Heating Up the Debate

A Distributive Justice Perspective on the Pricing Structure of Heating Grids in the Netherlands

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Abstract

This research looks into the debates around the pricing structure of heating grids through the distributive justice tenet from the Energy Justice Framework. The aim is to explore the conflicts in the debate, explain why they exist and make recommendations to improve the debate on the pricing structure of heating grids. The research question is: *How can the distributive justice framework help to structure, understand, and improve the debate between stakeholders about the pricing structure of heating grids in the Netherlands?* The five main conflicts in the debates are identified with literature research and conceptualized into four main aspects with an inductive analysis, based on a grounded-theory approach. Interviews with stakeholders are conducted and their opinions are interpreted with political philosophical principles of distributive justice (utilitarianism, libertarianism and egalitarianism), to unravel their underlying justice assumptions on each aspect. The results provide insight in the alignment between stakeholder opinions and explain why the main conflicts in the debates exist. Recommendations for praxis are given on how the distributive justice framework can help to improve the debate around the pricing structure of heating grids.

Keywords: heating grids, pricing structure, distributive justice

Summary

The development of heating grids in the Netherlands has stagnated due to uncertainty in the decision-making process of a new proposed legislation (Wet Collective Warmte). The decision-making process is dominated by complex and interwoven debates, that are concerning the pricing structure of heating grids [HGPS]. It is a normative question how (future) costs and benefits of heating grids should be allocated, so the distributive justice tenet from the Energy Justice Framework is a valuable framework to approach the debates. Justice aspects of the pricing structure are currently not addressed sufficiently in the decision-making process. This causes the uncertainty around the decision-making process, and can lead to energy policy failure, such as decreased societal support or energy injustice.

The aim of this research is to explore the conflicts in the debate, explain why they exist and make recommendations to improve the debate on the HGPS. That leads to the research question: *How can the distributive justice framework help to structure, understand, and improve the debate between stakeholders about the pricing structure of heating grids in the Netherlands?* This research applies energy justice as a tool to unravel the existing distributive justice conceptions of stakeholders, using political philosophical principles as a lens. It aims to bridge a gap between normative theories on distributive justice and the decision-making process in practice, by providing a clear definition and operationalization of the HGPS through the justice lens.

The debates in the decision-making process around the HGPS are explored with a literature research, supplemented by expert conversations. Five main conflicts are distilled: 1) *Which sustainable heating option should be implemented in the neighborhood*; 2) *The costs of heating grids are high for consumers*; 3) *Heating companies have difficulties composing a conclusive business case*; 4) *There are differences in heating tariffs between heating grids, and the risk for opt-out of consumers*; and 5) *A dilemma with incentive to decrease the heat use of consumers*. This research field is conceptualized into four main aspects: Strategy, Consumer Tariffs, Financial Feasibility and Division of Roles, through an inductive analysis, based on a grounded-theory approach. Political philosophical principles of distributive justice (utilitarianism, libertarianism and egalitarianism) are applied on these aspects, leading to the complete operationalization. To explore and unravel the underlying justice assumptions of stakeholders on each aspect, stakeholders are asked about their desired future in semi-structured interviews. Their opinions are analyzed with thematic analysis and assorted and interpreted through the political philosophical principles of distributive justice. The opinions are visualized in actor maps, to provide insight on the alignment between the opinions on each aspect of the HGPS. In general, it is striking that for Strategy, most stakeholders are aligned on the utilitarian principle, while for Consumer Tariffs, most stakeholders are aligned on the egalitarian principle. For Financial Feasibility and Division of Roles, stakeholders are divided over utilitarianism, libertarianism and egalitarianism. This research uses these results to explain why the main conflicts in the debate around the HGPS exist.

Recommendations for praxis are given on how the distributive justice framework can help to improve the debate on the HGPS. For Conflict 1, 2 and 4, it should be discussed which values (lowest national costs, freedom of choice, or affordability for consumers) should be prioritized over others, because lowest national costs and lowest consumer costs are not always the same. For Conflict 3, it should be decided whether society should have an individualistic, collectivistic or socialistic approach, determining what role the state, market and society should have. For Conflict 5, a decision should be made between prioritizing the values sustainability and affordability for consumers, or prioritizing financial feasibility for heating grid companies. In general, it is necessary to properly discuss these misalignments between stakeholder opinions. This can help policymakers to improve the decision-making process by navigating conflicts in a better way. It is also important to translate the agreed justice principles to associated policies regarding the pricing structure of heating grids. This can help policymakers in producing improved policies that are aligned with the values of stakeholders and are perceived as just by society.

Preface

In front of you, you find my master thesis about the pricing structure of heating grids approached through the framework of distributive justice. This thesis is written to complete my master's degree in Environment & Society Studies with the specialization in Sustainable Corporations and Economies.

During my studies at the Radboud University, the energy transition became my main interest. When selecting my Masters programme, I knew I wanted to continue studying sustainability challenges on the intersection between economy, technology, and our society. My supervisors from my internship at Haskoning introduced me to the complex conflicts around the pricing structure of heating grids, and my supervisor from the Radboud University inspired me to approach it through the energy justice framework. This resulted in a thesis topic that was a valuable opportunity to combine different domains. I hope the results of this research can be thought-provoking and can stimulate meaningful discussions in policymaking.

The research process included the typical ups and downs. It turned out that the heating grid sector contains extremely complicated debates with interwoven interests. The complexity of the topic kept my interest hooked through the whole process, however it was a challenge to demarcate my topic and it took more time than expected to get fully acquainted with the heating grid debates.

I could not have finished this thesis without the help and support of so many people. First of all, I would like to give special thanks to my supervisor from Radboud University, Sietske Veenman, for all her time and guidance throughout the whole process. She always challenged me and gave the necessary critical feedback, while still encouraging me to manage my own process and pointing me in the right direction. I enjoyed discussing with her and her insights were of much value to me. Furthermore, I would like to thank Haskoning for welcoming me to write my master thesis during an internship with them. I want to express gratitude for Thomas Beffers for spending a lot of time on supervising my research process, guiding me at Haskoning, and in helping me to figure out the complexity around heating grids. Also, I would like to thank all the colleagues at Haskoning for having conversations and discussions with me, they contributed greatly to my work. Furthermore, I could have never completed this thesis without all the people that helped me with an interview and shared their knowledge and views with me. Their passion for their field of work was contagious. I would like to thank them for their time, their insights elevated the depth of this study. In addition, I would like to thank fellow students and friends at the Radboud University, who either helped me with discussing with me on the topic, having lunch together or reminding me I was not alone in this process. And of course many thanks to my family, friends and especially Joris, for checking in on me during the process, having confidence in me and encouraging me no matter the ups or downs, and spending time with me to get my mind out of the thesis bubble.

Finalizing this thesis made me realize how happy I am I could have spent my study time in Nijmegen. I am grateful for all the opportunities that I was given here. My internship let me have a taste of the field, and I am thrilled to now apply my knowledge and skills in practice.

For anyone who reads this thesis, thank you for your interest and I hope it can bring you new insights.

Brenda Kloppenburg

Nijmegen, 12 December 2025

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List of abbreviations

ACM	Autoriteit Consument en Markt
BAK	Bijdrage aansluitkosten (one-time connection costs)
CPB	Centraal Planbureau
EBN	Energie Beheer Nederland
EJF	Energy Justice Framework
EZK	Ministerie van Economische Zaken en Klimaat
HGPS	Pricing structure of heating grids
KGG	Ministerie van Klimaat en Groene Groei
NMDA	Niet-Meer-Dan-Anders (not more than usual)
NPLW	Nationaal Programma Lokale Warmtetransitie
NVDE	Nederlandse Vereniging Duurzame Energie
PBL	Planbureau voor de Leefomgeving
PPS	Publiek-Private Samenwerking (public-private partnership)
Rli	Raad voor de leefomgeving en infrastructuur
TK	Tweede Kamer der Staten-Generaal (House of Representatives)
TKI MVI	Topconsortium voor Kennis & Innovatie Maatschappelijk Verantwoord Innoveren
TKI UE	Topconsortium voor Kennis & Innovatie Urban Energy
TNO	Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek
VEH	Vereniging Eigen Huis
VIVET	Verbetering Informatie Voorziening Energietransitie
VNG	Vereniging van Nederlandse Gemeenten
WEQ	Woningequivalenten (housing-residences equivalents)
WCW	Wet Collectieve Warmte
WOW	Coöperatie Warmtenet Oost Wageningen
WRR	Wetenschappelijke Raad voor het Regeringsbeleid
WW	Warmtewet

1. Introduction

1.1 Research problem statement

15% of the CO_2-emissions in the Netherlands is in the domain of the built environment (TNO, n.d.). Partly because of the use of natural gas, mostly for heating. The aim of the Dutch Climate Agreement is that by 2050 all 7 million residences, and 1 million utility building in the Netherlands are no longer supplied with natural gas (Klimaatakkoord, 2019; Algemene Rekenkamer, 2025). The Dutch government aims at connecting 500.000 existing houses and buildings to a new heating supply by 2030 (Hermans, 2024a; Hoenders & Demoed, 2024; KGG, n.d.). A sustainable form of heating residences is with a heating grid (NPLW, 2024a; Bokhoven et al., 2025).

However, the development of heating grids has stagnated. Every year 20.000 new connections to heating grids are realized, while from 2030 onwards, 80.000 new connections yearly are necessary to achieve the goals from the Climate Agreement (Teng et al., 2014; Hermans, 2024a). The problem lies in the execution, because in 2024, around 90% of the new heating grids projects, was stopped because of uncertainty about the decision-making process on the pricing structure of heating grids [HGPS] (Rispens, 2024).

This uncertainty is due to a new proposed legislation, the Wet Collectieve Warmte [WCW], as a new HGPS. This new legislation is initiated because the energy transition raised questions regarding the regulation of new markets in the energy sector and the improvement of the regulation of the 'traditional' energy markets (Vitéz & Lavrijssen, 2020). The decision-making process on this new policy is in full swing and dominated by complex debates. As this research substantiates, there are five main conflicts that drive the debates: 1) Which sustainable heating option should be implemented in the neighborhood; 2) The costs of heating grids are high for consumers; 3) Heating companies have difficulties composing a conclusive business case; 4) There are differences in heating tariffs between heating grids, and the risk for opt-out of consumers; and 5) A dilemma with incentive to decrease the heat use of consumers.

The core of these discussions concern what is a just way to distribute the costs and benefits of the implementation of heating grids. This touches upon the intersection of energy issues and justice questions. As Sovacool & Dworkin phrased: "To many, seeing the word 'energy' next to 'justice' may seem like a confusion of disciplines", because how is sustainable heating related to ethics, morality and philosophy? (Sovacool & Dworkin, 2015, p.435). A justice dimension is involved with the energy transition, because it can produce new inequalities and/or maintain existing inequalities, raise questions about how benefits and burdens are shared, which procedures are just and who is recognized in the transition (Van Wieringen et al., 2025; Sovacool, 2021; Williams & Doyon, 2019; Kaufmann et al., 2023). To make the moral implications of energy decisions more apparent and analyze energy-related issues, the Framework of Energy Justice [EJF] can be used (Sovacool & Dworkin, 2015), which is increasingly recognized as an important concept for the regulation of the energy sector (Vitéz & Lavrijssen, 2020). This framework consists of distributive, recognition and procedural justice. This research applies the tenet of distributive justice, because it is about the allocation of (future) costs and benefits, in this case of the HGPS. There exist different justice principles with different argumentations about what are just ways to distribute costs and benefits (Vergeer et al., 2017). These approaches on distributive justice, are each based on a different underlying political philosophical principle on what is just: utilitarian, egalitarian or libertarian.

It is a political choice which justice principle is followed in the decision-making processes (Vergeer et al., 2017). However, there is only limited discussion on the justice dimensions of the distribution and its costs and benefits; an implicit choice on the principle was already made, without debate on it; and/or distributive justice is not an explicit, visible aspect in the policies. The justice dimension of distributions is therefore not sufficiently addressed in the decision-making process (WRR, 2023; Buitelaar, 2020; Sovacool & Dworkin, 2015). This can lead to problems: the decision-making process is stagnated, because stakeholders seem to be talking past each other; the policy is not aligned with the articulated justice principle; or policymakers are simultaneously striving for different justice principles, while utilitarianism, libertarianism and egalitarianism, can sometimes be difficult to align (Buitelaar, 2020). These problems can all lead to energy policy failure, which means the policy does not deliver just outcomes and eventually results in unachieved Climate Agreement goals (Sokołowski & Heffron, 2021).

Energy policy failure as unjust outcomes can turn out in two ways. First, it means the chosen cost distribution is not perceived as just by citizens, which can lead to decreased social support or tension in society. Construction of heating grids is a collective process, which requires the support and acceptance of inhabitants (Van Aalderen et al., 2021). The HGPS plays an important part in making heating grids attractive and connecting more residences to the grid (Huygen et al., 2021). Energy policies intervene in daily life, and therefore have a big impact on society (WRR, 2023). That means that when governmental policies or the pricing structure is perceived as unjust by households, this can possibly lead to societal agitation, decrease the attractiveness for heating grids and the societal support, or even lead to social resistance. Therefore, it is crucial to address the justice dimensions of the distribution of costs and benefits (Bianchi, Dieben et al., 2022; Van Wieringen et al., 2025; WRR, 2023; Neuteleers et al., 2016; EZK, 2023; Vergeer et al., 2017).

The second way energy policy failure can turn out, is through energy injustice. Energy injustice points out that a part of society can live in energy vulnerability, meaning they have insufficient access to energy services, now or possibly in the future (Veenman et al., 2024; Bouzarovski & Petrova, 2015; Ferrall-Wolf et al., 2023; Simcock & Mullen, 2016; Bouzarovski et al., 2014). Living in energy vulnerability has drastic consequences for people's physical health, well-being, participating in social activities and their ability to lead a flourishing and fulfilling life (Simcock & Mullen, 2016; Marí-Dell'Olmo et al., 2016; Recalde et al., 2019; Veenman et al., 2024). Energy justice describes how energy related policies can (unintentionally) (re)produce energy vulnerability, because they overlook distributional justice (Kaufmann et al., 2023; Sokołowski & Heffron, 2021).

1.2 Research aim and research questions

To accelerate the implementation of heating grids, improve the decision-making process on the HGPS and prevent energy policy failure, more insights are necessary in the distributive justice dimension of the decision-making process around the HGPS. There are many conceptions of justice, and using different theories can lead to different framings of the same problem. It is necessary to understand the different underlying principles that stakeholders have, to make an agreement on the conceptions of justice and to agree in decision-making processes (Wood et al., 2024). The EJF and political philosophical principles of distributive justice can help to include justice principles in the decision-making process of the WCW (WRR, 2023; Buitelaar, 2020), which leads to the aim of this research.

The aim of this research is to make recommendations to improve the decision-making process on the HGPS. This is done by making implicit assumptions about distributive justice more explicit. The main conflicts are explored and the research field of the debates around the HGPS is conceptualized. By making an inventory of the stakeholder opinions in the debate, and by assorting and understanding the opinions with the framework of different political philosophical distributive justice principles, insight is provided in the alignment between stakeholder opinions on each aspect of the pricing structure. This can explain why certain conflicts in the debate around the HGPS exist, and recommendations can be made to improve the debate on the HGPS. In doing so, this research aims to bridge a gap between the normative theories on distributive justice and the decision-making process in practice.

The main question of this research is: **How can the distributive justice framework help to structure, understand, and improve the debate between stakeholders about the pricing structure of heating grids in the Netherlands?**

Which is divided into the following subquestions:

1. What are the main conflicts in the debate around the pricing structure of heating grids, and in what aspects can the conflict be structured?
2. How can the stakeholder opinions on the different aspects of the pricing structure be categorized and interpreted using political philosophical principles of distributive justice?
3. How can the insights into the alignment between stakeholder opinions help explain the main conflicts and contribute to improving the debate on the pricing structure of heating grids?

1.3 Scientific relevance

This study contributes to scientific literature by addressing a gap in current research on approaching the HGPS through the distributive energy justice framework. Previous literature on energy justice is synthesized by Ferall-Wolf, Gill-Wiehl & Kammen (2023) into a comprehensive review of the energy justice field. Other literature had a whole-systems approach to energy justice, looking into how decisions that operate on one place in the energy system, can lead to energy injustice on another place (Jenkins et al., 2016; McCauley et al., 2013; Bouzarovski & Simcock, 2017). Energy justice is also used as a framework to address the moral implications of electricity grid systems in the research of Milchram et al. (2020) and De Winkel et al. (2025). Other literature looks more specifically into distributive justice tenet, such as Lonergan & Sansavini (2025), that used distributive justice as a lens to evaluate energy systems in Europe in general. Also, Dynge & Cali (2025) give a formal definition of distributive energy justice for local electricity markets.

Previous studies on HGPS have focused on the technical, economic, and regulatory dimensions. There is literature on the possible regulation structures, governance typologies and ownership of heating grids, and all accompanying advantages and disadvantages (Odgaard & Djørup, 2020; Sanders et al., 2016; Egüez, 2021). Other literature is solely about the calculation of costs and pricing structures of (different types of) heating grids (Hoogervorst, 2020; Mulder & Hulshof, 2021), or about different possible pricing models of heating grids (Li et al., 2015; Li et al., 2019; Liu et al., 2019). Previous research into pricing structures that actually include distributive justice dimensions, are about another energy system, namely electricity, for example the research of Neuteleers et al. (2016). Both Khan et al. (2022) and Jarin (2025) argue that to improve the societal acceptance of the pricing structure of electricity, it is important to consider distributive justice principles. Distributive justice dimensions combined heating grids in general are examined by Bouzarovski & Simcock (2017). They explained energy vulnerability as a form of injustice due to geographical differences, next to socio-economic differences (Bouzarovski & Simcock, 2017). However, it researched distributive justice on heating grids in general, and is not about the associated pricing structure.

A study that focused on the energy justice dimension of the regulations around heating grids, is the research of Vitéz & Lavrijssen (2020). They conclude that, to guide decision-making and the regulation of heating grids and the energy sector as a whole, the concepts of "energy democracy, energy justice and the principles of good regulation can provide the handle and tools to attain the appropriate solutions" (Vitéz & Lavrijssen, 2020, p.20). Therefore, this research adds to the literature by applying energy justice as a tool to unravel the existing distributive justice conceptions of stakeholders, by using political philosophical principles as a lens. To attain more detailed insights, this research only focuses on the distributive justice tenet, instead of embedding the broader concept of energy justice. It provides a clear definition and operationalization of the HGPS approached as a normative question. This gives insights in how these conceptions are important in the decision-making process and enhances the theoretical understanding of energy justice, for HGPS.

1.4 Societal relevance

Justice dimensions of the distribution of costs and benefits of the HGPS, are not addressed sufficiently in the decision-making process (see Chapter 1.1). This is the cause of the uncertainty around the decision-making process, and can also lead to energy policy failure, that turns out as decreased societal support, or energy injustice (such as energy vulnerability). This research unravels the conceptions on distributive justice that stakeholders have in the debate around the HGPS, which provides a deeper understanding of the different underlying fundamental moral values that stakeholders have. This research also reveal the aspects of the HGPS where implicit justice assumptions of stakeholders are misaligned. The recommendations for praxis that are drawn from these results, are relevant for policymakers that are involved in the decision-making process around the HGPS, because it can improve both the decision-making process, and the produced policies.

A better decision-making process can be facilitated, when distributive justice is a more explicit part of the debate. It can help policy makers to better address and navigate conflicts in the debate, because an advanced understanding of why certain conflicts emerge in the debate is provided by insights in the fundamental moral values of stakeholders. This can facilitate negotiations by bridge-building and lead to a more transparent and weighed-out political debate (WRR, 2023; Davidson, 2021a).

The policies themselves can also be improved, and energy policy failure can be prevented by taking distributive justice dimensions into account in the decision-making process and making them a more explicit part of the policies (WRR, 2023). This research can assist policymakers to make more informed decisions in the decision-making process (Sovacool & Dworkin, 2015), because they can have more insights in possible (unwanted) implications and consequences of the policies (WRR, 2023). Also, they can be better informed on possible contradicting policies or policies with contradicting underlying values or principles. Eventually, that secures that the policy is aligned with articulated justice perspective and values of stakeholders (WRR, 2023; Williams and Doyon, 2019). This produces well-functioning pricing structures that are clear about the distribution of costs and benefits, perceived as just by society, prevent energy vulnerability, improve efficiency, improve technologies for future heating grids, and make sure suppliers can make investments and deliver the right quality (Ecorys, 2022; Odgaard & Djørup, 2020; TNO, 2022; Rli, 2018).

1.5 Structure of the thesis

To address the research question, it is necessary to understand what the debate around the HGPS actually entails. Therefore, Chapter 2 first conceptualizes the research field (debate around HGPS) into several aspects. The chapter provides a literature research on the HGPS and identifies the main conflicts in the debate, which answers subquestion 1. In Chapter 3, the theoretical framework that is used in this research is explained by providing a scientific literature review on energy justice and political philosophical conceptions of justice. Also, the conceptual model and operationalization is presented, by applying the theoretical framework on the conceptualization of the HGPS that resulted from Chapter 2. Next, Chapter 4 contains the methodology, outlining the research strategy and the methodology that is used for data collection and analysis. Chapter 5 describes all results from the data analysis. Finally, Chapter 6 offers both the conclusion, where the main findings are summarized and the research questions are answered, and the discussion, where is reflected upon the implications of this research and suggestions for future research are presented.

2. Conceptualization of the research field

The empirical object of this study is the debate in the decision-making process on the HGPS. This debate is a diffused cloud of conflicts and topics, that has not been structured before. This chapter addresses the first subquestion, by describing the context of the debate around the HGPS, structures it into the main topics of discussion, and explains how the conceptualization of the aspects was developed.

2.1 Climate policy, energy transition, heating transition

The construction of heating grids is part of the heating transition, which is subordinate to the energy transition, and climate mitigation policies. **Climate policies** cover climate mitigation, climate adaptation and repairing climate damage. This research situates itself under climate mitigation policies, which are focused on reducing the greenhouse gas emissions, to restrict climate change (WRR, 2023). The **energy transition** is about making the Dutch energy system sustainable for the future (EZK, 2023). An **energy system** is the process from energy generation to consumption, including production, conversion, distribution and the provision of energy services (McCauley et al., 2019). Within the energy system, energy as carrier (such as fuels, gases, electric power) is converted into **energy services** (such as heating, mobility, lighting), to fulfill a household's energy demand (Bouzarovski et al., 2014; Bartiaux et al., 2018). The energy transition covers different energy types, such as electricity and heat. The **heating transition** is the shift from natural gas as a source for heating, hot tapwater and cooking, to more sustainable forms of heating. Sustainable heating options are for example the heating pump, heating grid, an electrical boiler (E-boiler), heat storage or infrared panels. In this research, the two most important options for sustainable heating are taken into account, which are (collective) heating grids and individual heating pumps (possibly full-electric or hybrid) (Algemene Rekenkamer, 2025; ACM, 2024b).

