I would like to take this opportunity to thank all of my supervisors and advisors. I also would like to thank the interviewees for their cooperation. Without the people involved, this research would not have been possible.

List of figures

List of tables

Summary
What would you think if your neighbour, who owns a Tesla and therefore causes extra load on the already congested electricity grid and you would have to pay these costs? Feels unfair, doesn't it? This is currently happening in the Netherlands and it concerns millions of households that consume electricity. Electricity consumers are currently paying for the extra loads that are caused by electric vehicles. Why do these consumers have to pay for other consumers that own Teslas? Why do these consumers have to pay without reaping the benefits? Why do these consumers have to pay for these costs while the fixed costs are rising through inflation and increasing energy prices (RTLNieuws, 2021)?

Unfairness does not seem something to be desirable by society. So how does it suddenly arise? Unfairness of the network tariff system is in its core a cost allocation issue related to energy use. This issue is a recurring theme in the energy transition and it revolves around the central question of how we are going to divide the costs of the shift from fossil fuels to renewables. This question is currently a very relevant topic in the political and public debate and unfairness of the network tariffs further undermines the very necessary energy transition. The climate goals associated with this transition contributed to the development of sustainable energy technologies such as the electric vehicles, heat pumps, solar panels and wind turbines. The increasing penetration of these technologies cause extra costs for distribution system operators, the managers of the electricity grid. Electric vehicles, for example, congest the grid and therefore system operators will have to invest in the grid. The system operators will have to recover these costs from consumers through a network tariff system. The current tariff system uniformly distributes the costs for all households without making a distinction between heavy and light consumers. This means that consumers that cause extra costs for the system operators pay the same tariff as consumers that cause less costs. This was not a problem in the past because the differences in loads were small and inconsequential. This leads to an outdated network tariff system and causes unfairness for consumers.

The system operators (Netbeheer Nederland) in the Netherlands luckily also recognize the seriousness of unfairness and therefore they initiated a multi-actor decision-making process with the goal of introducing a new network tariff system for small consumers in the upcoming years. This will be done in collaboration with a lot of stakeholders in the energy sector. The government (Ministry of Economic Affairs and Climate, ACM), the energy suppliers (E-NL, Vattenfall, Eneco, Essent, Engie, Greenchoice), consumer organizations (Vereniging eigen huis, Consumentenbond, Aedes) and other stakeholders are involved.

The decision-making process that the stakeholders have initiated seems to be a step in the right direction. However, actually introducing a fair network tariff system is uncertain because there are a lot of unknown factors, barriers and uncertainties. These aspects will be identified and recommendations will be made to improve the decision-making process by answering the following research question:

'How can the decision-making process be improved to increase the chance of successful introducing a network tariff system that will be considered fair by the stakeholders?

Network tariff literature gave little clarity about fairness and network tariffs. A lot of different interpretations are made by researchers as well as stakeholders in the energy sector, which complexifies understanding fairness as a concept in relation to network tariffs. There is no universal notion of fairness. There are also a lot of other principles and values that could be encompassed in the concept of fairness in relation to network tariffs.

The stakeholders will have to communicate about their perception of fairness to achieve a result that could be considered fair. At some point the result of the process will have to be communicated externally. The language of the experts and participating stakeholders might be different from the language of non-participating stakeholders. This is an important risk and could limit stakeholders to achieve a fair tariff system. Explicit attention to the communication of the result is therefore necessary. The result of the process should be simple and unambiguous to improve communication between participants and non-participants. A barrier for efficient communication is that the stakeholders discuss these aspects without the right information. The right information during this process does not exist. Quantitative substantiation of a fair tariff model is difficult. Individual stakeholders therefore tackle the problem from their own perception.

During the process, the consumers' perspective of fairness is unclear to a certain extent. The stakeholders have actively involved consumers, but there are several factors that limit their involvement. The first factor is that the consumers that were involved are not well representing the whole population. The other factor is that consumers are limitedly represented in meetings during the process. Therefore, consumers need to be actively involved in the process of selecting a tariff model. One method that could be a of value to increase the consumers' perception during the process is the Participatory Value Evaluation method (PVE).

The PVE can contribute to the follow-up process in several matters (Mouter, N; Koster, P; Dekker, T, 2021). The PVE provides relevant information that could be used for the support and substantiation of a decision. The PVE could provide input for a societal dialog between the stakeholders. New insights of a large group citizens could change the stakeholders discussion. The PVE could lead to more support of the decision because a large group of citizens are involved in the decision making.

Table of contents

1. Introduction

What would you think if your neighbour, who owns a Tesla and therefore causes extra load on the already congested electricity grid and you would have to pay these costs? Feels unfair, doesn't it? This is currently happening in the Netherlands and it concerns millions of households that consume electricity. Electricity consumers are currently paying for the extra loads that are caused by electric vehicles. Why do these consumers have to pay for other consumers that own Teslas? Why do these consumers have to pay without reaping the benefits? Why do these consumers have to pay for these costs while the fixed costs are rising through inflation and increasing energy prices (RTLNieuws, 2021)?

Unfairness does not seem something to be desirable by society. So how does it suddenly arise? Unfairness of the network tariff system is in its core a cost allocation issue related to energy use. This issue is a recurring theme in the energy transition and it revolves around the central question of how we are going to divide the costs of the shift from fossil fuels to renewables. This question is currently a very relevant topic in the political and public debate and unfairness of the network tariffs further undermines the very necessary energy transition. The climate goals associated with this transition contributed to the development of sustainable energy technologies such as the electric vehicles, heat pumps, solar panels and wind turbines. The increasing penetration of these technologies cause extra costs for distribution system operators, the managers of the electricity grid. Electric vehicles, for example, congest the grid and therefore system operators will have to invest in the grid. The system operators will have to recover these costs from consumers through a network tariff system. The current tariff system uniformly distributes the costs for all households without making a distinction between heavy and light consumers. This means that consumers that cause extra costs for the system operators pay the same tariff as consumers that cause less costs. This was not a problem in the past because the differences in loads were small and inconsequential. This leads to an outdated network tariff system and causes unfairness for consumers.

There are reasons to deal with the unfairness. The success of the energy transition depends significantly on societal support. Allocating the costs of the transition in a fair way could increase the societal support. It is not farfetched to think that the current unfairness in the network tariffs could reduce the chance of succeeding at the energy transition. The undermining of the energy transition is not the only reason to deal with the unfairness. There are other reasons to deal with the unfairness. First of all, consumers are worried about the increasing energy prices. The energy prices are sky rocketing due to the immense increase in gas prices. Research institutions already identified alarming numbers of energy poverty (TNO, 2021). The unfairness of the network tariff also leads to an inefficient use of the grid. The tariffs should incentivize consumers to optimize their charging behaviour and reduce grid overload. The overload could lead to congestion and increases the necessity of grid expansion which results in increasing costs for the system operators. Overload could be reduced by distributing load evenly and recuing peak loads. Charging consumers that contribute to grid overload could lower the grid management costs and contribute to keeping the energy bill affordable. The unfairness of the tariff system does not incentivize consumers to optimize their charging behaviour.

So what actions have to be taken to deal with the current unfairness? Should politicians have to solve these problems? Policy measures could be an option to deal with the unfairness and keep the energy bill affordable. One obvious option is to decrease the energy taxes. The government therefore already announced a decrease in energy taxes for 2022 (Rijksoverheid, 2021). A lot can be said about lowering the energy taxes. Generally you do not want to touch this button because it is a well controllable button that has an important function of controlling behaviour in the energy transition. It seems that the most sensible option is to reduce the unfairness by altering the tariff system. The system operators (Netbeheer Nederland) luckily also recognize the seriousness of unfairness and therefore they initiated a multi-actor decision-making process with the goal of introducing a new network tariff system for small consumers in the upcoming years. This will be done in collaboration with a lot of stakeholders in the energy sector. The government (Ministry of Economic Affairs and Climate, ACM), the energy suppliers (E-NL, Vattenfall, Eneco, Essent, Engie, Greenchoice), consumer organizations (Vereniging eigen huis, Consumentenbond, Aedes) and other stakeholders are involved.

The unfairness is reflected in the electricity bill of small consumers (mostly households). The network tariff system only covers part of the electricity bill. The electricity bill consists of the following cost items: delivery costs, grid management costs, taxes and other costs (Consumentenbond, 2020). The network tariff system recovers the grid management costs. The network tariff system on its own consists of a periodic connection fee,

the capacity tariff and a measuring tariff. The unfairness arises in the categorization of the capacity tariff. The capacity tariff is a fixed amount that consumers will have to pay to cover transportation costs. The capacity tariff divides consumers in categories based on the capacity that they use. Most small consumers are put in the same category. This means, for example, that consumers that own electric vehicles, and therefore cause additional load on the grid, pay the same tariff as consumers who do not. The tariff is, in general, a couple of hundred dollars per year. . These costs are additional costs to the currently increasing delivery costs. The delivery costs are skyrocketing due to the immense increase in gas prices. In addition to that, consumers that have a smaller budget already experience energy poverty.

The decision-making process that the stakeholders have initiated seems to be a step in the right direction. However, actually introducing a fair network tariff system is uncertain because there are a lot of unknown factors, barriers and uncertainties. These aspects will be identified and recommendations will be made to improve the decision-making process by answering the following research question:

'How can the decision-making process be improved to increase the chance of successful introducing a network tariff system that will be considered fair by the stakeholders?

This research is conducted to provide concrete recommendations for improving the multi-actor decision-making process that has started in March 2021. This research will be conducted in the Dutch specific context to meet the needs of decision makers. A qualitative case study of the most recent decision-making process will be conducted. In this study, interviews will be conducted and systematically analysed with representatives of the stakeholders that are involved in the process. This will enrich the general international literature with country specific context data.

The structure of this thesis is as follows:

Chapter 2 will explain the research questions, approach and methodology. Chapter 3 elaborates on the multi-actor decision making process. Chapter 4 elaborates on the concept of fairness. Chapter 5 describes the role of fairness in the process. Chapter 6 describes the recommendations. Chapter 7 presents the conclusion and chapter 8 the reflection.

1.1. Knowledge gap and relevance

Introducing a fair network tariff system is relevant for clear reasons. In the first place, consumers feel unfairness because consumers that cause less costs on the grid are currently paying for consumers that cause more costs. The current unfairness in the capacity tariff is mainly caused due to the differences in consumer load. Consumers own sustainable technologies in an increasing rate in the Netherlands, which contributes significantly to grid overload. Secondly, the system operators want to reduce unfairness in the current tariff system because consumers are not incentivized to consume efficiently. This leads to an inefficient grid which results in higher costs for the system operators. The system operators will have to charge consumers to recover these costs.

Fairness related to network tariff systems is a fairly new concept and is becoming more relevant by the day. More literature is written on the concept of network tariffs. Network tariff literature shows a wide variety of studies that are conducted on network tariff systems. The study of Brown et. al. (Brown, Faruqui, & Grausz, 2015) focuses on the criteria in the design of network tariffs and uses representative data from Australia, while other research focused on the Dutch Power system. Several studies focus on developing mathematical models to optimize certain aspects of network tariff systems. The study of Nijhuis et. al. (Nijhuis, Gibescu, & Cobben, 2017,) for example, used mathematical models to assess the cost of the grid. This results in an adjusted optimisation problem to calculate the costs. The study of Jesus et. al. (Jesus, de Leao, Yusta, Khodr, & Urdaneta, 2005) focuses on mathematical modelling as well by focusing on the development of a method for distribution access pricing. This resulted in an optimisation problem that is suitable for large-scale test cases.

A wide variety of research methods are conducted in the network tariff literature. Other research (Hall, Jeanneret, & Rai, 2016) (Vassileva, Wester, Wallin, Odlare, & Bartusch, 2011) use empirical research to acquire research data. Half-structured in-depth interviews and surveys are conducted to get their empirical results. The research of Hall (Hall, Jeanneret, & Rai, 2016), focuses on the cost-reflective electricity pricing and maps the

preferences and perceptions of the consumer using surveys. The research of Bartusch, (Vassileva, Wester, Wallin, Odlare, & Bartusch, 2011) focuses on the demand response and customer perception of a demand-based electricity distribution tariff in the residential sector.

It can be stated that there is a lack of literature on fairness related to network tariffs. It also can be stated that little network tariff literature focuses on the use of case studies to actually study a specific case by direct observations. The current decision-making process that has started in March 2020 therefore provides a unique opportunity to observe how stakeholders in the energy sector will introduce a new network tariff system in the Netherlands.

This thesis makes the following scientific and practical contributions for policymakers, system operators and consumers:

- Recommendations are made to improve the support and communication of the elaborated tariff model.
- Recommendations are made to improve the engagement of communities by decision-makers.
- The research provides insights on the perception of fairness which could provide benefits for future collaborations between the stakeholders.
- This research provides an operationalization of fairness which could be used in future research on fairness-related decision making.

2. Research questions, approach and methodology

In the following paragraphs the research questions will be elaborated. After this, the research approach and the research methods that are used will be elaborated.

2.1. Research question and thesis outline

A qualitative case study of the most recent decision-making process regarding network tariffs will be conducted.

The following research question will address the knowledge gap mentioned in paragraph 1.1:

How can the decision-making process be improved to increase the chance of successful introducing a network tariff system that will be considered fair by the stakeholders?

The following sub questions will be answered:

1. *What does the multi-actor decision-making process look like?*

Chapter 3 answers the first sub question. The chapter will describe the multi-actor decision-making process. In this phase the stakeholders will select a tariff model, an important step in implementing the network tariff system. This chapter will describe the stakeholders, their process approach and the tariff models that they have provided to select one tariff model that will be used for future implementation.

2. *What are the main factors in the concept of fairness?*

Chapter 4 is conceptual. Chapter 4 explains fairness as a phenomenon and identifies the relevant factors that are needed to answer the research questions. This includes relating fairness to network tariffs, insights in the perception of fairness in fields outside of the network tariff domain and an ethical perspective on fairness. The chapter builds on the understanding of fairness in ethics, social psychology, policy and economics. Fairness is a vague concept. To study this concept an operationalisation is needed. This sub question will therefore define fairness.

3. *What is the role of fairness in the process?*

Sub question 1 describes how the stakeholders aim to select a fair tariff model. The second sub question has defined fairness. Sub question 3 will use the fairness definition of sub question 2 to analyse the role of fairness in the process. This will be done in chapter 5. Answering this sub question will gain insight in how the stakeholders are selecting a fair tariff model and provide the basis for the improvement of the decision-making process.

4. *How can the attention to the role of fairness in the decision-making process be improved?*

This sub question is answered in chapter 6. The recommendations will provide options for improving the decision-making process and the pros and cons of the options.

2.2. Research approach and research methods

A qualitative case study approach will be used to answer the research question. This approach is suitable to explore a program, event, activity, process or one or more individuals according to research theory (Creswell J. , 2009) p.30. The decision-making process that will be explored is bounded by time and activity. A case study is also suitable for exploring a specific process.

The data in the first two sub questions is gathered by studying scientific and grey literature. The first sub question will be elaborated due to analysing non-public documents. Non-public documents are gathered to get a first understanding of different stakeholder opinions and are confidential at the time of this research. Non-public and public documents consist of minutes of stakeholder meetings, reports from institutions related to network tariffs such as the OTE, E.DSO (European Distribution System Operators) CEER (Council of European Energy Regulators), ECN (Energieonderzoek Centrum Nederland) and the stakeholdersdialog. The second sub question

will be elaborated by studying scientific literature of network tariffs and the fields of ethics, social psychology, policy and economics. The third sub question is primarily based on the interviews.

The data has been gathered simultaneously to the decision-making process and between February 2021 and October 2021 .The stakeholdersdialog (Stakeholderdialog, 2020) consists of meeting minutes of several stakeholder meetings that presents empirical data. The stakeholders presented their point of view on introducing a new tariff system in the Netherlands during these meetings.

The interview protocol (Appendix IX) will structure the interviews. The stakeholders that will be interviewed are identified with the help of external supervisor Mr. Jonker. The interviews will be analysed by transcribing, data coding (Appendix X) and linking the codes together in cohesive themes. Interviews will be half-structured to allow flexibility.

Six semi-structured interviews will be conducted to collect data. The stakeholders are directly involved in the process. The stakeholders represent each stakeholder group (system operator, suppliers, consumers and regulator).

Interviewees	**Name**
ACM	Jeroen de Joode
NVDE (E-mail correspondence)	Govert Vermeer
Consumentenbond	Peter van der Wilt
Eneco	Wouter le Rütte
Enexis	Yvonne Straathof-Beyer
EZK	Paul Claassens - Rijnja

Table 1 Interviewees

3. Introducing a new network tariff system: the playing field

The goal of this chapter is to present a complete picture of the research subject. This will be done by answering the following sub question: *What does the multi-actor decision-making process look like*? The case that has been selected for this research is the multi-actor decision-making process that has started in March 2020 and will go on in the upcoming years and will end approximately in 2025 when a new tariff system has been introduced. During the process, the stakeholders will have to collaborate to be successful at introducing the tariff system. An important decision that has to be made is selecting the tariff model. The tariff model will be elaborated, communicated and introduced in the follow-up process of the upcoming years.

This chapter will describe how the stakeholders aim to introduce a new network tariff system. First it is necessary to describe the network tariff system and understand what a network tariff system actually is and how the system functions currently in the Netherlands. The current network tariff system will therefore be described in paragraph 3.1. To structure the decision-making process, the stakeholders have determined a process approach. The process approach will be described in paragraph 3.2. The characteristics of the stakeholders significantly determine how decisions are made. The key stakeholders will be described in paragraph 3.3. The tariff model will be selected out of eight proposed tariff models. These tariff models will be described in paragraph and elaborated in paragraph 3.4.

The data collection for this chapter is mainly based on initial meeting documents of the stakeholders (PVA Nieuw tariefstelsel, 2021), reports of relevant institutions such as the Council of European Energy Regulators and the Overlegtafel Energievoorziening, website of the stakeholders and the stakeholdersdialog (Stakeholderdialog, 2020). The research of Hakvoort et al. (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013) also plays an prominent role in the data collection. Hakvoort et al. have conducted research on the tariff systematics of the Dutch electricity grid.

3.1. The network tariff system in the Netherlands

A network tariff system is a tool used by system operators to influence the consumption as well as the generation patterns of agents in the energy system (Orega, Perez-Arriaga, Abbad, & Gonzalez, 2008). A network tariff system can therefore contribute to a more efficient system. The network tariff system allocates the costs but also influences the electricity use. This research generally refers to a network tariff model. The difference between a tariff model and a system is that the system has been elaborated, implemented and introduced.

The goal of network tariffs is to divide the network costs amongst the users of the network and to incentivize consumers to use the network efficient. (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013) The network tariff results in an income for network operators. The costs include capital costs that are associated with the technical infrastructure and the operational costs of maintenance and business operations. Besides these costs, the network tariffs cover network losses and the costs of reactive power. (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013)

Different models could be used to allocate costs to network users. There are models that attempt to apply the cost reflectiveness principle. This principle aims to lets the parties that benefit pay. Other models are socializing the costs because there are pros of the network that could benefit all parties (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013). The current network tariff system in the Netherlands is focused on the allocation of costs. So point one. There is no optimal network tariff design (because there are multiple goals) and secondly, every tariff adjustment results in benefits for one group of consumers and results in cons for other groups of consumers. (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013)

Small consumers

Network tariffs are set for small, commercial and industrial consumers. This research focuses on network tariffs for small consumers because the decision-making process focus on the network tariff system for small consumers. The network tariff system for commercial and industrial consumers will be implemented in another decision-making process. The Dutch network tariff system introduced capacity based tariffs in 2009 for small consumers (Table 2) (CEER, 2017). Small consumers mostly consists of households and are divided in 6 consumer categories (Table 2) in this system. The introduction of capacity based tariffs had two main reasons.

In the view of ACM, the grid costs for the system operator depend on the capacity of the grid and not on volume of usage (kWh). The other reason for introducing capacity based tariffs is the reduction in administrative costs for the system operator. (CEER, 2017) The cost reduction of introducing capacity based tariffs was estimated to be around 30 million euros.

The capacity based tariff divided the users in six categories (Table 2). Small consumers are generally classified in category 2. Small consumers with a higher consumption within this category pay the same tariff as small consumers with a lower consumption within this category. The categories are based on the small consumers' transmission value and each category has their own calculation capacity and price.

Consumer category	***Transmission value***	***Calculation capacity[kW]***
1	t/m 1*6A op het geschakeld net	0,05
2	t/m 3*25A + 1-fase aansluitingen	4
3	>3*25A t/m 3*35A^2	20
4	>3*35A^2 t/m 3*50A	30
5	>3*50A t/m 3*63A	40
6	>3*63A t/m 3*80A	50

Table 2 Consumer categories (CEER, 2017)

3.2. The process approach of introducing a new tariff system

The system operators aim to introduce a fair tariff system by initiating a multi-actor decision-making process. During this process, stakeholders select, elaborate and implement the optimal tariff model. This paragraph will clarify what stakeholders are involved and what the most relevant decisions are that the stakeholders will have to make and when they are made. The process approach has been determined by the stakeholders in an initial working session (PVA Nieuw tariefstelsel, 2021). This process approach is described during process phase 1, 2 and 3 of the process timeline (Figure 1). During this research the follow-up process still has to take place. The end of the first three phases of the process will initiate the start of the follow-up process. The process approach is based on a meeting document of the stakeholders. (PVA Nieuw tariefstelsel, 2021). The detailed process approach of the follow-up process still has to be made and therefore only the first three phases will be described here.

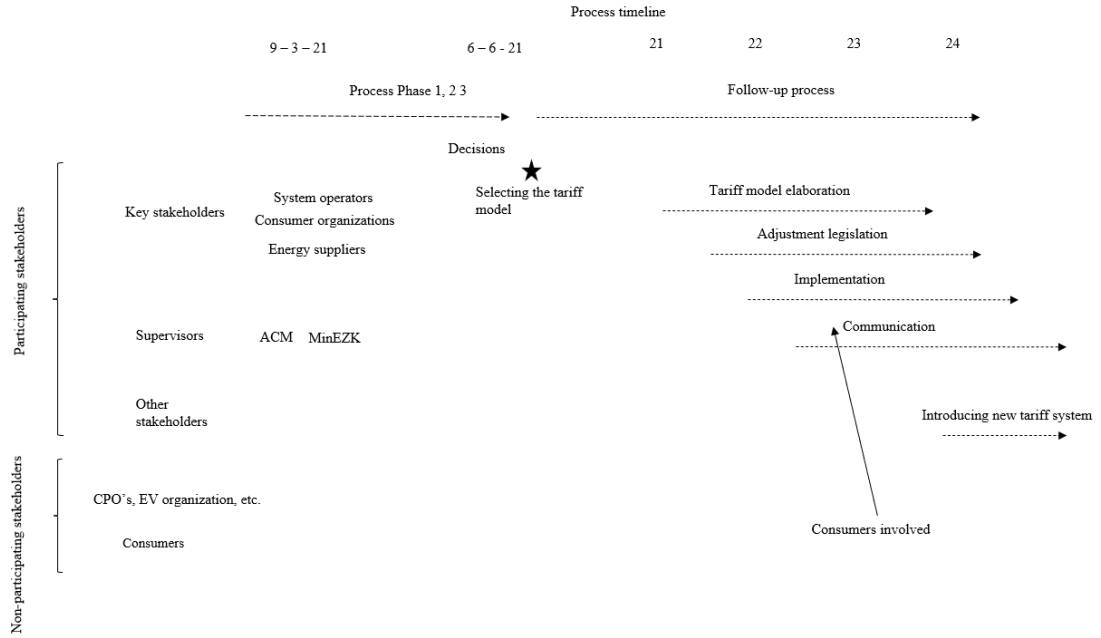


Figure 1 Process timeline, decisions and stakeholders (PVA Nieuw tariefstelsel, 2021)

According to the process approach, the stakeholders will select the tariff model in three phases:

1. Determining the process approach to select the tariff model. This phase includes determining the process rules
2. Determining the requirements, criteria and the optional tariff models.
3. Assessing the optional tariff models based on the requirements and rate the model based on the criteria. This will lead to a rating of each tariff model.

