The role of values and norms in challenging climate change

A case study of the interaction between social groups involved in the development of the Warmterotonde.

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CHORUS singing

strophe 1

Wonders are many, and none is more wonderful than man; the power that crosses the white sea, driven by the stormy south-wind, making a path under surges that threaten to engulf him; and Earth, the eldest of the gods, the immortal, the unwearied, doth he wear, turning the soil with the offspring of horses, as the ploughs go to and fro from year to year.

antistrophe 1

And the light-hearted race of birds, and the tribes of savage beasts, and the sea-brood of the deep, he snares in the meshes of his woven toils, he leads captive, man excellent in wit. And he masters by his arts the beast whose lair is in the wilds, who roams the hills; he tames the horse of shaggy mane, he puts the yoke upon its neck, he tames the tireless mountain bull.

strophe 2

And speech, and wind-swift thought, and all the moods that mould a state, hath he taught himself; and how to flee the arrows of the frost, when 'tis hard lodging under the clear sky, and the arrows of the rushing rain; yea, he hath resource for all; without resource he meets nothing that must come: only against Death shall he call for aid in vain; but from baffling maladies he hath devised escapes.[1]

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[1] Sophocles, *Antigone*, trans. R.C. Jebb, at classics.mit.edu/Sophocles/Antigone.html (accessed: 05 May 2016)

1. Introduction

Philosophical anthropology aims to understand what it means to be human; it is the quest for man. Sociology, psychology, anthropology and other studies that concern human life provide perspectives to grasp this matter.[2] These varying perspectives conclude, regardless of ones position in society, that death awaits us all. Death, as the end of physically *'being-in-the-world'* (Heidegger, 1927) is assumed in this thesis as the inevitable fate of mankind. The cultivation of nature is man's way of dealing with the finitude and contingency of life (Grant, 2007). Think for example about Dutch dikes, vaccinations, lightning rods, energy infrastructures and other seemingly normal and available things in our surroundings that illustrate humanity's desire to organise and order life.

Man's perpetual drive to understand life, through the sciences, also shows the reach and boundaries of knowledge about this world. If understanding the world has a temporal character because of continuous new insights – take the Western history of understanding the universe as an example - then the interpretation of the world faces the same contingency; knowledge of man is gained through media such as a telescope or scientific models, though these tools are in a continuous, dynamic state of change.

1.1 Coping with being a *Mängelwesen*; temporality of life and understanding

In this thesis the finitude of life and the finitude of understanding life is complemented by the philosophical views of Arnold Gehlen. This perspective will eventually lead to the introduction of the topic and the generation of the research questions.

One of the notions in philosophical anthropology is Arnold Gehlen's (1940) notion of man being a *deficient being* (in German: *Mängelwesen*). According to Gehlen, humans are born deficient and are dependent on others for their survival in nature. Man has no well-developed skin to survive the seasonal changes, no well-developed instinct to protect himself against animals and is therefore biologically condemned to dominate nature (Gehlen, 1940). Since humans are part of nature and therefore required to live in relation to it, the deficiency of mankind has led to innumerable designs, such as artefacts, traditions and institutions (see Marquard 1989 and 1991). All with the aim to cope with the world surrounding him.

By taking the notion of the human finitude together with the latter, the main line of thinking in this thesis will be that man is intrinsically motivated to cultivate the world and grasp it because of his finite and deficient nature (Grant, 2007). The Dutch dikes, sanitation systems, laws and other art are all emerging properties of man cultivating nature in order to survive and understand life.

In the next section, a historical overview will be given of man dealing with natural phenomena throughout Western history, thereby also explicating that the understanding of the world is rather an hermeneutic interpretation, and therefore inescapably temporal and situated.[3] The latter is in line

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[2] For a comprehensive overview of the question concerning man, please see Sapiens: A brief history of humankind (2015) by Y.V. Harari.
[3] For an introduction and in-depth overview of natural philosophy, please see: A History of Natural Philosophy, From the Ancient World to the Nineteenth Century (2007) by E. Grant.

with Martin Heidegger's *existentiell analytics* in *Sein und Zeit* (1927), in which Heidegger states that man has always a certain attunement or mood (*Stimmung*) in relation to the world, thereby visualizing the subjective and temporal character of relating to the world and interpreting it.

1.1.1. Philosophiae naturalis: grasping nature

The will to understand life, natural phenomena and to understand something external to the body, can be traced in Western history.[4]

One way of looking at the will to understand life and give meaning to it is by going back to antiquity where the roots of natural philosophy can be found; natural philosophy being the school of philosophy that is concerned with the structures of nature and physical reality as a whole. Radically different than Greek mythologies, Thales of Miletus, an early philosopher who lived around 500 BC, initiated a tradition of thought directed at the causal relations and structures in nature rather than basing explanation on the gods. According to Thales of Miletus, the world consists of water, merely water as the most determining factor of natural phenomena, thereby doubting the position of the gods dictating the faith of natural phenomena. At the same time, Pythagoras took a different approach by introducing geometry to explain the spherical nature of the world and the atomists were even arguing that the world consists of small particles, which we nowadays explain as atoms. The resemblance in this line of thinking is that *"rather than attribute earthquakes to Poseidon, god of the sea, as [the] Greeks had done for centuries, Thales chose to give a natural explanation, as did all the Pre-Socratics who followed him"* (Grant, 2007, p. 8).

After the Pre-Socratic thinkers, a different view of nature emerged from the works of Aristotle, specifically in his *Physica* (Grant, 2007, p. 40). Whereas the early natural philosophers did not provide a structural method, Aristotle introduced the importance of empirical analysis and related to it, inductive reasoning. The important key to understanding is the fact that a certain desire rose to understand and explain nature by finding the *archê;* its roots. There are of course theories that justify the latter in a variety of ways. However, the fact that human beings are finite and deficient can be a reasonable explanation for the rise of natural philosophy.

Natural philosophy shows the scientific roots and activities of mankind, which led to our current day natural sciences (Grant, 2007). In our current explanation of nature, the position of the natural sciences is indisputable. It can even be said that the sciences dominate the frame through which we understand the world. It is astronomy where our origins are explained, biology from where we understand our behavior and physics to get a grip on laws of nature. If this is all true and considering the dominant position of the natural sciences to explain natural phenomena, how come we cannot find a solution to tame the problems of climate change? Isn't this just a scientific problem? The chorus in Sophocles' Antigone praises mankind's capabilities and inventions of taming the untamed world of which death is the unconditional motivator. Isn't climate change deathly and pressing enough in order for us to find solutions that deal with the problem? In other words: if the natural sciences provide us ways to compensate our finitude and deficiency, how come that no large scale solutions are found and used for our climate change problems?

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[4] For the sake of demarcating the field, the focus will be on Western history.

1.1.2. Philosophiae naturalis principia mathematica: dominating nature and the scientific revolution

The birth of natural philosophy in antiquity formed a specific way of thinking about nature throughout Western history. In the early days of Christianity, natural philosophy was applied to understand God's creation as a way of understanding the order of things (Grant, 2007). This line of thinking also dominated the early medieval times (Taylor, 2007). However, in 15th and 16th century three main developments in the Western world led to a dominant role of natural philosophy in understanding life.

The first development is the reformation in Christianity leading to the uncoupling of religious and individual life (Taylor, 2007). Protestantism and deism found their birth, enabling man to use reason and his tools to understand the design of God without necessarily applying a religious justification to the outcome of the inquiry. The second related development is the invention of the telescope and the microscope leading to a revolution in scientific tools available for inquiry. These kinds of inventions made a more sophisticated view on nature available due to the character of mediation that these media provide. As a third development, the invention of the printing press led to the opening of possibilities for sharing the gained insights by scholars. For example, Newton's *Philosophiae naturalis principia mathematica*, this 1687 work set the groundwork for physical and mathematical laws of explaining natural phenomena, leading to a demystification of the worldview and providing a way for a more rational explanation of the life (Dijksterhuis, 1950).

According to Grant (2007), all of this led to the evolution, or so-called scientific revolution, of natural philosophy to the natural sciences as we know them today (Grant, 2007, p. 278-285). The key in this change of perceiving reality is the specific approach that became widely applied (Grant, 2007, p. 285). In the 16th century, Francis Bacon proposed an approach that substantially influenced the power relation between man and nature. Francis Bacon's method, the *instrumental approach* to nature, argued for dominion of man over nature by torturing it and thereby finding its secrets (Grant, 2007. p. 275-280). This implies that the study of nature was no longer a study to gain insights into natural phenomena, primarily based on the motivation to understand nature (Grant, 2007). Rather, it became close to understanding nature in order to structurally influence it according to our desires (Grant, 2007). This dynamic has subsisted throughout later centuries and is still active in our relation with nature. Just think about the use of fossil fuels for our own benefits, the genetic modification of vegetables and the laboratories in which animals are used to find the origin of diseases. The instrumental approach to nature, by relying on the scientific method can be seen as a revolution in the history of natural philosophy, leading to the natural sciences as we know them today.

1.2. Science and facts: coping with climate change

The scientific method provides us with various insights from which we develop our truths about the world. This also counts for the understanding of climate change. Enumerable models are used to find patterns in the climate system and thereby to understand how the climate works. The UN organization called the International Panel on Climate Change (IPCC) is one of the organizations

providing models and other studies on which world leaders and scientist rely in dealing with climate change. For two decades, scientists and world leaders have universally come to the understanding that climate change is becoming a fundamental issue. Because of this, climate change is a topic that is currently hotly debated in society. In the last twenty years, international governmental climate policies and science have focused on avoiding dangerous situations regarding climate change - 2 degrees of temperature increase are seen as the limit for the sake of avoiding health, energy and security issues. Objectives have been developed concerning this situation and are perceived as the core targets in the scientific and governmental research on climate change.[5] This shows that governments act together in finding solutions for the climate change problems in order to be able to subsist their position in the world.

In this thesis, it is assumed that climate change problems can be perceived as pressing and deathly as death itself. Because of this, mankind can potentially use its abilities gained throughout the history of inquiring nature enabling him to tame these problems. For example, creating sustainable technologies for sustainable development. However, the fact is that perspectives on solving climate change problems by sustainable developments, and even the understanding of sustainability, is not universally shared, leading to friction between actors such as governments, political parties, residents, interest groups et cetera. The question is why these frictions occur, whereas there is a universal acceptance of the urgency to challenge climate change. Stated differently: if sustainable development and sustainable technologies are directed at enhancing the quality of life, how come competing perspectives on these activities dominate the field, leading to frictions and blocking a sustainable development? It may be the fact that our temporal and finite understanding of reality leads to different, finite, interpretations of reality, which could explain competing perspectives on sustainability.

Before introducing the research questions, it should be clear to the reader that this thesis concerns the question whether a variety of competing interpretations of reality can be overcome if the context demands immediate action or a certain pressing need. In our case it comes down to the practical question whether competing interpretations of sustainability can be overcome if climate change becomes deathly as death itself. On an abstract level, the thesis is directed at the question whether issues of climate change can lead to a shared interpretations of reality in which prejudgments and beliefs of people are omitted, or whether we are bound by our own horizon of experiences, beliefs and truths.

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[5] The IPCC (International Panel on Climate Change) and UNFCCC (United Nations Framework Convention on Climate Change) are forming the core platforms for providing scenarios and data for international conferences and research on the topic of climate change.

1.3. Problem statement and introduction of the case

(Figure 1. Protests against a technological solution)

Figure 1 shows the protest of people against the implementation of the Warmterotonde (in English: Heat roundabout) in the Netherlands[6]. The protests give an insight to the debate about the Warmterotonde. The main narratives in the debate about the Warmterotonde is formed by two polarized group of actors. One group is arguing that the Warmterotonde will be a sustainable solution to the current situation, because of waste heat from coal-fired power plants being used in the region. Whereas other actors argue that the Warmterotonde is not sustainable because it leads to a lock-in of coal-fired power plants. According to this last narrative, sustainability would mean that coal-fired power plants are replaced by sustainable energy systems. The example of the debate about the Warmterotonde shows that the interpretation of reality and the interpretation of "sustainability" is different for each of the social groups taking part in the debate. The question is whether this could be overcome.

In 2011 in order to meet the Dutch climate goals, the regional government of South Holland proposed to redirect waste heat from industries to the greater area of South Holland, thereby creating a sustainable development to meet the need of challenging climate change. The scientific, technological and economic feasibility of the technology was assessed in 2014 and has led to ambitions for implementing the technology in the coming years. On a methodological level, the regional government made use of scientific data and models to understand the facts of the problem and develop a solution. Hence it is in line with the scientific *enframing* of reality.

The Warmterotonde is proposed for the sake of expanding sustainability and thereby leading to a better world for mankind. Interviews[7] with protesters confirm that they agree that sustainability is

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[6] See: www.warmopweg.nl for more information about the Warmterotonde.
[7] The results of these interviews are discussed in chapter 3.

crucial for mankind. However, they disagree about the method that the regional government is proposing. This shows that there is a shared goal, but that there are different notions on how to resolve the matter among different social groups. It can be said that the explanation of nature may be dominated by the natural sciences, but the practical use of these scientific insights is not uncontested. The research question in this thesis is related to the latter.

Life is finite and this fact has led to the birth of inquiring nature in order to cope with this uncertainty of life. The natural sciences provide insights and solutions that have shown their importance throughout history. Just think about the delta works, medical ultrasound, central heating systems and GPS. In the same line of thought, the Warmterotonde is proposed as a scientific solution to a problem – a sustainable development - thereby assuming that mankind will benefit from it. However, the development of this artefact is contested by various social groups. Implying that instead of a convergence of views, a divergence of views is dominating the current discussion on solving climate change problems by means of a technological solution. How come? I assume that we need to open-up the black box of the development of an artefact, thereby shedding a light on the interaction between the social groups that take part in the discussion about this very technology, and that we need to understand their values and norms and translate these insights to answering the research question that I will introduce in the next paragraph.

1.4. Introduction to the research question

The research aims to understand the dynamics between social groups that lead to this present situation in which different social groups have different thoughts on a broadly shared idea about the purpose of a technological development, which is to enhance the quality of life. Stated differently: how come sustainability as a concept is shared by all social groups as being something to strive, whereas these groups disagree about real life sustainable "actions". In order to link theory to present empirics, the case of the Warmterotonde will form the real life topic of study.

As will be explained in chapter 1.5., a theory from the field of philosophy of technology is selected, that allows two things:

1. Allowing to systematically analyse the relation between the development of the Warmterotonde and the social groups that are related to this very development.
2. Allowing to analyse how these social groups interact, which views they share and disagree about, and how this interaction influences the development of the technology.

By applying a theory from the field of philosophy of technology, the aim of the research can be approached systematically.

The research question is as follows:

"How to understand the role of different views of the different social groups (stakeholders) on the development of the Warmterotonde, assuming that these social groups do share the view that the technological development of more sustainable technologies is to enhance the quality of life?"

This research question will be answered by assessing the following sub-questions:

1. Which philosophical theories reflect on the development of a technological artefact in which social groups influence this development?
2. What are the social groups involved in the development of the Warmterotonde?
3. What are the differences in views and values between these social groups; what are the congruencies and incongruencies and how can the incongruencies be overcome?
4. What does the current discussion look like: what are the main presuppositions?

Next to an analysis of the variety of views that surround the Warmterotonde, the aim of this research is also to assess and reflect on existing philosophical theories or perspectives that are traditionally applied in this type of research.

In the course of this research, a certain philosophical theory will be chosen as a theoretical frame for answering the research question. However, this very theory will be assessed on its pretentions and reach. Taken together, the aim of this research is to understand the role of different views of social groups on the concept called "sustainability" by analysing the Warmterotonde, which is presented as a sustainable technological development. The Warmterotonde case allows to use empirical data in the research about the interpretation of "sustainability."

1.5. Methodology and structure of report.

The methodology of this research consists of two main steps.

First of all, a concept from the *philosophy of technology* is selected that is close to the topic of study. The assumption is that a concept or model needs to be chosen in a research in order to be able to have a focused and demarcated approach on the matter. However, each theory faces certain challenges. The selected concept will be critically assessed and the challenges of the concept will be overcome. This is done by assessing the implications and reach of this particular concept. After this, the next step consists of applying the concept to the topic of study. So first of all a theory is selected. After this, a critically assessment takes place, thereby tailoring the concept to the aim of this research which is to understand the variety of views on sustainability, and how these social groups agree and disagree about this very concept. It is assumed that taking these two methods together will provide an answer to the research question.

The next main step in this research is to apply the theoretical framework to the empirical analysis of the Warmterotonde. It can be seen as a medium through which the empirics are analysed, specifically focussing on the questions that are raised about the social groups, their interaction and their relation with the Warmterotonde.

These two main steps lead to the following structure of the report:

Chapter 1 introduces the problem statement concerning the question how different interpretations of "sustainability" occur and how these can potentially be overcome, in light of the the pressing climate change issues. The Warmterotonde is selected as a case for gaining empirical data. The

Warmterotonde is involved in a discussion about it "sustainable" character, thereby presenting a fruitful source of data.

Chapter 2 presents the philosophical concept chosen to systematically analyse the different views of social groups involved in the development of the Warmterotonde. A concept from the philosophy of technology is chosen because it fits our question and case. However, each philosophical theory has its own weakness. The weakness of the chosen philosophical theory is assessed and structural remarks are proposed in order to tailor the theory to the aim of this research.

Chapter 3 is directed at applying the principles of the philosophical theory to the empirics. Chapter 3 leads to an answering of the research questions. Chapter 3 can be seen as the chapter in which the actual empirical research takes place.

Chapter 4 is a concluding chapter, summarizing the results and answering the research questions.

Motivation for methodology.

It is not common to perform an empirical analysis in philosophical research. The field of applied philosophy – in this thesis contemporary philosophy of technology - is one of the few philosophical disciplines in which empirics play a role. On the other hand, there is no dominant position for normativity and philosophical theories in the sciences as it is merely descriptive. As a student in both Philosophy and Industrial Ecology, I have been intrigued by the possibility of making the best of both worlds, which is why I combine both philosophical theory and the empirics to the study of the research question.

"Understanding of people's interpretations of a technology is critical in understanding their interaction with it" (Orlikowski & Gash, 1994, p. 175)

2. Framing the research question by following the social construction of technology (SCOT) approach

The research question that is brought forward in the previous chapter binds both the need for a theoretical, philosophical answering of the question as well as a more empirical answering. The research question not only considers the dynamics leading to the differences in views on the Warmterotonde but also concerns a real life situation in which social groups act in relation to this technology. For this, we need to select a frame or concept that allows getting a grip on the relation between the development of the Warmterotonde and the variety of views related to this very development.

2.1. Concepts to approach the question

In the course of Western philosophy, the question whether it is possible to relate to an object without being prejudiced is something that has always been a source of debate.[8] This same dynamic applies for answering a question. We could ask ourselves whether it is possible to answer a question without already having a certain idea about it because of earlier experiences? Or, stated differently, is it possible to read this specific page without using your memories or so-called 'horizon of experiences' to interpret it? This question is a direct link to the chapter 1 in which the idea of temporality and finitude of life and understanding it is brought forward. Because of our deficient nature, the knowledge about reality is based on an interpretation that derives from our horizon of experience and horizon of knowledge.

The inevitability of the latter implies that a reasonable position to take in order to answer a question scientifically is to stick to a theory that has gained both empirical and theoretical support in the field, thereby acknowledging the fact that each answer to a question affects the role of other possible answers. This comes down to the argument that there is no unsituated form of answering a question, as every reaction relies on earlier experiences and knowledge, i.e. a theory or model about the world. The best thing to do is to select a strong frame of knowledge.[9] This also counts for the perspectives that are taken in understanding the relation between technology and society.

The relation between technology and society has led to the birth of the *philosophy of technology* in 20th-century Western philosophy. In this tradition, the major part of the 20th century has been dominated by a more conservative, sceptical view on the role of technology in society. Thinkers in this tradition, known as the *classical philosophy of technology* see the dominance of technology as a cause

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[8] This discussion became a major field in the continental philosophy in the 20th century by the works of Husserl, Heidegger, Sartre & later on by Gadamer.
[9] Strong in this sense means that it consists of fruitful peer review and is perceived in literature as a reliable and sufficient model.

of loosing a direct relation to the world. Thinkers in this tradition are for example Jacques Ellul and Martin Heidegger.[10]

In contrast to these, the late 20th century consists of thinkers who did not ask the question: "What is technology?", as the earlier thinkers did, indeed they moved to asking the question: "How to make technology?" (Bijker, 2010, p. 63). This so-called *empirical turn* in the philosophy of technology of the 1970s (Brey, 1997) focused on the effects of individual technologies on life instead of perceiving technology as an abstract concept. Thinkers in the early 20th century perceived technology as an autonomous actor having the power to influence and mediate the relation between mankind and the world, whereas the late 20th century focused on technologies, as things that can be influenced and shaped by society as well. The interpretation of technology and technological artefacts changed in the 20th century; this again shows the temporality of understanding reality.