2.2 Heating grids

A **heating grid** is a transport infrastructure grid of pipelines under the surface, filled with hot water and connected to a heating source. When heating grids replace natural gas, they deliver both 'heating' ("thermal energy that is delivered for the heating of spaces or tap water, by means of transportation of water" (Blom et al., 2022, p.11)) and hot tap water. For cooking, another option needs to be implemented, such as electrical cooking (Algemene Rekenkamer, 2025). There are several types of sustainable heating grid sources, such as residual heat, aquathermal heat and geothermal heat (KGG, 2024; Haffner et al., 2016). The temperature of the water in heating grids can vary from 15 to 90 degrees (VEH, n.d.). The heat demand depends on the behavior of the residents, on the type of residence and the isolation level of the residence (Algemene Rekenkamer, 2025).

This research concerns the construction of new heating grids and existing heating grids. Heating grids can be applicable for the built environment, industry and greenhouse horticulture. This research focuses only on the built environment sector, which covers both housing and utility buildings. Housing residences can be existing residences or newly constructed residence, and rental properties or owner-occupied homes (Blom et al., 2022; Algemene Rekenkamer, 2025; Haffner et al, 2016). In this research, a 'heat consumer' is defined as a household connection up to 100kW (considered 'small-scale consumers'). Other large-scale connections (connections for more than 100kW), are large companies and organizations, but they are excluded from this research (Vitéz & Lavrijssen, 2020; Blom et al., 2022; ACM, n.d.; Algemene Rekenkamer, 2025; Haffner et al, 2016).

There are multiple actors in the heating sector, which are summarized in Table 1 (Algemene Rekenkamer, 2025; Haffner et al., 2016; Blom et al., 2022; Bianchi, Dieben et al., 2022; NPLW, 2024a; KGG, n.d.). Often, there is vertical integration within the heating sector, which means that the producer, supplier and investor is the same actor, called a **heating company** (Blom et al., 2022; Haffner et al., 2016; Bianchi, Dieben et al., 2022; NPLW, 2024a; KGG, n.d.). In 2024, the most (large) heating grids in the Netherlands are owned by four large, private heating companies (Eneco, Vattenfall, Ennatuurlijk, HVC), that together cover around 400.000 housing-residences equivalents [WEQ] (Algemene Rekenkamer, 2025; Rooijers, 2025).

Table 1. Overview of actors in the heating sector

Actor	Role / responsibility
Ministerie van Klimaat en Groene Groei [KGG]	Constitutes policies
Autoriteit Consument and Markt [ACM] (supervision authority)	Surveillances on the comply of all legal requirements composed by the government and tariffs supervision
Municipality	Chooses in which order their neighborhoods are made sustainable and disconnected from the natural gas grid
Building owner	Can choose themselves which (sustainable) heating option they want
Landlord	Has to get approval from the majority of the tenants for their proposed sustainable heating option of their residence
Producer of the heat	Produces heat
Supplier of the heat	Delivers heat from the producer to the consumer
Consumer of the heat	Purchases and uses the heat
Investor	Invests risk-carrying own and borrowed capital, as well as assist in attracting financing, to cover the costs of constructing a heating grid. This can be a public or private party, or a cooperative (a combination of the two (public-private partnership [PPS]), or a citizen initiative

2.3 Pricing structures of heating grids

Heating grids are a type of **energy infrastructure systems** or **energy networks**. Infrastructures provide a public service, and enable the functioning of society (Roelich et al., 2015; Sorrell, 2015). Energy networks such as electricity, gas and heating, have a **pricing structure**, which refers to the way in which the total energy network costs are distributed among the consumers. The HGPS covers the invested costs of the heating company (a business case), and the costs for consumers.

2.3.1 Business case for heating companies

The costs to construct a heating grid are invested by a heating company (Blom & Ahdour, 2017; Blom et al., 2022). Especially in the construction phase of the heating grid, a heating company makes a lot of costs, while there are no profits yet. Therefore, the heating company drafts a financial business case, to determine whether to develop the heating grid or not. In this business case, the heating company weighs the costs against the profits, considering the risks and a certain desired yield, over a certain time span (Algemene Rekenkamer, 2025). The costs consist of capital expenditures [CAPEX] and operational expenditures [OPEX] (Bianchi, Buijs et al., 2022; Algemene Rekenkamer, 2025). The profits consist of the monthly heating tariff and one-time connection costs [BAK], both paid by consumers, and subsidies from the government. Both costs and profits are dependent on certain aspects that can vary: amount of connections; capacity utilization rate; tariffs and the heat demand; investments; the desired yield; and the type of heat source. The one-time connection is often used as a variable to make a business case conclusive (Algemene Rekenkamer, 2025).

2.3.2 Consumer costs

The **costs for consumers** to be connected to a heating grid include monthly heating tariffs, one-time connection costs, and possible disconnection costs. The monthly heating tariffs consist of a fixed and variable component. The fixed cost component is the payment for the exploitation of the heating grid, a measurement tariff (payment for the maintenance and management of the electricity meter), and a tariff for the delivery kit, which is installed and maintained by the heating company. The variable cost component (also called Gigajoule tariff) depends on the amount of heat use and is the price per gigajoule (currently connected to natural gas price), plus an energy tax (Blom et al., 2022; Blom & Ahdour, 2017; Algemene Rekenkamer, 2025).

2.3.3 Type of market

There are differences between the pricing structures of electricity, gas and heat, because it depends on the characteristics of the market and the energy carrier (Blom et al., 2022). The market characteristics of heating grids are summarized in Table 2.

Table 2. Market characteristics of heating grids

Market characteristic	Explanation
Local character	In the built environment, heating grids are locally organized and usually most appropriate for high-density neighborhoods. Because of temperature losses, thermal energy cannot be transported over long distances in an efficient way (Vitéz & Lavrijssen, 2020; Blom et al., 2022; Haffner et al., 2016; Algemene Rekenkamer, 2025).
Limited supply of local heat sources	A heating grid is dependent on a certain heat source, and there is a limited supply of heat sources. Therefore, it is not likely that the market for heating sources will develop into an effective, competitive market (Blom et al., 2022).
Monopoly position	There can be only one heating company that develops a heating grid in a certain location, which leads to a closed market without competition (Algemene Rekenkamer, 2025; Blom et al., 2022; Haffner et al., 2016; Bianchi, Dieben et al., 2022).
Private property	Heating grids are mostly owned by private companies, and the costs of heating grids are not socialized over all heating grids in the Netherlands, which is a big difference compared to the natural gas and electricity market in the Netherlands (Blom et al., 2022).

2.3.4 Market regulation

Because of these characteristics, the market of heating grids is a local and closed market. That makes heating grids not an usual market commodity, and therefore the pricing structure is more complex than price setting on a 'free market' of supply and demand on national scale (Haffner et al., 2016). The model of rational decision-making by well-informed actors in well-functioning markets, is not a fitting estimation for the markets for energy services (Sorrell, 2015). Therefore, market regulation is necessary to guarantee the functioning of such utility markets. Examples are ensuring access to the markets, prevent excessive pricing in natural monopolies, avert collusion and anti-competitive market shares, and security of supply (Roelich et al., 2015). Making adjustments in the pricing structure can be used as a tool in this market regulation. Energy demand and usage correlate with changes in energy prices, depending on the type of market and on the amount of time. Evidence demonstrates that higher energy prices can lead to residents altering their behavior and lowering electricity usage and demand (Sorrell, 2015; Faruqui & Sergici, 2009). Currently, the most evident market failure for heating grids is the monopoly position of heating companies. To protect consumers, the market is regulated by the ACM (that applies maximum tariffs) and there are agreements about the pricing structure (Algemene Rekenkamer, 2025; Blom et al., 2022; Haffner et al., 2016; Bianchi, Dieben et al., 2022; Milieu Centraal, n.d.; Kamp, 2015; Odgaard & Djørup, 2020).

2.4 Context of the decision-making process

The current law that is applicable to heating grids, is the Warmtewet [WW]. It mainly prevents that the average tariffs for heat grid consumers are higher compared to the average tariffs for natural gas consumers, by imposing maximum tariffs, called the Niet-Meer-Dan-Anders [NMDA]-principle (Blom et al., 2022; Milieu Centraal, n.d.; Kamp, 2015; Odgaard & Djørup, 2020; NPLW, 2024b; Bianchi, Dieben et al., 2022; Blom et al., 2022). The current Warmtewet is insufficient on a few aspects, with the NMDA-principle as most important one. There is consensus that the NMDA-principle leads to difficulties, because the maximum consumer tariffs are not based on the actual costs of the development of the grid, making it difficult for heating companies in composing a profitable business case and to offer consumers an attractive tariff. Also, it is questionable whether the connection to the natural gas price should be maintained, when the built environment is made more sustainable (Verboon et al., 2024; Bokhoven et al., 2025; Bianchi, Dieben et al., 2022; Blom et al., 2022).

Therefore, the government wants to replace it with a new law, the Wet Collectieve Warmte [WCW], in development since 2020. In June 2024, Rob Jetten submitted the proposed legislation of the WCW to the House of Representatives (Raad van State, 2024; Algemene Rekenkamer, 2025; TK, n.d.). Ever since, the decision-making procedure is in progress (TK, n.d.; NVDE, 2025; De Jonge Baas, 2025; Rispens; 2025; VNG, 2025). On the 3rd July 2025, the House of Representatives accepted the law, and the Senate on 9th December 2025. The expectations are that it will take effect from 1st January 2026 (TK, n.d.; NVDE, 2025; De Jonge Baas, 2025; Rispens; 2025; VNG, 2025; NPLW, 2024b). The biggest changes compared to the current WW are the mandatory public majority ownership share in heating grids, and the cost-based principle to base heating tariffs on (Algemene Rekenkamer, 2025).

The cost-based principle is that consumers of a heating grid only pay for the construction and maintenance of the heating grid, and production of the heat (KGG, n.d.; NPLW, 2024b; Bianchi, Dieben et al., 2022). This covers the costs that a heating company has to make for the supply of the heat, investments in the heating grid and a reasonable, fixed, yield. It can also lead to more transparency, because there is more obligation for heating companies to report about their business case. This can also lead to more societal support, because the tariffs are directly related to the costs of the heating grid and consumers do not pay more for their delivered heat than necessary (Bianchi, Dieben et al, 2022; Hermans, 2024a). However, there are also difficulties, risks and challenges involved with the new cost-based principle, that contribute to the debate around the pricing structure. These difficulties are explained in Chapter 2.5.

2.5 Main conflicts of debate

This research took place during the decision-making process of the proposed WCW. In Table 3, the five main conflicts of the debate around the HGPS are summarized, and further explained in this paragraph. Considering the scope of this research, not all conflicts can be explained.

Table 3. Overview of the main conflicts around the pricing structure of heating grids

Conflict	Explanation
Conflict 1) Which sustainable heating option should be implemented in the neighborhood?	Should the lowest cost principle be leading in making the decision where a heating grid should be implemented?
Conflict 2) Costs for consumers are high	What should affordability for consumers mean, and how can it be secured?
Conflict 3) Heating companies have difficulties composing a conclusive business case	When should a business case of a heating grid be considered financially feasible for heating companies and how can that be secured?
Conflict 4) Differences in heating tariffs between heating grids and risk for opt-out	Are differences in heating tariffs between heating grids considered just?
Conflict 5) Dilemma with incentive to decrease heat use	What should the proportion of the fixed costs compared to the variable costs be in the heating tariff for consumers?

2.5.1 Conflict 1: Which sustainable heating option should be implemented in the neighborhood?

Municipalities have to establish a Heating Program by 2026, in which they provide clarity about which neighborhoods are disconnected from natural gas and what the possible sustainable heating alternatives for those areas are for the coming 10 years (Van Polen et al., 2025; Hermans, 2024a). Municipalities should choose for the sustainable heating option with the lowest national costs (lowest national cost principle), but they are allowed to deviate from this and include other societal costs, when they argue for their decision in the Heating Program (Algemene Rekenkamer, 2025). **National costs** show the direct financial costs, savings and yields of a policy measure for the Netherlands as a whole. The costs, benefits and yields are calculated back to one number, the national cost balance. For this number, it does not matter how the costs and benefits are distributed (among the government, citizens or companies) (Juijn et al., 2023; Algemene Rekenkamer, 2025).

From many reports, it seems that heating grids are the option with the lowest national costs in many neighborhoods when transitioning to natural-gas free. That is because heating pumps can lead to an increase in electricity demand, an increase in impact on electricity grids and electricity net congestion and with that, higher national costs for investments in electricity infrastructure upgrades (Teng et al., 2024; Rooijers, 2025; Blom & Ahdour, 2017). The initial investment for a heating grid is higher, but eventually that is cheaper than an expansion of the electricity grid (De Koning, 2025; Algemene Rekenkamer, 2025; De Ronde, 2025). Also, there is still a debate on how much pressure heating pumps place on the electricity grid (De Ronde, 2025). In this research, the assumption is made that heating grids are, compared to heating pumps, in some neighborhoods the natural gas-free option with the lowest national costs (Rooijers, 2025; Teng et al., 2024).

The lowest national cost principle has shortcomings and is debated. First, because the calculation of the national costs in comparison to those of other heating options, is crooked. The costs of heating pumps (when investments in electricity grid upgrades are necessary), natural gas grids and electricity grids are socialized over the whole Netherlands, while the costs of heating grids are demanded from the connected consumers to the heating grid (Blom & Ahdour, 2017; Algemene Rekenkamer, 2025). The benefits of a heating grid are lower national costs because of averting an upgrade of the electricity grid, and more people profit from that, than just the consumers of the heating grids. While the only ones benefitting from the benefits of heating pumps, are the heating pump owners (Hermans, 2024a; Algemene Rekenkamer, 2025). Second, the lowest cost principle is debated, because it can be in conflict with other values, such as affordability for consumers or lower emissions of greenhouse gases (depending on the type of grid). Lowest national costs do not automatically mean lowest cost for consumers, for example (further explained in Chapter 2.5.2), and a heating grid is not always the most sustainable option (depending on the type of source). This conflict is about whether the lowest national cost principle should be the leading principle in making decisions about which sustainable heating option should be implemented in the neighborhood.

2.5.2 Conflict 2: Costs for consumers are high

This conflict of the debate is about what affordability for consumers should mean, and how it can be secured. With the current pricing structure, it is not financially attractive for people to choose a heating grid. High heating tariffs, or the feeling of consumers that there are high prices for heating grids, lowers the societal support for heating grids (Algemene Rekenkamer, 2025). The 'high' prices result from the cost-based principle, that does not automatically guarantee 'acceptable' heating grid tariffs for consumers (Bokhoven et al., 2025). First, that is the case when heating grid tariffs are compared to what people paid with their natural gas connection before switching to the heating grid. Natural gas is cheaper for most consumers than the tariffs of a heating grid (Verboon et al., 2024). However, this will be solved in the future, by regulations that make natural gas financially less attractive (Hermans, 2024a). Second, that is also the case when the heating grid tariffs are compared to the tariffs of other sustainable heating options. The national costs of heating grids can be lower compared to other sustainable heating options. But simultaneously, consumer costs of heating grids, are usually much higher compared to the consumer costs of other heating options (De Koning, 2025; Verboon et al., 2024; De Ronde, 2025). In addition, in some neighborhoods, subsidies for both heating grids and heating pumps can be possible for consumers. That makes individual heating options, such as heating pumps, more attractive for consumers. When more people choose for individual heating pumps, the costs rise for the remaining consumers of the heating grid, making the development of heating grids even more difficult (Algemene Rekenkamer, 2025; Hermans, 2024a; Rooijers, 2025; De Koning, 2025).

2.5.3 Conflict 3: Heating companies have difficulties composing a conclusive business case

There are a lot of aspects that make the development and exploitation of heating grids a complex task, requiring a lot of expertise (from technique, financing, heating market and electricity market), time and money (Rooijers, 2025). Heating grids require a (by preference sustainable) heating source, enough capacity utilization rate is required, permits need to be requested, streets have to be broken open and houses need to be adjusted. It is difficult to reach a sufficient capacity utilization rate, because societal support for heating grids is low (as explained in Chapter 2.5.2) (Algemene Rekenkamer, 2025). In addition, there are high material costs, technical complexities, scarce resources and slow procedures. That means the risks are high (Bokhoven et al., 2025). Moreover, extensive investments are necessary before any profits can be made, resulting in significant financial risks (Rooijers, 2025; Algemene Rekenkamer, 2025; Blom & Ahdour, 2017; Kamp, 2015; Hoenders & Demoed, 2024). The investments have to be earned back trough the heating tariffs. To compose a cost-effective business case, this must fit in a certain time span, which is equal to the estimated useful life of a heating grid (Algemene Rekenkamer, 2025). It is difficult to realize economies of scale, meaning that the costs for each consumer are lower, when the total costs are shared among more consumers. This is because the costs of heating grids are not socialized over the whole Netherlands, but are only earned back by the connected consumers to the heating grid (as explained in Chapter 2.5.1). Realizing economies of scale is necessary to make efficient use of heating grids (Blom & Ahdour, 2017; Algemene Rekenkamer, 2025). All of this makes the business case of heating grids not attractive for investors to invest in them on a large scale (Blom et al., 2022). Everything together results in heating companies being unable to succeed in designing a conclusive business case. That means there is often a unprofitable portion, due to higher investments costs for the construction of the heating grids against lower expected profits during exploitation (Algemene Rekenkamer, 2025). The unprofitable portion also leads to difficulties in offering consumers an acceptable tariff (Bokhoven et al., 2025). Several subsidies exist, aiming to cover the unprofitable portion. However, even with these subsidies, it remains difficult to make a heating grid business case conclusive (Algemene Rekenkamer, 2025). This conflict is about when a business case should be considered financially feasible for heating companies and how that can be secured.

2.5.4 Conflict 4: Differences in heating tariffs between heating grids and risk for opt-out

The cost-based principle entails that the tariffs are locally determined and therefore depend on several circumstances, such as the type of heat source, type of building, and obsolescence of the heating grid. That probably leads to big tariff differences between heating grids. This can possibly have a negative influence on the societal support, because consumers can perceive this as unfair (Bianchi, Dieben et al, 2022; Blom et al., 2022; Algemene Rekenkamer, 2025; Verboon et al., 2024; Geldhof et al., 2024).
The tariffs will also be dependent on the amount of consumers that are connected to the heating grid. Currently, consumers have the possibility to opt-out, which can provide flexibility for consumers and increases the societal support. However, when consumers do opt-out, the tariffs for the remaining consumers increase. In time, that can also lead to more consumers deciding to be disconnected from the heating grid, leading into a negative spiral of disconnections (Bianchi, Dieben et al, 2022; De Boer, 2024). This conflict is about whether differences in tariffs between heating grids and higher tariffs for remaining consumers when someone opts-out, are considered just.

2.5.5 Conflict 5: Dilemma with incentive to decrease heat use

The construction costs of a heating grid usually have a higher share of the total costs, compared to natural gas heating. This means the fixed cost component in the consumer tariff is higher. That gives consumers less influence in their expenses, which also removes the incentive to decrease heat use (Bianchi, Dieben et al., 2022). However, this fixed costs component of the consumer tariffs, is still too small to cover all the construction costs. Therefore, heating companies have to earn back a share of their initial investments, through the variable costs component (Blom & Ahdour, 2017). That means that the business case becomes less profitable, or undermined, when consumers consume less heat.

However, it is desirable for consumers to have influence on their total costs, e.g. through behavior (using less heat) or isolation measures. There is also a desire to have an incentive in the heating grid tariff to decrease the heat use of consumers for sustainability reasons. This is a dilemma, because it is in conflict with the business case of heating companies depending on the income through the variable cost component of the heating tariff (Bokhoven et al., 2025; Bianchi, Dieben et al, 2022). This conflict of the debate is about what the proportion of the fixed costs compared to the variable costs should be in the heating tariff for consumers.

2.6 Structuring the debate

Chapter 2.5 explains interwoven conflicts that exist in the debate around the HGPS. It is important to structure this discussion and distill the main aspects, which is done by using a normative approach and making a distinction between point of views of different stakeholders: first the consumers, then the heating grid companies, and finally the governmental perspective. This distinction was inspired on the typology of regulation by Steurer (2013) into government, businesses and civil society.

2.6.1 Consumer lens

The first lens is the point of view of consumers. As explained in Conflict 2) *The costs for consumers are high*, consumers are currently perceiving the tariffs as too high. 'High' costs or 'affordability' are obviously subjective and relative, and a definition is unclear. This topic of affordability for consumers, is in a broader sense about the consumer costs. As explained in Chapter 2.3.2, these costs consist of monthly heating tariffs (with a fixed and variable component) and the costs for connecting and (possibly) disconnecting to a heating grid. This insight can also help to unravel Conflicts 4 and 5. Conflict 4) *Differences in heating tariffs between heating grids and risk for opt-out* is a discussion whether the differences in tariffs *between* heating grids, and *within* heating grids (higher tariffs when a neighbor opts-out), are just (WRR, 2023). The differences are a result of the division between fixed and variable costs, how these relate to each other, and who is responsible for paying the costs for connecting and disconnecting to a heating grid. Conflict 5) *Dilemma with incentive to decrease heat us*e has implications for how the monthly tariff for consumers looks like, depending on the fixed cost component and the variable component.

To conclude, topics 2, 4 and 5 have to do with the pricing structure approached from a consumers point of view. This is about questioning the commonly used concept of affordability, what that means, and how the monthly tariffs for consumers are composed. This resulted in the aspect **Consumer Tariffs**.

2.6.2 Heating company lens

The second lens is the point of view of heating grid companies, applicable for Conflict 3) *Heating companies have difficulties composing a conclusive business case.* As explained in Chapter 2.3.1, a business case is about the costs and the profits of a heating grid. The costs are typically objective: they are dependent on the geographical location of the heating grid, the type of heat source, and the costs for the construction. The profits are dependent on the amount of connections, the tariffs, subsidies and the desired yield, which can be influenced by how the HGPS looks like. The conflicts raises the following questions: How can the pricing structure be shaped to give heating companies the opportunity to develop a conclusive business case? When is a business case conclusive and is it financially feasible to develop a heating grid? These questions are determined by assumptions of what is a just way to determine the tariffs (from the perspective of the heating grid companies), if there should be subsidies for heating grid companies (and how much), and if heating grid companies are allowed to make profit (and how much). These questions are all captured in the aspect **Financial Feasibility** for heating companies.

2.6.3 Governmental lens

Finally, a governmental lens can enhance the operationalization. The government is responsible for mapping out the route for society regarding sustainable heating options. This touches on the debate about the competition between heating grids and other sustainable solutions, such as heating pumps, as explained in Conflict 1) *Which sustainable heating option do we implement in the neighborhood?* This aspect is not about which heating solution we decide to choose, but based on what criteria we make that decision. Altogether, this is included in the aspect **Strategy.**

To approach the debate even better, it is necessary to take a step back and approach the discussion topics from a further viewpoint. In this operationalization so far, it was reasoned that our society has several goals and values, governed by the state, while there is the interplay of supply and demand between consumers and suppliers (in this case, heating companies) on the 'free' market. But this can raise the question if this (capitalistic) system where heating grids are perceived as 'business cases', and where a conclusive business case is necessary for the heating grid to decide to exploit the heating grid, is desirable. Should heating grids be seen as a type of infrastructure, or collective good, that should be governed and regulated by the state instead, where heating companies have more of an execution role? These questions are in the core about the different relations between the stakeholders involved with the HGPS. That leads to the formulation of the final aspect **Division of Roles**.