The stakeholders will rate the tariff models in the third phase of the process approach according to their criteria. These ratings will be used as an input for conversation and to select the tariff model. If there is no consensus during the conversation will take place on an administrative level. ACM will approve the proposal if there is not too much resistance from other parties.

The working sessions started 9 march 2021 and the model is presented between 15 June and 6 July. The chosen model will be elaborated in the next two years, regulation will be amended between 2021 and 2024, the tariff system will be implemented before 2024. The communication will take place between 2023 and 2025.

Determining the tariff model seems to be an important factor in introducing a new network tariff system. This tariff model will be elaborated, communicated and implemented during the follow-up process to introduce a new tariff system. The key stakeholders consists of: consumer organizations, energy suppliers and system

operators. The government representatives during the process are the ACM and MinEZK. Other stakeholders are also involved during the first three phases of the process approach. The key stakeholders are the most prominent during all the phases of the process approach. Consumers are limited involved in the process. The consumers are the most relevant non-participating stakeholders. The decisions made during the process will have to be communicated to consumers. The elaborated tariff model will have to be presented to the consumers at some point during the follow-up process.

3.3. The key stakeholders

The process approach showed what stakeholders are involved during the process and when and what decisions they make before introducing the network tariff system. The participating stakeholders consists of key stakeholders and other stakeholders (Figure 2). The non-participating stakeholders consists mostly of consumers. The key stakeholders play a prominent role in all relevant decisions that have to be made to introduce a fair tariff system. The characteristics of these stakeholders determines significantly what and how decisions are made. This paragraph will therefore identify the key stakeholders, describe their goals and resources. Data has been gathered from the stakeholdersdialog (Stakeholderdialog, 2020) and meeting documents complemented with websites of the relevant institutions of the working sessions. The new tariff system will have a significant impact on all stakeholders and therefore each stakeholder will have their own interests in the process. Describing the 'real' interests is difficult due to various reasons. Stakeholders could, for example, have a hidden agenda and therefore have an incentive to not reveal their interest. Therefore their formalized goals will be described.

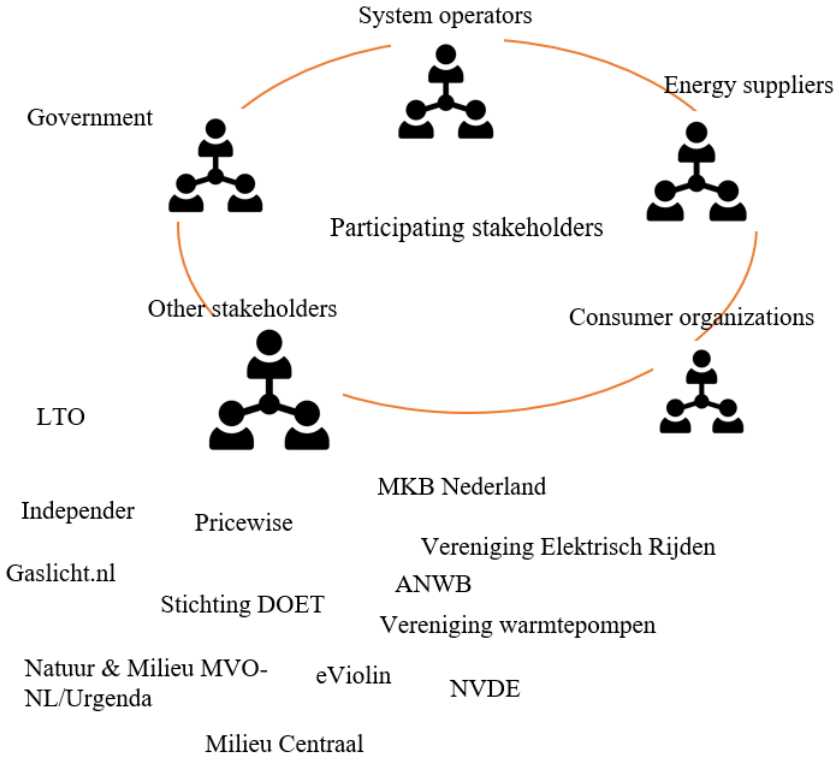


Figure 2 The participating stakeholders around the table

System operators (Netbeheer Nederland)

System operators provide network services. System operators are responsible for several tasks including laying powerlines, pipelines, transporting electricity and gas, connecting (smart) meters and registering connections (Energiekamer, 2021). There are several regional system operators in the Netherlands. Every region has their own system operator. Using the electricity grid costs money and system operators therefore will have to charge

consumers. Consumers pay for these costs on their monthly invoice to energy suppliers. The energy suppliers settle the costs with the system operators (Energiekamer, 2021).

From the system operators perspective, the tariffs should lead to reasonable and lead to predictable revenue. The revenue needs to ensure the distribution business. It is in the system operators interest that customers are incentivized to optimize their energy usage to optimize the capacity utilization rate in the network (Honkapuro, et al., 2017). System operators generate a large proportion of their revenue from the distribution of electricity and gas. Alliander N.V. for example, generates 85% of their revenue from regional distribution of electricity and gas (Alliander N.V., 2021). The remaining revenue is generated by providing extra services to customers. The decision-making process has the highest priority for the system operators. They therefore have sufficient resources assigned.

Energy suppliers (E-NL, Vattenfall, Eneco, Essent, Engie, Greenchoice)

Energy suppliers supply energy (electricity, gas, warmth and cold) to consumers. The suppliers buy energy of producers and sells energy to the consumers. Energy suppliers can also produce energy themselves (Vattenfall, 2021). Consumers have to sign a contract with energy suppliers to get access to electricity. Energy suppliers use the transportation grid of the system operators. Consumers are free to choose and switch their energy supplier.

For suppliers it is necessary that the tariffs do not limit their business opportunities. Changing the tariffs could decrease the accuracy of load forecasting in the transition phase (Honkapuro, et al., 2017). This impacts the balance management of suppliers. Suppliers also play an active role in the implementation of the tariffs. They have to charge consumers and inform them. The decision-making process has the highest priority for the system operators. They therefore have sufficient resources assigned.

Consumer organisations (Vereniging eigen huis, Consumentenbond, Aedes)

The consumers are represented by consumer organizations such as Vereniging eigen huis, Consumentenbond and Aedes. An important function of this organization is policy lobbying to influence the decision-making of the policy maker in such a way that it benefits the consumer. Consumer organisations want to create beneficial rules, terms and conditions for consumers. Consumer organizations can also set up joint actions when large group of consumers experience problems. Consumers and consumer organisations are also involved in numerous other businesses. Being involved in the process therefore is not prioritized.

3.4. Proposed tariff models in the process

Removed due to confidentiality

3.5. Conclusion

Selecting the tariff model seems to be an important factor in introducing the new tariff system. This tariff model will be elaborated, communicated and implemented during the follow-up process to introduce a new tariff system. The key stakeholders consists of the stakeholder groups: consumer organizations, energy suppliers and system operators. The government representatives during the process are the ACM and MinEZK. Other stakeholders are also involved during the first three phases of the process approach. These stakeholders are ,for example, EV organizations. The key stakeholders are the most prominent during all the phases of the process approach. Consumers are represented by consumer organizations. Consumers are involved to a limited extend during the process. The consumers are the most relevant non-participating stakeholders. The decisions made during the process will have to be communicated to consumers. The elaborated tariff model will have to be presented to the consumers during the follow-up process.

4. The concept of fairness

The goal of this chapter is to gain deeper understanding of the concept of fairness. This will be done by answering the following sub question: *What are the main factors in the concept of fairness?* The stakeholders want to use the concept of fairness during the process. The stakeholders will have to know what fairness is or they have to agree on a certain fairness definition to efficiently communicate and make decisions. The stakeholders want to use the concept of fairness, but the stakeholders also state unfairness as an important starting point and have stated fairness as an important goal.

At some point during the process, the stakeholders will have to monitor if their goal has been met. An understanding is needed of what fairness actually is. This chapter will therefore operationalize the concept of fairness and identify expectations based on the gained insight. This will be done by describing the concept of fairness related to network tariffs according to scientific literature (4.1). A literature study will be conducted on the perception of fairness in ethics, social psychology, policy and economics (4.2) to understand what aspects could be perceived as fair or unfair in selecting a network tariff model. This will be presented in a theoretical framework that will be used to analyse the case.

4.1. Fairness in network tariff literature

Little research is written about fairness in relation to network tariffs. Google Scholar is used to find these articles. There is mainly searched for leading journals in the energy area, but also for journals in economics. Research is used from the Energy Policy Journal and the Economic Analysis and Policy journal. Besides the use of search engines and key words, snowballing was used to find relevant sources in the references of main articles. The articles are identified based on the title, abstract and the keywords stated earlier. The key words "Network tariffs" AND "Fairness" were used in the search engine. Little research was found. The research of Neuteleers et. al (Neuteleers, Hindriks, & Mulder, 2017) is used prominently throughout this chapter. The articles were selected because they all have a clear relationship with the research areas and the key concepts. The views of the limited amount of authors that have described fairness in relation to network tariffs will be elaborated here.

When it comes to network tariffs, fairness is interpreted and defined in multiple ways (Brown, Faruqui, & Grausz, 2015). Neuteleers et. al (Neuteleers, Hindriks, & Mulder, 2017) defines fairness as being broader than inequality. Schittekatte and Leonardo (Schittekatte & Leonardo, 2018) define fairness as a regulatory principle in the context of network tariffs. Schittekatte and Leonardo (Schittekatte & Leonardo, 2018) defined the fairness principle as a regulatory principle that encompasses distributional issues, transparency and graduality. Distributional issues are related to flexibility, affordability and non-discrimination. Transparency is related to simple and predictable. Non-discrimination and transparency are required from EU regulation (European parliament, 2019) This means that there has to be minimally complied to these two regulatory principles. Other aspects of fairness mentioned in network tariff literature (Schittekatte & Leonardo, 2018), such as flexibility and simplicity are conditions that have the goal to make sure that these regulatory goals are met (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013). Hakvoort et. al (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013) identified transparency as something that applies to the methodology of determining the tariffs as well as the method of when and how the users should be taken into account. Both of these aspects of the tariff need to be clear for consumers.

The network tariff needs to be non-discriminatory. This principle results in vulnerable consumers having to pay the same tariff as those who are not. This contradicts the affordability principle (Schittekatte & Leonardo, 2018). (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013) determined that similar net use should, under the same circumstances lead to the same tariff so that it does not disturb the electricity market. Other literature also states that non-discrimination and equity are the same concept in relation to network tariff design (Ortega, Pérez-Arriaga, Abbad, & González, 2008). Non-discrimination could interfere with the economic efficiency of the system. For example, there are methods that could be considered as discriminatory and promote efficiency, such as the Ramsey prices method. (Ortega, Pérez-Arriaga, Abbad, & González, 2008).

According to network tariff literature, flexibility could also be seen as an aspect of fairness (Schittekatte & Leonardo, 2018). The design needs to be flexible, due to the fact that certain consumers do not have the option to not consume electricity, such as hospitals. Electricity is also considered as a basic need and therefore needs to be affordable for every consumer. Not all consumers have the possibility to pay the real electricity price and they cannot be cut off from electricity. Besides flexibility, simplicity is also mentioned as an aspect of fairness (Schittekatte & Leonardo, 2018). The network tariff design needs to be simple since consumers do not want to spend time in understanding the tariff.

Other literature sees fairness as a primary criterium in assessing tariff options (Brown, Faruqui, & Grausz, 2015). One interpretation of fairness is that consumers should not experience the increase of its bill in a short time while others experience a decrease in its bill. Another interpretation is that changes in tariff design should

not result in changes in revenue. A third interpretation of fairness is that all customers within the same class should pay the same average tariff in $ per kW or cents per kWh (Brown, Faruqui, & Grausz, 2015).

Within network tariff literature fairness has been interpreted in several ways. Fairness is interpreted as a regulatory principle that encompasses other principles (Schittekatte & Leonardo, 2018). Other literature states that fairness is an important criterium in evaluating the network tariffs (Brown, Faruqui, & Grausz, 2015). Some literature interprets fairness as very specifically related to one subject, such as the increase of the bill in a short time while others experience a decrease (Brown, Faruqui, & Grausz, 2015).

4.2. Perception of fairness in scientific literature

Previous paragraph showed the different interpretations of fairness in relation to network tariffs. Little research has been conducted and therefore scientific research from other fields has to be studied to gain a deeper understanding in the concept of fairness. Google Scholar is used to find articles about the perception of fairness. There is mainly searched for leading journals in ethics, social psychology, policy and economics. The research of Neuteleers et. al (Neuteleers, Hindriks, & Mulder, 2017) was used for snowballing and plays a central role in this study. The articles are identified based on the title, abstract and the keywords stated earlier. The key words "Fairness" AND "Price" was used in the search engine. The research of Neuteleers et. al (Neuteleers, Hindriks, & Mulder, 2017) is used prominently throughout this chapter. Neuteleers et. al (Neuteleers, Hindriks, & Mulder, 2017) has assessed the fairness of dynamic grid tariffs in the Netherlands by combining theoretical and empirical research. The articles were selected because they all have a clear relationship with the research areas and the key concepts.

The perception of fairness strongly depends on the context in which fairness is perceived. Van den Bos et. al (van den Bos, Wilke, & Lind, 2001) mentions for example that the perception of fairness is often understood as quick, intuitive and unconscious reactions that could be biased by the specific context. Choosing a tariff model is a form of price allocation within the public sector. Price allocation as a management tool within the context of public utility influences the perception of fairness. The study in economic behaviour (Frey & Pommerehne, 1993) shows that a negative attitude towards pricing is worse for a public provider in comparison to a commercial organization. Pricing itself also influences the perception of fairness. In comparison with other allocation mechanisms, such as queuing or a lottery, experts found that queuing is a procedure that is considered to be the most fair and pricing is considered to be the least fair.
The perception of fairness also has been researched in the transport sector. In the theory of public choice, the study of Raux (Raux, Souche, & Croissant, 2009) presents a research on the perception of fairness in two cases: seats on a train and parking spaces. The study states that the attitude towards the rules of allocation depends on the context. The study states that peak pricing is seen as more acceptable when the context is recurring and not exceptional. It also seems that the destination of the additional revenue from the price increases plays a large role in the perception. Raux (Raux, Souche, & Croissant, 2009) mentions for example that an increase in pricing for traveling with the train, investing in extra trains increases the fairness that is perceived. Oberholzer-Gee (Oberholzer-Gee & Weck-Hannemann, 2002) also states this, and that revenues should be used for the same problem that the pricing is supposed to solve. Another point that is mentioned by Raux is that trust in the agency that is controlling the revenues increases the perception of fairness.

Price changes impact the perception of fairness. Studies in behavioural economics have determined that different pricing types result in different perceptions to fairness (Kahneman, Knetsch, & Thaler, 1986). An example of the unfair perception of pricing would be the protest against the pricing of Uber during peak use (Surowiecki, 2014).

Neuteleers et. al (Neuteleers, Hindriks, & Mulder, 2017) has determined that three aspects are central in the perception of the fairness of pricing in relation to network tariffs. The price increase is acceptable if the underlying production costs has increased. People also find it acceptable that if the costs decrease, that the price stays the same. On the other hand people find it strongly unfair if the price increase is caused by using excess demand or the increase in monopoly power.

4.3. Fairness in ethics

Ethical theory states two determinants of the total fairness perception. The research of (Ferguson, Ellen, & Bearden, 2014) connects distributive justice and procedural justice to the perceived total fairness of pricing (Figure 3). Another field of ethics that is relevant to the process is procedural justice. Procedural justice refers

mostly to how an allocation decision is made (Konovsky M. A., 2000). Procedural justice is therefore in contrast with distributive justice. Distributive justice and procedural justice both impact the perceived total fairness of pricing. In essence justice and fairness have different meanings (Goldman & Cropanzano, 2015). Justice involves normative standards and whether certain rules of conduct are followed and obeyed (Goldman & Cropanzano, 2015). Fairness refers to the subjective evaluation or assessment of certain events and whether they are moral. These terms have been used interchangeably by researchers where justice is a synonym for fairness (Goldman & Cropanzano, 2015).

4.3.1. Distributive justice

Distributive justice aims to distribute society's resources in a fair way. Distributive fairness refers to the comparison of the outcome of individuals to the outcome of other individuals (Ferguson, Ellen, & Bearden,

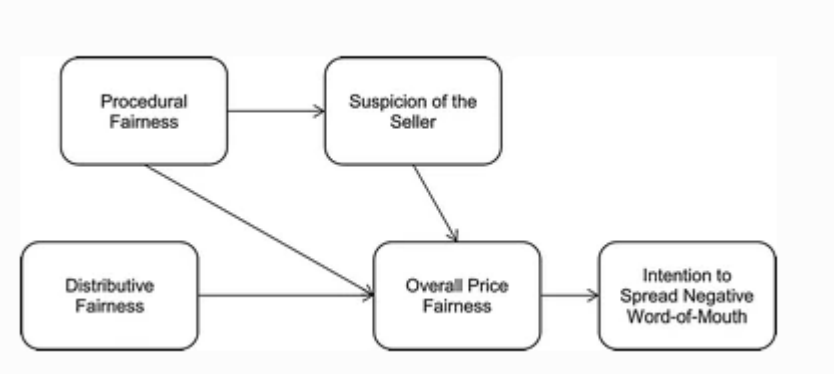


Figure 3 Determinants of overall price fairness (Ferguson, Ellen, & Bearden, 2014)

2014). To understand distributive fairness in relation to selecting a new network tariff model, the definition of the outcome of the process needs to be clarified.

The outcome of the process determines how the costs and rewards will be distributed amongst the stakeholders. Selecting a tariff model provides consumers certain rules that will set the eventual price on the consumers' invoice. Choosing these set of rules means the consumer still has influence on the exact price on their invoice when the model has been chosen. The model could therefore be seen as a procedure (instead of an outcome) to set the price because the final price has not been determined yet. The final price is determined at the end of the time-period related to the invoice that will be send to the consumer. However, choosing a tariff model determines to a certain degree what group of consumers will pay more. For example, several models that are discussed during the process increase the price during peak hours. This means that the price increases for consumers that use electricity during peak hours and are not flexible enough to change their charging behaviour. Determining the tariff model therefore already 'sets a price' to a certain degree. A large amount of stakeholders can already evaluate the outcome of the process when the model has been chosen.

Stakeholders have stated that the perception of fairness of the tariff model will partly be determined by the elaboration in the follow-up process (Appendix X, stakeholder 1). Despite this complexity, within this research the 'outcome' of the process is seen as the tariff model.

Distributive justice seems to play the most central role in the discussion of rights in network tariffs. Neuteleers mentions (Neuteleers, Hindriks, & Mulder, 2017) four central principles:

- Equality
- Need
- Desert
- Efficiency

The principles equality and efficiency play a large role in economic and political theory and need and desert play an important role in thinking about justice and fairness. Desert is referring to the linkage between receiving the benefits and between undertaking a valued activity ((Miller, 1999). Needs are the conditions that people need to live a decent life in society. From now on, this research often refers to fairness instead of justice. An

important reason for this is that fairness is more comprehensible by stakeholders and this terminology therefore improves communication. Stakeholders could also not be aware of the subtle difference.

4.3.2. Procedural justice

Procedural justice refers to *how* an allocation decision is made (Konovsky M. A., 2000). Procedural justice can be related to a range of procedures. From a simple procedure, such as the negotiation in a market to a more complex negotiation procedures in politics (Doherty & Wolak, 2012). The perception of the procedural fairness depends on fair or unfair aspects of the process (Doherty & Wolak, 2012).

When defining procedural justice it is of importance to distinguish process from outcome. The answer to whether something is a procedure or an outcome is not that simple (Cropanzano & Ambrose, 2001). Depending on the purpose of the research, events can be seen as a procedure or as an outcome (Cropanzano & Ambrose, 2001). The outcome of the process is described in the previous paragraph. In this research, the process that determines this outcome is the process described in paragraph 0.

Procedural fairness is about the assessment of the consumer of whether the seller played fair in their adherence of social norms when the price is set (Maxwell, 2002). (Brockner & Wiesenfeld, 1996) states that the fairness of the process is based on the consistency, without self-interest and represent interest of all concerned parties. Fairness heuristic theory states that individuals find it easier to interpret the fairness of the procedure than distributive fairness to make fairness judgements and when there is no comparison information available (Van den Bos, Lind, Vermunt, & Wilke, 1997).

According to Leventhal (Leventhal, 1976), procedures can be considered fair if the procedure follows six rules: consistent, accurate, bias, correctable, based on prevailing ethical standards and representative of all concerns. The Harvard Business Review mentions three principles (Kim & Mauborgne, 2003) of process fairness. A study was conducted in a diverse management context and three principles emerged from all kind of management levels:

- Engagement
- Explanation
- Expectation clarity

Engagement involves individuals in decisions that affects them and allows them to provide their input. Explanation is about the understanding of the final decisions that are made by individuals. Expectation clarity is about the new rules of the game. Individuals should understand the new rules of the game. It matters less what the policies and rules are but it matters more that they are clearly understood.

4.4. Operationalization of the concept of fairness

Despite the vagueness of fairness, the concept needs to be operationalized to study it. To study the case from a fairness perspective, the following framework has been developed:

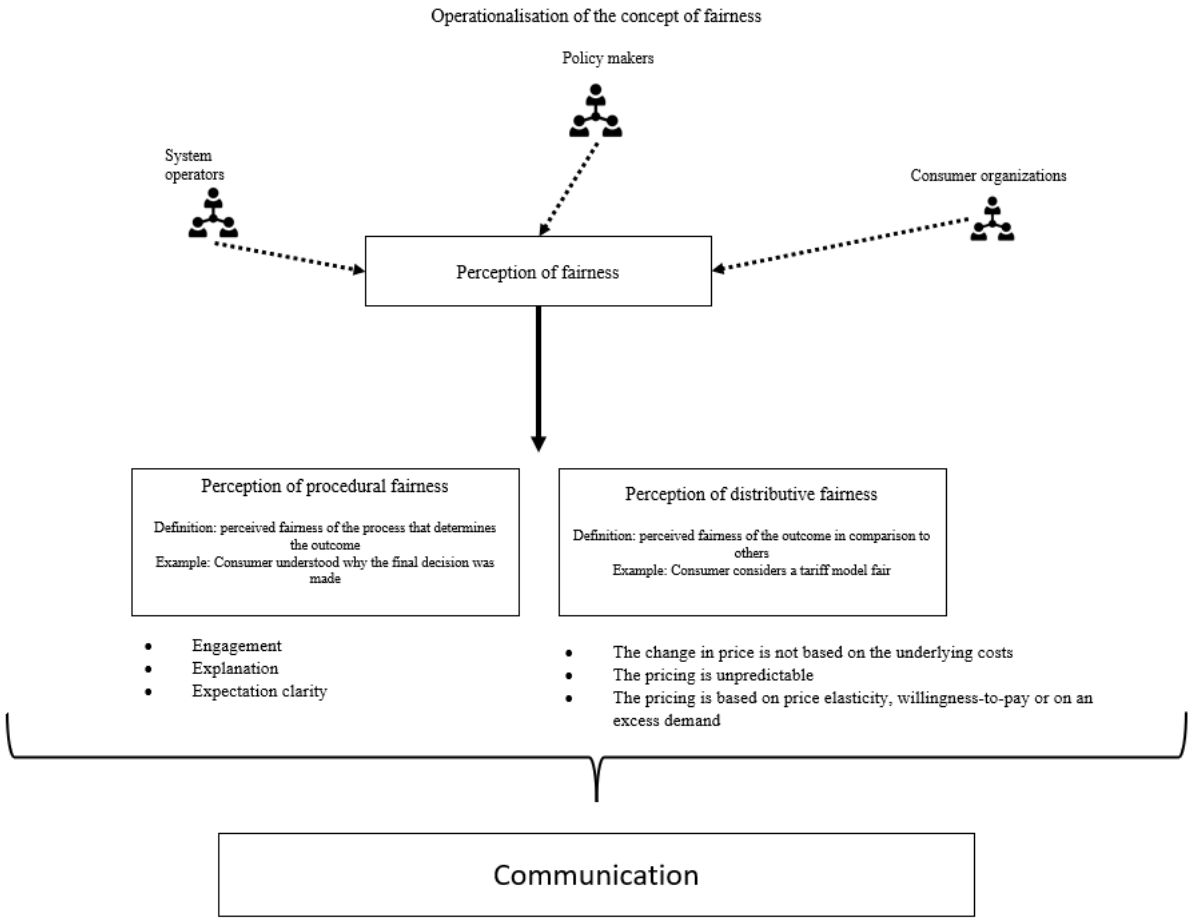


Figure 4 Operationalisation of the concept of fairness

The concept of fairness is operationalized in three layers. The first layer defines fairness as a concept that is perceived in different ways. The concept of fairness is vague and the stakeholders interpreted and define fairness different. They therefore each have a different perception of fairness. The perception of fairness depends on the underlying values and these differ per stakeholder. The perception of fairness also strongly depends on the context in which fairness is perceived.