The polarized view on the subject gives way to explain the two major traditions in the philosophy of technology. These traditions are the *technological deterministic* tradition and the *social constructivist* tradition. There is also a third tradition called the *interactionist* tradition. The latter is a relatively new tradition also deriving from the empirical turn of the 1970s and is based on the idea that artefacts shape our understanding of reality because of their role in our life world (Ihde, 1990; Lie & Sorenson).

Answering the role and nature of technology is a complicated one. In technological deterministic views, technology is seen as a driving and autonomous force of social and cultural change. Within technological determinism, there is room for the more *radical* or *hard* forms of determinism as well as for the approach, which is called *soft* determinism. The different forms represent the amount of influence technology has on its own development and on society. Hard- and soft technological determinism do share the idea that it eventually comes down to technology as a dominant force that shapes the outcome of the development of a technological artefact (De Mul, 2002).[11] Examples of this view are for example roads and parking spots in cities. The existence of automotive technologies makes these infrastructures necessary. It is not up to social groups to determine whether there will be a road connecting cities. Instead, automotive technologies drive the developments in civil infrastructures such as bridges, roads and the like.

The dominant role of technology as the single driver in technological determinism also implies that there is little to no focus on the role of social groups in the development of a technology. This is contrary to the social constructivistic views. In this tradition, social actors do have an influence on the development and outcome of a technological artefact, thereby arguing that technology is no longer autonomous, but is instead shaped by society. As it is the case for technological determinism, social constructivism also has its radical and soft versions. These will be explained in the next section. But before elaborating on social constructivism, it should be stated that the truth may lie somewhere in between these two traditions.

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[10] For Dutch readers, H. Achterhuis' *Van stoommachine tot cyborg, denken over techniek in de nieuwe wereld* (1998) gives a clear overview of the philosophy of technology in the early 20th century. Otherwise Jacques Ellul's *The Technological Society* (1964) or Martin Heidegger's works, especially *The Question Concerning Technology* (1977) can be consulted as a representative way of thinking about the role of technology in the early times of the philosophy of technology.
[11] For an extensive introduction of technological determinism, see: Marx & Smith (1994). *Does Technology Drive History? The Dilemma of Technological Determinism.*

2.2. Social constructivism: an overview

2.2.1. Emergence of social constructivism

Social constructivism is born in the late 70s of the 20th century (Bijker, 2010). The social constructivist theory was one of the emerging views in Western history that were part of a broader intellectual movement that concerned the retrieval, construction, meaning and the use of knowledge (Berger & Luckmann, 1966). One could, therefore, see social constructivism as part of a broader tradition in which intellectuals of the Frankfurter Schule, such as Theodor Adorno, Herbert Marcuse and Jürgen Habermas also take part. These thinkers aimed to shed a critical light on how power and knowledge are constructed, structured, retrieved and used in our societies.[12] The key to this intellectual tradition is that the sciences are not seen as neutral in the sense that they provide unsituated insights. Instead, ideologies, interests and agendas of scientists influence the outcome of inquiry. According to Habermas (1962) a rational, merely critical use of reason, which reflects the principles of the Enlightenment, has turned to a prejudiced use of reason, fuelled by political and economic interests (Habermas, 1962). So, on the one hand, there are the sciences providing insights and on the other hand, scientists influencing the insights that the sciences provide. Hence the backbone of social constructivism, which argues that there is an important role for actors in the development of technology, rather than arguing from a technological determinist position that technology is an autonomous force that takes nothing from social groups or from society as a whole.

The use of this broader view of knowledge found its way into the science and technology studies through the work of Berger & Luckmann (1966). In their book, *The Social Construction of Reality*, Berger & Luckman lay the seeds of what is now known as the *sociology of knowledge.* Within sociology of knowledge, all knowledge claims and the use of knowledge need to be perceived as being socially constructed (Bijker & Pinch, 1984)[13]. This means that:

"explanations for the genesis, acceptance and rejection of knowledge-claims are sought in the domain of the Social World rather than in the Natural World" (Bijker & Pinch, 1984, p. 401).

An important implication of this view is that, since all knowledge claims are socially constructed, there is no initial truth that lies behind the frame or medium that is used to look at the world by a certain individual or group of people (Bijker & Pinch, 1984), meaning that there is nothing epistemologically special about scientific knowledge. It should be seen as one kind of knowledge in a broader web of knowledge frames, or models, for example including that of primitive tribes and cultures (Bijker & Pinch, 1984, p. 402). The point is that analysing truths or knowledge is not something that needs to be done at an epistemological level but on a sociological level, because if truth is formed by engineers, these truth claims needs to be analysed at exactly this level, i.e. the level of the engineers.

Concerning the research question about the purpose of the Warmterotonde, what is needed according to Layton (1977):

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[12] See for a more elaborate view on the three forms of knowledge retrieval that Habermas distinguishes in his 1968 Erkenntnis und Interesse.
[13] For further reading, please see: Nye, 1992, p. 233-235.

"is an understanding of technology from the inside, both as a body of knowledge and as a social system. Instead, technology is often treated as a 'black box' whose contents and behaviour may be assumed to be common knowledge" (qtd. in Bijker & Pinch 1984, p. 404)*.*

Opening the black-box of the development of a technological artefact is something that might shed a light on the variety of views on the development of a technology that seems to be for the greater good, e.g. a sustainable technological development.

As argued earlier, the inclusion of users or social groups in the sociology of knowledge is first and structurally done in social constructivism (Oudshoorn & Pinch, 2008, p. 543-544). Since social groups are currently involved in the development of the Warmterotonde, the social constructivist line of thinking will be extensively introduced in the next section to see whether it fits the purpose of our research.

2.2.2. A variety of social constructivist approaches

Social constructivism as a concept within the broader intellectual development argues that values and views held by society influence the development of a technology. The concept called *sociotechnical system* captures the level on which these dynamics between the development of a technology and society take place. As the pioneer on this notion, Hughes states in Bijker et al. (1989):

"Because they are invented and developed by system builders and their associates, the components of technological systems are socially constructed artifacts. Persons who build electric light and power systems invent and develop not only generators and transmission lines but also such organizational forms as electrical manufacturing and utility holding companies" (Bijker et al. 1989, p. 52).

Within social constructivism, different approaches have been developed in the 80s of the 20th century (Brey, 1997). The range of these approaches is similar to that of technological determinism; there are hard social constructivist approaches and soft social constructivist approaches. These different approaches, however, do have something in common (Brey, 1997, p.3).

The approaches share the assumption that technological change and the development of technologies do not happen linearly or follow a step-by-step protocol, rather the outcome of a technological development is the product or emergent of the interplay between various social groups, the technology itself, society and culture. In other words, there is no internal logic to the path that the development of a technology takes. Rather, social constructivism assumes that groups of people, which are named in literature as *relevant social groups, actants, actors, stakeholders and publics* all have their own perspective on a technology, give meaning to it in a unique way and all strive to fix the development and outcome of a technology in their favour by using their resources (Brey, 1997, p.4). Hence, the roots of the sociology of knowledge.

In contrast to normative theories in philosophy, like the critical theory of the Frankfurter Schule, social constructivism does not presuppose one truth to which each technology will align. Moreover, it is the context dependency and the interaction between the social groups that led to the final form

and outcome of a technology (Klein & Kleinman, 2002).

Social constructivism is branched into a variety of approaches. These approaches can be divided into *strong social constructivism, mild social constructivism* and *soft social constructivism*, which is also known as *actor-network theory*. These approaches are as follows:

I. *Strong social constructivism*

The strong social constructivism approach is generally labelled as the most original form of social constructivism and is strongly in line with the sociology of knowledge (Brey, 1997). The *social construction of technology*[14] approach – abbreviated as SCOT - is the well-known approach within strong social constructivism. This approach argues that the development of a technology in the sociotechnical system is solely shaped by relevant social groups negotiating with each other about the value of the technology and eventually converge to a moment of closure, leading to a stabilized technology (Bijker, 1984). In this approach, there is no power or influential properties given to other actors, whether human or non-human, besides the relevant social groups themselves (Brey, 1997, p. 5).

Social construction of technology (SCOT) studies therefore mainly focus on an agency-centred approach to the development of technology. The roots of this SCOT literature can be found in the work of Bijker & Pinch (1989). An important key in the SCOT approach is that it ignores other factors that might have an influence on the development of a technological artefact. Think for example about economic and political influences in a society. It seems to be common sense that these have an influence on the development of a technology as well.[15]

II. *Mild social constructivism*

The influences that find little to no focus in the hard social constructivism, do find a role in mild social constructivism. The mild social constructivism approach is different from strong social constructivism in its assumption that there might be other, non-social influences related to a technology, like political, economic and scientific influences that shape the process of a technologic development (MacKenzie & Wajcman, 1999).

The mild social constructivists do not take the position that these other influences in themselves shape the development of a technology in the sociotechnical system, rather they accept that these influences exist in relation to a particular social context in which the technology exists. The returning argument that is made in literature on mild social constructivism is argued by Williams & Edge (1996) as:

"the concept that there are 'choices' (though not necessarily conscious choices) inherent in both the design of individual artefacts and systems, and in the direction or trajectory of innovation programmes" (Williams & Edge, 1996, p. 866).

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[14] The "social construction of technology approach" should not be confused with social constructivism. It is an approach in the field of social constructivism.
[15] For further reading on the topic of critique on the SCOT model, please see: Russell (1986); Winner (1993).

Whether this implies an ethical responsibility is not clearly defined, yet this position shows that the relevant social groups do have the possibility to choose certain paths of development, considering the role that things as religion, fear, politics, et cetera play in the sociotechnical system.

Eventually these properties of social and non-social actors shape the outcome of a technology in a certain context (Brey, 1997, p.5; MacKenzie & Wajman, 1999). The main approach that derives from mild social constructivism is the approach called *social shaping.* In sum, the focus in mild social constructivism is more on the web of influences that a technology has in its development, whereas strong social constructivism mainly focuses on the relevant social groups influencing the form and meaning that a technology eventually gets.

III. Soft social constructivism, also knows as the Actor-network theory

The actor-network theory – abbreviated as ANT - is the third approach that derives from social constructivism and is the softest social constructivist theory; it is nowadays seen as a concept that can both be assigned to the social constructivist tradition and to the interactionist tradition. The reason for this is that ANT does not allocate any significant power difference to social actors and non-human actors such as bolts, material resources et cetera in the construction of a technology. One could therefore argue that the actor-network theory opposes the strong social constructivist theory; not in the sense that it is a defender of technological determinism, but rather because of the fact that it states that a web of interactions determines the essence of a technology. Everything exists in reality, but the interaction between certain existents determines the essence of the emerging technology. A car is an emerging property of the interaction between gasoline, bolts, tires, engineers designing it, a salesman, et cetera. These exist in reality, but combining them gives them an essence, making them part of the emergent property called a car. Hence the difference in interpretation between strong and mild social constructivism about the role of social actors in technological developments. Abstractly stated: a technology is an emergent of a web of human and non-actors relating to each other (Cressman, 2009). At a certain moment in time a specific configuration in the web leads to the mobilization and emergence of a technology. This can be because of opportune circumstances for a specific outcome that is in line with the current dynamics in the world. The latter implies that relevant social groups do play a role, but that their role is not exclusive.

All influential parties in ANT are called *actants*. An actant can also be the technology itself, for example the state of the technology can influence what the limits and possibilities are. This also counts for the current political sphere in a country; the form of a technology can be different in different countries. According to Cressman's article (2009) the authors in the field have a hard time conceptualizing ANT. The point is that ANT should be seen as a tool to clarify and reveal the complexity of our sociotechnical world (Cressman, 2009). As is stated by Law & Callon (1988), about ANT:

"… we are not primarily concerned with mapping interactions between individuals… we are concerned to map the way in which they [actors] define and distribute roles, and mobilize or invent other to play these   roles".

Due to the fact that the social constructivist tradition seems to have a clear eye for social groups in the development of a technology, the social constructivist tradition will be followed throughout this research. There are two main justifications for this:

I. The social constructivist tradition acknowledges and allows us to consider the role of social actors in the development of a technology. This does not mean that it is the ideal tradition to understand the development of a technology, but is does have an eye for the sociotechnical system in which designers, engineers and the technology itself play their various role in the development of this very technology. If the question is to understand the variety of views surrounding the Warmterotonde, then it could be said that the technological determinist tradition does not open up this field of views and social groups.

II. The technological determinist tradition usually interprets technology as a metaphysical concept. Scholars in this tradition talk about "the" technology and how "the" technology changes the nature of mankind. It could be argued that this is a rather reflective attitude talking about already available artefacts or imaginary artefacts and their abstract relation to humans, nature et cetera. It is the empirical turn in the philosophy of technology that moved the discussion from a metaphysical view on technology to analysing concrete technologies and their role in society, as well as how technologies are embedding in the life world of humans (Ihde, 1990; Verbeek, 2005). The topic of study is a concrete technology and how this technology interacts with social groups. This justifies the use of the social constructivist tradition in answering the research question.

Within the social constructivist tradition, the *strong* social constructivist approach specifically highlights the role of these social groups, their views and values. This is why SCOT as a philosophical theory will be used to systematically analyse the relation between the views of various social groups about sustainability and the interaction between these social groups – and interaction between views – in the development of the Warmterotonde; SCOT will be used in answering the research question. The research question is essentially directed at understanding the variety of views and values of social groups on the development of the Warmterotonde as a sustainable technology.

The SCOT approach is a fruitful approach to understanding the dynamics. The actor-network theory and mild social constructivism are in their own way reliable approaches. The actor-network theory can be used as a tool to backcast which configuration in a web of interaction led to a specific outcome of a technology and the social shaping approach can be used to see which other factors play a role in the development of a technology. But since the scope of the research concerns the different views of groups of people regarding an emergent technology, the SCOT approach seems to be most appropriate. It would, however, be unfruitful to leave the insights of the other social constructivist approaches behind.

In section 2.4, philosophical remarks and structural additions will be offered to the SCOT approach, with the aim of constructing a conceptual framework that is tailored to the focus of this research and also to a fine-tuning of the original SCOT approach. This invites us to consider adjusting the conceptual framework with elements of mild- and soft social constructivism.

2.3. Social construction of technology (SCOT)

In this section an overview will be provided of the social construction of technology approach by closely following the original introduction of the SCOT approach in Bijker & Pinch's (1984) article 'The Social Construction of Facts and Artifacts: *Or How the Sociology of Science and Sociology of Technology Might Benefit Each Other.'*

In this original work, the authors provide an insight to the structure of the SCOT approach and to the methodology that is used. First of all, they make clear that the development of a technology does not follow a linear line, which would already present the next steps of a development process. Instead they state that the development process of a technological artefact is something that happens as an alternation of *variation* and *selection* and can take multiple directions (Bijker & Pinch, 1984, p. 411).[16] The driving forces in this process are the groups of people that are related to the technology. In our case, it concerns both the regional government and the protesters, since these social groups have the capacity to influence the outcome of the technology; for example by making use of their blocking power to delay further development of the Warmterotonde (De Bruijn & Ten Heuvelhof, 2008). In the social construction of technology approach, these groups are called the relevant social groups. Earlier on it is said that the words "actor", "actant", "stakeholder" and "publics" are also interchangeably used in the field; SCOT literature mainly talks about relevant social groups. Important to notice is that these groups really do have the ability to push the technological development in a certain desired direction at different stages of development, leading to a field of diverging views on the technology. This dynamic of divergence does not exclude the possibility of following the same path twice in the development of the technology. It could be the case that there is a form of circularity or return during the development. Hence the non-linear path of development (Bijker & Pinch, 1984).

The original SCOT approach contains four related components. The first component is called the '*interpretive flexibility',* followed by the component named as '*relevant social groups',* thirdly '*closure and stabilization'*, and finally, a less mentioned and elaborated component called '*the wider context'*. This fourth component has not received that much attention in early works on the SCOT approach (Klein & Kleinman, 2002) and is sometimes even neglected as part of the general methodology. However, it does play an important role in interpreting the other components, which shall be explained in section 2.4.

2.3.1. Interpretive flexibility

The first component is the interpretive flexibility of a technological development. Interpretive flexibility can be seen as the starting point of a technology being interpreted and valued in various ways. This resembles the idea that the design of a technology is an open process that can take different outcomes depending on the social circumstances of that specific moment in time (Klein & Kleinman, 2002, p.29).

Bijker & Pinch (1984) provide a clear example of this interpretive flexibility by mentioning a case study

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[16] This is one of the major differences with the technological deterministic argument in which technology is the driving force of its development, i.e. autonomous force.

of gravity wave episodes, which is however not a technological development:

 "… *an experimenter, Joseph Weber, was faced by several groups who failed to confirm his experimental claims to have detected large flues of gravitational radiation. By interviewing Weber and his critics, Collins was able to show that the negative results lacked compulsion because there was no agreement as to what counted as the 'same' experiment. It was possible to question whether the negative experiments had really been 'repeats' of Weber's original experiment. The thrust of the negative experiments could thus be diverted"* (Bijker & Pinch, 1984, p. 420).

The lesson to be learned from this example is that the meaning of something can be perceived in various ways and contested on its correctness. This shows the interpretive flexibility in the case of gravity wave episodes; it allows interpretations. It moves the ontic discussion to the arena of interpretations. The example shows that there was a discussion of actors about the conditions of something being the 'same' experiment, considering the reproduction of an earlier experiment.

This openness of a technology and the important role interpretations and values of people have, forms the core of the SCOT approach.

2.3.2. Relevant social groups

The interpretive flexibility applies to the technology itself. Individuals however have these interpretations and perceptions about the technology. In the SCOT approach, the individuals are translated to something called relevant social groups. The argument is that there are social groups in which actors share a set of values, regarding a certain artefact (Bijker & Pinch, 1987, p. 30). One could question whether there are clear-cut relevant social groups or whether it is the case that actors within the relevant social group have their own slightly differing view on the subject. However, for the sake of following the methodology of the SCOT approach, this remark will be touched upon in section 2.4.

The role of these relevant social groups is to propose various, diverging paths for a process of development, by providing their understanding, opinion and views on the technology. The role of the relevant social groups is to widen the possible outcomes of a technology. Outcomes that are related to the understanding of the technology by certain relevant social groups.[17]

This dynamic is in line with the research question. It is the case that sustainability and sustainable development is interpreted and measured in various ways by various relevant social groups. It therefore does make sense to link the notion of interpretive flexibility of a technology to the notion of relevant social groups.

2.3.3. Closure and stabilization

The relevant social groups all have an influence on the development of the technology. In an ideal

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[17] Bijker (1995) provides examples of the development of the bicycle in history. There were different relevant social groups that all had their own understanding of what safety means and what the role should be of a bicycle in society: see Bijker, 1995, pages 19-100.

situation a development continues until all groups come to a consensus (Bijker, 1995, p. 270). This ideal outcome forms the third attached component, called closure and stabilization.

In the previous components of the SCOT methodology, the development process of a technology finds a variety of paths that may be taken. The closure and stabilization component implies that there is a moment of convergence of paths. So eventually, after negotiation and communication of the different relevant social groups' experiences, opinions and perceived meanings of a technology, one final outcome is chosen.

In the original SCOT approach, the closure process is a process in which everyone is eventually content with the outcome; the pluralism of artefacts decreases and one dominant outcome of an artefact emerges (Bijker, 1995; Klein & Kleinman, 2002). Closure mechanisms take place leading to a stabilization of the technology.