2.7 Operationalization

Chapter 2.6 described how the debate around the HGPS has been structured into the four main aspects, namely Strategy, Consumer Tariffs, Financial Feasibility and Division of Roles, which are the aspects (concepts) of the operationalization of the debate around the HGPS in this research. Each of them is operationalized into different dimensions, visible in Table 4**Error! Reference source not found.**.

Table 4. Operationalization of the debate around the pricing structure of heating grids

Aspect	**Dimensions**	**Related philosophical question to illustrate the debate**[1]
Strategy	Heating options	*What is the best way to heat our homes?*
	Heating transition	*Do we want to have the transition to natural-gas free neighborhoods?*
	Freedom of choice	*To what extent can citizens choose themselves between different heating options?*
	Societal support	*How important is societal support?*
Consumer Tariffs	Affordability	*What heating tariffs are considered affordable for citizens?*
	Fixed costs	*Who pays the fixed costs, are these differentiated within a heating grid, and what is the proportion of the tariff compared to variable costs?*
	Variable costs	*What is the proportion of the tariff compared to the fixed costs?*
	Costs for connecting and disconnecting	*Who pays the costs for connecting and disconnecting a house to the heating grid?*
	Subsidies or taxes for consumer	*Are there subsidies and/or taxes, and for who?*
	Differences in tariffs or connection costs between heating grids	*Are differences in tariffs or connection costs between different heating grids considered just?*
Financial Feasibility	Determination of tariffs	*How should the tariffs for consumers be determined?*
	Subsidies for heating companies	*Are there subsidies for heating companies?*
	Profits	*Are heating companies allowed to make profit?*
Division of Roles	Security of supply	*Is heating considered a basic need, and who is responsible for the security of supply?*
	Regulation and governance	*What is the role for the market and the state, and the associated parties (heating companies, government, municipalities)?*
	Competition	*Should there be competition between heating companies?*

[1] To clarify, these are not necessarily the questions that have been asked in the interviews.

3. Theoretical frameworks

Several interests are articulated as the goals of regulating the heating grid market with the pricing structure, which align with broader public interests that are served with the energy supply and policy measures for the energy transition: **affordability** of energy for consumers, **financial feasibility** for heating grid companies, **security of the energy supply** (reliability of energy grids), and **sustainability** of the energy supply (including saving energy with volume incentives and efficient energy use) (Blom et al., 2022; Sanders et al., 2016; Hoenders & Demoed, 2024; ACM, 2024b; Van Aalderen et al., 2021; Van Vlerken, 2024; Ecorys, 2022). These are the aims that the regulations, such as pricing structures, ought to achieve. However, there are two difficulties regarding these goals: first, they can be in conflict, and second, they are missing a clear and consistent meaning. These difficulties compose the core of the five main conflicts in this debate (see Table 3). Therefore, this chapter argues why the difficulties and main conflicts can be best approached by the energy justice framework, supplemented with political philosophical principles of distributive justice. The conceptual model shows how the theoretical framework of distributive justice is applied on the conceptualization of the HGPS, leading to the complete operationalization scheme that was used in this research.

3.1 Energy trilemma

These public values of affordability, financial feasibility, security of the energy supply and sustainability should be taken into account in the decision-making processes in the energy sector. However, current decisions are often a trade-off between goals, which means that investing in one goal, can go at the expense of other goals (Blom et al., 2022; Vitéz & Lavrijssen, 2020). That leads to tensions between goals, which can be the root of conflicts. For example, when feasibility for heating companies, sustainability and security of supply all decrease the affordability for consumers, then what aim is most important?

The tensions between the goals can be understood with the notion of the **energy trilemma**. The energy transition affects various stakeholders, such as policymakers, investors and consumers. All these stakeholders have interests on economic (e.g. affordability), environmental (e.g. sustainability) and political (e.g. security of supply) domains. It is a challenge to address and balance these interests, called the energy trilemma, visualized in Figure 1. The trilemma can be solved with **energy justice**, which goes further than just describing the interplay of the different interests, but also aims for a just balance between the dimensions. By addressing aspects that were not part of the decision-making process before, energy justice can induce implications for energy policymaking (Michaelis et al., 2024; Heffron et al., 2015). Besides that it is a goal, energy justice is also an academic field, holding a plurality of frameworks and theories, making it a very multifaceted field (Ferrall-Wolf et al., 2023).

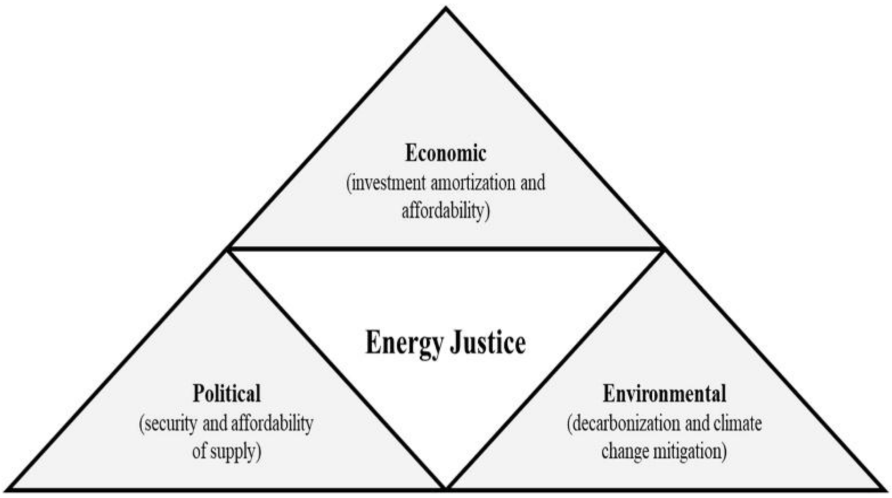

Figure 1. The energy trilemma (Michaelis et al., 2024)

3.2 Energy justice

Energy justice is founded in literature on environmental justice and carries the same basic philosophy but is more specifically focused on energy services (Schlosberg, 2013; Wood & Roelich, 2020; Krüger et al., 2022; Snell et al., 2015; McCauley et al., 2013; Hickey & Robeyns, 2020). Energy justice can be described as an analytical tool that draws on a range of justice concepts to analyze energy-related issues (Wood et al., 2024; Sovacool & Dworkin, 2015), and "aims to provide all individuals, across all areas, with safe, affordable and sustainable energy" (McCauley et al., 2013, p.1). Energy justice "boils down to who gets what, and the processes and procedures that govern how we decide the principles of that distribution" (Sovacool & Dworkin, 2015, p.437). Literature on energy justice focuses on the justice implications of many technological fields (e.g. solar, fossil fuels, transportation, etc.), on different demographic levels (e.g. gender, income, health, etc.), on geographies all around the world and on different time scales. This can also comprise injustices that occur possibly in the construction of the energy technology or the access to it, or whether energy benefits or burdens are being distributed, and many other issues (Ferrall-Wolf et al., 2023).

Two main frameworks dominate this research field: the 10 principles for energy justice of Sovacool et al. (2017) and the triumvirate of tenets of McCauley et al. (2013). The ten core principles of Sovacool et al. (2017) characterize the concept of energy justice and comprise availability, affordability, due process, transparency and accountability, sustainability, intra- and intergenerational equity, responsibility, resistance, and intersectionality (Ferrall-Wolf et al., 2023; Sovacool et al., 2017; De Winkel et al., 2025). These principles need to be promoted by the energy decisions that we make, and can therefore be seen as an decision-making tool (Sovacool & Dworkin, 2015). This framework is valuable in scientific literature, however, these principles do not fit well with the exploratory nature of this research.

The triumvirate of tenets of McCauley et al. (2013) is the definition of energy justice as based on three tenets of justice, later elaborated in a framework by Jenkins et al. (2016). The **Energy Justice Framework** [EJF] of Jenkins et al. (2016) consists of distributive justice, recognition justice and procedural justice. **Distributive justice** is about identifying the ways in which (future) costs and benefits of the energy transition, and their associated responsibilities, are distributed over space and time. Access to energy services is about both the physical access to energy (e.g. heating and electricity), and the freedom of the individual (to what extent they have a choice or certain responsibilities) (Jenkins et al, 2016; Veenman et al., 2024; Wood & Roelich, 2020; Royapoor et al., 2023; Knox et al., 2021; Dynge & Cali, 2025; Kaufmann & Veenman, 2025). In the energy transition, distributive justice is about the unequal access to energy services, rising prices as consequence of the energy transition, nuisance of (re)building processes or new energy sources and loss of jobs. The distribution between the costs and benefits can take place on several different levels, for example between or within communities, and between different social-economic or demographic groups of people (Kaufmann & Veenman, 2025; Veenman et al., 2024). **Recognition justice** is about how individuals and communities are represented and recognized in energy-related events, and about possible sections of society that are ignored, not recognized, or misrepresented (Jenkins et al., 2016; Wood & Roelich, 2020; Royapoor et al., 2023). It is about recognizing the abilities, knowledge and historical or systemic injustices of actors (De Winkel et al., 2025). A lack of recognition can reveal a distortion of people's view that can appear as demeaning or contemptible, and can emerge as forms of political and cultural domination, insults, degradation and devaluation (Jenkins et al., 2016). **Procedural justice** is about access to the decision-making processes, procedures and possible strategies that regulate the distributions and the fairness of them (Jenkins et al., 2016; Wood & Roelich, 2020; Royapoor et al., 2023). This involves aspects such as transparency, inclusive dialogue and empowerment (De Winkel et al., 2025). It looks into how practices, norms, values, behaviors and access to legal systems can underpin procedural justice. Procedural justice calls for procedures that engage all stakeholders in a non-discriminatory way (Jenkins et al., 2016).

In further research, the dimensions of cosmopolitan justice and restorative justice are added to distributive, procedural and recognition justice (McCauley et al., 2019). **Cosmopolitan justice** assumes that all principles "apply universally to all human beings in all nations" (McCauley et al., 2019, p.917), because there is a belief that we are all global citizens (De Winkel et al., 2025). There is a sense of collective morality, where all human beings have equal moral, inviolate worth, that must be respected and protected. Therefore, the ethical responsibilities apply to everyone, everywhere (McCauley et al., 2019; Sovacool & Dworkin, 2015). **Restorative justice** is about addressing and correcting the prior and ongoing harm to low-income communities and communities of color, ensuring that harms are acknowledged and remedied (Ferrall-Wolf et al., 2023; De Winkel et al., 2025).

Summarized, the EJF is a valuable approach to address the debate around the HGPS. Since research is about the normative question how the (future) costs and benefits of heating grids should be distributed, there is a focus on only the tenet of distributive justice. The question of distributive justice is about how costs and benefits can be distributed in a just, fair, equal or equitable way. These concepts are related, but different. **Fairness** is a subjective judgment if the distribution is morally praiseworthy, and is always about proportionality to a certain relevant dimension, for example equability or equity (Goldman & Cropanzano, 2014; Lilico, 2017). In an **equality**-based approach, everyone receives the same resources or opportunities, but that does not mean that everyone gets the same outcomes. In an **equity**-based approach, everyone receives different resources or opportunities, to compensate for people's disadvantages, to make everyone end up with the same outcome (also called material equity or substantive equality) (Vlek et al., 2017; Buitelaar, 2020; Pellegrini-Masini et al., 2019; Cook & Hegtvedt, 1983). There is also a difference between the concepts justice and fairness. **Justice** is about the behavior that is morally required, and considered as a normative standard that is agreed upon in society (Goldman & Cropanzano, 2014). "Justice claims are assertions about how things ought to be, often highlighting perceived injustices and calling for action to solve them" (Van Wieringen et al., 2025, p.3). That makes justice an ethical obligation. A just outcome does not have to be fair; a fair outcome can be equal or equitable (Lilico, 2017). Also in the energy transition, people can have different views (which are sometimes conflicting) about what is a just energy system or policy (Van Wieringen et al., 2025). This research applies the concept of justice, because it looks into the normative principles and values of society.

3.3 Energy injustice

Energy justice is related to energy injustice, which is connected to the concepts of energy poverty, energy insecurity, fuel poverty and energy vulnerability. According to distributive justice principles, "people are entitled to a certain set of minimal energy services which enable them to enjoy a basic minimum of wellbeing", (Sovacool & Dworkin, 2015, p.440). **Energy poverty** is defined as insufficient access to energy services (Ferrall-Wolf et al., 2023; Bouzarovski & Petrova, 2015; Simcock & Mullen, 2016; Bouzarovski et al., 2014). Being unable to heat a residence sufficiently, is a typical feature of energy poverty (Snell et al., 2015). The concepts of energy insecurity and fuel poverty have similar definitions (Ferrall-Wolf et al., 2023). The term energy poverty is preferred over fuel poverty and energy insecurity in political and scientific literature, because it encompasses larger issues (focusing on energy resources, infrastructures and households needs, as well as access, income and energy efficiency) (Bouzarovski & Petrova, 2015; Bartiaux et al., 2018). The difference between energy poverty and the concept of **energy vulnerability**, is that energy vulnerability has a probabilistic approach. It also takes into account that households that are not considered as energy poor at the moment, can become energy poor in the future, and vice versa (Veenman et al., 2024; Bouzarovski & Petrova, 2015; Mesdaghi et al., 2025). Because this research also encompasses distributions of costs and benefits in the future, the term energy vulnerability is used.

Energy vulnerability is a problem of distributive injustice at the core, and underpinned by further injustices regarding recognition and in policymaking procedures (Walker & Day, 2012; Bouzarovski & Simcock, 2017). What are considered as people's basic entitlements for a healthy daily life, such as access to (sufficient, sustainable and affordable) energy services, is linked to matters of justice (Walker & Day, 2012; Simcock & Mullen, 2016). For providing and expanding access to energy services for all people, a thorough understanding of the justice dimension is therefore necessary (McCauley et al., 2019). **Energy injustice** is therefore a relevant and related concept, and points in this context at the issue that *not all citizens* have access to safe, affordable and sustainable energy services (Veenman et al., 2024; Kaufmann et al., 2023). Energy vulnerability is also related to the pricing structure, because it is attributable to three main causes: inequalities in income, inequalities in energy prices, and inequalities in housing and energy efficiency (Walker & Day, 2012; Recalde et al., 2019; Bartiaux et al., 2018). These factors (income, energy efficiency and energy price) are again the result of profound structural determinants, which are for example governmental, political and social aspects. The factor energy prices is influenced by the energy market and policies, such as the pricing structure (Marí-Dell'Olmo et al., 2016; Recalde et al., 2019).

The energy transition will not per definition improve the access to affordable energy for everyone or can even unintentionally lead to more energy poverty, because certain groups can be underrepresented in discussions and policymaking, such as those in energy vulnerability (Sovacool et al., 2019). Energy related policies can increase the risk of energy vulnerability by the miscalculation of policy consequences, because they overlook distributional equity, and only focus on effectiveness and efficiency (Kaufmann et al., 2023). Currently, the responsibilities for the energy transition challenges are divided in a singular way. However, not all households can afford the rising energy prices or make investments in sustainable energy. This can lead to energy vulnerability or worsen existing inequalities (Veenman et al., 2024; Kaufmann & Veenman, 2025; Mesaghi, Schuurman Hess & Straver, 2025). So, different groups in society do not equally benefit from developments and changes resulting from the energy transition (Kaufmann & Veenman, 2025). This shows how energy justice issues are not straightforward, but complex and nuanced. Even interventions aimed to improve justice, can create some type of inequality (Sovacool et al., 2017). For example, financial instruments that are aimed at supporting citizens in investing in energy efficiency measures or new technologies, can unintentionally (re)produce energy vulnerability (Kaufmann et al., 2023).

3.4 Political philosophical principles of justice

The second difficulty regarding the debate around the HGPS and its goals, is that they consist of several concepts, such as affordability and feasibility, that lack a clear and consistent definition. These concepts imply normative assumptions and conceptions, for example how should the pricing structure look like, to produce 'affordable' tariffs for consumers and make the development of heating grids 'feasible' for heating companies? Stakeholders can have assumptions about the definitions, but these assumptions are not explicit in the debate and can differ from each other.

These normative questions cannot be addressed with the EJF alone. Criticism on the EJF is that it only focuses on concepts of justice, and not on conceptions of justice. That means the framework is normative uncertain about *what* is just, so it is not specified what justice itself exactly means or consists of (Wood & Roelich, 2020; Dynge & Cali, 2025). This is about the differences between **concepts of justice** (which are distributive, procedural and recognition justice, according to the Energy Justice Framework) and **conceptions of justice** (which are in more detail about the principles, rules and conditions under which something is just or not) (Wood et al., 2024; Buitelaar, 2020). There can exist disagreements about what is (un)just *within* the tenets. Therefore, the EJFis not sufficient to understand what is just and therefore limited in making normative evaluations and (policy) recommendations (Wood et al., 2024). The EJF is supplemented with political philosophical principles of justice in this research.

We cannot argue over just feelings or intuitions about conceptions of justice, but we need arguments. These arguments are based on moral, political philosophical principles about justice. There are certain 'rules' for these principles. First, we can expect consistency and coherence, which means that moral intuitions that we have in certain situations are following our moral principles about justice (Vergeer et al., 2017). Second, the conceptions of justice have to be derived from an objective stance, instead of merely serving the vested interests of the person that holds the conceptions. When a person takes different positions on justice for different aspects, in a strategic manner, this has little to do with justice. Instead, the justice conception should also be tenable in the hypothetic situation where we do not know our own position in society (e.g. rich or poor, male or female, etc.) (Davidson, 2021a; Vergeer et al., 2017). While it is important to look further into conceptions of justice in policymaking, it is also important to recognize that there are always different perspectives, and the chosen policy can never be considered just by everyone (Van Ravenzwaaij et al., 2023).

The WRR (2023) distinguishes 10 different distribution principles which are based on three main political philosophy and ethics principles, namely utilitarianism, libertarianism and egalitarianism. Not all 10 distribution principles are applicable in every context. The three underlying political philosophical perspectives are broader and therefore more applicable for this research. A very crude distinction between these three theories is between deontological and consequentialist reasoning.

Libertarianism and egalitarianism apply deontological reasoning, which is about individual rights and perfect and imperfect duties. Perfect duties are not to harm others in bodily integrity and personal property, and imperfect duties consist of helping aid others in need. Libertarians believe governments should make people conform to their perfect duties. Egalitarians believe governments also have a role in regulating the collective fulfillment of imperfect duties. Utilitarianism applies consequentialist reasoning, which is about the broader consequences of the action and denies the existence of duties. It only focuses on total sum of happiness (utility) (Davidson, 2021a; 2021b; WRR, 2023; Van Ravenzwaaij et al., 2023).

3.4.1 Utilitarianism

Utilitarianism is a collectivistic approach. It should aim to maximize collective happiness, wellbeing or societal utility (WRR, 2023; Davidson, 2021b; Buitelaar, 2020; Vergeer et al., 2017). Private property and rights to exchange goods on free markets are supported, because the exchange of goods leads to an optimal allocation of (scarce) resources and therefore to optimal social welfare. People can be forced to contribute to the greater good (Davidson, 2021a; 2021b). Utilitarians intend to maximize utility, not wealth. Therefore, they do not strive to protect individual rights and properties but are in favor of government intervention and the redistribution of wealth, because that increases collective utility (according to the law of diminishing marginal utility) (Davidson, 2021a; WRR, 2023). That means it is allowed that the wealth for some citizens decreases if the total national societal gains are higher (Buitelaar, 2020). A complete redistribution is not promoted, because that takes away the incentive for individuals to increase utility (Davidson, 2021b). The policy should be as efficient as possible, because collective utility increases most when the intended goals are achieved against lower costs (Vergeer et al., 2017).

3.4.2 Libertarianism

Libertarianism is an individualistic approach (WRR, 2023; Van Ravenzwaaij et al., 2023). Libertarianism is an individualist approach, that values “liberty in terms of equality of individual rights and opportunities for all members of society”, and is therefore an equality-based approach (McDermott et al., 2013, p.418). The need for state action and government intervention is minimal. The state can not redistribute incomes and wealth to promote social justice (Hamann et al, 2023; Moser, 2023; WRR, 2023; Van Ravenzwaaij et al., 2023; Alonso González, 2022). Libertarians consider only voluntary transfer of properties to others as legitimate, and favor the free market and capitalism (Davidson, 2021a; 2021b; Van Ravenzwaaij et al., 2023). In this approach, people’s citizen-based rights in the energy transition, are not described (Hamann et al., 2023). This theory is also not common to justify climate change policies, because for sustainability transformations huge, large-scale investments from the government are needed, but any interference of the government is seen as illegitimate (Moser, 2023). However, libertarians can see the interest of climate policy, because climate change can harm people (body and resources). Climate policies should be based on the ‘polluter-pays-principle’, meaning that the costs should be paid by the ones that are responsible for the costs that have to be made (Vergeer et al., 2017).

3.4.3 Egalitarianism[2]

Egalitarianism is a socialistic approach (WRR, 2023; Davidson, 2021b). People are all born with different natural advantages or disadvantages, which can for example be the social setting you are born in, or talents or disabilities. Because people's (dis)advantages lie beyond their own doing, egalitarians consider it legitimate for governments to improve the position of the worst-off in society (Davidson, 2021a; 2021b; Vergeer et al., 2017). Therefore, egalitarianism is an equity-based approach (Vlek et al., 2017; Buitelaar, 2020). There can still be differences in rewarding, as long as the least-advantaged profit from it the most (Van Ravenzwaaij et al, 2023). Complete redistribution (as is the case in strict egalitarianism) is not promoted, because that takes away an important incentive for individuals to increase and generate their personal wealth (Davidson, 2021a; 2021b; Vergeer et al., 2017). The government should guarantee the fundamental rights and freedoms of all citizens, and furthermore decrease the differences between citizens, by proving a tax system and system of redistribution that works in favor of the least-advantaged citizens (Van Ravenzwaaij et al, 2023). Citizens can be forced to contribute helping the least-advantaged in society (Davidson, 2021b).

3.5 Conceptual model and operationalization

The flow between the concepts in this research is visualized in the conceptual model in Figure 2. The debate around the HGPS can be structured in a few aspects. This corresponds with the first subquestion and is visualized in pink colorFigure 2. Stakeholders can have their own opinions on these aspects. This research aims to unravel these conceptions of justice that stakeholders have. Therefore, a distributive justice lens is applied, which means that the stakeholder opinions are understood through the normative political philosophical principles of distributive justice. This corresponds with the second subquestion and is visualized in yellow color. Comparing the analyzed opinions of stakeholders, can give insight into the alignment between stakeholder opinions. This can help to explain better why conflicts in the debate exist and possibly produce insights to improve the debate. This corresponds with the third subquestion and is visualized in green color. How the perspectives align, is the dependent variable and derived from the different perspectives on justice.