To further operationalize fairness, two determinants that are defined by Ferguson et. al. (Ferguson, Ellen, & Bearden, 2014) will be used. Ferguson et. al identified procedural fairness and distributive fairness as determinants of the total fairness perception related to pricing. Procedural fairness is further defined by assigning the principles of Kim and Mauborgne (Kim & Mauborgne, 2003) as attributes of procedural fairness:

- Engagement
- Explanation
- Expectation clarity

Distributive fairness is defined by assigning the distributive fairness aspects towards peak pricing from Neuteleers et. al. (Neuteleers, Hindriks, & Mulder, 2017) as attributes:

- The change in price is based on the underlying costs
- The price is predictable
- Not based on price elasticity, willingness-to-pay, and not based on excess demand

The third layer identifies communication as a key factor in achieving fairness. Fairness is subjective, vague and stakeholders have different perceptions. These stakeholders will have to communicate about their perception of fairness to achieve a result that could be considered fair.

4.5. Conclusion

The goal of this chapter was to gain understanding of the concept of fairness and operationalize the concept. Scientific literature in the field of network tariffs, ethics, psychology, economics and policy has been studied to achieve this goal.

Network tariff literature gave little clarity about fairness and network tariffs. A lot of different interpretations are made by researchers as well as stakeholders in the energy sector, which complexifies understanding fairness as a concept in relation to network tariffs. There is no universal notion of fairness. There are also a lot of other principles and values that could be encompassed in the concept of fairness in relation to network tariffs. According to network tariff literature, fairness can be related to non-discriminatory, flexibility, affordability, simplicity, transparency, graduality, predictability and equity. Not only is fairness interpreted differently by different stakeholders, it is also a wide concept that could encompass a lot of other principles and values. Fairness also does not have a clear role in relation to network tariffs. The role of fairness is interpreted differently in network tariff literature. Some literature states fairness as a criterium for evaluating network tariffs while other literature relates fairness to one subject such as the increase of the bill in a short time while others experience a decrease.

Understanding the concept of fairness is difficult based on just network tariff literature. A deeper understanding is therefore gained from studying literature in ethics, psychology, economics and policy. Fairness is a very sensitive topic in the context of peak pricing and in the public utility sector. Pricing decisions in the context of the public utility sector are prone to being perceived as unfair by consumers. On top of that, literature also states that peak pricing is prone to being perceived as unfair. It also seems that the destination of the additional revenue from the price increases plays a large role in the perception. Paragraph 4.2 also identified aspects which could influence the perception of fairness, such as the predictableness of the price. This is in line with the statements in paragraph 4.1 which relates the perception of fairness to the context in which fairness is perceived.

It can be stated that fairness is broadly interpreted, interpreted differently by researchers as well as stakeholders. Despite the vagueness of fairness, an operationalization of the concept is made. The concept of fairness depends on the stakeholders' perception of fairness. The stakeholders have different perceptions and the perception also depends on the context. The perception of fairness depends on the distribution of the costs and rewards as well as how people perceived how the process that resulted in an outcome went. These aspects could be identified as two determinants of the total fairness perception: procedural and distributive fairness. Procedural fairness is related to the way stakeholders perceive how the outcome of the decision is determined. Distributive fairness refers to the comparison of the outcome of individuals to the outcome of other individuals.

To further operationalize fairness, two determinants that are defined by Ferguson et. al. (Ferguson, Ellen, & Bearden, 2014) will be used. Ferguson et. al identified procedural fairness and distributive fairness as determinants of the total fairness perception related to pricing. Procedural fairness is further defined by assigning the principles of Kim and Mauborgne (Kim & Mauborgne, 2003) as attributes of procedural fairness. Distributive fairness is defined by assigning the distributive fairness aspects towards peak pricing from Neuteleers et. al. (Neuteleers, Hindriks, & Mulder, 2017) as attributes.

Communication as a key factor in achieving fairness. Fairness is subjective, vague and stakeholders have different perceptions. These stakeholders will have to communicate about their perception of fairness to achieve a result that could be considered fair.

5. The role of fairness in the process.

The goal of this chapter is to understand the role of fairness in the process. This will be done by answering the following sub question: *What is the role of fairness in the process?* To answer this question the decision-making process will be analysed from a fairness perspective. The operationalisation of fairness (Figure 5) will be used to analyse the decision-making process. This will be done according to the three layers (i, ii and iii). The first layer will be used to analyse the perception of fairness and the differences between these perceptions. The second layer will be used to analyse the perception of fairness using attributes that have been assigned to the determinants of procedural fairness and distributive fairness. The third layer will be used to analyse the communication about fairness between the stakeholders.

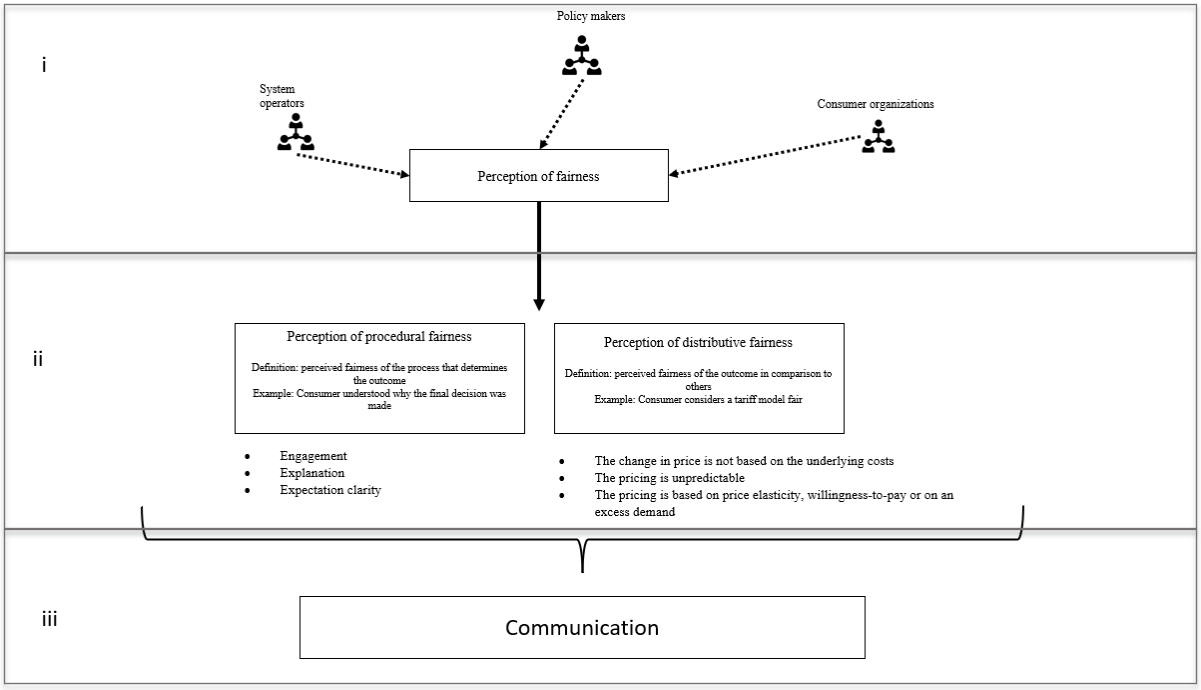


Figure 5 Framework for analysing the decision-making process from a fairness perspective

Chapter 3 has described how the stakeholders aim to select a tariff model. This is the blueprint of the decision-making process. Chapter 4 has operationalized the concept of fairness. To understand where the decision-making process can be improved, it is necessary to look at the decision-making process in a real-world context. This is described in this chapter. This chapter will describe how the stakeholders have executed their blue print. This is done by viewing through the 'fairness lens'. Chapter 4 provided the basis for the 'fairness lens'.

5.1. Distributive and procedural fairness analysis

A fairness analysis will be conducted in this paragraph. In this fairness analysis the second layer of the fairness operationalization will be used (Figure 5, layer ii) will be used to analyse the case that is presented in chapter 3.

Distributive fairness

The three distributive fairness aspects of Neuteleers et. al (Neuteleers, Hindriks, & Mulder, 2017) will be used for the analysis:

The perception of a price rise/discrimination is unfair when:

- The change in price is not based on the underlying costs
- The pricing is unpredictable
- The pricing is based on price elasticity, willingness-to-pay or on an excess demand

An analysis of the possible tariff models will be conducted from a distributive fairness perspective. The technical aspects of each model will be highlighted. Some models have overlapping technical components and therefore will be combined in the synthesis.

Model 1 and 2 increase the amount of consumer categories for mostly residential users. This further differentiates light, medium and heavy users. More consumer categories will change the allocation of the costs and could therefore be perceived as fair/unfair. Model 1 and 2 lead to an predictable invoice. An predictable invoice is preferred by consumers and system operators (paragraph x). Predictable pricing is perceived as unfair. Model 3a and 3b both use the bandwidth system. This system focuses on medium and heavy users. This will change the allocation of the costs and this could be perceived as fair/unfair. The bandwidth system is a familiar system for consumers and therefore increases the understandability. Model 4 has the characteristic that consumers are charged directly based on their measured maximum power. This means that the billing will be done in hindsight, leading to unpredictable invoices for consumers. The model focuses on medium and heavy users. Unpredictability could be perceived as unfair. Model 5 complements model 3a by adding a traffic light to the system. This adds complexity and increases the unpredictability for consumers. Model 6 also depends on smart metering. The model is unpredictable and could therefore be perceived as unfair. In model 8 costs are not allocated fair to the consumer that cause the costs. Model 8 is a simple tariff model, could be perceived as fair. The dynamic pricing is related to the net usage of the consumer which could be perceived as fair. The model distinguishes different categories of consumers which could be perceived as fair/unfair. Costs are not allocated fairly between consumers according to stakeholders.

In all the tariff models, the maximum capacity on the grid is directly translated in the invoices. This means that customers that have an higher demand of capacity have a disadvantage. These are for example customers with charging stations and heat pumps. Some tariff models give the option to customers to adjust their charging behaviour and therefore influence the invoice (Overlegtafel energievoorziening, 2018). The efficiency of these models is determined by the change of charging behaviour of the consumer. The insight in the change of this behaviour is currently not know by the OTE (Overlegtafel energievoorziening, 2018). Model 1 gives the most predictable invoice for the consumer. For other models, such as model 6, the required capacity can be predicted rather well. This is where the smart meter also plays a role since it provides real time data in the required capacity. All of the models are expected to lead to redistribution effects for the relevant consumer groups. For the small consumer segment, the total costs do not increase, however between the consumer groups they do change.

Procedural fairness

To look through from a procedural fairness perspective, the concept of procedural fairness has to be identified. The Harvard Business Review mentions three principles (Kim & Mauborgne, 2003) of process fairness. A study was conducted in a diverse management context and three principles emerged from all kind of management levels:

- Engagement
- Explanation
- Expectation clarity

Engagement involves individuals in decisions that affects them and allows them to provide their input. Explanation is about the understanding of the final decisions that are made by individuals. Expectation clarity is about the new rules of the game. Individuals should understand the new rules of the game. It matters less what the policies and rules are but it matters more that they are clearly understood.

To understand the procedural fairness, the interviewees were asked whether there were clues on procedural fairness. Most stakeholders indicate that the process has been fair, their core values were respected and they could serve their interest. However, there are some clues about the procedural unfairness. Stakeholder 1 indicated that the pace of the process was too fast. Some process rules were imposed. Stakeholder 3 stated that the process is kept too long behind doors by the system operators. Other stakeholders participated later in the process and therefore did not have the possibility to suggest tariff models. During the process, the substantiation of decisions was lacking. The bandwidth model was recommended by stakeholders early in the process, this could have caused tunnel vision during the process. Interests should have been taken into consideration more neutral before looking at solutions. Stakeholder 3 indicated that he could not serve his interest during the process. This was mainly caused due to the late involvement in the process. The stakeholder missed steps in the thought process and certain trade-offs during the process.

5.1.1. The stakeholders' definition of fairness

The fairness definition of the stakeholders is discussed during the initial working sessions. As expected from the analysis of network tariff literature, the stakeholders have different perceptions of the definition of fairness.

The data analysis of the interviews shows that most stakeholders agree on the definition being related to cost reflectiveness (Appendix X, stakeholder 1,4,5,6). However, some stakeholders also have stated that this definition is ambiguous (Appendix X, stakeholder 2) and inadequate (Appendix X, stakeholder 1). Stakeholder 1 stated that the definition of fairness was inadequate due to overlapping principles and values (Appendix X, stakeholder 1). This lead to different definitions of fairness. Some participants encompassed simplicity or choice of freedom under fairness during the process (stakeholder 1). Stakeholder 1 also stated that the current fairness definition is scoped on small consumers. An argumentation for this statement is that small consumers have to bear a large part of the total costs of the electricity grid. Stakeholder 1 thinks that the discussion about fairness should also include the discussion about this disproportional costs that small consumers bear in comparison to large consumers.

Other stakeholders think fairness is ambiguous (Appendix X, stakeholder 2) or not including aspects such as sustainability within the definition (Appendix X, stakeholder 3). For example, stakeholder 3 has indicated that fairness is very one-dimensional defined. Stakeholder 3 states that electricity pricing demands a more fair approach than gas pricing. To achieve this, fairness needs to be related to cost reflectivity under the condition that discounts to large consumers will be taken away. According to stakeholder 3, rewarding sustainable decisions or taxing CO2-intensive initiatives could contribute to a fair outcome. Fairness is related to cost reflectivity, however stakeholder 3 states that the definition is inadequate due to missing descriptions of 'heavy' and 'light' users. Peak use determines in which category the user falls. Unclear descriptions are also limiting the discussion about fairness according to stakeholder 1. The stakeholder mentions that they have different visions of the tariff models. This is caused due to a limited description of the tariff models. For example, a measuring period is mentioned in the descriptions, however it is unclear if this period is a month, day or year (stakeholder 1).

Including sustainability into the definition means that a trade-off will have to be made within fairness between sustainability and cost reflectivity. This means reduced cost reflectivity to incentivize sustainable initiatives. According to stakeholder 3 a sustainable connection could for example receive a discount and a non-sustainable connection could be penalized. Stakeholders 3 and 5 relate fairness and efficient net use. Stakeholder 3 states that efficient net use should be rewarded and this would increase the fairness.

5.1.2. The stakeholders' fairness perception of the tariff models

Removed due to confidentiality

5.2. Communication between the stakeholders during the process

Communication between the participating stakeholders about these decisions is necessary to gain stakeholder support to implement the tariff system. At some point during the follow-up process, the participating stakeholders will have to gain support from consumers and explain how and what decisions they have made. The participating stakeholders will have to explain why their tariff model is fair. This could induce barriers for introducing the tariff system. Fairness is complex and the substantiation of why a tariff model is fair or unfair is difficult. The stakeholder support depends on the communication process between the participating stakeholders and the non-participating stakeholders. The stakeholder support could decrease or even turn into resistance if the communication process is inadequate. This paragraph will therefore describe the communication between the stakeholders during the process. This includes the communication between the participating stakeholders, as well as communication between participating and non-participating stakeholders. Empirical data has been gathered from the working sessions meetings for this section.

5.2.1. Communication between the stakeholders

Communication between the participating stakeholders is a dynamic process which is essential to get to a supported agreement. The individuals that represent their organizations transfer relevant information to make decisions. A significant part of the decision-making is based on the communication between the stakeholders. The communication between the stakeholders sets a direction and can solve problems for the decision-making. Efficient communication contributes to the decision-making and therefore increases the chance of succeeding at

implementing the tariff model. This section will therefore describe the communication process between the participating stakeholders (Figure 6), but also between the participating stakeholders and non-participating stakeholders (Figure 7). This section will present barriers that could reduce efficient communications. Data gathered from the working sessions will be used for this section.

Communication between the participating stakeholders

During the first three phases, communication between the participating stakeholders takes place in seven

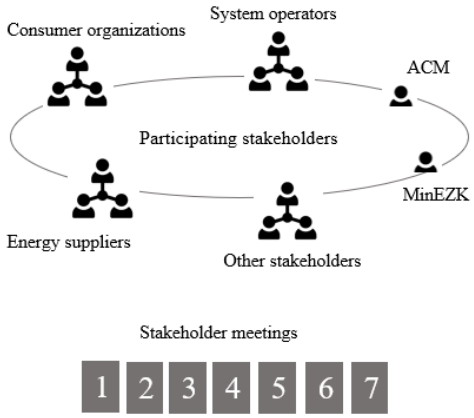


Figure 6 Communication between the participating stakeholders during phase 1,2 and 3

meetings (Figure 6). During the working sessions, the stakeholders discuss relevant aspects for selecting the tariff model. Most participating stakeholders are experts in their field, which results in jargon during the communication process. For example, most stakeholders are known with terms like 'cost reflectiveness'. Terms like these are often used by stakeholders to present their arguments. These terms improve the efficiency of the communication between the participating stakeholders. Most stakeholders understand the jargon which leads to quick and efficient exchange of information during the first three phases of the process.

The process approach structures the communication. For example, the process approach determines the amount of meetings, the decisions that will be made after each working session, the criteria and requirements and the time span. During the working sessions, the communication usually revolves around the determined criteria and requirements.

A barrier for efficient communication is that the stakeholders discuss these aspects without the *right information*. The right information during this process does not exist. This is because the stakeholders are dealing with an unstructured problem (or wicked problems). A characteristic of a wicked problem is that there are multiple explanations for the problem and they could vary depending on the individuals' perspective. Quantitative substantiation is difficult to substantiate the decision-making. Individual stakeholders therefore tackle the problem from their own perception.

Communication between participating stakeholders and non-participating stakeholders

The wickedness of the problem that is faced and the lack of the right information makes the communication between the participating stakeholders challenging. The participating stakeholders often deal with these kind of wicked problems, they are experts and use jargon to efficiently communicate. The communication becomes problematic when non-participating stakeholders will have to be informed about the decisions that are made. In the follow-up process the participating stakeholders will have to communicate and inform non-participating

Figure 7 Communication between the participating stakeholders and non-participating stakeholders during the follow-up process communication

stakeholders about the decisions that are made.

Non-participating stakeholders mostly consist of consumers or 'the public'. The public is a stakeholder that significantly determines the support of the tariff model. The public has been left out of most important decisions that are made. This could worsen the already existing communication barrier. The non-participating stakeholders also do not speak the jargon that is used during the process.

5.3. Conclusion

This chapter describes the role of fairness using the three layers of the operationalization of the concept of fairness: (i) the perception of fairness (ii) distributive and procedural fairness (iii) the communication between the stakeholders.

The system operators are the initiators of the process and have gathered the most relevant stakeholders. The key stakeholders will make important decisions about the tariff model. These stakeholders make decisions based on the information that they are presented with during the process. At some point the result of the process will have to be communicated externally. The language of the experts and participating stakeholders might be different from the language of non-participating stakeholders. This is an important risk and could limit stakeholders to achieve a fair tariff system. Explicit attention to the communication of the result is therefore necessary. The result of the process should be simple and unambiguous to improve communication between participants and non-participants.

Communication between the participating stakeholders about these decisions is necessary to gain stakeholder support to implement the tariff system. At some point during the follow-up process, the participating stakeholders will have to gain support from consumers and explain how and what decisions they have made. The participating stakeholders will have to explain why the selected model is fair. This could induce barriers for introducing the tariff system. Fairness is complex and the substantiation of why a tariff model is fair or unfair is difficult. The stakeholder support depends on the communication process between the participating stakeholders and the non-participating stakeholders. The stakeholder support could decrease or even turn into resistance if the communication process is inadequate.

The fairness analysis of the tariff models showed differences between the tariff models that could be perceived as fair or unfair. Certain technical characteristics could be beneficial or costly for different stakeholders. For example, the current capacity tariff is simple and understandable and therefore could be preferred by the consumers. On the other hand, the tariff model is not cost reflective. Cost reflectiveness is preferred by the system operator.

The stakeholders aim to introduce a fair network tariff system by selecting a fair tariff model that is based on the perception of stakeholders. The stakeholders have rated the fairness of the tariff models and selected a tariff model. Empirical data was gathered by conducting interviews with six stakeholders. This resulted in the following conclusions about the perception of fairness in selecting a tariff model.

Fairness as a criterium seems to play the largest role in selecting a network tariff model in comparison to other criteria. This is shown in the weights that stakeholders give to the fairness criterium and their argumentation for these weights. Stakeholders rated the weight of fairness high. Besides stakeholder 2, all stakeholders rated fairness the highest over other criteria such as simplicity and predictability. Stakeholders are clear on the importance of fairness. Some stakeholder emphasize the importance of fairness by stating that an unfair tariff model could lead to reduced supportiveness or protest.

The stakeholders' perception of fairness depends on several factors. All stakeholders seem to relate fairness to cost reflectivity. A quantitative substantiation seems to be lacking in the argumentation of the stakeholders. This is emphasized by stakeholder 2. Stakeholder 2 states that there was no quantitative data to substantiate decisions during the whole process. When asked about the definition of fairness during the process, some stakeholders indicated that sustainability and the disproportional costs that small consumers bear in comparison to large consumers should be taken into account in the definition of fairness during the process. It seems that the perception of the stakeholders is largely based on the technical characteristics of the tariff models and consumer characteristics. The most relevant technical characteristic, from an economic perspective, is how the tariff models charge the consumers' capacity use. Capacity use plays a larger role in the perceived fairness of all stakeholders than volume due to the larger impact on costs that is caused by increased capacity. Stakeholders also take the consumer characteristics into account when scoring fairness. Some stakeholders stated that residential area should be taken into account. Other stakeholders took the possibilities of consumers to access (future) smart grid features to change their charging behaviour into their rating. Some stakeholders found it unfair to penalize sustainable innovations, while other stakeholders did not take sustainability into account.

The perceived fairness of the stakeholders differs between the tariff models, but also between the stakeholders. Stakeholder 2 and stakeholder 5 showed no large differences in fairness across the tariff models. While stakeholder 1 and 4 showed large differences in fairness of the tariff models. Stakeholder 1 perceived tariff model 3b, 4 and 7 as unfair. The argumentation for tariff model 7 is that the model could charge consumers differently based on their consumer characteristics. Model 3b penalizes based on the one-time peak of consumers. Tariff model 4 is perceived by stakeholder 1 as unfair, stakeholder 2 however rates this tariff model as the most fair.

During the stakeholder meetings, the stakeholder discussed the fairness of the tariff models. They discussed their arguments and ratings with each other to select the model.

