Internal Carbon Pricing in the Province of Utrecht

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Abstract

This research explores to what extent carbon pricing can take shape within the province of Utrecht and so contribute to their ambitions on carbon reduction. In combining theory with practice, with two case studies as main objects of research, shaping a transformation process with its barriers and opportunities can hopefully guide climate mitigation efforts in the province of Utrecht, and too beyond. The practice of performing SCBA will be analysed as it is done now, in practical steps and in the extent to which external societal costs are weighted currently. With a formal decision made of implementing SCC prices into SCBA, this research will pave pathways working towards new ambitions and experiment, learn and evaluate within this transition pathway. And beyond carbon pricing in SCBA, possible other pathways towards internalizing carbon pricing will be explored. Incorporating climate mitigation objectives, by implementing different forms of carbon pricing into sectoral policy- and decision making is called mainstreaming. Mainstreaming is to capture climate mitigation potential in other policy areas and sectors and lay appropriate links between them to solve problems, and increase efficiency and effectiveness of policymaking. This empirical research is based upon desk research, in depth-interviews and two experiments, aiming at a practical implementation guidance on which the province and other organizations can possibly steer further policy implementation.

Keywords: Internal carbon pricing; Social Cost of Climate Change; Transition theory; Mainstreaming theory; Social Cost-benefit Analysis; Procurement

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List of Abbreviations

CO_2: This study uses the term CO_2 which in this context means the same as CO_{2e}, also called CO_2-equivalent. The CO_2-equivalent includes not only carbon dioxide (CO_2), but also the other greenhouse gasses such as Nitrous oxide (N20), methane (CH4) and fluorinated gases (F-gases). CO_2-pricing and carbon pricing will be two definitions used in collaboration in the extent of this study.

SCBA: Social-Cost-Benefit Analysis

MVOI: Maatschappelijk Verantwoord Opdrachtgeven en Inkopen

DMJOP: Duurzame Meerjarenonderhoudsplan

LCA: Life-Cyclus-Analysis

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1. Project framework

1.1 Introduction

In a world where the climate is warming, a fact that will have far-reaching consequences for both current and future generations, I am inspired by the many forms of inequality this entails. Inequality in which the benefits of economic and social growth in certain countries and societies contrast unfairly with the extensive negative effects of this growth, which often fall on places that are already disadvantaged. The greatest example of our time could be called climate change. The concept of sustainable development was first put on the agenda at the climate summit in Rio De Janeiro, in 1992, where the following definition of sustainable development, from the UN Brundtland Commission (1987), was central; ''development that meets the needs of the present without compromising the ability of future generations to meet their own needs''. One of the key principles deriving from sustainable development, which was also included in the 1992 Rio Declaration, is the principle of ''the polluter pays''. Under ''the polluter pays'', it is generally accepted that whoever produces pollution is also responsible for the costs that this pollution imposes on humans, animals and the environment. In this sense, the polluter may be limited not only to the producer, but also to the consumer.

Climate change can be considered a market failure within the current economic system, (external) risks and costs are most often not embedded in the actual market. Many scientists, academics and actors within this field therefore claim that this failing market has to be corrected and these risks and costs must be internalized. In this way governments and organisations are effectively taking responsibility for their share in emissions. In a future-proof and sustainable economy, people will have to pay for pollution and the impact that climate change causes and will cause in the future. In that case, it is important to put a price on emissions, a fair price. A price on emissions can be calculated and applied in different ways, and implemented within different governments, companies or organisations.

The organisation Klimaatverbond, an association of local governments, was commissioned in part by the province of Utrecht to draw up a consideration framework for carbon pricing in provincial policy. The report thus aimed to put an internal price on CO_2, which would in future be taken into account within the implementation of SCBAs. A social cost-benefit analysis (SCBA) is a tool for making decisions on major spatial projects. On 18 January 2023, it was announced that the Climate Alliance recommendation would be adopted and that the Province of Utrecht would from then on commit to the following two actions: first, to use a price of €875 within the SCBA in order to include the social costs of climate change in policy considerations. Secondly, the Province of Utrecht will focus on researching and designing a CO_2- pricing toolkit for other areas of application within the provincial organisation. This new price of €875 is more than 10 times higher than the CO_2-prices applied in the SCBA until then. This makes the province of Utrecht the first government in the Netherlands to put an unprecedentedly high, but fair, price on emissions.

Because applying such a high internal CO_2-price in the SCBA, an important policy- and decision-making tool, has never been done before, researching how this implementing of a new high CO_2-price may be done, is interesting. Firstly because this effort to adopt and implement a high and socially fair CO_2-price is the first attempt in the Netherlands for a government institution, studying the implementation of this policy instrument is scientifically and societally relevant.

Part of this research project will be an internship at Klimaatverbond te Arnhem, within the CO_2-pricing team. Klimaatverbond is an organisation with a pioneering role in two overarching programme lines; Climate Mitigation and Climate Adaptation. With various partners and public authorities as members (municipalities, provinces and water boards), local climate policies are prepared and constructed that ensure resilience, future-proofing and active participation. The 'internal CO_2-pricing' programme is one of the policy programmes within Klimaatverbond and its latest report 'Rekenen met de toekomst' (2022) is the base and inspiration for this research thesis.

1.2 Research problem statement

Bento & Gianfrate (2020) conclude in their determinants of internal carbon pricing that the success of the Paris agreements will largely depend on how the true costs of carbon will be internalized in further climate agreements. Now that the decision is both political and administrative authorized and approved by the provincial states, the question arises 'where to go from here?'. This question is both organisational as well as societal and scientific relevant. The starting point of this inquiry will be related to the ambitions of the province of Utrecht and the way in which this new carbon price is an illustrating policy example of these ambitions. Therefore knowledge is provided about what internal carbon pricing in the province is and how it comes about relating to the Social Cost of Carbon (SCC). The SCC is an estimate of the cost, in euros, of the damage done by each additional ton of carbon emissions. It too is an estimate of the benefits of any action taken to reduce a ton of carbon emissions. There is general ambition and hope with the province and with Klimaatverbond that the decision to implement this price will bring about change in the thinking, the acting and the spreading of ideas surrounding the inclusion of the polluter pays principle in (governmental) organizations. This pioneer project of the province of Utrecht may serve as example of a carbon price as policy instrument can be institutionalized in climate policy. This study will build on the objectives belonging to the decision taken on 18 January 2023, implement the SCC in the SCBA and orientate on further areas of application in the province of Utrecht.

What now lays ahead for the province of Utrecht is a transition. The transition from a policy toolbox wherein SCC is not assigned a sustainable value, to a policy toolbox wherein SCC does factor into policy considerations and choices. Stating the famous author of transition management Rotmans, one may say that the recent development of such revolutionary high but fair price on carbon has been pre-developed and is now waiting to take off towards further breakthrough of the instrument and principle (Rotmans, et al., 2000). The transition towards working with a fair internal carbon price may in the end be the start of an overlapping transition towards catalysing and mainstreaming carbon reduction in the different provincial domains, from policies and activities towards infrastructure and the built environment.

Transition management in turn then is an approach that aims to stimulate, facilitate and accelerate sustainability transitions through a participatory process of visioning, learning and experimenting (Rotmans, et al., 2001). The approach has been used to stimulate national sustainability transitions, just as well as sustainability transitions in localities (e.g. provinces, cities, neighbourhoods) (Roorda & Wittmayer, 2014). There is a lack of experience and information, both in practice and in the academic literature, to guide such an implementation of a CO_2-pricing instrument. This concerns, for example, the decisions to be made at the various stages of implementation, such as design choices. In various areas of a government organisation, such as provincial government, take operations or procurement policy, forms of CO_2-pricing are new and not yet applied, let alone researched. As with transition management, this research can focus on the participatory process of visioning, learning and experimenting with carbon pricing in relevant policy areas. In this way, we

can test what implementation of carbon pricing might look like. The report 'Rekenen met de toekomst' does not yet provide a picture of the consequences of applying new carbon pricing in, for example, the SCBA.

For successful implementations, it is also important to get both the different departments and individuals in the province on board with this transition. This is a process of change in the organisation, and people may see these changes in different ways. It is therefore interesting to see what perspectives, barriers and opportunities arise among the various officials involved in this implementation.

It is not only important what is needed from people and departments within the province, but the organisation itself can also respond and have great influence in guiding and facilitating certain transitions and implementations. Using concepts from mainstreaming theory (Uittebroek et al., 2013 and Runhaar et al., 2018), all these perspectives, barriers and opportunities can be analysed and structured. Insight in mainstreaming factors determine the robustness of the province regarding both environmental and social challenges (Uittenbroek et al., 2013).

1.3 Research aim and research question

This study will look at 'action in practice', at applying planning in an implementation process steered at transformative environmental governance with transition management theory. A transformation that has not yet begun but is characterised in a change in thinking about climate change and its current and future impacts. The use of CO2 price in policy instruments is central to this transformation of governance and to this end, theories around the process of governance and planning are appropriate. The management of the provincial government involve sensitivity to existing dynamics and the regular (re-)adjustment of goals and ambitions to overcome the conflict between long-term goals and short-term concerns (Rotmans et al., 2001).

The aim of this thesis is two-folded. First, the practical aim is to gain insight in the role that internal carbon pricing might play as working towards a broader inventory of carbon reduction instruments and policies. It will seek insights in the extent to which applying carbon pricing in the SCBA and other internal primary process within a province such as procurement, will contribute to carbon reduction potentials. Then the policy implementation process and translation of carbon pricing theory to practice will be assessed with the help of theories of transitions and mainstreaming. From this assessment, individual perspectives just as well as stimulating or limiting factors can be localized. The following question and sub-questions are formulated to serve these research aims:

Main research question

How can, with the help of experimenting, the implementation process of an internal carbon price in the province of Utrecht be shaped in SCBA and procurement, and what perspectives, barriers and opportunities arise in this transition?

Sub questions

1. What is an internal CO_2-price and how does it come about?
2. Making use of experimenting, how can the implementation of a carbon pricing instrument in the SCBA take shape, and what would be the consequences of this implementation?
3. Making use of experimenting, how can the implementation of a carbon pricing instrument in procurement practices take shape, and what would be the consequences of this implementation?
4. Based upon mainstreaming and transition theories what identified perspectives, barriers and opportunities arise in the process of mainstreaming a carbon pricing instrument in the organization of the province of Utrecht?

1.4 Societal relevance

The goal of this research is, as earlier described, to gain insight in how the policy instrument of internal carbon pricing can be shaped within the provincial policy- and decision making. This is done by experimenting within the two provincial domains of mobility and procurement. By doing so, the effects of climate change will be chained in provincial policy with a realistic economic weight which in part may accelerate steering towards fair and effective climate policy. This fair internal carbon price is fundamentally relevant as internalizing the Social Cost of Climate Change is embodying precautionary principles and is making a governmental organization responsible, or at least aware of its effects on the climate. Internal carbon pricing influences economic decision making where choosing for lower-carbon alternatives is stimulated, and is thereby directly helping to choose the more environmental, and in turn societal friendly future. The price of carbon is directly intertwined with the possibilities and motivations of decreasing emissions. By setting a higher carbon price, such as the one the province of Utrecht is implementing, the estimated benefits of mitigating emissions are increasing. And with these increasing benefits come the expected net benefits of more rigorous local climate policy (Rennert et al., 2022). A more optimal policy decreasing carbon emissions can be determined with the method of SCC and a higher SCC means investments will have a higher rendement in terms of avoiding future economic and social damage, see chapter 2.

Apart from researching the implementation process, the research will provide insight in how the decision of the provincial states is received, transitioned, and hopefully mainstreamed in policy. It provides insights in the perspectives of departments and people (civil servants, project managers and external experts) regarding the transition and implementation of a carbon pricing instrument. This is relevant since it will be the first local government internally working with such an high price and much may be learned from its surrounding process. This research is further directly providing evident- and experience-based information for future (decentral) governments and organisations. Indirectly and via current and future policy-implementations this research can support its share in internalizing social costs of carbon in other organisations. The results that are retrieved in this research can contribute to the knowledge of stakeholders, organisations and (local)governments that have the further ability and will to implement mitigation principles, the social costs of climate

change and an internal carbon price to help fight, and protect citizens of the future for climate change.

With practitioners within the province starting to work with a carbon price more than ten times as high as before, it is interesting to investigate what the transition can bring about. When organisations are concerned about the risks that carbon brings along, this might trigger decarbonization efforts in decision- and policy-making. From performing transition management at a provincial level, multiple developments can be used to accelerate the ongoing transition towards decarbonization at the province of Utrecht. Networks can be created, experimenting set up and new knowledge can be learned and spread further (Rotmans et al., 2001

1.5 Scientific relevance

The field of climate mitigation has been developing quickly over the last decades wherein (internal) carbon pricing as a mitigation measure has only recently been rapidly evolving. There have been many articles written about the Social Cost of Climate Change, which is referred to as a the base costs placed on carbon emissions. Wilbanks (2005) highlights the challenges related to linking the global and long term issue of climate change with local priorities in local planning. It is at the local level that many adaptation and mitigation actions are implemented. Though Swart & Raes (2007) also mention that there the general knowledge about climate change is limited, and the issue is being one regarding less urgence in planning process considerations.

The scientific research concerning the construction of a carbon price used for internal carbon pricing is abundant, it is only in the further implementation of this scheme, its analysis and its evaluation that research is only few. Bento & Gianfrate (2020) conclude in their determinants of internal carbon pricing that the success of the Paris agreements will largely depend on how the true costs of carbon will be internalized in further climate agreements. They also state that more research is needed to understand how effective internal carbon pricing is implemented and this research may just fill in this gap. The adoption of internal carbon pricing principles can be interpreted as a shift that includes important aspects of climate change mitigation. Therefore, there are strong parallels between this research and the assessment of the integration of climate adaptation into spatial policies. Uittenbroek et al. (2013) argue that there are many studies suggesting that the integration of climate mitigation in government policies should be encouraged. However, few studies explain how to understand the integration and implementation process. Therefore, this study examines the implementation of climate mitigation using the principles of internal carbon pricing. This inquiry will help discover how an internal carbon price may take shape within the governmental organization of the province of Utrecht. Trinks et al. (2022) mention the importance of studying how organisations expectations of future carbon constraints affect their decision- and policy-making.

1.6 Reading guide

This research consists of nine chapters. The first chapter is introductory, including the project framework, problem statement, research aim, research questions and relevance. The second chapter provides the theoretical framework, an overview of the existing scientific literature and ending with the conceptual framework that is used throughout this research. The third chapter sets apart the methodology of this research, including the research design, data collection, research phases and a selection and explanation of the case studies used. Chapter four sets apart the results of the case study on the SCBA, whereas chapter five presents the results of the case study on procurement. These chapters both begin with appointing the design choices, after which carbon pricing is introduced in a case study and applicated in the accompanying experiment. These chapters end with an reflection on the experiments. Chapter six is in turn focused on the mainstreaming of carbon pricing within the organization of the province of Utrecht. It sheds light on the lessons learned from previous case studies and structures the perspectives, barriers and opportunities that may drive or hinder the mainstreaming of carbon pricing in the provincial organization. In chapter seven conclusions are drawn up on the main and sub questions of this research, followed by a reflection, discussion and recommendations for further research. Then chapter eight includes the references used. At last, chapter nine contains the appendices.

2. Theoretical Framework

The theoretical framework provides the foundation for the study and the conceptual model that incorporates the research questions. Firstly, the literature on SCC is outlined. This is followed by a detailed explanation of the theory of SCBA and an introduction to the theoretical underpinnings of procurement practice. Finally, there is a chapter on transition and mainstreaming theory, which was used as a basis for identifying and structuring the various barriers and opportunities.

2.1 The Social Cost of Climate Change (SCC)

Since the prices that Klimaatverbond found in their research and the eventual price taken over by the province of Utrecht are founded in the calculation methods of Social Cost of Carbon Change, this section focuses on how this price comes about.

Broadly seen, there are two ways of calculating a carbon price, dependent on the ethical, moral or financial choices made in the process. The first method is focused around abatement costs, the costs involved regarding investments to avoid further emissions. This method is economical in its base where carbon emissions (in relation to a necessary decline) are seen as a scarce resource that will become more expensive and scarce during the process of declining emissions until 2050. The cost put on carbon taking the abatement cost principle could count as the minimum price basis for the second method of calculating a carbon price; the method of social cost of climate change. Adopting the abatement costs as method of decarbonisation makes it possible to at least gradually move towards the zero emissions. Questions are however, if this necessary reduction of emissions is quickly enough, putting the limit of global warming to 1.5-2°C at risk. In this research, since the social cost of carbon plays a crucial role in the principle decision of the province of Utrecht to adopt this concept, we explain how this concept has come about and how the quantitative level, the figure of €875 has been constructed.

2.1.1 The origin of SCC

The name Social Cost of Climate Change, or SCC, says it already because this method takes into account both the economic and social impact of climate change when putting a price on carbon emissions. It is based upon the precautionary principle and the method has been translated into many models and corresponding publications which will be explained further below. These models take into account worldwide impact of climate change, both its damage as well as returns on economies and societies and try to place a minimal price on carbon to capture these effects.

To arrive at a carbon price using the SCC method, there are a some relevant questions that need to be argued first. First of all there is the question of how much damage (or return) will there be in the different parts of the world. Then there raises the question of what the impact of this damage (or return) is on the economies. At last this damage needs to be monetized to a certain price level in, for example, euros or dollars.