Bijker & Pinch (1984) provide two mechanisms for this. The first one is '*rhetorical closure'*, in which it is decided by the relevant social groups that there are no longer issues to focus on. For example, by providing financial help to the groups that are not fully advantaged. The second mechanism is *'closure by redefinition'*, in which a problem is turned into something that isn't a problem at all. For example, think about the notion of privacy and cell phones. People used to think the use of cell phones would reduce their privacy, but nowadays it is seen as something normal to live with. After the use of this closure mechanism, the technology eventually finds a final form that is no longer contested and therefore becomes stable.[18]

2.3.4. The wider context

The wider context is the fourth and last component of the SCOT approach. It is the component that regards the framework on a meta-level. It is not concerned with the methodological steps apparent in the SCOT approach, but rather, as Bijker & Pinch (1984) state:

"Obviously, the sociocultural and political situation of a social group shapes its norms and values, which in turn influence the meaning given to an artefact". (Bijker & Pinch, 1984, p. 428).

Not much more is said about the wider context, but it gives way to critical questions about the overall structure and methodology of the SCOT approach. The wider context is of significant importance to our research, highlighting the relation between the relevant social groups and their mechanisms of giving meaning to a technology.

Furthermore, one could ask how 'content' the different relevant social groups are, whether all social groups are heard, or whether there is a power asymmetry at play in the closure mechanism. The original SCOT approach doesn't seem to give a clear-cut answer to these questions. These are however important topics that need to be incorporated into the original approach, in order to provide a fruitful ground for analysing the research questions. These additions to the original SCOT approach are discussed in the next section.

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[18] Bijker (1995) provides the example of the bicycle that found a stabilization in early 20th century and has ever since not led to radical changes, assuming that electronic devices in road bikes aren't that radical.

2.4. Philosophical remarks and structural additions to the model

One could criticize the SCOT approach on different levels. The remarks could be on the individual components as well as on the overall claims of the SCOT approach. Before moving to critical remarks and structural additions to this philosophical perspective, it is fruitful to wrap-up the original literature on SCOT by quoting the following paragraph of Bijker & Pinch (1984) on what they see as the purpose and the role of the SCOT approach:

"The model has been developed from a series of case studies, and not from purely philosophical or theoretical analysis. Its function is primarily heuristic - to bring out all the aspects relevant for our purposes. And indeed, as we have shown, this model already does more than merely describe technological development: it highlights its multi-directional character. Also, as will be indicated below, it brings out the interpretative flexibility of technological artefacts and the role which different closure mechanisms may play in the stabilization of artefacts". (p. 419)

From this closing statement, one of the early remarks in the 1990s has been on the mere descriptive character of the SCOT approach. Langdon Winner (1993) as a critique on the original work SCOT approach, argues that it has only described the processes of technological development in which social groups play a role, but hasn't taken a normative point of view. According to him, the SCOT approach also has not focused on what the frames and paradigms of the social groups or what their horizon of experience is; no ethical remarks were placed at the outcomes of a technology, and the only social groups that are taken into account are the groups that are apparent in the construction of the technology. This early critique led to the rise of different kind of critiques in years following after. As a philosophical counterargument to the remarks that have been posed by Winner (1993), it could be argued that the lack of visibility of the normative claims, ethical remarks and the internal structure of the relevant social groups does not necessarily imply that these can not be analysed by taking the SCOT approach as a point of departure.

Throughout this section, two main arguments will be introduced and assessed in order to tailor the SCOT approach to the aim of this research. These arguments concern (I) *the composition of the relevant social groups* and (II) *the role of frames of knowledge used by the relevant social groups.*[19] The latter is also introduced to reflect on the potential power relations between actors in their communication. The specific *enframing* of reality by different relevant social groups leads to the question whether the convergence of views and values is even possible; this regards the third component of SCOT. The third component assumes that the interests of relevant social groups and the specific *enframing* of reality are surpassed. One could ask whether this idea of a rational dialogue between relevant social groups, leading to a convergence of views, is even at play in the development process of a technology.

Before introducing the arguments, it should be clear to the reader that questions about the role of

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[19] A third relevant topic is the power asymmetry that can be at play between relevant social groups and how this is related to resources, legitimacy and public opinion. This topic can be a fruitful addition to the original SCOT literature since *"throughout Bijker's text, power is either ignored or deployed in an ad hoc fashion"* (Klein & Kleinman, 2002, p. 34). It however falls beyond the scope of this research.

technology as an autonomous actor or the ontological claims about it, fall beyond the scope of this section. As explained in section 2.1, 2.2 and 2.3, the focus in this thesis is merely on the SCOT approach, with some excursions to the other social constructivist approaches.

The critiques that are given in this section are critiques on the internal claims of the SCOT approach and not on the comparison of it with a different model; it is about the components and the methodology, with the aim to fine-tune them. However, by doing this, the fine-tuning takes place on a theoretical level. The eventual fine-tuning of the SCOT approach might happen after it is translated to a conceptual framework and used in empirical study of the research question.

2.4.1. Composition of relevant social groups

In the original SCOT approach, the notion of relevant social groups is straightforward. It is assumed that the actors within the relevant social group share certain beliefs and thereby share uniformity. A critique could be whether this is correct. In following Williams and Edge (1996) it may be the case that certain members have doubts about the shared ideas and are not fully honest. So what is the role of the individual actors within the relevant social group regarding uniformity? An answer to this will be given in section 2.4.2 in which the notion of *family resemblances* in relevant social groups is brought forward.

A second critique on SCOT concerns the pluralist character of the SCOT model. In the traditional application of the SCOT approach, researchers select relevant social groups that they see as important. However, pragmatically selecting the relevant social groups can lead to a situation in which some of the relevant social groups are forgotten or even not able to join or organize themselves (McAdam 1982, p. 39). An unforeseen situation may occur since it is possible that the neglected group can have a big influence on the development of the technology but is now left unseen. This remark on the relevant social groups leads to a methodological complementation of the SCOT approach: a researcher needs to take into account the pitfalls of pure pragmatic selection of relevant social groups.

As a third point one could argue that there is always a specific moment, or stage in a process in which a relevant social groups is taken into account. The question will then be what the factors are that determine when a relevant social group is considered to take part (McAdam, 1982)? Questions as: Who are the social groups that have been relevant in configuring this specific form? And related to this: how is relevance defined? The original SCOT model doesn't have an eye for this. It is important to consider the latter, since it can explain the influence that different relevant social groups have on the outcome of a technology.

Taking into account the views of social groups after the implementation of a technology is something that is currently happening in the Dutch energy- and climate debate. Taking the social groups into account seems to be democratic, however, it also shows that these social groups can only have an influence on a demarcated part of development processes: after it has been presented to the broader public by means of green deals, et cetera, thereby implying that the different relevant social groups may not always be able to take part in the intermediate stages of closure and stabilization.

Having an eye for this can make the SCOT approach more accurate and inclusive. By doing this, a structural addition can be made to the original SCOT approach.

2.4.2 Framed knowledge: the role of technological frames

Next to remarks on the role of relevant social groups on a process level, it is also important to understand how these views of the relevant social groups come into existence and what role they play. This is not broadly highlighted in the original SCOT literature. It is only marginally discussed and brought under the wider context. An analysis of the views of the social groups can present how different views come into existence, departing from a shared idea about the purpose of a technological development. Where the original SCOT literature provides an entry to the relevant social groups and how they shape a technology, there an understanding of these views will shed a light on the difference in views held by these social groups.

An answer to this question is given by Orlikowski & Gash (1994) and later on also by Bijker (1995). Bijker (1995) has proposed the notion called *technological frames* 10 years after the introduction of the SCOT, but has not presented this as a structural addition to the original SCOT approach. According to Orlikowski & Gash (1994), people have to make sense of a technology. They use their preconceptions and horizon of experiences in order to make sense of it, which frames the way of relating to a technology, i.e. how they perceive it (Orlikowski & Gash, 1994, p.175). This kind of understanding also applies on how people imagine a technology will work and exist in their life world. The concept of *technological frames* is defined in literature as*:*

"technological frames are frames that show how we construct meaning from technology and technology-related change", these are *"lenses through which we filter and then interpret the actions of others and our environment to make sense of our world"* (Olesen et al, 2013, p. 81).

And, according to Bijker (1995):

"Like a Kuhnian paradigm (1970) a technological frame can include goals, key problems, current theories, rules of thumbs, testing procedures, and exemplary artefacts that, tacitly or explicitly, structure group members' thinking, problem solving, strategy formation, and design activities." (Klein & Kleinmann, 2002, p. 31).

Understanding these technological frames provide insight to how social groups perceive and frame thoughts about an artefact. In our case, it will tell how different relevant social groups perceive the Warmterotonde.

A major assumption in the theory on technological frames is that people act on the basis of their interpretations of the world, form social realities and endow them (Orlikowski & Gash, p. 176).[20] The roots of the theory about technological frames can be found in cognitive and social psychology. In this field of science, the notion of cognitive structures of meaning is widely approached. The primary

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[20] These are seen in literature as cognitive maps (Eden, 1992), mental models (Argyris & Schon 1978) and other slightly differing approaches (Olesen, 2013).

interest in this field is to understand how individuals make their decisions and on what cognitive value giving mechanisms they rely (Walsh, 1995).

In expanding work on this topic, scientists found the same dynamics at play at a group level. Accordingly, the decision-making process does not radically change when an individual is a member of a social group (Goia et al, 1989; Walsh, 1995). This makes it possible to apply the elements of Bijker's (1995) definition of technological frames on a group level in order to see the difference in views between the relevant social groups surrounding the Warmterotonde. The following can be said based on the assumption in the latter sentence.

It is true that each person has his own thoughts and that this thought is unique to a person in a relevant social group. In a social group, however, there is a something at play that relates them. There is something that members of a social group share – through interacting with each other or being affiliated with an institution (Orlikowski & Gash, 1994, p. 177). More technically, the latter can be interpreted as a real life example of Wittgenstein's notion of *family resemblances.*[21]

Wittgenstein has introduced this notion in his second great work on language and communication, named as *Philosophische Untersuchungen* (1953). In this 1953 work, Wittgenstein analyses the meaning of words. In his earlier *Tractatus Logico-Philosophicus* (1921), Wittgenstein argued that the use of words in communication is actually based on the communication of pictures or images that people have in their minds about an idea or concept that the words refer to. This work eventually led to the idea that people may have a different image in mind when using the same words and that good communication is based on determining what people really mean when they are using words, or to which image people refer to. Wittgenstein's inquire into the meaning of words also formed a key in his 1953 work. In this later work Wittgenstein argued that there is no essence of words that is either exemplified in images or in reality. In contrast to his earlier work, Wittgenstein argues that words get their meaning by their use in language. More specifically, words can have a different meaning in different contexts. Rather than looking for the meaning of words, Wittgenstein states that it is more fruitful to understand this changing meaning of words. Wittgenstein uses the example of a game to explain what he means.

There are a lot of games, but none of the aspects of a game is necessarily common to all, e.g. not all games are recreational, et cetera. But we do use the word "game" when referring to something that we see as a game. So the word "game" has no essential character that each game refers to, but it in a certain way all games have a family resemblance. It can also be said that games exist in a network that we call "game". Even though two games do not share a single characteristic, they might belong to the same family of games. So there is no essential character, but there is a family resemblance. None of the features of games are common to all, but they resemble each other.

This rather metaphorical example also applies to the technological frames of relevant social groups. The actors in a relevant social group might have different interpretations about the world, but still be part of a specific relevant social group. Hence the notion that the members of a relevant social group may have slightly different views on the matter, but do agree in a certain way. The actors are part of a

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[21] See Wittgenstein's work: Philosophical investigations (original title: Philosophische Untersuchungen)

relevant social group because of the family resemblance of their individual frames of knowledge.

Williams and Edge (1996) argued that it may be the case that certain members of a relevant social group have doubts about the shared ideas and are not fully honest, questioning the role of the individual actors within the relevant social group regarding their uniformity. Wittgenstein's notion of *family resemblances* counters this argument and thereby complements the gap in SCOT literature about the uniformity of actors in social groups. This, and the analysis and use of frames of knowledge in the steps of the SCOT approach leads to a second structural addition to the SCOT approach.

Congruency and incongruency in technological development.

The notion of *congruency* and *incongruency* in frames is something fruitful to mention. One could assume and propose this notion as an addition to understanding the difference in views of the social groups.

Orlikowski & Gash (1994) state that the different relevant social groups' technological frames can share a certain amount of consensus about key elements or categories. This is called *congruence* in technological frames (Orlikowski & Gash, 1994, p. 180). It is also possible that there is *incongruence*, which can lead to a situation in which the development of a technology faces obstacles and experiences conflicts. Closure may not happen or some relevant social groups may be excluded (Haard, 1993). More specifically: What are the congruencies and incongruencies that surround the development of the Warmterotonde? This is not structurally mentioned in the original SCOT literature. The analysis of congruencies and incongruencies, and their role in the development of a technology is a third structural addition to SCOT literature. The analysis of congruencies and incongruencies is of major importance for answering the research question. It could present to which extent the concept of "sustainability" is shared and not shared by the different social groups involved in the discussion.

The role of power between different technological frames.

A related remark questions the role of these technological frames with regards to the third component of SCOT. In this third component, the idea is that eventually a moment of closure will occur in which the different relevant social groups come to a consensus about values and things they held important in the development of the technology. One could argue that this idea is based on the assumption that eventually a moment of rational dialogue will lead to a surpassing of interests, positions and beliefs that the relevant social groups have. This is a rather *enlightened* way of thinking, arguing that relevant social groups can go beyond their primary *horizon of experience* that makes up their *enframing* of reality. Is it possible to communicate without making use of experiences and beliefs that are ingrained in our minds? And what are the power relations that occur during a communication between different frames of knowledge, represented and embodied by the persons taking part in communication? This remark questions the principles of the SCOT approach. An analysis of the communication between relevant social groups, by analysing the role of existing interests, experiences and beliefs, will be applied in the empirical analysis.

Recapitulation

Concerning the aim of this research, we have argued for two things. First, the original SCOT approach has no clear vision on the dynamics that determine the inclusion and exclusion of relevant social groups throughout the process of development. However, the focus on these dynamics are of major importance to an understanding of how actors understand the world, specifically what they determine as a "sustainable development." An understanding of the origin of the views held by the relevant social is something that is valuable for answering the research question. Secondly, the same applies for the congruencies and incongruencies that surround a technological development and to the role of power in communication between different relevant social groups. This is not discussed in the traditional SCOT approach. Analysing and understanding these may highlight which topics, values and positions influence the development of the Warmterotonde and how actors value the Warmterotonde, either being sustainable or not. It will also highlight how communication between the social groups take place and what the boundaries of communication are.

2.5. Conceptual framework: additions to SCOT approach and the use of it in empirical research

In the original SCOT approach, the interpretive flexibility of an artefact leads to different relevant social groups that all have their own views on the technology, see figure below
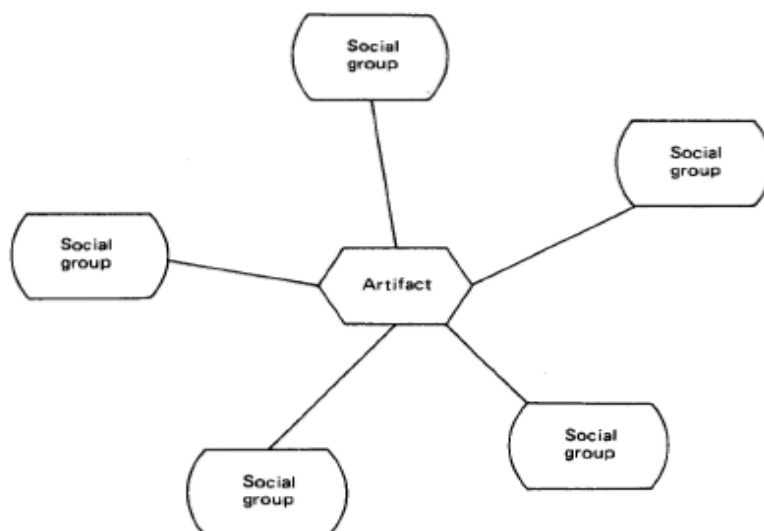
Figure 2.10
Related to an artifact, the relevant social groups are identified.

(Source: Bijker, 1995, p. 47)

From here, the focus on the relevant social groups leads to the notion that each relevant social group has its own perception of problems and solutions, see figure 2.11 and 2.12.
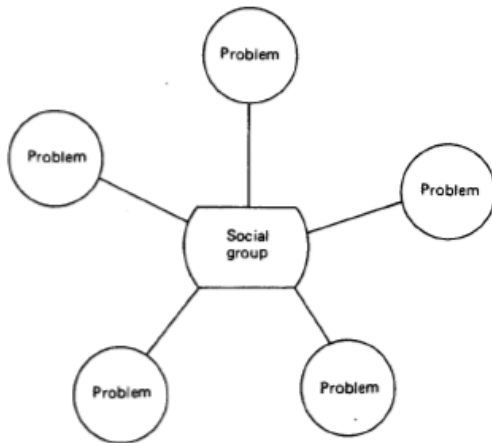
Figure 2.11
Artifacts are described by focusing on the problems perceived by the relevant social groups.

(Source: Bijker, 1995, p. 51)
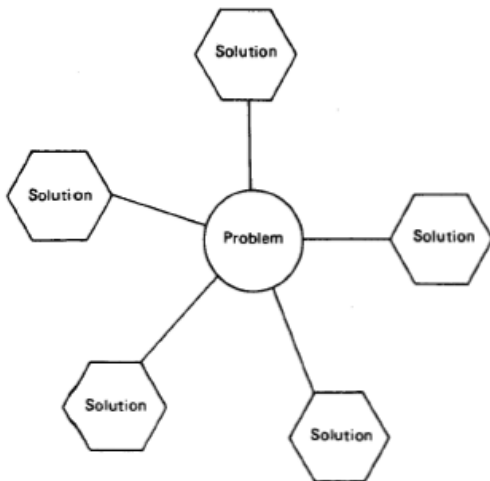
Figure 2.12
Finally, the solutions are described that are seen as available to each of the perceived problems.

(Source: Bijker, 1995, p. 52)

The critical remarks in chapter 2.4 have led to a fine-tuning of the SCOT approach and to a tailoring of the original approach to the aim of this research. This has led to the following framework that will be used in the empirical analysis of the research question, which focusses on a real-life case-study of how social groups determine a technology as being "sustainable" or not, and how communication between these groups take place:
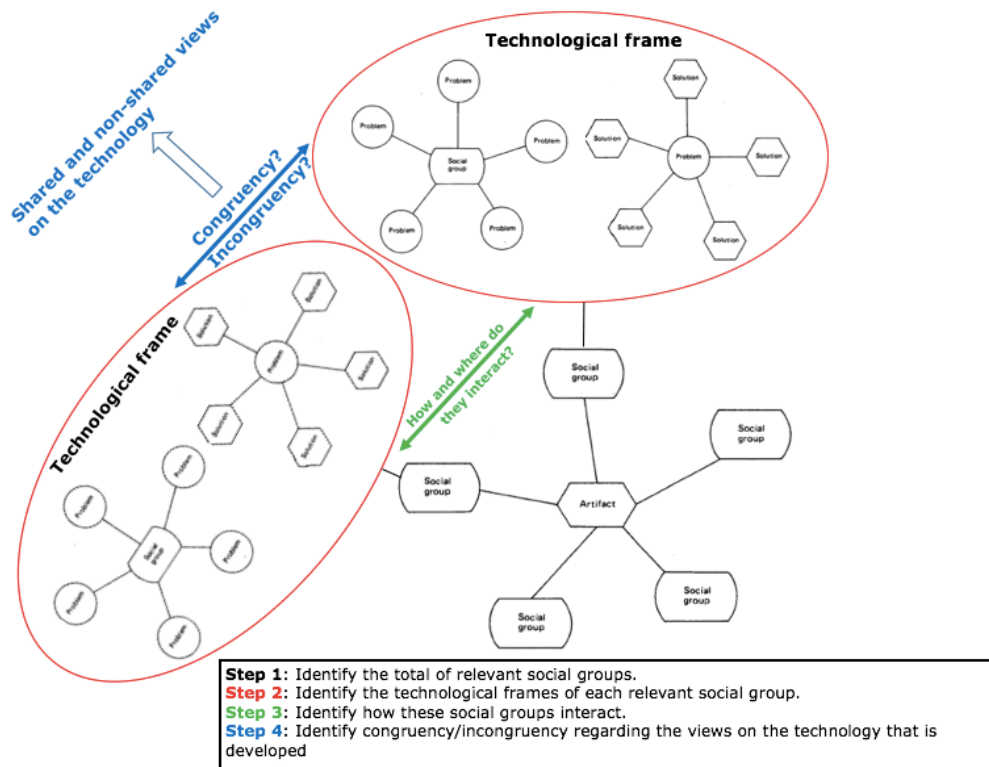
(Figure 2.13. Proposed conceptual framework, tailored to the study)

The skeleton is formed by the basic components and principles of the original SCOT approach. The focus on all possible relevant social groups, technological frames, and the role of congruency and incongruency between the relevant social groups is added to the methodology; complementing the SCOT approach. The assumption is that applying this approach will lead to a fruitful answer to the research question. The practical application of the framework will be done in the next chapter.