From the analysis in this chapter it can be concluded that there are three aspects, which are intertwined, that could reduce the chance of implementing a fair network tariff system:

- The right information.
- Communication to non-participating stakeholders
- Limited consumer involvement

At some point during the follow-up process, the participating stakeholders will have to gain support from consumers and explain how and what decisions they have made. The participating stakeholders will have to explain why the selected model is fair. This could induce barriers for introducing the tariff system. Fairness is complex and the substantiation of why a tariff model is fair or unfair is difficult. A complicating factor for efficient communication is that the stakeholders discuss the network tariffs without the right information. The

right information during this process does not exist. Quantitative substantiation is difficult to substantiate the decision-making. Individual stakeholders therefore tackle the problem from their own perception.

Successfully introducing the network tariff system depends on the communication process between the participating stakeholders and the non-participating stakeholders. The stakeholder support could decrease or even turn into resistance if the communication process is inadequate. During the process, the consumers' perspective of fairness is unclear. The stakeholders have actively involved consumers, however there are several factors that reduce their involvement. The first factor is the sample of consumers that are used to gain insight in the consumers' perspective. To gain this insight, system operators have involved the public by doing consumer research. Consumer research was conducted on several tariff models. Five consumer studies have been conducted by the system operators. Two studies focused on meetings with consumers. Two other studies were conducted intern by system operators. Within these studies 254 and 194 employees participated in the role of consumers. One study focused on the interaction between consumers and the tariff models. This study focussed on tariff model 3A and tariff model 3B. The other study also focussed on tariff model 3A and 3B and aimed to gain insight in how fairness, clarity, and predictability was valued, changes in charging behaviour and the impact on operational processes. From a scientific perspective, these samples of consumers are not representing the characteristics of the total population. This limits the conclusion that can be drawn from these studies.

The other factor is that consumers are limitedly represented in meetings during the process. Consumer organizations are representing the interest of consumers. However, the consumers' perception is also unknown for consumer organizations. Consumer organizations also have limited resources in comparison to the system operators and energy suppliers. Therefore, consumers need to be actively involved in the process and well represented during the process of selecting the tariff model.

These three aspects provide the basis for the recommendations in chapter 6.

6. Recommendations

This chapter will answer the following sub question: *How can the attention to the role of fairness in the decision-making process be improved?*

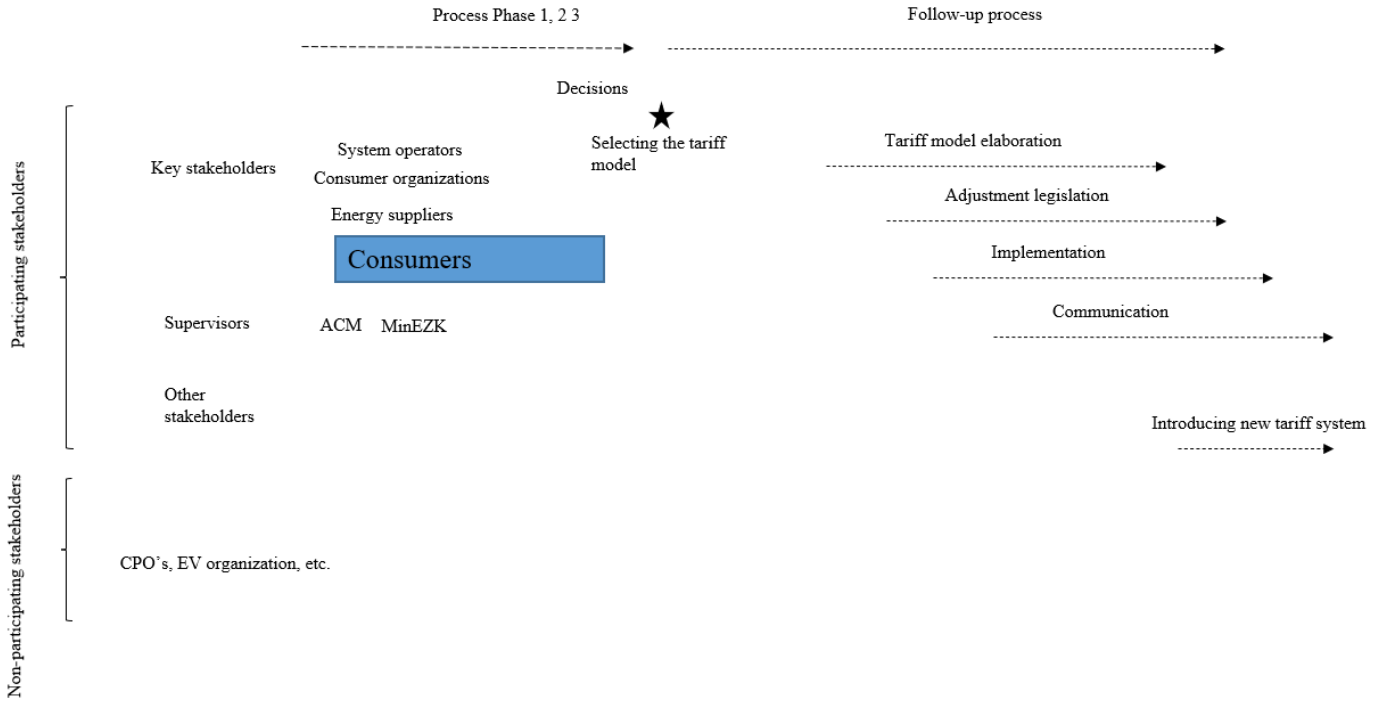
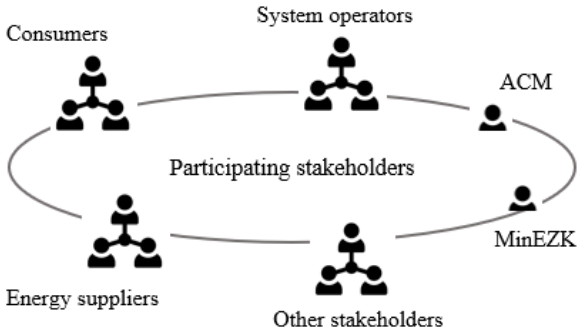


Figure 1 Consumer involvement in the process

Consumers should be actively involved in meetings during the process as well.



Participatory Value Evaluation (PVE) (Mouter, Koster, & Dekker, 2021)

One method that could be a of value to increase the consumers' perception during the process is the Participatory Value Evaluation method (PVE). Consumers need to be informed about the results of the process. This communication process could be a challenge since consumers did not participate in the process. Fairness is a difficult subject to communicate. It is predicted that the price of electricity will rise the upcoming years. Implementing a new tariff model could therefore be a sensitive topic. The participatory value evaluation is recommended to increase societal dialogue and increase the understanding of the consumers' perception of fairness.

The participatory value evaluation method is a new economic evaluation method that analyses the effects on welfare due to policy measures. The method does this on the basis of preferences of individuals on the allocation of public resources. The essence of this method is that participants could see a constraint and policy measures that have a certain effect. In this experiment, participants have to make decisions within the limit of the constraint.

The participatory value evaluation could contribute to the follow-up process (Mouter, N; Koster, P; Dekker, T, 2021). The PVE presents four types of information. The experiments results initially in the amount of times a policy measure has been chosen. The economic model calculates how the different characteristics of the tariff models will be rated. For example, a PVE that has been conducted on the traffic region Amsterdam showed how citizens rated shorter travel times in comparison to travel safety. Another research that has been conducted using PVE showed the amount of people that are willing to pay for more freedom of choice and a higher CO2 reduction. The third form of information is the economic calculations of the policy measures in terms of societal value. The fourth form of information is the qualitative motivations of respondents for the decisions that they have made in the PVE. The qualitative data could lead to new insights for the researchers and policy makers (Mouter, N; Koster, P; Dekker, T, 2021).

The PVE can contribute to the follow-up process in several matters (Mouter, N; Koster, P; Dekker, T, 2021). The PVE provides relevant information that could be used for the support and substantiation of a decision. The PVE could provide input for a societal dialog between the stakeholders. New insights of a large group citizens could change the stakeholders discussion. The PVE could lead to more support of the decision because a large group of citizens are involved in the decision making.

7. Conclusion

Introducing a fair network tariff system is uncertain because there are a lot of unknown factors, barriers and uncertainties. These aspects are identified and recommendations are made to improve the decision-making process by answering the following research question:

'How can the decision-making process be improved to increase the chance of successful introducing a network tariff system that will be considered fair by the stakeholders?

1. *What does the multi-actor decision-making process look like?*

Selecting the tariff model seems to be an important factor in introducing the new tariff system. This tariff model will be elaborated, communicated and implemented during the follow-up process to introduce a new tariff system. The key stakeholders consists of the stakeholder groups: consumer organizations, energy suppliers and system operators. The government representatives during the process are the ACM and MinEZK. Other stakeholders are also involved during the first three phases of the process approach. These stakeholders are ,for example, EV organizations. The key stakeholders are the most prominent during all the phases of the process approach. Consumers are represented by consumer organizations. Consumers are involved to a limited extend during the process. The consumers are the most relevant non-participating stakeholders. The decisions made during the process will have to be communicated to consumers. The elaborated tariff model will have to be presented to the consumers during the follow-up process.

2. *What are the main factors in the concept of fairness?*

Network tariff literature gave little clarity about fairness and network tariffs. A lot of different interpretations are made by researchers as well as stakeholders in the energy sector, which complexifies understanding fairness as a concept in relation to network tariffs. There is no universal notion of fairness. Understanding the concept of fairness is difficult based on just network tariff literature. A deeper understanding is therefore gained from studying literature in ethics, psychology, economics and policy.

To study fairness, an operationalization of the concept is made. The three layers of the operationalization of the concept of fairness are: (i) the perception of fairness (ii) distributive and procedural fairness (iii) the communication between the stakeholders. The concept of fairness depends on the stakeholders' perception of fairness. The stakeholders have different perceptions and the perception also depends on the context. The perception of fairness depends on the distribution of the costs and rewards as well as how people perceived how the process that resulted in an outcome went. These aspects could be identified as two determinants of the total fairness perception: procedural and distributive fairness. Procedural fairness is related to the way stakeholders perceive how the outcome of the decision is determined. Distributive fairness refers to the comparison of the outcome of individuals to the outcome of other individuals. Communication as a key factor in achieving fairness. Fairness is subjective, vague and stakeholders have different perceptions. These stakeholders will have to communicate about their perception of fairness to achieve a result that could be considered fair.

3. *What is the role of fairness in the process?*

This chapter describes the role of fairness using the three layers of the operationalization of the concept of fairness: (i) the perception of fairness (ii) distributive and procedural fairness (iii) the communication between the stakeholders.

The system operators are the initiators of the process and have gathered the most relevant stakeholders. The key stakeholders will make important decisions about the tariff model. These stakeholders make decisions based on the information that they are presented with during the process. At some point the result of the process will have to be communicated externally. The language of the experts and participating stakeholders might be different from the language of non-participating stakeholders. This is an important risk and could limit stakeholders to achieve a fair tariff system. Explicit attention to the communication of the result is therefore necessary. The result of the process should be simple and unambiguous to improve communication between participants and non-participants.

Communication between the participating stakeholders about these decisions is necessary to gain stakeholder support to implement the tariff system. At some point during the follow-up process, the participating stakeholders will have to gain support from consumers and explain how and what decisions they have made. The participating stakeholders will have to explain why the selected model is fair. This could induce barriers for introducing the tariff system. Fairness is complex and the substantiation of why a tariff model is fair or unfair is difficult. The stakeholder support depends on the communication process between the participating stakeholders and the non-participating stakeholders. The stakeholder support could decrease or even turn into resistance if the communication process is inadequate.

The stakeholders' perception of fairness depends on several factors. All stakeholders seem to relate fairness to cost reflectivity. A quantitative substantiation seems to be lacking in the argumentation of the stakeholders. This is emphasized by stakeholder 2. Stakeholder 2 states that there was no quantitative data to substantiate decisions during the whole process. When asked about the definition of fairness during the process, some stakeholders indicated that sustainability and the disproportional costs that small consumers bear in comparison to large consumers should be taken into account in the definition of fairness during the process. It seems that the perception of the stakeholders is largely based on the technical characteristics of the tariff models and consumer characteristics. The most relevant technical characteristic, from an economic perspective, is how the tariff models charge the consumers' capacity use. Capacity use plays a larger role in the perceived fairness of all stakeholders than volume due to the larger impact on costs that is caused by increased capacity. Stakeholders also take the consumer characteristics into account when scoring fairness. Some stakeholders stated that residential area should be taken into account. Other stakeholders took the possibilities of consumers to access (future) smart grid features to change their charging behaviour into their rating. Some stakeholders found it unfair to penalize sustainable innovations, while other stakeholders did not take sustainability into account.

4. *How can the attention to the role of fairness in the decision-making process be improved?*

During the process, the consumers' perspective of fairness is unclear to certain extent. The stakeholders have actively involved consumers, but there are several factors that limit their involvement. The first factor is that the consumers that were involved are not well representing the whole population. The other factor is that consumers are limitedly represented in meetings during the process. Therefore, consumers need to be actively involved in the process of selecting a tariff model. This can be done by increasing consumer involvement in the stakeholder meetings. One method that could be a of value to increase the consumers' perception during the process is the Participatory Value Evaluation method (PVE).

The PVE can contribute to the follow-up process in several matters (Mouter, N; Koster, P; Dekker, T, 2021). The PVE provides relevant information that could be used for the support and substantiation of a decision. The PVE could provide input for a societal dialog between the stakeholders. New insights of a large group citizens could change the stakeholders discussion. The PVE could lead to more support of the decision because a large group of citizens are involved in the decision making.

8. Reflection

Writing this thesis is one of the largest and complex projects I have done during my studies. In a complex environment setting up a project like this was very challenging. There were several aspects that made this project even more challenging. This section will reflect on these complexities, the used methods, results and how I have learned from them.

Research factors

Determining and understanding the factors that are involved in the research was difficult. This made the structuring of the report challenging.

A complicating factor was the determination of the process and the outcome. When researching a process, it is of importance to define the process and the outcome of the process. I learned that this answer could be very complex depending on the context. The tariff model is an example of a complex 'outcome' to determine. The outcome of the process determines how the costs and rewards will be distributed amongst the stakeholders. Selecting a network tariff model provides consumers rules that will set the eventual price on the consumers' invoice. The model will be selected this year and elaborated in the years to come according to the planning. Choosing the set of rules means the consumer still has influence on the exact price on their invoice when the model has been chosen. The model could therefore be seen as a procedure (instead of an outcome) to set the price because the final price has not been determined yet. The final price is determined at the end of the time-period on the invoice that will be send to the consumer.

The process is not easy to define. Although a decision will be made were different stakeholders will benefit from, some stakeholders will not define it as a decision-making process. Stakeholders have mentioned other definitions, such as stakeholder trajectories. The process also consists of several phases to selecting a tariff model, elaborate the tariff model with the goal of implementing a tariff system. This is also were the distinction from a tariff model to a system becomes clear. The tariff model is a representation of the final tariff system.

Fairness is vague and difficult to grasp. This makes communication more challenging. A lot of variables in this research were challenging to determine and sometimes time depended. For example, 'tariff model' could refer to the alternative tariff models, the currently selected tariff model, the elaborated tariff model before implementation. Tariff system also differs from a tariff model. A model is a representation of reality. The tariff model therefore is representing a possible future implemented tariff system. Fairness is also a term that is used a lot in non-scientific context. People all have an interpretation of what is fair or unfair. Fairness is not only difficult to grasp by the stakeholders. Within the scientific context, researchers also interpreted fairness different. I have learned to question certain definitions in literature. Interpretations, as well as definitions and the use of the word fairness differs between scientific fields. Within ethics, fairness and justice are separated concepts. Outside of the ethics literature these concepts are often intertwined. Within ethics, justice relates to the moral obligation of acting based on fairness. This complexifies my communication as a researcher with supervisors as well as participants of the process.

Researching a subject simultaneously to a process was a unique experience for me. It made some aspects of the research complex. A lot of difficulties arose, such as the planning of this project. I had to anticipate certain steps in the process, which made the planning harder. A lot of factors were still unclear before the start of this thesis. The exact process rules were unclear. Process rules changed during the process as well as opinions of stakeholders. Changes like these make it difficult to draw conclusions from the gathered data. I have learned to state in what phase I have gathered the data during my research.

Another complexity of fairness is the perception of fairness of the non-participants of the process. Understanding the perception of the stakeholders was already quite challenging. Fairness related to energy use is also a topic outside of the process. Currently the energy prices are very high and it is predicted that this will increase the upcoming years. Fairness is a topic discussed in the political debate and in the media. The protests of the 'gele hesjes' in France in 2018 emphasized the importance of fairness and the tension with achieving sustainability goals. The stakeholders' perception of fairness during the process is related to cost reflectivity. Some stakeholders exclude other aspects (such as sustainability) from the process. This shows differences in the perception of fairness within the process and fairness outside of the process. Consumers are worried about their

increasing electricity bill. It is predicted that the price of electricity will rise the upcoming years. Implementing a new tariff model could therefore be a sensitive topic.

I also learned to understand the language of participants and understand their perspective better. For example, in my communication I speak of 'external stakeholders' and 'internal stakeholders'. In the context of my research this terminology could be very clear. However, in the communication to participants this terminology could lead to miscommunication. 'External stakeholders' could also relate to external stakeholders of the company. This differs from external stakeholders of the process. As a researcher, understanding these nuances is very important.

Determining the role of fairness also does not come without complexities. A role could refer to how the situation is or how the situation should be. Especially with a topic that is very subjective it is important to describe various perspectives. The role of fairness from a legal perspective could be very different than the role of fairness from an economic perspective or process perspective. From a process perspective, fairness plays a role as a 'tool' that structures the discussion. How fairness is used during the process is less relevant from a legal perspective. From a legal perspective the end result matters since the result has to comply to the regulations. Determining and describing all these different perspectives deepens the understanding of the research topic.

Despite these difficulties this was a unique opportunity to talk to stakeholders during the process while certain decisions have just been made or were about to be made.

Trade-offs and dilemmas

The network tariff model will be implemented in a very complex environment. Network tariffs have an impact on all stakeholders. Whether they are participants of the process or non-participants, almost all stakeholders use electricity and therefore will have to pay. A lot of complexities exist within the electricity grid. Fairness could relate to a wide variety of other principles, from equity to sustainability to cost reflectivity. Ultimate fairness is also not achievable due to limitations and therefore complex trade-offs will have to be made. Cost reflectiveness is strongly related to fairness during the process. This only relates to the economic aspects of the network tariff model and is already very complex. Determining individually cost reflectivity is difficult to determine. Smart meters are required to measure the capacity that is used by an individual household. Consumers will have to be willing to give their consumption data to achieve this kind of measurements. The individuals capacity is also difficult to relate to the exact costs that are caused on the grid. The costs that are caused differ from transformer to transformer. In a congested neighbourhood the costs for the transformer rise. The distance from the consumer to the transformer also increases the costs that are caused. This shows the difficult trade-offs and dilemmas that occur in determining cost reflectivity.

Data gathering

The downside of qualitative research is that it has a lot of uncontrolled factors that can affect the research and the research can be influenced by the researcher's subjectivity when analysing and interpreting data. The data collection is also labour-intensive. Doing a project simultaneously to a process has a pros and cons.

An important benefit of doing a project simultaneously to a process is the data gathering. Data changed during the process. For example, participants left out certain models before scoring fairness. This also had consequences for research interpretations. I learned to state in what stage data has been gathered. Doing this project simultaneously to a process had many benefits. Gathering empirical data is an excellent example of this benefit. Stakeholders were verbally strong and were well prepared for the interviews. This limited the amount of explaining during the interviews and also limited the guidance that the stakeholders needed to give their answers on the questions. Often interviews took place around the same time of a process meeting. This resulted in straight to the point answers to my questions. Gathering the right people to interview was also relatively simple. My supervisor (who participated in the process) had good knowledge of the participants I could interview to get my interview results.

The communication with stakeholders also went smooth. The interviewees understood the importance and topic of the interview and usually no additional explanation was needed. This is the benefit of interviewing

participants of the process. In other studies acquiring research data is often more difficult. Participants could be not familiar with the concept or not verbally strong.

Research results

The scoring provided a clear guidance for the interviews and provided clear results. I learned to not draw conclusions from these results too soon. Interviewing the participants revealed some misinterpretations from the gathered data. The scoring was done in an informal way which reduces the reliability of the results. The scoring provided a clear guideline during the interviews and this resulted in more reliable results. Not drawing conclusions to soon helped me in the research process. When conducting qualitative research, the subjectivity of the researcher could influence the data interpretation. The interview results were validated by sending the interview codes and transcription related to the code to the interviewees. Sometimes this resulted in interesting discussions about the interpretation of the transcription. To improve the validating process I therefore added an additional interpretation of the transcription and send that to the interviewees. For example, a stakeholder stated that sustainability did not play a role in the process of scoring fairness. The code and interpretation implied that sustainability was not an important aspect of the stakeholder. The stakeholder emphasized the importance of sustainability, however not in relationship with scoring fairness during the process.

The interviews revolved around the scoring of the tariff models. The scoring of the tariff models was done in an informal way. A learning point here is that the context matters a lot in which data is interpreted. In this case, the ratings were given in a less formal process than was expected. This differed across the stakeholders. Some stakeholders indicated that the process is not a prominent topic within their company. This emphasizes the importance of doing interviews as a research method. The ratings helped structuring the interviews and drawing conclusions from them. The scoring of the tariff models provided unique insight in the perspective of the stakeholders on fairness.

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Appendix I

Stakeholders interest (Additional)

In the complex electricity system stakeholders cooperate intensively with each other that produce benefits for the system and also for each party. These benefits are for example, the reduction of the carbon output, protecting the environment and facilitate energy efficiency. The new tariff model will impact all have a significant impact on all stakeholders and therefore each stakeholder will have their own interests in the decision-making process. To understand the differences in the perception of each stakeholder on the fairness principle it is necessary to understand the interest of their stakeholders.

Suppliers (E-NL, Vattenfall, Eneco, Essent, Engie, Greenchoice)

For suppliers it is necessary that the tariffs do not limit the business opportunities of the suppliers. Changing the tariffs could decrease the accuracy of load forecasting in the transition phase (Honkapuro, et al., 2017). This impacts the balance management of suppliers. Suppliers can learn quick and the tariff system can increase the predictability of load behaviour. (Honkapuro, et al., 2017)

Based on a stakeholders analysis performed in 2020 mentions the following. The suppliers are producing electricity for consumers. One fundamental aspect of the network tariff system is to determine whether the suppliers and consumers are paying a transport tariff or only the consumers. The suppliers first want to gain insight in the lacking network capacity in residential areas and the possibilities of (verzwaren). Suppliers think the market can solve shortages in network capacity by smart charging, time of use propositions and storage. The suppliers think that possible adjustments in the network tariff system could only be solved if the power limits will be physically solved. Suppliers also think that individual network peaks are not always bad, therefore they think penalizing is unnecessary. (Stakeholderdialog, 2020)

Consumer organizations (Vereniging eigen huis, Consumentenbond, Aedes)

An important aspect for the customer is understanding how the invoice is formed and how they can influence their invoice. (Honkapuro, et al., 2017) The research of Honkapuro mentions the strengths and weaknesses of the stakeholders. Honkapuro mentions for example that a simple tariff structure with only one price component is viewed as a strength of a tariff model. What also is viewed as a strength is that the customer can affect the whole electricity bill.

The stakeholders analysis mentions the following information has been recorded. The consumers are represented by consumer organizations such as Vereniging eigen huis, Consumentenbond and aedes. This analysis show the same key aspects of the perception of the customer on the network tariff model. Customers value the possibilities of control and want the world to be understandable and transparent.