All questions surrounding the construction of social costs of climate change cannot simply be answered and argued in a clear and structured manner, but are subject to much ambiguity and uncertainty. Like Tol (2012) mentions in his paper when setting apart estimated probabilities of total economic impact of climate change, more than 300 estimates of a SCC are available and thousands of studies have been done around the subject. Estimates have and will always be dependent to

their position in time and knowledge available at that time, one main important aspect in such is the constant revision of existing and new researches used to determine the estimates. The SSC builds towards a price and the main way to determine these estimations in with the help of Integrated Assessment Models (IAM). These models seek to quantify climate-economy interactions to optimize policy responses to climate change in which pricing carbon can be an opted mitigation measure (Nordhaus, 2013). Grubb et al. (2021) states that three important pioneer models, all developed in the 1990s can be distinguished; DICE (Nordhaus, 1992), PAGE (Hope et al., 1993) and FUND (Tol, 1997).

All IAM's work basically the same way, calculating all key factors with sets of formulas relating to topics and themes, doing so while dependencies of these factors remain connected as best as possible. The models estimated worldwide effects of carbon emissions on factors like consumption, production and welfare as far as a coming century (van den Bergh & Botzen, 2014). The models have absorbed thousands of studies in its calculations and ever growing algorithms use these to determine the damage done to the economy. As continuously expanding and further incorporating complex systems, the models acquire better consistency and accuracy over time (van den Bergh & Botzen, 2014).

Many studies have quantified or at least partially quantified certain effects of climate change. These studies have (tried to) expose current and future systems to foresee the effects climate change will have on them. Tol (2012) describes some of the systems that so far have been successfully and at least partially integrated and quantified into the social cost of carbon. Systems and effects that thus far are for the most part quantified can be associated with effects relating to agriculture, forestry, energy use, supply of water, coastal and riparian zones, air quality, human health and human mortality (Tol, 2012).

The models DICE, PAGE and FUND all proved relevant in climate policy-making and research of Nordhaus into the social costs of carbon, although its critique, proved to be the pioneer on further research on SCC. Nordhaus presented his DICE model in 1992 and this model has been further adapted by countless scientists to this day because of its source code made open and accessible. DICE, as Dynamic Integrated Climate-economy model, is used to investigate alternative approaches to slower climate change and Nordhaus (1992) proved that implementing a carbon tax would be an efficient approach to do so.

The first author to estimate the social and economic impact per ton of carbon emissions is too the author Nordhaus (1991) whose price of 7.3 dollars per tonne has caused a stir at the time being. The main critique being on the assumption Nordhaus makes that the carbon emissions are in a resource steady state, implying the level of emitting will remain constant while not taking into account further growth of emissions (Fankhauser, 1995). This said, in 1992 the IPPC already predicted a doubling in total emissions during the time frame between 1990 and 2005 (IPCC, 1992). Fankhauser (1995) states that climate processes are clearly non-linear and the price on carbon emissions will and should thus be dependent on the future concentration and warming levels.

Van den Bergh & Botzen (2014) sets apart the different studies behind the models, including their shortcomings, to conclude that all estimates from the IAM's should be treated with care and caution. First of all there is the constant revision in time which can the ultimate price on carbon to be the subject of either significant change, or steady fixedness. DICE values more than doubled between revilements of the model between 1999 and 2007 whereas the FUND model estimate remained constantly the same (Hoffman, 2009., Anthoff et al., 2011). Next, studies show that estimate prices per ton of carbon can differ heavily when taking into account different systems and

studies. Anthoff et al. (2011) show again that the SSC of FUND is beyond 25 dollars if income differences are implemented in the calculations, wherein the relative low and constant price of 8 dollars was caused by the implementing positive effects of carbon on the fertilization of agriculture. Studies by Hope (2011) proposed even higher estimates up to 100 dollars per tonne with the use of the PAGE model. The three models combined are often used by organizations and governments to, for example, estimate the social cost of carbon. The Environmental Protection Agency by the UN is one of the organisations both using and reviewing the models (EPA, 2014).

Critique on SCC

The IAM's have through the years produced the clearest and in quantity the most policy recommendations but this does not mean that the assumptions they're build upon are widely accepted. Although these IAM's are partly open accessible, constantly updated and include many factors different ranges, critique by many authors should emphasise the importance of an a critical approach and its most common critique will be discussed below.

Multiple studies emphasize that the empirical base of the SCC currently is narrow and incomplete (van den Bergh & Botzen, 2014., Tol, 2012). First of all there are many climate change effects that are not, or only partially, quantified in the estimates of SCC. Topics that currently miss out in the estimates, but do have significant impact on the SCC have been described by van den Bergh & Botzen (2014) and include the following: Political impacts like political instability and violent conflicts; Societal impacts like large migration flows and heat stress effects on health; Nature impacts like a major loss of biodiversity and irreversible and increasing extreme climate change, including tipping points. At last, the current models cannot predict the long-term impact on economic growth and as Tol (2012) mentions, studies as from Nordhaus (1994, 1996, 2006) ''impose a future climate on today's economy, and they assume instantaneous adaptation''

2.1.2 CO_2-pricing: Different objectives, different prices

As CO_2-pricing has proved to be a complex and multiple concept in both the preparation, execution and reflection of this research, the choice has been made to give a brief introduction on the different types of pricing and the different pricing methodologies. The quadrant as designed by Klimaatverbond, shown in figure 2.1 provides a clear illustration of the four application fields where carbon pricing might be implemented.

Real application: In a real application, money flows do occur. Like the fictional application, it can be applied both inside and outside an organisation or government where other parties can also be involved. Examples of real applications are fund formation, the European Emissions Trading Scheme (ETS) and CO_2-taxes and charges.

Fictitious application: In a fictitious application, no actual cash flows occur but the price serves to support policy decisions and/or create awareness in a consideration framework. The fictitious application is the only application of CO_2-pricing that is the focus of this study. However, within this notional application, a distinction is made between two forms of notional CO_2-pricing, internal and external. Within these two forms, there is then also a distinction between different pricing methodologies to arrive at different CO_2-prices.

Fictive and internal application: Here we are mainly concerned with the social costs associated with Pigouvian taxation, or the SCC (Social Cost of Carbon), see section 2.1. This is a price set by Klimaatverbond based on national and international literature at a minimum of €700/tonne CO_2 and which the province of Utrecht has set at €875/tonne CO_2. Before this, however, the SCBAs used a CO_2-price based on the abatement/prevention cost pricing methodology, a price that is significantly lower and does not include the social effects of CO_2. The difference between abatement/prevention costs and the SCC is discussed further in section 4.1. In contrast, the SCC price is a price implemented in this study in the SCBA of the province of Utrecht with associated experiments, see sections 4.2 and 4.3. It is also one of two different prices which has been tried to implement in procurement practices and experiments, see sections 5.1, 5.2 and 5.3.

Fictitious and external application: External and fictitious application concerns the 'efficient cost', where the price is part of the award criteria of a tender. The level of this price is not fixed but can vary per project. For energy-intensive prices, an efficient low price below 50 €/tonne CO_2 can be used, while for other energy-extensive prices an efficient high price of 7000 €/tonne CO_2 or higher can be used. Therefore, for the experiment of procurement practices in section 5.2, an efficient price of 8000 €/tonne CO_2 was set for the Merwedekanaal energy-extensive project.

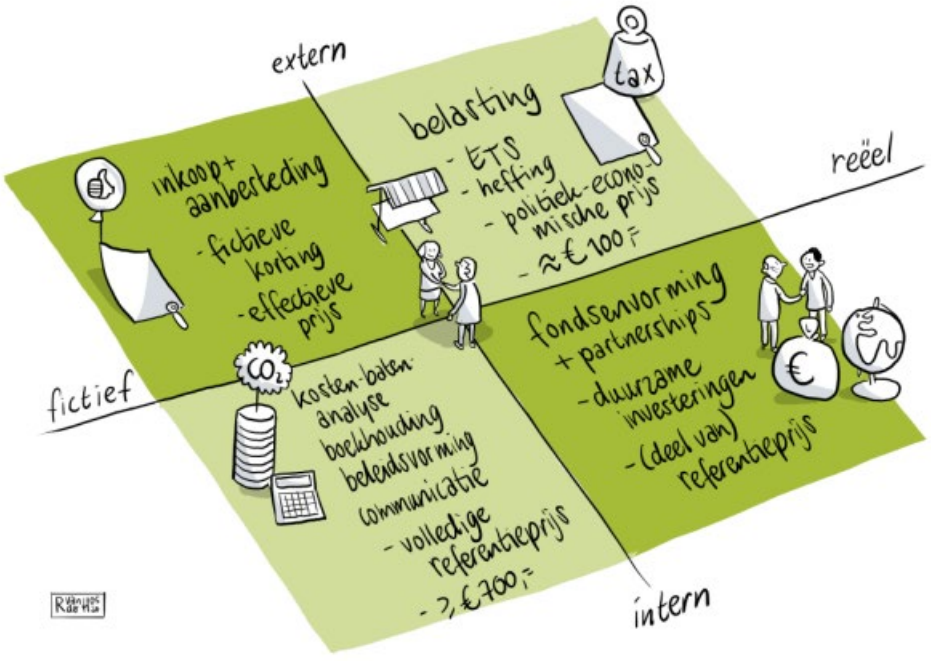


Figure 2.1: The quadrant of Klimaatverbond Nederland with the four different application fields of carbon pricing. (Source: Klimaatverbond Nederland, 2022).

2.2 The Social cost-benefit analysis (SCBA)

Two case studies looked at two key working processes in the Province of Utrecht. The first is the SCBA, which is mainly used in the field of mobility as a (mandatory) tool for decision-making on important spatial issues. The SCBA is a general and widely used approach in the Netherlands for making mobility decisions. It is a model-based approach that is scientifically described, but also often criticised for not always covering reality. The province of Utrecht uses the SCBA as a methodology within which CO_2-pricing is applied and this research is an experiment. Therefore, this section describes the methodology. First, an overview will be given on the theory behind the SCBA, the concept of broad welfare and the extent to which CO_2-emissions are included so far.

2.2.1 The definition and method of the SCBA

The Social cost-benefit analysis (SCBA) is an integrated assessment tool that weighs up all present and future social advantages, or welfare effects, of a spatial intervention by expressing them in monetary terms (Ruijgrok et al. (2004). The SCBA is mostly cross-sectoral because it captures both advantages and disadvantages of stakeholders, (local) governments, citizens and companies or – everyone involved in the spatial intervention. Next to these stakeholders mentioned, nature, soil and water are too being an integral and important part of the assessment (Ruijgrok et al. (2004). The Dutch government highlights that everyone, from governments to interest groups and companies can make use of an SCBA to help their policy- and decision-making (Rijksoverheid, n.d.). For some projects, the national government mandates the use of a SCBA, like in the MIRT project (Meerjarenprogramma Infrastructuur, Ruimte en Transport). An example of a MIRT project is the 'Exploration Living & Public Transport' in Utrecht (Rijksoverheid, n.d.). The national government sets apart the main recommendations for when to carry out a SCBA which are the following; projects have major consequences for citizens or the environment; several alternatives for the measure are available; major discussions about spatial plans; to check whether (particular) interest have been sufficiently included (Rijksoverheid, n.d.). The variables, measurements and weighting and other basic instruments related to carrying out a SCBA are expressed in the 'General Guidance on social cost-benefit analysis' (Algemene leidraad voor maatschappelijke kosten-batenanalyse), from the PBL and CBP (Romijn & Renes (2013). The SCBA determines the costs and benefits of different alternatives. The general idea is that when a benefits outweigh costs, a project is socially acceptable.

Step-by-step plan of a social cost-benefit analysis

The following step-by-step plan of a social cost-benefit analysis is by policy steering literature from the PBL guidance (Romijn & Renes, 2013), supportive document for policy-makers by Wouters (2013) and a recent example of an infrastructural SCBA in Utrecht (Hoefsloot et al., 2020).

1. *Problem analysis*
   An SCBA is in preparation for a project, a project that needs to solve or change a certain existing problem or situation. A problem analysis provides the necessary context of the problem and also describes what goals the necessary intervention should fulfil. For a large infrastructure project such as addressing a national or provincial road, a problem analysis often involves several bottlenecks and areas of concern that are considered simultaneously in a SCBA. Provincial minister Van Lunteren (n.d.) describes here that it is important to stick to the problem analysis and associated objectives at all times in the process to make sure that the solution you are working on is actually the solution to the problem.

2. *Determining null alternative*

The problem analysis more or less describes the reference scenario, also known as the null alternative, and the basis against which other alternatives are set out. This null alternative is the ''most likely development without policy'' (Romijn & Renes, 2013). The effects calculated in the following steps are the result of a subtraction, namely the sum: policy alternative – null alternative = effect.

3. *Determining other alternatives*

These other policy alternatives are integral (preferred) variants submitted for potential improvement to the null alternative. In this step, the baseline analysis is also drawn up, such as the vision year to which project effects are to be mapped; following the WLO scenarios, this is often 2050. In addition, there is also a vision period in which effects are calculated up to 30, 50 or even 100 years after the moment of commissioning. The costs and benefits must also be based on a certain price level, taking into account any expected price changes in the (near) future. Finally, a discount rate is set, to convert future costs and values back to a base year and thus convert future time-dependent costs and benefits. It is here that it matters whether one choses to put prices on the emission of CO_2 as costs, and at what price levels, now and projected into the future. It also matters what discount rate is chosen. A discount rate of 0% considers the balance between welfare of future generations equal too the welfare of the current generation. A discount rate greater of 1% considers current welfare more important than future welfare.

4. *Estimating effects, costs and benefits*

Project effects are estimated by comparing the situation with a project alternative with the world without a project alternative (the zero alternative). Crucial here is the extent to which effects of measures can be determined and translated; this varies for each measure and also for each policy area. Effects can be financial, such as investment costs, construction costs and maintenance costs. They can also be focused on the policy area the SCBA is aimed at, such as mobility where effects for passenger transport, freight transport, cycling and public transport can be measured. In addition, there are the other social effects, which are often more difficult to concretise but are no less important as a result, on the contrary. Examples of these other social effects are climate, noise, biodiversity, direct living environment, indirect effects and external effects. The main methods for determining effects are behavioural models, business cases, empirically determined price elasticities, experiments, key figures and environmental impact studies (Romijn & Renes, 2013). Implementing a policy alternative as a solution involves costs, and the costs relative to the baseline alternative are relevant to the analysis. These costs can be time-varying, occur once or periodically, and be fixed or flexible. For CO_2, one can set a discount rate as low as 0%, as the German Umweltbundesambt is recommending to do, making use of the pricing method of SCC.

5. *Preparation of variant and sensitivity analysis*

An SCBA is an analysis in which many effects, costs and benefits cannot be calculated completely accurately, especially over the longer term. These uncertainties around impact estimates can be described or plotted using sensitivity analyses and future scenarios.

6. *Overview of costs and benefits*

Using a set of discount rates, all costs and benefits of the various future years are now calculated back to the base year. An overview is also made here of all possible effects, both those that are not qualified and/or monetised.

7. *Presenting final results*

   PBL (2013) indicates in its guideline that the final SCBA in this final step should meet the following three requirements. First, the results are clearly and accessibly developed with corresponding justification. Second, users of the SCBA should find answers that are relevant to them. Third, the results must be interpretable, about what choices can be made based on the SCBA and what can be learned from it. The final report contains both quantitative and qualitative information on effects and elaborates responsibly on effects that may not be monetised. Total effects can be explained in the regional context, just as well as national or even worldwide context, the latter being mostly interlinked to climate and other external and indirect effects. The addition of broad welfare by CPB and PBL (Hof, 2022) in to the general guidance of PBL, showcases the growing importance of taking into account cross-border and intragenerational effects into a final SCBA report.

The SCC in SCBA

Within the roadmap of a SCBA, the change in pricing method of CO_2 emissions takes place concretely from step 4, when identifying future costs, benefits and effects and monetising them. When translating effects into concrete euros, key figures are used, for example on CO_2 emissions (Aalbers et al., n.d.). These key figures are based on studies, and in the case of CO_2 emissions, these are the WLO studies discussed earlier in this chapter (WLO: CPB & PBL, 2015a). These studies then again are based upon calculations using the abatement-costs method. ''One calculates the costs to be incurred to achieve the agreed reduction in CO_2 emissions. These can then be calculated back to the price of a tonne of CO_2'' (Klimaatverbond, 2022).

The established new price of €875 is based on the calculation method SCC where the calculations of the German planning agency Umwelbundesamt were guiding to arrive at the new pricing (Bunger & Matthey, 2020). As the SCBA is a supporting investment decision tool, the costs for CO_2 emissions fall under the CO_2 pricing application field ''internal and notional''. This means that calculating with CO_2 prices has no direct financial consequences, thus a higher CO_2 price does not equal more expenditure. Setting a higher price means adding more weight to the factor of climate in the SCBA, this means alternatives that are more climate-proof are more likely to surface at the end of a SCBA process. At the end of the SCBA process policymakers will still be able to make their own choices regarding the factors that they prioritise. However a solution that is relatively favourable to the climate will emerge more quickly and can therefore be chosen more quickly. The province of Utrecht deliberately chose, by taking over the higher CO_2 price, to be ahead of other provinces who may be waiting for the new WLO-scenarios to come out in 2024. With its role as pathfinder, this means a line is not drawn with other provinces yet, which can count on both positive respects as well as criticism from inside and outside of the province. It does mean that this process is interesting to research since this research may very well contribute to further agenda setting and implementation at other (local) governments in the Netherlands.