An operationalization is not only necessary for the debate on heating grids, but also for the justice principles. To finish the operationalization, the political philosophical foundations of utilitarianism, libertarianism, and egalitarianism have to be applied to the conceptualization of the research field. That gives a table of 16 dimensions by 3 justice principles, so 48 cells, that are the indicators for this research. Each indicator (cell) contains a description of the dimension through the approach of each justice perspective, along with the associated codes used in the data analysis. This extensive table is included in Appendix C.

[2] In this research, with the term 'egalitarianism' is not meant strict egalitarianism, but the political perspective of liberal-egalitarianism (Vergeer et al., 2017). The short term is used for the sake of conciseness and clarity.

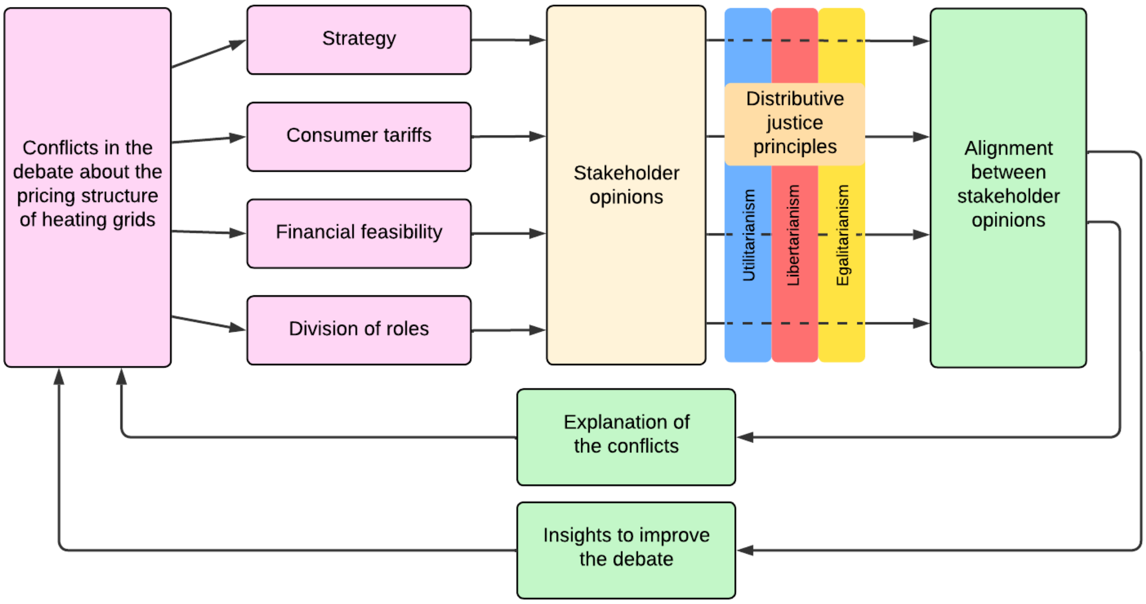

Figure 2. Conceptual model

4. Methodology

This chapter explains the research philosophy first. Then, the approach to theory development and the methodological choice are argued and the research strategy is explained. Consequently, the techniques and procedures of the data collection and data analysis are elaborated. Finally, is reflected upon the reliability, validity and confirmability of this research.

4.1 Research philosophy

In this research it is important to understand the different opinions of the stakeholders and to unravel their implicit justice assumptions. The fitting research philosophy is **moderate constructivism**, because it is considered that everyone has their own opinion on what a just distribution entails. With moderate constructionism, the ontological stance is **bounded relativism**. In this approach, a belief in the physicality of the natural world ('objective reality') is maintained, which is different from strict relativism, that aligns with strict constructionism. By interpreting the world, humans construct knowledge and meaning comes into existence (Jones, 2002). The HGPS is 'out there', but different individuals can construct meaning in different ways, because the cultural, social and historical context influence how the individual engages with and understands their world (Moon & Blackman, 2014; Jones, 2002). Thus, stakeholders can have different interpretations of the HGPS and with that, different worldviews, beliefs and meanings (a '**subjective reality**'), about what is a just distribution. Knowledge about people's subjective reality and understanding the differences in constructions of reality, is the epistemological stance of moderate constructionism (Jones, 2022; Moon & Blackman, 2014).

4.2 Research design

The aim of this research is to make recommendations to improve the debate on the HGPS (**evaluative)**, by exploring what conflicts in the debate exist (**exploratory**) and explaining why they exist (**explanatory**) (Saunders et al., 2023). In the bounded relativism stance, the objective reality is in this case the HGPS and the debate around it. The aim of this research is to obtain knowledge to solve a problem or change a situation in real life, which explains why this research is practice oriented (Verschuren & Doorewaard, 2015; Vennix, 2019).

The approach for theory development for this research, is induction for answering the first subquestion, and abduction for answering the second and third subquestions. **Induction** is only used to collect empirical data from literature on the debate around the HGPS, and to structure it into four different aspects. An **abduction** approach is used for the larger part of this research. The different opinions of stakeholders are the empirical data source. The goal is to understand and describe them, to ground a theoretical understanding of the world as seen from their perspectives (Bryman, 2012). This is done by exploring the themes and patterns in the data and then understanding them with the conceptual framework of the political philosophical principles of distributive justice. This framework is tested through subsequent data collection and so forth (Saunders et al., 2023).

Since the subjective realities of stakeholders in the heating grid sector are dependent on the context, according to moderate constructionism, a **case study** (of national scale, the Netherlands) is a suitable research design, because this contributes to investigating context-specific themes and meanings (Harrison et al., 2017). To unravel and understand the beliefs and opinions of stakeholders in the heating grid sector, it is necessary to use a method that can provide insight into people's opinions. The aim of qualitative methods is to understand why and how something is the way it is, making a mono qualitative method a fitting research design for this research.

4.3 Research methods

Table 5 gives an overview of which research methods for data collection and data analysis are used for each subquestion of this research. This is explained further in this paragraph.

Table 5. Overview of research methods

Main question: How can the distributive justice framework help to structure, understand, and improve the debate between stakeholders about the pricing structure of heating grids in the Netherlands?			
Subquestion	**Data collection**	**Data analysis**	**Chapter**
1) What are the main conflicts in the debate around the pricing structure of heating grids, and in what aspects can the conflict be structured?	Literature research Expert conversations	Inductive, iterative qualitative analysis based on a grounded-theory approach	Answered in Chapter 2
2) How can the stakeholder opinions on the different aspects of the pricing structure be categorized and interpreted using political philosophical principles of distributive justice?	Interviews	Abductive, iterative thematic analysis using Atlas.ti	Answered in Chapter 5
3) How can the insights into the alignment between stakeholder opinions help explain the main conflicts and contribute to improving the debate on the pricing structure of heating grids?	Resulting from subquestion 1 and 2	Evaluation of alignment between stakeholder opinions	Answered in Chapter 6

4.3.1 Literature research and inductive qualitative analysis

To answer the first subquestion, secondary data is gathered through a literature research. This entails reading existing academic literature, policy documents, and earlier researches and reports, summarized in Appendix A, to fully understand what the current status is on the development on the HGPS in the Netherlands and what the main conflicts in the debate are. This is a suitable method, because the first subquestion has an exploratory aim and a literature research can provide a broad insight into the research field. To structure the debate and identify the main aspects, patterns are recognized through iterative engagement in the empirical data. An inductive, qualitative analysis was applied, based on a grounded-theory approach, so the analysis was inspired by the principles of grounded-theory, such as theoretical sampling, theoretical saturation and constant comparison (Bryman, 2012), without following the completely strict procedures, because of the exploratory aim of this part of the research. It was focused on developing aspects from the data, in an inductive and iterative process, without using formal coding. That lead to the identification of the main conflicts in the debate on the pricing structure and a preliminary configuration of several aspects that summarize the core of the debate. To reflect on this preliminary structuring, an analytical lens was applied, informed by Steurer's (2013) regulation typology. This led to the configuration of the four main aspects as the first part of the operationalization. How these aspects are configured, was explained step by step in Chapter 2.6.

After that, these core aspects were approached with the distributive justice framework. That led to a full 'theoretical' operationalization, necessary for the second and third subquestion. This operationalization was preliminary and used as a starting point for exploring the perspectives of stakeholders. Following the abduction approach of this research, the preliminary operationalization was reviewed, adjusted and complemented many times in an iterative process during the next phase of the research (the interviews). The final operationalization is included in Appendix C.

To improve the internal validity and objectivity of the research, the literature research was supported by conversations or interviews (varying between 30 and 90 minutes) with colleagues, experts, researchers and a professor. An overview of the conversations is shown in Appendix B. The conversations provided expert knowledge about the heating grid sector in practice and insights on how to apply the political philosophical justice framework on it.

4.3.2 Interviews

To answer the second subquestion, primary data is gathered by conducting interviews with different stakeholders involved with heating grids in Netherlands. To answer this question, the perspectives, opinions, beliefs, experiences, feelings and judgements of each stakeholder as an individual had to be acquired. Because the aim of this research is exploratory, explanatory and evaluative, semi-structured interviews are the best fitting method (Saunders et al., 2023). With this type of interviewing, there is a balance between structure and flexibility (Verschuren & Doorewaard, 2015). There was structure, because there is a predetermined order and formulation of questions. The preliminary operationalization was used to produce an interview guide, included in Appendix D. There was flexibility, because the asked questions were open, and there were no fixed answer categories (Vennix, 2019). The interviews were audio-recorded, so during the interview, the researcher could be alert to what is being said and ask probing- or follow-up questions, following the flow of the interview (Bryman, 2012). This secured that the implicit assumptions, opinions and beliefs about justice of each stakeholder could be unraveled in the best way. This contributed most to the abduction approach of this research: to provide information on all aspects of the debate on the HGPS, but also be able to discover new things during the interviews, that could complement the operationalization.

Stakeholders beliefs about conceptions of justice are mostly implicit and seem obvious to each stakeholder, an open approach and neutral stance of the researcher in the interviews was necessary. In the interviews, the stakeholders underlying assumptions are unraveled by asking them about their **desired future**. Our worldviews about what type of society we wish to live in, are related to views about the future. Therefore, the framework about futures is used as a method in the interview guide. There is a distinction possible between different paradigms of futures: expected, possible, desired and critical futures (Veenman et al., 2021; 2023; 2024; Van Asselt et al., 2010; Enserink et al., 2013). In this research, stakeholders have normative opinions about how the HGPS should look like in the future. This correspond with asking for their desired future, where a normative dimension is very present (Van Asselt et al., 2010; Veenman et al., 2024). Issues of distributive justice are reflected in desired future narratives, that can influence the energy transition through policymaking (Kaufmann & Veenman, 2025; Veenman et al., 2024). Thinking of futures can capture values and goals of stakeholders, such as how society should distribute costs and benefits (Finn & Wylie, 2021; Kaufmann & Veenman, 2025; Veenman et al., 2024). By exploring what stakeholders perceive as the desired future of the pricing structure, it can be found out where their values, visions and priorities align. This can help develop a common vision (Finn & Wylie, 2021). To unravel the desired future, normative scenarios (what should happen) can be used. Using normative scenarios instead of predictive (what will happen) or explorative (what could happen) scenarios, can enable more transformative thinking and question our assumptions (Nalau & Cobb, 2022). Questioning the common assumptions and capturing the values of stakeholders is important for this research, because the aim is to make the underlying justice opinions of stakeholders explicit.

The interviews are conducted with different stakeholders that are involved with the HGPS. The stakeholders are both influencing the debate around the pricing structure and affected by it, and categorized into government, businesses and civil society, according to the typology of regulation by Steurer (2013). Table 6 provides an overview of all interview stakeholders.

Table 6. Overview of interview stakeholders

ID	Organization	Name	Job title	Date	Mode
Government sphere (public organizations)					
National government					
I.1	Ministerie van Klimaat en Groene Groei [KGG] [3]	* *	Policy Officer Energy Market Senior employee Heating Supply	12/05/2025	Online
I.2	Warmtealliantie	Alex Kaat	Advisor Warmtealliantie	17/04/2025	Online
I.3	Autoriteit Consument en Markt [ACM]	Paul Adriaansen	Regulatory economist	01/04/2025	Face-to-face (Den Haag)
I.4	Energie Beheer Nederland [EBN]	*	Sales development manager	15/04/2025	Face-to-face (Utrecht)
I.5	TKI Urban Energy [TKI UE]	Robert Jan van Egmond	Programme Manager Sustainable Heating and Cooling	29/04/2025	Online
Municipalities					
I.6	Municipality Apeldoorn [Apeldoorn]	Arno Klein Goldewijk	Manager Heating Transition	04/04/2025	Face-to-face (Apeldoorn)
I.7	Municipality Zwolle [Zwolle]	Wim Lones	Developer Sustainable Heating Grid	16/04/2025	Online
Business sphere (private organizations)					
Larger, private heating companies					
I.8	Ennatuurlijk	Barry Scholten	Senior Project Developer (Former employee[4])	26/03/2025	Face-to-face (Nijmegen)
I.9	HVC	Robert Crabbendam	Manager Spatial Area Development	01/04/2025	Online

[3] The interview with KGG is not used in the results, because of confidentiality.

[4] At the time of the interview, Barry Scholten was employee of Ennatuurlijk. By now, he is director of a public heating company.

Smaller private heating companies / citizen initiatives					
I.10	Linthorst World [Linthorst]	*	Director of Linthorst World	14/04/2025	Online
I.11	Coöperatie Warmtenet Oost Wageningen [WOW]	* *	Project Team Leader Board Member	30/04/2025	Face-to-face (Wageningen)
Civil society sphere					
Residents representatives					
I.12	Vereniging Eigen Huis [VEH]	*	Policy Officer Energy and Sustainability	31/03/2025	Online
I.13	Woonbond	Bastiaan van Perlo	Energy Policy Officer	03/04/2025	Online
Housing associations representatives					
I.14	Aedes	Daylam Dag	Sustainability Advocate	02/04/2025	Face-to-face (Den Haag)

4.3.3 Thematic analysis

The audio recordings of the interviews, were manually transcribed in Dutch as a word-for-word transcription, because the content is important, and not the way something was said. To analyze the transcripts of the interviews, **thematic analysis** was used, using ATLAS.ti. To identify patterns in qualitative data, the data is coded into different categories, analyzed and interpreted. Codes were assigned to parts of the texts in a qualitative way, so the text was interpretated and translated into theoretical concepts and underlying themes. Since this research has an abductive approach, both a priori coding and emergent coding was used. With a priori coding, first a few categories were generated, based on the indicators from the preliminary operationalization (Van Thiel, 2014). Also, emergent coding was applied, to explore the perspectives of stakeholders. After using the a priori codes for a few data sources, the categories were revised and complemented (Bryman, 2012). Also, additional codes have been gradually developed during the process of analysis, by looking at similarities and differences in the data. During the process the coding scheme was continuously supplemented. That has eventually led to an exhaustive coding scheme (Van Thiel, 2014).

4.3.4 Evaluation of alignment between stakeholder opinions

To answer the third subquestion, insight in the alignment between stakeholder opinions is necessary, and therefore they are visualized in actors maps. These are Venn-diagrams consisting of Utilitarianism, Libertarianism and Egalitarianism circles. Stakeholder opinions can correspond best with one, two or all three of the principles. That is visualized with the placement of a stakeholder on one circle, or on the interception of circles. The evaluation of the alignment between stakeholder only compares the opinions of different stakeholders on each aspect. This is done by looking at the actor map for each aspect, and evaluating in what principle the stakeholder opinions are positioned. Other types of alignment, for example between aspects for one, or more, stakeholders, are not evaluated, because of constraints regarding the extensiveness of this research.

There are a few important remarks on the placement of stakeholders in the actor maps. First, some of the stakeholders chose to answer the interview questions from the perspective of the organization that they represented, and others chose to answer the questions from their personal opinions. Because of the moderate constructionist approach of this research, the context of the interviewee (such as career and function in the stakeholder organization) is considered important in shaping the beliefs and the personal opinions of the interviewee. Thus, the interviewees are interviewed in their specific function with a certain organization, however, they spoke from their own personal beliefs and opinions. Second, there is no meaning on what position a stakeholder has within one circle in the actor maps (and stakeholders are listed in order with their number in Table 6). Third, stakeholders are placed on a specific political philosophical principle, because the stakeholders argumentation corresponded the most with that certain philosophy. However, the stakeholder does not necessarily have to agree with the whole scenario of that justice principle on a certain aspect.

4.4 Methodological limitations

In this paragraph, it is reflected upon the research methods that are used and how that leads to potential limitations regarding validity, reliability and objectivity of the research.

Qualitative research tends to be less **reliable**, because research into complex phenomena is difficult to replicate (Bryman, 2012). The reliability of this research is strengthened by a transparent research approach, and systematic methods are used for the data collection and data analysis, which are clearly documented (Bryman, 2012; Van Thiel, 2014). The conceptualization of the research field was conducted by an inductive qualitative analysis, without executing the formal coding procedure of a grounded-theory approach. However, the reliability was strengthened by providing a transparent description of the steps through which the four main aspects were identified. The interview guide, operationalization and coding scheme have been checked by the internship supervisor, to ensure a degree of inter-researcher reliability (Van Thiel, 2014).
The research could have been influenced by the time and timespan that it was conducted. The data collection took place around April and May 2025. During that time, the decision-making process in the House of Representatives on the proposed WCW was ongoing, and the voting was planned before the summer recess. Because the decision making process was already taking five years, there was a sentiment that a decision was needed. This could have influenced the opinions of stakeholders. Next to that, because the procedure on the proposed legislation was in a critical stage (right before the voting), that could have influenced stakeholders to be more careful in sharing their opinions and being more insecure in the interviews, because everything they said could be politically sensitive. However, conducting the research in this time was also really valuable, because no final decision on the proposed legislation was made yet. The decision making was in a really 'malleable' stage and the HGPS was a popular topic of debate. That caused stakeholders to think about their own positions and some stakeholders were more excited about participating in an interview, because they also saw it as an opportunity to discuss their own stance with an outsider. That positively influenced the data collection process.

Since this research is a case study, it typically has lower **internal validity**. The internal validity of this research is guaranteed by triangulation. The goal is to double check the data collection and results (Bryman, 2012; Van Thiel, 2014). In this research, method triangulation was applied. The conceptualization of the research field was a literature research and inductive qualitative analysis, which is lower in internal validity because it relies on the interpretations of the researcher. This was addressed by complementing it with expert conversations. Also, for the research in general method triangulation was applied, because the semi-structured interviews were complemented with a literature research. This way, the collected data and insights include as much information as possible, and all data can be verified. By using triangulation, subjective interpretations of the researcher can be reduced, so the data can be better separated from the researcher (Van Thiel, 2014). The iterative process of this research also contributed to higher internal validity. That means that it was about going back and forth between data collection and data analysis, to constantly revise, adapt and complement the research questions, preliminary operationalization (including indicators and Atlas.ti codes), and preliminary results. Being open to new aspects of the HGPS debate during the literature research and interviews, secured that the theoretical construct is adequately operationalized (Van Thiel, 2014). In addition, the interpretations of the results are discussed with colleagues and experts in the field in the expert conversations, to ensure plausibility.

The design of this research is a case study, which usually has lower **external validity** and **transferability**. This is because the findings are analyzed within a specific context, making it difficult to separate those and generalize the results to a broader scale (Bryman, 2012; Van Thiel, 2014). Therefore, the stakeholders were selected from different (government, business, civil society) spheres to represent as much possible interests and opinions, to improve the external validity. In addition, the research philosophy is moderate constructivism, with the limitation that findings are not widely generalizable, because they apply to a specific context (Guba & Lincoln, 1994). In this philosophy, knowledge acquisition is still contextually dependent, but by finding the common ground, it can be generalizable (Moon & Blackman, 2014). The aim of moderate constructivism is therefore to distill a consensus construction (Guba & Lincoln, 1994). To tackle the low external validity of moderate constructivism, this research looked into the alignment between stakeholder opinions, which made it possible to find a common ground and distill a consensus. That made the results more generalizable, at least for the context of the HGPS, and therefore contributed to the external validity of this research.

This research is not completely **objective**, because it is influenced by the role, biases, interests, personal values and experiences of the researcher, playing a part in the way the data is interpreted(Bryman, 2012). This particularly applied to the data collection and data analysis phase. In the data collection, the interviewees are considered as social actors who interact with, interpret, and create their social world, as well as being shaped by it, because of the moderate constructionist theoretical perspective of this research. The data that is collected in the interviews, is socially constructed and co-produced by the views and interpretations of the interviewees, and of the researcher as interviewer. By asking questions, responding to the views of the interviewee, and interpreting the data, the researcher has a central role in constructing meanings and being reflexive (Saunders et al., 2023). Also, the thematic data analysis method is mainly subjective and can be influenced by the researcher's bias, because the researcher is responsible for indicating certain patterns, formulates and composes the categories that certain codes can be assigned to, and decides what themes get emphasis. That can lead to findings mainly reflecting the researcher's own interpretations (Van Thiel, 2014). In this research, the objectivity is increased by the fact that the researcher is a student with little background knowledge on the HGPS before the start of the research. The research is conducted with an open perspective, decreasing personal bias. In addition, the collected data and the interpretations are discussed with colleagues and experts in the field in the expert conversations, to escape potential researcher biases. Also, the interviewees have checked the researchers' interpretations of their opinions, by reading and approving the written results for this research, which increased the objectivity.

5. Results

This chapter explains what the stakeholder opinions are on the previously mentioned aspects of the debate, structured by the three political philosophical distributive justice principles, which answers the second subquestion. Each paragraph describes the three justice principles applied to one aspect, and starts with an actor map of the stakeholder opinions. Because of confidentiality and simplicity, the interviews are numbered, and the results are linked to the specific interview number.

5.1 Strategy

The opinions of interviewees on Strategy are visualized in Figure 3. This paragraph explains the utilitarian, libertarian and egalitarian perspectives on Strategy.

Figure 3. Visualization of interviewees opinions on the aspect Strategy

5.1.1 Utilitarian view on Strategy

In the utilitarian view, decisions are made that contribute the most to the welfare of the Netherlands as a whole, against the lowest possible national costs. It is important to look at the broader collective interest, instead of just individual priorities. *"That is our current individual oriented society, everyone is more interested in himself, instead of looking broadly around us to the collective interest"* (I.6). To increase the welfare mostly, the aim is to mitigate climate change: *"…our choice is no longer if we transition from natural gas to sustainable heating, because we are going to sustainable heating, which is already secured in the Climate Agreement"* (I.6). First, because the effects of climate change will eventually have enormously higher costs for society in total. Second, because mitigating climate change is a goal in itself, since our environment and biodiversity are difficult to express in economic values.