The consumer organizations are representing the interest of the consumers. One of these organizations is the Consumentenbond. An important function of this organization is policy lobbying to influence the decision-making of the policy maker in such a way that it benefits the consumer. The consumer organizations see the urgency to clarify the current problems. Consumers do not know their power demand and that does not give them the possibilities of control. They see difficulties for the consumer. An example of this, is to use power when solar cells are producing and in other moments they have to reduce their power use. An invoice without a notification of exceedance increases their distrust of the use of a smart meter. Consumer organizations want the world to be understandable. (Stakeholderdialog, 2020)

Charge Point Operators (CPO's)

Charge point operators are operating the charging infrastructure for electric vehicles. The CPO's understand the necessity of system operators to develop a new tariff system. In the design of the bandwidth and exceeding costs, the CPO's ask for enough space should be created for trading in the imbalance market. The current business case of the CPO's will change due to the increasing net costs for this consumer group. (Stakeholderdialog, 2020) The CPO's see using the lower energy taxes, load balancing over multipble sockets and increasing the kWh price to the consumer as a solution.

Electric vehicle organizations

Electric vehicle organizations are representing the interests of the electric vehicle owners. One of the lobbying priorities of the Vereniging Elektrische Rijders is affordable and transparent tariffs at the charging station. (Verengiging Elektrische Rijders, 2021). The vereniging elektrische rijders does not see higher tariffs as the right path. It is proposed to make charging in the night more attractive. They propose a solution that private individuals with an own charging station could sign special EV-energy contracts that takes into account the problems.

Other parties propose smart charging as a solution. E-Violin mentions a challenge in making the tariff system understandable for the consumer and give them the tools to stay within the bandwidth. E-Violin thinks smart charging could be too complicated for a lot of EV owners. E-violin thinks it is a bad thing that flexibility of the cars to balance energy being pressed by steering on constant lower use. E-violin indicates that some cars, such as the Renault Zoe have a minimum power demand and therefore is limited controllable. The current way of thinking seems to not take the benefits the EVs can have on the net into consideration. (Stakeholderdialog, 2020) Tesla thinks the current proposal (2020) makes it difficult to anticipate and arrange things ‘smart’.

The ANWB thinks fitting in smart charging is necessary to keep the network tariffs acceptable. If this does not happen the bill will go up and small consumers (non-peak consumers) will pay the bill that is caused by solar panel owners and EV drivers.

Appendix II

Trade-offs related to industrial consumers

Cost reflectivity vs competition (Related to large consumers)

When the grid costs of the consumers are strictly determined by the cost reflectivity principle, the local electricity production is being favoured over production elsewhere. This is because local production uses less of the grid because of the shorter distance. (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013) Choosing one of the tariff models could lead to a more cost reflective tariff by making consumers that have a longer transportation distance pay more than consumers with a shorter transportation distance.

Cost reflectivity versus International level playing field

The chosen tariff system should be aligned with the international context. Even if the net costs on a national scale will be divided fairly, this does not mean that international producers and consumers will be charged the same costs. This could worsen the competitive position of Dutch companies that either produce or consume electricity from the grid. (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013)

Appendix III

Total tariff model ratings

Removed due to confidentiality

Appendix IV

Interview invitation
All participants are Dutch speaking. The initial contact has been made by the external advisor from Alliander (Mr. Jonker). He already introduced me to the participants by explaining that I am a graduation student that does research on the tariffs and fairness in choosing the models as well as the process. The respondents have responded by sending their contact details. All participants will be contacted by mail in Dutch.

The following invitation has been e-mailed:

Onderwerp: Uitnodiging interview met betrekking tot een afstudeeronderzoek naar eerlijkheid in het kiezen van een nieuw netwerktariefmodel.

Beste ……..,

Ik ben Victor Burgers en ik studeer Complex Systems Engineering and Management aan de TU Delft. Ik ben betrokken geraakt bij het proces voor het kiezen van een nieuw tariefmodel via meneer Jonker. Hij heeft mij ook doorverwezen naar u. Naast meneer Jonker word ik begeleid door meneer Steenhuisen en meneer de Vries van de Techniek, Bestuur en Management Faculteit. Eind Mei ben ik begonnen met het onderzoek naar de rol van eerlijkheid in het kiezen van een nieuw netwerktariefmodel. Om dit in kaart te brengen wil ik graag meer weten over de beoordeling van eerlijkheid als voorwaarde, als criteria en als weging. U bent hierbij betrokken geweest als werknemer van ……. Ik zou daarom graag uw kijk op eerlijkheid willen weten, de argumentatie en afwegingen die gemaakt zijn bij het bepalen van de rating van eerlijkheid, het (eventuele) proces dat geleid heeft tot het bepalen van de rating, de (eventuele) communicatie naar externe betrokkenen en op de eerlijkheid van het proces.

Ik zou hiervoor graag een afspraak met u willen maken voor een interview. Het interview zal half-gestructureerd zijn en de vragen zullen over de eerdergenoemde onderwerpen gaan. Ook hoop ik een opname te kunnen maken om het interview uit te schrijven en te analyseren. Indien dit niet gewenst is kunnen wij het daar voorafgaand aan het interview over hebben. Mochten er nog vragen zijn dan hoor ik dat graag. Ik zie graag uw reactie tegemoet. Alvast bedankt.

Met vriendelijke groet,

Victor Burgers

Appendix V

Distributive fairness aspects

To understand the characteristics of the network tariff models that could be perceived as fair or unfair the following synthesis has been conducted (table x, appendix x). The relevant technical aspects of each model will be highlighted. Some models have overlapping technical components and therefore will be combined in the synthesis. The technical components will be synthesised with the stakeholders' interest. Distributive fairness in the third column refers to the general perception on distributive fairness. The synthesis provides a basis for understanding the stakeholders' perception which will be elaborated in paragraph

Based on the stakeholders' interest and the technical components conclusions about the distributive fairness in are made per tariff model. The three aspects of pricing perception of (Neuteleers, Hindriks, & Mulder, 2017) are used to structure the synthesis:

The perception of a price rise/discrimination is unfair when:

- The change in price is not based on the underlying costs
- The pricing is unpredictable
- The pricing is based on price elasticity, willingness-to-pay or on an excess demand

The perception of unfairness can be lessened if:

- There is an increase in trust in the pricing agency
- The revenue is used to address the problem
- The situation is predictable

Model 1 and 2 increase the amount of consumer categories for mostly residential users. This further differentiates light, medium and heavy users. More consumer categories will change the allocation of the costs and could therefore be perceived as fair/unfair. Model 1 and 2 lead to an predictable invoice. An predictable invoice is preferred by consumers and system operators. Predictable pricing is perceived as unfair. Model 3a and 3b both use the bandwidth system. This system focuses on medium and heavy users. This will change the allocation of the costs and this could be perceived as fair/unfair. The bandwidth system is a familiar system for consumers and therefore increases the understandability. Model 4 has the characteristic that consumers are charged directly based on their measured maximum power. This means that the billing will be done in hindsight, leading to unpredictable invoices for consumers. The model focuses on medium and heavy users. Unpredictability could be perceived as unfair. Model 5 complements model 3a by adding a traffic light to the system. This adds complexity and increases the unpredictability for consumers. Model 6 also depends on smart metering. The model is unpredictable and could therefore be perceived as unfair. In model 8 costs are not allocated fair to the consumer that cause the costs. Model 8 is a simple tariff model, could be perceived as fair. The dynamic pricing is related to the net usage of the consumer which could be perceived as fair. The model distinguishes different categories of consumers which could be perceived as fair/unfair. Costs are not allocated fairly between consumers according to stakeholders.

In all the tariff models, the maximum capacity on the grid is directly translated in the invoices. This means that customers that have an higher demand of capacity have a disadvantage. These are for example customers with charging stations and heat pumps. Some tariff models give the option to customers to adjust their charging behaviour and therefore influence the invoice (Overlegtafel energievoorziening, 2018). The efficiency of these models is determined by the change of charging behaviour of the consumer. The insight in the change of this behaviour is currently not know by the OTE (Overlegtafel energievoorziening, 2018). Model 1 gives the most predictable invoice for the consumer. For other models, such as model 6, the required capacity can be predicted rather well. This is where the smart meter also plays a role since it provides real time data in the required capacity. All of the models are expected to lead to redistribution effects for the relevant consumer groups. For the small consumer segment, the total costs do not increase, however between the consumer groups they do change.

Model	*Technical components*	*Stakeholders' interest*	*Distributive fairness aspects*
1,2	• More consumer categories are introduced in the range of 1 x10A to 3x35A	• Model 1 could be perceived as unfair due to the differences in pricing between small consumers. • Consumers value the predictability of the invoice. • System operators value the	• Charges small consumers differently based on the costs they cause • Secures against unpredictable invoice • Could be perceived as fair due to the predictability of the invoice.
3a, 3b	• Small consumers are contracted for a bandwidth of e.g. (4,10,15 kW) • User pays same amount for contracted bandwidth. Exceedance costs extra (3a). • Users pay same amount for contracted bandwidth. Exceedance is based on peak use.	• Consumers want the world to be understandable. Familiarity of bandwidth could therefore be valued by the consumer.	• Distinguishes light, medium and heavy users • Familiar concept which is also used in telecom.
4	• Consumers are directly charged based on measured maximum power	• Most small consumers are not affected. • Unpredictable for customers	• Unpredictability could be perceived as unfair •
5	• Traffic light determines if maximum peak counts towards the bill.	• Complex model and therefore not preferred by consumers • Unpredictability is not valued by consumers	• Unpredictability could be perceived as unfair
6	• Real-time price per kW for a time period	• Unpredictability is not valued by consumers	• Unpredictability could be perceived as unfair. • Complex for regulatory agreements
7	• Tariff category or bandwidth depends on the time of net use.	•	•
8	• Direct or indirect link of grid management costs to consumer in kWh.	• Small consumers that use more pay more	• Costs are not allocated fair to the consumer that cause the costs • Simple tariff, could be perceived as fair. • The dynamic pricing is related to the net usage of the consumer which could be perceived as fair • The model distinguishes different categories of consumers which could be perceived as fair/unfair. • Costs are not allocated fairly between consumers according to stakeholders.

Table 3 Fairness analysis of the tariff models

Appendix VII

Perception on distributive fairness

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Based on the synthesis and the following characteristics of the tariff model have been determined to play a role in the discussion about distributive fairness:

Based on the stakeholders' interest and the technical components conclusions about the distributive fairness are made per tariff model.

- Complexity: Complexity seems to have a strong relationship with predictability. For the consumer this usually means the complexity of the invoice. However, model 6 also seems to be complex for regulatory agreements.
- Differentiation trough physical transmission. Currently most of the small consumers fall in the same consumer category. Further differentiation of these groups will result in different consumer groups being charged less or more.
- Predictability. The predictability is related with the complexity of the model. Model 4 for example, charges in hindsight based on the actual consumption using a smart meter. This results in fluctuations in the price consumers have to pay every month. Consumers could perceive this as unfair.
- Sustainability. Owners of sustainable technologies contribute to a sustainable world, which is the starting point of changing the network tariff model. The majority of the models penalize these owners by charging them more.
- Non-discrimination. Consumer groups are distinguished in various tariff models. A difference is made in and between small and large consumers. Small users are divided in light, medium and heavy users.
- Bandwidth plays a role in various proposed tariff models. Using bandwidth allows consumers to change their behaviour and stay within their bandwidth. Charges consumers with sustainable technologies more than consumers without these and therefore penalizes these consumers.
- Smart Meter, the smart meter is necessary for the functioning of several tariff models. The smart meter can be used to gain insight in the real-time electricity use of the consumer. However, adds complexity for the consumer and could make the invoice less predictable. The use of smart meters involves data governance and increase privacy risks.
- Traffic light, models can be complemented with a traffic light to allow unpenalized extra use of the grid. Adds complexity to the system however.

Appendix VIII

Smart Grids

The potential of smart grids plays a large role in the process. (Gharavi & Ghafurian, 2011) The traditional Dutch electricity grid is evolving to a smart grid. Smart Grids evolve by building on the traditional electricity grid which leads to new functionalities of the system. A smart grid can be defined as an electricity grid that integrates communication technologies, computational intelligence and cyber-secure communication technologies across electricity distribution, transmission, substations, consumption and generation with the goal of achieving a safe, secure, resilient, efficient, sustainable, clean system (Gharavi & Ghafurian, 2011). The smart grid therefore covers the whole spectrum of the energy system. Starting at generation and ending at consumption of electricity. Generally a traditional grid shifts to a smart grid due to the implementation of each new feature. The traditional grid is characterized by a centralized power generation, a passive customer participation and limited user knowledge, limited real-time monitoring, inflexible system.

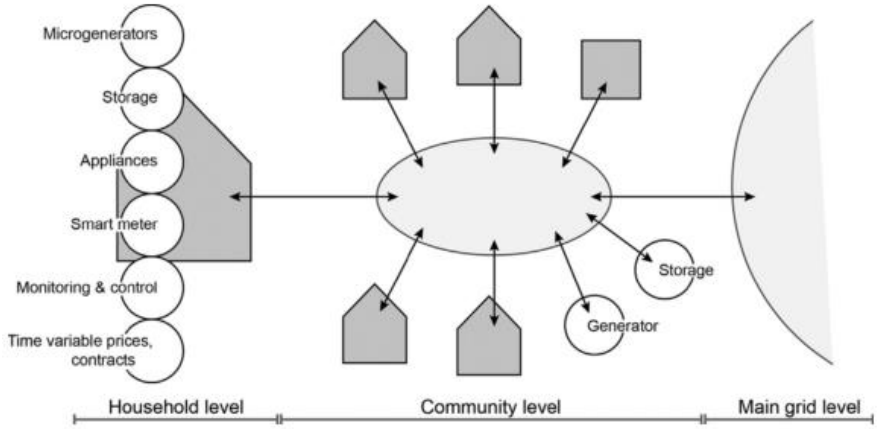

Figure 8 Smart Grid (Geelen, Reinders, & Keyson, 2013)

In the Netherlands bottom-up initiatives are encouraged by national policy. For example, 'subsidieregeling cooperative energieopwekking', a new policy measure that has started in April 2021 supports local renewable electricity production (Postcoderoosregeling, 2021). The current and future characteristics of the smart grid plays a large role in deciding on the right tariff model. Important characteristics related to fairness are the customer participation which allows demand-response and real-time monitoring.

One of the most important features of the smart grid are performed with the help of smart meters. The smart meter receives information from the consumers load device and can measure the energy consumption. The smart meter can provide added information for the system operator (Zheng, Gao, & Lin, 2013). The smart meter contains multiple sensors and control devices that are connected with a communication infrastructure.

Smart meters facilitate the option for demand response. Demand response allows consumers to participate in the operation of the electricity grid. (Office of Electricity, 2021) This allows consumers to reduce or shift their electricity use during peak hours. Consumers will be rewarded by time-based rates or other financial incentives. The electric power industry views demand response programs as an valuable option. Using sensors problems in peak load can be perceived and automatically switch to reduce power in strategic locations (Office of Electricity, 2021).

Appendix IX

Interview protocol
Project: De perceptie op eerlijkheid in het besluitvormingsproces voor het selecteren van een nieuw netwerktarief model.

Tijd van het interview:

Datum:

Plaats:

Interviewer:

Geïnterviewde:

Positie/Bedrijf van de geïnterviewde:

Geïnterviewde informeren over:

a) Doel van het onderzoek en het interview

Het doel van het onderzoek is om de rol van eerlijkheid bij het kiezen van een nieuw tariefmodel in kaart te brengen. In mijn onderzoek heb ik eerlijkheid als een middel in het besluitvormingsproces gedefinieerd maar ook als een resultaat van een tariefmodel waar elke stakeholder zijn eigen perceptie op heeft. Deze perceptie wil ik in kaart brengen door stakeholders uit elke stakeholdergroep te interviewen. Om de perceptie op eerlijkheid in kaart te brengen wil ik graag vragen stellen omtrent het ratingn van eerlijkheid als criterium en als voorwaarde wat besproken is in werksessie 6. Ook wil ik graag de focus leggen op het eventuele proces voor het bepalen van de ratings en de communicatie tussen de interne en de externe stakeholders. Tevens verdeel ik eerlijkheid in de eerlijkheid van de 'uitkomst' (het tariefmodel) en eerlijkheid van het proces. Ik wil daarom ook graag weten hoe de eerlijkheid van het proces ervaren wordt.

b) De verzamelde data

Indien ik toestemming krijg om een opname te maken zal ik het interview transcriberen om vervolgens via codering relevante thema's uit te halen. Ik wil in het onderzoeksrapport per stakeholdersgroep (consumenten, leveranciers, netwerkbeheerder) de perceptie op eerlijkheid neerzetten met als doel de rol van eerlijkheid bij het kiezen van een nieuw tariefmodel in kaart te brengen.

c) Lengte van het interview

Ik verwacht dat het interviewen ongeveer 30 minuten zal duren.

d) De tape recorder

Ik zou graag een opname willen maken voor het maken van transcriptie voor mijn data analyse. Ik zal hier toestemming voor vragen voorafgaand aan het interview.

Vragen (half-gestructureerd):

Hoe verloopt het proces binnen xxxx tot het komen van een besluit met betrekking tot eerlijkheid?

Wat is uw argumentatie voor de rating van model x……x als eerlijk/oneerlijk?

Wat zijn de belangrijkste afwegingen die gemaakt zijn bij het beoordelen van eerlijkheid als voorwaarde?

Wat is uw argumentatie voor de rating van model x als 'x' op eerlijkheid als criterium?

Wat zijn de belangrijkste afwegingen die gemaakt zijn bij het beoordelen van eerlijkheid als criterium?

Beschouwt u het besluitvormingsproces als eerlijk?

Heeft u voldoende kans gehad om uw belangen te behartigen? (de Bruijn & ten Heuvelhof, 2018)

Zijn uw kernwaarden gerespecteerd? (de Bruijn & ten Heuvelhof, 2018)

Appendix X

Coding stakeholders

Thematic analysis (Gamage, 2019) will be used to analyse the interview transcription. Within social science thematic analysis is seen as an accepted method. (Braun & Clarke 2013) The authors state that thematic analysis can help to identify themes and patterns across various qualitative datasets. The analysis consists of seven steps, reading, transcribing, familiarizing, coding, searching for themes, reviewing themes, defining and naming the themes and the finalization of the analysis. All stakeholders are anonymized. The stakeholders are given a number and in the transcription and code they are referred to as 'stakeholder' instead of their institution.

The transcription has been checked on missed data by listening to the audio tape. The first sub-question provides the right familiarization with the data to proceed to the next step in the thematic analysis. Relevant data that has been found relevant to answer the research question has been captured in table x by assigning code to the data.

Coding Stakeholder 1 (v)

Code	Transcription
Unclear fairness definition	Ik kan me herinneren dat er wat onduidelijkheid was bij sommige deelnemers over de definities dat dingen door elkaar gingen lopen.
Overlap with other criteria	Dat bijvoorbeeld eenvoud of keuzevrijheid. Dat als je dan hoorde wat iemand te zeggen had op het gebied van eerlijkheid, dat ze die dingen meenamen.
Fairness related to cost reflectivity	Maar ja, hoe ik dus kijk naar de definitie van eerlijkheid en dat die sterk gerelateerd is aan die kostenreflectiviteit. Dat lijkt me wel. En ja, ik zie daar niet zo'n probleem
Fairness related to capacity use	Als ik het net op een bepaalde manier belast en mijn buurman belast het net twee keer zo zwaar. Zou het raar zijn als ik meer betaalde dan hij? Ja dus ja. Wie net zwaarder belast euh. Betaalt in ieder geval niet minder dan iemand die het met minder zwaar belasten trekt daar
Model descriptions limit discussion about fairness	En dat je dan dus het kan zijn dat er verschillende stakeholders een verschillende beeld in hun hoofd hebben van hoe het model eruit ziet. Bijvoorbeeld de omschrijving van de modellen. Die is zo duidelijk mogelijk opgesteld, maar daar staat niet in wat bijvoorbeeld een meetperiode is of dat het al een maand rekening gaat over misschien om een dag van het jaar.
Process of fairness rating	Dat gezegd hebbende vind ik een proces vrij simpel dat ik zelf gewoon met de kennis uit de sessies en de presentaties en de powerpoints zo goed mogelijk heb geprobeerd met mijn eigen achtergrond.
Process of fairness rating	Dit is zeker ja, bij wijze van spreken is het zo. Is het nog geen promille van waar de stakeholder zich mee bezighoudt. Dus je kunt niet verwachten dat zijn managers zich hiermee bezighouden.
Consumer values fairness over simplicity	De reden daarvoor is dat iets kan nog zo eenvoudig zijn, maar als het gewoon duidelijk is dat het niet eerlijk is, ja dan. Dan werkt het niet. Dan gaan mensen zich er niet goed bij voelen en dan gaan ze ertegen protesteren.

Fairness related to supportiveness	Dan werkt het niet. Dan gaan mensen zich er niet goed bij voelen en dan gaan ze ertegen protesteren.
Fairness related to capacity use	Nou, als dus die elektrische auto en de manier van opladen daarvan net dusdanig belast dat grote verzwaringen nodig zijn. Dan is het eerlijker dat die die groep consumenten die als het ware verantwoordelijk zijn voor de benodigde verzwaringen daar meer aan betalen dan consumenten die zich überhaupt geen elektrificatie nog kunnen veroorloven en een heel klein beslag doen op het net. Ja, is die zin dat die tarieven daar niet meer gaan differentiëren? Dat valt als eerlijk te zien. Het zou in ieder geval niet eerlijk zijn als het andersom
Rating fairness based on technical characteristics	Ik vind het inzoomen op 3B wel goed, omdat ik daar ook merkte dat daar bij de netbeheerders wat vraagtekens over maken omdat ik dus 3 a heel goed scoort op dat punt en 3 bij niet ja.
Rating fairness based on technical characteristics	Ehm ja, en het piek verbruik bepaalt dan in welke bandbreedte je afgerekend wordt (Model 3B). Terwijl bij 3A krijg je een 1 gewoon per overschrijding. Naarmate van de duur en de grootte van die overschrijding krijg je een bijbetaling. Bij 3 B is het dus zo dat een gebruiker die zeg maar de hele maand niet of niet boven die 50 kilowatt komt, maar één keer per ongeluk is en de oven en zijn inductie kookplaat tegelijk aan zet en een uurtje ook 6 kilowatt zit.
Fairness rating based on consumer characteristics (possibility to access smart grid features)	En want bij model 7 had ik nog wat betreft eerlijkheid de opmerking dat een nadeel van model 7 is. Ja en ja, dan kan dus een gebruiker die euh ja, zeg maar. Hij heeft een grote elektrische auto en hij heeft zijn hele huis internet of things helemaal subliem ingericht en hij kan vanaf kantoor. Kan die via zijn telefoon zorgen dat precies om één over 5 gaat alles aan.
Trade-off between fairness and sustainability.	En maar het model zou erop gericht moeten zijn dat niet zozeer de bezitters van de elektrische auto bestraft wordt, maar dat ie gestimuleerd wordt om euh, niet te snel laden of om zijn laden zo te programmeren dat die gewoon gelijkmatig over de nacht of zo'n auto oplaadt? Ja, dan word je niet gestraft. Maar je moet die gewoon zijn gedrag een klein beetje bijsturen ten opzichte van komt thuis. En iedereen die van zijn werk komt zet tegelijk de auto op maximaal snelheid en je ze om 9 uur s avonds weer vol terwijl dat helemaal niet nodig is. Ja dus, daar zie ik niet echt oneerlijkheid
Fairness rated on consumer characteristics	En dan zou het volgens mij dus helemaal niet zo gek zijn als net zoals de gemeente ook het onroerend zaakbelasting in zeg maar Den Haag hoger zou zijn

	dan in een klein dorp in het oosten van het land, vind ik het ook niet zo gek als andere kosten verschillen tot uiting komen in tarieven
Fairness related to cost optimalization	Dus dat het totale bedrag wordt door alle consumenten in Nederland samen betaald wordt, een stuk hoger komt te liggen dan als je tarieven optimaliseert op gebieden.
Informing external stakeholders	Want nu zijn de nettarieven al lang hetzelfde geweest. Daar gaan wij consumenten daar natuurlijk over informeren. En met name wat hun handelings perspectief is en wat grosso modo in bepaalde situaties het beste advies volgens ons is. Ja ja is in bepaalde situaties het advies zijn van kies eieren voor je geld en probeer je gedrag zodanig aan te passen dat je niet te vaak een overschrijding heeft.
Informing external stakeholders	Nee, het moet wel euh, transparant zijn. Want euh ja, veel consumenten zijn terecht zo kritisch en die neem je niet zomaar alles aan. Dus als er teveel een black box is, zou vanuit andere zaken geen factuur te gaan. En daar staat in dit jaar twee keer zoveel betalen. Want dat blijkt uit ons
Process fairness	En ja. Ik had wat moeite vanaf het begin en dat is eigenlijk altijd zo gebleven met het tempo wat er achter zat
Process fairness	En dat is de tweede van die drie vragen. Die waren wat mij betreft open genoeg en iedere partij kreeg voldoende kansen om zijn standpunten te uiten en om elkaars standpunten te bevragen.
Process fairness	Die werd best wel opgelegd vanuit Netbeheer Nederland. Dus op een gegeven moment maakte ik daar bezwaar tegen. Daar is er misschien een keer iets één week opgeschoven. We hebben één keer een extra sessie ingelast. Maar ja, eigenlijk was mijn feedback van nou.
Fairness definition incomplete	Maar het lijkt vast te liggen dat de kleinverbruikers in totaal euh, zeg maar een bepaald deel van de kosten van het elektriciteitsnet dragen. En als we het echt over eerlijkheid hebben, dan vind ik dat je ook de discussie moet voeren van goh is het niet zo dat überhaupt kleinverbruikers relatief veel net kosten hebben ten opzichte van grootverbruikers en dat een stuk gestaffeld en de tarieven per kilowatt zijn. Zeg maar absoluut natuurlijk niet vergelijkbaar tussen een industriële user en kleinverbruikers.