2.2.2 Reformulation of the factor CO_2 in the SCBA

WLO-scenario's

To quantify climate into Dutch policy, work has been done on climate scenarios of the Future Outlook for Prosperity and the Living Environment (WLO: CPB and PBL, 2015a). These climate scenarios work towards a CO_2-emission budget with an associated required reduction to meet climate targets. There is a high climate scenario where the emissions reduction is higher and the emissions budget lower than the low climate scenario. The WLO climate scenarios form the basis for how CO_2-emissions should be included in a SCBA. Within a SCBA, calculating a CO_2-price can answer the question of whether a particular project contributes to achieving emission reductions and whether this project is thereby more sustainable than other included projects. Invariably, this involves the abatement costs being passed on, and not the SSC, the social costs of climate change.

CPB (2016) provides a background and picture of how the valuation of CO_2-emissions resonates in SCBAs to complement the scenarios of WLO (2015). Meanwhile, the models are considered outdated and new calculations are due in 2024. At the time of writing, based on the numbers from CPB (2016) in table 2.1, CO_2-emissions are still being calculated in SCBAs, as for example by the Province of Utrecht, making it relevant to paint a picture of these numbers. The table 2.1 from CPB (2016) lists the efficient prices which is summarised as the price to be calculated per tonne of CO_2 to meet the 2050 climate targets for the lowest possible cost.

Whether or not to include a CO_2-price is a choice that can be made in advance by an administrative organization. For instance, within the province of Utrecht, a maximum CO_2-price of 80 euros per tonne CO_2 is used so far, and a minimum CO_2-price of 20 euros per tonne CO_2. The inclusion or exclusion of a CO_2-price, and especially the level of this CO2 price, can have a major impact on the outcomes of a SCBA. It is then up to policymakers how to respond to these outcomes. These CO_2-prices have been determined on the basis of the WLO-scenarios as produced by the PBL and CPB.

Tabel S1 Efficiënte en ETS-prijs van een ton CO_2 (in euro per ton) in de twee scenario's en de tweegradenonzekerheidsverkenning.

		2015	2030	2050
Hoog	Efficiënte prijs	48	80	160
	ETS-prijs	5	40	160
Laag	Efficiënte prijs	12	20	40
	ETS-prijs	5	15	40
2°C	Efficiënte prijs	60-300	100-500	200-1000
	ETS-prijs	5	100-500	200-1000

Table 2.1: The carbon prices as calculated with Abatement Costs by the Dutch PBL

Towards CO_2 based upon other factors

One can in the first change make a division between the two most common used methods of calculating a carbon price, on the base of abatement costs or on the base of the social costs of climate change, both explained in the previous chapter. The difference between the prices

resulting from both methods can be large, just as well in amount, as in impact on the economy as in what the price is covering. To show this one can make a comparison between two government bodies which conduct leading research often used as a basis for choosing policy-strategies; The Dutch Planbureau voor de Leefomgeving and the German counter organisation Umweltbundesamt. Currently, a CO_2-price is advised by the Dutch PBL on the basis of abatement costs. In Germany, the German equivalent of PBL has also advised a carbon price where this price is based on the calculation method of SCC. The SCBA's of the province of Utrecht that will be recalculated in this inquiry will have their existing carbon prices retrieved from table 2.2, with prices based on SCC.

Jaar	2020	2021	2030	2050
1% pure tijdspreferentie inclusief 25% risico (voorrang geven aan het welzijn van de huidige generatie boven het welzijn van toekomstige generaties)	€ 248,75	€ 251,25	€ 273,75	€ 318,75
0% pure tijdspreferentie inclusief 25% risico (gelijke weging van het welzijn van de generaties)	€ 868,75	€ 872,50	€ 901,25	€ 977,50

Figure 2.2: Price of a tonne CO_2 (in euros per tonne) based upon the Social Costs of Carbon method used by the German Umweltbundesamt. (Source: Klimaatverbond, 2022).

The differences can be seen visualized in the tables 2.1 and 2.2. It is not said that these prices are structural used in policy-decisions and strategies in both countries but the reports these calculations are retrieved from do count as a guideline for government policy. Klimaatverbond has decided to follow the guidelines and calculations by the German Umweltbundesamt because they state ''this price is supposedly widely supported in the scientific literature and seems a logical guide price to use in SCBA and provincial policy considerations'' (2022). The price also incorporates intergenerational equity.

In addition to the general guidance issued by CBP and PBL around the use of SCBA in 2013, an extension of this guidance was launched by both organization at the request of the second chamber, recognising the importance of broad welfare and integrating it into the use of SCBAs. This report, by Bos et al. (2022) came out in 2022. The concept of broad welfare consists of an addition of four main characteristics to the 'standard' concept of welfare, all of whom retrieved from the PBL's and CPB's supplement to the general SCBA guide of 2013. First of all broad welfare goes beyond financial-economic prosperity by including sectors such as health, living environment and (social) security. Secondly it takes into account the prosperity of not only the current generation, but too the prosperity of future generations. Thirdly broad welfare includes the distribution of wealth and lastly it takes into account the effects of welfare in other countries and regions worldwide. These characteristics all relate to the concept of SCC and have been brought up before the previous methodological chapter.

2.2.3 Obstacles of a SCBA in practice and theory

An SCBA remains a supportive decision-making tool and is therefore often not the only consideration. This is mainly due to three main obstacles that surround the implementation and use of a SCBA as an investment decision-making tool, as explained from Romijn & Renes (2013).

First of all, an SCBA is always incomplete, and is thus unable to take into account all the effects in the various social areas. For example, an SCBA takes as its basis maximising prosperity in the Netherlands, where not harming prosperity in e.g. the Global South could be at odds with the former. The supplement broad welfare to the general guideline SCBA does offer three new guidelines that are important for intergenerational effects and the impact elsewhere within the same generation. These include the effects of climate change elsewhere which occurs from CO_2-emissions, and which are, at least partially, included in the SCC calculations (van den Bergh & Botzen, 2014., Tol, 2012).

Second, there is always uncertainty at play because we are talking about effects that lie in the future, and the future is by definition uncertain. Key figures and existing models bring more order to this uncertainty, but here the question is whether models do justice to reality. Koetse et al (2011) previously indicated that including uncertainties about climate effects is much needed within a SCBA. The SCC assumes the real social costs of climate change in the long term and keeping these, higher SCC prices, will thus be a safer option for governments to hedge against future negative climate impacts. Romijn & Renes (2013) recognize that variables and information are not always clear or measurable, but deal with a lot of uncertainty, that in turn can lead to dispersion of possible outcomes. One of three forms of uncertainty mentioned is knowledge uncertainty, revolving around the extent it is known whether impacts occur and how these impacts then should be valued. Romijn & Renes (2013) state that this type of uncertainty revolves around the extent measures reduce CO_2 emissions and the extent to which CO_2-emissions affect the global climate. The price put on CO_2 is in direct relation with this uncertainty and therefore is a subject of debate and spreading in SCBA. Koetse et al. (2011) highlight that dealing with the uncertainty of climate effects in a SCBA is difficult, but also essential to arrive at meaningful policy recommendations.

A final obstacle to a SCBA is the difficulty to quantify effects such as climate effects and social costs, which quickly results in these effects having an undervalued position within the analysis. A goal of the province of Utrecht was to use a new carbon price to make these climate effects of the province's operations and policies quantifiable for now and in the future (Klimaatverbond, 2022).

2.3 Procurement and tendering practices

The second case study in this research concerns the procurement and tendering process. Here too, a carbon pricing instrument can be implemented in practice. There is not yet a consistent body of literature on how a procurement process comes about, and this is primarily due to the many different services, supplies and goods that a province may procure. A brief introduction to the theoretical underpinnings is provided in this section. In contrast to the previous chapter on SCBA, the question of how CO_2-pricing can be implemented in procurement and contracting is, It is to our knowledge, not yet developed in theoretical literature yet. We will explore how this CO_2-price implementation may take shape in our empirical analysis, which will be discussed in chapter 5. We use recent experts reports as our current knowledge base and as reference literature on this topic. Multiple reports (Klimaatverbond, 2022., ten Bosch et al., 2020., de Graaff et al., 2020., CE Delft, 2022) and experts indicate that the field of application of Procurement and Tendering is the most complex for implanting a carbon pricing instrument. At the same time it is also seen as the field of application that with the use of a carbon pricing instrument can realise the most impact.

2.3.1 Definition and method of procurement practices

The province is a purchasing organisation, this means that they place orders for supplies, services and works, from infrastructure projects to the renovation of its own property. In this, provinces have their own procurement policy that includes economic, social and societal principles (Pianoo, n.d.). The province of Utrecht's procurement policy is described as follows ''The province's procurement and tendering policy sets out the frameworks for all procurement and tendering. Transparency, objectivity and equal treatment are key words in it. Lawful procurement is our starting point.'' (Province of Utrecht, 2022). The procurement policy then states, for example, how the province deals with supply risks, product and supplier quality, procurement functions, tendering and award criteria and contract forms.

Within the procurement policy, general or specific starting points may concern sustainability. Again, the province of Utrecht states in its procurement policy ''The province wants its procurement to be as sustainable as possible. Sustainable procurement means that the province includes social aspects (e.g. social return), environmental aspects (e.g. sustainable materials, animal welfare, etc.) and economic aspects (e.g. fair world trade) in the procurement process.'' (2022).

The province of Utrecht pays attention to climate and the MVOI (Maatschappelijk verantwoord opdrachtgeven en incoop) in its procurement policy, in a chapter on sustainability themes, but also states directly; ''In principle, the province uses the Beste Prijs Kwaliteit Verhouding (BPKV) award criterion as a starting point in all tenders. This means that quality aspects, such as for example MVOI, of the product, service or work to be realised are leading and price is subordinate to this.'' (2022, p. 7). BPKV is one of the three award criteria drafted in the ARW2016, alongside 'lowest price' and 'lowest life-cycle cost'. If sustainability is the main interest of a procurement contract, the BPKV indeed is the most appropriate choice (Rijksoverheid, 2016). What is further notable is that the province endorses the inclusion of MVOI themes in tender documents wherever possible, and that the ''apply or explain'' principle always applies here. This means that one or sustainability themes are always included unless the internal client can provide sound written justification for not doing so.

CO_2-pricing in practice

Procurement and tendering lies within a different application field than the SCBA discussed earlier, namely within notional and external fields. CO_2 thus receives a price that still remains fictitious but in this case is also expressed externally, thus involving external parties. At its core, procurement and tendering are also about the interaction between clients and tenderers, about complementary cooperation that makes both the system and the calculation methodology different from internal.

The way that a carbon pricing instrument takes shape in procurement is in the award criteria, as in granting on value with a fictious discount (Lees: fictieve korting). The CO_2-price can be determined on a project-by-project basis and is then used as a pricing mechanism within the 'granting' of tenders to bidders. An granting method is the process of how the weighting between price and quality is determined, as well as the evaluation process of how the price and quality are determined of the different offers (ten Bosch et al., 2020). Roughly, two granting methods can be distinguished; the points method or the method of granting by value, the latter being relevant for applying CO_2-pricing.

Granting by value means that the quality of an offer from a bidder is expressed in a monetary value. A quality of an offer could then be a certain 'lower' amount in CO_2-emissions. For example, the lower the CO_2, the higher the quality and therefore the higher the monetary value. This monetary value can then be linked to the price of CO_2 and can then apply as a notional deduction from the tender sum of the offer. The final report 'CO_2-beprijzing bij provincies', by consultancy firms Tauw and Witteveen+Bos describes this method in practice succinctly as follows. Parties can tender for a project and are asked what the total emissions will be from their operations within addressing the specific project. These emissions can then be converted to a monetary amount and this amount can then be fictitiously deducted from the tender sum. This notional discount can ensure that the tenderer is 'granted' the project partly because the evaluation price (the tender sum - the notional discount) is ultimately the lowest of all the tenderers. In this case, the tenderer is awarded the project for the amount of the original tender sum (Ten Bosch et al., 2020). The step-by-step plan of implementing carbon pricing in a procurement project is done so in the empirical sections 5.2 and 5.3.

2.3 Mainstreaming and theories on transition and change

Having analysed the implementation process of the new internal carbon price within the practice of performing SCBA's with the help of transition management theories. A new question arises relating to the ambition of the province in making the SCC a more integrated part of their organization. Going beyond using the principle solely in the SCBA and asking the question of how to 'mainstream' the principle broadly in the organization. Mainstreaming can be used as a theoretical lens to enhance understanding of the process of integration and to investigate barriers and opportunities for implementing the SCC beyond its planned use in SCBA's, and further and deeper into the organization of the province of Utrecht.

2.3.1. Origins of mainstreaming

Mainstreaming is a theoretical concept originating from international development studies and environmental studies in the 1990s, and is concerning issues ranging from poverty reduction to emission mitigation. The idea of mainstreaming is to address these issues more effectively and to express the need for these issues to become an integral part of policy, rather than considering issues per sector (Oates et al., 2011). The social costs of climate change is not sector-specific and so is the use of a SCBA. Climate change effects are widely spread among actors, geographical scopes and sectors, and mitigation measures therefore ask to be mainstreamed in climate-policies, just as well as in non-climate policies (Swart & Raes, 2007). Another aim of a mainstreaming strategy is to "capture the potential in other policy areas and sectors for implementing climate-friendly and climate-safe development pathway" (Kok & de Coninck, 2007, p. 588). By laying appropriate links between different functionally linked issues can help possibilities for solving problems, and the efficiency and effectiveness of the policymaking are increased.

This research will be about mitigation and in lesser extent about adaptation measures and in this context, Klein et al. (2005, p. 584) gives us the most exact definition of mainstreaming mitigation and adaptation policies; "The integration of policies and measures to address climate change in ongoing sectoral and development planning and decision-making, aimed at ensuring the sustainability of investments and at reducing the sensitivity of development activities to current and future climatic conditions". Both mitigation and adaptation to climate change call for action in many sectors of society and organizations but to this day these concerns have hardly been integrated within the policy- and decision-making processes in these sectors (Kok & De Coninck, 2007). Mainstreaming has so far mostly been used in context of climate adaptation measures, and not in the context of climate mitigation measures, like carbon pricing (Uittenbroek et al., 2013). This gap is interesting since Füssel highlights that climate mitigation has gained more attention the past decennia with as main reason "its ability to reduce impacts on all climate-sensitive systems whereas the potential of adaptation is limited for many systems" (Füssel 2007, p. 265). Mainstreaming climate mitigation measures in this viewpoint could in turn prevent the need for mainstreaming adaptation measures in the (far) future. Biesbroek et al. (2009), Swart & Raes (2007) and other authors call for integrating the two concepts of mitigation and adaptation together in maximize effective sustainable development since the two approaches fundamentally deal with the same problem: climate change. It is recent researches like Zen et al. (2019) and Baniya et al. (2021), performing researches mainstreaming both mitigation and adaptation in policy, doing this in contexts of Indonesia and Nepal. Kok & Coninck (2007) mention the opportunities concerning mainstreaming financial mitigation measures for making investments more sustainable, therefore helping reduce emissions and their future impact on the climate.

2.3.2. Conceptual model of mainstreaming climate adaptation

To Uittenbroek et al., (2013) developed a conceptual model of mainstreaming climate adaptation, based on three other researches of Moser & Ekstrom (2010); Adger et al. (2007); Kivimaa & Mickwitz (2006). A brief introduction will be given on the contributions of these authors before explaining how the model can help give insight in the extent in which a fair carbon price can be mainstreamed in provincial policy.

First of all, the outer shell of the framework is based upon the three common phases of a policy phase, as distinguished by Moser & Ekstrom (2010), These three phases are understanding, planning and managing. This cycle provides clarity on which level of government and in what stadium of the implementation process, relevant barriers and opportunities emerge. The first phase of a policy process entails around understanding. This involves the problem detection and framing and retrieving information about its context. Barriers and opportunities arising in this stage are often social, cognitive, organisational and institutional. The second phase evolves around planning. That is the development of policy options, their assessments and selections. Main barriers and opportunities in this turn are financial, technological and organisational and institutional in nature. The third phase is the management phase and goes about the implementation, monitoring and evaluation of the options. Main barriers and opportunities here are financial, organisational and institutional. The different barriers and opportunities are not fixed to certain phases, can arise and disappear throughout the iterative policy process, and will be explained in more detail now (Moser & Ekstrom, 2010).

This section assesses the limits to adaptation that have been discussed in the climate change and related literatures. Limits are defined here as the conditions or factors that render adaptation ineffective as a response to climate change and are largely insurmountable. These limits are necessarily subjective and dependent upon the values of diverse groups. This section assesses the limits to adaptation that have been discussed in the climate change and related literatures. Limits are defined here as the conditions or factors that render adaptation ineffective as a response to climate change and are largely insurmountable. These limits are necessarily subjective and dependent upon the values of diverse groups.

The barriers/ opportunities mentioned in the framework by Uittenbroek et al. (2013) are retrieved from Adger et al. (2007), whom summarizes the limits to adaptation related to climate change, as found in existing literature. These barriers can be faced in the policy process of integrating adaptation to climate change into policy, they can be subjective and dependent on existing values and norms of the organization. The authors, reporting for the IPCC, make distinctions in types of limits, into the following sub-categories: social, financial, technological, cognitive and organisational/institutional. A new study by Runhaar et al (2018) that builds on mainstreaming theory has distinguished six categories of factors that hinder mainstreaming. These six factors will be structured and analysed used for this study and are sequential: Political factors, institutional/organizational factors, cognitive factors, resources, characteristics of the mitigation problem at issue and timing. Uittenbroek et al. 2013 and Runhaar et al. (2018) highlights that next to barriers, opportunities can too arise within the policy processes, such as political or public support, leadership and the availability of resources which can too be divided into one of the six categories mentioned above. Certain processes can be both a barrier and an opportunity, depending on its contexts goals. Leadership in this case can both serve as an opportunity for adaptation but too as an barrier.