The conceptual framework consists of four main steps. In the first step, all relevant social groups are aimed to be identified. From here, the same is done for the technological frames. In the figure above, only two technological frames are shown. This is however merely for the sake of a clear visualization. The third step is to identify how these relevant social groups interact and which main arguments determine the value that is given to the Warmterotonde. When this is done, the next step is to analyse what the congruent and incongruent aspects are between the different relevant social groups, in order to understand the current stage in the development of the Warmterotonde and to understand the interaction between the social groups. Stated differently: the current dynamics in the development of the Warmterotonde can be explained by looking at congruent and incongruent aspects, which in turn will present the shared and non-shared views of the relevant social groups, thereby providing a tool to answer the research question.

In this way the original SCOT model is fine-tuned to answer the research question of this thesis.

"Why does man not see things? He is himself standing in the way: he conceals things." (Nietzsche, 1881; translated from German by R. J. Hollingdale)

3. The empirics

The Warmterotonde functions as a case to gain empirical data for answering the research question. The SCOT approach is chosen and tailored to the aim of this research, by translating the philosophical remarks of chapter 2.4 into a new conceptual framework based on the SCOT approach. This implies that the SCOT approach will be used in the empirical research focussing at understanding the variety of views of social groups that are involved in the discussion about the role of the Warmterotonde as a sustainable technology. Chapter 3 concerns the concrete empirical analysis of concepts such as "social groups", "values", "congruencies" et cetera, that are posed as concepts in the first to chapters of this thesis.

3.1 Methodology used to understand the variety of views surrounding the Warmterotonde

There are numerous ways of approaching the empirics related to the case. However, since the core of the research is based on the SCOT approach, it is convenient to stick to the steps of the SCOT approach. To cover all the additions made to the original SCOT approach, the steps in the empirical research of this study will be as follows:

1. Selecting a technological development, i.e. the case study

The first component of the SCOT approach asks for a technological development that allows to be interpreted in a variety of ways and by a variety of social groups. The first component asks for interpretive flexibility.[22] The Warmterotonde can be perceived as a technological development that is currently surrounded by a variety of views and social groups that interpret it in numerous ways; making the Warmterotonde a feasible case to focus on.

The reflection on technological developments found in the original SCOT literature are mainly reflections performed after the technology has come to stabilization; a kind of historical description of a technological development such as a bicycle. This implies that an analysis of a technology is always linked to the scope and the moment of analysis. And therefore it is argued in this thesis that the empirical analysis of the Warmterotonde and the results of this very analysis are necessarily linked to moment and scope of analysis.

One might argue that merely analysing a technological development at a specific moment carries the consequence that the results of the empirical analysis are only a sketch of the situation at that moment in time. This inevitability is acknowledged in the empirical study of this research. The

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[22] The SCOT approach focusses on the interplay between technological development and the social groups that decide and foster upon the development. As explained in the previous chapters, this dynamic can be covered by the concept called "sociotechnical system"

empirical research in this thesis will focus on the current[23] stage of the development of the Warmterotonde in Zuid-Holland and the results are considered as results of this situational analysis.

2. Listing the relevant social groups

From the selection of the case, the next step is to identify the social groups that are linked to the Warmterotonde. These so-called *relevant social groups* will be identified by a media analysis of Dutch newspapers, media of non-governmental organizations, the website of Warmterotonde, social media, magazines and also by listing the relevant social groups that are expected to be apparent. This list will be made together with Dr. Mattijs Taanman, an expert on energy transition in the Dutch energy and climate debate. The latter will lead to insights on social groups that are based on personal experiences from a neutral actor in the field.

The critical remark that is stated in the last paragraph of step 1 also counts for this step; results are dependent on the timespan in which the media analysis is performed and the situational context related to it. In line with this, a specific critical remark for the step of identifying relevant social groups is the situational appearance of relevant social groups[24]. The scope of this thesis might lead to questions about the value and correctness of social groups that are chosen to be relevant. Especially when some relevant social groups are expected to be visible in the discussion but are not.[25] This possibility is countered by performing a media-analysis of the Dutch energy and climate debate and by interviewing Dr. Mattijs Taanman, an expert in the field, leading to a list of relevant social groups that does justice to the current situational context of the technological development.

Boolean operators AND, and OR will be used to fruitfully access the media and public debate; the media analysis. The primary search terms are:

- *Warmterotonde Zuid-Holland, Warmopweg, Warmtenet Zuid-Holland;*
- *nieuws, kritiek, aanleg, politiek, tuinders, Westland, duurzaam, kolen, centraal, stad, woningbouw, decentraal, gas, veilig, bewoners, financieel, efficient, toekomst, klimaat, oplossing, onderzoek, energiedialoog, energie, huishoudens, industrie, restwarmte.*

The scope of research will be January 2014 until April 2016. 2014 can be seen as the starting point of the development of the Warmterotonde and April 2016 is selected for the sake of being able to perform the empirical research as up-to-date as possible.

The data will first of all be used in order to get access to the arguments in the field and in order to make an overview of the relevant social groups. Secondly, the data will be used to make an overview of the arguments and views in the discussion on the Warmterotonde. These will eventually lead to an overview of the key discussions and the key congruencies and incongruencies in views of the relevant social groups.

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[23] This research has been performed between January 2016 and July 2016. When the word "current" is used in this report, the reader should <u>note</u> that it applies to the timespan between January 2016 and April 2017.
[24] It is not just being or not being apparent of relevant social groups but also being or not being apparent of sociotechnical imaginaries, meaning and influences of social groups.
[25] The word "discussion" is used to capture the component in the SCOT principle that covers the step in which various relevant social groups discuss with each other what they think about the technology and what they imagine as the path of development.

3. How is the Warmterotonde valued by the social groups: how do relevant social groups interact and what are their frames?

The focus in this step will be on understanding the views of the various social groups. In order to do this, the concept called *technological frames* will be used; thereby incorporating the notion of sociotechnical imaginaries.

In the previous chapter, the notion of technological frames is introduced. Elaborating on this notion it can be assumed that each relevant social group has its framed view on the technology, as a discourse that is shared within a group. It can be said that meaning of the Warmterotonde is created when different views meet each other and eventually lead to a fix, in which meaning of the technology is created in and for that specific moment. The discussion can take place in various fields, for example in the parliament or in departments at universities. The assumption is that this variety of fields eventually comes together in public media sources. For example, a forum in which the social groups can have their say.

4. Listing the congruencies and incongruencies between relevant social groups

Step 4 is an addition to step 3. This step is used as a way of listing the shared beliefs of the relevant social groups in order to see what the relation is between the type of arguments that are shared and arguments that are not shared between the relevant social groups. This step is in line with the conceptual framework that has been developed throughout chapter 2. Listing the congruencies and incongruencies surrounding the Warmterotonde will add to the understanding of the type of views that are shared and are part of a broadly shared view on the purpose of a technological development.

5. Results and reflecting on the case

Step 5 has two sub-steps, which are called step 5A and 5B. Step 5A will be performed to give an overview of the results of the empirical study. This is a way of understanding how the discussions take place between the relevant social groups that are apparent, which views are visible and also which views and relevant social groups are not visible; it recapitulates steps 1 to 4. Secondly, step 5A will also be the step in which philosophical explanations will be given considering the results of the empirical analysis. The purpose of this step is to list questions for further analysis.

From here step 5B will be used to reflect on these questions. The reflection will be performed by interviewing experts in the field. These experts are actors that have an overview of the dynamics in the field and in the current Dutch energy and climate debate. The reason for introducing step 5B is to gain an expert view on the dynamics that lie in the results that derive from the empirical analysis; providing factual insights.

Step 5A will provide an insight to the results of the empirical analysis. Step 5B will provide an understanding of the background dynamics that have led to these results.[26] The idea is that by taking

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[26] The framework for performing the interview will be developed after the results of the empirical analysis.

these two steps together and linking it to philosophical theory, a clear understanding of the empirics will emerge.

6. Reflecting on results

Step 6 of the empirical analysis will function as a reflection on the results. This step concludes the research. This will be mainly done by linking step 5A to step 5B.

3.2. The empirical research

3.2.1. Selecting a technological development, i.e. the case study

As introduced earlier, the regional government of South Holland proposed to redirect waste heat from industries to the greater area of South Holland. The Warmterotonde has been proposed in 2011 in order to meet the Dutch climate goals. The scientific, technological and economic feasibility of the technology was assessed in 2014 and has led to ambitions for implementing the technology in the coming years**.** Making use of waste heat is assumed give a boost to the sustainable impact of the region, because of the decrease of energy production due to the use of this waste heat.[27]

The Warmterotonde is an exemplary technology that seeks for a physical place in society and also for social acceptance. The reason for this is threefold.

I. The Warmterotonde is a relatively big infrastructure that needs the same piping system as gas piping in the cities but is even bigger in diameter. As can be expected, the implementation of this kind of technologies requires large scale operations that can lead to controversies about the value of the technology by local communities who live close to the operations. Hence the picture in the introduction chapter. This makes the Warmterotonde a fruitful case to assess.

II. In the Dutch energy and climate debate questions have been raised about the value of coal-fired power plants and the value of centralized energy systems.[28] As can be expected, these questions are also related to the Warmterotonde because it uses waste heat from the current fossil intensive industries. One might, therefore, ask whether there will be a *lock-in* of coal-fired power plants as the primary provider of input to the Warmterotonde.

III. The current discussion in the Dutch public debate on energy issues is mainly about the changing role of consumers and producers. Instead of these two traditional positions, a third position called *prosumers* is nowadays broadly assumed in the debate. By means of decentralized energy systems, consumers can become producers of energy as well – prosumers. The role of these prosumers in the Warmterotonde is not clear. It can become a multi-dimensional infrastructure allowing prosumers to sell their energy production on the grid, but it can also become an infrastructure totally based on

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[27] For further information about the Warmterotonde, please see: www.warmopweg.nl
[28] The Dutch parliament has decided to close the oldest coal fired power plants in the Netherlands. However, parties like GroenLinks and Greenpeace aim to close down the others as well, since they state that the coal fired power plants will hinder the use of sustainable energy sources, both centralized and decentralized.

centralized energy systems. Because of this, the Warmterotonde plays an important role in this specific public debate, making it a fruitful case.

Stage of development.

The Warmterotonde has not yet been implemented. The current situation of the Warmterotonde shows that social hurdles need to be passed.

In late 2014, the program members of the Warmterotonde decided to perform a feasibility study in order to see whether the technology is economically and environmentally feasible. The results of the study were positive, leading to practical steps for the implementation of the technology. However, at that moment various social groups started to protest against the Warmterotonde by making use of a broad range of platforms and arguments. This led to the current situation in which there is not yet a moment of closure and stabilization.

The technology is really at its early steps of implementation and is currently marked by its introduction to the Dutch society and thereby enrolled in a discussion about its value and meaning. The technology is therefore still interpretive flexible.

3.2.2. Listing the relevant social groups

The relevant social groups are seen as the groups of people, independent of size, that are related to the development of the Warmterotonde. There might be different relevant social groups active in different stages of the development of the Warmterotonde. Before analysing the debate and making a list of relevant social groups, an initial list is made by interviewing Dr. Mattijs Taanman. The results in this initial list are based on the personal experiences of the interviewee and led to a list of relevant social groups, possibly different than the list that evolves from the media analysis.

> *1. Power stations.*
> *2. Industries that have process heat.*
> *3. Scientists.*
> *4. Fossil heat providers, like waste incinerators.*
> *5. Program Warmte Koude Zuid-Holland.*
> *6. Regional and national government.*
> *7. Horticultural sector.*
> *8. Housing cooperations.*
> *9. Environmental NGOs*
> *10. Action groups/ protestors.*
> *11. Residents.*
> *12. Political parties.*
> *13. Owners of sustainable energy producing sources.*
> *14. Electricity system operators.*
> *15. Investors.*

(The initial list made together with Dr. Mattijs Taanman)

It is important to understand the role and value of this list. The list will be used to reflect on the actual composition of the relevant social groups during the empirical analysis. The relevant social groups from the list are assumed to be involved in the development of the Warmterotonde. Taking the step of making a list before performing the empirical analysis is something that is different than is traditionally done in the SCOT methodology. As is explained in chapter 2.4, performing the step of actively reflecting on the relevant social groups that are expected to be active in the discussion, is a way of taking a closer look at the potential relevant social groups. After making this list, a media-analysis is performed of mainly Dutch newspapers, magazines and social media like Twitter.[29]

The relevant social groups that were apparent in the media analysis are:

1. Municipality of Westland
2. Provincie Zuid-Holland (Regional government)
3. Raad van State (Coucil of the state)
4. Program director Warmte Koude Zuid-Holland
5. Minister Kamp (Minister of Economic Affairs)
6. Uniper (Power station)
7. Eneco (Power station)
8. AVR Rozenburg (Waste incinerator)
9. Warmtebedrijf Rotterdam (Distribution system operator)
10. LTO Glaskracht (Branch organization for agricultural sector)
11. Horticultural sector A (pro Warmterotonde)
12. Horticultural sector B (contra Warmterotonde; protestors)
13. Reclame Code Commissie (Dutch advertising code authority)
14. Netwerk Zuidelijke Randstad (Collective of private and public parties with the aim of enhancing innovation in Zuid-Holland)
15. CE Delft (Research institute)
16. Urgenda (Environmental NGO)
17. Wijstoppensteenkool! (Environmental NGO)
18. CDA (Political party)
19. Christenunie (Political party)
20. GroenLinks (Political party)
21. PVDA (Political party)
22. D66 (Political party)
23. SP (Political party)
24. PVDD (Political party)
25. Woonstad Rotterdam (housing cooperation)
26. Vereniging eigen huis (Advocacy group of home owners)
27. Exit Energiebedrijf (forum in Amsterdam)
28. DWA (consultancy agency)
29. Geldengroen (Investment consultancy/ action group, protestors)

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[29] **The list of references on the media, the relevant social groups and the arguments can be found in the appendix of this thesis**.

When compared to the initial list, the only social group that is not apparent in the media analysis is the social group consisting of *residents* of the Zuid-Holland region. Even the local newspapers do not mention the opinion of the residents living in this region. The other expected relevant social groups are covered in the media, some with more social groups than others. It can also be concluded from the list that the relevant social group named as the 'horticultural sector' consists of two type of actors within this relevant social group. There are actors from the horticultural sector, which is called "A", who do support the Warmterotonde whereas group "B" does not.

3.2.3. How is the Warmterotonde valued by the social groups: how do relevant social groups interact and what are their frames?

This question asks for two type of answers. In order to do so, two separate analyses are performed and eventually linked to each other to answer the question.

Listing the elements of a technological frame.

The actual views on the Warmterotonde and the meaning given to it are explored by listing the arguments that are given by the relevant social groups in the media.[30]

In line with this, Bijker's (1995) *tentative list of technological frames* [31] will be used to connect these arguments with the concept of technological frames. The original list of Bijker consists of elements to understand the frame of relevant social groups considering a technology. Bijker designed this list during a case study of organizational change (Bijker, 1995, p. 124-130). The list should, therefore, be seen as a tentative list that is open for adjustments. The original list of Bijker (1995, p. 125) consists of the following elements:

> *1. Goals that the relevant social group has;*
> *2. Key problems the relevant social group sees;*
> *3. Problem-solving strategies of the relevant social group;*
> *4. Requirements to be met by problem solutions;*
> *5. Current theories the relevant social group commits to;*
> *6. Tacit knowledge the relevant social group has;*
> *7. Testing procedures that are used;*
> *8. Design methods and criteria used;*
> *9. Users' practice;*
> *10. Perceived substitution function;*
> *11. Exemplary artifacts the relevant social group has in their frames.*

(The tentative list of elements of a technological frame)

This list is relatively broad and covers multiple levels of the technological frame. The focus of our research is merely on understanding the different views and also the discussion that currently takes place thereby to be able to answer the research question.

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[30] Again, see Appendix.
[31] This list is tentative in the sense that "in each new case (...) additional elements may need to be incorporated to give an adequate interpretation of the interactions" (Bijker, 1995, p. 125). For an example of a study on technological frames, please see table 3.2 in Bijker (1995).

That is why the tentative list of understanding the technological frames in our case is cut down to the following set of elements - also one element is added to the study:[32]

> 1. Goals that the relevant social group has;
> 2. Notions of sustainability that the relevant social group has;.
> 3. Key problems seen by a relevant social group;
> 4. Requirements to be met by problem solutions;
> 5. Current ideas and believes the relevant social group commits to.

(List of element of a technological frame; to be used in our case)

1. Goals that the relevant social group has

In our study, the goals of a relevant social group will merely be a representation of the goals that can be extracted from the arguments that the relevant social group brings into the current discussion. This approach is selected for the sake of setting boundaries. Goals may be broad and may also cover topics that fall beyond the scope of this research, such as internal, organizational goals. The indication of the goal is done pragmatically. It is assumed that having an overview of the arguments that the relevant social group is giving will lead to the possibility of extracting the goals from it.

2. Notions of sustainability that the relevant social group has

This element is added to the list because of the importance of the next sections of the empirical analysis. As will be seen from the arguments, the relevant social groups all seem to assess and measure sustainability in different ways. Filtering the way sustainability and sustainable development is seen will presumably lead to an understanding of the variety of views in the Dutch energy and climate debate about these concepts.

3. Key problems seen by a relevant social group

Searching for specific problems that the relevant social group mentions will allow for key problems to be highlighted. These problems will only be problems that are related to the Dutch energy and climate debate; arguments that can be found in the media.

4. Requirements to be met by problem solutions

This element is partly in line with element 2 and element 3. It is assumed that element four is part of a bigger view on possible solutions, which are apparent in element 2, and is an answer to element 3. This element will capture the indicators that the relevant social groups use in order to be satisfied with a problem solution.

5. Current ideas and beliefs the relevant social group commits to

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[32] "Notions of sustainability that the relevant social group has" is added as an element in order to make a link to the research question. The fifth element is also slightly adjusted for the sake of tailoring it to the topic of research. Bijker (1995) came up with this list by assessing the technological frames of different scientists. The scientists in his study had various paradigms of measuring the possible outcomes of a design, i.e. theories. In our case, the method of measuring the possible outcomes of a design is most likely done by relevant social groups relying on their ideas and beliefs about the world.

This element mainly focuses on the underlying ideas and beliefs that the relevant social group holds and refers to in their argumentation. A way to indicate this element is to search for returning patterns in various lines of argumentation. The arguments in the media analysis show for example that there are groups which state that "fossil fuels are bad and need to be excluded from possibilities no matter to which costs". The set of arguments that these groups are given serves as a way to legitimize a line of argumentation related to a certain topic.

Before interpreting the technological frames, an overview will be given of the arguments that are apparent in the current discussion about the Warmterotonde; an overview of the interpretive flexibility surrounding the Warmterotonde.

The arguments in the field

The results of the media analysis consist of arguments given by each relevant social group. However, the type of arguments that are found in the media show that there is merely a set of main topics, and attached to it a small set of polarized arguments that each relevant social group refers to in their view on the matter.

This fact leads to mere marginally different value statements and views of social groups that fit in a discourse of topics and pre-fixed polarized positions, in the form of arguments. This is an interesting result. So the game seems to be played within a certain boundary that has been set or maybe evolved over time. Also implying that there is a resemblance in the arguments given by the social groups. Practically stated, the meaning given to the Warmterotonde by each relevant social group is pushed by a main set of topics and arguments that subsist and eventually surrounds the Warmterotonde. This conclusion can be underlined by the fact that there are no fundamental different views on the Warmterotonde in the analysis of the media, except for the competing views on the main set of arguments. These main topics and arguments are as follows[33]:

I. Main topic: The discussion about the use of coal

Argument 1:

> A: *"The Warmterotonde makes use of waste heat delivered by the coal fired power plants.*
> B: *The coal fired power plants are not sustainable and need to be phased out.*
> C: *The Warmterotonde does not add to phasing out the coal intensive industries.*
> Hence: *Our sustainability goals won't be reached by the Warmterotonde".*

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[33] The full list containing 83 marginally different arguments given by the relevant social groups can be found in the appendix.