Coding Stakeholder 2 (v)

Code	Transcription	Toelichting
Unclear definition of fairness	Dat kan. Ik vind dat die eerlijkheid niet een heel eenduidig begrip is.	Hieruit leid ik af dat eerlijkheid op meerdere manieren uitgelegd kan worden.
Predictability more important than fairness	Bijvoorbeeld voorspelbaarheid dat dat ook duidelijk je voor een klant dat hij kan inzien wat hij voor kosten gaat krijgen is belangrijker dan dat het echt wel 100 procent. Euh ja, eerlijkheid.	Ik leid hieruit af dat de stakeholder meer waarde hecht aan voorspelbaarheid dan aan eerlijkheid.
Predictability and simplicity more important than fairness	Daar gaan wij niet alleen over daar gaat netbeheer niet alleen over maar dat is iets wat we maatschappelijk moeten bepalen maar voorspelbaarheid en eenvoud is, is voor onze consumenten en onze klanten. gewoon belangrijk dat dat inzichtelijk is.	De stakeholder hecht meer waarde aan de voorspelbaarheid en eenvoud dan eerlijkheid van het model. (Kleine nuancering dat wij hier vanuit de consument hebben geredeneerd en vanuit het kostenperspectief. Eenvoud maakt implementatie daarmee wat makkelijker.)
Fairness rating process	Ik heb zelf een voorzet gedaan. Ik heb me een beetje op het gevoel van niveau, want ik wat ik in het proces had meegekregen en dit heb ik aan een aantal stakeholders doorgestuurd met de vraag of zij daar een bepaald beeld bij hadden of dat ze afwijkend of dat ze het andere zouden ratingn. En die ratings heb ik een beetje geïntegreerd	De rating van eerlijkheid is besproken met interne stakeholders. Ratings van interne stakeholders zijn daarbij meegenomen in de rating van de stakeholder.
Fairness rating process	En dan inderdaad aan meerdere mensen gevraagd van joh. Zijn jullie het hier mee eens. dat geïntegreerd en dat meegenomen in de afstemming met Energie Nederland, met collega's van concullega's van Energie Nederland. Ja, ze moesten samen tot één ding komen. Ja, volgens mij hebben daar euh, zijn we daar wel wat in. Hebben we gewoon een beetje koehandel gedaan van waar komen we gemiddeld we gemiddeld een beetje uit.	Binnen de stakeholder is er overlegd over de rating en dit is ook afgestemd met andere marktpartijen. De afstemming is gedaan met concullega's binnen E-NL om tot één gezamenlijke reactie te komen.
Different fairness perspectives within the stakeholder group	Sommige mensen hadden eerlijkheid wat hoger staan, sommige ook lager staan.	Binnen de marktpartijen waren er verschillende perspectieven wat betreft eerlijkheid.
Fairness rating reduction argument	Volgens mij was de argumentatie achter dat je dan een piek hebt en dat je dan voor de rest van de maand daarna gaat betalen, terwijl dat het wel een een een euh, terwijl dat niet	De rating van eerlijkheid van tariefmodel 3B wordt hier beargumenteerd. In de argumentatie wordt benoemd dat het maken van één piek te

	per se kostenreflectief is. Als je één keer zo'n piek maakt en dat dat dan zal vast misschien wat kosten opleveren. Maar staat niet in proportie tot dan de rest van de maand.	zwaar bestraft wordt. Dit moet in het bredere plaatje van kostenreflectiviteit worden geplaatst.
No trade-off fairness vs sustainability related to the process	We hebben niet. Volgens mij niet echt meegenomen. Eerlijkheid als het gaat om wij vinden het belangrijker dat degene die verduurzaamt wordt gecompenseerd dat is echt een politieke vraag wat hem zou hebben. En dat bedoelen wij ook met eerlijkheid dat dat, maatschappelijk moet worden bekeken van moeten we willen dat we inderdaad van mensen die een elektrische auto aanschaffen, dat we dat die meer gaan betalen. Je kan daar niet ja of nee op zeggen.	Duurzaamheid wordt niet meegenomen. Duurzaamheid wordt dus wat betreft de stakeholder buiten de scope van het proces gelaten. Er wordt dan ook geen afweging gemaakt met duurzaamheid. De stakeholder neemt dus bijvoorbeeld niet mee dat eigenaren van EV's meer gaan betalen terwijl zij wel bijdragen aan de algemene duurzaamheid. Het is belangrijk om hierbij te vermelden dat de stakeholder duurzaamheid wel belangrijk vindt, maar deze afweging is meer een politieke vraag.
Overlapping criteria.	Dat valt ook een beetje onder de keuzevrijheid. Ja, we hadden ook heel vaak dat we deze discussie hadden. Is dit eigenlijk meer voor voorspelbaarheid. Is dit? Het luistert allemaal niet zo nauw aan een beoordelingscriteria en dat heeft veel overlap vaak	Eerlijkheid kan overlappen met andere criteria zoals keuzevrijheid. Dit is ook tijdens het proces ter sprake gekomen.
Overlap fairness and simplicity	Maar wat is nou het bij een eenvoud of is het nou eerlijkheid waar we hier mee zitten te klooien?	Eventuele overlap tussen eenvoud en eerlijkheid.
Non-discrimination overlapping with fairness	Ja, dat zit er ook dingen als non non discriminatie bijvoorbeeld, die daar als voorwaarde bij staat dat is ook zo'n ding. Maar hoe zie je dat dan? Dan kan je zon factor natuurlijk ook een beetje meenemen in eerlijkheid.	Eventuele overlap tussen discriminatie en eerlijkheid. Punt is hier dat non-discriminatie een beetje dogmatisch wordt geïnterpreteerd, en dat discriminatie/onderscheid maken onder bepaalde voorwaarden wel eerlijk kan zijn, als je ongelijke gevallen ook ongelijk behandeld.
Fairness related to consumer characteristics	Is het eerlijk om een hele om de hele Nederlandse bevolking te aan bepaalde nettarieven bloot te stellen als zij er eigenlijk voor congestie in een paar gebieden, terwijl tal van een andere gebied normaal geen congestie is dat ze ook gelimiteerd worden? Is dat eerlijk?	De geografische locatie van consumenten (wat invloed heeft op de kosten die veroorzaakt worden) wordt meegenomen in de argumentatie voor het beoordelen van eerlijkheid. Waar het gaat om verschillen in locaties. Ik denk niet dat

		we dit zwaar hebben meegewogen, maar het is wel een algemene opmerking waar we wel een sterk gevoel bij hebben.
Stakeholders could present their statements in the process	Uhm ja, het ontwerp van het proces denk ik dat we dat het wel een fijne sfeer was en dat het wel een fijn constructieve sessie was en dat dat in die zin dan we men elkaar ook aan het woord liet.	Moeite met het kwantitatief bepalen van eerlijkheid.
The process is not well substantiated	Het eerste is dat dat dat er gewoon geen goede onderbouwing aan het proces zit. Ook daar zijn geen goede onderzoeken laten zien waarom de probleemstelling en hoe die is geformuleerd.	Moeite met de onderbouwing van het proces. Dit punt gaat vooral over het feit dat er geen cijfers worden aangeleverd om hier kwantitatief goed wat over te kunnen zeggen. De hele discussie over tarieven is enkel kwalitatief geweest en mist naar onze mening kwantitatieve onderbouwing. Zowel de probleemanalyse als de oplossingsrichting.
Active role in the process	Uhm, nou ja, in die zin Consumentenbond, die staat voor de rechten van de klant. Wij natuurlijk ook. op een bepaalde manier. Uhm. Maar wij hebben daar natuurlijk een iets actievere rol in de uitvoering van de nettarieven. Wij moeten dat innen bij mensen. Wij moeten onze systemen daarop aanpassen. En kosten gaan maken. het is nogal een operatie. En op een moment dat je gevraagd wordt om zo'n grote ingreep te doen dan mag dat wel wat duidelijker onderbouwd worden van waarom dat nou zo is.	Er wordt aangegeven dat leveranciers een actievere rol hebben bij de implementatie van het tariefmodel. Er wordt daarom aangegeven dat er behoefte is aan onderbouwing van gemaakte keuzes in het proces.
Process unfairness	Ja en in die zin dat zou je misschien onder oneerlijkheid kunnen noemen als je dat dat perspectief niet mee laat wegen.	Aspect van oneerlijkheid genoemd aan het proces.
Stakeholder could serve their interest during the process	In zekere zin natuurlijk ook weer wel. Een zachte 'Ja' of zoiets	Er wordt voorzichtig aangeven dat er sprake was van een eerlijk proces.
Core values were protected	Nu was het echt van joh waar kunnen wij elkaar nou in vinden. Er werd goed eh respectvol, iedereen werd respectvol behandeld wat dat betreft klopte dat volledig behalve dan richting het einde een beetje makkelijk werd afgedaan maar dat is niet zo zeer met kernwaarden te maken.	Aangegeven wort dat iedereen respectvol werd behandeld wat bijdraagt aan het beschermen van de kernwaarden tijdens het proces.

Coding Stakeholder 3 (v)

Code	Transcription
Incomplete fairness definition.	Dit is een heel relevant onderwerp, zeker omdat ik in de werkgroep meerdere keren heb aangekaart dat het begrip ‘eerlijkheid’ hier erg eendimensionaal belicht wordt en in mijn ogen niet per definitie eerlijk is
Fairness encompasses sustainability	Daarom zal elektriciteit op een eerlijke manier moeten worden behandeld t.o.v. gas. Hiervoor zijn van belang: Kostenveroorzakingsprincipe: beloon zo laag mogelijke impact op het net; dus hoe zwaarder je het net belast hoe meer je betaald. Daarvoor is het wel van belang dat kortingen zoals gegeven die gegeven worden aan grootgebruikers weggenomen worden. Beloon duurzame keuzes die leiden tot co2-reductie (dus zit stap naar o.a. e-boilers en EV’s niet in de weg) of belast co2-intensieve initiatieven
Difficulties current definition of fairness	er wordt hier uitgegaan van een verdeling in ‘heavy’ en ‘light’ user. Dit is uitgaan van capaciteitsbelasting. Er wordt alleen geen rekening gehouden met het feit dat een gebruiker een dienst kan leveren aan het net door vraagsturing waarin je wacht met energieverbruiken tot een dal. Dan lever je een dienst aan het net maar zou je onder de huidige definitie wel meer moeten betalen. Kortom er is geen incentive voor demand-response, wat juist een bijdrage levert aan het zo efficiënt mogelijk gebruiken van het net.
Trade-off between sustainability and fairness	Dat betekent dus dat je deels zou moeten afwijken van kostenveroorzaking om duurzame initiatieven te blijven stimuleren. Dit zou dus betekenen dat een ‘duurzame’ aansluiting bijv. 0,8x de kosten die hij/zij veroorzaakt betaald en een ‘fossiele’ aansluiting 1,2x.
Lacking definition heavy and light user	dit maakt de definitie dus ontoereikend. Er mist een uitgebreide beschrijving van een ‘heavy’ en ‘light’ user. Hoe het mij is uitgelegd gaat het om piekvermogen dat bepaald welk van de twee je bent. Terugkomend op je vraag: wat ik hier stel is dat het ‘eerlijk’ is om partijen die ‘diensten’ aan het net leveren door het net te ontlasten zoals met uitgestelde levering daarvoor beloont worden met een financiële prikkel (dus lager tarief). Twee individuen kunnen evenveel stroom afnemen, maar als de een ‘slim’ reageert op de situatie in het net en de ander niet dan veroorzaakt de eerste minder kosten voor de netbeheerder.
Fairness rated above simplicity	Eerlijkheid weegt wat mij betreft zwaarder dan eenvoud
Fairness related to efficient net use	Wat betreft overlappende criteria ging niet perse daarover maar ik zie het zo: iets is ‘eerlijker’ als je beloont wordt voor ‘efficiënt netgebruik’. Er zit dus een connectie tussen die twee.
Process unfair	Het besluitvormingsproces is te lang achter gesloten deuren gehouden binnen netbeheer land.

Process unfair	Nu is die beginfase voornamelijk intern gedaan bij netbeheer, terwijl er vanuit de sector wellicht andere opties voor tariefmodellen hadden kunnen worden aangedragen. Die worden nu niet eens meegenomen in besluitvorming.
Lacking substantiation during process	Ik zou zelf iets meer onderbouwt willen zien waarom bepaalde opties wel/niet kunnen zoals dynamische tarieven afhankelijk van tijd en plaats.
Possible tunnel vision process	In het proces werd eerst het bandbreedtemodel naar voren geschoven, het gevaar van het proces is dat het altijd al het bandbreedtemodel had moeten worden vanuit perspectief van diegenen die met dit idee kwamen.
Process unfair	In het vervolg zou er veel neutraler moeten worden gekeken naar behoeften alvorens er al oplossingen worden uitgewerkt.
Stakeholder could not serve their interest	Voldoende kans voor belangen behartiging? Nee ben meermaals vergeten in het proces meegenomen te worden, ondanks bestuurlijk akkoord dat dit zou gebeuren. Ik kon dus pas aanhaken bij een van de laatste sessies. Grote nadeel hiervan is dat ik meerdere denkstappen en afwegingen in het proces heb gemist

Coding stakeholder 4 (v)

Code	Transcription	Aanvullende conclusie
Fairness related to efficient net use	Je noemde al het is vooral gerelateerd aan kostenreflectiviteit? Maar ik denk dat net zo belangrijk is dat aspect van efficiënt net gebruik en dat ook dat heel erg gelinkt aan het is al een apart is van eerlijkheid, maar het heeft er heel erg mee te maken.	Nu betaalt een huishouden hetzelfde capaciteitstarief voor een kleinverbruik aansluiting, ongeacht het daadwerkelijke gebruik van die aansluiting. Dus een traditioneel huishouden (bijv. flatje op 3 hoog met enkel ouderwetse apparaten) betaalt hetzelfde netbeheer tarief als een huishouden met een EV die in de praktijk 3x zoveel capaciteit gebruikt: max 4 kW versus mogelijk 17 kW. Dat is niet eerlijk. En dat heeft vooral te maken met kostenreflectiviteit.
Unfair tariff due to peak use on large scale	Als elke kleinverbruiker af en toe een korte, hoge capaciteitspiek zou veroorzaken, hoeft dat niet per se tot problemen in de netten te leiden. Als deze pieken echter gelijktijdig en massaal optreden, dan ontstaat er wel een probleem. Bijv. als in een wijk iedereen rond 18 uur thuiskomt en dan meteen snel zijn EV wil opladen met de maximale benutting van de capaciteit van zijn aansluiting. Dat is wel een probleem voor het huidige netwerk.	Het ontstaan van de huidige oneerlijkheid wordt toegelicht. Dit wordt beargumenteerd met het tegelijkertijd veroorzaken van een piek op het net.

Fairness only related to costs	Vanuit het perspectief van een netbeheerder zien wij het vraagstuk van eerlijkheid inderdaad als puur het gebruik van het net door de aangeslotene. M.a.w. het net bestaat uit koperen draadjes en de manier op je dat gebruikt. Je gebruik bepaalt hoeveel kosten jij veroorzaakt, dat bepaalt hoeveel jij zou moeten betalen voor het netbeheer tarief. En of dat nou duurzaam is of niet, maakt voor de netbeheerder en de netkosten dus niet uit. Het willen stimuleren van de opwek van duurzame energie en de invoeding daarvan staat – voor ons als netbeheerders – los van hoe je de kosten voor het netbeheer in rekening zou moeten brengen.	Er wordt benadrukt dat eerlijkheid gerelateerd is aan kostenreflectiviteit. Vanuit het perspectief van de netbeheerder en de verdeling van kosten voor het net is eerlijkheid niet ook gerelateerd aan duurzaamheid. Duurzaamheid wordt daarbij buiten de scope van het proces gelaten.
Sustainability unrelated to fairness	Het zou niet moeten uitmaken of je naar duurzame energie terug levert en of dat je simpelweg energie afneemt op het net. Vanuit het gebruik van netcapaciteit en hoe zwaar het net hiervoor moet worden aangelegd, maakt het geen verschil. Dus ook niet qua netbeheer kosten.	Duurzame energie of niet duurzame energie. Vanuit het perspectief van eerlijkheid van de netbeheer tarieven zou het niet uit moeten maken. Aanvullend argument dat duurzaamheid buiten de scope van het proces valt.
Fairness related to capacity	Jij hebt dikke kabels nodig als je het net intensiever gebruikt. Ja, en dan maakt het wel uit of je één keer piekt in de maand of twintig keer. En hoe hoog je pieken zijn en of deze tegelijk met andere pieken plaatsvinden.	Dit argument linkt eerlijkheid aan de capaciteit van het net. Dikkere kabels zorgen voor hogere kosten. Een hogere capaciteit zorgt voor dikkere kabels en dus hogere kosten.
Internal informal meetings	Binnen de stakeholder is er geen formeel proces gevolgd om te komen tot een definitie van eerlijkheid. En er is ook geen formeel besluit over genomen. Over de definitie van eerlijkheid er zijn natuurlijk wel gesprekken gevoerd tussen mij en mijn collega's hierover.	Binnen de stakeholder is er geen formeel proces gevolgd voor het beoordelen van eerlijkheid. Gesprekken zijn wel gevoerd tussen collega’s wat betreft de definitie van eerlijkheid.
Difficulties in relating fairness to efficient net use	Het is beter voor de maatschappij als geheel (of voor het energiesysteem als geheel) als er in het tariefmodel prikkels ingebouwd zijn die ertoe leiden dat de netten efficiënt gebruikt worden. Dat bespaart kosten voor iedereen en dit is ook een vorm van eerlijkheid.	Er wordt aangeven dat het niet altijd even duidelijk is wanneer een tariefmodel een juiste prikkel geeft voor het efficiënt gebruiken van het net tijdens het proces. Onduidelijk is of dat nu aan de definitie van eerlijkheid ligt.

Fairness is the largest problem	Dat wij als stakeholder er van overtuigd zijn dat eerlijkheid eigenlijk het grootste probleem is waarover verder de gewone man bang is. Dat is de reden dat er op korte termijn een ander tariefmodel voor kleinverbruik nettarieven moet komen.	Er wordt beargumenteerd dat eerlijkheid het grootste probleem is. Het huidige (capaciteits)tarief wordt daarbij steeds oneerlijker omdat huishoudens op heel verschillende wijze gebruik maken van de capaciteit van hun kleinverbruik aansluiting terwijl ze allemaal wel ongeveer hetzelfde tarief betalen.
Fairness related to supportiveness tariff model	Draagvlak voor de energietransitie gaat een probleem worden als je het huidige capaciteitstarief niet op korte termijn wijzigt.	Eerlijkheid wordt gerelateerd aan draagvlak. Het huidige capaciteitstarief wordt steeds oneerlijker. Dit wordt een probleem als het tarief niet aangepast wordt.
Predictability not a large problem due to smart grid features	Wij als stakeholder schatten in dat voorspelbaarheid voor klanten niet zo'n groot probleem hoeft te zijn bij een nieuw tariefmodel. Wij hebben voorkeur van een bandbreedte model als netbeheerders en ik denk dat het op basis van de apparatuur die je in huis hebt dat het best wel goed te voorspellen is wat je rekening wordt kwa netbeheerkosten. Deze aanname is gebaseerd op dat de prikkel tot efficiënt netgebruik eenvoudig kan worden gerealiseerd door automatisering.	Voorspelbaarheid is niet het grootste probleem. Dit wordt beargumenteerd door het benoemen van automatisering. Dit is een 'smart grid feature'. In de argumentatie worden smart grid features dus meegenomen bij het bepalen van het gewicht van het voorspelbaarheid criterium. Dit heeft indirect gevolgen voor de beoordeling van het gewicht van het eerlijkheid criterium.
Fairness rated based on peak use	Een heavy user van netcapaciteit zou meer moeten betalen dan een light user. Dat is eerlijk volgens de netbeheerders. Dat betekent in onze optiek niet dat je een enkele piek afstraft, maar wel dat je een continue prikkel moet hebben om pieken in gebruik van netcapaciteit zo veel mogelijk af te vlakken.	Eerlijkheid wordt gerelateerd aan piekverbruik en hoe vaak die pieken optreden en hoe lang die pieken duren. Een argument wordt benoemd dat één piek veroorzaken en dat bestraffen als niet eerlijk wordt beschouwd. Dit heeft relatie met de beoordeling van eerlijkheid van tariefmodel 3B.
Fair process	Ja, ik vind dat er een eerlijk proces heeft plaatsgevonden om de relevante stakeholders hun input te verkrijgen.	Een aspect voor een eerlijk proces wordt benoemd.
Stakeholder could serve their interest	Ik zou zeggen dat wij als stakeholder zeker onze belangen in het proces hebben kunnen behartigen.	Stakeholders kunnen hun belangen behartigen. Dit draagt bij aan een eerlijk proces voor alle stakeholders.