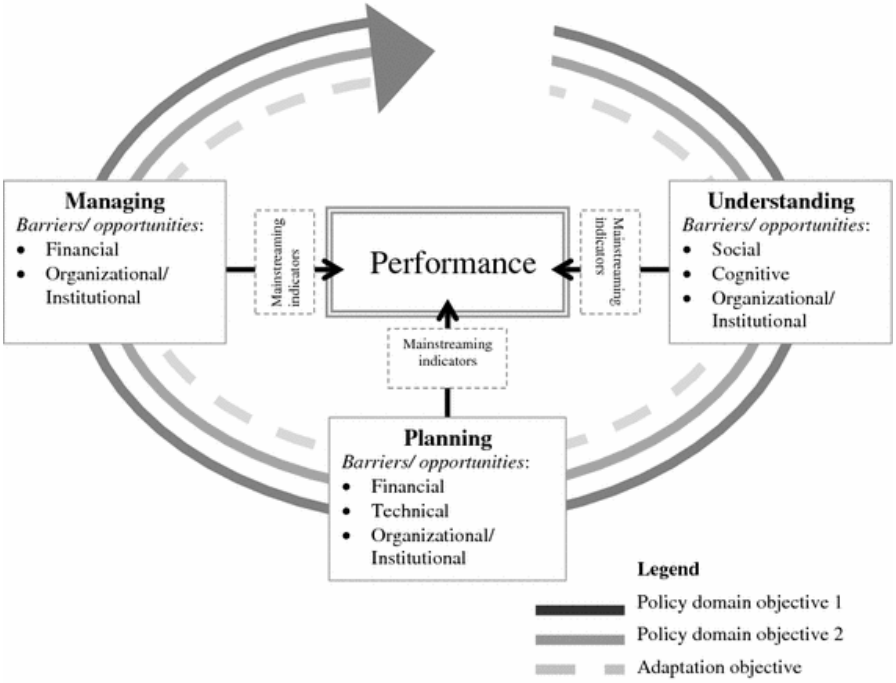


Figure 2.2: The mainstreaming performance model. From Uittenbroek et al. (2013).

Klein et al. (2007) states that the practice and theory of mainstreaming is used to ensure with two goals in mind. First of all to ascertain the extents in which existing projects already consider climate risks or address vulnerability to climate change. And secondly, to identify opportunities for including climate change explicitly in future projects, of which the latter will be the main aim of using mainstreaming in the case of Utrecht.

2.3.3 Barriers and opportunities to the implementation of internal carbon pricing.

The distinction in five categories of barriers and opportunities in implementing mitigation measures in an organization are retrieved in the first place from Uittenbroek et al. (2013) and Runhaar et al. (2018), who made the distinctions based upon great and extensive literature research on organizational change by Adger et al. (2007); Moser and Ekstrom (2010); Biesbroek et al. (2011). Barriers can delay implementation or exclude internal carbon pricing as a whole from the policy process. Although the same distinctions can too guide in exposing opportunities. The following categories are operationalized below and have been translated to the context of the province of Utrecht.

1. *Political factors:*
   Political barriers and drivers relate to political commitments that conflict or align with adaptation objectives. From political support for climate mitigation to the flexibility of legislative and policy context and the level of political stability. The province of Utrecht is first and foremost a political organisation, with the Provincial Councils forming the people's representatives of the province, and in that form being representatives of political support. The Provincial States determine and control the province's policy on key issues and are reconstituted every 4 years on the basis of provincial elections. (Stead and Meijers 2009; Runhaar et al. 2012; Dupon and Oberthür 2012; Uittenbroek et al. 2014; Wamsler and Pauleit 2016).

2. *Organisational/institutional factors:*
   These barriers and drivers relate not solely to the subject of climate mitigation, but the more give insight in the organizational layers of an organization or institution. Organizational factors can include fragmentation, lack of coordination and can relate to organizational structures, cultures, routines and practices. Institutional factors more relate to (incompetent) leadership, the lack of political support and public pressure or internal competition. (Persson 2007; Stead and Meijers 2009; IPCC 2014; Wamsler 2014; Uittenbroek 2016).

3. *Cognitive and informational factors:*
   These barriers and drivers relate to the uncertainty, urgency, complexity and level of knowledge about, in this case, understanding of climate mitigation concepts and instruments. The literature suggests that complexity of the topic is an important factor hindering further mainstreaming. Other cognitive factors include the level of awareness and the degree of social learning. (Persson 2007; Runhaar et al. 2012; Biesbroek et al. 2013; Wamsler and Pauleit 2016).

4. *Resources:*
   Resources are needed to support the further mainstreaming of mitigation measures and instruments. Resources include the necessary financial resources, subsidies and grants from higher levels of government, sufficient staff, information dissemination and guidance and access to knowledge and expertise. (Stead and Meijers 2009; Runhaar et al. 2012; Ekstrom and Moser 2014; Uittenbroek et al. 2014; Wamsler and Pauleit 2016).

5. *Timing:*
   Timing is mentioned by literature as waiting and sustaining a momentum for implementation. Mainstreaming can be extra driven by, or been hindered by making or not making use of a window of opportunity. (Runhaar et al. 2012; Wamsler 2015; Uittenbroek 2016).

This categorization of types of barriers will be used in this research project as overview of potential barriers and opportunities in interviews with employees in the provincial organization and with experts in the relevant policy fields. Besides getting in-depth insight into the possibilities and complications of implementing a new CO_2-price in specific workflows (of SCBA and procurement), this research aims to shed light on wider organizational implications when the experiments would be further processed and implemented in the organization as new practices. Therefore, we come to anayse how recipients of these new practices would then perceive the changes involved. The 5 potential mainstreaming barriers serve as a helpful guidance for these interviews.

Other theories as internal strategies

Beyond theory, mainstreaming is also an internal strategic choice. Other internal strategy choices can also be made. For example, the main counterpart theory is called the 'dedicated approach' (Uittenbroek et al., 2014). In this case, a dedicated policy unit is set up for a new substantive policy area to be implemented, such as CO_2-pricing, which will then also involve and influence the other policy units. In this study and in this section, only the mainstreaming theory has been used despite the fact that taking into account the use of or combination with a dedicated approach would have been insightful. Mainstreaming theory gave this research and the researcher a solid basis as to which one can identify and structure different barriers and possibilities, wherein the dedicated approach did not. It is still considered useful to now give a brief definition of the dedicated approach including the differences from mainstreaming.

The mainstreaming approach is based on indirect political commitment to climate adaptation and climate mitigation. This means that these climate objectives are linked to objectives of different policy areas and thus integrated. The main difference with the dedicated approach is that mainstreaming does not create new structures in the organisation, but 'hitchhikes' with existing structures. Here, it is very important to mobilise actors and resources in the different policy domains to achieve policy synergies, it can here be more difficult to achieve support. The dedicated approach is based on direct political commitment to climate adaptation and climate mitigation. The focus is on setting a political agenda, clear objectives and allocating resources to newly created structures within the organisation (Uittenbroek et al., 2014). With this new structure and strong political pressure, new policies are expected to implement quickly.

The discussion section at the end of this document will too shortly reflect on these two different approaches and the way they can be projected on the practices and processes taking part in the provincial organization of Utrecht.

2.3.4 Other theories on transition and change

Climate change is a fact and governments and organizations have to either way adapt to its effects, or even try and mitigate its causes to try and weaken its affects. This is asking for transitions to be made, a change in ways of working. In the previous pillars, theories about the Social Cost of Climate Change and The Social-cost-benefit analysis explained that currently the effects of climate change are not weighted realistically in the guideline of SCBA's of (local) governments in the Netherlands. Governments are currently calculating with CO_2-prices based on outdated assumptions drawn up even before the Paris Agreement. With newly calculated WLO-scenarios coming approximately in 2024, and the province of Utrecht deciding to take into account more than just these scenarios, this asks for a transition towards a new way of working (van Eck & Hilbers, 2022).

Transition processes are about change, a change in the way of working and in the way of behavior, showing a transition from one basis approach to another innovative approach. Geels & Kemp (2000) call, the transformation of an old system to a more innovative system by adding elements, cumulation. When integrating the new policy tool of a high CO_2-price in working towards a more climate-proof system, this is an example of cumulation. The following sub-sections will dive deeper into theories around transitions, change and mainstreaming.

Transition Management

Over the past decades there is an exponentially increasing demand for society to initiate so-called sustainable transitions (Chaffin, et al. 2016). With ever-growing attention and warnings for climate change and most of the world's governments dedicated to start working towards a climate neutral world in 2050, sustainable development is desperately needed to set off innovations and transitions. The idea of managing societal and sustainable transitions has inspired researchers in sustainable development to work towards theories of transition management. Transition management is a multi-level governance model giving shape to processes of co-evolution. Each transition involves changes and these changes can be in the needs or the wants, or in institutions, organizations, cultures and practices (Kemp et al., 2007).

Transition management is one of the foundational concepts of transformative governance. Transformative governance is an approach to environmental governance that has "the capacity to respond to, manage, and trigger regime shifts in coupled social-ecological systems at multiple scales" (Chaffin, et al. 2016). Transition management in turn then is an approach that aims to

stimulate, facilitate and accelerate sustainability transitions through a participatory process of visioning, learning and experimenting (Rotmans, et al., 2001). A transition in the first place is "a profound and irreversible change of (a part of) society", thus Rotmans (2012, p. 236). The approach has been used to stimulate national sustainability transitions, just as well as sustainability transitions in localities (e.g. provinces, cities, neighbourhoods (Roorda & Wittmayer, 2014). Transition management can be used in the plan-reforming process.

The approach is made up of four developments in which governance takes place along multiple levels, in turn shaping multi-level governance (Loorbach, 2004). A visualized model of the transition management cycle is shown in figure 1. Let us explain the four levels with authors Rotmans & Loorbach (2010). At first there is the strategic level, consisting of vision development and long term goal formulations. Secondly there is the tactical level consisting of processes of agenda building, negotiation and strategic planning. Thirdly there is an operational level consisting of experiments, projects, innovations and implementations. At last there is a reflexive level aiming at evaluating, monitoring and learning. Going through this cycle creates an innovative transition arena in which to learn, search and experiment outside the old arena.

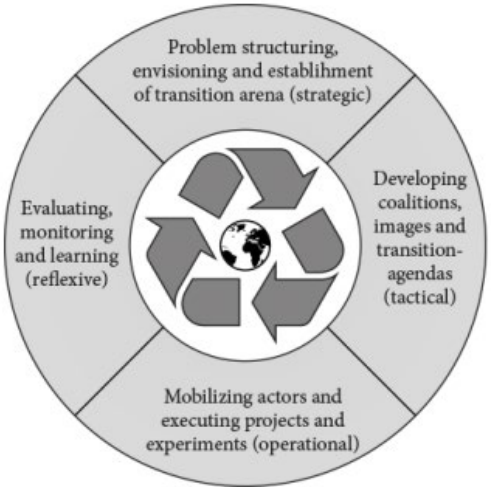


Figure 2.3: The transition management cycle. From Loorbach (2010)

Transition management as a theoretical concept builds from the transformative governance approach and is based on bringing about fundamental societal changes. The theory has originally been used as a lens for transitions in functional and widespread systems such as sustainable mobility (Kemp et al., 2011) and the energy sector (Loorbach et al., 2008). However, Spekkink et al. (2013) highlight that the approach has more recently seen the initial loci of transition management practices on local scales, like on region, city or neighbourhood. Rotmans et al. (2001) highlight that ''the aim of transition management is not so much the realization of a specific transition: it may be enough to improve existing systems, or the problems may turn out to be less severe than at first thought.''. The authors also state that transition management is a collective learning process of development rounds, a process that follows the basic stages as outlined here below.

Addressing climate mitigation transitions in the local context has for instant recently been the research subject of transition-focused research institute DRIFT and their MUSIC project (Mitigation in Urban Areas: Solutions for Innovative Cities) (Roorda et al., 2014). With the goal of fastening integration of CO_2 reduction measures on energy-intensive activities in the built environment in a city context, their final guidance report emphasizes the need to understand the local dynamics. In doing so, Roorda et al. (2014) recommend performing a system analysis and an actor analysis, of which the system analysis provides an overview of the system and its state and characteristics, identifying elements, interdependencies and potential problems arising from this system. An actor analysis gives insights in individual roles, personal competencies and access to different forms of power, and will provide a structured overview of persons involved in the selected issue (Roorda, et al. 2014).

To put transition management into practice, Rotmans & Kemp (2004) identified six important reference points:

1. The transition concepts of multi-phase and multi-level.
2. Long term thinking as a window for short term policy.
3. Feedback, making long-term and short-term goals based on visions and possibilities
4. Learning by doing: shaping the right conditions by experimenting.
5. System innovation focused on structural societal change.
6. Exploring a multitude of scenarios and test these constantly.

In this thesis research, the rationale of transition management is used for the set-up of this research project, and two experiments have been formulated as part of the research process. By doing these experiments and reflecting on them with experts and civil servants of the province of Utrecht and Klimaatverbond, this research conducts a form of 'action-research' that contributes to learning by doing at the organization which aims to transition, in this case the province of Utrecht. This is not directly about building on a theoretical foundation of transition management, but rather about emulating a transition management strategy in practice. The researcher forms part of the transition management cycle around the province's transition and then becomes part of it.

2.5 Conceptual framework

The overall baseline is a transition of the province of Utrecht in which they are on their way to confirm themselves to the climate targets to be climate neutral in 2050. Part of this transition can be many incremental steps of which the implementation of a carbon pricing instrument may be one of these smaller steps. The This transition towards working with a carbon pricing instrument will be briefly described in its organizational context with the help of the conceptual model, illustrated in figure 2.4.

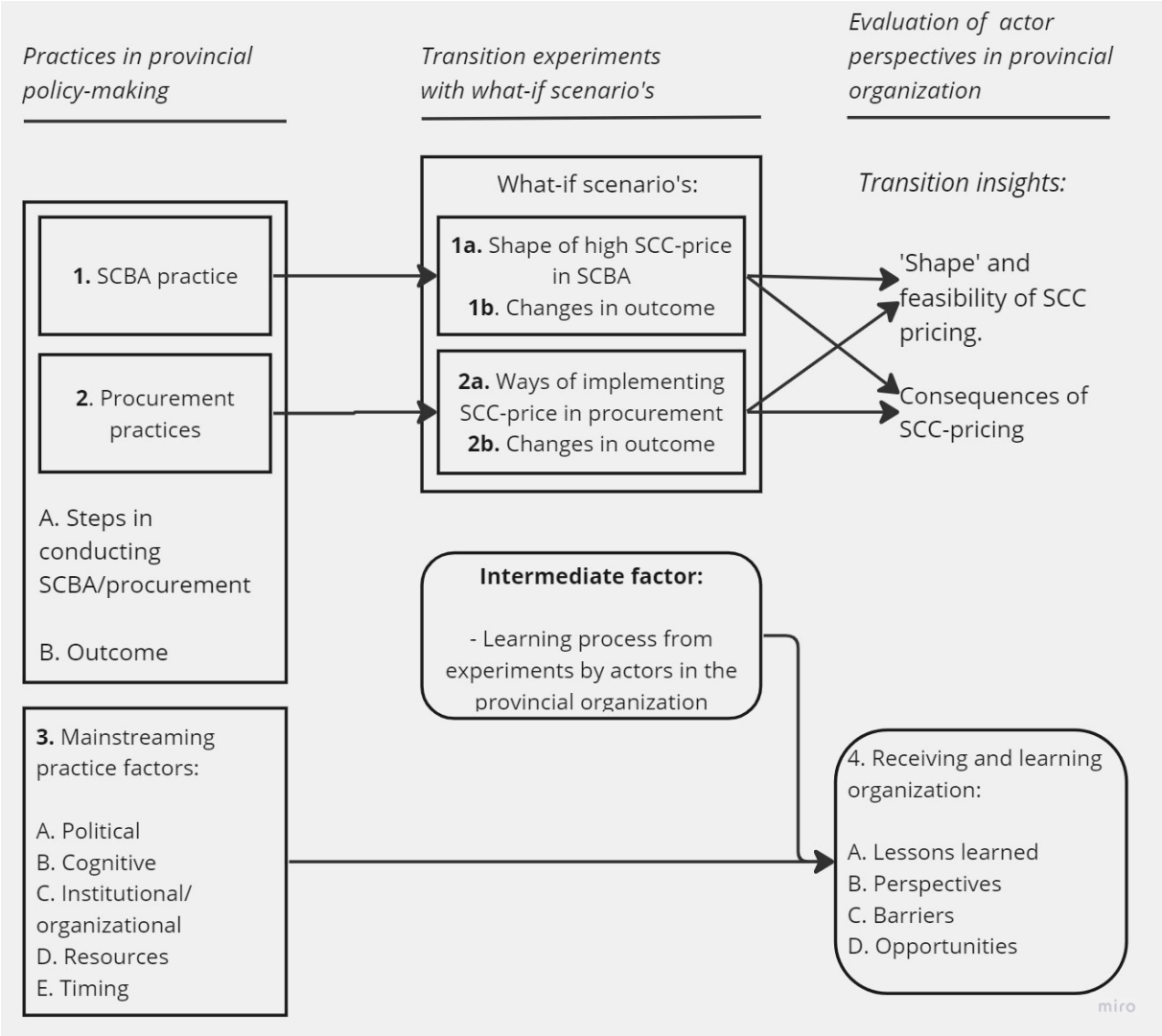


Figure 2.4: The conceptual model. From author.