Argument 2:

> A: "*Making use of the waste heat from the coal fired power plants is adding to the sustainable impact and it is also an improvement of the current situation; it leads to reaching the sustainability goals of the region.*
> B*: The coal fired power plants are already here, they have waste heat as a product, and investments have been made. You can not just close them down.*
> C*: Our gas system needs a renovation. Renovation is costly and also means investing in dependency on gas from other countries. The Warmterotonde is a good alternative.*
> Hence*: So, we need to think about the energy sources as a system that is in transition, a transition to a sustainable landscape. The Warmterotonde is a reasonable next step to reach our sustainability goals.*"

II. Main topic: Centralized versus decentralized energy <u>system</u>.

Argument 1:

> A: "*The current intensive use of the gas system is not desirable because of dependency on other countries and the price of gas.*
> B: *The Warmterotonde can be a feasible solution to make a transition to a more sustainable energy system by keeping the comfort, reliability and the availability of energy for the citizens and the horticultural sector.*
> C: *Other energy sources like cogeneration are not efficient.*
> D*: The horticultural sector will be the primary consumers and it will be designed according to their wishes*.
> Hence: *The Warmterotonde is therefore a desirable technological and sustainable improvement of the current situation, both economically, socially and environmentally.*"

Argument 2:

> A: "*Who needs a centralized energy system like the Warmterotonde? There is a growing interest in society of making use of decentralized energy systems and being the owner of your own energy supply. This also applies to the type of products – the products need to have a sustainable origin - that are required by society from the horticultural sector.*
> B: *Only the dominant centralized industries will benefit from the Warmterotonde.*
> Hence: *Warmterotonde is the product of a lobby by the fossil industries and it seems to be the final convulsions of the fossil intensive industries. There is no other demand from society.*"

III. Main topic: Centralized versus decentralized energy <u>sources</u>.

Argument 1:

> A: *"Westland has enough geothermic energy potential to supply sustainable energy to the region.*
> B: *Investments should be made to research the possibilities of geothermic energy sources in the region.*
> C: *Investment in Warmterotonde means that there will be less financial resources to invest in decentralized energy sources, such geothermic energy sources and other smaller possibilities.*
> Hence: *Warmterotonde will be a barrier for the growth of geothermic and other sustainable energy sources."*

Argument 2:

> A: *"The Warmterotonde will be a marketplace for all possible energy sources; you just do not choose an energy source for a lifetime.*
> B: *We will guarantee the growth of geothermic energy sources.*
> C: *However waste heat from fossil industries will be used in the first stages, because of the reliability and independence of seasonal changes.*
> D: *The character of the Warmterotonde being a marketplace will lead to new innovations and fair competition.*
> Hence: *The Warmterotonde will eventually have a range of energy sources as an input."*

The reflection on the type of arguments given by various relevant social groups will be performed in the next two steps of the empirical research. Before moving to that part, the technological frames of the relevant social groups will be identified.

The relevant social groups that are apparent in the discussion and provide relatively[34] enough data to use for understanding their technological frame are the following:

1. LTO Glaskracht (Branch organization for agricultural sector).
2. Program director Warmte Koude Zuid-Holland.
3. Minister Kamp (Minister of Economic Affairs).
4. Provincie Zuid-Holland (Regional government).
5. Woonstad Rotterdam (housing cooperation)/ Vereniging eigen huis (Advocacy group of home owners).
6. Horticultural sector B.
7. Geldengroen (Investment consultancy/ action group, protestors)/ Exit Energiebedrijf (forum in Amsterdam).
8. GroenLinks (Political party).

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[34] One could argue against this by stating that this will not give a clear overview of all relevant social groups and their views. This is true, however the role of the technological frames is to show the variety of views on a technology held by various relevant socials groups in order to shed a light on the type of arguments that these groups share and the arguments that are not shared, and thereby to be able to answer the research question. It is not an end to list the relevant social groups and their arguments, rather they are means in order to understand what dynamics lead to differences and similarities in views on a technological development.

The exploration of each of the above mentioned actor's technological frames is performed in the next section.

The technological frames.[35]

Relevant social group: **LTO Glaskracht (Branch organization for agricultural sector).**

1. *Goal:*

- Implement a system that is more sustainable than it is now.
- Implement a system that makes us independent of other countries.
- Implement a system from which the horticultural sector will benefit.

2. *Notions of sustainability:*

- Fossil fuels are not desirable, but needed in first stages of transition.

3. *Key problems:*

- Current gas system makes us dependent on other countries.
- The Warmterotonde does not have a good image in the horticultural sector; see current discussions.

4. *Requirements to be met:*

- Warmterotonde needs to be a marketplace for all energy sources.
- Project will only get support if growth of geothermic energy sources is guaranteed.

5. *Ideas and beliefs:*

- Warmterotonde is the solution because it is sustainable and is a product from our own industries.
- Warmterotonde will be a marketplace, otherwise it won't be implemented.
- Coals are not good, that is something for sure. But we need them in the first stages of transition.

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[35] The data in the technological frames are interpretations of the actual arguments in the field. The interpretation is done to have coherency in the arguments of the different relevant social groups.

Relevant social group: **Program director Warmte Koude Zuid-Holland**

1. *Goal:*

- Reuse the heat from industries that is currently wasted.
- Implement a system the horticultural sector is proud of.
- Implement a system that makes us independent of gas from other countries.
- Warmterotonde is the future!

2. *Notions of sustainability:*

- Sustainability means improving the current situation on economic, environmental and social levels.

3. *Key problems:*

- How to attract investors for this project.
- Gas is not the solution and cogeneration is not a profitable alternative.

4. *Requirements to be met:*

- The actual design will be done according to the wishes of the primary consumers, which is the horticultural sector.

5. *Ideas and beliefs:*

- Warmterotonde is our best reasonable and reliable option to improve the sustainable impact of the region.
- The horticultural sector is our primary consumer and they are enthusiastic and motivated to make this project work.
- There will not be a lock-in of fossil industries.

Relevant social group: **Minister Kamp (VVD)**

1. *Goal:*

- Reducing the CO2 emissions.
- Using our climate and sustainability ambitions to follow the path of making the Netherlands more sustainable!
- Staying reasonable in the energy solutions: things need to be changed; however responsibility forms the core.
- Gas system needs a renovation. Better to invest in Warmterotonde than in a renovation of the gas system, even tough the Warmterotonde is not the most sustainable solution.

2. *Notions of sustainability:*

- The Netherlands needs to become more sustainable. For this, the climate and sustainability goals can be followed.

3. *Key problems:*

- Exit of coals is needed, however big investments have already been done.
- Gas system needs a renovation.

4. *Requirements to be met:*

- Responsibility and reason are the core indicators.
- It needs to improve the sustainable impact on the environment.

5. *Ideas and believes:*

- Warmterotonde may not be the most sustainable option, but it is better than renovating the gas system.
- Sustainability can be with various energy sources, however we have a responsibility as civil servants.
- Big investments have already been made in the fossil industries. Closing the industry down is not an option.

Relevant social group: **Provincie Zuid-Holland (Regional government)**

1. *Goal:*

- Reaching our climate ambitions for the Zuid-Holland region.
- Warmterotonde needs to be implemented. It is a reasonable step to meet our climate ambitions.

2. *Notions of sustainability:*

- The Zuid-Holland region needs to be more sustainable. For this, climate ambitions have been stated.

3. *Key problems:*

- Too much CO_2 is emitted in the current situation.

4. *Requirements to be met:*

- Climate ambitions form the indicator of testing an alternative to the new situation.

5. *Ideas and beliefs:*

- Warmterotonde is feasible and will lead us to our climate ambitions.
- Warmterotonde can be a marketplace for energy sources.

Relevant social group: **Woonstad Rotterdam (housing cooperation)/ Vereniging eigen huis (advocacy group of home owners)**

1. *Goal:*

- Energy for residents needs to be easy, reliable and cheap.
- Warmterotonde means moving away from gas system. This means more safety. We therefore argue for the Warmterotonde.

2. *Notions of sustainability:*

- Saving energy and reducing the CO_2 emissions is something to pursue.

3. *Key problems:*

- Current system is to energy and CO_2 intensive.
- The current gas system in the houses is not the safest option to have.

4. *Requirements to be met:*

- Quick, easy, reliable and safe energy for the residents.
- The energy price needs to be transparent. People value transparency.

5. *Ideas and beliefs:*

- Warmterotonde is the answer to the current system, which is less safe than the Warmterotonde is providing.
- Warmterotonde means reduction of CO_2 emissions.
- The only thing that residents want is quick, easy and reliable energy, which is transparent in its price. Adding to sustainable impact is valued, however it should be in line with the latter.

Relevant social group: **Horticultural sector B.**

1. *Goal:*

- Implementation of a system that meets our sustainable character and ambitions.
- Growth of geothermic energy sources.

2. *Notions of sustainability:*

- Horticultural sector has the ambition to have a more sustainable region and more sustainable production processes and eventually more sustainable products.

3. *Key problems:*

- Idea of Warmterotonde does not stroke with our climate ambitions.
- Warmterotonde is connected to fossil intensive industries; this will have an impact on our products. We cannot sell them with a sustainability mark on it; heat used in production is heat from fossil industries.
- Our sustainable image is impaired.

4. *Requirements to be met:*

- The centralized solution to our problems should be in line with our own sustainability ambitions.

5. *Ideas and beliefs:*

- We will lose our license to produce in the EU. Our products will no longer be recognized as being sustainable.
- In the future, consumers and investors will only make deals with sustainable producers of agricultural products.

Relevant social group: **Geldengroen (Investment consultancy/ action group, protestors)/ Exit Energiebedrijf (forum in Amsterdam)**

1. *Goal:*

- Warmterotonde needs to be critically assessed and the results need to be shared with society.

2. *Notions of sustainability:*

- Sustainable solutions to the current situation are important.

3. *Key problems:*

- Warmterotonde and current situation is monopolized by fossil industries.
- Centralized option instead of upcoming trend of being the owner of your owner energy source.
- Warmterotonde will hinder development of smaller sustainable energy sources and initiatives.
- Who will pay for it?
- Who want it, except for the current energy sector and its lobby?

4. *Requirements to be met:*

- Do we need such a system?
- Housing cooperations make long term contracts. They need to rethink whether they will align with the Warmterotonde.

5. *Ideas and beliefs:*

- There won't be fossils in the future. Why invest in fossil dependent option?
- Project is paternalistic and will lead to the same formation of power in the energy sector.
- Upcoming trend of decentralized energy initiatives which is better than current form of centralized energy system.
- Current new houses are perfectly isolated, so they do not need waste heat.

Relevant social group: **GroenLinks (political party)**

1. *Goal:*

- The results of the feasibility study of the Warmterotonde needs to be critically assessed.

2. *Notions of sustainability:*

- We pursue for a sustainability, fairness and transparency.

3. *Key problems:*

- The Warmterotonde is too costly.
- How is feasibility measured?

4. *Requirements to be met:*

- Fossil industries need to pay for waste heat as an incentive to become more sustainable.

5. *Ideas and beliefs:*

- The fossil industries will not become more sustainable because of the Warmterotonde. Providing waste heat will be presented by them as improving their sustainable impact.

The main type of arguments, the topics that are discussed, the relevant social groups that are mostly apparent, and their technological frames have now been explained. A reflection on the results will be performed in section 5 of the empirical analysis. Chapter 3.2.4. will be used to make a distinction between the congruencies and incongruencies of the relevant social groups' frames (Orlikowski & Gash, 1994, p. 180).

3.2.4. Listing the congruencies and incongruencies between relevant social groups

Section three can be summarized by stating that there are three discussions apparent in the media analysis.

I. The first is about the role of coal in the future energy system. The Warmterotonde is surrounded by this discussion because it is assumed that the Warmterotonde is linked to, and dependent on the coal-intensive industries.

II. The second discussion is part of a bigger discussion in the Dutch energy and climate debate, which is on the role of centralized systems instead of local decentralized possibilities. The Warmterotonde is perceived by some of the social groups as a centralized infrastructure, which makes it a source of

discussion.

III. The third discussion is about the role of decentralized energy sources in the energy system. Energy is traditionally provided to the households from large installations that are located in industrial areas such as the Maasvlakte in Zuid-Holland. These systems, also systems such as nuclear energy systems, are big installations with a capacity to continuously and securely deliver energy to regions in the Netherlands. The question that is brought forward in the media is about the future role of decentralized energy sources in the Dutch energy system. These are energy sources that can be owned privately or by communities, e.g. solar panels or wind turbines. Their reach is smaller but gives citizens the possibility to become both a consumer and a producer of energy – prosumer. Geothermic energy is one of the decentralized energy sources that is brought forward in the discussion which can be extracted from the media analysis.

It is however not the aim of this research to reflect on the relation between these arguments and the current discussion in the Dutch energy and climate debate. It is interesting to note that the Warmterotonde receives its value from its role in a broader national discussion and not merely by the relevant social groups giving their own independent views on the technology; a view outside of the existing playfield.

In the previous section the technological frames of the most apparent relevant social groups are introduced. From here it is fruitful to give an overview of the views that are shared among all relevant social groups and to see how these shared views are approached differently.

Congruencies

The view that each relevant social group is sharing is the one arguing for *"a more sustainable world as a world that uses fewer fossil resources from the environment, emits less carbon dioxide (CO2), for the sake of saving ourselves and our planet."*

This is, of course, a summary or paraphrase of the views held by the relevant social groups. It can be argued from the empirical analysis that there is congruency on a meta-, abstract level which is about changing our current relation with the environment. All relevant social groups share the believe that it is not reasonable to invest in fossil resources in the decades to come, and also factors of environmental impact have become important indicators to assess whether a new technology is feasible.

A comparison with the United Nations Climate Change Conference

The congruency of views held by the relevant social groups can be compared with the conventions that are made during the last two United Nations Climate Change Conferences. During these conferences, the member states of the United Nations have come to a shared ambition and convention on how to solve climate change problems, i.e. enhance sustainability. For this, the member states have stated goals for the coming decades.[36]

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[36] Please see: http://unfccc.int/resource/docs/2015/cop21/eng/l09.pdf

However, in reality, these shared ambitions goals and the climate convention are not approached by shared strategies and methods. Each country designs its own path, on basis of factors that are perceived to be important. The variety of political landscapes, the economic position of a country and the social challenges each country has, leads to a variety of approaches and paths to reach the climate goals. Isn't this dynamic visible in the case of the Warmterotonde? It seems to be that there is a congruency on a meta-level that concerns a more sustainable relation between people and the environment. At the same time, each relevant social group has its own beliefs and ways of translating this to real life activities.

Incongruencies

The incongruencies between the relevant social groups about the Warmterotonde can also be extracted from the elements of the technological frames. It can be said that the technological frames of the relevant social groups consist of the same arguments given in the Dutch energy and climate debate. Which means that the incongruencies are about (I) the role of fossil fuels in the transition to reach the sustainability goals and the role of (II & III) decentralized versus centralized energy sources and energy system.

Each relevant social group is approaching the matter in their own way, by making use of their own horizon of beliefs, experiences and theories (Habermas, 1986, p. 316). Because of this, each relevant social group seems to propose a reasonable path to reach the sustainability goals that is shared. It being reasonable is mainly due to the arguments and views held within a technological frame that legitimize the norms that the relevant social group is valuing the most. But this makes it difficult in real life decision making and discussions between the relevant social groups.

We can argue that the reason for this is that there is no universally shared norm or normative basis by which the positions of relevant social groups can be tested on its correctness, except for the technical, environmental norms that are shared universally i.e. the climate and sustainability goals. Take for example the view of Mr. Kamp, Dutch minister of Economic Affairs. He states that fossil fuels are not desirable because they are not sustainable. Mr. Kamp adds to this that one cannot just close down the Dutch fossil industries because large investments have already been made and the energy needs to keep on flowing in society. The last two arguments seem to move from the technical, environmental indicator to an economic and a social indicator. But these two kinds of indicators are not considered by each relevant social group. Therefore, the discussion touches economic and social challenges, but there is no shared norm or goal that can be used to test the relevant social groups' arguments on their validity. Hence there is an indicator for technical, environmental indicators deriving from the climate agreements.

Questions do arise about costs and social challenges but are measured differently in each technological frames. Where one relevant social group is focussing on the dependency of the residents on a centralized energy system, there the other relevant social group focussing on the independence of the residents from the gas sector and other countries; there is no clear-cut indicator to measure dependency. And therefore it can be argued that the incongruencies between the technological frames will subsist as also parallel to it, the different horizon of experiences and beliefs subsists when there is are no clear indicators for economic and social issues. Rather than a fusion of

horizons (German: *Horizontversmelzung*) (Gadamer, 1997, p. 302), the incongruencies potentially leads to a diffusion of horizons.

As was argued earlier by coining the finitude of life and interpreting the world, the horizon of experience needs to be seen as part of a hermeneutical sphere that allows a certain interpretation of reality. This also shows the historicity of interpreting reality, as part of the horizon of experience that is available to the interpreter.

The fact that the social groups approach certain shared values, such as "economic benefit" or "social benefit" with different norms regarding these values, contains the possibility that there is a fundamental *non-understanding* in their communication (Schleiermacher, 1985). If certain shared values do not lead to fixed norms and if all social groups have their own unveiling of reality, then the fundamental question is whether these social groups are even able to communicate with each other when both do use the same words and concepts though. The words and concepts may look the same, but the connotation is different and based on the hermeneutical sphere from where each social group relates to the world. The dissemination of horizons and the role in our research will be analysed philosophically in the next section.

A second explanation for the incongruencies will also be provided in the next section, based on John Rawls' (1971), *Theory of Justice* and on the so-called value-hierarchy of Dutch philosopher of technology Ibo van der Poel. John Rawls introduces the distinction between *concepts* and *conceptions.* According to Rawls (1971) everyone would understand certain concepts such as "safety", "reliability" and "peace" and grasp it as something to "strive for". However, the conception of these concepts may differ between people. Where person A would argue to "strive for" a specific concept means doing at least A, B and C – this and that, there another person might say that A, B and C do not necessarily follow from the concept and therefore concepts – grasps – the concept as performing at least A, D and E. This line of thought might be a second justification for the current variety of views deriving from a shared vision of the purpose of sustainability or sustainable development, as will be addressed in the next section.

In line with the latter, Van der Poel (2014) argues that there is a distinction between *values* and *norms* deriving from these values. Where Rawls (1971) states that conceptions of concepts may lead to incongruencies about the interpretations of the concept there Van der Poel (2014) argues that the same applies in the development of technologies. Social groups will understand the value of "striving for a safe system", but the very interpretation of safety may differ, leading to a normative discussion. This implies that it may seem that social groups agree on certain topics, whereas this is agreement is merely on the level of abstract concepts or values.

3.2.5. Results and reflecting on the case

Step 5A.

Before moving to the in-depth interviews with experts in the field, the main results of the empirical research and philosophical reflections on each of the results is listed below.

1. The voice of the residents.

The main difference in relevant social groups between the initial list that was made and the list that has been made after the media analysis is the role of *residents* as a relevant social group. It was expected that the residents would be apparent in the media analysis because the Warmterotonde is a technology that requires a large-scale implementation in the region and would thereby affect people living close to it. However, this social group may not be that relevant as is assumed. The thoughts of the experts in the field will be applied to reflect on this finding in the next step, but before moving on to that step a philosophical reflection will be given to the first result of the empirical research.

Philosophical reflection on result 1

The concept that is used to reflect on the first result is the concept known as *"Not in my backyard"* (NIMBY). This concept is not specifically a philosophical concept however it covers insights that can be applied in the field of philosophical anthropology.

The NIMBY concept is a concept that arose next to other similar concepts which functioned as a way to capture the conflicts in the 1990s regarding the construction of asylum centres, prisons, football stadiums and other kind-like facilities near people who live close to these. (Dear, 1992). *"More formally, NIMBY refers to the protectionist attitudes of and oppositional tactics adopted by community groups facing an unwelcome development in their neighbourhood. Such controversial developments encompass a wide rang of land-use proposals, including many humans service facilities (…) Residents usually concede that these "noxious facilities are necessary, but not near their homes, hence the term "not in my back yard"* (Dear, 1992, p. 288).