To achieve climate mitigation against the lowest national costs, the government on a national level or local level (e.g. provinces or municipalities) have to determine the best sustainable heating option for each neighborhood. The best option is determined based on research by experts into the option with the lowest national costs. *"We trust the calculations, because the municipality based them on models and research of the RVO"* (I.3). *"To keep the national costs limited, the consideration between heating grid or electricity infrastructure should be done on* *a national level"* (I.8). We have to trust experts to guide the transition in the Netherlands: "*I think the people that have expertise on this, can make the best choice about it, also on a larger scale*" (I.14).

Efficiency is an important starting point, because that contributes to achieving the lowest costs. Therefore, a clear future vision is necessary. *"So we look at the end picture of the transition, and at all the costs that should be made to become completely fossil fuel free as BV Nederland, at al societal costs, and then we determine what the most efficient procedure is"* (I.10). Efficiency also means that it is attempted to provide each neighborhood with one and the same heating option. That way, it is prevented that consumers have different heating options within one neighborhood (called scattered ownership), which is a sub-optimal and more expensive outcome (I.4). To achieve this, there are two strategies possible with different amounts of government intervention and of freedom of choice for consumers. It is a political estimation which option is most efficient.

The first option is to use the free market, because the free market is an efficient way of distributing costs and benefits. People have freedom of choice to choose their own heating option. However, societal support is a very important requirement to achieve the heating transition. *"…one thing you can't ignore, is what is on people's minds in the population"* (I.4). For achieving societal support, freedom is choice is important: *"With a mandatory connection, the Dutch people will kick up a fuss, and will no longer participate"* (I.11). However, a certain steering is necessary: "*To find some sort of middle ground, between with and without obligation"* (I.14). Steering towards sustainable options is necessary. Therefore, the government gives direction into the considered 'best' option for each neighborhood, for example with advertising or financial instruments (e.g. price incentives, subsidies or taxes). That increases the societal support for heating grids, which stimulates the construction of heating grids in areas where they are the best option. *"All the environmental damage that fossil fuels cause, are not calculated in the system. That way, sustainability is never attractive. So subsidize it generously, […] to makes a heating grid more attractive"* (I.2). There is an aspiration to achieve a higher capacity utilization rate then necessary to conclude the business case, because this means more efficient use of the heat source.

The second option is that consumers have to compulsory choose for the option with the lowest national costs in their neighborhood. In those areas, heating grids are developed and consumers have a mandatory connection (and are forbidden to use another form of heating). *"For the neighborhoods where is calculated that a heating grid is the best solution, considering the societal costs. Than the choice should be made. Because that way, it is the cheapest for everyone, for the BV Nederland"* (I.7). *"Actually, municipalities should make the right choice. Because we are either developing a heating grid, or we are upgrading our electricity grid. If we do both, it becomes a lot more expensive obviously"* (I.9).

5.1.2 Libertarian view on Strategy

In the libertarian view, it is important to look at the best solution for each consumer. Climate change mitigation is in itself not necessary, and for achieving the heating transition, all forms of more sustainable heating are better than natural gas heating. Therefore, we should not consider different sustainable heating options as 'competitors': *"…in a certain way, a heating pump and heating grid are competitors, however, actually we desperately need everything to achieve the Climate Agreement. We should not say, it is this or that"* (I.12). Everything is distributed on the free market. One of the most common and implicit interpretations of justice in the libertarian approach is that the market model itself ensures benefits (possibly to a varying extent) for all consumers (Dynge & Cali, 2025). Consumers can completely free choose an heating option themselves, whether it is sustainable or not. That also implies that transparency and the communication of understandable information towards consumers is very important, to assure consumers can make a rational choice (I.12). Freedom of choice is important in itself: "*Why would you make it mandatory? You need to have an alternative, right? Maybe we can decide, natural gas is not an option anymore. But we can not force people to connect to a heating grid"* (I.11). The transparency and freedom of choice contribute to more societal support for heating grids. There is no steering or intervention from the government in this. Consumer decisions are for a great part determined by financial incentives, so consumers mostly choose the heating option with the lowest consumer costs. To conclude a business case for heating grid companies, a sufficient capacity utilization rate is necessary. That means heating grids are only developed in areas where they can be financially lucrative. To convince people to choose for a heating grid, there needs to be a financially attractive offer, an *“offer you can’t refuse”* (I.12) regarding the connection costs and heating tariffs for consumers.

5.1.3 Egalitarian view on Strategy

Heating is seen as a basic need, so it is important that all citizens have access to sustainable heat. As a society, we want to make the decision where less fortunate people are increasing in welfare the most (equity-approach). In this view, consumer costs are important, and the government should regulate the distribution of heating options, to assure everyone has equal access to all of them. To achieve this, there are two strategies possible with different degrees of freedom of choice for consumers.

First, it is considered just that everyone has full freedom of choice, while ensuring that everyone has equal access to different possible heating options in their neighborhood. *“So as a municipality, we have to do everything we can at all times, to give people a choice between individual and collective heating options”* (I.6). A heating grid is therefore always constructed in areas where it is technically possible. All consumers in that area get a ‘potential connection’ (best possible with very-low-temperature grids): ‘standby’ pipelines to the house are constructed, but not connected yet to the house inside heating system: called the fibre optic cable strategy. People still have freedom of choice about which heating option they want, but the connection to the heating grid is already there, making it easier to switch to the heating grid (now or in the future). This contributes to societal support: *“That makes it a lot easier to find societal support for a heating grid. And by giving people freedom of choice, you show a lot of confidence in your own product”* (I.13).

The second option is that consumers get a mandatory connection to the heating grid, in areas where the grid has the lowest national costs compared to other heating options. That way, there is the highest capacity utilization rate, so economies of scale can be achieved, making it easier to compose a conclusive business case and lowering consumer costs. It is considered unjust that the heating gid becomes more expensive for connected consumers, when another consumer chooses a different heating option. *“I really think that the freedom of choice is used, by the people with enough financial resources, to purchase a heating pump. With that heating option, they have all freedom. But that makes the heating grid more expensive for others”* (I.7). Also in this case, the societal support increases, because the organization of heating grids is publicly secured.

5.2 Consumer Tariffs

The opinions of interviewees on Consumer Tariffs are visualized in Figure 4. This paragraph explains the utilitarian, libertarian and egalitarian perspectives on Consumer Tariffs. ACM and EBN do not take a specific stance.

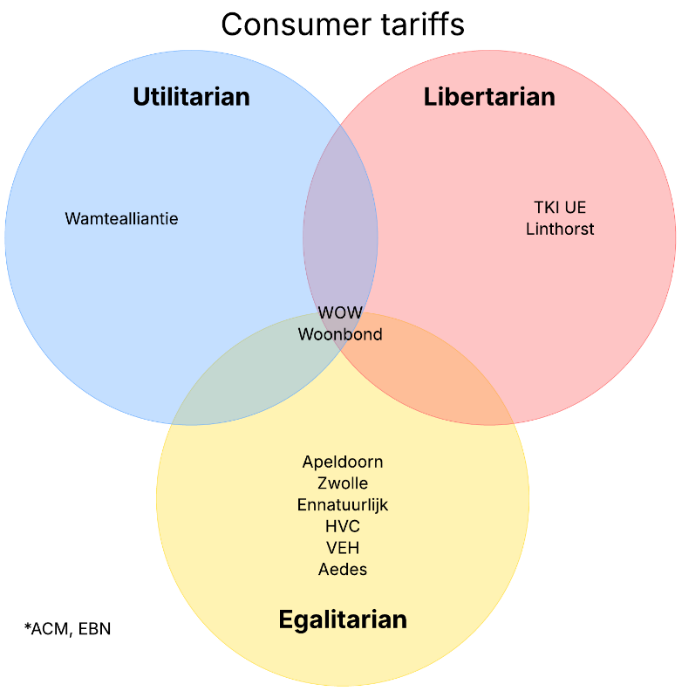

Figure 4. Visualization of interviewee opinions on the aspect Consumer Tariffs

5.2.1 Utilitarian view on Consumer Tariffs

Energy poverty is seen as part of a larger problem: not enough income. How the consumer tariffs look like and what is considered 'affordable', depends on the chosen strategy regarding the amount of freedom of choice of consumers. In both cases, it is important that the tariffs are efficient costs and that the variable part of the tariff is higher than the fixed costs part, to give consumers an incentive to save energy, which aligns with the Climate Agreement.

In the first option, where the free market with governmental direction is used to increase societal support, it is important to shape the tariffs in such a way that the societal support is also maximized. This contributes the most to the development of heating grids where they are the option with the lowest national costs. That could mean that the costs have to be cheaper than the other sustainable alternatives, for at least the largest group of citizens. *"Is has to be a better option to switch to a heating grid, for the largest group. With a clear prospect for the future, that they are better of, the coming years"* (I.2). Consumers have to pay for the connection- and disconnection costs themselves. However, there are subsidies for consumers when they decide to be connected, or a fine added to the disconnection costs, to give consumers an incentive. *"If you think the societal costs of a heating grid are attractive, then you should organize the system in such a way, that the consumer costs are also attractive. Possibly through subsidizing it"* (I.13). There can also be taxes on other heating options, in a neighborhood where a heating grid is developed, to maximize the governmental steering towards the considered 'best' heating option in each neighborhood. The investment costs for the heating grid are covered by only the connected consumers. Every consumer within the heating grid pays the same amount of fixed costs tariffs, and the societal support is high and a lot of people are connected, which induces economies of scale and lowers the fixed costs per consumer. There are no differences in fixed costs within a heating grid. However, there can possibly be differences between fixed costs between different heating grids. This is considered just as long as this is perceived as fair by consumers, and enough societal support is maintained.

In the second option, where consumers get a sustainable heating solution compulsory, all pricing structures and consumer tariffs are acceptable, as long as they are aligned with the strategy that has the lowest total costs for the whole Netherlands and increases the total welfare the most.

5.2.2 Libertarian view on Consumer Tariffs

Energy poverty is seen as part of a larger problem: not enough income. Affordability is defined as an attractive offer for consumers. Consumers should always have a choice, therefore the tariffs should also be compared to the tariffs of other heating options: natural gas heating, heating grid heating and all electric heating. When affordability is approached in comparison to other heating options, that is called *relative* affordability. "*So affordability is always relative. Is something is affordable, the consumer will always question: What are my alternatives?*" (I.10) "*Yes, I would approach affordability in comparison to a heating pump*" (I.5). It is important what the reference option is: do we still consider natural gas as a possible reference, or only other sustainable heating options? Following the pure libertarian line of argumentation, the heating transition is not per definition necessary, so that means natural gas can be the reference. This also relates to 'housing costs neutrality', where the current form of heating is the cost reference for consumers. However, the heating transition is included in the current policy, so taking that into account, also means natural gas cannot be considered as a reference anymore.

If the costs for a heating grid are higher than the costs for another option, the chances are smaller that people switch to a heating grid. Because the societal support is lower, the capacity utilization rate is also lower, which means the fixed cost tariff for each connected consumer is higher. Also, there can possibly be differences between fixed costs tariffs between different heating grids. This is considered just, because heating grids have a local character and the source, geographical context, and other aspects are different for each heating grid. The variable costs should be a reflection of the true costs for the delivery of the heat. The system should be transparent for consumers. "*That means all stakeholders know what is invested, what someone earns, how it works, how sustainable it is. That you are just transparent about that energy infrastructure*" (I.10). Consumers have to pay for the connection- and disconnection costs themselves, which are equal to the true costs of connection and disconnection. When consumers choose for a heating grid, they engage in a contract with the heating company. These contracts can differ regarding the time span, amount of costs for connecting, disconnecting and tariffs. There is no steering or intervention from the government, which means there are no subsidies for consumers (for all heating options).

5.2.3 Egalitarian view on Consumer Tariffs

Energy vulnerability is caused by too high heating tariffs. Affordability is defined as an absolute criterium, because heat is a basic need. Therefore, there is a focus on the monthly spendings that consumers have on the heating grid. *"We just think that a consumer can never be a victim of the fact that something is considered the best option for society. So you should honestly look into, what are you burdening upon people"* (I.12). Since all consumers in a heating grid area have a potential or mandatory connection (depending on the chosen strategy), other interventions need to be taken to assure the affordability for everyone and distribute the costs in a way that the least fortunate people are better off. There are different ways to do that.

The first two options are equality pricing, where everybody pays the same tariff for heating (Menghwani et al., 2020). For example, by enforcing a maximum tariff (such as the current ACM maximum tariff): "*What we think is important, is that consumers are protected against extremely high energy bills. So that there is a maximum tariff"* (I. 12). Or second, by socialization, which is redistributing the fixed and/or one-time connection costs of heating grids equally over everyone (over all heating grid consumers in the Netherlands, or over everyone in the

Netherlands, e.g. trough income taxation). *"The fixt costs component should be collectively carried, because it consists of the costs that have to be made to maintain and repair the infrastructure, which should be a core value, that we do altogether"* (I.6). "*The principle of socializing is not a bad idea, if we want to prevent that people, especially lower income groups, to sink though the ice"* (I.13). *"What you would want in an ideal situation, is to throw all three modalities together, so natural gas, electricity, and heating supply. And that would lead to one fixed cost price. That way, the costs for connecting a heating grid, are socialized over a larger part of society. To prevent that specific consumers have a gigantic bill"* (I.14) *"I think that is the maximum possibility to socialize. And with income taxes we can do that fairly, based on financial capacity"* (I.7).

The last two options are equity pricing, where prices vary with respect to affordability for consumers (Menghwani et al., 2020). The third option is differentiation in the fixed costs component of the heating tariffs. Differentiation can be based for example on the surface of the living space, the sustainability/energy label of the residence, income, or other criteria. Or the fourth option is subsidizing all types of heating options, for lower income groups. Ideally, the government invests large amounts of money for this. *"We think it is fair, that consumers are not subsidized substantially more, depending on whether they choose for alternative A or alternative B"* (I.12).

The variable costs can also be approached in two different ways: on the one hand, people want to their heating tariffs to be as stable as possible. That means that the fixed cost component of the tariff is higher than the variable cost component. On the other hand, it is important for people to have influence on their monthly heating bill. When they are frugal with their heating use, they want their heating bill to reflect that. That means that the variable costs component is large, and even progressive: with each extra used Gigajoule unit of heat, the price rises per Gigajoule.

The potential disconnection costs should be low, so no consumer is ever financially trapped in a heating option. That also means there is a higher risk of declining connections. Differences in fixed costs and one-time connection costs between heating grids are considered unjust, because consumers have no influence in the fact that one heating grid can be more expensive to develop then another. Extremely large differences might decrease the societal support for heating grids. *"So honestly, I think you should have the aim to offer everyone a tariff as low as possible: a feasible, affordable and attractive offer. But you have to stay honest that the construction costs are not the same in all regions of the country. That is more a geographic, local dimension"* (I.6).

5.3 Financial Feasibility

The opinions of interviewees on Financial Feasibility are visualized in Figure 5. This paragraph explains the utilitarian, libertarian and egalitarian perspectives on Financial Feasibility. EBN and TKI Urban Energy do not have a specific stance on this topic.

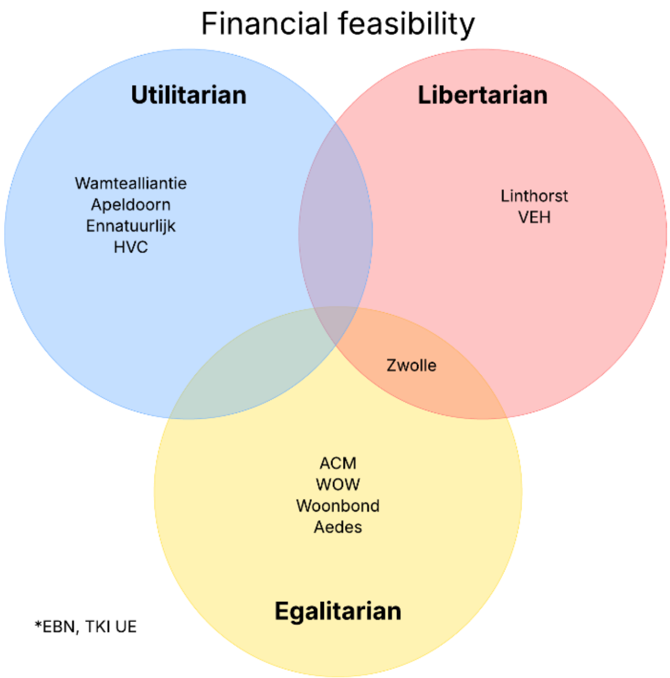

Figure 5. Visualization of interviewee opinions on the aspect Financial Feasibility

5.3.1 Utilitarian view on Financial Feasibility

The tariffs for a heating grid should be determined with the cost-based principle, because this can boost the development of heating grids and the heating transition. There are subsidies for heating companies, to promote the development of heating grids in the areas where they have the lowest national costs. This can better guarantee the feasibility for heating companies. *"If you have the resources as a municipality to decrease the BAK as much as possible, that will help to make the transition for people"* (I.6). *"But actually, the government should take the costs for the infrastructure for heating companies for their account. Which will be paid back through taxes. That way, heating companies can offer very attractive tariffs, and connect more households. That will accelerate everything"* (I.9)

In the option of the free market, heating companies are allowed to make profit, because the costs are distributed in an efficient way, and heating companies can invest their yield into the development of other heating grids, which can contribute to the interest of whole Netherlands. *"Our investor is PGGM, the retirement fund, so I would say that Ennatuurlijk spends pension money in heating grid projects, of which you could say, that should yield a return, which is in interest of BV Nederland"* (I.8). For a mandatory connection, heating companies cannot make profit, because it cannot be guaranteed that there are only efficient costs involved.

5.3.2 Libertarian view on Financial Feasibility

The tariffs for heating grids are determined with the cost-based principle, because that reflects the true costs of the development of the heating grid. Market forces and the balance between supply and demand guarantee as low prices as possible. Heating companies strive for a capacity utilization rate as high as possible, because that means a better business case for heating companies, and the societal support increases by offering consumers a lower tariff. *"And because more people connect tot he heating grid, the business case is more advantageous. […] And that way, it becomes financially more attractive fort he heating company"* (I.12) There are no subsidies for heating companies, because there is no governmental intervention. Heating companies can make profits, because they have the right to do so on the free market.

5.3.3 Egalitarian view on Financial Feasibility

The tariffs are connected to the natural gas prices through the NMDA-principle, because then the tariffs for heating grids among each other, and compared to other heating options, remain as equal as possible. There are subsidies for heating companies, because that also lowers consumer tariffs, and better guarantees the affordability. "*We think that… heating grids are almost only promising if they are heavily subsidized, to lower the end user costs that way"* (I.13).

Because heating companies have a monopoly position, they can only make regulated, limited, profit, so there is supervision on heating companies. *"As ACM, we prevent monopoly positions, which are characterized by the fact that a company is capable of making excessive profits*" (I.3). *"That heating grid companies can never use their monopoly position to charge more than necessary"* (I.13). Heating companies can only have a limited yield, to stay financially healthy. And there can be public heating companies, that do not have the profit motive. A municipality mentioned: "*So we want to have a certain return, to stay at least financially healthy. But we do have the potential that that return requirement is a bit lower, compared to purely commercial companies"* (I.7). And for housing corporations, the same reasoning applies: *"Obviously we do not have a profit motive, but of course we should not go bankrupt"* (I.14). Profit for heating companies is not appropriate, because heating grids are a public facility. "*Yeah, I think the comparison with our water supply would be valid. They are also not making profit, I thought. So for heating, lets use the same systematic"* (I.11). Bianchi, Dieben et al. (2022) explain that public business cases can have lower consumer tariffs, because the infrastructure can be depreciated over a longer period of time (e.g. 40 or 50 years, instead of 20 to 30). In combination with no profit motive, public business cases can result in lower consumer tariffs, not because there is a 'better' business case compared to private heating companies (I.9).

5.4 Division of Roles

The opinions of interviewees on Division of Roles are visualized in Figure 6. This paragraph explains the utilitarian, libertarian and egalitarian perspectives on Division of Roles. ACM does not have a specific stance.

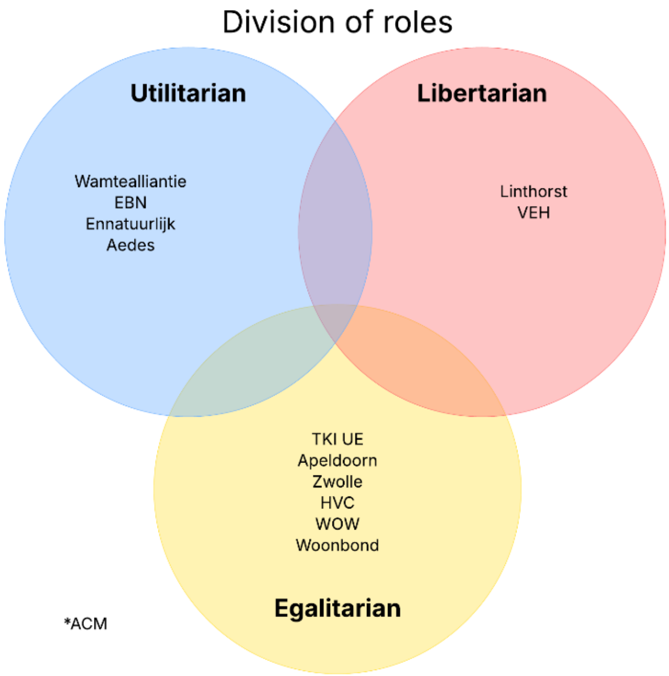

Figure 6. Visualization of interviewee opinions on the aspect Division of Roles

5.4.1 Utilitarian view on Division of Roles

Heating companies carry the first responsibility for security of supply of heat, but the government should always guarantee it in exceptional circumstances. A strong public regulation can help to achieve the heating transition, because large investments are needed. *"Because I mean, we are in a transition that should be managed. […] We know for sure that we have using natural gas is no longer an option. And that very large investments are going to be necessary. And there is no other way, than that is managed by the government"* (I.10). Also, for market failure, public direction is necessary to accelerate the heating transition. The government, provinces or municipalities can get a directory role in that case. *"Eventually, you will see that it* [the development of heating grids] *will be taken over by the market when the market mechanism is working again. However, as long as the market mechanism does not function, there can be a public driving force*" (I.4).

It does not matter if heating grids are privately or publicly owned, as long as the chosen division of roles means an efficient business management and an acceleration of the development of heating grids. *"This discussion is going on for years already. Meanwhile, nothing is happening. We just want there to be clarity"* (I.2). Other stakeholders mention that it is important to do it together, both a public regulatory role and the knowledge and expertise from the private sector are important (I.8). "*I think you should combine forces. And that actually public and private should be brought together, and make sure to make the best of it, together"* (I.14).

To achieve the heating transition, we need societal support, therefore transparency is really important. Consumers do not perceive private heating companies as transparent. Public organizations serve the societal interests, therefore they can be transparent about their business cases. *"If it is public, it is very transparent. Private is not transparent for inhabitants at the moment. They do not understand it. So you see that they resist, and maybe rather not connect to a heating grid. And then we actually lost the whole collective ideology"* (I.4).