3. Methodology

3.1. Research Design

To answer the central questions of this research, it is key to find relevant information and to do so multiple methods of data collection will be chosen. Verschuren & Doorewaard (2007) highlight the relevance of knowing how to extract necessary and relevant information from selected sources. This research focuses on gaining insight into how internal CO_2-pricing can be included in a good and, above all, fair way within the province, so that more attention is paid to climate mitigation. This is why in the first place the study revolves around a case study of the province of Utrecht, which is further underpinned at the end of this methodological chapter. It is a study with a contemplative underlay, namely it focuses on a transition that is underway and how within this transition the policy instrument CO_2-pricing can have a place in the province's decision-making and investment options.

The research is combined with an internship at Klimaatverbond and will therefore focus on the province of Utrecht, but also on Klimaatverbond itself. This specific perspective means that it will be an empirical research in the field, where there will be plenty of room for dialogues, policy and (administrative) considerations. A predominant qualitative approach will therefore be appropriate. This approach embodies a form of 'action research' wherein the researcher is part of the transition taking place in the province of Utrecht at the same time with this research unfolding. In the case of the SCBA case study, the choice was made to quantitatively recalculate old SCBAs. These recalculations provide quantitative results that will then also be interpreted and analysed qualitatively.

Rotmans (2012) describes transitions as radical and irreversible changes that have to break with existing discourses and patterns, and therefore will not follow an easy and fluent pathway. The main interest of this research is to better understand the actions that take place, or can take place, within the provincial organisation of Utrecht, thereby making use of qualitative research. The various barriers, opportunities and perspectives relating to the transition within the province of Utrecht, of the implementation and mainstreaming of SCC, can be analysed. Research questions will be addressed with triangulation of data collection methods, elaborated upon below.

Figure 3.1 illustrates the methodological timeline of this study. This study starts with an orientation on the possible application areas of carbon pricing within the province of Utrecht. In doing so, using desk research, participatory observations of meetings within the province or at Klimaatverbond. There is a first range of interviews with external experts and provincial employees taking place in the policy areas of mobility, procurement and business operations. These interviews will first of all provide the researcher with a clearer image of the policy field being studied. Next to that it will shed light on the degree climate mitigation is now part of provincial practices, and seek to investigate what is needed as first steps for designing and implementing a carbon pricing instrument. These first round of interviews will guide as the base of analysing the provincial organization on the potential of mainstreaming carbon pricing, identifying perspectives, barriers and opportunities in the process.

The previous retrieved data will guide as opening a transition arena in which now a case study is shaped for both policy practices. Now experiments will be taken place on the bases of these case studies. For SCBA, implementing carbon pricing is done by two external companies of Decisio and Arcadis. For procurement, implementing carbon pricing is done by the researcher in a partly fictional project. On the hand of these case studies in which forms of carbon pricing are used, there

will be another round of interviews with previous interviewed provincial employees in both policy fields. The aim of this experiment with accompanying interview questions is to retrieve perspectives on the potential of carbon pricing in the relevant policy field.

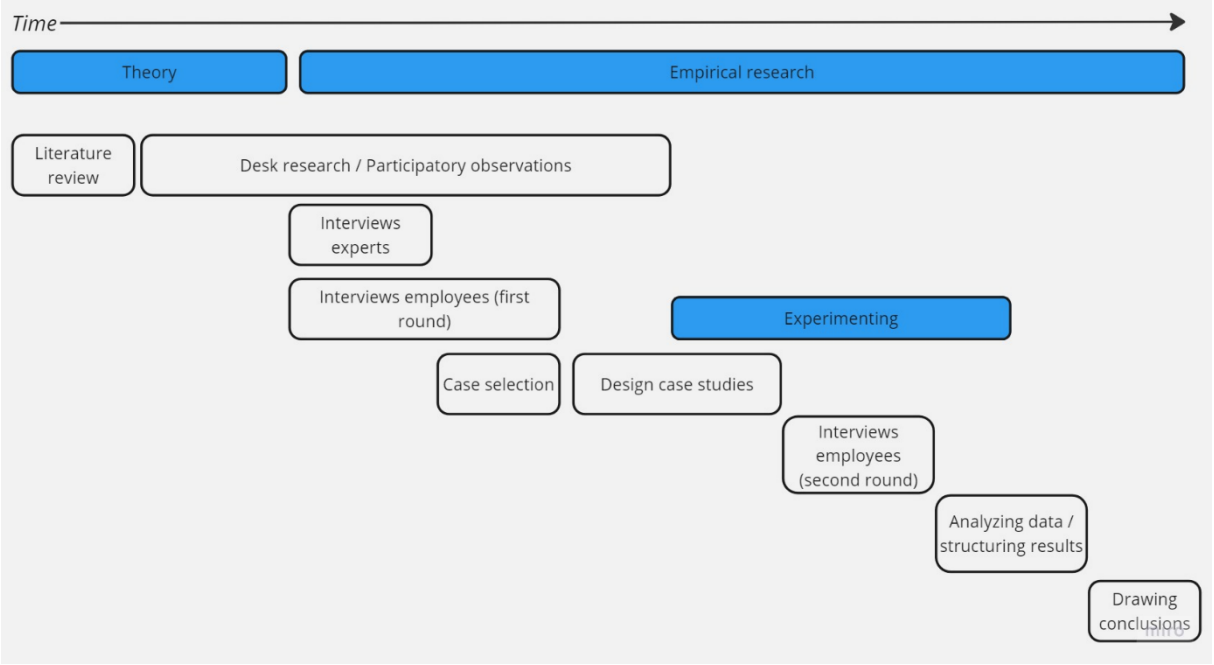


Figure 3.1: Methodological timeline of the research (From author)

3.2. Data collection

Before one starts the research, one should consider how to extract the necessary and relevant information from the selected sources (Verschuren & Doorewaard, 2007). For obtaining the right information about the research object, methods of data collection should be chosen. As the research has a predominant qualitative research approach, the used data collection methods are predominantly qualitative as well.

3.2.1 Desk research and documentation analysis

The first and foremost method of data collection, and also at the base of this proposal, is desk research and documentation analysis. The goal of using documentation method is to require relevant information out of policy-documents and other government-related documents. It is used in an explorative way to give insight in the current situation, in relation to decision-making and relating to the most important concepts and theories of this inquiry. Desk research can guide as the base for both actor and system analysis of the policy area researched.

3.2.2 Participatory observations

Because this research is mainly centred around action in practice, it lends itself well for participatory observations. Much will be happening in the period March to June, in relation to moving towards using new CO_2-pricing in decision making and these recent developments can be followed within the organization of Klimaatverbond or in the province of Utrecht, attending useful meetings. Using this method it will allow the researcher to look into the practical environment of research, either being participatory or non-participatory. Meetings will be with policymakers and practitioners in the

field of SCBA and carbon pricing and will mainly provide in giving context about discourses and structures into the organizational structure. At the same time participatory observations can give hint full insights in possible barriers/opportunities in the transition process while maintaining unbiased myself, and with related policymakers being able to talk unbiased without the possibility of steering questions. Evidently, all received data is taken with care and honesty and will be translated into this inquiry with approval from the observed participants.

3.2.3 In-depth semi-structured interviews

Filling in the existing gap in the data collected, in depth interviews will be held with policy-makers and with practitioners and experts in the relevant field of study. This method is both explorative and analytical in exposing links and complementing the broader organizational structures.

Interviews with external experts/advisors

In addition to the literature study, desk research and the participatory observations, exploratory interviews with experts in the field of both SCBA's and sustainable procurement were conducted. The external advisors interviewed were chosen because of their involvement and familiarity with the research objects, and with the province of Utrecht and/or Climate Alliance. They were interviewed to reflect from this involvement and familiarity on the research objects and the process surrounding them, and do so from their own experiences. These interviews help to complement the theoretical framework and the level of knowledge of the researcher, but also provided a basis, and also a counterbalance, to the data analysis. This methodology may also involve bias, or unrepresentative results. Nevertheless, it is relevant to extract useful information, research results and a possibly different perspective from outside the provincial organisation. In the end, three interviews with external advisers were conducted, one around the SCBA case study, and two around the procurement case study. A list of the external experts/advisors is provided in below in table 3.1.

Table 3.1: Overview interviewees external experts/advisors

NR	NAME	ORGANISATION	FUNCTION	DATE(S)
1.	SV	Decisio	Senior Advisor	09-05-2023
2.	HB	PIANOo	Advisor Sustainable Procurement and Tendering	17-05-2023
2.	**CS**	**TAUW**	**ADVISOR MVOI**	**26-04-2023 22-05-2023**

Note: This table was created by the author of this research

Interviews with provincial employees

Om te onderzoeken welke rol klimaat en de factor CO_2 op dit moment speelt binnen de verschillende teams en domeinen van de provincie zijn er interviews afgenomen met verschillende provinciaal medewerkers. Daarnaast is gevraagd naar het onderwerp CO_2-beprijzing en naar het mogelijke proces waarin potentie en noodzaak van een beprijzingsinstrument in het betrokken domein, team of functie aan bod komt. The selection of provincial employees has been done by purposive sampling. A purposive sample is a non-randomly selected sample based on the characteristics of a population and the object of the research (Saunders et al., 2019). Together with the researchers supervisor in the province, participants have been deliberately chosen based on their function and involvement regarding the case study and (potential) implementation of a carbon

pricing instrument. The scale of the provincial organisation and the different cases, and the scale of the relevant staff involved meant that there were 'only' a select number of interviewees to survey. The size of this scale may raise questions about representativeness and bias. Nevertheless, the chosen interviewees form a representative size within the domains under study.

A list of the provincial employees is provided below in table 3.2.

Table 3.2: Overview interviewees of the Provincie Utrecht

NR	NAME	TEAM/DOMAIN	FUNCTION	DATE(S)
3.	RU	Business operations/ Hard services	Facilities coordinator	05-05-2023
4.	DD	Mobility	Mobility and waterways commissioner	10-05-2023
5.	SK	Team Klimaat Centraal	Program manager	18-04-2023
6.	AH	Team Klimaat Centraal	Strategic policy advisor climate (mitigation)	20-04-2023
7.	MT	Business operations / Team Klimaat Centraal	Policy officer climate	16-05-2023
8.	RW	Business operations	Central contract manager	15-05-2023 28-06-2023
9.	AB	Business operations	Senior purchasing officer	15-05-2023 27-06-2023
10.	ST	Business operations	Procurement legal expert	15-05-2023 27-06-2023
11.	**SK**	**BUSINESS OPERATIONS**	**DIRECTOR MVOI**	**30-05-2023**

Note: This table was created by the author of this research

3.2.4 Shaping case studies within the province

The new CO_2 prices will be applied in two cases within the field of SCBA and one case in the field of procurement. First of all, in two former, but recent applications of SCBA's in the province of Utrecht; the case of '*N201 Fase 3*' and the case of '*Netwerkperspectief Provinciale Wegen 2040*'. These cases have been chosen in corporation with provincial employees in de mobility domain. Recalculations have been done by the engineering firms that were also initially responsible for the original SCBA calculations; Arcadis and Decisio.

For the field of procurement, the case of 'Het vervangen van de oeverconstructie Schagerkoggekanaal traject 15' is used as a base for a hypothetical case in which new CO_2-prices will be applied. The latter case is originally constructed by the province of Noord-Holland but for the sake of this research is translated to the context of the province of Utrecht, with the case renamed as *'Europese aanbesteding: het vervangen van de oeverconstructie Merwedekanaal, traject 14'*. This case study is choses based on corporation with collegues from Klimaatverbond, the supervisor from the province of Utrecht and the external advisor sustainable procurement.

3.2.5 Experimenting

After collecting as much information as possible on the application of a carbon pricing tool, and applying the tool in the case studies described above, it is time to collect new results. By now the researcher has a broad knowledge regarding the theory and has together with experts and policy-makers been able to give shape to a case study. By returning to the provincial employees with the

results of the case studies, and letting participants prepare their perspectives, expectations and visions, the possible potential of a carbon pricing instrument in their field is discussed.

In the case of the recalculated SCBA's, the mobility commissioners can reflect on the new results with the new CO_2-prices. They will then be questioned about any practical impact this recalculation will have on, for instance, internal policy considerations and final decision-making. They will also reflect on the predetermined expectations and their possible rectification. Finally, we look back at the process of applying the new CO_2-prices and, by means of the most important lessons, also look ahead to how the past process can serve as inspiration, also for other factors besides CO_2.

For the case study on procurement, the set-up of the experiment is different, because here we are working from a hypothetical example. Here, the first objective is to become acquainted with the instrument in practice, in order to learn more about the potential of such a CO_2-pricing instrument within provincial practice. By discussing the uncertainties, opportunities and perspectives on the Merwede canal example described earlier individually with each of the provincial staff involved here, important information is extracted from the different functions. After this, it is also again possible to compare how the assumptions regarding the topic differ from those following the experiment.

3.4 Case selection

3.4.1 Selection of the organization

This study is performing a case study on the province of Utrecht. This province is not randomly chosen but is the result of recent interactions between the organization of Klimaatverbond and the province of Utrecht. The province of Utrecht asked for advice and steering regarding integrating future effects of climate change in their policies. The province did so by asking research questions and Klimaatverbond in their turn reported back on these questions with their report ''Taking into account the future – considerations framework for CO_2-pricing in provincial policy'' (Klimaatverbond, 2022). Now that the advice has been taken over and the provincial states have approved the use of a internal carbon price as high as €875 per ton CO_2, the process of integrating this measure in internal policy will be studied with this inquiry. Since the province of Utrecht is the first (local) government in the Netherlands ambitioning to work with this high price, it is a logical and the more interesting subject of study.

The province of Utrecht covers almost 1550 square kilometers, borders four other provinces, has 26 municipalities, four water boards and around 1.35 million inhabitants (Provincie Utrecht, 2021). With its 1,300 employees, the province of Utrecht is among the smaller provinces in terms of the number of employees. Like all other provinces, the provincial organisation roughly consists of three parts. First, there is the administration, which is the Provincial Council and the Provincial Executive together. These are supported by the civil service, which are all civil servants working for the province. The civil service organisation is managed by the Executive Board, which consists of the group managers and the provincial secretary, who is also the link between the civil service and the Executive Board.

Just like the National government and other provinces, the province of Utrecht has the goal to be climate neutral (CO_2 neutral) by 2050 (Provincie Utrecht, n.d.). This means producing as much

energy in the province as the province consumes. Deputy of the province Huib van Essen (2023) recognizes that ''almost everything humans do and make causes emissions somewhere in their life cycle: in production, in use and in disposal''. He states that these emissions are now hardly reflected in the actual price of goods and services and CO_2-pricing can be an important signal to contribute to limiting climate change (van Essen, 2023). CO_2-pricing may in this way contribute to choosing alternatives which cause substantial lesser emissions, thereby helping the province in becoming CO_2-neutral.

The organizational structure of the province of Utrecht is displayed in whole in appendix 9.4 and visualizes the provincial organization that is divided into five domains: operational management, mobility, urban living environment, rural living environment and administrative and management support. All domains in turn have their own permanent teams, and the domains also include various temporary programmes, of which team 'Climate Central' is the most involved and relevant programme within this study. It is part of the domain 'urban living environment'. Within the official organisation, Team Climate Central carried and implemented the proposal and assignment around CO_2-pricing. According to the climate policy advisor and programme manager, the team's aim is to take on a driving role in order to get the various domains and programmes in the province of Utrecht to focus more on climate mitigation, and thus achieve provincial and national climate and CO_2-targets.

3.4.2 Selection of policy fields

The interviews took place in the context of three different application areas of carbon pricing: mobility, procurement and business operations. From these, mobility and procurement were selected as two case studies to delimit the research. Business operations was dropped because of its complexity, and because there was no expert or relevant theoretical or practical information available for this area.

The mobility case study was the most obvious choice. There is a decision to implement CO_2-pricing in the SCBA, but the elaboration of this decision in a next realistic SCBA was further ahead for the province. For this reason, it is interesting to examine how CO_2-pricing can take shape and what the practical consequences might be. Using two practical examples, the N201 Phase 3 and the Provincial Roads Network Perspective 2040, the application of new, higher CO_2-prices was compared with the old results. This recalculation was carried out by the two companies Desicio and Arcadis. This was followed by an interview with a mobility client to reflect on the results of the recalculation.

The procurement and tendering experiment designed for this study uses as a case study a fictitious European public tender; the replacement of the Merwedekanaal dam, section 14. The example is based on a previously completed and real tender of the province of North Holland; Replacing the embankment construction Schagerkoggekanaal section 15 (prepared by Veldhuis, 2016). A detailed description of the case study can be found in Annex 2.

3.5 Reliability and validity

Reliability refers to the consistency in which variables are measured. It consists of two elements: the accuracy of the measurements, which means that the variables to be measured should be described as precisely as possible. And the possibility of consistency of measurements, which contributes to the reproducibility (van Thiel, 2014). Validity in turn says something about whether the indicator used to measure a concept, does really measure that one concept. There are two aspects to internal validity. First, whether the researcher has actually measured what was intended to be measured. Second, whether the proposed causal relationship presented really exists. External validity poses questions on the generalisability of the research (van Thiel, 2014).