The last sentence implies that there is a dynamic at play, which comes down to people rejecting a new situation, such as a new infrastructure, however at the same time not necessarily arguing that the infrastructure is to be rejected. This dynamic will be used to argue for the reason why the citizens as a social group are not relevant at this moment. The explanation will be given by focussing on two dimensions of the NIMBY concept.

Why NIMBY occurs

It is important to understand why the NIMBY-attitude occurs, in order to be able to reflect on the fact that citizens are a relevant social group is not visible in the analysis. The definition given by Dear (1992) already touches upon it by stating that it has to do with *"unwelcome developments in the neighbourhood"* (Dear, 1992, p. 288).

In his previous work, Dear (1990) states that the relation between a development and a neighbourhood can be explained by looking at the common arguments of opposition, which are called *'opposition arguments'*. These are arguments that regard concerns about *property values, personal security and neighbourhood amenity* (Dear, 1992, p. 290).[37] As a reflection on the oppositional arguments, we could say that these have to do with personal interests and values, and the personal

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[37] For further reading on these opposition arguments, see Dear (1990) in its work on policy makers gaining acceptance by communities.

space at stake when a development is introduced in this sphere. More specifically, *"the closer residents are to an unwanted facility, the more likely they are to oppose it"* (Dear, 1992, p. 291). This notion of personal interests and personal space is a fruitful starting point to develop an explanation of residents being not visible in the discussion.

The social groups that currently take part in the discussion about the Warmterotonde mainly talk about it on an abstract, conceptual level. As we have seen, the discussion is mainly about the relation between the Warmterotonde and the use of coal, and about the Warmterotonde and its implications for centralized and decentralized energy sources and energy systems. So by applying the NIMBY concept it can be argued that there are not yet personal interest or values at stake for residents because there is no current development that finds its way into the neighbourhoods. And therefore no oppositional arguments are at play. Personal interests seem to be the key to understanding the position that the residents take. This is radically different in the region of Groningen, where the gas extraction has led to action groups and protests by citizens.[38]

The discrepancy between public and personal interests

A second dynamic that it is linked to the first one is the relation between personal and public interest. The reason for focussing on this is to understand which public interest could be derived from the case and what it means for the residents as a social group.

As explained earlier, the literature shows that people taking the NIMBY position acknowledge that solutions to problems need to be found, but at the same time state that these solutions shouldn't be implemented in their own backyard (Dear, 1992). This highlights the difference between public and private interests. Where public interests consider commonwealth and are essentially abstract concepts far from people, there the private interests are interests that are close to your own personal world, such as safety, affluence and housing.

There are several examples of these available in our societies. One of them is, for example, the position that some local municipalities hold regarding the allocation of immigrants in the area. One of the arguments given by the local government of the Breskens area in the Netherlands was that immigrants need to be accommodated but placing them in Breskens would have a huge negative impact on the tourism sector. The local government eventually decided not to house the immigrants in Breskens.[39] Hence the NIMBY position. It can be assumed that this is also the case for the Warmterotonde.

By assessing the frames of the different relevant social groups, it is seen that there are congruencies about the climate goals, being for the public good – public interests. So a sustainable relation with the environment is something everyone is voting for. From here it can be assumed that the residents also do want a sustainable environment and solutions for this, but probably not in their backyard – private interests. There is no difference between the public and personal interests for the residents as a social group because the Warmterotonde is not yet implemented. Hence there is no protectionist

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[38] The extraction of gas in the Groningen region has led to a range of action groups such as the "Bodembeweging" and others.
[39] See: http://www.trouw.nl/tr/nl/4492/Nederland/article/detail/4307458/2016/05/25/Geen-groot-asielzoekerscentrum-in-het-Zeeuwse-Breskens.dhtml

position taken by the residents and resulting in them not being visible in the discussion about the Warmterotonde.

The NIMBY concept can be used to explain why residents are not yet visible in the discussion. This explanation is however merely a theoretical, philosophical one. It does lead to questions that can be asked to the experts in the field.

2. *Shared and not shared views.*

Concerning the second result of the empirical study, results clearly show that there is a shared view by the relevant social groups on the climate and sustainability goals and on the new relation that people need to have with the environment. But the value statements and strategies to reach this goal are different because of the technological frames of the relevant social groups.

As a metaphor: All relevant social groups accept the climate and sustainability goals and thereby position themselves next to each other, standing hand in hand in a circle. In the current situation however they do not face each other in the circle, instead their backs are directed at each other. Thereby having no shared vision on the common ground in the circle, even though standing hand in hand surrounding the matter. Because of this, the congruency in sharing the belief that sustainability is inevitable and that the climate goals are indisputable has brought them to the circle holding hands. But the same matter has also led to incongruencies on topics such as social and economic ones. The relevant social groups frame their beliefs in a way that their approach seems reasonable, however, they do not meet each other in the circle to test their views by clear-cut indicators that are shared between them.

This is, of course, an interpretation of the current dynamics that take place. It is however also interesting to understand why the relevant social groups do not come to a consensus on social and economic indicators or goals to challenge climate change. As it is the case for the first result of the empirical study, the view of the experts on this result will be done in the next section. It is however fruitful to give a philosophical reflection on this result as well. This will be done by looking at the debate on hermeneutics between Hans-Georg Gadamer & Jürgen Habermas that took place in the last decades of the 20th century. The latter will be complemented by outlining the distinction between *concepts & conceptions* that John Rawls poses in his 1971 work called *A Theory of Justice* and the value-hierarchy of Ibo van der Poel.

Philosophical reflection on result 2

The Gadamer & Habermas debate.

The debate between Jürgen Habermas and Hans-Georg Gadamer is one of the prominent debates that have taken place in later years of the 1960s. The discussion concerned the reach and possibility of communication between participants in forms of communication such as a debate.

As introduced in the second chapter of this thesis, Jürgen Habermas is one of the intellectuals arguing that each act of understanding reality and especially scientific results are always *enframed* by certain

attitudes towards the object of analysis. This led to the so-called "sociology of knowledge" and related to it the birth of social constructivism in the STS-studies. Habermas and similar minded scholars *"attempted to show the limits of the objectifying methods of natural science while defending the legitimacy of other types of discourse"* (Mendelson, 1979, p. 45). By accepting this fact, analysing interpretations of reality should be done at an epistemological level, which means to understand the frame of thought, methodologies and knowledge that is at play during a specific interpretation.

Habermas argues in his *Strukturwandel der Öffentlichkeit* (1962) and later in his *Erktenntis und Interesse* (1968) that the underlying epistemological prejudices in interpreting reality should be acknowledged and overcome by bringing it up in inter-subjective communication. The public sphere forms the ground on which these inter-subjective communications can take place, striving for overcoming ideologies, prejudgments and fixed interpretations of reality. Instead of taking prejudgments as a fact of life, Habermas aims to transcend the Heideggerian idea of men having a certain attitude towards reality (*Stimmung*) deriving from a specific existential position in life. According to Heidegger, existing always goes together with existing with things, persons and the surrounding world (Heidegger, 1927). "Existing with" implies a specific relationality of which this specificity explicates the individual attunement, mood or disposition. Hence the horizon of experiences deriving from it.

The final intention of Habermas is that the subjective interpretations of reality, based on ideologies – in our terminology it would be "technological frames" - can be overcome and that this will lead to a rational and unprejudiced and unsituated interpretation of reality. Interesting to see is the prejudices of Jürgen Habermas' hermeneutics. It could be argued that Habermas is prejudiced about the ideals of the Enlightenment being irrefutable. He has specifically coined the idea of placing ratio above dogma and ideologies, leading to enlightened communication between subjects.

Hans-Georg Gadamer argues that interpretations of reality are always based on a horizon of experiences of the one interpreting reality, thereby arguing that prejudgments are inevitable.

One of the important outcomes of the debate is that Gadamer argued that the idea of having a pure rational dialogue on a certain topic is something that is naïve and impossible. He thereby opposes Habermas' argument about the enlightened way of communicating. Gadamer states that this idea of the Enlightenment neglects the fact that each participant of a discussion needs to make use of his own horizon of experiences to structure questions and start to think about an answer. Stated differently: Habermas neglects the fact that each person is fundamentally bound by his attitude towards the world. This places Gadamer in line with the early Heidegger arguing that each person is *thrown into the world* and is required to un-throw (design) himself or herself by relating to the world via one's moods (*Stimmung*).

According to Gadamer, these fore-structures are a necessary way of understanding (*Verstehen*) the world (Gadamer, 1976, p. 59-68). It is, therefore, unfruitful to assume that value-free communication exists: communications that do not touch upon the existing views that each individual has (Gadamer, 1997, p. 272-281). Hence the fourth structural addition made in section 2.4 on page 32.

As a counter-argument to this position, Habermas states that these fore-structures bear the

consequence that they will lead to *systematically distorted communication and speech* and therefore to *pseudo communication* between participants (Habermas, 1986, p. 302). This concept of Habermas covers the idea that each participant in a discussion may only address issues, vocabulary and arguments that are in line with his or her own horizon of experiences and his or her own interests. Which implies that issues are framed in such a way that congruencies can be apparent between the participants (Stone, 1988), but the conflicting horizon of experiences and the interests will lead to incongruencies and pseudo communication.

These insights on the horizon of experiences, the interests of participants and how these are used in communication, can be used to reflect on our second result. The second result shows that even tough some congruencies are apparent between the relevant social groups, it does not follow that the various relevant social groups also accept each other's way of perceiving the Warmterotonde. It can be argued that it is not merely the missing indicators on social and economic values that lead to incongruencies, but also the conflict of interests, the issue framing and pseudo communication that is used by the various relevant social groups. What these conflicting interests are and how issues are framed will be reflected upon in the interview with the experts. But before moving to the explanations of the experts, the hermeneutical debate between Habermas and Gadamer can be complemented by the philosophy of John Rawls (1971) and Ibo van der Poel (2014).

In his 1971, *A theory of Justice*, John Rawls tries to come up with a universal definition of justice. Rawls eventually describes justice as being related to fairness; justice is fairness. The most important lesson to be learned from this work is John Rawl's introduction of the distinction between the *concept* of justice and the *conception* of justice. Where a concept is shared by the broader society, such as "freedom", "justice" and "democracy", the conception of these concepts are interpretations made by certain individuals (Rawls, 1972, p. 9). Following Rawls' line of thinking, it might be the case that people share a concept but disagree about the conception of this concept. This distinction is crucial for our research.

The relevant social groups seem to agree and share the value that "sustainability" is inevitable but at the same time disagree about the actual meaning of this very concept – and value. As it is shown by the technological frames and the hermeneutical sphere, based on the existential analytics of Heidegger and the horizon of experience of Gadamer, each social group has its own finite interpretation of reality.

The Dutch philosopher of technology Ibo van der Poel specifies Rawls' notion to the development of technologies. Van der Poel (2014) shows by empirical analysis that design processes could be more inclusive if attention is paid to the norms that each social groups holds regarding a specific feature of a technology. Van der Poel coins the example of battery cages and argues for acknowledging a so-called value-hierarchy; see figure 3.1 and 3.2.
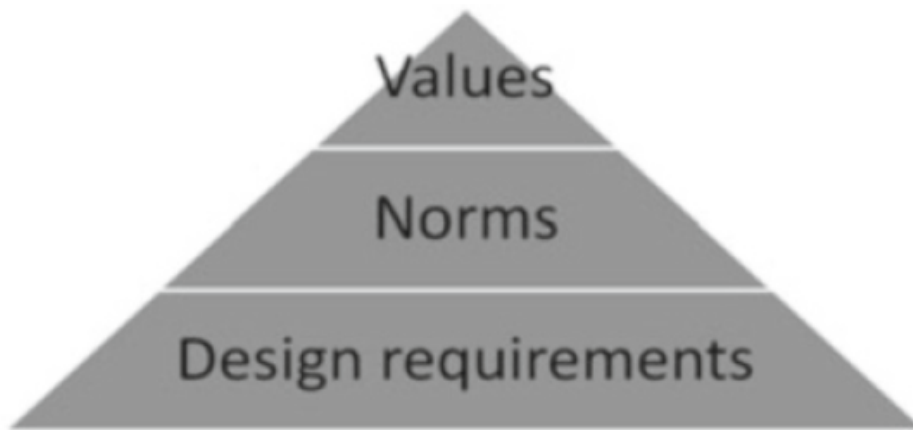
(Figure 3.1: The value hierarchy. Source: Van de Poel (2014)).
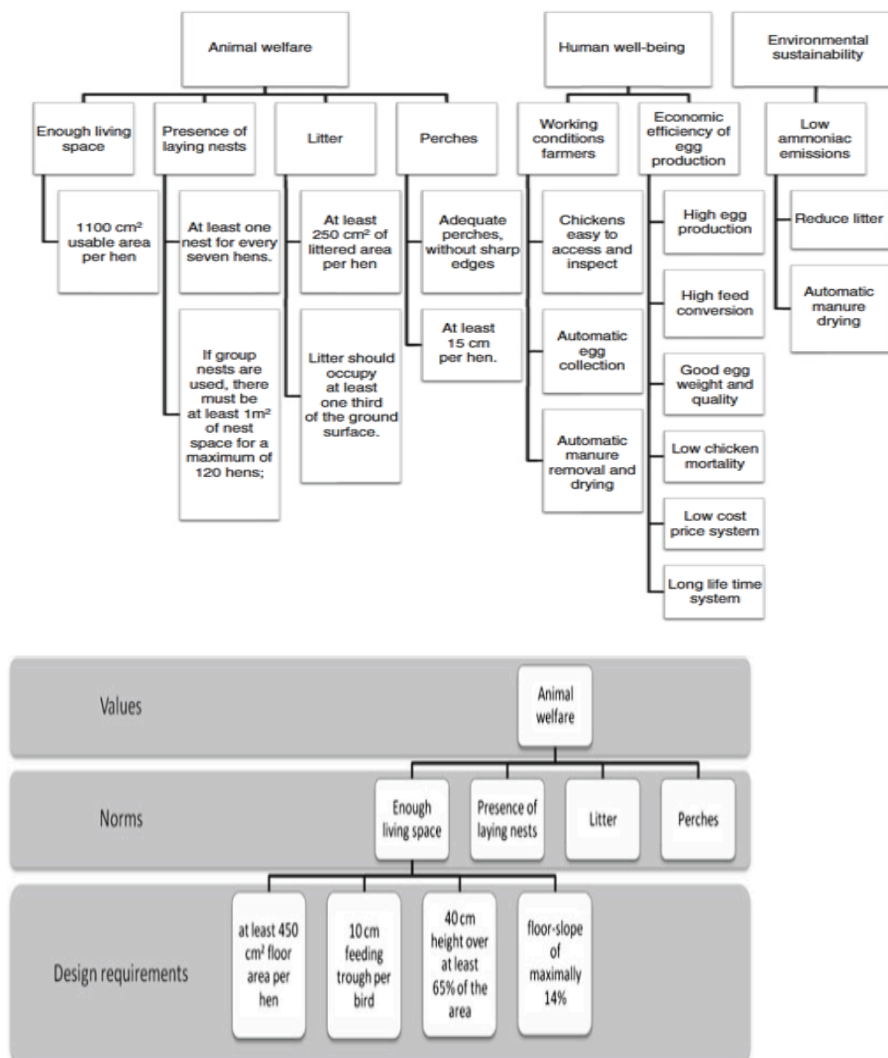
(Figure 3.2: Practical examples of a value hierarchy in Chicken Husbandry systems (battery cages). From values to norms, to design requirements. Source: Van de Poel (2014)).

Van der Poel shows that there are certain values that are shared by all of the relevant social groups. So, *"at the concept-level there is a great degree of consensus regarding the central values that society upholds for the development of a technology"* (Dignum et al. 2015, p. 1181). However, at the same time it is *"important to understand public values at the level of conception, since controversies seem to arise from a different conception, or different operationalization of the same value"* (Dignum et al. 2015, p. 1181).

In terminology of van der Poel, values seem to be shared, but norms deriving from these values are not shared and based on the technological frame each social groups holds. The next step in the value hierarchy is to derive design requirements from these norms.

The latter is not relevant to our case. The lesson to be learned from this distinction between concepts & conceptions and between values & norms is that sustainability can be shared between groups, but disagreements about the actual meaning of it can dominate the field. This is an adequate explanation of the current discussion that surrounds the Warmterotonde. So complementing *social constructivism* by having an eye for different technological frames and by acknowledging the tension between concepts & conceptions, as well as values and norms, can be a philosophical answer to the research question.

3. The value of the Warmterotonde.

As it is explained in chapter 2 of this thesis, the original SCOT approach states that a technology receives its value and position in the sociotechnical system. The relevant social groups interpreting the technology surround it with their views and beliefs, i.e. technological frames, and are therefore to be perceived as the major constituent factor for the value that the Warmterotonde gains.

The results of the empirical study show something more sophisticated. They show that the views held by the relevant social groups are pushed by the broader Dutch energy and climate debate, leading to the fact that the Warmterotonde as a technology implicitly receives its value in relation to this broader discussion. This implies that the political landscape and the current societal challenges also significantly influence the value that a technology gets.

Philosophical reflection on result 3

A specific view on mankind has been brought forward in the first chapter of this thesis. It is argued that mankind is dealing with physical finitude by perpetually striving to transform nature to an understandable and controllable culture. Mankind is also mentally finite in understanding reality. Knowledge is always a temporal, state-of-the-art and unfinished knowing; new scientific and social findings can lead to a Kuhnian paradigm shift in understanding the surrounding world. This implies that knowledge is always formed by methods that are at hand. Think about microscopes, political tools and new insights in the public debate. New media and methods will lead to new interpretations and a new state-of-the-art interpretation. Hence the hermeneutical sphere of man. This view can also function as an explanation for the result that the views of the relevant social groups are based on certain bigger discussion in the national energy and climate debate.

The empirical analysis shows that there are three main topics to which the social groups relate in a slightly polarized way; either holding pro or contra arguments. Because of this, it seems to be the case that these relevant social groups are discussing the Warmterotonde within a shared discourse or paradigm in which there are certain main topics and arguments available. Metaphorically speaking: the relevant social groups are asked to share their vision on a new planet by using the telescope available in the astronomical observatory where they are waiting for their turn to have a view on the planet. Even though these social groups are asked to give their personal view on the planet – whether they like it or not - they are fundamentally bound by the medium they use. The available telescope provides a certain playfield in which the social groups can act. The metaphor shows that the specific telescope reveals the planet in a specific way and determines the state-of-the-art knowledge on the matter held by the social groups. As a temporal and finite form of understanding. The individual actors using this telescope to explore the planet do share their own interpretation and view about it, but all of the actors are determined by the boundaries of the specific telescope.

The current national climate and energy debate can be seen in the light of this metaphor. The arguments present in the national debate dominate and determine the views that the social groups hold. Just like the telescope, the current arguments in the national debate are inescapable. These arguments are however essentially temporal because of the temporality of knowledge; new technologies will lead to new findings. But since there are no new insights, this temporality is perceived as all-encompassing. Hence the Warmterotonde being perceived by the social groups from a shared point-of-view departure, which are the current three main topics in the debate about the Warmterotonde.

Step 5B

The three main results of the empirical study and the philosophical reflection on these results are presented to three experts in the field. These actors will be asked to shed light on the results and also on the philosophical reflection that has been given in step 5A.

The experts in the field are as follows:

1. Arash Aazami

Arash Aazami is an energy expert who has been active in the Dutch energy sector for several years. He is the founder of Kamangir I Beyond Boundaries. Arash Aazami is selected as one of the interviewees because of his approach to the Dutch climate and energy debate. Where the majority of actors in the field are challenging energy related topics by focussing on the possibilities of more sustainable supply of energy, Arash Aazami takes a different approach. He prefers to focus on the demand side and on the values that actors hold and how this influences the energy system.

2. Eppe Luken

Eppe Luken has been active in the energy sector for several decades. He now works as the policy director at Energieonderzoek Centrum Nederland (ECN). ECN is seen as the prominent research institute on energy related topics. It is assumed that Eppe Luken's knowledge as a policy director will

provide information about the underlying reasons for the dynamics between the different relevant social groups.