Coding Stakeholder 5 (v)

Code	Transcription	Toelichting
Fairness is related to cost reflectivity	Uhm dat is wel goed om even die context helder te maken. Uhm, in die zin ben ik wel van mening dat er aan die kostenreflectiviteit en en eerlijkheid dat die wel hand in hand gaan. In ieder geval voor de stakeholder wel.	Er wordt aangegeven dat eerlijkheid en kostenreflectiviteit sterk aan elkaar gerelateerd zijn.
Informal meeting with internal experts	Dus er is ook geen proces. Wij hebben daar een opinie over. En daar heb ik het met twee collega's ook de algemene uitgangspunten besproken. Ja, dus er is in die zin niet echt sprake van een proces.	Er is geen formeel proces om de tariefmodellen te beoordelen op eerlijkheid binnen de stakeholder.
Fairness more important than other criteria	Kostenreflectiviteit een belangrijk uitgangspunt is. Dat iedereen daar betaalt naar mate hij gebruik maakt van het netwerk. Zo heb ik eerlijk, worden de kosten eerlijk verdeeld over de gebruikers. Ja dan denk ik toch dat je daar een hoge rating aan moet geven. Ja, en dat vinden jullie belangrijker dan euh, voorspelbaarheid en eenvoud? In die zin word er ook wel gewicht aan voorspelbaarheid en eenvoud gewicht gegeven. Maar in die zin vind ik eerlijkheid. Euh ja belangrijker en natuurlijk een tarief moet uitvoerbaar zijn en die moet ook voorspelbaar zijn voor klanten.	Het meeste gewicht wordt toegekend aan eerlijkheid en eerlijkheid als criteria wordt dan ook als belangrijker gezien. Aan andere criteria wordt ook gewicht toegekend.
Price based on one time peak use perceived as less fair	En daardoor is het iets minder eerlijk dan de variant waarbij dat piekverbruik wel wordt verrekend bijvoorbeeld. Ja, tenminste de capaciteit is de voornaamste. kostendriver in een tarief van een net en dat moet dan ook tot uitdrukking komen in een tarief. Dus daarom heeft die iets lagere score gekregen dan.	Hier wordt gesproken over tariefmodel 3B. Deze wordt minder eerlijk bevonden dan tariefmodel 3A.
Fairness is stronger related to capacity than kWh use	Dus met name omdat de kosten sterker gerelateerd zijn aan de capaciteit. Meer aan de net capaciteit dan aan de kWh.	Dit heeft betrekking op tariefmodel 8. Deze wordt beoordeeld met een 4. Een argument voor deze score is dat de kosten sterk gerelateerd zijn aan de capaciteit. Dit model rekent af per kWh.
Stakeholders are heard during the process	Beschouwt u het besluitvormingsproces als eerlijk? In die zin zijn er natuurlijk sessies geweest om verschillende modellen met	Betrekking op de eerlijkheid van het proces. Iedereen wordt gehoord gedurende het proces.

	elkaar te bespreken. Tuurlijk, met het idee om tot een nieuw voorstel te komen richting de ACM. En in die zin wordt iedereen gehoord. Euh, iedereen die mee deed had de kans om gehoord te worden.	
Fair process	Dus in die zin beschouwt u het besluitvormingsproces als eerlijk? Zo eerlijk als zeg maar praktisch mogelijk is. Maar tegelijkertijd kun je daar natuurlijk nog altijd wel kanttekeningen bij plaatsen. Ja. Euh misschien? Ik kan me niet per se een proces voor kunnen stellen waarin je dit beter had kunnen organiseren. Laat ik het zo zeggen. Dat wil niet zeggen dat je daar geen kanttekening bij kunt plaatsen	Het proces wordt als eerlijk beschouwd. Er worden wel kanttekeningen bij geplaatst.
Stakeholder could serve their interest	En natuurlijk willen we ook gewoon dat tariefprikkels en kostverdelingen zo eerlijk mogelijk plaatsvinden.. En ik denk dat dat is zeker wel naar voren gekomen. Dat zijn zeg maar onze belangen.	De belangen van de stakeholder zijn zeker naar voren gekomen gedurende het proces.

Coding Stakeholder 6 (v)

Code	Transcript	Toelichting
Stakeholder does not use fairness in their final judgement	Ja, de term eerlijkheid gebruiken we dan niet in die beoordeling. Kijk, volgens artikel 36 van de elektriciteitswet moeten wij beoordelen of aan een trits aan uitgangspunt wordt voldaan	Eerlijkheid wordt niet letterlijk gebruikt door de stakeholder om een eindoordeel te vellen. De stakeholder haalt de aspecten waarop beoordeeld wordt uit de elektriciteitswet artikel 36.
Non-discrimination, cost reflectivity objectivity and proportional closest to fairness used by stakeholder	Dat is dat de tarieven objectief worden vastgesteld, niet discriminerend zijn en evenredig	De wet schrijft voor dat: 1) tarieven kostenreflectief moeten zijn, en stelt 3 eisen aan tariefstructuur: 2) non-discriminatie 3) objectief 4) proportioneel Deze vier samen bepalen wat ons betreft wat 'eerlijk' is.
Stakeholder asks questions with proportionality of tariff models	Dat iemand in een bepaalde categorie opeens een sprong maakt in een tarief. En dat valt dan misschien prima economisch te onderbouwen. Maar ja, is dit? Is dit voor die groep aangeslotenen? Is dit wel? Is dat wel evenredig te noemen?	Vragen worden gesteld bij een tariefmodel (welke als voorbeeld wordt gebruikt) door de stakeholder op basis van proportionaliteit en evenredigheid.
Stakeholder judges if tariff structure complies with the electricity law, but also consumer law.	, maar wij moeten oordelen of het of überhaupt het voorstel voldoet aan wetgeving, ook aan consumenten wetgeving	Elektriciteitswet speelt niet als enige een rol. De stakeholder kijkt ook naar de consumentenwetgeving om een eindoordeel te geven.
Current tariff structure less cost reflective	Uhm , dat zorgt voor minder goede kostenreflectiviteit en zorgt ook voor dat uhm aangeslotenen nog minder een prikkel voelen om bij te dragen aan een efficiënt netbeheer	Stakeholder geeft aan dat huidige tarief minder kostenreflectief is. Daarnaast wordt gesteld dat het huidige tarief klanten niet stimuleert om efficiënt het net te gebruiken.
Stakeholder fairness ratings not included in the process.	dat Excel formulier met die rating wel ingevuld, maar dat niet in de groep ingebracht	Verduidelijking van de rol van de stakeholder. Stakeholder houdt toezicht en brengt dus ook geen eigen beoordelingen tussentijds in.

Process of the judgement of the stakeholder	Er is altijd een jurist die het per definitie behandeld, ik ben zelf een van de economen in het team en die ook dus daarmee zal kijken. Waarschijnlijk uhm, maar er staan vier tot zes weken voor. En als wij daar niet binnen vier tot zes weken nog niet tot een oordeel kunnen komen. Dan kunnen we daar nog één keer een verlenging daarvan uh van uh in gang zetten. Uhm, en dan volgt een oordeel.	Ik zie dit als een uitleg van het proces van beoordeling van de stakeholder (o.a. van eerlijkheid). Er is een team vastgesteld dat bestaat uit juristen en economen. Wanneer de netwerkbeheerders hun voorstel hebben ingediend, heeft dit team 4 tot 6 weken met een optie tot verlenging om een oordeel te vellen.
Discussion about proposed model between the stakeholder and system operators	Daar kunnen we achter de schermen overleg over plegen. Valt daar iets anders te doen of een keuze te maken, et cetera? En dan kan het zijn dat de netbeheerders nog weer even terug moeten en nog weer een nieuw voorstel moeten kunnen geven. Eigenlijk een wijzigingsopdracht. Ja, en dan wordt er een nieuw voorstel ingediend.	Er wordt aangegeven dat er discussie mogelijk is over het voorgestelde model tussen netwerkbeheerders en . Mogelijk kan dit leiden tot een nieuw voorstel. Ik zie dit als een onderdeel van het beoordelingsproces van de stakeholder.
Example of possible risk of selecting a new tariff model	Uhm bij het idee van de bandbreedte en een overschrijding van bandbreedte is daarbinnen ook wel weer een parallel getrokken bij Roaming bij bij mobiele telefonie en het feit dat je in Europa reist en opeens ongemerkt voor 100 euro aan extra bytes had gebruikt.	‘Roaming’ wordt als voorbeeld genoemd om aan te tonen waar de stakeholder op let tijdens het proces en wat bijvoorbeeld bij het optionele bandbreedtemodel mogelijk kan spelen.
Clarification of role of stakeholder during the process	wij zijn geen stakeholder maar wij zijn scheidsrechter en tijdens de sessies probeer ik wanneer dat handig is dat te verduidelijken hoe wij naar dingen kijken.	Verduidelijkt de rol van stakeholder.
Stakeholder indicates tariff models to be more fair than current tariff	En van de andere modellen en ook van de bandbreedte modellen denk ik dat ze in essentie eerlijker zouden kunnen zijn dan uh dan het huidige model dus die heb ik hogere cijfers geven dan het huidige model	Stakeholder geeft aan dat de nieuwe tariefmodellen waarschijnlijk in essentie eerlijker zijn dan het huidige model.
To some extent unclear what consumers want during process	Uh, hebben jullie informatie in wat de consument wil? Of is dat wat de Consumentenbond bijvoorbeeld aandraagt in het proces? Nee De consumenten zitten natuurlijk ook aan tafel die kunnen dat ook aangeven. Maar volgens mij heeft de	Toont aan dat het onduidelijk is wat de consumenten willen. Dit is onduidelijk tot een zekere hoogte.

	consumentenbond deze informatie ook niet per se	
Option mentioned for consumer research	Maar hoe kunnen jullie dat boven water halen? Wat wat de consument wil is een goeie vraag. Ja goed, er zijn allerlei onderzoeken die ook peilen onder consumenten of onder klanten	Onderzoeken kunnen mogelijk boven water halen wat de consument wil.
Process has started for network tariffs for large consumers	De scope van de werkgroep van deze werkgroep. dat zijn kleine gebruikers, maar er is inmiddels ook een werkgroep gestart die kijkt naar grootgebruikers die is gestart.	Er wordt aangegeven dat er een proces gestart is wat betreft de tarieven van grootverbruikers (industriële gebruikers)
Stakeholder does not take disproportionality between small and large consumers into account during process	Ja, dat politiek dan moet ingrijpen om nog tot een betere verdeling van totale kosten in de transitie te komen. Maar dat kunnen wij dat dat mogen wij en kunnen wij niet meenemen in alleen beoordeling van tarieven structuren?	Wat betreft de disproportionele kosten die de kleinverbruikers op zich dragen. Er wordt geopperd dat dit een vraag voor de politiek is. Dit wordt dan ook niet meegenomen bij de beoordeling van de tarieven.
Stakeholder includes sustainability considerations in its evaluation of alternative tariff structures.	Dus in die zin zeg je 'buiten de scope laten van dit proces' ? Ja ja, ja ja ja dat klopt	Stakeholder can most certainly take sustainability into account when evaluating the tariff models.
Process perceived as fair	Uhm, beschouwt u het besluitvormingsproces als eerlijk? In ieder geval voor het proces tot nu toe. Euh, ja, ja ja.	Kanttekeningen werden geplaatst bij het proces, echter werd het proces wel als eerlijk bevonden.

Appendix XII

Topic	Concept(s)	Major philosophical influence(s)	Application to energy	Injustices	Solutions
Energy efficiency	Virtue	Plato and Aristotle	Energy efficiency: high penetration of efficient service	Inefficiencies involved in energy supply, conversion, distribution, and end-use	Fuel economy standards, energy efficiency labelling, industrial retrofits, utility-scale demand-side management, ascending block rate pricing, advanced metering and smart grids, training and capacity building, consumer education and awareness
Energy externalities	Utility	Jeremy Bentham, John Stuart Mill, Henry Sidgwick	Wellbeing: less suffering, pain, externalities, and disasters associated with energy production and use	The imposition of negative social and environmental costs on society such as traffic congestion, the extractive industries affiliated with energy production, the resource curse, nuclear waste, air pollution, greenhouse gas emissions, and water consumption	Passage of a carbon tax, accurate price signals and tax shifting, and environmental bonds
Human rights and social conflict	Human rights	Immanuel Kant	Universal human rights: an obligation to protect human rights in the production and use of energy	The violation of civil liberties—in some extreme cases death and civil war—undertaken in pursuit of energy fuels and technology, as well as the contribution of energy production to military conflict	Extractive industries transparency initiatives, energy truth commissions and inspection panels, improved social/environmental impact assessments for energy projects, availability of legal aid to vulnerable groups
Energy and due process	Procedural justice	Edward Coke, Thomas Jefferson, Jürgen Habermas	Due process: free prior informed consent for the siting of energy projects; fair representation in energy decision-making	Approaches to energy siting that ignore or contravene free, fair, and informed consent, and/or do not conduct adequate social and environmental impact assessments	Better information disclosure, broader community involvement and participation
Energy poverty	Welfare and happiness	John Rawls, Amartya Sen, Martha Nussbaum	Accessibility and subsistence: an energy system that gives people an equal shot of getting the energy they need, energy systems that generate income and enrich lives	Lack of access to electricity and technology, dependence on traditional solid fuels for cooking, and time-intensive fuelwood and water collection and processing of food in emerging economies, borne mostly by women and children	Social pricing and assistance programs as well as pro-poor public private partnerships for micro hydro units, solar home systems, improved cookstoves, biogas digesters, and small-scale wind turbines, mechanical energy for pumping, irrigation, and agricultural processing
Energy subsidies	Freedom	Robert Nozick, Milton Friedman	Libertarianism: energy decisions not unduly restricted by government intervention	Gross subsidies that involve an involuntary wealth transfer to recipients, essentially raiding the pocket books of the unwilling	Elimination of inappropriate subsidies, subsidy impact assessments, sunset clauses, and adjustment packages for those dependent on subsidies
Energy resources	Posterity	Ronald Dworkin, Brian Barry, Edith Brown Weiss	Resource egalitarianism: an obligation to minimize resource consumption and ensure adequate reserves for future generations	Exhaustion of depletable energy reserves and fuels	Improved energy efficiency, establishment of national resource funds, commercial-scale deployment of renewable electricity and biofuels
Climate change	Fairness, responsibility, and capacity	Peter Singer, Henry Shue, Paul Baer, Stephen M. Gardiner, Dale Jamieson, Simon Caney	Intergenerational equity: an obligation to protect future generations from energy-related harms	A daunting suite of negative impacts from climate change including ocean acidification, food insecurity, climate refugees, and the increased frequency and severity of natural and humanitarian disaster	Greenhouse Development Rights, community-based adaptation, mitigation through stabilization wedges

Tabel 4 Complete energy justice analytical applications to energy problems. (Sovacool & Dworkin, 2015)

Appendix XIV

Research Proposal

Fairness in the decision-making process for selecting a new network tariff system

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Abstract

This paper presents a research proposal for a CoSEM Master thesis on the regulation principles and the decision-making process approach for a new network tariff system. The EU goals to limit global warming by reducing greenhouse gas emissions lead to drastic changes in managing the power grid. A network tariff system is an important tool in managing the grid and is used by the network operators to influence the consumption as well as the generation patterns of agents in the energy system. The changes within the energy sector lead to challenges for the current network tariff system in the Netherlands.

To deal with these challenges, the network operators want to search with consumer organisations and energy suppliers to come to a model of the future tariff system. In the process of agreeing on a new network tariff model, a common understanding in the definition of the regulatory principles is missing. The regulatory principles can be grouped into three general principles, the tariff system needs to be cost-reflective, allow cost-recovery and the system needs to be fair. The Netherlands Authority for Consumers and Markets (ACM) asks for a network tariff model that is highly supported by the stakeholders. The fairness principle encompasses other principles such as flexibility, affordability, non-discrimination and transparency and should play a role in determining the network tariff system as well as the network tariff system itself. This research focuses on the role of the fairness principle in the decision-making process that determines the network tariff model.

A mixed methods research approach has been chosen to tackle the research problem. Qualitative research will be combined with the use of the Q-method. The Q-method is a research method that is suitable to do research in the views and perceptions of people. The Q-method can be used to identify groups of participants that share or have alternative opinions about a subject. This research will contribute by helping understand the stakeholders' perception on the fairness principle and make recommendations for the current and future decision-making between the stakeholders.

Keywords: Network Tariff System; Regulatory Principles; Fairness

Word count: 5721

1. Introduction

The prominence of climate change on the political agenda has a large impact on all kind of areas in the energy sector. The EU goals to limit global warming by reducing greenhouse gas emission lead to drastic changes in managing the power grid. The increase in climate change awareness leads to the development of sustainable energy technologies such as the electric vehicle, heat pumps, photovoltaic cells and wind turbines. These technologies have a large impact on the loading patterns.

These developments lead to challenges for the current tariff system in the Netherlands. The current network tariff system is developed in the initial years after the liberalisation (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013). The system was characterized by the production of electricity on a large scale that supplied the high voltage grid and extra high voltage grid (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013). An important characteristic is the electricity flow from higher voltage levels to lower voltage levels. This has changed in recent years due to the participation of the consumers in the electricity production. Consumers are

feeding the electricity grid by using solar panels and wind turbines which results in large consequences for the electricity grid (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013).

The impact of these innovations on the amount of network capacity has been analysed (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013). The model calculations show that the local energy production does not lead to less network capacity. The total amount of consumed electricity has decreased. However, the feed-in of the local production can take up more capacity than the supply when there is a large penetration of local production. The loading patterns of electric vehicles also have been shown to have a significant impact on the transport capacity of the power grid. (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013) However, charging strategies can be used to reduce the impact on the necessary capacity.

To deal with the challenges for the current tariff system in the Netherlands, the overlegtafel energievoorziening (OTE) asked the Tariff working group to investigate these challenges and to investigate how to mitigate these challenges. The OTE is an informal government body that has the goal to look into future issues in the energy world (NVDE, 2021). The OTE consists of stakeholders related to the energy sector, such as suppliers, consumers and network operators. The Ministry of Economic Affairs and Climate Policy and the Netherlands Authority for Consumers and Markets are auditors of the group (NVDE, 2021).

The investigation lead to the determination of six future challenges in the current network system (Overlegtafel energievoorziening, 2018). The report of this investigation is also input for the legislative agenda of the Ministry of Economic Affairs and Climate Policy. The report presents challenges and requirements for the new tariff system. One problem of the current network tariff system is that it charges the same tariff for users with different charging behaviours during peak use. Extra network costs are made due to the energy transition and a new fair tariff system needs to be designed (Sprintteam NBNL KV Tarieven, 2021) to follow regulatory principles of the EU and national regulatory guidelines (European parliament, 2019).

The future tariff system will have a large impact on network costs for the network operators. The network operators also have the social responsibility to keep the network cost efficient. The future tariff system also has a large impact on consumers and energy suppliers. The urgency and necessity to deal with the uniform capacity tariff challenge is caused due to unfair sharing of the costs and the inefficient use of the network (OTE)

Therefore, the network operators want to search with consumer organisations and energy suppliers to come to a model of the future tariff system. The model is a generic tariff system which will be elaborated in the follow-up process. In march 2021, a stakeholder trajectory has started to determine the model in July 2021. Important stakeholders are energy suppliers, consumer organizations, Ministry of Economic Affairs and Climate Policy and the Netherlands Authority for Consumers and Markets.

The regulatory principles can be grouped into three general principles (Schittekatte & Leonardo, 2018) The tariff design needs to be cost-reflective, allow cost-recovery and the design needs to be fair. In the process of agreeing on a network tariff system, a common understanding in the definition of the fairness principle appears to be missing (Brown, Faruqui, & Grausz, 2015).

In 2016 a research was conducted on the design of a process approach to adjust the tariff system of the electricity network (Mechelen, 2016). The research focussed on the potential adjustments of the tariff system and the most important discourses with respect to adjusting the tariff system. The research has been conducted several years before the start of the process and a lot has changed.

The design of a network tariff system is a solution within a complex socio-technical environment and has a large societal relevance. Technical, economic and institutional knowledge is needed to further investigate the topic. This makes this topic suitable for a CoSEM Master thesis. In this research proposal a literature review is conducted, after which a knowledge gap and a research question is determined. To answer the research question sub-questions are constructed. A research approach is chosen as well as research methods and data requirements. To visualize the process a research flow diagram is made and a timetable is made for the research planning.

2. Main concepts

Network tariff system

A network tariff system is a tool used by system operators to influence the consumption as well as the generation patterns of agents in the energy system (Orega, Perez-Arriaga, Abbad, & Gonzalez, 2008) A tariff design can therefore contribute to a more efficient system. The goal of network tariffs is to divide the network costs amongst the users of the network and to incentivize users to use the network efficient. (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013) The network tariff results in an income for network operators that has to recover the costs. The costs include capital costs that are associated with the technical infrastructure and the operational costs of maintenance and business operations. Besides these costs, the network tariffs cover the network losses and the costs of reactive power. (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013)

Different methods could be used to allocate the costs to the network users. There are methods that attempt to apply the cost-reflectiveness principle. This lets the parties that benefit pay. Other methods are socializing the costs because there are pros of the network that could benefit all parties (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013). The current Dutch network tariff system is focused on the allocation of costs. Every tariff adjustment results in benefits for one group of consumers and results in cons for other groups of consumers. (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013)

Regulatory authority

The Netherlands Authority for Consumers and Markets (ACM) are responsible for approving the network tariff design (ACER, 2020). ACM is a regulatory authority that is based in The Hague. ACM supervises the competition, a number of sectors and the protection of consumers. (ACM, 2021). The goal of ACM is to let the market function well for people and companies. ACM maintains the rules of the game that apply to companies by countering unfair practices and by making sure that the rules of the game are complied with. (ACM, 2021)

ACM imposes additional rules in the energy sector specifically because competition does not come naturally in the energy sector. These rules are meant to guarantee the affordability, quality and availability of products and services. ACM also wants to stimulate innovation within this sector. (ACM, 2021)

System operators, such as Alliander, provide services whose tariffs are regulated by law. System operators are monopolists and therefore can make more costs than necessary and can ask the consumer higher rates. Tariff regulation keeps the tariffs on a reasonable level, incentivizes system operators to work efficiently and makes sure that system operators earn enough income to deliver a reliable services of good quality and to make the energy supply sustainable. ACM makes regulatory decisions about tariffs every year and every 3-5 years a method decision is made.

The ACM wants the network tariffs to follow the regulatory principles, which are stated in the EU regulation (European parliament, 2019). The regulatory principles can be grouped into three general principles (Schittekatte & Leonardo, 2018) The tariff system needs to be cost-reflective, allow cost-recovery and the system needs to be fair. Some of the regulatory principles are setting boundaries and other principles provide clues. (Orega, Perez-Arriaga, Abbad, & Gonzalez, 2008)

Cost-reflectiveness

The cost-reflectiveness is a principle which states that the implied network costs of the consumer is reflected by the tariff design. This makes it possible for the consumer to make decisions about their consumption behaviour. The cost-reflectiveness tariff could lead to a more cost-efficient system. This means that a cost-reflective tariff design will lead to the lowest final costs for supplying electricity to all consumers. (Schittekatte & Leonardo, 2018)

Cost-recovery

The goal of the cost-recovery principle is that the DSO is able to recuperate the grid costs. ACM can decide that DSOs expenses were inefficiently and therefore they cannot be recuperated through the tariff. (Schittekatte & Leonardo, 2018) Some pricing methods are designed to make the distribution network tariff to be cost-efficient and at the same time make sure that grid costs are recovered. To be cost-efficient, network tariffs can be designed to let consumer pay different shares of grid costs based on their elasticity to prices. This discrimination could be perceived as unfair.

Fairness

The fairness principle encompasses other principles such as flexibility, affordability, non-discrimination and transparency. The design needs to be flexible, due to the fact that certain consumers do not have the option to not consume electricity, such as hospitals. Electricity is also considered as a basic need and therefore needs to be affordable for every consumer. Not all consumers have the possibility to pay the real electricity price and they cannot be cut off from electricity. The network tariff design needs to be simple since consumers do not want to spend time in understanding the tariff. The design needs to be non-discriminatory, which means that vulnerable consumers should pay the same tariff as those who are not. This means that this principle contradicts the affordability principle. (Schittekatte & Leonardo, 2018) In the process of deciding about the tariff structure, there will be inevitably a trade-off between fairness and the cost-efficiency. The literature also states that there are conflicting interpretations of the fairness principle (Brown, Faruqui, & Grausz, 2015). (Brown, Faruqui, & Grausz, 2015) also recommends that clarifying the interpretation of fairness would be helpful in tariff design.