There should be competition between the private heating companies on the free market, so in an ideal case, consumers can choose between heating companies. Competition between heating companies and benchmarking can contribute to efficient management and lower costs in a positive way. That means that there are different tariffs possible depending on the heating company.

5.4.2 Libertarian view on Division of Roles

Heat is not considered a basic need, and therefore citizens are responsible themselves for arranging their heating supply. If a heating company promises security of supply in the contract with a consumer, they have to fulfill their duty. Heating grids are perceived as business cases, and private heating companies have the expertise for developing and exploiting them, and consumers have trust in that. Consumers are not in favor of the monopoly position of heating companies, whether that are private or public companies. Therefore, consumers can be best protected with a free market, where they have freedom of choice between heating options, and have the possibility to easily opt-out of a heating grid when they want: *"That is why we argue for any kind of competition, […] by for example lowering the disconnection costs, or avoiding them. […] Because in that way, in this monopoly market, you can create some sort of competition with for example heating pumps"* (I.12). In this free market, market forces such as transparency and benchmarking, positively influence the energy transition. They are an incentive for heating companies for efficient business management, performing better, low costs and innovation. *"Because then you can benchmark really well. […] It would be really good, that you could compete based on the performances you deliver"* (I.10). That means that there are different tariffs possible depending on the heating company. There is no specific role for the government (there is even low trust and confidence in the government).

5.4.3 Egalitarian view on Division of Roles

Heat is seen as a basic need, and heating grids are perceived as a public infrastructure, that means they are a societal facility and of public interest. *"Because otherwise, people can not heat their home anymore. We can't let that happen obviously"* (I.9). Therefore, the government, provinces and municipalities get a large role in the heating transition, to manage and guarantee the security of supply of heating. The responsibility can be decentralized to local governments, such as municipalities. *"But on this moment it is clear that to make the whole transition, a very strong public responsibility is necessary for the upcoming decades. And I personally support the way it is organized currently, that as a local government, we are the director in our own area. That you grab a strong position to stand up for the collective interest, for both electricity and heating. It is a vital utility, that we should publicly guarantee"* (I.6). Also, there is little trust in private heating companies, and market failure shows the need for public regulation. *"And the municipality is a different party that is just a little closer. Is ought to care for its inhabitants. And therefore also more trustworthy. And does not calculate with sky-high return requirements"* (I.7).

There has to be a public majority share of ownership in heating grids, to guarantee the transparency, affordability and security of supply for consumers. Because heating companies have a monopoly position, while also many subsidies are necessary to make heating grids attractive. "*So much subsidized, it is also sensible to keep the assets in public hands. […] We do consider it logical… considering the necessity of subsidies and such systems, and the fact that it are just energy networks with a monopolistic character… that it is more safe for consumers if it are public networks"* (I.13). The government can take over private heating companies, to smooth the transition and keep them involved. This transition has to be sped up, because otherwise the private heating companies (which have the knowledge and the expertise), are less willing to invest. *"Just buy up those commercial companies, just press ahead. Because right now, I think we are at risk that the knowledge that is involved, walks away. […] Make sure that those people stay on board, and stay enthusiast. That they will help with all developments that we are facing, hopefully"* (I.7). Also knowledge sharing can contribute to lower costs, and happens more when heating grids are publicly owned: "*And that knowledge is just shared. And in a commercial setting… you will just have that not as much"* (I.11).

6. Conclusions and discussion

With answering the first two subquestions, this research explored the main conflicts in the debate around the HGPS, and understood the opinions of stakeholders on it with the framework of political philosophical distributive justice principles. From the results, the alignment between stakeholder opinions can be summarized, which is done in Appendix E. In this chapter, it is explained how these insights can help explain the main conflicts of the debate around the HGPS, answering subquestion 3. To answer the main question, recommendations for praxis are given, where it is explained how this research can improve the debate. Finally, the results are discussed regarding how they relate to previous theories and literature. The chapter closes with recommendations for further research.

6.1 Explaining the conflicts

In general, it is striking that for Strategy, most stakeholders are aligned on the utilitarian principle, while for Consumer Tariffs, most stakeholders are aligned on the egalitarian principle. For Financial Feasibility and Division of Roles, stakeholders are divided over utilitarianism, libertarianism and egalitarianism. When looking into more detail, the main conflicts in the debate around the HGPS can be explained because stakeholders have different perspectives on justice for different aspects. These are summarized in Table 7 and further explained in this paragraph.

Table 7. Overview explanation of the conflicts

Conflict	Concerning aspects	Explanation
Conflict 1) Which sustainable heating option should be implemented in the neighborhood?	On aspect Strategy, most stakeholders are aligned on utilitarianism, however, a few stakeholders correspond with the libertarian and egalitarian principle	Conflicting prioritization of values: the lowest national costs (utilitarian) against freedom of choice (libertarian) against affordability for consumers (egalitarian)
Conflict 2) Costs for consumers are high	On aspect Strategy, alignment of most stakeholders on utilitarian principle, while on aspect Consumer Tariffs, alignment of most stakeholders on egalitarian principle	Conflicting prioritization of values: lowest national costs (utilitarian) against prioritizing affordability for consumers (egalitarian)
Conflict 3) Heating companies have difficulties composing a conclusive business case	On aspects Division of Roles and Financial Feasibility, stakeholders are divided over the utilitarian, libertarian and egalitarian principles	Conflict if society should be individualistic, collectivistic or socialistic, resulting in different perspectives about whether heating grids should be exploited by market parties, if they should receive subsidies, and if they are allowed to make profit

Conflict 4) Differences in heating tariffs between heating grids and risk for opt-out	On aspect Strategy, alignment of most stakeholders on utilitarian principle, while on aspect Consumer Tariffs, alignment of most stakeholders on egalitarian principle	Conflicting prioritization of values: lowest national costs (utilitarian) against assuring there are no differences in heating tariffs (egalitarian) → which can potentially be reconciled
Conflict 5) Dilemma with incentive to decrease heat use	On the aspect Financial Feasibility, stakeholders are divided over the utilitarian, libertarian and egalitarian principles	Conflicting prioritization of values: sustainability (utilitarian) & affordability for consumers (egalitarian) against financial feasibility for heating grid companies (libertarian)

6.1.1 Explaining Conflict 1

Conflict 1) *Which sustainable heating option should be implemented in the neighborhood?* can be explained with the differences in conceptions of stakeholders for Strategy. As explained in Chapter 2.5.1, there is an existing policy, that prescribes the aim to achieve the Climate Agreement goals against the lowest national costs. This approach corresponds best with utilitarianism, as explained in Chapter 5.1.1. Also, most stakeholders are aligned on the utilitarian principle for Strategy. However, a few stakeholders correspond with the libertarian and egalitarian principle. In the libertarian principle, consumers have most freedom of choice, and in the egalitarian principle, all consumers should have access to heating with the lowest costs for consumers (affordability for consumers). Conflict 1 results from a misalignment in perception about which of these values (lowest national costs, freedom of choice, or affordability) should be prioritized over others, when a decision is made about if and where a heating grid is implemented.

6.1.2 Explaining Conflict 2

Conflict 2) *Costs for consumers are high* can be explained with the stakeholder alignment for Strategy and consumers tariffs. For Strategy, most stakeholders are aligned on the utilitarian principle, while for Consumer Tariffs, most stakeholders are aligned on the egalitarian principle. An egalitarian principle gives higher prioritization to affordability of the consumer tariffs and possible access of all consumers to affordable heating options. In contrast, the utilitarian principle prioritizes the achievement of the sustainability goals against the lowest national costs. This is in conflict, because the option with the lowest national costs (utilitarian) can potentially lead to higher consumer costs (egalitarian); and because assuring all consumers have access to affordable heating options (egalitarian) can potentially lead to scattered ownership, meaning higher national costs (utilitarian). These opposed stances explain why Conflict 2 exists.

6.1.3 Explaining Conflict 3

Conflict 3) *Heating companies have difficulties composing a conclusive business case* can be explained by the misalignment between stakeholders for Division of Roles. Stakeholders are divided over the utilitarian, libertarian and egalitarian principles. The conflict about what role the state, market and society should have, is at the basis of the discussion whether heating grids should be perceived as business case and exploited by market parties. It is about choosing an individualistic, collectivistic or socialistic approach. According to the egalitarian principle, heating grids should be seen as a collective good where a large role of the state is necessary, while the libertarian principle argues for a market of supply and demand, meaning heating grids are only constructed in areas where they are financially feasible for heating companies. The utilitarian principle steers towards the route that is the most efficient in ensuring heating grids are constructed in areas where they are the option with lowest national costs. That stakeholders are divided over these three principles, showing the misalignment on Division of Roles, and explaining why Conflict 3 exists.

The conflict can be further explained with Financial Feasibility, because stakeholders are also divided over the utilitarian, libertarian and egalitarian principles. According to the utilitarian and egalitarian principle, heating companies should receive subsidies, even though they have different underlying reasonings: because it can stimulate the implementation of heating grids (utilitarianism) or because it can better secure the affordability for consumers (egalitarianism). In contrast, the libertarian principle does not perceive it as just that heating companies can receive subsidies, because there should be a free market without governmental interference. The principles are also divided regarding the question if heating companies can make profit. In the utilitarian and libertarian principle heating companies have the right to make profit, because they operate on the free market. In contrast is the egalitarian principle, reasoning that heating companies are not allowed to make an unregulated amount of profit, because they have a monopoly position. All these aspects are important for the development of a business case for the heating company, and therefore these different perspectives on how financial feasibility for the heating company should be defined, can result in Conflict 3.

6.1.4 Explaining Conflict 4

Conflict 4) *Differences in heating tariffs between heating grids and risk for opt-out* is more difficult to explain from the results, since most stakeholders are aligned on the egalitarian principle for Consumer Tariffs. However, there is a difference in alignment of stakeholders between Strategy and Consumer Tariffs, because for Strategy, most stakeholders are aligned on the utilitarian principle. That means stakeholders acknowledge the aim to achieve the Climate Agreement goals against the lowest national costs, while also disapproving differences in heating tariffs between heating grids. These two perspectives seem to in conflict with each other, because choosing the heating option with the lowest national costs, can result in different heating tariffs between neighborhoods. However, these two perspectives are not impossible to align: when choosing the options with the lowest national costs in each neighborhood, the differences in costs can thereafter still be straightened by distributing them in with equality or equity pricing structures. The utilitarian and egalitarian principle have the same outcome in this case, while reasoning from different arguments.

6.1.5 Explaining Conflict 5

Conflict 5) *Dilemma with incentive to decrease heat use* can be explained by the misalignment between stakeholders for Financial Feasibility. This leads to a tension between the values sustainability (utilitarian) and affordability for consumers (egalitarian) on the one hand, and financial feasibility for heating grid companies (libertarian) on the other hand. When the values sustainability and affordability for consumers are prioritized, that means an incentive to decrease heat use is necessary, which implies a lower variable costs part, even when that means a (larger) unprofitable top for a heating company in the development of a heating grid. In this case, the utilitarian and egalitarian have the same effect (advocating for a lower variable cost part), however with a different argumentation (higher valuation of sustainability or affordability for consumers). When the feasibility for heating companies is prioritized, that means a high fixed cost component and a low variable cost component is desirable, in order for heating companies to compose a conclusive business case. It is perceived as less important whether consumers have an incentive to use less heat, or can lower their own monthly heating bill by using less heat. These two sides of the dilemma show the friction between the utilitarian and egalitarian principle on the one hand, and the libertarian principle on the other hand, explaining conflict 5.

6.2 Recommendations for praxis

In Chapter 1.1 is explained how limited discussion on justice aspects of the distribution of costs and benefits of the policy regarding the HGPS, can lead to energy policy failure, such as decreased societal support or tension in society or energy injustice. Therefore, the main question of this research is: *How can the distributive justice framework help to structure, understand, and improve the debate between stakeholders about the pricing structure of heating grids in the Netherlands?* This research explored all existing stakeholder opinions about the HGPS. The distributive justice framework revealed that conflicts in the debate arise from different underlying justice perceptions. The main conflicts in the debate around the HGPS are explained with misalignments between stakeholder opinions. Accepting misalignments is not a solution when we want to achieve the Climate Agreement, because the debate will end in an impasse, and the stagnation of the development of heating grids remains. Therefore, recommendations for praxis are given on how the distributive justice framework can help to improve the debate on the HGPS, to help policymakers to a) improve the decision-making process by navigating conflicts in a better way (see Chapter 6.2.1), and b) produce improved policies are aligned with the values of stakeholders and are perceived as just by society (see Chapter 6.2.2).

6.2.1 Improving the decision-making process

It is necessary to properly discuss misalignments between stakeholder opinions, since that can lead to conflicts in the debate and stagnate the decision-making process. This research shows that whole debate on the HGPS boils down to agreeing on what values all stakeholders think are most important. For most aspects, an agreement should be made between a collectivistic (utilitarian), individualistic (libertarian) or socialistic (egalitarian) approach, and this is where negotiations and bridge-building come into effect. Navigating misalignments between stakeholders becomes easier and more straightforward, because all core values of stakeholders, are made explicit. With that, the core of conflicts is pointed out (explained in Chapter 6.1). That means for Conflict 1 and 2, it is about discussing which values (lowest national costs, freedom of choice, or affordability for consumers) should be prioritized over others, because lowest national costs and lowest consumer costs are not always the same. For Conflict 3, it is about deciding whether society should have an individualistic, collectivistic or socialistic approach, determining what role the state, market and society should have. For Conflict 5, a decision should be made between prioritizing the values sustainability and affordability for consumers, or prioritizing financial feasibility for heating grid companies.

6.2.2 Improving the policies

To improve the policies that emerge from the decision-making process, and avoid energy policy failure, the associated outcomes of a certain justice principle should be discussed. What we perceive as a just distribution of costs and benefits for everyone in society, determines what specific decisions in policymaking are made, and why. When agreements are made about what values should be prioritized and what our decision-making criteria should be, it is necessary to translate the agreed justice principles to associated policies regarding the HGPS. This research provided insight into the different outcomes of different justice conceptions regarding the HGPS, as explained in Chapter 5. With an aligned vision about what is a just distribution of costs and benefits in the HGPS, less conflicts arise in how the policies should look like. However, sometimes the different opinions of stakeholders do not have the same outcomes. When different opinions cannot be reconciled and all have a different outcome, conflicts can arise in the debate. In that case, the decision-making process can be facilitated by relying on the justice principle and moral values that are agreed on in the decision-making process. The improved decision-making process can produce policies that balance the different justice conceptions of stakeholders and are perceived as just. For example, reconciling Conflict 4 (between choosing heating option with lowest national costs and no differences in heating tariffs) in policymaking is possible, when decided that the costs can be distributed with equality or equity pricing structures, to solve differences in tariffs.

6.3 Theoretical discussion

By applying distributive energy justice to the debate around the HGPS, resulting in specific implications of how aspects of the pricing structure look like, depending on which political philosophical perspective of justice is complied, this research provides explicit recommendations on how energy justice can improve the debates in the decision-making process of the HGPS. Therefore, this research adds to the existing literature, because Vitéz & Lavrijssen (2020) showed that energy justice can provide the tools to improve regulations of the energy system of heating grids, and this research explains more explicitly how that can be done, to bridge the gap between normative theories on distributive justice and the decision-making process in practice.

Specifically for pricing structure, this research provides a better understanding, because it clarifies the social justice dimension of the HGPS. The technical, economic and regulatory dimensions have been researched before (Odgaard & Djørup, 2020; Sanders et al., 2016; Egüez, 2021; Hoogervorst, 2020; Mulder & Hulshof, 2021; Li et al., 2015; Li et al., 2019; Liu et al., 2019), as well as the connection between justice and energy or the sustainability transition (Sovacool & Dworkin, 2015; Jenkins et al., 2016; McCauley et al., 2013; Van Wieringen et al., 2025; Kaufmann et al., 2023). Also, how justice concerns are related to the pricing structure of an energy system has been researched in previous literature (see Neuteleers et al., 2016; Khan et al., 2022; Jarin, 2025) but not for the energy system heating grids. Looking into the justice dimensions of the HGPS is relevant, because the heating transition is accompanied by new energy systems, that require revising the associated regulations and pricing structures (Vitéz & Lavrijssen, 2020). The results of this research provide a clear operationalization of how the HGPS can be reviewed through an energy justice lens, making normative theories on distributive justice more applicable to the decision-making process. The operationalization highlights relevant questions that can be a tool for policymakers to address justice concerns in the debate. It can also be used (as a starting point) for future research, for example in the social domain, to apply other justice questions on the HGPS, or in related domains of the energy transition (such as economics, politics, and environmental sciences, as addressed by the energy trilemma), where similar conflicts about justice can emerge (Michaelis et al., 2024; Heffron et al., 2015).

This research only looks into the distributive justice tenet of energy justice, which is both a strength and a weakness. It shows how distributive justice is a valuable lens to analyze questions regarding pricing structures of energy systems, particularly heating grids. This adds to the existing literature on distributive justice, where the concept was considered for electricity markets (Dynge & Cali, 2025) and for heating grids in general (Bouzarovski & Simcock, 2017), but not yet for the HGPS explicitly. However, only looking into the distributive energy justice tenet does not cover all energy justice questions that are related to energy systems, mentioned in the triumvirate of tenets by McCauley et al. (2013) and Jenkins et al. (2016). This was also apparent from the research findings, that showed that the debate around the pricing structure touches upon more than just the distribution of costs and benefits, but also for example on broader questions regarding regulation and stakeholder responsibilities.

This research adds to the literature on political philosophical justice principles, because they are applied to make different scenario's explicit of a decision-making process in practice (in this case of the HGPS), as recommended by Wood et al. (2024), WRR (2023) and Davidson (2021a). The results can also be relevant for economic and political fields, because they illustrate different possible distributions of costs and benefits (economics), depending on different political philosophical perspective on justice (politics).

6.4 Recommendations for further research

Although the results reveal insights into the conceptions of distributive justice that stakeholders have regarding the HGPS, this research has three main limitations that should be addressed in future research.

First, the results raise qualitative questions regarding why stakeholders are (mis)aligned on certain aspects. This research only looks into how (mis)alignment between stakeholders can explain conflicts in the debate, it does not provide insight into why certain stakeholders are (mis)aligned on specific aspects. For example, stakeholders are aligned for Strategy and Consumer Tariffs, but not for Financial Feasibility and Division of Roles. Because alignment between stakeholders can help to avoid conflicts in the future and can promote decision-making processes, it is interesting to look deeper into why stakeholders are (mis)aligned and for which aspects.

Second, the results indicate an association to recognition and procedural justice. This research focused only on the distributive tenet of energy justice, while the findings showed that the debate around the HGPS covers more than just the distribution of costs and benefits, such as broader questions regarding regulation and stakeholder responsibilities. These topics could be understood better with recognition and procedural justice. These dimensions of energy justice could be used in further research as a framework to apply on the debate, to broaden our understanding of the justice dimension for heating grids.

And third, this research does not reflect on the real probability of the desired future views of stakeholders. This research aimed to bridge a gap between the normative theories on distributive justice and the decision-making process in practice. Therefore, the different outcomes of different justice conceptions regarding the policymaking around the HGPS, are explained in Chapter 5. However, these outcomes are based on desired futures of stakeholders and are applications of the most idealistic form of the political philosophical principle on a certain aspect, but this can be different from what is realistically possible. This research lacks a reflection on the probability of the scenario's regarding content, which lowered the generalizability of this research. To better bridge the gap between the normative theories on distributive justice and practice, future research could look into the possibility and probability of the scenario's in the real world.

AI statement

In this research, no use was made of ChatGPT or other generative AI-systems or Large Language Models), for writing, formulating arguments, or producing text. The analysis, reasoning, and written text in the thesis are the results of the own work of the researcher.

This research holds the philosophical position that doing research is primarily a process of cognitive, creative, interpretative decision-making. The researcher itself has weaved together many complex arguments, because generative AI-systems are poorly equipped for this task.

Only in the preparatory stages of the research, for the purpose of background research, brainstorming and outlining tasks, Microsoft Copilot was used. This AI-system was only used after the researcher was fully informed on the subject through search in academic databanks, and able to confidently manage AI hallucinations and unjust predictive text. The use of AI-systems was consciously limited to a minimum, by taking the social costs and environmental impact of AI-systems for a sustainable future, and its potential reliability and bias into account, in line with the Radboud Nijmegen School of Management guidelines on sustainable and responsible research practices.