3. Maya van der Steenhoven

Maya van der Steenhoven is the program director of Warmte Koude Zuid-Holland. She is working at the regional government with the aim of making the region more sustainable, primarily by considering the environmental climate goals that have been explained in the previous sections. Maya van der Steenhoven has her own view on the value of the Warmterotonde, which means that she looks at the topic by using her own frame. However, Maya van der Steenhoven can also be seen as a mediator of the discussion that is currently taking place in the Dutch energy and climate debate. One of her core activities is to understand the different arguments that are hold by relevant social groups in the region. Interviewing Maya van der Steenhoven will presumably lead to clearer and factual insights on the frames of the relevant social groups that are apparent in the empirical study.

The questions that have been used in the interview are both open and framed in such a way that these touch upon the philosophical reflections that have been made in step 5A. The questions are as follows:

First of all, I would like to thank you for your time. The questions that I have prepared are based on an empirical analysis of the discussion that currently surrounds the Warmterotonde. One of the things that has been done is to give an overview of the technological frame that each relevant social group holds. From this empirical research two main results emerged. The results are grasped by reflecting on them by using philosophical theory.

The questions that I would like to reflect on with you are:

The empirical analysis of the controversies that surround the Warmterotonde shows that there are various views held by various social groups. The field consists of arguments that are pro Warmterotonde and also contra Warmterotonde. The arguments can be divided into three main categories. These categories cover the possible lock-in of fossil based industries, the need for a centralized system and thirdly about the future role of decentralized energy sources. Mapping the congruencies and the incongruencies between the different social groups that are active in the discussion shows that all actors do share the idea that we need to become more sustainable than we are now and that the environmental climate goals are the key to assess our performance.
Also, the discussion about the Warmterotonde seems to be fuelled by the national discussion on sustainability. Even the actors use arguments that are related to this bigger discussion than rather on the Warmterotonde itself.

0. Do you agree that the value of the Warmterotonde is created in this bigger, national debate on climate and energy? So is the discussion even about the Warmterotonde itself? What are your thoughts about this?

1A. As can be expected, each relevant social group chooses its own path to reach the environmental sustainability goal. Because of this incongruencies may occur. Why does this happen, if we argue that working together rationally to solve the pressing issues of climate change would be more fruitful.
1B: If it also has to do with conflict of interests, what do you think are the main interests of the parties that are pro and contra the Warmterotonde?
What do you think is the relation between issue framing because of specific interests and the inevitability of the occurrence of incongruencies?

2A. One argument would be that the possibility of congruencies is determined by the fact that there are clear environmental goals set by the government and the UN. Think for example about the 20-20-20 agreements. However, there are no clear economic and social goals, not even economic and social indicators. Does this have a relation with the incongruencies or do you think that there are other reasons for the incongruencies?
2B: If it is true that the main reason lies in the fact that there are no clear economic and environmental goals, what do you think are the reason that environmental and economic goals are not available whereas environmental goals are?

3: How can we explain that the various relevant social groups are able to come to a congruency regarding the future CO_2 emissions? What is the role of conflicting interests in this?

The second question is more about the relevant social groups that are missing.

The main relevant social group that is missing are the residents of the region. Before the start of the empirical analysis, it was expected that the residents would have an opinion about the Warmterotonde since it requires operations in their surroundings.

4: What we, however, do see is that the residents are not apparent in the discussion. One way of explaining this is by arguing that there are not yet clear plans about the implementation of the Warmterotonde in neighbourhoods and therefore residents don't yet have an opinion about the Warmterotonde. What do you think of this line of thinking? What would you add?

5: The "Not in my backyard (NIMBY)" concept can be used to further explain this. By using the NIMBY concept it could be argued that the technology is not yet apparent in the backyards of the residents and therefore the public resistance has not yet occurred. So there is a difference in personal and public interests.
What do you think about the residents not being apparent in the media?

6: What do you think are the possibilities to transform the discussion about the Warmterotonde to fact and rationality based dialogues instead of its current character in which politics and certain situatedness plays a major role?

Would you like to add things to this interview?

Thank you very much for your time.

The interviews with Arash Aazami and Maya van der Steenhoven were conducted on the 8th of June 2016. These two interviews took approximately one hour and were conducted face to face. The interview with Eppe Luken has been conducted in May 2016 and contrary to the interview with Arash Aazami and Maya van der Steenhoven, this interview took place via e-mail. This was due to practical reasons.

The intention of the interviews was to see what experts in the field think of the results and the discussion surrounding the Warmterotonde. Therefore, no transcription, specific interview analysis and reflection on the interview has been conducted. The answer of the experts on the specific questions are noted and paraphrased.

Step 5B: Interview results.

Interview with Arash Aazami.

Question 0.:

"I think you are right about that. In my opinion the Warmterotonde is merely a tool or symbol that is used by various social groups in order to strengthen their arguments or defend their position in the Dutch energy and climate debate. So the Warmterotonde in itself is used as a means for other goals. Goals that lie beyond the intrinsic value of the Warmterotonde."

Question 1A.

"It all has to do with personal interest. For example, I went to the Springtij festival, which is the festival where all green hearted people come together and meet-up. What I saw was that the majority of these people are claiming that they have the answer to the climate problems and are thereby proclaiming things that they see as the truth. This is interesting because it shows that instead of working together, each person had his own narrative and truth that they were willing to tell to others. I saw that they were competing with each other instead of working together. I think that the underlying reason for this is that people just do not clearly understand what climate change is about and what it implies. Of course everyone believes that we should reduce the CO2 emissions, you can't be against this, can you? However other climate change related topics such as the transformation of the economic model to for example a more circular one, social responsibilities, et cetera, are not clearly intelligible and therefore people fill this gap of ignorance with their own frame. No one understand climate change clearly and what you see is that various truths occur and are proclaimed, as the emerging properties of different frames of thought".

Question 1B:

"There are a lot of varying personal interests, so I don't think it is fruitful to focus on that. It however does show us that we are addicted to our own beliefs, our own values and that this will always lead to incongruencies. I think that we need a moment of crisis, a moment in which people will forget about their own personal interests and will move to do whatever it needs to survive. So if climate change is still not apparent in your backyard than people will stick to their own ideologies and frames. For example, think about Estonia they had a moment of ecological crisis, which led to an acceleration of the energy transition. People worked together and made big steps, steps that are in my opinion only able to be made when there is a moment of crisis; climate change is unfortunately not perceived as pressing enough."

Question 2A&B:

"Social goals and economic goals may indeed be good indicators for climate change that are currently missing. Having these will presumably help, but I think that again we can state that climate change is still perceived in the Netherlands and surrounding nations as too general, as something not yet perceivable. Taking steps such as becoming clear about economic and social goals for the future are too confronting. Think for example about the footprint of western countries. These things can not be challenged easily and ask for a moment of crisis or a window of opportunities."

Question 3:

"I think that this is just because of the fact that you can not be against the reduction of CO2 emissions. Therefore congruencies are apparent. However the arbitrary fields of the climate change problem leads to various paths that are taken by various social groups. All with its own justification and frames that are related to it."

Question 4:

"I think that you are right about this line of thinking. What I would like to add is that it is not just about personal interests that are at stake. It also about personal interests that are thought to be at stake. This is something that we shouldn't forget. There are parties that are able to influence other parties in order to coordinate their actions in favour of their own beliefs."

Question 5:

"Linked to my answer to the last question, I would say that there is indeed not yet a moment of perceived personal interests that are at stake."

Question 6:

"Your question is interesting. I think that on a meta-level, the possibilities lie in a moment of crisis. Rational decision-making will occur instead of lobbying, because there will be pressing moment. Considering the Warmterotonde the only thing that I can think of is making use of scientific research and facts that can filter frames of the social groups."

The second interview has been conducted with Maya van der Steenhoven.

Interview with Maya van der Steenhoven.

Question 0:

"I think you are definitely right about this. The Warmterotonde is surrounded by the situatedness of various social groups that do not reflect on the character of the Warmterotonde, rather they use the Warmterotonde to subsist their own position. When I speak about the Warmterotonde and show scientific data of universities such as the Delft University of Technology, still some of the social groups ignore it and bring their own situated view into the discussion. Promoting the Warmterotonde by focussing on its benefits jus won't work that easily."

Question 1A:

"Again I think that rational decision-making is something that one would use in order to challenge the problems. However you see that sitatuedness plays a big role in which personal interests lead to political discussions instead of rational dialogues. I have experienced this when talking with people that are against the Warmterotonde. You can see that the same arguments are brought into the discussion, it even seems that there are issues are framed and therefore no space is left open for other arguments than the ones given in the frame. Egocentrism and ignorance are the keys in my opinion. We could also say that climate problems are not that pressing enough and therefore this dynamic will stay apparent."

Question 1B:

"There are a lot of personal interests and therefore a lot of conflicts instead of fruitful collaborations. I am also thinking about the fact that there are no good leaders or policy entrepreneurs that can take a

lead in the collaboration between the various social groups. We really need them because otherwise various truths and various frames will stay and merely lead to incongruencies."

Question 2A&B:

"I think it is more complicated than that. The problem with social and economic goals is that these are based on speculations, for example about growth of population. Because of these, no clear economic and social goals can be formulated. You state that there are congruencies about the environmental climate goals, i.e. CO2 emission goals. This might be true but you also do see that there are conflicting views about the amount of CO2 that countries are willing to reduce. So even here you see that conflict of interests play a role.
You know I think that people just don't realize how pressing the climate issues are. We are all like little children aiming to only listen to our own truths, i.e. frames. This can be explained by the following metaphor: We are standing with each other in front of a burning village that needs to be rescued. However, instead of acting to extinguish the fire, we are busy with promoting our own fire extinguisher and eventually nothing happens. I think this is the key problem now which also surrounds the Warmterotonde."

Question 3:

"You cannot be against CO2 reduction, so there you see congruency. But even here there are incongruencies when it comes down to real implication and actions. Just think about the geo-political arena."

Question 4&5:

"I don't fully agree. It is true that there is a difference for people between personal and public interests and that this determines their actions. However you can currently find residential interest groups in the media that are active and have their opinion about the Warmterotonde. But it is true that these parties do not have a NIMBY attitude. The attitude that is currently visible is the conservative attitude. People are just not willing to change and are asking question about what is expected from them, et cetera.

Question 6:

"We really need policy entrepreneurs and leaders that will work on changing the attitude from competing to collaboration. And secondly, a moment of crisis might be a fruitful opportunity to change and focus on public interests instead of personal ones. Think for example about Finland. They did not want to be dependent on Russian gas because of structurally returning problems. This moment of crisis led them to become one of the first countries that accelerated the energy transition. We also need this. If not then we will stay in the same paradigm of competing instead of looking at our shared beliefs and values."

The interview with Eppe Luken has been conducted via e-mail, approximately one month before the interview with the other two interviewees. At that moment the questions were more abstract and

merely focussed on the two results of the empirical analysis still they do cover the same questions as the ones that are used in the interviews with Arash Aazami and Maya van der Steenhoven. Because of this, the interview with Eppe Luken consists of two main questions. The first merging questions 0, 1, 2 and 3, whereas the second question covers the other questions.

The interview with Eppe Luken.

Question "1":

"I think the main key here is that we do share some views that are general, but the shared ideas will become contested when concrete actions are required. You will see that personal interests will become an important source for the position that various social groups take. So whenever the climate problems and actions are general then there will be no conflict, but this changes when real life actions are required. Just think about the implementation of a new highway. A good infrastructure is something that everyone wants, so there won't be any major issues. The stance will become different if it won't be in line with your own interests. In Dutch we have the saying: 'wat niet raakt, dat niet deert'. I think this sums it up well.

You might be right about the fact that there are no clear social and economic goals. We do have some general ideas about it, but again, when it comes to transforming it to real life actions people will use their own interests in order to reflect on it. Shared views will not longer apply. Personal interests play a major role, they are inevitable and very dominant."

Question "2":

"Why should they be in the news, what is their personal interest at this moment? This is important to realize. People don't know a lot about energy systems in general and when comfort and business as usual is provided then nothing will happen. It is just not that interesting to talk about during daily life and gatherings such as birthdays. But when the impact becomes visible then you will see opposition. So I think that there isn't any impact visible. And actually at that moment the faith of the public opinion will take over. Negative sounds are far stronger than positive ones. Just think about the few arguments given about asylum seekers. The relatively few arguments will influence the public opinion significantly."

After these three interviews, a recapitulation and conclusion on the empirical analysis can be given. This will be done in step 6.

3.2.6. Reflection on results

When looking at the results of the five steps of the empirical research from a methodological standpoint, I argue that the technological frames in themselves, the relation between various technological frames and the congruencies and incongruencies, opens a whole new field of research for the SCOT approach. Adding the technological frames to the SCOT methodology and using them in the way it is done in our case, will lead to an understanding of the dynamics in the creation of value with respect to a certain technology. The SCOT approach in itself lacks the ability to shed a light on

the dynamics that take place in the interaction of social groups. As will be explained later, making use of the technological frames showed that the value of the Warmterotonde is not created by relevant social groups thinking about the Warmterotonde itself, i.e. about its properties. Rather these relevant social groups use the Warmterotonde to strengthen their position in a broader debate on climate change. Concerning the SCOT approach, it could be argued that hard social constructivism, in which there is a dominant role for social groups in shaping a technology, needs to take into account the role of other equally important factors. The empirical analysis of the Warmterotonde shows that the positions taken by the relevant social groups are mainly framed by a certain discourse of pre-fixed arguments and topics that drive the debate about the value of the Warmterotonde as technological development. This discourse influences the opinions that social groups have. Acknowledging this implies that mild social constructivism seems to be more in line with the empirics. As explained in chapter 2.3., mild social constructivism has an eye for the big picture, incorporating also political and economic activities to the shaping of a technology.

A second reflection on the results concerns the idea of communication between relevant social groups in order to come to a consensus is something that is mentioned in the SCOT literature. It is presented as something natural to happen. However, the use of technological frames in empirical research leads to the conclusion that a conflict of interest and a horizon of experiences – hermeneutical sphere - play a role in the interaction between various social groups, instead of rational discussion with the aim to come to a consensus. I argue that consensus does occur, but there seems to be consensus about concepts and values and not about conceptions and norms - which are too general and cover things people are already agreeing on, such as making our world a better place by becoming more sustainable. How can one be against this?

As a third reflection that takes a more sophisticated approach in understanding the interaction between social groups , I argue that both Habermas and Gadamer are right in their own way. I agree with Gadamer that each person has a certain relation with the world surrounding him or her. This relation is based on personal experiences and thereby on the horizon of our experiences. This horizon is to be seen as a certain paradigm in which we have our personal ideas of truths, beliefs and "things to pursue"; certain so-called *fore-structures* (Gadamer, 1976). Just think about different cultures in the world; we all have our own interpretation of the same reality. That is why I think Gadamer has a sound argument. So, in line with Gadamer's thesis, it can be said that aiming to overcome the variety of interpretations of "sustainability" or a "sustainable development", as is coined in the problem statement of this thesis, shows that this aim is based an Habermasian view on communication. It is based on the assumption that a rational dialogue can be reached if we get rid of our prejudgments, i.e. our own horizon of experience.

At the beginning of this thesis it is argued that a pressing situation, such as climate change, can be a strong incentive to get rid of our competing interpretations and aim for a shared view on sustainability. I argue that this view on reality is naive. It does not do justice to the fact that each individual has its own background of beliefs and a frame in which certain truths are evident, e.g. his or her own culture. It is not the question whether these beliefs are true or not. These are to be seen as media that we use to understand the world surrounding us. Since there are a variety of backgrounds and therefore a variety of truths, overcoming these truths, or prejudgments as Habermas would say, would lead to communication without truths to base us on. Because, how can a prejudgement be

found if there is no medium to distinguish a true and false judgement. Because allowing a certain medium to distinguish true from false, or distinguish dogma from ratio demands a certain paradigm in which judgements discriminating between dogma and ratio are at play. So how to look at reality without a medium? As a remark on Habermas, I argue that Habermas has its own prejudgments about a rational dialogue being value-free. Distinguishing ratio from dogma already implies a polarization between claims on reality that are true and false.

However, on the other hand the social groups in our case seem to agree that "sustainability" needs to be pursued. None of the social groups is against this value or concept. If so, then it can be argued that communication in which people agree on concepts can take place, thereby agreeing with Habermas' aim of a rational dialogue. This is why both Gadamer and Habermas are right in their own way. I would argue that Habermas is correct to the extent that all social groups can come to an agreement that a certain value has to be pursued. In our case, sustainability is acknowledged by all actors. There is no discussion whether sustainability is to be pursued or not. To this extent Habermas' view is correct. However, this changes when the conception of this concept or the valuing of this value comes to play. The interpretation of sustainability is different for each of the social groups. This is why I would argue that the horizon of experience of our frames of knowledge are inevitably connected to our relation with the world surrounding us, thereby inevitably connected to our interpretations of the world. So, Habermas is correct to the extent that we can eventually agree on certain concepts or values, however the conception of these concepts or the valuing of values is inevitably bound to our own relation to the world and therefore in line with Gadamer's thesis.

So is communication between social groups possible or is it rather based on *pseudo communication*? I would argue that communication takes place to the extent that the social groups communicate about the same concepts or values. However, pseudo communication is in my view the form this communication eventually gets. The example of the program director perpetually arguing that scientific results and reports present the sustainable character of the Warmterotonde, shows that she does talk about sustainability however in a rather technocratic way. On the other hand, protestors also talk about sustainability but argue that these scientific reports do not explain whether there will be a lock-in of coal-fired power plants or not. Pseudo communication takes place, because as a reaction both the program director and the protestors try to convince the other by using their own arguments based on a certain technological frame.

In step 5A three main results of the empirical research are extracted. These three results are philosophically explained and also used in the interviews with the three experts in the field. Linking these two steps together gives a more robust explanation of the results, which are described below.

1. The voice of the residents

One of the main results of the empirical research is the mix of relevant social groups that are apparent in the media. The initial list led to an overview of all expected relevant social groups. However, the residents as a social group weren't apparent.

In step 5A a detailed reflection is given on the possible reasons why the residents are not actively participating in the interpretive flexibility phase of the technology. The discrepancy between personal

and public interests is used to explain by using the NIMBY approach as the basis. The interviewees think that this is correct and state that real life action mainly depends on interests being or not being at stake. When topics are too general or too far away removed from people, then it won't lead to people taking a firm position or talk about it in daily life.

One of the interviewees added to this idea that residents can be nudged towards taking a certain position because of certain strategies of other parties. This means that speaking out or taking a position does not necessarily imply that there is a perceivable personal interest at stake. It might be the case that the position of one party can influence another while there isn't any interest at stake. This has to do with the ability of certain parties having the legitimacy and resources to influence other parties in a way that it gains the support of the people that are influenced instead of a rejection of the imposed information.

So we can conclude that the residents are missing in the media analysis because they do not see the Warmterotonde leading to an infringement of personal interests and also that there aren't any parties that mobilize these residents to take a certain position. This is interesting since it shows that thinking about the mix of relevant social groups when performing a SCOT analysis, requires an understanding of the difference between personal and public interests considering the specific relevant social groups. Hence, personal interests from the key for parties to take or not take a position.

2. *Shared and not shared views*

The shared and not shared views, i.e. congruencies and incongruences, are touched upon in the introduction of step 6. The results of the empirical analysis show that all social groups seem to accept that we do need to change our relation with the environment to a relation, which is more sustainable, i.e. becoming more sustainable. The technological frames of the relevant social groups show that this forms a key, however, all relevant social groups are providing their own path for reaching these goals.

In step 5A this is explained in two ways. First, it is stated that the reason for the occurrence of congruencies may be because of a certain norm that is currently held in the energy and climate debate, which is to reduce CO_2 emissions in the coming decades. This environmental goal is clearly stated and no one seems to discuss this. Hence the congruence. On the other hand, there are no clear shared social and economic goals, which makes it hard to reach a congruent view between the relevant social groups.

The second explanation in step 5A is the existence of fore-structures, prejudgments (Gadamer, 1976) that lead to a certain horizon of beliefs and values held and applied by a social group. Gadamer states that it is, therefore, naïve to think that pure rational dialogue will take place in which people don't rely on their previous experiences, beliefs, values and norms. Habermas (1986) reacts to this argument and states that pseudo-communication will occur and therefore issues will be framed in a way that it fits into a certain technological frame. Because of this, each judgment gains legitimacy and rationality, without necessarily being factual (Stone, 1988).