Fairness is a regulatory principle. This means the ACM demands the tariff model to be fair. Fairness also plays a role in the process as a criterium and a requirement in the selection process. Stakeholders will give a weight to the fairness criterium and give a rating for every optional tariff model. This will contribute to the total rating of the optional tariff models (figure 1). Some aspects of fairness, such as transparency, not only concerns the network tariff model, but also should play a role in the process for selecting the network tariff model (Hakvoort, Knops, Koutstaal, van der Welle, & Gerdes, 2013). This means that the network tariff model should be transparent, but also the process itself.

Process approach

The trajectory to get to a tariff model consists of three phases. 1. Determining the process to get to preferred model 2. Assessing the requirements of the tariff system, determining the trade-off factors and determining the possible tariff models. 3. Assessing the possible tariff models based on the requirements and ‘scoring’ the model based on the trade-off factors.

The first phase consists of determining the decision-making process. The conclusion of the OTE report are the starting point of the process. The goal of the process is to make a tariff model that can be developed in the next trajectory and shall be implemented. The process is focused on choosing the best tariff model. This phase is completed when all participants agree on the process.

The second phase determines the requirements, trade-off factors and tariff models. When these aspects have been determined, the overview will be presented to the broad group of stakeholders to give them the opportunity to give feedback.

In the third phase, trade-offs models will be used to rating the optional network tariff systems. The ratings will be used as an input for conversation and getting to a model. If there is no consensus during the conversation will take place on an administrative level. The proposed network model can be submitted by the system operators or the Vereniging Nederlandse Energie Data Uitwisseling (NEDU). Depending on the agreement the proposal should also pass the Gebruikersplatform Elektriciteits- en Gastransportnetten (GEN). ACM will approve the proposal if there is not too much resistance from other parties.

The model will consist of the main points of a tariff system.

The working sessions started 9 march 2021 and the model will be presented between 15 June and 6 July. The preferred model will be elaborated in the next two years, regulation will be amended between 2021 and 2024, the tariff system will be implemented before 2024. The communication will take place between 2023 and 2025.

In the first two phases the following criteria and requirements have been determined:

Criteria:

- Fairness
- Transparency
- Predictably
- Costs of implementation
- Explainable
- Efficient

Requirements:

- Fairness
- Efficient
- Non-discriminatory
- Transparency

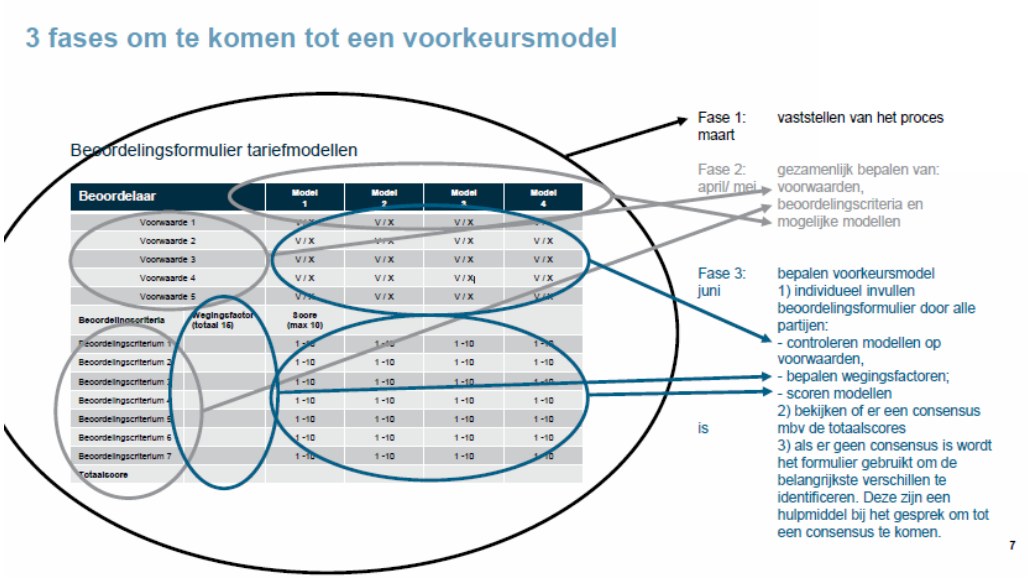


Table 5 Assessment form tariff models

Literature review

The literature review is conducted based on the guidelines of Webster (Webster & Watson, 2002). A complete review focuses on relevant literature that is related to the topic. When searching for relevant literature, there is searched in prominent journals, such as Energy Policy. The literature review process is started by using search engines. Search engines, such as Google Scholar, were consulted and the following terms were used to find articles "Network tariff system" AND "Regulatory principles". The TU Delft Library was also consulted in this process. This searching process lead to around 60 articles of which the abstract was read. The abstracts were screened and if the relevance to the research topic was unclear the whole article was read. The articles were found relevant if one or preferably two or more of the key concepts were discussed in the article. The key concepts are 'Network tariff system', 'Network tariff design' and the regulatory principles: 'Fairness', 'Cost-reflectiveness', 'Cost-recovery'.

Table 1 presents the literature selection process. The most relevant articles were used for snowballing. The most relevant articles are (Ortega, Pérez-Arriaga, Abbad, & González, 2008), (Nijhuis, Gibescu, & Cobben, 2017,) and (Neuteleers, Hindriks, & Mulder, 2017). This process lead to a first selection of 60 articles and 11 of them were used for in-depth analysis. 7 articles were chosen based on searching by the concepts and 4 articles were chosen by snowballing.

"Network Tariff System", "Regulation Regulatory Principles"	Key concepts	Snowballing	Final articles
60 articles	7 articles	4 articles	11 articles

Table 6 Literature selection process

Webster recommends to use a concept matrix for the structuring the review. (Webster & Watson, 2002) The concept matrix in table 2 shows the articles chronologically and the methods and perspectives are described. The key concepts are marked when the concept is prominent in the article.

Author	***Methods***	***Perspective***	***Key Concepts***				
			Network Tariff System	*Fairness*	*Cost-reflectiveness*	*Cost-recovery*	*Network Tariff design*
(Jesus, de Leao, Yusta, Khodr, & Urdaneta, 2005)	Mathematical modelling	-	x				
(Ortega, Pérez-Arriaga, Abbad, & González, 2008)	Analysing method of cost-causality function	-	x	x	x	x	x
(Vassileva, Wester, Wallin, Odlare, & Bartusch, 2011)	Empirical, surveys, half-structured in-depth interviews	Consumer	x				
(Brown, Faruqui, & Grausz, 2015)	Tariff design model	-	x	x			
(Hall, Jeanneret, & Rai, 2016)	Survey	Consumer	x		x		
(Tuunanen, Honkapuro,	Power band pricing method	DSO	x				

& Partanen, 2016)							
(Nijhuis, Gibescu, & Cobben, 2017,)	Mathematical modelling, optimization	DSO	x		x		
(Neuteleers, Hindriks, & Mulder, 2017)	Theoretical, Empirical, surveys	Consumer	x	x			
(Honkapuro, et al., 2017)	Multi criteria analysis, Novel tariff structures	Consumer, DSO, supplier, society	x	x	x	x	x
(Passey, Haghadi, Bruce, & MacGill, 2017)	Assessment method applied on a typical demand charge network tariff proposal	-	x		x		
(Mosácula, Chaves-Ávila, & Reneses, 2019)	-	-	x (Gas)				

Table 7 Concept and method matrix

Synthesis

Table 2 shows the relevant concepts and methods presented in the literature. The literature shows a wide variety of studies that are conducted on network tariff systems. The study of (Brown, Faruqui, & Grausz, 2015) focuses on the criteria in network tariff design and uses representative data from Australia, while other research focused on the Dutch Power system.

Strong similarities are also found. Several studies focus on developing mathematical models to optimize certain aspects of network tariff systems. The study of Nijhuis (Nijhuis, Gibescu, & Cobben, 2017,) for example, used mathematical models to assess the cost of the distribution network. This results in an adjusted optimisation problem to calculate the costs. The study of Jesus (Jesus, de Leao, Yusta, Khodr, & Urdaneta, 2005) focuses on mathematical modelling as well by focusing on the development of a method for distribution access pricing. This resulted in an optimisation problem that is suitable for large-scale test cases.

Other research (Hall, Jeanneret, & Rai, 2016) (Vassileva, Wester, Wallin, Odlare, & Bartusch, 2011) use empirical research to acquire research data. Half-structured in-depth interviews and surveys are conducted to get their empirical results. The research of Hall (Hall, Jeanneret, & Rai, 2016), focuses on the cost-reflective electricity pricing and maps the preferences and perceptions of the consumer using surveys. The research of Bartusch, (Vassileva, Wester, Wallin, Odlare, & Bartusch, 2011) focuses on the demand response and customer perception of a demand-based electricity distribution tariff in the residential sector. Both studies are similar in the sense that they focus on the perspective of the customer by conducting an empirical study and let households participate by conducting a survey.

Other studies, such as the study of Tuunanen (Tuunanen, Honkapuro, & Partanen, 2016), focuses on the perspective of the DSO. The studies how the power-based distribution tariff structure affects the distribution network loads. The study advises the use of this tarrif design for DSOs and investigates it's potential benefits in low-voltage networks.

Several studies focus on the assessment of optional tariff systems based on criteria. The study of Honkapuro for example (Honkapuro, et al., 2017), uses perspective of the consumer, DSOs, electricity supplier and society to assess the network tariff system. The paper states the strengths and weaknesses of three tariff systems and the tariff systems are compared. Some of the criteria are aligned with the regulatory principles, such as the cost-reflectivity. From the DSOs perspective, the power limit tariff shows an improvement on cost-reflectivity.

The research of Nijhuis (Nijhuis, Gibescu, & Cobben, 2017,) focuses on assessing the network tariff structures in a similar way. The paper investigates the consequences for robustness, predictability and cost-reflectivity. The paper concludes that the reflectivity of energy consumption based network tariffs are showing low reflectivity.

The consumer's perspective on the tariff structures is also researched in the study of Bartusch (Vassileva, Wester, Wallin, Odlare, & Bartusch, 2011). The research concludes the consumer's preference for a demand-based tariff. In contrast to this, the research of Tuunanen (Tuunanen, Honkapuro, & Partanen, 2016) investigates the impact of tariff structures from a DSO perspective. The paper concludes that power band pricing is an effective method to deal with high peak powers due to electric vehicle use.

In contrast to papers that focus on the assessment of network tariff structures, the research of Ortega (Orega, Perez-Arriaga, Abbad, & Gonzalez, 2008) focuses on the design of the network tariff structure. The paper presents a new tariff design methodology and analyses the compliance with regulatory criteria. The methodology consists of three steps: defining the tariff structure, allocating of total costs and the computation of final rates. Both papers (Honkapuro, et al., 2017) (Orega, Perez-Arriaga, Abbad, & Gonzalez, 2008) contribute to the design of a new network tariff structure. The paper of Honkapuro focuses on assessing the network tariff system based on different perspective and the study of Ortego focuses on developing a methodology for the tariff design.

Knowledge gap and research question

The synthesis shows that the literature is focused on assessing the tariff structures. This is often done from a DSO perspective or the consumers perspective. Different quantitative and qualitative methods are used to assess the research tariff structures. The literature lacks to define the fairness regulatory principle. This is also stated by Brown (Brown, Faruqui, & Grausz, 2015), the paper states that "fairness" is not clearly defined. Regulators need to careful balance, make trade-offs to reflect relevant policy considerations.

Research states that further research is needed on the fairness perception. The paper of Neuteleers (Neuteleers, Hindriks, & Mulder, 2017) states that survey methods could be used with polls from stakeholders, especially from consumers to increase the understanding of the fairness perception. The study of Honkapuro (Honkapuro, et al., 2017) states that further study is needed on the fairness of the development of tariff structures. For example, the paper states that certain price structures can cause energy poverty for people that cannot afford home automation or have difficulties in understanding the price structures. Therefore studies on these aspects are needed to take these issues into account when developing tariff structures.

Network tariff structures need to be designed in accordance with the regulatory principles. Further research still needs to be done however in understanding these principles and what they mean in practice. The literature lacks on the role of these regulatory principles on the network tariff design. The Netherlands Authority for Consumers and Markets (ACM) asks for a network tariff model that is highly supported by the stakeholders..

This research will contribute by increasing the understanding of the fairness principle in network tariff design. To support the decision-making process of the OTE and the relevant stakeholders, further research in this area is needed.

The knowledge gap leads to the following main research question:

What role does the fairness principle play in selecting a highly supported network tariff model?

Increasing the understanding of the fairness principle helps evaluating the alternative network tariff systems. This research will lead to recommendations for the DSO and contribute to a more efficient operating network. This research could also contribute to future collaborations in the energy sector by increasing the understanding of the decision-making process.

Research approach

The research question will be divided into sub-questions due to the complex nature of the research topic. The sub-questions create structure and makes the topic manageable. To answer the research question a fitting research approach is necessary. The research question will be answered by using a mixed methods approach that combines a qualitative approach with the use of the Q-method. The Q-method is a research method that is suitable to do research in the views and perceptions of people (Jedeloo & A, 2009). The Q-method combines qualitative and quantitative research methods and therefore can be viewed as a hybrid method..

Creswell (Creswell J. W., 2012) states that a qualitative research approach best fits a research problem with unknown variables that need to be explored. In qualitative research, the data collection from participants plays a large role. For collecting data from participants, the use of protocols is recommended. Interview protocols will be necessary to conduct interviews successfully.

The benefit of qualitative research is that it is flexible, can generate new ideas and it occurs in a real-world setting. The downside of qualitative research is that it is flexible, has a lot of uncontrolled factors that can affect the research and the research can be influenced by the researcher's subjectivity when analysing and interpreting data. The data collection is also labour-intensive.

The mixed methods approach will be used to answer the following sub questions:

What is the current context of selecting a supported tariff model in the decision-making process?

Answering this sub question will gain insight in the relevant context of the decision-making process. The characteristics of the Dutch power grid will be elaborated, the relevant stakeholders will be analysed, characteristics of network tariff systems and models will be explained. The stakeholders analysis will identify stakeholders, categorize stakeholders by their interest and power and determine the relationship between stakeholders.

What are the differences and similarities in the perceptions on the fairness principle between the stakeholders?

The second sub question will make clear what the different perspectives of the stakeholders are on the fairness principle in relation to choosing a network tariff model. Since there is no clear definition of the fairness principle, the stakeholders will have different perceptions on the fairness principle. However, the fairness principle is an important part of the criteria in choosing the network tariff model. The stakeholders can be divided in four groups: consumers, suppliers, network operator and the regulatory authority. In this sub question the similarities and differences in the perception between these groups of stakeholders will be clarified using the Q-method.

How can the fairness principle contribute to choosing a network tariff model that is supported?

The third sub question will make clear what aspects could be improved in the decision-making process. The process will be analysed from a process fairness perspective. The process involves stakeholders with different interests. A fair process does not ensure a fair final decision, however following a fair process could contribute to reaching a fair and correct decision that is highly supported.

Research methods and data gathering

This chapter elaborates the research methods that will be used to answer the sub-questions. The research process is also clarified in the research flow diagram (figure 1). The research methods will be a of a hybrid nature: interviews, literature and the q-method.

The first sub-question will be answered by doing desk research and interviews. Answering this sub question will gain insight in the relevant context of the decision-making process. The characteristics of the Dutch power grid will be elaborated, the relevant stakeholders will be analysed, characteristics of network tariff systems and models will be explained. The data will be gathered by analysing public- and non-public documents, scientific literature and grey literature. The use of public documents enables the researcher to already obtain language that participants could use (Creswell J. , 2009), the documents can be analysed in a convenient time. Some information however, may be unavailable because it is protected, materials may be incomplete or not be authentic.

The second sub question will make clear what the different perspectives of the stakeholders are on the regulatory principles. To map the perspectives of the stakeholders, the Q-method will be used. The data gathering for using the Q-method will mostly consist of interviewing experts. The interviews will be analysed by transcribing, data coding and linking the codes together in cohesive themes. Interviews will be half-structured to allow flexibility. Due to the coronavirus it is not possible to have one-on-one in person interviews (Creswell J. , 2009), most of the interviews will therefore be telephone(zoom, skype) interviews.

The use of interviews has the benefit that useful information can be provided and that participants are very flexible to interview since there is no need to meet in person. The use of interviews has the downside that the researcher can bias the response of the participants and not all participants are equally articulate (Creswell J. , 2009). Consulting experts is also uncertain since not every expert shall be available for conducting an interview. Participants will be informed about the possibility of audiotaping. Transcribing interviews can also be very time consuming. These factors have to be taken into account when doing the research.

The third sub-question will make clear what aspects could be improved in the decision-making process. The process will be analysed from a ‘fairness’ perspective. The role and the interest of each stakeholder will be elaborated. The distribution of costs and benefits of each stakeholder will be elaborated. The process will be analysed, the criteria and the alternative network tariff models will be described.

The regulatory principles can conflict between each other. For example, increasing the fairness could lead to a lower efficiency. To make a considered decision about network tariff system a good understanding of the regulatory principles is necessary. The stakeholders will provide their opinion on their understanding of the principles and maybe there are other criteria to fulfil. To make a good decision differences in the relevancy of the criteria need to be clear. Some principles could for example be more important in the decision-making then other principles. For example, it seems that cost-reflectiveness plays a larger role then transparency.

The process revolves around choosing a network tariff model. This model will be further elaborated in the years to come. It is important to know what the optional tariff models are for the decision makers to choose from. Another aspect in the decision-making process is about identifying the criteria that are used to select the right network tariff model. The criteria will be largely based on the regulatory principles, but there are also other criteria possible. For example, what potential impact does the network tariff model have on the charging behaviour of consumers? The process will determine what criteria are valued the most.

Protocols

The data collection is an essential part of the research. To prevent issues when collecting data from participants, protocols will be used. The interview protocols will structure the interviews. The questions have to be ready and notes need to be taken during the interviews. A sample interview protocol (Creswell J. W., 2012) will be used for structuring the interviews. The protocol will help noting important aspects, such as time of interview, data, place, interviewer, interviewee, and the half-structured questions.

Q-method

The Q-method is a research method that is suitable to do research in the views and perceptions of people (Jedeloo & A, 2009). The Q-method combines qualitative and quantitative research methods and therefore can be viewed as a hybrid method. The Q-method can be used to identify groups of participants that share or have alternative opinions about a subject. The Q-method asks participants to order statements based on their individual preferences. The Q-method uses a 'small-sample' method with the primary goal of not generalizing to the larger public (Jedeloo & A, 2009). The use of a small amount of participants does not influence the results because the primary goal is to identify a typology and not to test the prevalence of the typology.

The Q-method uses different steps to determine the subject of a study and to gather data about what people have to say about it (concourse), determining the statements to a Q-set that is manageable, determining the participants that will sort the set based on their preferences (Q-sorting) and the descriptions of the factors that are found. The Q-method has the benefit that the focus on similarities and differences the variety of perceptions clarifies and the tendency to focus on the perception of the majority is reduced. A downside of doing a Q-study is that the results are not transferable to other groups with other experiences. (Jedeloo & A, 2009)

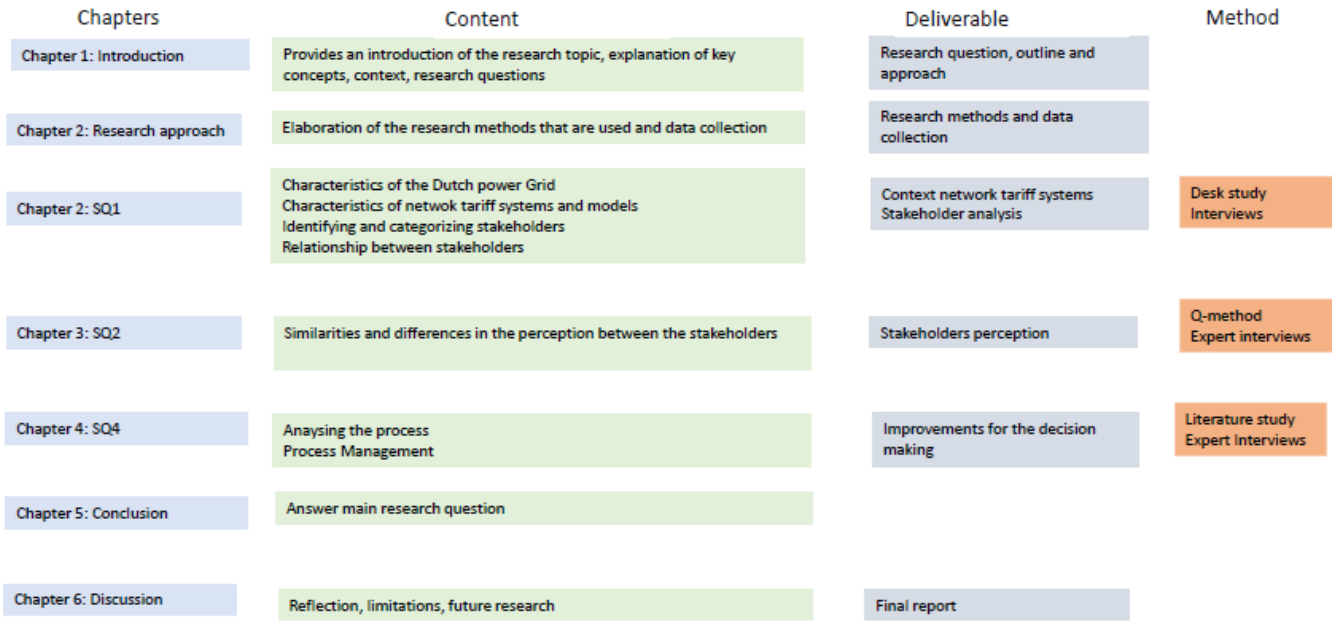
The Q-method will revolve around the following question:

When is the process to choose a network tariff model fair?

To gather the initial statements from the Q-method, academic and grey literature will be used in addition to the interviews. This will lead to a set of 40 to 80 statements about the perception of how the regulatory principles relate to the criteria and requirements of the network tariff model. All groups of stakeholders are represented (Energy suppliers, consumers, network operators and regulator) in the participants group. Using the Q-method conclusions can be drawn based on the statistically analysis of the Q-sorts.

Research flow diagram

The data collection will mostly consist of scientific literature, public documents and interview transcriptions. The data will be analysed using coding. The collected data will be used for the input of the different sub questions. This will lead to writing and structuring the report.



Gantt Chart

Gantt Chart

TASK NAME	START DATE	END DATE	START ON DAY	DURATION (WORK
Kick off meeting			0	1
Chapter 1	26-5	26-6	0	32
Context, Problem Statement & Research Question	26-5	14-6	0	20
Thesis outline, Scope	29-5	14-6	3	17
Chapter 2	29-5	22-6	3	25
Chapter 3	22-6	22-7	27	31
Characteristics of power grid	22-6	22-7	27	31
Characteristics network tariff systems and models	1-7	22-7	36	22
Stakeholder analysis	1-7	22-7	36	22
Contacting experts on literature	1-7	7-7	36	7
Gathering grey literature	1-7	7-7	36	7
Analyse public and private documents	1-7	22-7	36	22
Chapter 4	22-7	22-8	57	32
Interviews	22-7	22-8	57	32
Q-method	22-7	1-8	57	11
Contacting relevant stakeholders to interview	22-7	29-7	57	8
Constructing interview protocols	22-7	1-8	57	11
Transcribe interviews	1-8	16-8	67	16
Code interviews	1-8	16-8	67	16
Chapter 5	22-8	22-9	88	32
Write academic article	22-8	22-9	88	32
Recommendation, conclusion, discussion	22-9	22-10	119	31
Academic and social relevance	29-9	7-10	126	9
Greenlight meeting II Final report	22-10	22-10	149	1
Final Thesis assessment	22-11	22-11	180	1