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Appendices

Appendix A. List of literature for literature research

Author / organization	Title	Year of publication	Referencing in text
	Klimaatakkoord	2019	Klimaatakkoord, 2019
Ministerie van Economische Zaken en Klimaat [EZK]	*Klimaatplan 2021-2030*	2020	EZK, 2020
Ministerie van Economische Zaken en Klimaat [EZK]	*Nationaal Plan Energiesysteem [NPE] - Hoofddocument*	2023	EZK, 2023
Ministerie van Klimaat en Groene Groei [KGG]	*Ontwikkelperspectief duurzame warmtebronnen*	2024	KGG, 2024
Minister voor Klimaat en Energie, Rob Jetten	*Wetsvoorstel Wet collectieve warmte. Kamerstuk 36576*	2024	Wetsvoorstel WCW, 2024
Minister van Klimaat en Groene Groei, Sophie Hermans	*Kamerbrief Randvoorwaarden voor de verdere uitrol van warmtenetten*	2024	Hermans, 2024a
Minister van Klimaat en Groene Groei, Sophie Hermans	*Kamerbrief Ontwikkelperspectief Duurzame Warmtebronnen*	2024	Hermans, 2024b
Minister van Klimaat en Groene Groei, Sophie Hermans	*Kamerbrief Actualisatie randvoorwaarden collectieve warmte*	2025	Hermans, 2025
Autoriteit Consument en Markt [ACM]	*Uitvoerbaarheids- en handhaafbaarheidstoets door ACM op Wet Collectieve Warmte*	2023	ACM, 2023
Autoriteit Consument en Markt [ACM]	*Schriftelijke Inbreng Autoriteit Consument en Markt bij Technische Briefing toezicht warmtevoorziening*	2024	ACM, 2024a
Raad van State	*Samenvatting advies publiek meerderheidsbelang bij collectieve warmtevoorziening*	2024	Raad van State, 2024
Planbureau voor de Leefomgeving [PBL]	*Startanalyse aardgasvrije buurten 2020*	2020	Hoogervorst et al., 2020
Planbureau voor de Leefomgeving [PBL]	*Actualisatie Startanalyse aardgasvrije buurten 2025*	2025	Van Polen et al., 2025
Warmtealliantie	*Het warmtebod*	2025	Bokhoven et al., 2025
Onafhankelijk verkenner & ex-directeur CE Delft, Frans Rooijers	*Verkenning warmtebedrijven*	2025	Rooijers, 2025

Algemene Rekenkamer	*Een koud bad voor warmtenetten*	2025	Algemene Rekenkamer, 2025
CE Delft	*Het effect van het stagneren van de groei van warmtenetten*	2024	Teng et al., 2024
CE Delft	*Werkwijzer Nationale Kosten*	2023	Juijn et al., 2023
CE Delft	*Tariefstelsel energienetten en energietransitie - Analyse van knelpunten en effecten voor eindgebruikers*	2022	Blom et al., 2022
CE Delft	*Socialiseren van netkosten van warmtenetten*	2017	Blom & Ahdour, 2017
Berenschot	*De Wcw: kostprijs+-tarief, consumentenbescherming en verduurzaming*	2022	Bianchi, Dieben et al., 2022
Berenschot	*Ontwikkeling instrumentarium warmte op basis van casussen*	2022	Bianchi, Buijs et al., 2022
Berenschot	*Verkenning beleidsopties financiële aantrekkelijkheid collectieve warmte*	2024	Verboon et al., 2024
Berenschot	*Verkenning alternatief nettariefstelsel kleinverbruik*	2024	Bianchi, Meijering et al., 2024
Berenschot	*Kaders voor betaalbaarheid*	2024	Bianchi, Geldhof et al., 2024
Nederlandse organisatie voor toegepast-natuurwetenschappelijk onderzoek [TNO]	*Vergelijking tarieven collectieve warmtesystemen in Nederland met tarieven in Zweden, Denemarken en Duitsland*	2022	Huygen & Verstraten, 2022
Ecorys	*Evaluatie Warmtewet en toekomstig marktontwerp warmte*	2016	Haffner et al., 2016
Raad voor de leefomgeving en infrastructuur [Rli]	*Warm aanbevolen: CO2-arme warmte in de gebouwde omgeving*	2018	Rli, 2018
Vereniging van Nederlandse Gemeenten [VNG] & Ministerie van Economische Zaken en Klimaat [EZK]	*Handreiking betaalbaarheid - warmtetransitie in wijkaanpak*	2023	VNG & EZK, 2023
Planbureau voor de Leefomgeving [PBL] & Centraal Planbureau [CPB]	*Kosten- en batenbegrippen in klimaatbeleid*	2020	Hof et al., 2020
Verbetering Informatie Voorziening Energietransitie [VIVET]	*Begrippenkader Warmtenetten: Gezamenlijke taal voor de warmtetransitie*	2024	Teulings et al., 2024

Author / organization	**Title**	**Year of publication**	**Referencing in text**
Position papers			
Autoriteit Consument en Markt [ACM]	*Schriftelijke inbreng ACM Rondetafelgesprek Wet collectieve warmte*	2024	ACM, 2024b
Energie Beheer Nederland [EBN]	*Position paper: Wcw belangrijke stap voor versnelling warmtetransitie*	2025	EBN, 2025
TKI Urban Energy [TKI UE]	*Positionpaper TKI Urban Energy: Extra route voor de warmtetransitie*	2024	Van Egmond, 2024
Ennatuurlijk	*Position paper Ennatuurlijk voor Rondetafel Wet collectieve warmte 17 oktober 2024*	2024	Japikse, 2024
HVC	*Inbreng HVC - Position paper ten behoeve van Ronde tafel Wet collectieve warmte*	2024	HVC, 2024
Vereniging Eigen Huis [VEH]	*Stel de consument centraal bij warmtenetten - Position paper Wet collectieve warmte (Wcw)*	2024	VEH, 2024
Woonbond	*Inbreng Woonbond voor RTG over de Wet collectieve warmte*	2024	Woonbond, 2024
Aedes	Borg de betaalbaarheid bij warmtenetten - Position paper Aedes	2024	Aedes, 2024

Appendix B. Overview of expert conversations / interviews

Organization	Name	Function	Date
Haskoning	Thomas Beffers	Consultant Energy Transition	multiple
Haskoning	Edward Pfeiffer	Leading Professional Smart Energy Hubs	multiple
Haskoning	José Varwijk	Senior Consultant / Project Manager	11/03/2025
Haskoning	Thijs Boxem	Leading Professional Heating Transition	13/03/2025
Haskoning	Laurens Jeronimus	Consultant Energy Transition	13/03/2025
Haskoning	Anish Bosch	Consultant Energy Systems	18/03/2025
Haskoning	Anna ten Boom	Advisor Strategy & Management	19/03/2025
Nederlandse organisatie voor toegepast-natuurwetenschappelijk onderzoek [TNO]	Pieter Verstraten	Research Consultant	09/04/2025
Haskoning	Joost Poldervaart	Advisor Energy Transition	10/04/2025
TKI Maatschappelijk Verantwoord Innoveren [TKI MVI]	Maurice Mommen	Programme Manager	10/04/2025
Planbureau voor de Leefomgeving [PBL]	Petra van der Kooij	Researcher	28/04/2025
Municipality Zwolle	Channah Dijk	Project leader Energy Saving and Heating Transition	29/04/2025
Haskoning	Stephan Roos	Sustainability Consultant	12/05/2025
Radboud Universiteit	Dr. Marc Davidson	Professor Philosophical Ethics and Political Philosophy	13/05/2025

Appendix C. Operationalization[5]

Legend of the code colours:	
Blue	Utilitarian
Red	Libertarian
Yellow	Egalitarian
Purple	Can be both utilitarian and libertarian
Orange	Can be both libertarian and egalitarian
Green	Can be both egalitarian and utilitarian

Concept + dimensions	Explanation	Distributive justice principles		
		De uitkomst moet in totaal meer collectief welzijn opleveren	*Individuele rechten en vrijheden, vrije markt van vraag en aanbod*	*Verbeteren van positie van minderbedeelden, verminderen van ongelijkheid in uitkomst*
Strategie (Strategy)		**Utilitarisme**	**Libertarisme**	**Egalitarisme**

[5] This operationalization was made in Dutch, because the interviews were also going to take place in Dutch language.

Warmteoptie	Wat is de beste optie om te verwarmen?	Dat is de optie met de laagste maatschappelijke kosten voor Nederland	Dat wordt bepaald op de vrije markt, waar consumenten zelf vrijwillig een rationele keuze kunnen maken (waar dus meestal de goedkoopste en beste optie gekozen zal worden)	Dat is de optie waarbij de minstbedeelden er het meeste op vooruitgaan, en iedereen gelijke toegang heeft tot warmtevoorziening. Neutraliteit in alle warmteopties, dus alle opties staan open
	S. Warmteoptie	• BV Nederland • Economische beslissing • Elektriciteitsnetwerk / netcongestie • Experts inschatting • In het belang van iedereen / collectieve baat • Maatschappelijke / nationale kosten • Warmtenet beste oplossing	• Vrije markt • Concurrentie tussen vormen van verwarmen / warmtepomp • Beste oplossing voor bewoner • Eindgebruikerskosten	• Eindgebruikerskosten
Warmtetransitie	Moeten we naar aardgasvrije wijken?	Er is waarschijnlijk veel draagvlak (volloop) omdat er op warmtenetten wordt gestuurd waar die de maatschappelijk beste optie zijn (streven naar meer volloop dan nodig voor haalbaarheid business case)	Niet per se, klimaatmitigatie is geen doel op zichzelf, dus de markt blijft leidend en mensen kunnen zelf kiezen of ze de verduurzamingsopties willen, die op de markt komen	Ja, want alle burgers moeten toegang hebben tot warmte, en dus ook tot toekomstbestendige, duurzame warmte
	S. Warmtetransitie	• Klimaatdoelen / Klimaatakkoord • Warmtetransitie / aardgasvrij / elektrificatie • Duidelijke toekomstvisie	• Bewoners kiezen om woning aardgasvrij te maken / verduurzamen	• Warmte als levensbehoefte / basisbehoefte

Keuzevrijheid	In hoeverre mogen bewoners zelf kiezen tussen verschillende warmteopties?	Gemeentes/overheid bepalen de beste warmteoptie, na onderzoek door overheid of experts (en gemeente maakt warmteprogramma). Er wordt geprobeerd om de wijk op één warmteoptie te krijgen (efficiëntie), om de maatschappelijke kosten zo laag mogelijk te houden. Daarbij is er een vrije markt met warmteopties, omdat dat het meest efficiënt is	Bewoners hebben keuzevrijheid en mogen zelf de warmteoptie kiezen (die voor hem het beste / goedkoopste is). Bewoners zijn transparant en duidelijk geïnformeerd over de opties, zodat ze een rationele keuze kunnen maken	Bij de aanleg van een warmtenet, krijgt iedereen in de wijk een mogelijke aansluiting, bewoners kunnen zelf kiezen of ze het warmtenet willen gebruiken (glasvezelbenadering)
	S. Keuzevrijheid	• Warmteprogramma (voorheen transitievisie warmte) / wijkaanpak / wijkuitvoeringsplan • WGIW (Wet gemeentelijke instrumenten warmtetransitie) / toetsingskader gemeentes • Keuzevrijheid, maar wel sturing • Aansluitverplichting	• Vergelijkingstool • Individualisme • Persoonlijk recht • Transparantie en duidelijkheid • Concurrentie tussen vormen van verwarmen / warmtepomp • Volledige keuzevrijheid voor consumenten • Salami tactiek voorkomen • Aantrekkelijk aanbod / financiele prikkel	• Glasvezelbenadering / aansluitoptie • Gemeente moet bewoners keuze proberen te geven (door warmtenet aan te leggen) • Voorkomen dat keuzevrijheid gebruikt wordt door beter bedeelden • Aansluitverplichting
Maatschappelijk draagvlak	Hoe belangrijk is maatschappelijk draagvlak en acceptatie van bewoners?	Er is waarschijnlijk veel draagvlak (volloop) omdat er op warmtenetten wordt gestuurd waar die de maatschappelijk beste optie zijn (streven naar meer volloop dan nodig voor haalbaarheid business case)	Mensen moeten verleid worden met een aantrekkelijk aanbod (marktwerking), daardoor is er waarschijnlijk minder draagvlak (streven naar genoeg volloop als nodig voor haalbaarheid business case)	Er is waarschijnlijk meer draagvlak, want iedereen in de wijk krijgt een mogelijke aansluiting, bewoners kunnen zelf kiezen of ze het warmtenet willen gebruiken (glasvezelbenadering)

	S. Maatschappelijk draagvlak	• Bewoners overtuigen van maatschappelijk beste optie • Sturing op warmtenetten (met middelen) dus meer draagvlak • Streven naar meer volloop dan nodig voor haalbaarheid • Ervaren betaalbaarheid • Draagvlak belangrijk • Meer draagvlak door keuzevrijheid + transparantie	• Aantrekkelijk aanbod / financiele prikkel • Draagvlak belangrijk • Ervaren betaalbaarheid • Meer draagvlak door keuzevrijheid + transparantie	• Meer draagvlak doordat mensen optie hebben (glasvezelbenadering) • Meer draagvlak door publieke organisatie

Warmtenettarieven voor consumenten (Consumer Tariffs)		**Utilitarisme**	**Libertarisme**	**Egalitarisme**
Betaalbaarheid	Welke tarieven zijn 'betaalbaar' voor bewoners?	Elk tarief is acceptabel, zolang het in totaal voor Nederland de laagste maatschappelijke kosten heeft. In een vrije markt komen de meeste efficiënte prijzen tot stand	Betaalbaarheid wordt gezien als relatief ten opzichte van andere warmteopties, want bewoner kiest de optie die voor hem het goedkoopst is. Daarom moet er voor de aanleg van een 'aantrekkelijk aanbod' zijn naar de bewoner	Betaalbaarheid wordt gezien als absoluut, want er mag geen energiearmoede zijn. Daarom is er een maximum tarief dat aan bewoners mag worden gevraagd

	W. Betaalbaarheid	• Efficiënte kosten • Voor de grote groep warmtenet goedkoper t.o.v. huidige situatie • Energiearmoede is probleem van te weinig inkomen (niet van te dure energie)	• Relatieve betaalbaarheid • Woonlastenneutraliteit • Energieprijzen / elektriciteitsprijs / gasprijs • Energiearmoede is probleem van te weinig inkomen (niet van te dure energie)	• Absolute betaalbaarheid • Financiële maandlasten / inkomen / vermogen bewoners • Financieringsfonds (voor eenmalige kosten) • Maximale kosten / tarieflimiet • Energiearmoede • Terugverdientijd consument • Vereveningsfonds (bijv. hele energiesector)
Vastrechtkosten	Wie betaalt de vastrechtkosten voor het aanleggen van een warmtenet, zijn deze gedifferentieerd binnen een warmtenet, en wat is de verhouding ten opzichte van variabele kosten?	Alleen de mensen die zijn aangesloten op het warmtenet betalen de investering voor het aanleggen van de infrastructuur terug. Daarbij betaalt elke bewoner op het warmtenet hetzelfde vastrecht. (Om meer te sturen op warmtenetten, kunnen bijvoorbeeld woningcorporaties de vastrechtkosten betalen (bewoners de variabele kosten).) Tussen warmtenetten kunnen er verschillen zijn (verschillen op nationale schaal). Omdat het vollooppercentage per wijk waarschijnlijk groter is, zijn de kosten per huishouden lager	Alleen de mensen die zijn aangesloten op het warmtenet betalen de investering voor het aanleggen van de infrastructuur terug. Daarbij betaalt elke bewoner op het warmtenet hetzelfde vastrecht. Tussen warmtenetten kunnen er verschillen zijn (verschillen op nationale schaal). Omdat het vollooppercentage per wijk waarschijnlijk lager is, zijn de kosten per huishouden hoger	De kosten voor de aanleg van warmtenetten worden over iedereen in Nederland gesocialiseerd. De vastrechttarieven zijn gedifferentieerd (afhankelijk van woonoppervlak, inkomen, oid), dus tariefverschillen binnen een warmtenet zijn mogelijk (verschillen op lokale schaal)
	W. Vastrechtkosten	• Investering warmtenet terugbetalen met vastrecht aangesloten bewoners	• Investering warmtenet terugbetalen met vastrecht aangesloten bewoners	• Socialiseren vastrechttarief • Differentiatie vastrechtkosten • Socialiseren door korting op elektriciteit

Variabele kosten	Hoe zien de variabele kosten er uit en wat is de verhouding ten opzichte van vastrechtkosten?	Het variabele deel van het tarief is hoger dan het vastrechtdeel, want er moet een prikkel zijn om warmte te besparen (verduurzamen)	De variabele kosten zijn gelijk aan de kosten voor het leveren van de warmte	De variabele kosten kunnen progressief zijn, waarbij hoe meer de afnemer verbruikt, hoe meer hij betaalt per afgenomen energie unit. Daardoor hebben bewoners veel invloed op hun variabele kosten
	W. Variabele kosten	• Variabele kostendeel hoog, prikkel om te besparen • Motivational tax, korting als retourtemperatuur lager is	• Variabele kosten gelijk aan kosten voor leveren warmte	• Bewoners invloed op variabele kosten
Kosten aansluiten/afsluiten	Wie betaalt de aansluitkosten (BAK (bijdrage aansluitkosten)) en afsluitkosten van het warmtenet?	Bewoners betalen zelf de kosten voor het aansluiten en afsluiten van het warmtenet, en om bewoners te sturen zijn er mogelijk subsidies voor het aansluiten op een warmtenet	Bewoners betalen zelf de kosten voor het aansluiten en afsluiten van het warmtenet	De kosten voor het aansluiten op een warmtenet worden over iedereen in Nederland gesocialiseerd, of er zijn subsidies voor het aansluiten op een warmtenet
	W. Kosten aansluiten/afsluiten	• Woningcorporaties betalen BAK • Subsidies voor aansluiten op warmtenet voor consument • Kosten aansluiten / afsluiten voor bewoner zelf • Verschillende tarieven voor nu of later aansluiten	• Contract met warmtebedrijf • Verschillende tarieven voor nu of later aansluiten • Kosten aansluiten / afsluiten voor bewoner zelf	• Leegloop percentage / risico • Socialiseren aansluitkosten • Afsluitkosten laag (en betaald door warmtebedrijf) • Aansluiten / afsluiten glasvezelbenadering • Subsidies voor aansluiten warmtenet

Subsidies / belastingen (voor consument)	Zijn er subsidies en toeslagen, en voor wie? Zijn er extra belastingen of andere restricties op andere warmteopties?	In een gebied waar een warmtenet de beste optie is, is er geen subsidie, of zelfs extra belasting, voor andere warmteopties. Voor warmtenetten zijn er wel subsidies, waarbij de positie van de minstbedeelden wordt verbeterd en daarmee het totale collectieve welzijn (law of diminishing marginal utility)	Bewoners mogen zelf kiezen op de vrije markt, dus er zijn geen subsidies/toeslagen/belastingen/restricties	Er zijn subsidies en toeslagen voor verschillende duurzame warmteopties, om te zorgen dat alle warmteopties voor iedereen even betaalbaar zijn. De subsidies zijn dan met name compensaties voor lagere inkomens, om de kosten voor een warmtenet gelijk of lager te maken dan het alternatief. Er zijn geen extra belastingen of restricties
	W. Subsidies / belastingen	• Regulering, dus geen subsidie op andere warmteopties voor consumenten	• Geen subsidie voor consumenten	• Subsidies en toeslagen voor verschillende warmteopties voor consument
Tariefverschillen tussen warmtenetten	Is het eerlijk als er tariefverschillen / verschillen in BAK tussen warmtenetten zijn?	Er kunnen verschillen tussen tarieven / BAK tussen warmtenetten zijn. Dit is rechtvaardig zolang dit door bewoners als eerlijk gezien wordt, en er dus genoeg draagvlak blijft en warmtenetten ontwikkeld kunnen blijven worden	Er zijn verschillen tussen tarieven / BAK tussen warmtenetten, en dit is rechtvaardig omdat elk warmtenet anders is en andere kosten heeft (geografische verschillen zijn, bronafhankelijkheid, etc)	Er zijn zo min mogelijk verschillen door het socialiseren van vastrechttarieven / BAK. Verschillen zijn niet rechtvaardig omdat bewoners geen invloed hebben op dat het ene warmtenet duurder is om aan te leggen dan een ander warmtenet
	W. Tariefverschillen tussen warmtenetten	• Verschillen in tarieven / BAK tussen warmtenetten beperkt houden	• Verschillen in tarieven / BAK tussen warmtenetten is rechtvaardig	• Verschillen in tarieven / BAK tussen warmtenetten is niet gewenst

Financiële haalbaarheid voor warmtebedrijven (Financial Feasibility)		Utilitarisme	Libertarisme	Egalitarisme
Tariefbepaling	Hoe moeten de tarieven bepaald worden?	Kosten+, omdat dat de warmtetransitie nu een boost kan geven, en daarmee opties met de laagst maatschappelijke kosten bevordert. Ook is het logischer om de koppeling met gas lot te laten, gezien de energietransitie, en omdat een koppeling aan de daadwerkelijke kosten en elektricteitsprijs stabieler is dan een koppeling aan de fluctuerende gastarieven	Kosten+, daarmee worden de daadwerkelijke kosten doorberekend in de tarieven, marktwerking zorgt voor laagst mogelijke tarieven	NMDA, omdat daarmee de tarieven voor afnemers zoveel mogelijk gelijk blijven vergeleken onderling en met andere warmteopties
	F. Tariefbepaling	• Kosten+, want bevorderen warmtetransitie • Kosten+, want koppeling aan elektriciteitsprijs stabieler dan gasprijs	• Kosten+, want eerlijke doorwerking van kosten	• NMDA-principe
Subsidies (voor warmtebedrijf)	Zijn er subsidies en toeslagen voor warmtebedrijven (om de onrendabele top te dekken)?	Er zijn subsidies voor warmtebedrijven, om de uitrol van de optie met de laagst maatschappelijke kosten te stimuleren	Er zijn geen subsidies voor warmtebedrijven, omdat er een vrije markt is en er geen overheidsinmenging is	Er zijn subsidies voor warmtebedrijven, om de financiële haalbaarheid van warmtenetten te verzekeren, terwijl ook de betaalbaarheid voor de consument beter geborgd wordt
	F. Subsidies	• Subsidie voor warmtebedrijven om uitrol warmtenetten te bevorderen	• Geen subsidie voor warmtebedrijven	• Subsidie voor warmtebedrijven om haalbaarheid en betaalbaarheid te borgen

Winst warmtebedrijven	Mogen warmtebedrijven winst maken?	Warmtebedrijven mogen winst maken, want de vrije markt werkt het efficiënts om kosten te verdelen	Warmtebedrijven mogen winst maken, want daar hebben ze recht op	Als er een monopoliepositie is, mogen warmtebedrijven geen winst maken. Dan zijn er óf warmtebedrijven waar toezicht/controle op is, óf warmtebedrijven zijn staatsbedrijven die geen winst maken
	F. Winst	• Warmtebedrijven mogen winst maken (ten bate van Nederland, gemaximaliseerd) • Genoeg rendement om te kunnen investeren in verduurzamen van warmte	• Warmtebedrijven mogen winst maken (recht op)	• Warmtebedrijven mogen geen winst maken • Rendement om financieel gezond te blijven

Rolverdeling (Division of Roles)		**Utilitarisme**	**Libertarisme**	**Egalitarisme**
Leveringszekerheid	Is warmte een basisbehoefte, en wie is er verantwoordelijk voor de leveringszekerheid?	Warmte wordt het meest efficiënt via de vrije markt geregeld. Warmtebedrijven zijn in eerste plaats verantwoordelijk voor leveringszekerheid, bij falen moet de overheid het garanderen	Warmte is geen basisbehoefte, en iedereen is zelf verantwoordelijk om zijn warmtevoorziening te regelen (als in een contract met een warmtebedrijf wel leveringszekerheid wordt beloofd, dan moet het warmtebedrijf daarvoor zorgen)	Warmte is een basisbehoefte, en de overheid moet uiteindelijk de leveringszekerheid garanderen (warmte kan wel via de vrije markt geregeld worden, en warmtebedrijven kunnen ook eerst verantwoordelijk zijn voor de leveringszekerheid)
	R. Leveringszekerheid	• Warmtebedrijf verantwoordelijk voor leveringszekerheid	• Warmtebedrijf verantwoordelijk voor leveringszekerheid	• Consumentenbescherming • Warmte als levensbehoefte / basisbehoefte • Overheid verantwoordelijk voor leveringszekerheid

Regulering en beheer	Wat is de rol van de markt en de overheid (moeten warmtenetten privaat of publiek geregeld worden)? Wie is eigenaar, heeft zeggenschap, investeert, is aandeelhouder, draagt de risico's, ontwikkelt, onderhoudt en exploiteert het warmtenet?	Privaat of publiek maakt niet uit, zolang het maar zorgt voor het meeste welzijn (dus een efficiënte bedrijfsvoering en een versnelling van de uitrol van warmtenetten) Private warmtebedrijven of de overheid, afhankelijk welke de meest efficiënte bedrijfsvoering heeft en de laagste maatschappelijke kosten	Warmtenetten zijn een business case en moeten privaat geregeld worden. Er is een grote rol voor de markt, en geen rol voor de overheid Private warmtebedrijven, want die hebben de kennis en kunde	Warmtenetten zijn een maatschappelijk goed en van collectief belang. Er is een grote rol voor de overheid, er moet een publiek meerderheidsbelang zijn, zodat bewoners worden beschermd Private warmtebedrijven, waarbij de overheid toezicht/controle houdt, of de overheid zelf. Er is ook ruimte voor bottom-up initiatieven
	R. Regulering en beheer	• Wie het beheert is niet relevant • Investeren met rendement voor Nederland • Kennis en kunde op de juiste plaats • Snel en daadkrachtig keuze maken over rolverdeling tussen publiek en privaat • Overheid moet regie nemen warmtetransitie • Marktfalen, dus publiek aanjagen • Gemeente regierol	• Privaat warmtebedrijf / warmtenet • Geen vertrouwen in overheid / zwalkend beleid • Kennis en kunde van warmtebedrijven • Investeerder heeft ook zeggenschap / is aandeelhouder • Risico's en beheersbaarheid in de hand houden • Vertrouwen in warmtebedrijf	• Collectief • Consumentenbescherming • Bottom-up initiatieven / bewonersaandeel • Publieke participatie / meerderheidsbelang • Enkele grote landelijke warmtebedrijven • Geen vertrouwen in warmtebedrijf / onbetrouwbaar • Overheid overnemen commerciële warmtebedrijven • Maatschappelijk goed / publiek belang / nutsvoorziening • Gemeente regierol • Marktfalen, dus publiek aanjagen • Overheid moet regie nemen warmtetransitie

Concurrentie tussen warmtebedrijven	Moet er concurrentie tussen warmtebedrijven zijn of is een monopoliepositie van een warmtebedrijf niet erg?	Met een vrije markt is er benchmarking en een prikkel voor warmtebedrijven voor efficiënte bedrijfsvoering en lage kosten	Er moet een transparante, vrije markt zijn (dus geen monopolie), waarbij bewoners kunnen kiezen tussen aanbieders. Transparantie zorgt voor benchmarking, en is een prikkel voor efficiënte bedrijfsvoering en lage kosten	Zolang het publiek meerderheidsbelang de betaalbaarheid en leveringszekerheid borgt, zijn monopolieposities van warmtebedrijven niet erg
	R. Concurrentie	• Wel concurrentie tussen warmtebedrijven • Verschillende tarieven tussen warmtebedrijven • Prikkel voor warmtebedrijf om goed te functioneren • Transparantie, voor prikkel efficiënte bedrijfsvoering	• Wel concurrentie tussen warmtebedrijven • Verschillende tarieven tussen warmtebedrijven • Prikkel voor warmtebedrijf om goed te functioneren • Transparantie, voor prikkel efficiënte bedrijfsvoering	• Geen concurrentie tussen warmtebedrijven • Kennisdeling, daardoor lagere kosten • Publiek, dus meer transparant

Appendix D. Interview guide[6]

Introductie

Eigen introductie
Ik zal me eerst even voorstellen: ik ben masterstudent Environment and Society aan de Radboud Universiteit. Voor mijn masterscriptie doe ik onderzoek naar de prijsstructuur van warmtenetten in Nederland. Daarvoor doe ik een afstudeerstage bij Royal HaskoningDHV.