The debate between Gadamer and Habermas is complemented by the distinction between concepts & concepts coined by John Rawls and the distinction between values & norms argued by Ibo van der Poel. When applied to our results we can say that discrepancy between the views of reaching our climate goals really depends on the fore-structures that each relevant social group holds and believes to be the truth and see as incontestable. They agree on the need for "sustainability" but disagree about the route to take. In line with the debate between Gadamer and Habermas I argue that Habermas is correct in the sense that we can come to an agreement about concepts or values. However, the conception of these concepts or values is bound by our fore-structures that are inevitably connected to our personal relation with the world surrounding us, thereby justifying Gadamer's claim. These explanations are given using philosophical theory, however the interviewees complemented these views by taking a slightly different approach however agreeing with the argument that communication is possible to a certain extent.

Concerning the first explanation, the interviewees agreed that a missing norm or climate law could be an explanation for the discrepancies in congruencies and incongruencies. They also state that the matter is more sophisticated to understand whether this is the most pressing explanation. The interviewees argue that the environmental climate goals are goals that one cannot argue against. Of course, one can argue against the time-span in which CO_2 needs to be reduced and by which countries, e.g. does the polluter pay (Risse, 2008)? But in general, there is a certain shared belief about the importance to reach the environmental climate goals, mainly because it is too general. On the other hand, the social and economic goals are a bigger burden and too complex to agree on, because they are less general and more convincing but still being too speculative. The interviewees argue for a key to the understanding of the congruencies and incongruencies, which are more in line with the second explanation in step 5A.

The interviewees think that the main reason for the dynamic between congruencies and incongruencies has to do with personal interests being or not being at stake. The personal interest is not always something that is tangible and consciously experienced. Arash Aazami and Maya van der Steenhoven argue that people in the Dutch energy and climate debate have their own situatedness and believe in their own story, which they see as rational and truth – this is in line with the idea of technological frames and the distinction that John Rawls and Ibo van der Poel are coining. The actors solely believe in their own path and therefore disagree with other beliefs. Arash Aazami even argues that he has a real life example of congruencies and incongruencies being visible at the gathering of similarly minded people. He has witnessed the gathering of people with a shared interest in sustainability. All of these people argued that we need to change our relation with the world because CO_2 emissions are rising and rising. At the same time, they were only focussing on their own solution to reach this sustainable world; hence the distinction between values and norms deriving from it. According to Arash Aazami and Maya van der Steenhoven, this all has to do with situatedness, technological frames or fore-structures (Gadamer, 1976) that people have.

According to Maya van der Steenhoven, one way to deal with the situatedness of people is to provide fact based scientific data about sustainability, which assumes that rationality will overcome situated thoughts. In reality, however, this doesn't seem to work. Actors frame issues in such a way that the rational data in itself are being contested. Maya van der Steenhoven can be seen as a Habermasian

who states that rational dialogue will overcome conflicts. But as we can see, the notion of Gadamer seems to be the key to understanding real life interaction between actors.

Since all actors have their own situatedness, incongruencies occur when the different social groups are providing paths to reach the general goal of reducing the CO_2 emissions. All social groups congrue on its importance, but incongrue on paths that others are providing. All groups share the value and concept but disagree about the conception and norm. There is, however, a risk lying in solely relating to our own interpretation of reality, which is that *"We are standing with each other in front of a burning village that needs to be rescued. However instead of acting to extinguish the fire, we are busy with promoting our own fire extinguisher and eventually nothing happens."* (Maya van der Steenhoven).

The risk is that being too competitive and merely believing in your own truths may lead to marginal progress. What is the key to change? Rationality is not since facts and scientific data are also being contested. Do we need an *enlightened despot* that decides what is good for the nation while others forced to remain silent? I will come back to this.

3. The value of the Warmterotonde

The last result of the empirical analysis deals with the creation of value of the Warmterotonde. This result also questions the SCOT approach, since it argues that the value of a technology is created during its interpretive flexibility, closure and stabilization.

In step 5A it is stated that the three main types of arguments about the Warmterotonde can be traced back to arguments that are visible in a broader, national energy and climate debate. So the question arises whether the Warmterotonde is valued by looking at its internal properties or whether it receives its value because of its interpretation in the broader debate. In step 5B, Arash Aazami and Maya van der Steenhoven both argue that the Warmterotonde can be seen as a symbol or a mean, which is used by different social groups to defend their argument or position in the broader debate. This means that the Warmterotonde receives its value by being pulled into the broader discussion as a mean for a variety of goals that are held by the social groups. If this is true, then it also means that hard social constructivism is not the approach that is closest to the real world. Mild social-constructivism seems to be more fruitful to pick.

4. How to become more congruent?

When the interviewees were asked about the underlying reasons for the Warmterotonde being used as a symbol by the social groups and also asked about the reason why facts and rationality do not work, they answered by stating that people do not have an eye for the big picture. People are situated and unable to reflect on their own thoughts. Even if facts about the implications of the Warmterotonde are available, politics will always influence the debate (Giddens, 2010). Hence the variety of views and the holdback for real life action.

What to do about it, what do we need to become more congruent in our climate change challenges? This question is asked to the interviewees. Of course, this doesn't have a direct relation with the

Warmterotonde but is interesting to ask since there is an indirect link because of the fact that the Warmterotonde is pulled into the broader discussion.

The interviewees replied to this by stating that we need a moment of crisis, as a moment that will change our competitiveness towards each other to an ethos in which collaboration forms the basis. They state that climate change is currently not perceived as pressing and therefore we are just muddling through. Arash Aazami and Maya van der Steenhoven give the example of the energy crisis that Estonia and Finland have faced. The energy crisis in those two countries emerged when they realized the implications of their major dependency on Russian gas. They no longer wanted to stay dependent on Russia. Soon enough, the energy transition in these Baltic countries happened, whereas in the Netherlands incongruencies rule the field.

Both Arash Aazami and Maya van der Steenhoven are explicitly argued that we need a moment of crisis that will lead to a shift in our paradigm, like a Kuhnian revolution in the scientific discipline (Kuhn, 1962).

The physical and mental finitude of man has led to artefacts, cultures, and even medicine to deal with the most challenging diseases. However, there is a perpetual motivation at play. The motivation is driven by the fact that finitude itself will never be overcome. An important connotation of this perpetual motivation is a certain utopian standpoint (de Mul, 2014). A hope to reach utopia. A hope for complete control. In this sense, the interviewees argue that a moment of crisis will potentially lead to an overcoming of incongruencies and thereby to a moment of control. The critical question will be whether a moment of crisis will really help. In my opinion, a crisis opens up a new playfield of conceptions and norms about this very crisis. Referring to the idea of an *enlightened despot* on page 71, this very idea of crisis or arguing for an *enlightened despot* both depart from an assumption that eventually an overcoming of current competing views can be reached if a radically different or powerful situation occurs. In my opinion, these posed solutions neglect the fact that man does not have the ability and capacity to omit his or her predjudgments, based on culture, frame or anything similar to a concept describing how man is bound by his or her situatedness in life; a moment of crisis or an enlightened despot are there to be interpreted by people relating to it.

I argue that the interviewees are using the same argument as I have posed in the problem statement in chapter 1. I have argued that it is to be expected that a pressing situation will eventually lead to an overcoming of our own prejudgments. This line of thinking is close to Habermas' idea that rational dialogue can eventually be reached. But looking at our results I would argue that this is a rather naive position. As Arash Aazami has told, even people with the same goals compete with each other about the path to take. I therefore argue that our finite and situated understanding of reality and our own *being-in-the-world* are inescapable. This is why I argue that we can agree about certain concepts such as sustainability but the actual conception of these concepts are determined by our own fore-structures, truths and beliefs about reality.

4. Conclusion: answering the research question

The underlying motivation for putting this specific research on the agenda is based on the assumptions that lie in the introductory chapter. In the introductory chapter, I argued that man is required to cope with his environment because of his finite nature. Man is not only physically finite but also has a finite understanding of reality, which can be seen as a situated form of understanding. Man's cultivation of nature is a way of dealing with this finite nature. This cultivation has led to the development of both various artefacts and a specific method to do so throughout history.

Related to this I asked the question how it is possible that climate change problems are not yet solved and that collaboration between world leaders does not have a significant impact. After a preliminary analysis of the Warmterotonde in Zuid-Holland, presented as a sustainable technology that makes use of waste heat from industries to heat the region, it is argued that the actors involved in the development and in the debate about the Warmterotonde all agree that sustainability is important but disagree about the conception of this concept; each actor has its own interpretation of it.

The underlying question in this thesis has been whether a variety of competing interpretations of reality can be overcome if the context demands immediate action or a certain pressing need. In our case it comes down to the practical question whether competing interpretations of sustainability can be overcome if climate change becomes deathly as death itself. On an abstract level, the thesis is directed at the question whether issues of climate change can lead to a shared interpretations of reality in which prejudgments and beliefs of people are omitted, or whether we are bound by our own horizon of experiences, beliefs and truths. It should be clear to the reader that the presumption in this thesis is based on the question whether a shared view can be reached if there is a pressing need to do so, or whether it will not make any difference because we are bound by our own horizon of experiences.

The Warmterotonde is selected as an empirical case to gain insights in order to answer this very question. From here chapter 2 presented the SCOT approach as a theoretical framework to enter the empirics in a structured way. Chapter 2 also led to a tailoring of the original SCOT approach because of it lacking focus to analyse the interaction between social groups concerning their view on the Warmterotonde. The original SCOT approach merely describes the interaction that takes place, but it does not provide any tools to do so. After a critical analysis of the original SCOT approach, several additions are made and led to a tailoring of the SCOT approach to the focus of our study.

Chapter 3 has been directed at analysing the social groups, their views on sustainability, the congruencies and incongruencies of their views and how these groups interact. This eventually led to an answer on the question whether these variety of different views can be overcome in order to develop a universal or shared conception of "sustainability".

The research question in this thesis has been:

"How to understand the role of different views of the different social groups (stakeholders) on the development of the Warmterotonde, assuming that these social groups do share the view that the technological development of more sustainable technologies is to enhance the quality of life?"

The research question can be answered from multiple perspectives.

I. *A methodological angle*

On a methodological level, an answer can be given by applying the interplay between technological frames, the horizon of experience, and the tension deriving from this between concepts & conceptions and values & norms to the philosophical inquiry of the research question; adding a study of discourse to the philosophical inquiry.

The SCOT approach provides a good starting point to be able to frame the study of the case in such a way that the relevant social groups, their interaction and the development of the technology come to the foreground. This is valuable and fruitful when aiming to answer questions similar to the ones addressed in this thesis; a question linking social topics with technological ones.

However, the SCOT approach is in essence not sophisticated enough to capture the big picture. Fine-tuning it by including an eye for the technological frames of social groups, the congruencies and incongruencies of the social groups as well as an analysis of values and norms, provides a more accurate analysis of the development of a technology in which social groups take part. The original SCOT approach leaves us with an unanswered question. The research also showed that the development of the Warmterotonde has to be seen in light of a bigger, national debate about coal and sustainable energy systems. The arguments of the social groups can be extracted from this national debate and thereby shows that it is not only the individual claim of the actor determining his or her view on the technology. The arguments are determined by another debate that is encompassing. This insight questions the SCOT approach. The focus in mild social constructivism is more on the web of influences that a technology has in its development, whereas strong social constructivism mainly focuses on the relevant social groups influencing the form and meaning that a technology eventually gets. In this regard, mild social contructivism seems to be closer to pick than rather applying the SCOT approach.

II. *Content wise*

The different interpretation of "sustainability" can be understood by acknowledging that each relevant social group surrounding a technology has its own interpretation of sustainability. This interpretation is backed-up by the horizon of experiences and beliefs that each social group holds. Which in turn leads to specific conceptions and norms deriving from a shared concept or value. Each relevant social group has its own internally legitimized way of framing a technology rationally, based on uncontested beliefs, methods and other key elements. The point is that we should not have the idea that there is merely one rational way of framing the world and thereby believing that eventually, all relevant social groups will find each other in this. Instead, a variety of views are held by the relevant social groups. Especially the empirical step in the study shows the internal rationality of the technological frames of some of the relevant social groups.

The second part of the research question asks why there is both incongruencies in views on the Warmterotonde between the relevant social groups as there is also congruency. This can be

answered by stating that social groups accept and share views on general concepts and values. So more specifically: the relevant social groups in our study accept that technological solutions will help us reach the sustainability goals, however they move from congruency to incongruency when it comes down to the path that needs to be taken in order to reach the goals. Hence the tension between concepts & conceptions and between values & norms. Again, the underlying assumption in this thesis has been that pressing climate change issues have to lead to a rational dialogue or an overcoming of our own fore-structures and prejudgements. However, by acknowledging Gadamer's thesis of interaction between actors it can be argued that an overcoming can be reached on the level of agreeing that certain concepts or values are important, but that we are inevitably determined in our understanding of these concept or values because of our own horizon of experiences, beliefs and truths. Therefore, rather pseudo communication can take place. This is form of communication, coined by Habermas, arguing that people seem to communicate about the same concept but do this from their own conception of this concept and is therefore called a "pseudo" form of communication. Because do these communicating people really understand the connotation used by the other? To this extent both Habermas and Gadamer are true. Gadamer argues that we are determined in our communication by our own horizon of experiences, truths and beliefs. This implies that it is naïve to think that a rational dialogue can be reached in which prejudgments of people are omitted. Gadamer even argues that Habermas has its own prejudgments about the value of a rational dialogue. Habermas then asks whether there will eventually be a rational dialogue in which prejudgments are omitted or whether pseudo communication dominates the field. I agree with Gadamer and argue that we can not get rid of our own *being-in-the-world*. I justify my position with the results of the empirical analysis.

III. *On a meta-level: our deficient and finite nature*

As said earlier, the specific research question of this thesis is part of a bigger question that concerns our current day actions in solving climate change problems. Man is deficient and finite and has always cultivated nature in order to survive (Grant, 2007). How come those incongruencies dominate the field of taming the climate change problems? Is it not perceived as life threatening? An answer to this can be given by relying on the interviews of the experts and on the arguments in the field. We have seen that instead of a focus on collaboration between parties, a focus polarization and incongruencies is taking the lead. The example of Maya van der Steenhoven and Arash Aazami shows that the discussion between the relevant social groups on the way of coping with nature just leads to muddling through and pseudo communication. As argued earlier, this pseudo communication is inevitable when it comes down to our conception of concepts. Understanding reality is always an understanding by using a certain horizon of experiences and truths. Whether these truths are correct or not is not be determined. Because determining truths can only be done by applying certain methods in which other truths discriminate between true and false. So how to determine whether these truths are true? This is why I argue that people can come to an agreement about the value of a certain concept, but the concrete understanding of this concept is based on our own fore-structures and therefore leads to pseudo-communication.

The interviewees argued that a moment of crisis could help us to overcome our incongruencies. I would argue that a moment of crisis opens up a new field conceptions and norms about this very crisis.

IV. *Concerning the development of the Warmterotonde*

The study of the research question has also shown that technologies do not solely gain their value by relevant social groups giving their view on the properties of the technology itself. The research has shown that the major determining factor deals with how the Warmterotonde is seen in a broader discussion in the Dutch energy and climate debate. The Warmterotonde is used as a symbol or example by the different relevant social groups and receives its value by testing the Warmterotonde on other levels than merely on its internal elements, such as the diameter of the pipes and the physical position in the streets.

Instead of this, the technology gains its value by its position in a broader discussion on centralized and decentralized systems and energy sources and the discussion on fossil energy sources. It however also does show that the discussion can change over the years and therefore the value of the technology will change as well. This brings us back to the fact that man is finite and so is his interpretation of reality. His relation with the world surrounding him is always based on a temporal state-of-the-art knowledge about the world, based on the medium that is used.

The title of this thesis is "The role of values and norms in challenging climate change" with a specific focus on the interaction between social groups involved in the development of the Warmterotonde. I argue that values and norms both play a crucial role in challenging climate change. The question is whether both of these concepts are fruitfully separated from each other. Values and norms are traditionally seen as values being "concepts", and norms being "rules" or "guidelines" deriving from "concepts". Our research has shown that there is hardly any disagreement about the importance of "sustainability", as a value or concept, in challenging climate change. But how come that the Warmterotonde, as a sustainable technology, is not yet in use? How come people disagree about its position in the Dutch energy system? Questions like these have to be answered by looking at the norms, or rules, deriving from concepts. The analysis of the 8 technological frames in our research has shown that norms of 8 actors are different. If so, is agreement about norms possible, just like the agreement about values? I argue that norms are determined by our own situatedness in life. This situatedness can be understood as a "culture" in which we find our truths and beliefs. Overcoming disagreements for the sake of answering to climate change issues comes down to saying that we have to develop a shared view on reality in which we agree about principles, guidelines and truths. I deram about reaching this utopian position, but I argue that it is more likely and realistic to argue that even though we agree about norms, words explicating these norms are in themselves empty concepts which have to be filled with our connotations, associations and interpretations of words. I argue that because of these, language always frames reality in a certain way, based on our own vocabulary and situatedness.

The most likely position that we will have is pseudo communication about challenging climate change. The role of values and norms in challenging climate change is a crucial one of which I argue that even agreement about values and norms will always eventually lead in a way to non-understanding because of associations and connotations that differ but are not necessarily visible (Schleiermacher, 1985).

I will end this thesis by posing an example that describes the fact that we will always understand reality in a determined and situated way and thereby questions Habermas' aim for communication that is free of predjudgments, or my aim in the introduction of this thesis to come to a shared view on sustainability in challenging climate change.

In 2013, in light of the so-called *eurocrisis* Angela Merkel (Chancellor of Germany) argued the following about the concept "Austerity" coined in the European Union as a set of political actions directed at stabilizing state budgets and restoring competitiveness:

> *'Austerität'.*
> *Bis dahin hieß das 'Haushaultskonsolidierung',*
> *'solides Wirtschaften', oder 'keine Schulden machen'.*
> *Jetzt heißt das 'Austerität', was sich ja schon als Wort so anhört,*
> *als ob ein Feind auf uns zukäme.*[40]

Let us face it, even the understanding of this example is inescapably bound by the reader's situatedness.

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[40] Rede von Bundeskanzlerin Merkel beim 24. Deutschen Sparkassentag (2013).

Words of thanks

Writing this thesis has been a project that took me 1,5-year to finish. Not because of difficulties that I faced in dealing with the empirics or in applying the philosophical perspectives and theories to the case. It took me longer than expected because of personal choices that I made in the last two years, which also influenced the writing of my thesis.

I eventually finished it. For this I want to thank my parents and my brother for perpetually insisting on finishing my thesis. I want to thank my supervisor, Jos de Mul for his attention, enthusiasm, his excellent critical remarks and his patience; I could count on him. I also want to thank my advisor, Han van Ruler. After his thorough reading of my thesis I was left with doubts. Han van Ruler took the time to help me overcome these doubts. I think that I made a significant improvement because of the critical reading of Han van Ruler which resulted in a thesis that I am proud of.

A special thanks to my beautiful girlfriend, Ivana Barisic. I have no words to explain what I felt when she thoroughly understood my mood; without judging and determining, she always motivated me to keep on going. Ivana was, is and will always be my pillar of strength.

Appendix

The Appendix can be reached by the following link:

https://www.dropbox.com/s/9pg0ha1r29j4j4m/stakeholdersanalysis_arguments_energeia%20%281%29.xlsx?
dl=0   .

The first tab provides insight into the media items that are studied. The second tab provides insight into the arguments on the Warmterotonde. This tab is called "Pro-contra Warmterotonde". The other tabs are for further reading since they concern other technological solutions, such as geothermic energy.

The reader should note that the research has been performed between January 2016 and July 2016. A quick insight to the current dynamics in the development of the Warmterotonde can be gained by using the following search terms in the Google search engine, by making use of the BOOLEAN operators AND or OR:

- Warmterotonde Zuid-Holland, Warmopweg, Warmtenet Zuid-Holland.
- nieuws, kritiek, aanleg, politiek, tuinders, Westland, duurzaam, kolen, centraal, stad, woningbouw, decentraal, gas, veilig, bewoners, financieel, efficient, toekomst, klimaat, oplossing, onderzoek, energiedialoog, energie, huishoudens, industrie, restwarmte.

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