3.5.1 Reliability

Factors within reliability relate to the consistency and accuracy of what is described in the study. To increase reliability, each data collection method describes what will be measured, how it will be measured, and any comments that need to be made. In addition, the interview guides are based on the operationalisation of the different concepts. These operationalisations are used throughout the study and conclusions are drawn on the basis of them. In interviews it is made clear which variable a question is trying to answer. However, with both observations and interviews it is difficult to have a high level of realism. There is always a degree of subjectivity in interviews, and the fact that the researcher is entering areas in which he or she has no training can also contribute to limited reliability. The complexity of the topic, and in particular the different possibilities and interpretations of the concept of CO_2-pricing, also affect the reliability of this research. Working with and thinking about CO_2-pricing is challenging and requires a wide range of information, which was certainly not always available to respondents. The results can therefore be seen as a good basis, but the reality beyond the experiments will present new challenges. Finally, the methodology is linked to the theory in a timeline depicting the different data collection methods, as seen in figure 3.1.

3.5.2 Validity

The internal validity of this research is challenged by triangulation, combining theories and methods to avoid bias arising from the use of any single theory or method. For all interviews, people were asked to read and check the transcript to avoid any misunderstandings or discussions being part of the data collection. This is part of the validation of respondents. Even before this study is published, the results can be sent back to the respondents. Because this study consists of a form of action research, the researcher has been involved in the preparation, designing and execution of multiple experiments and interviews. For that it is important to be both transparent and precise in the description of steps taken in the research. For every research there are chances of personal bias getting involved. One should be aware of possible influence on the to be studied method and to the personal interactions in this study and should be able to reflect on this during the process of the research.

External validity is more difficult to assess. A lot of data has been collected around the concept of mainstreaming climate change with a focus on mainstreaming carbon pricing. It can be assumed that the findings presented in this study can be applied to other parts of the mainstreaming theory, such as other facets of climate change mitigation or, more specifically, climate change adaptation. The research objects are located in the organisation of the Province of Utrecht, and although provinces operate in the same way in principle, the results cannot be extrapolated on a one-to-one

basis to other provincial organisations or decentralised authorities. Although the findings and recommendations are focused on the Province of Utrecht, depending on the organisational context and culture, this research may be a relevant starting point or guiding document for other provinces with similar ambitions regarding the implementation of carbon pricing. The generalisability of this study has been attempted to be as high as possible, for example by defining the research population in detail. Also, the size of the total number of interviewees within the province will be representative and that the help of external experts will also be sought for different research objects.

4. Results: Application of CO_2-pricing in the SCBA.

This chapter sets apart the implementation process of carbon pricing within the SCBA. In doing so following the process line of preparing, implementing and reflecting via experimenting with a carbon pricing instrument. It answers the following sub-question:

'How can the implementation of a carbon pricing instrument in the SCBA take shape, and what would be the consequences of this implementation?'

First, based on observations, interviews and desk research, the choices that emerge in the design and preparation phase are described in paragraph 4.1. Then, by means of two recent practical examples, the new CO_2-prices are experimented with in paragraph 4.2 and 4.3. Here, a CO_2 price of €875 per tonne is introduced in the SCBA of the case study 'N201 Phase 3' and the case study 'Network Perspective Provincial Roads 2040'. This examined how the difference in CO_2-prices affects the results of a SCBA. These results are reflected on in paragraph 4.4, which also provides insight into the potential of the tool within the SCBA.

4.1 Design choices for the tools to be implemented.

The province of Utrecht distinguishes between larger projects, often above €15 million, and smaller projects below this price level, according to the mobility commissioner. For these larger projects, a comprehensive SCBA is made, often outsourced to a consulting engineering firm. For smaller projects, but also for the preparation phase of larger projects, the province has had a SCBA tool developed, a kind of compact and therefore less detailed SCBA model. In preparation for working with the new CO_2-prices and in anticipation of a larger SCBA, not expected until the end of 2023, the new prices were first incorporated into the SCBA tool. The following will first briefly describe the tool, including the role CO_2 plays, and how CO_2 influences the final results of the SCBA(tool). This is followed by a description of the discussion on the pricing methodology, which came up early in the implementation process.

4.1.1 The SCBA-tool

To carry out an SCBA, the province of Utrecht uses a so-called SCBA tool, co-designed by the economic research firm Decisio. The SCBA tool comes in the form of an Excel sheet in which all required data of an SCBA can be entered, and which is then used to calculate and quantify the costs, benefits and effects per project alternative. Each sheet focuses on different effects, e.g. there are two sheets for 'heavy and light motor vehicles' in which data on 'trips', 'travel distance', 'travel reliability' and 'travel time' are entered for the different project alternatives. Similarly, there are sheets on 'public transport', 'bicycle' and 'safety and environment', the latter being most relevant when it comes to adjusting to the new CO_2 prices. The adapted manual by Decisio and the Province of Utrecht (2023, 14 April), provides the necessary context to the SCBA tool on issues that are important and may require extra attention. The sections below summarise where and how CO_2 emissions are addressed within the practical implementation of a SCBA, using the tool.

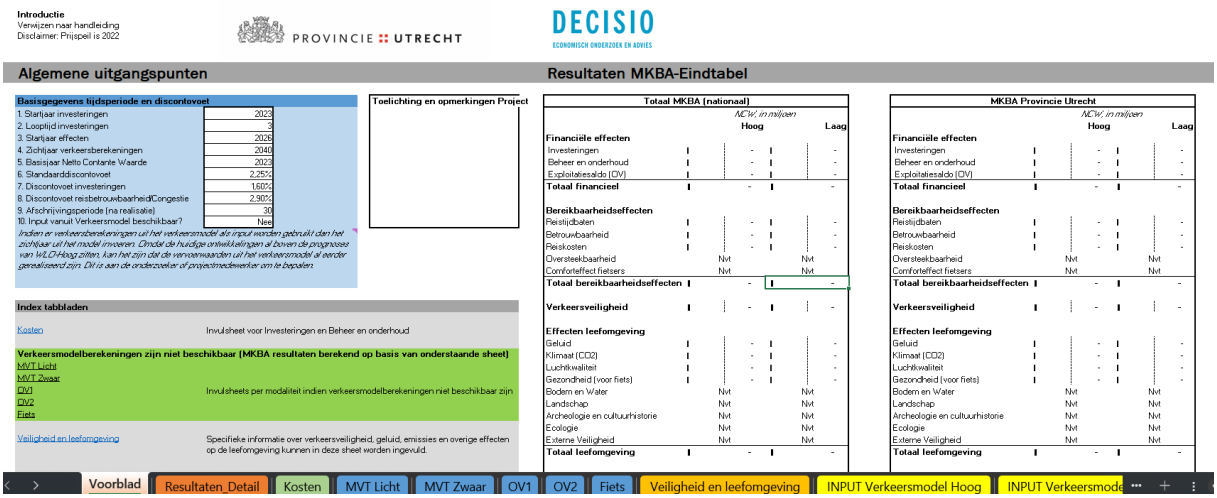


Figure 4.1: Illustration of the SCBA tool of the provincie of Utrecht. (Source: Province of Utrecht and Decisio).

Travel distance

Based upon the average trip length per vehicle journey, the effects on the living environment in terms of noise, air quality and also climate (CO_2) can be calculated using key figures per kilometre. By entering the average trip length per vehicle journey, the alternatives are calculated by corresponding formulas in the 'safety and living environment' excel sheet.

Reisafstand	Nulalternatief	Projectalternatief	Verschil	
Gemiddelde ritlengte			0	km
De gemiddelde ritlengte is noodzakelijk voor doorrekening van de externe effecten.				
INPUT MKBA: Gemiddelde ritlengte	0	0	0	

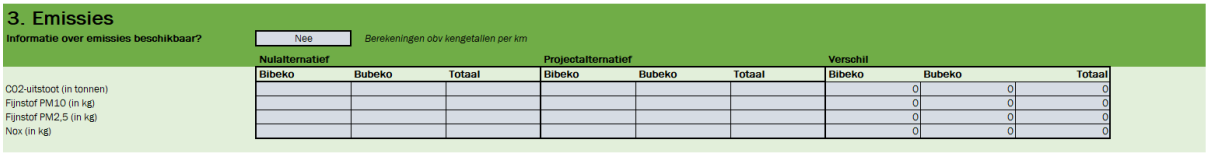
Figure 4.2: Illustration of the table 'average trip length per vehicle journey' in the SCBA-tool of the province of Utrecht. (Source: Province of Utrecht and Decisio).

Safety and living environment

Under the heading of safety and living environment are the external and unintended effects that mostly affect others, and not the users themselves. Within the living environment, besides noise pollution and air quality, this includes biodiversity and climate, and safety effects often affect third parties such as cyclists and pedestrians. When these key figures are not available per project alternative, the effects will be measured on the basis of change in kilometres, and refer to the travel distance described in the paragraph above.

Emissions

The climate effects of a project are expressed in CO_2 emissions and the effects for air quality in particulate matter, both part of the heading 'external effects'. When the specific effects in emissions are not readily available, key figures per kilometre are used. Within the SCBA tool, emissions can be differentiated into emissions inside/and or outside built-up areas. For climate effects, this differentiation does not matter in principle, but for air quality, this split is related to the severity of health effects. In the table below, the number of tonnes of CO_2 emissions per alternative can be entered.



3. Emissies

Informatie over emissies beschikbaar? Nee — Berekeningen obv kengetallen per km

	Nulalternatief			Projectalternatief			Verschil		
	Bibeko	Bubeko	Totaal	Bibeko	Bubeko	Totaal	Bibeko	Bubeko	Totaal
CO2-uitstoot (in tonnen)							0	0	0
Fijnstof PM10 (in kg)							0	0	0
Fijnstof PM2,5 (in kg)							0	0	0
Nox (in kg)							0	0	0

Figure 4.3: Illustration of the table 'emmissions' in the SCBA-tool of the province of Utrecht. (Source: Province of Utrecht and Decisio).

CO_2-emissions in the results

Depending on the project and its alternatives, the scale of the project and the defined problem and objective, the results can be presented in different ways. For instance, a distinction can be made between national costs, benefits, and effects, and regional ones, such as only the effects within the respective province. In addition, the WLO scenarios play a role and the social effects can be translated for both scenarios. The determined CO_2 emissions in tonnes are monetised in the final table. Whereas previously this was done with a factor of 20 to 80 euros based on the WLO scenarios, now a tonne of CO_2 is multiplied by €875 in the newest version of the tool.

4.1.2 The pricing methodology

As indicated earlier in the theoretical framework, there are roughly two ways to price CO_2; prevention costs and the SCC. The current framework and methodology of the SCBA is centred around the prevention cost methodology. Implementing the new price based on the SCC methodology raised questions in practice, first of all around the different pricing methodologies used. Prevention costing assumes a steeply rising CO_2-price, the last mile CO_2 reductions are far in the future and relatively cost the most.

The second methodology, that of SCC, starts with a much higher price which increases relatively slowly and linearly in the future until the year 2050. Following the decision to apply the €875, it was also decided to revise this price biennially, in order to include the representativeness of the then current state of affairs and knowledge. Both pricing methodologies and their future pricing pathways are visualized in tables 2.1 and 2.2.

Questions arose about this price development among several mobility officials within which the SCBA is used. These included the question of why the price at SCC is linear and whether it is expected to continue to grow linearly at this rate after 2050. The answer to this came from Umweltbundesamt (personal communication, 22 March 2023), which states that linear interpolation is the simplest thing to apply. 'We do not want to report values for the years that are not presented by the data in our models,' the Umweltbundesamt said. The data beyond 2050 is thus simply not realistic and reliable enough to make statements about costs or cost trends.

The CO_2-price originally in the SCBA was linked to the WLO scenarios. These WLO scenarios play no role within the methodology of the SCC. Both the province's official mobility staff and Decisio's external SCBA consultant noted that the new system with the €875 as a price, as a result, is not or difficult to fit into the old system with multiple prices. They suggest developing scenarios in addition to SCC's methodology. Several interviewees indicated that in terms of economic and demographic development, the province of Utrecht has been in the high scenario for some time. Even in the old methodology based on the WLO scenarios, decision-making took place largely on the basis of the results in the high scenario. The data analyst mobility states after his own run-through of a SCBA with the new CO_2-prices that; *'the use of the new CO_2-price is debatable within the WLO low because of, among other things, slower technological developments and therefore relatively higher emissions'*. Even after the new prices are introduced, the WLO-high scenario will

play the biggest role in the decision-making process. A substantive employee of Climate Alliance also indicates that *'the price does not fit within scenarios, because it is not a scenario and is not or cannot be linked to the WLO scenarios'*. This Climate Alliance content officer and the province's policy adviser emphasise that in addition to the current prices, which are outdated and still date from 2015, the methodology in itself is also considered outdated. This is because the new price exactly fulfils the guidelines and advice given by PBL and CPB to better embed broad welfare in the SCBA. From the WLO scenarios and prevention costs, this does not (yet) happen at the moment. As a suggestion, the possibility of adding a disclaimer to the results to explain the differences in methodology and price development is raised.

The opportunities of the new methodology therefore seem to overshadow the uncertainties. According to both the provincial climate policy advisor and mobility client, the fact that the province is now the only organisation to start working with this methodology makes the organisation a *'loner that has to do it alone',* something that makes implementation and 'mainstreaming' more difficult in the short term, but where the province as a 'frontrunner' could actually make a difference in the long term, should others follow their lead. The province also explicitly set itself the goal of spreading the knowledge gained beyond its own province. This includes explicitly putting the methodology as well as practical experiences on the agenda and promoting them.

The external consultant SCBA also states *'go ahead, you can't wait for the CPB'*. The same consultant also emphasises that, the assignment from the province was not thrown over the fence for him in this sense, but that the alignment on this was respectful with room for criticism and rebuttal. The province of Utrecht has set itself the goal of lobbying in an interprovincial context for the use of the new methodology with associated higher prices within the SCBA. They thus want to enter into discussions for this with other provinces or governments, but also with CPB and PBL, and the relevant ministries themselves.

4.2 Application in experiment 1: N201 Fase 3

The last question raised in the interviews was whether it was possible to recalculate old SCBAs. This question was put by civil servants to the various parties involved in the first calculation with the old prices of the WLO scenarios. In this way, two SCBAs were reviewed; that of the N201 Phase 3, conducted by research firm Decisio, and the case of the Network Perspective provincial roads 2040, conducted by engineering firm Arcadis. In both SCBAs, the new price of €875 was entered for the CO_2 factor, creating new results regarding the final factor climate (CO_2), the overall balance and the benefit-cost ratio.

On request, the external consultant MBKA from research firm Decisio updated the SCBA 201 Phase 3. For the valuation of CO_2 in the performed SCBA for the N201 Phase 3, CO_2-prices in WLO High and WLO Low were initially used. For WLO High, these prices in the old calculation are €48, €80 and €160 per tonne of CO_2 in 2015, 2030 and 2050, respectively. For WLO Low, these prices in the old calculation are €12, €20 and €40 in 2015, 2030 and 2050, respectively. All these prices are increased by VAT. The calculation done with the newly set prices assumes the CO_2 prices based on the SCC, as presented in the report 'Computing the future', and are €681, €723 and €782 excluding VAT per tonne of CO_2 in 2015, 2030 and 2050, respectively.

Variant 6 was labelled the most favourable variant from the SCBA in the original 2022 final report. In practice, this amounted to providing the 'bocht van Mijdrecht met 1 kruising'.

4.2.1 Results of recalculations SCBA

WLO Hoog

		CO_2-prijs: Oude WLO	CO_2-prijs: nieuwe €875
Variant 1: Leefbaarheid	Klimaat (CO_2)	€ 106	€ 541
	Totaalsaldo	€ -3,155	€ -2,720
	Baten/Kosten verhouding	-16,8	-14,3
Variant 2: Doorstroming	Klimaat (CO_2)	€ -170	€ -894
	Totaalsaldo	€ -60	€ -756
	Baten/Kosten verhouding	1	0,7
Variant 3: Veiligheid	Klimaat (CO_2)	€ -102	€ -514
	Totaalsaldo	€ -2.372	€ -2789
	Baten/Kosten verhouding	0,5	0,5
Variant 4: Gezondheid	Klimaat (CO_2)	€ 36	€ 187
	Totaalsaldo	€ -656	€ -949
	Baten/Kosten verhouding	-4.1	-3.6

Table 4.2: Recalculation of SCBA Netwerkperspectief Provinciale Wegen 2040

WLO Laag

		CO_2-prijs: Oude WLO	CO_2-prijs: nieuwe €875
Variant 3.0	Klimaat (CO_2)	€ 0,48	€ 11,01
	Totaalsaldo	€ -15,13	€ -4,59
	Baten/Kosten verhouding	0,85	0,95
Variant 3.1	Klimaat (CO_2)	€ 0,72	€ 16,57
	Totaalsaldo	€ -1,24	€ 14,61
	Baten/Kosten verhouding	0,99	1,15
Variant 5	Klimaat (CO_2)	€ 0,90	€ 20,83
	Totaalsaldo	€ -37,84	€ -17,92
	Baten/Kosten verhouding	0,54	0,78
Variant 6	Klimaat (CO_2)	€ 0,78	€ 18,14
	Totaalsaldo	€ 11,29	€ 28,64
	Baten/Kosten verhouding	1,13	1,33

Table 4.1: Recalculation of SCBA N201 Fase 3 (From author)

4.2.2 Explanation and interpretation of the results

What is striking first of all is that the higher positive CO_2-costs result in higher climate costs, total balances and also higher benefit-cost ratios in all variants. Variant 6 remains in all respects the most favourable variant with the highest benefit-cost ratio of all variants and will therefore still be preferred.