Ik kijk specifiek naar hoe de mening van stakeholders over hoe eerlijk de prijsstructuur is, en wat zij als definities zien van 'betaalbaarheid' en 'financiële haalbaarheid'. Daarvoor wil ik verschillende stakeholders interviewen.

Het doel van mijn onderzoek is om uit te zoeken wat de onderliggende principes zijn van stakeholders, en waar de visies overeenkomen, om zo aanbevelingen te kunnen doen voor het besluitvormingsproces rondom de nieuwe Wet Collectieve Warmte. Royal HaskoningDHV hecht waarde aan dit onderzoek omdat het betaalbaar zijn voor de eindgebruiker van collectieve warmte en het financieel haalbaar zijn voor het warmtebedrijf beide noodzakelijk zijn om de warmtetransitie te versnellen gericht op een klimaat neutrale warmtevoorziening in Nederland. Aanleiding voor het onderzoek is de constatering dat de huidige prijsstructuur belemmerend werkt in de bestendiging en groei van stadsverwarming. Kan dit niet anders en beter?

Vraag toestemming om op te nemen
Dit interview wordt gebruikt voor mijn masterscriptie. Om zeker te weten dat ik niets vergeet, zou ik graag de audio van dit interview opnemen. De audio en het transcript van het interview zijn alleen in te zien voor mij, mijn stagebegeleiders Thomas Beffers en Edward Pfeiffer, en mijn scriptiebegeleider Sietske Veenman. Vindt u het goed dat ik het interview opneem? (vraag voor en na starten met opnemen)

Info over interview
Allereerst bedankt voor uw tijd en instemming om mee te doen aan dit interview! Dit gesprek duurt ongeveer een uur. Het interview is volledig vrijwillig, dus u kunt op elk moment stoppen. Ook zijn er geen goede of foute antwoorden, ik ben benieuwd naar uw visie. Als u vragen heeft tijdens het interview, mag u die altijd stellen.

Anonimiteit en vertrouwelijkheid
Voor mijn onderzoek kijk ik naar de verschillende perspectieven van stakeholders, en vooral naar welke oplossingen en gewenste uitkomsten zij zien, en daarom zijn er geen goede of foute antwoorden. Om een goed beeld te krijgen van wat er speelt, is het belangrijk dat ik stakeholders met verschillende belangen interview. Daarom is het voor de betrouwbaarheid van het onderzoek belangrijk als ik de resultaten transparant kan rapporteren, en daarbij uw naam en organisatie kan noemen in de resultaten. Echter, als u dat zou willen, kunt u ook anoniem blijven. Vindt u het goed als ik uw echte naam en organisatie noem in het transcript van het interview en in mijn masterscriptie? (Eventueel: vindt u het goed als u anoniem blijft, en dat ik alleen uw organisatie noem?). U kunt hier ook aan het einde van het interview nog op terugkomen.

Voordat we beginnen, heeft u nog vragen?

[6] Stakeholders had Dutch as their native language, therefore the interviews have taken place in Dutch.

Achtergrondinformatie

- **Kunt u zich kort even voorstellen, wie bent u, en wat is uw rol binnen [stakeholder x]?**
- Wat is de rol van [x] rondom warmtenetten? / Welke belangen vertegenwoordigt [x]?

Introductie inhoudelijke vragen

- In mijn onderzoek, ben ik gericht op warmtenetten voor de gebouwde omgeving, en niet voor de industrie. Verder richt ik me op bestaande en nieuwe warmtenetten, omdat de prijsstructuur voor beide geldt.
- Binnen de gebouwde omgeving kijk ik alleen naar woningen, en niet naar utiliteitsgebouwen. Verder kijk naar zowel bestaande als nieuwe woningen, en zowel huur- als koopwoningen.
- Twee aspecten die vaak genoemd worden bij de prijsstructuur van warmtenetten, zijn dat het tarief 'betaalbaar' moet zijn voor eindgebruikers en dat het project 'financieel haalbaar' moet zijn voor warmtebedrijven.

Betaalbaarheid

Betaalbaarheid wordt genoemd als belangrijk criterium, maar een specifieke definitie is lastig te vinden. Het gaat hier om de kosten van het aansluiten op een warmtenet als woningeigenaar of woningverhuurder, en het tarief van warmte voor eindgebruikers (zowel het vastrechttarief als het variabele tarief); en of deze kosten als betaalbaar worden gezien.

- **Wat is naar idee van [x] op dit moment de definitie van betaalbaarheid (van de bijdrage aansluitkosten en bijvoorbeeld isolatiemaatregelen; en voor het warmtetarief voor eindgebruikers) dat gehanteerd wordt bij warmtenetten in Nederland?**
  - Is er, naar idee van [x], op dit moment consensus over de definitie van betaalbaarheid onder stakeholders? Zo niet, waar zitten de verschillen?

Betaalbaarheid kan bijvoorbeeld gemeten worden in absolute zin, bijvoorbeeld dat het warmtetarief niet boven een maximaal percentage van het inkomen mag komen, dat er een minimaal besteedbaar inkomen moet overblijven na het betalen van de warmterekening, afhankelijk van het woonoppervlak of een maximaal tarief op warmte (ongeacht inkomen). Betaalbaarheid kan ook gezien worden in relatieve zin, ten opzichte van andere duurzame vormen van verwarming (zoals groengas, warmtepompen of warmtekoudeopslag) of aardgas.

- **Wat zou de definitie van betaalbaarheid moeten zijn volgens [x] in de context van het aansluiten op een warmtenet, en van het warmtetarief, voor eindgebruikers?**

- **Op dit moment bepaalt de ACM de maximumtarieven voor warmtenetten, nu nog gebaseerd op het NMDA-principe. Als dat straks wordt losgelaten, hoe zou betaalbaarheid dan gezien moeten worden?**
- Zou de betaalbaarheid van de tarieven van warmtenetten gezien moeten worden ten opzichte van alternatieve duurzame vormen van verwarming?

- **Is het onderscheid tussen vastrechttarief en variabel tarief van belang, of zou de prijsstructuur ook geheel anders ingericht kunnen worden?**
  - Bijvoorbeeld alleen een vastrechttarief, of alleen variabel tarief?
  - Is het eerlijk als iedereen hetzelfde vastrechttarief betaalt?
  - Wat is een betaalbaar <u>vastrechttarief</u> en/of een betaalbaar <u>variabel tarief</u>?

- **Zouden er regelingen moeten zijn om het tarief van warmte betaalbaar te maken/houden, zoals subsidies, een lagere belasting op warmte, of bepaalde toeslagen?**
    - Subsidies zoals de Investeringssubsidie duurzame energie en energiebesparing (ISDE) voor eindgebruikers/huishoudens, de Subsidie voor verduurzamingsmaatregelen (SVVE) voor Verengingen van Eigenaren, woonverenigingen en wooncorporaties, of de Stimuleringsregeling aardgasvrije huurwoningen (SAH) voor gemengde VvE's of verhuurders?
    - Waarom wel of niet?
    - Welke groepen eindgebruikers wensen we te bereiken met deze subsidies (iedereen, of alleen kwetsbare groepen)? En waarom?
    - Moeten deze subsidies structureel of afbouwend zijn, en waar hangt dit dan vanaf?

- Indien nodig extra vragen: Welke maatregelen zijn er nodig in de prijsstructuur om te zorgen dat het warmtetarief betaalbaar wordt of blijft voor (alle verschillende groepen) eindgebruikers?
    - Welke factoren moeten meegewogen worden om te zorgen dat warmte voor alle eindgebruikers betaalbaar is, ook voor kwetsbare bevolkingsgroepen, zoals mensen met een lager inkomen, of bijvoorbeeld ouderen, die vaak een hogere warmtevraag hebben om gezondheidsredenen?

(Financiële) haalbaarheid – vooral voor warmtebedrijven

Haalbaarheid wordt ook genoemd als belangrijk criterium, bij het ontwikkelen van een nieuw warmtenet, maar een specifieke definitie is lastig te vinden. Haalbaarheid kan gezien worden als onder andere technische, financiële of sociale haalbaarheid. Voor dit onderzoek richt ik me op haalbaarheid die samenhangt met de financiële haalbaarheid, voor warmtebedrijven. Financiële haalbaarheid wordt bepaald door of een project rendabel is (wanneer de opbrengsten hoger zijn dan de kosten, en er een redelijke winst kan worden gemaakt, waarmee risico's afgedekt kunnen worden, en waarmee investeerders een marktconform rendement kan worden geboden).

- **Wanneer wordt een project als rendabel ervaren?**
    - Hoe kan de omgeving eraan bijdragen dat een project eerder of meer rendabel wordt?

- **Welke aspecten zouden moeten worden gebruikt om de financiële haalbaarheid van een nieuw warmtenetproject te bepalen volgens [x] in de context van warmtenetten?**
    - Wordt er gekeken naar nationale / maatschappelijke kosten?
    - Hoe zou er met het vollooppercentage om gegaan moeten worden?

- **Wanneer een plan onhaalbaar is, waar wordt dan naar gekeken om te zorgen dat een plan toch haalbaar kan worden? En welke belangen zijn dan belangrijk?**

- **Welke maatregelen zijn er nodig in de prijsstructuur om te zorgen dat een nieuw warmtenetproject financieel haalbaar wordt/blijft voor private, publieke of gemeentelijke warmtebedrijven?**

- **Zouden er subsidies moeten zijn, zoals de Warmtenetten Investeringssubsidie (WIS) voor warmtebedrijven?** Waarom?

Algemeen over de prijsstructuur

Ik heb gelezen en gehoord dat er allerlei knelpunten zijn rondom warmtenetten en de prijsstructuur daarvan. Mijn onderzoek is echter gericht op verbeterpunten. Daarom ga ik vragen stellen over hoe de gewenste toekomst en voor [x] uit zou zien. U kunt zich een toekomst inbeelden voor ongeveer 2030, die rechtvaardig is volgens [x], en hoe de regulering en prijsstructuur van warmtenetten er dan uit zou moeten zien, volgens het perspectief van rechtvaardigheid van [x].

- (Kort, algemeen) **Kunt u kort vertellen hoe de prijsstructuur en de verdeling van kosten en baten er in deze gewenste toekomst uit zou zien?**
    - Waarom moeten de kosten en baten op deze manier verdeeld worden?
    - Wanneer is de verdeling rechtvaardig?
    - Welke aspecten van de prijsstructuur zijn in deze toekomst belangrijk voor [x]?
    - Welke vorm moeten deze aspecten krijgen volgens [x]?

<u>Regulering</u>

- **Welke rol hebben de overheid, warmtebedrijven en gemeentes in deze toekomst, bij de ontwikkeling van warmtenetten?**
    - Wie is dan eigenaar van de warmtenetten in deze toekomst?
    - Wie heeft er zeggenschap over het warmtenet in deze toekomst?
    - In hoeverre moet de overheid betrokken zijn bij het aanleggen van warmtenetten?
    - Wie betaalt dan voor het aanleggen en onderhouden van een warmtenet?
    - Wie draagt de investeringsrisico's van het warmtenet in deze toekomst?
- **In dit toekomstscenario, zijn warmtenetten dan een maatschappelijk goed (van publiek belang) of geprivatiseerd (warmtenetten als business case)?**

<u>Keuzevrijheid</u>

- **In dit toekomstscenario, mogen mensen dan zelf kiezen op welke manier ze hun woning verwarmen? Bijvoorbeeld met aardgas, groengas, warmtepompen of (waar dat er is) met een warmtenet?**

- **Als mensen keuzevrijheid hebben, hoe zouden warmtenetten dan met andere vormen van verwarmen moeten concurreren?**
    - Moeten we dit als concurrentie zien?
    - In hoeverre moeten individuele warmtepompen gereguleerd worden in gebieden waar warmtenetten kansrijk zijn? Waarom?
    - In nieuwe wijken, in hoeverre moeten CV-ketels gereguleerd worden in gebieden waar warmtenetten kansrijk zijn, gegeven dat het gedeelte groen gas in de toekomst mogelijk verder toeneemt? Waarom?
    - Moeten (bestaande) woningen verplicht worden verduurzaamd voordat het warmtenet verder wordt ontwikkeld? Waarom?

<u>Aansluiting</u>

- **In deze toekomst, mogen mensen keuzevrijheid hebben in of ze de aansluiting op een warmtenet willen?** Of moet er een aansluitverplichting zijn? (Hoe zit dat voor bestaande woningen, en hoe zit dat voor nieuwe woningen?)
- **Wie zou de kosten voor het aansluiten op een warmtenet moeten betalen (bijdrage aansluitkosten (BAK))?**
    - Wat is een betaalbare bijdrage voor eindgebruikers om te betalen voor de aansluiting op het warmtenet?

Afsluiting

- **En mogen mensen keuzevrijheid hebben om weer van het warmtenet afgesloten te worden?**
- **Wie zou de kosten voor het afsluiten van een warmtenet moeten betalen?**
    - Wat is een betaalbare bijdrage voor eindgebruikers om te betalen voor het afsluiten van het warmtenet?

Financiële looptijd

- **Welke financiële levensduur of terugverdientijd zou er gebruikt moeten worden bij een businesscase van een warmtenet?**
    - Een warmtenet gaat langer mee dan één generatie. Zouden volgende generaties ook mee moeten betalen aan de kosten van een warmtenet? **Zou de financiële levensduur een langere looptijd moeten krijgen, zodat het meer overeenkomt met de technische levensduur?**

Tariefbepaling

- **In dit toekomstscenario, hoe worden dan de warmtetarieven bepaald?**
    - Bijvoorbeeld op een NMDA-principe, of gebaseerd op de kosten van het aanleggen van een warmtenet, of op een ander principe?
    - Welke winst of rendement mag er zijn voor warmtebedrijven?
- **Zou er een maximum warmtetarief moeten zijn?**
- **Zouden er subsidies, toeslagen en belasting(voordelen) moeten zijn?**

Verschillende tarieven

Bij de wetgeving van de Wcw die er aan komt, worden de tarieven van warmte gebaseerd op de kostprijs van het warmtenet. Dit kan ertoe leiden dat er verschillende tarieven zijn tussen verschillende warmtenetten.

- Is dit eerlijk? **Of zouden de kosten voor warmte bij elk warmtenet gelijk moeten zijn?**

- **Mogen de tarieven verschillend zijn tussen huidige gebruikers van een warmtenet, en nieuwe gebruikers die worden aangesloten op het warmtenet?**

Afsluitende vragen

We hebben nu ongeveer besproken hoe een rechtvaardige, gewenste toekomst voor de prijsstructuur volgens [x] eruit zou moeten zien.

- **Hoe kunnen we ervoor zorgen dat de prijsstructuur over het algemeen als rechtvaardig wordt ervaren, waarbij de hieruit volgende kosten ook als betaalbaar worden ervaren, en warmtenetprojecten als haalbaar worden gezien?**
- **Hoe kan de prijsstructuur eruit zien om te voldoen aan de belangen van alle stakeholders die ermee te maken hebben?**
- **Hoe bereid zou [x] zijn om deze prijsstructuur te steunen?**
- Indien nodig extra vragen: Wat is de verwachting voor de ontwikkeling van de prijsstructuur van warmtenetten voor de komende 5, 10 of 20 jaar?
    - Wat is een realistische wens voor de toekomst van de prijsstructuur van warmtenetten voor de komende 5, 10, 20 jaar?
    - Wat zou volgens [x] de eerste stap op dit gebied moeten zijn?
- **Als de prijsstructuur op orde is, halen we de klimaatdoelen voor 2030 en 2050 dan of zijn er nog andere problemen op te lossen?**
- Zijn er nog andere dingen die niet naar voren zijn gekomen, die u wel wilt noemen?

Afsluiting

Afsluiting interview
Ik denk dat we alle onderwerpen die we wilden bespreken, behandeld hebben. Heeft u nog andere opmerkingen, of is er nog iets dat u zou willen toevoegen? Afrondend heb ik nog een paar praktische vragen.

Gegevensopslag, gegevensanalyse, resultaten
Naar verwachting rond ik een conceptversie van mijn onderzoek af in juni. De definitieve versie verwacht ik eind augustus af te hebben. Daarna zal het onderzoek gepubliceerd worden in de database van de Radboud Universiteit (Radboud Repository) en waarschijnlijk ook door Royal HaskoningDHV worden verspreid, bijvoorbeeld onder collega's en op de website.

- Als u wilt, kan ik u het **transcript** van dit interview toesturen, zodat u weet welke informatie ik uit het interview gebruik voor mijn onderzoek.
- Vindt u het nog steeds goed als ik uw **echte naam en organisatie** noem in het transcript van het interview en in mijn masterscriptie?
- Wilt u de **definitieve versie** van mijn scriptie ontvangen, als ik deze heb afgerond?
- In het geval dat het analyseren van de gegevens vragen oproept, kan ik dan **opnieuw contact** met u opnemen?

Feedback / Vragen / opmerkingen
Heeft u nog vragen voor mij? Of opmerkingen of feedback over het onderzoek of het interview? Dit kan natuurlijk positieve of negatieve feedback zijn.

Bedank de respondent voor zijn bijdrage
Heel erg bedankt voor uw tijd en inbreng tijdens dit interview!

Appendix E. Overview of stakeholder (mis)alignment

Table E1. Overview of stakeholder (mis)alignment (absolute numbers)[7]

Aspect	Utilitarian	Libertarian	Egalitarian	Total
Strategy	6	1	2	9
Consumer Tariffs	1	2	6	9
Financial Feasibility	4	2	4	10
Division of Roles	4	2	6	12

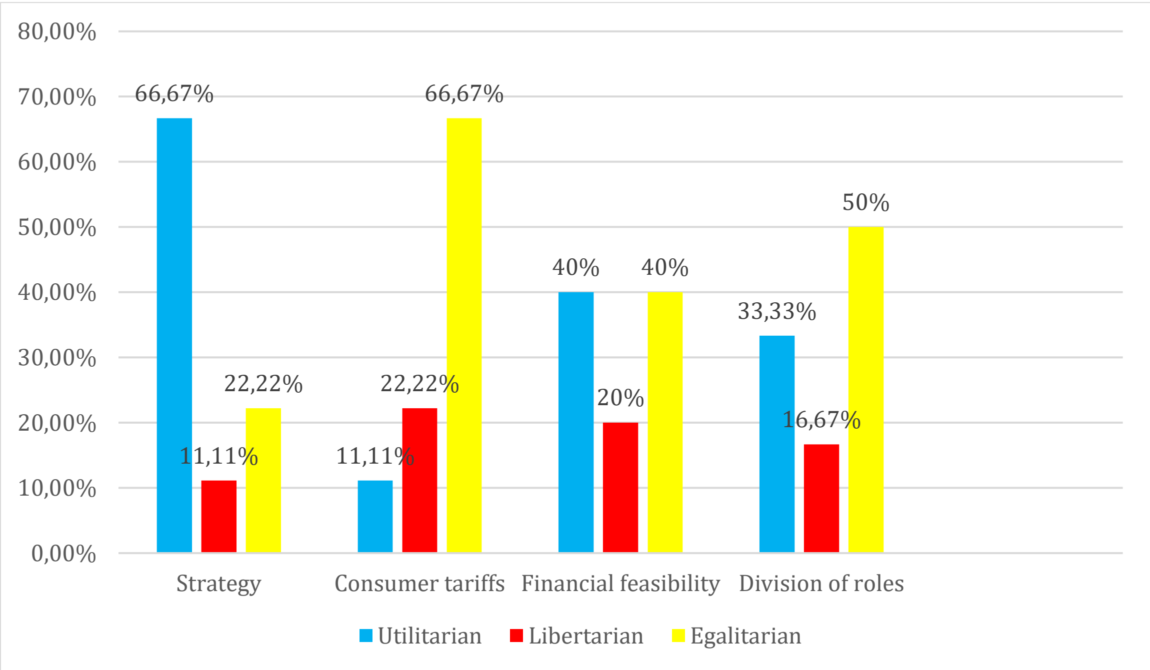

Figure E1. Overview of stakeholder (mis)alignment (relative numbers)[7]

[7] Stakeholders that are in-between principles or without a clear opinion are not included