In variant 5, with the new CO_2-price in WLO High, the balance becomes positive, with the benefit-cost ratio also rising above 1. Variant 3.1 also jumps from a negative to a positive benefit-cost ratio in the WLO Low scenario. In SCBA terminology, a benefit-cost ratio above 1 represents a socially profitable project. In that case, these new prices would be able to jump a project variant from socially unprofitable to socially profitable. In reality, the uncertainty margin of an SCBA is so large that in practice there is little difference between a benefit-cost ratio of 0.95 and 1.12, according to the mobility commissioner. In all other variants, at least in WLO High, the benefit-cost ratios rise to well over 1.

By using the new CO_2-price of €875 in 2022, the monetised CO_2-effects are almost a factor of 5 higher in the high growth scenario and a factor of 23 in the low growth scenario in the three scenarios. In WLO-Low, however, the use of the new CO_2-price is debatable because of, among other things, slower technological developments, and therefore relatively more CO_2-emissions. Based on this calculation, it can be concluded that calculating with the new CO_2-prices would not have led to a different decision. Variant 6 has become even more positive than in the old situation and thus jumps even further into the positive balance. Appendix 1 again sets out and summarises the variants as recalculated by Decisio.

4.3 Application in experiment 2: Netwerkperspectief Provinciale Wegen 2040

The valuation of CO_2 in the conducted SCBA for the Network Perspective Provincial Roads 2040 used the CO_2-prices in WLO High, €48, €80 and €160 per tonne CO in 2015, 2030 and 2050, respectively, and an annual growth rate of 3.5%. VAT was added to these prices. The calculation done with the newly set prices assumes the CO_2-prices based on the SCC, as presented in the report 'Rekenen met de toekomst', and are €681, €723 and €782 excluding VAT per tonne CO_2 in 2015, 2030 and 2050, respectively.

Variant 4 ended up being the chosen variant.

4.3.1 Results of recalculations SCBA

WLO Hoog

		CO_2-prijs: Oude WLO	CO_2-prijs: nieuwe €875
Variant 1: Leefbaarheid	Klimaat (CO_2)	€ 106	€ 541
	Totaalsaldo	€ -3,155	€ -2,720
	Baten/Kosten verhouding	-16,8	-14,3
Variant 2: Doorstroming	Klimaat (CO_2)	€ -170	€ -894
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	Baten/Kosten verhouding	0,5	0,5
Variant 4: Gezondheid	Klimaat (CO_2)	€ 36	€ 187
	Totaalsaldo	€ -656	€ -949
	Baten/Kosten verhouding	-4.1	-3.6

Table 4.2: Recalculation of SCBA Netwerkperspectief Provinciale Wegen 2040

4.3.2 Explanation and interpretation of results

Of all scenarios, the total CO_2-effects have been multiplied by a factor of 5.1 due to the introduction of the new CO_2-prices. Unlike the previous example of the N201 Phase 3, in the above example not all total balance and benefit-cost ratios have become more positive.

For variant 1, the climate effects have become more positive and hence both the total balance and benefit/cost ratio have also become more positive. Nevertheless, even with the new prices, this variant remains strongly negative in the benefit-cost ratio and thus far behind the other variants. For alternative 2, the climate effects become more negative, thus the overall balance also becomes significantly more negative and the benefit-cost ratio changes from 1 to 0.7. In theory, this would change variant 2 from a 'good' project, to a 'bad' project with the new prices. In variant two, there is a greater role for different types of automobility, which also involves greater CO_2-emissions. For variant three, climate effects again become more negative, and so does the overall balance. In this variant, climate effects have a less dominant share in the total, leaving the benefit-cost ratio unchanged. For alternative 4 the climate effects become more positive, only this does not translate into a more positive overall balance. The benefit-cost ratio becomes more positive again, but also remains far below zero.

Network projects involve a larger scale of alternatives in which different types of mobility play a part in the variants to varying degrees. This involves a multitude of uncertainties and differences, and this is also reflected in the results of the experiment. The variants differ a lot in both climate effects, in their overall balances, and in benefit-cost ratios. The example given here is that when speeds are

reduced on roads, people start travelling in other ways, or travel less or not at all. A mobility employee states:

> *'So there you really see a net CO_2-reduction in the scenario (variants 1 and 4) of a reduced speed so the price you put on CO_2-is also suddenly more decisive'*.

For the variant of traffic flow you see in the above experiment also shows immediately that a positive SCBA score is not the priority in this case compared to the total effects, costs and benefits. Thus, variant 2 or 3 was already not chosen in the first instance but variant 4 with the second lowest benefit-cost ratio. It is therefore concluded that even with new CO_2-prices, the choice in the decision-making process would have been unchanged for alternative 4.

4.4 Reflection on experiments

The above results were discussed again with the mobility principal in conclusion and monitoring. As an initial reaction, a mobility employee labelled the results as 'nice and reassuring', by explaining:

> *'What you see from the pilot calculations is that it only increases the result, not decreases it. So an SCBA with a higher CO_2-price becomes more positive which in itself is not strange because many projects create fewer emissions by solving congestion, and not causing congestion and therefore CO_2.'*

In a prior interview with a mobility employee, it was mentioned that the new CO_2-prices could still have an effect on network projects like in experiment 2. The external expert also indicated beforehand that:

> *'The new prices could be of great influence in projects where different modalities are weighed in different sizes. Then we are talking about projects where a different role for cycling or public transport is visualised'*

After calculating in experiment 2, the new CO_2-prices do not appear to generate a distinguishing effect between the different variants. Jumping from a negative to a positive benefit-cost ratio need not mean much, according to a mobility worker. Thus, such a small shift as in experiment 1 is "not shocking". When a project is already around a benefit-cost ratio of 1, one has to wonder if one wants to do the project in the first place. In addition, experiment 2, in which a variant with a strongly negative benefit-cost ratio was already chosen in the decision-making process beforehand, also shows that the results are still highly dependent on different interpretations.

Although the mobility employee finds the results interesting, he says he did not fall off his chair. Also speaking for mobility colleagues, the small increase in positive impacts, because the CO_2 saved is valued higher, is said to be acceptable and valuable. Asking about the impact of the new prices on decision-making, the client states that it is only going to have a small impact, but that this does not move it towards a different decision. The mobility employee questions whether the decision would have been as good if it had exposed big differences. He says he is *"reassured"* now that it is clear that this does not appear to be the case. This mobility employee also indicated beforehand that he expected that calculating new prices would rarely be decisive in future projects. These experiments once again confirm these expectations, although it is also argued that for any new SCBA, it may again be interesting to see what the new prices do.

Another type of SCBA has been experimented with by the interviewed external expert SCBA. In that case, the prices were applied in infrastructure projects where aviation plays a role. This external expert says that, because of the high CO_2-values associated with aviation, these projects with the new prices have a significantly higher impact on the overall climate impact balances and results of a SCBA. Here, it is expected that the new prices are more likely to influence decision-making based on an SCBA calculation.

4.4.1 The future of CO_2-pricing and the SCBA

A mobility employee gives an example of how CO_2-pricing has further emerged in their work. For example, at a recent presentation where the CO_2-Performance Ladder was also discussed, it was suggested that, in addition to this Performance Ladder, CO_2 should also be more heavily priced independently. In this way, the underlying policy documents surrounding the creation and substantiation of the €875 were disseminated. On this, this employee then states

> *'So I also put it to the others and at least I spread the story. A lot of people do deal with this kind of thing, you certainly really notice that. And people are really making considerable strides in this. All this in turn motivates people to take a critical look at what they do and how they can do it differently.'*

According to the mobility employee, this adjustment on CO_2 also fits in with a broader trend started by the province, namely better quantifying effects on the living environment and a reduced influence of vehicle loss hours in the results. According to a mobility employee, this step is one that does more justice to reality and multiplicity. He hopes that following the decision on increasing CO_2-effects, next steps will focus on equalising vehicle effects with public transport and cycling effects. This contributor concludes:

> *'An SCBA is also partly a political tool, and politicians will have to choose in the end. For now, politics has decided to include climate effects with CO_2 in a different but fairer way. Choices will also have to be made about other effects in the SCBA in the near future.'*

He adds that one only finds out what impact these choices will have when it is implemented in practice. Using new CO_2-prices ensures that more justice is done to social costs, while in day-to-day practice and policy implementation, for the time being there appear to be no risks. This case may be a prelude to reviewing whether other effects in SCBA still do justice to the current state of knowledge.

5. Results: The application of CO_2-pricing in procurement and tendering.

This chapter sets apart the implementation process of carbon pricing within the practices of procurement and tendering. In doing so following the process line of preparing, implementing and reflecting via experimenting with a carbon pricing instrument. It answers the following sub-question:

> *'How can the implementation of a carbon pricing instrument in procurement practices take shape, and what would be the consequences of this implementation?'*

First, based on observations, interviews and desk research, the choices that emerge in the design and preparation phase are described in paragraph 4.1.

Then, by means of one recent practical examples, it is shown how two different CO_2-prices are experimented with in paragraph 4.2. Here, CO_2-prices of €8000 per tonne and €875 per tonne, as based upon different calculation methods, are introduced in the fictious case study 'Oeververvanging Merwedekanaal'. This examined how CO_2-pricing in general is seen by provincial employees in practice, and examined how the difference in CO_2-prices affects the perspectives of these employees. These results are reflected on in paragraph 4.4, which also provides insight into

5.1 Design choices for the tools to be developed.

The province of Utrecht has set itself the goal of exploring further areas of application of CO_2-pricing. In this, the application field of procurement and tendering is often mentioned as promising and the place where the province can make the biggest impact. In the design phase of this, a government like the province can make a number of theoretical choices in which the different elements will be described in this section. These choices can be principled, ethical or pragmatic, and will affect subsequent steps in the mainstreaming process and any objectives set.

5.1.1. Question, criterion or requirement

In the light of this study on CO_2-pricing, it is mainly interesting to look where a form of pricing instrument can actually be applied, for procurement this is in the award criteria. Nevertheless, besides this application, other possibilities for including CO_2 in procurement and tendering emerged in the study. In line with this are the; non-binding solicitation, requirements and award criterium.

1. Non-binding solicitation

To gain an initial insight into a tendering party's emissions, as well as to prepare the same parties for possible future calls for tender in which CO_2 may play a decisive role, one can start asking for CO_2-emissions as early as possible. For the province, this serves as an information tool from which to determine the current state of the market. Based on this information, further applications can then be steered. An operations employee indicated that within facilities management they have started asking companies how they work with CO_2 in their operations. This relates to certification on the CO_2-Performance ladder but one could go further by asking to what extent they have insight into CO_2 throughout their production or service chain. Interviews reveal that companies are still very much in search, with some not here, and some here dealing with CO_2-emissions. Procurement also says that it occasionally asks an additional substantive question in the tender instructions, which parties may or may not answer. An employee in procurement says he finds it useful to always start with the non-binding question, and not with a direct application in award criteria or requirements. Yet there is also a critical sound from procurement, as another employee argued:

> *"As a purchaser, I just say don't do it. What are we going to do with that information? A supplier is going to put effort into that and you have to ask yourself how seriously he is going to put that effort if it does not bring him any monetary gain in the contract? If as a buyer I'm not going to do with it, then just don't ask because that's disproportionate to the effort a supplier is putting in and what he gets in return."*

2. Requirements

Even without actually resorting to carbon pricing, it is also possible to choose to include CO_2 in the minimum tender requirements. This can be a suitability requirement where a tenderer is tested for suitability by setting a minimum or maximum for the selection criteria CO_2- emissions or CO_2-reduction. Here, a legal officer from procurement gives the only example known to them where CO is included as a strict requirement in provincial policy:

"European regulations require that only electrified vehicles may be used within natura2000 areas for nature restoration programmes. This does provide an example where the province takes CO_2 into account and gives you direction of how this work can be brought in. Then we get that programme of requirements again as a call for tenders."

What is demanded depends on the justifiable interest vis-à-vis the goals to be achieved, and how far one wishes to challenge or engage the market, this same employee said. It is further said that requirements are a lot of customisation in the beginning, especially with new topics like CO_2. A requirement is seen as an effective way of ensuring that you work with parties that actually adhere to a set standard and requirement. It thus provides guidance, but without the right preconditions it can also be less efficient than the use of CO_2 in award criteria.

Because a set requirement must meet a maximum or minimum, there is a danger that the set requirement is already easily within the reach of bidders, or, on the contrary, inaccessible, so that no party will tender. An example that came up more often in this study is the setting of the requirement to be certified on the CO_2-Performance ladder. A procurement employee stated that all notable bidders are now already certified at the highest level, making this requirement actually too low. The following described application of CO_2- in award criteria could be an answer to the inefficiency of the above applications.

3. Award criterium

Award criteria are used by the province of Utrecht to compare and assess tendering parties, the province uses the award criterion Best Price-Quality Ratio (BPKV) in its procurement policy. Besides price aspects, this award criterion also takes quality aspects into account in the form of sub-award criteria, or quality criteria. Examples include risk management and sustainability, which also includes CO_2-(reduction). With award criteria, you ask the question of; what is important and makes one contractor better than another? Award criteria are of course meant to make the distinction between bidders transparent and differentiate or based on CO_2-emissions. A procurement legal officer says award criteria respond to tenderer behaviour:

"The psychology among tenderers starts working with award criteria, and then people want to get the most favourable out of the system to get that contract. Because it works psychologically, it can also produce more, less, or different effects than you had hoped for, for example when bidders have different approaches."

When in doubt about the applicability of a requirement, an employee says it is smart to include CO_2-emissions in award criteria so that it does not work too restrictively and exclusively for bidders. How this can take concrete and practical form follows in the following paragraphs.

5.1.2. Efficient CO_2-price or SCC

On carbon pricing within procurement, the following is stated in the report 'Rekenen met de toekomst', by Klimaatverbond Nederland: 'By adopting a nuanced approach to carbon pricing, i.e. calculating social costs in social deliberations (MKBA, design and planning) and calculating efficient costs in procurement and tendering (where the actual price depends on ambitions and related investments), the above performance areas can have a real impact' (p. 9). The sections below will describe these two methodologies in the context of carbon pricing in procurement and tendering processes. First, the methodology of efficient costs described and the different views on this. In addition, the way in which the established price of €875 for the social cost of CO_2 could be given a place within the procurement process was examined, and to what extent this is considered

desirable. The results below were used as a basis for the thought experiment described in appendix 2, on which official staff reflected in chapter 5.3.

Efficient costs:
The sustainable procurement consultant argues that calculating 'efficient costs', with a varying CO_2-price, can really ensure that a purchaser will award on the truly most sustainable option. In this case, awarding on this most sustainable option means that the project emits as little CO_2 as possible. In this case, a tipping point is assumed that involves a CO_2-price set just high enough as to influence the tenderer's behaviour and associated risk appetite, in order to offer a sustainable design. The sustainable procurement consultant states:

> *"Setting this variable carbon price per project is not always easy. Especially in the beginning, it takes more time and expertise. The methodology in itself is not very complicated but it is the knowledge and expertise around calculating the CO_2-emissions that is the most difficult. In fact, with this methodology, the amount of the price can vary greatly from project to project. For highly energy-intensive projects, the efficient CO_2-price can be under €50, for other projects it might be as high as €5,000."*

If you want to attach a distinctive CO_2-price to the emissions that should motivate bidders to tender for the lowest possible emissions, you will also need to have a picture in advance of the possible CO_2-emissions and the achievable CO_2-reduction considered by the contracting party. Because the CO_2-price is not fixed, it makes it more difficult to set up an administrative system around this price methodology states the external expert on sustainable procurement. The consequence is therefore that working with this methodology requires more from the various people and domains in the province.

In practice, this means that for a project, an estimate is made in advance of what the possible CO_2-emissions will be for the various phases, elements and materials involved in the project. This results in an estimate of both the possible CO_2-emissions and the CO_2-reduction that is considered realistic. Based on this, a price should be put on CO_2, which should start to steer towards maximum CO_2-reduction. It is important that this CO_2-price is as close as possible to the tipping point. If the price is set too low, there is a risk that the maximum achievable notional discount does not outweigh the investments required to receive this discount. A detailed elaboration of this methodology in a practical example can be found in section 5.2. Oeverconstructie Merwedekanaal.

The Social Cost of Climate Change (SCC):
Previous reflections would suggest that calculating €875 based on the SCC within procurement, at least, has less real impact in terms of carbon reductions. In the event that CO_2 becomes part of the tender guide, both in a requirement and in an award criteria, a CO_2-price of €875 is going to make a difference in one project and not in another, the sustainable procurement consultant said. As with the SCBA and within design choices, it is not a price that really sorts out sustainability, but 'only' captures the social costs of climate change of a project. The external sustainable procurement consultant questions whether the SCC's carbon price will lead to sustainable choices and behaviour and states:

> *"Personally, I think it is good that the €875 is there anyway. It will still be too low to make an impact in a lot of projects but at least it is the real price for social costs that you therefore do have to count with in your internal process."*

This is agreed more often, for example, a content officer from Climate Alliance states that there is a 'split' in applying the SCC within procurement. You do pull the SCC story from the underlying

report with substantiation from internal notional to external notional, but you do achieve less impact in terms of CO_2-reduction. By both the external expert and Climate Alliance

A provincial employee also agrees and says he wants to go even further, taking the set price of €875 as a minimum for CO_2-pricing in procurement:

> *"Once you now say that this is the social cost, it is difficult to say that it does not apply to procurement'. It cannot be that it is €875 per tonne for a SCBA is but not for procurement, then that is a weird story."*

Use of the SCC methodology within mobility in SCBA has shown that while use of a 'fair' CO_2-price does more justice to reality, it does not yet bring about a distinctive change in results or decision-making. Even for carbon pricing in procurement, distinctive change need not be the primary goal, but can thus be enough to calculate with the social costs in the internal and external process. Depending on the project and market, this form of carbon pricing may or may not achieve the desired amount of CO_2- reduction as an impact. This depends on how much a tenderer must, is willing or able to invest to achieve a certain amount of CO_2-reduction. The external expert on sustainable procurement therefore argues that stating an amount is more difficult because it is not going to be distinctive and thus only grabs the low-hanging fruit, i.e. the reduction that can be achieved for the lowest price.

The external expert on sustainable procurement does mention another option here, namely to make the contract requirement stricter, and thus the limit of the maximum discount a lot stricter, and thus set later. From this new limit of notional discount (read in Dutch: fictieve karting) it would be better to work with the €875. Section 5.2 illustrates what this might look like in practice.

The external sustainable procurement expert concludes that with a CO_2-price of €875, the award criterion CO will not work decisively when the ultimate goal is to steer towards system change. System change is very expensive and requires more customisation, according to this external expert. A detailed elaboration of this methodology in a practical example can be found in section 5.2. Oeverconstructie Merwedekanaal.

5.1.3. Linear or logarithmic price distribution

Previous section describes how to arrive at a CO_2-price level, then it is important how this price level might move. Where some form of CO_2-pricing is used today, it is almost always in a linear price band, that is a set price for CO_2 that remains the same as emissions fall or increase. The external sustainable procurement expert says:

> *"You actually want to have a logarithmic distribution, the more effort, the more relative discount. But when implementing such an instrument, it should be as simple as possible and this includes a working with a linear price distribution, at least in the start-up phase of carbon pricing."*

This does make it difficult to get a feel for where the market is and how to get a price that maximises impact. The elements where the easiest emission reduction is to be achieved for tendering parties, is the so called low hanging fruit. The risk is that at some point all parties will no longer want to or be able to innovate because the costs involved in this innovation do not outweigh the potential benefits in the form of fictitious rebates, for example. To still maximise potential emissions reductions, the consultant argues that: 'You can then start rewarding at a more ambitious

level, you don't reward the first bit'. The following section 5.2 illustrates what such a difference between a linear or logarithmic distribution looks like in practice.

5.2 Case study: Oeverconstructie Merwedekanaal

The experiment developed for this study takes as its case study a fictitious European public tender; the replacement of the Merwedekanaal dam, section 14. The purpose of this experiment is to provide answers to two sub-questions posed in this study, and to enable procurement officers to learn and reflect on the cases presented. The original tendering guideline of the province of Noord-Holland was used as an example and partly adopted. The most important points were extracted from the tendering guideline in order to create a format, together with additional information, that could be presented in the experiment. The format, which can also be read in full in appendix 2, provided the following important information for the experiment participants. First, there was a short introduction that stated the objectives of the tender, including the maximum amount of the tender price. This was followed by brief, concise explanations of the two different types of CO_2-pricing, that of SCC and that of efficient costs. Two different examples were then presented as case studies. In example 1, the tender used a CO_2-price of €8000 based on efficient costs. Example 2 used a CO_2-price of €875. For both examples, it was then worked out what such a CO_2-price would mean for the maximum monetary gain to be achieved, and the amount of the notional rebate was worked out schematically. It is important to note that the format of the tender guide was initially given to the officials with only Example 1 attached.

For the experiment, three different people were interviewed, who together in three different positions represent the procurement and tendering department well. After the format with the information had been given and read, a questionnaire was started that was also personally specified from the three different perspectives. Firstly, questions were asked about Example 1, how bidders might respond and whether they thought CO_2-pricing in this way would meet the stated objectives. Then example 2 was presented and explained and the same questions were asked. The focus of this part of the experiment was more on questioning the differences that might arise in practice between the two examples. At the end of this part, the participants were asked for their personal preference based on their own arguments.

The second part of the experiment focused more on the respondents' personal function and responsibilities. Questions here were more focused on the knowledge and skills that respondents could bring to bear on the sample case from their perspective. For example, the lawyer was asked to look at the example more from a procurement law perspective, the contract manager mainly explained what such an example means in practice for contract management, and a purchaser was asked about daily practice and how a purchaser can deal with a carbon pricing instrument.

5.3 Application of theory and practice in an experiment:

After decisions have been made on the design choices discussed in the previous chapter, the application of carbon pricing in practice follows. This chapter shows the steps and, again, the choices a government like the province has to deal with when working out carbonpricing in a case study. The roadmap below is based on GWW projects and is directly applied below to the case study of the experiment 'Bank Replacement Merwedekanaal', which is fictitiously designed for this study. Figure 5.1 is an illustration from the report 'CO_2-pricing at provinces' by Witteveen+Bos and Tauw (2020, p.30). On the basis of this illustration, together with the external expert on sustainable procurement, we broke down what a fictitious discount based on CO_2-reduction might look like in practice.

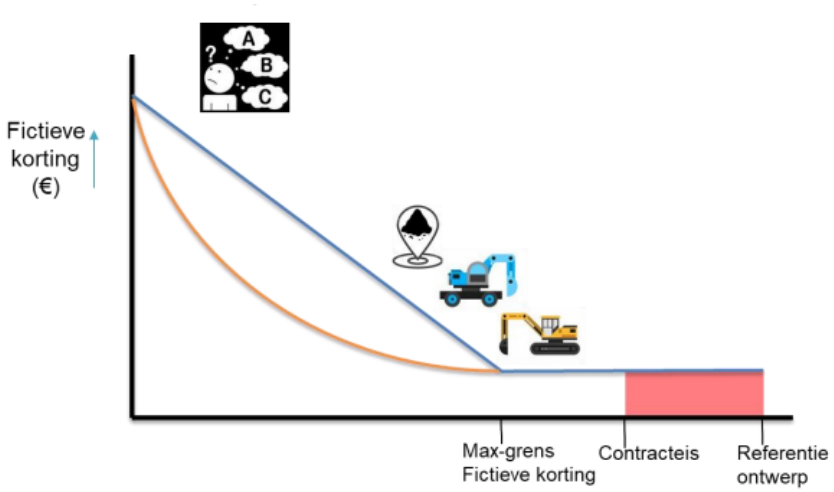

Figure 5.1: Illustrating steps to be taken for carbon pricing in a procurement project. (Source: Witteveen+Bos, Tauw, 2020, p.30).

Reference design:

First of all, there is the reference design, for which a certain CO_2-emission is calculated in advance. This can be through an MKI (Milieukostenindicator) calculation based on a LCA (life cycle assessment), for example. According to the consultant, the CO_2 data relevant here can be calculated using three methods or categories. The first is based on category 1 data, where a supplier has already done an LCA for a certain product and its CO_2-emissions or MKI value is known. Category 2 data assumes an industry average and thus needs a wider range. Category 3 data is a sector average and is therefore the category where the data has the largest uncertainty margin. The sustainable procurement consultant argues that it can be difficult to set a reference value and then be too high or too low on a level. This requires good insight into what the market is capable of and how much insight they as a market themselves have into their own operations and executive works.

For an example like the embankment replacement, all the parameters of the different elements can be calculated on, for example, the amount of materials, earth movement and demolition. For instance, a procurement employee states:

> *"For a bank replacement, what is relevant is; the removal of the old bank construction; its disposal and processing; the supply of the new one and its materials; the requirements to be made of the materials. It is important to see what liberties you give in the assignment requirements, for example, it makes quite a difference in terms of amount of CO_2-emissions whether the material is wood or steel."*

For these elements, a bandwidth can be given in terms of CO_2-emissions and this then leads to a reference design that, according to the sustainable procurement consultant, always contains an overestimate. The calculations of all these parameters are reflected in a spreadsheet, which is then sent to bidders to calculate their own CO_2-emissions on this basis. According to another procurement employee, this spreadsheet is essential:

> *"Within such a calculation sheet there should be clear frameworks, where per phase, element or material it should be clearly indicated which CO_2-emissions should be entered and where necessary also how they should be calculated. This will facilitate comparability between bidders. The province could also already fill in a few small fields itself."*

The calculation sheet can also serve as a basis for contract management and is therefore also legally interesting to check against procurement law even before sending it out.

Contract requirement and maximum limit notional discount:

After this, a contracting authority sets a contract requirement on CO_2-emmissions and this is often about 30% less than the calculated CO_2-emmissions in the reference design, according to the sustainable procurement consultant. This is so because a reference value set one-to-one on a contract requirement does not steer towards a reduction gain but would mean that any tenderer can already have a 30% gain by doing nothing. One can choose to start from the contract requirement by providing a notional discount on CO_2-reduction, but a contracting party can also undercut this by trying to incentivise bidders to do more. For example, with a linear price level, one may choose to set the maximum limit of the notional discount lower than with a logarithmic price level. In the illustration of figure 5.1, the yellow line represents a logarithmic price distribution and the blue line represents a linear price distribution.

For the Merwedekanaal bank replacement experiment, the maximum limit of the notional discount is set at 800 tonnes of CO_2-emissions, meaning that for every bidder with emissions below this figure, a linear notional discount is provided. Every bidder who tenders with higher CO_2-emissions will not receive a notional discount on the EMVI (Economisch Meest Voordelige Inschrijving) criterion of sustainability.

The range of the notional discount:

Based on preparatory research by, for example, a team of assessors, both the maximum limit of the notional discount and the bandwidth of notional discount achievable can be determined. In reality, what the province of Utrecht currently lacks is precisely the knowledge and expertise of a team of assessors, says a procurement employee:

> *"Knowledge around CO_2 is just very important in this case. I don't think most people in the organisation are capable of assessing for CO_2. You then have to go and get this externally and that also involves additional costs."*

To reduce costs, it is suggested to work towards a set of standards, a library from which to choose applications of CO_2-assessments. Another procurement employee agrees that the knowledge on CO_2 is not currently in-house at the province, but sees potential in recruiting an assessor team, saying that this is already happening in other areas:

> *"You could expand that such a team or put together a team based on a certain criterion, so that you say these people only look at CO_2. This also happens, for example, for the criterion of circularity within furniture. As long as you have experts who can have a certain opinion on a subject because of their expertise."*

For the Merwedekanaal experiment, this bandwidth was set at 300 to 800 tonnes of emissions, with a tenderer with emissions of 300 tonnes or less being assured of the maximum notional discount. The experiment also mentions that emissions of 300 tonnes or less were deemed realistic based on a team of evaluators.

The bandwidth also depends on the elements you do or do not include in your call-out, it may be that you only look at the 75% largest impact and want to price it and thus reward reduction. For the bank replacement experiment, this involves the materials and transport that you do include, while you do not include the CO_2-emissions of, say, the demolition of an old bank revetment. The emissions of the latter can then sit in the range 0 to 300 tonnes of CO_2-emissions to which no further notional discount is attached.

Choice of pricing methodology

Once all the parameters have been set and a clear estimate of CO_2-emissions has been given to this, the final step is to assign a price on CO_2. As discussed in section 5.1.2, there are two methodologies for assigning this price, the efficient cost methodology where the CO_2-price depends on the project, and the SCC where there is now a set price of €875 per tonne of CO_2. Both prices were worked out for the Merwedekanaal experiment, after which the staff involved were asked which methodology they think is best, and what trade-offs are involved. The details of the experiment can be found in appendix 2 but relevant to mention is that the experiment awards contracts on two quality criteria; Risk management and CO_2-reduction. The tender price is subject to a ceiling amount of EUR 14 million; tenders above will not be taking into account.

For all interviewees in the experiment, the different examples in pricing methodology were linked to the different goals the province of Utrecht may have in their applications. Thus, the preference of two interviewees is for the efficient cost methodology in figure 5.1, while another employee expresses a preference for the second methodology of SCC in figure 5.2.

Hoeveelheid CO2 uitstoot (in Ton CO2)	Fictieve korting op de inschrijvingssom	
800 of meer	EURO 0,=	geen meerwaarde
300 of minder	EURO 4 miljoen	maximale meerwaarde
500 (Voorbeeld Inschrijving)	EURO 2,4 miljoen	voorbeeld inschrijving

EMVI criterium	Maximale te behalen monetaire meerwaarde in Euro
G.1. Risicobeheersing: 4 OG-risico's	€ 4.000.000,00
G.2. Duurzaamheid: CO2 reductie	€ 4.000.000,00

Table 5.1: Illustration of applying efficient costs: Example 1

Hoeveelheid CO2 uitstoot (in Ton CO2)	Fictieve korting op de inschrijvingssom	
800 of meer	EURO 0,=	Geen meerwaarde
300 of minder	EURO 437.500,=	Maximale meerwaarde
500 (Voorbeeld inschrijving)	EURO 262.000,=	Voorbeeld inschrijving

EMVI criterium	**Maximale te behalen monetaire meerwaarde in euro**
G.1. Risicobeheersing: 4 OG-risico's	€ 4.000.000,-.
G.2. Duurzaamheid: CO2 reductie	€ 437.500,-.

Table 5.2: Illustration of applying a fixed price of €875 (SCC): Example 2

The main reason for choosing efficient costs is again cited as the distinctiveness of an award criteria. In this case, the higher CO_2-price causes tendering behaviour to change and steer towards CO_2-reduction. With the lower CO_2-price, it is more difficult to make the CO_2 criterion distinctive; tenders will be more similar. The notional discount is also always related to the contract value, what it contains in terms of margin and what a tenderer gains from it. An legal procurement expert concludes that determining and quantifying quality criteria is something a procurement officer is good at, *'who knows how the market moves and where the profit can be made'*.

A procurement employee interviewed says that from his practical experience he expects that in example 2: *'everything will be thrown on risk management for the sake of the lowest price'*. This interviewee is familiar with daily practice in which this kind of instrument would be implemented. He says that while a total notional discount of 4 million still tries to drive CO_2-eduction, in figure 2 there is probably no incentive for bidders to focus on achieving the total notional discount on quality criterion CO_2.

The contract manager takes issue with Example 2, the social cost as a fixed price of €875 in the award criteria, saying:

> *"If it is a fair price where you know it is the cost to restore CO_2-emissions, I think it is fair. With this price, you put it in proportion to reality and also there is no need to set up an extensive set of instruments for a small effect where you might go overboard with your CO_2, as is the case now in Example 1."*

By saying going overboard with your CO_2, the employee is referring to the fact that calculating with a CO2 price far above the established price of 875 euros for the social costs, the actual social costs are no longer in a fair and reasonable proportion to the given notional discount based on the CO2 price of 8000 euros. When asked whether this SCC price will make a difference in this example, this employee replied that this is more difficult in the Merwede Canal case, but that the price of SCC does have the ability to make a difference in other projects. It may happen that in energy-extensive projects where the SCC price is used, a fictitious discount is provided that is larger than the total tender sum. According to an employee, this does not matter:

> *"If the notional discount is in the minus, we as a province are actually also saying that it generates money for us as a social cost. The project then costs money but also delivers a reduction gain, according to the contract manager."*

5.4 Reflection on experiment

This chapter will reflect on the experiment as described in appendix 2. Here, it will first highlight the findings compared to the previous interviews in the preparation phase. Here it will also describe what the experiment contributed to in terms of learning, and the removal or adjustment of assumptions and perspectives. All this is described in section 5.4.1. Alongside this, the experiment also opened the way to a new phase, the implementation phase, in which new perspectives and new options that require making political choices, perhaps based on strategic decision making. These new choices are described in section 5.4.2.

5.4.1 Reflection on the learning and transition process

Legal assumptions:
Procurement law-wise, conducting an experiment with example cases helped to remove previously assumed legal obstacles, which emerged in earlier interviews. In that respect, applying an example helped to give context to important assumptions. Two key procurement law concerns are mentioned. First, an assessment must be absolute and objective, meaning that all bidders are put along the same bar of carbon pricing. Second, it is important that the CO_2 award criterion is linked to the terms of the contract, that there is a relationship with the contract and that the use must be defensible. Both points are met by the Merwede Canal example, according to a legal employee interviewed. Another employee said in the experiment:

> *"I do have legal questions I wish to ask beforehand. If my lawyer says it is tenable, then it is fine, then you can easily apply it from the tender."*

The spoken legal officer in indicates during the experiment that he 'definitely sees possibilities' in the form of CO_2- pricing in the case discussed. Asking about the possibilities, the external consultant on sustainable procurement states:

> *'I use PONT as a guide, where PONT stands for Proportional, Objective, Transparent and Non-discriminatory. As long as these pillars are followed a requirement can be justified and explained, and this is defensible, as a province one can go quite far in encouraging sustainability criteria."*

Including CO_2 as an award criterion therefore offers opportunities with a justified interest in contributing to the energy transition and national and provincial climate goals. Especially in the field of CO_2 and in relation to recent climate objectives, including CO_2 in award criteria makes it easily applicable, defensible and relevant. For the procurement officials involved, the experiment helped to give context to CO_2-pricing in practice, which also allowed better reflection on legal and procurement law assumptions.

Tenderer's behaviour:
The experiment asked how bidders are expected to react to such a questioning of CO_2 in award criteria. First, tenderers are expected to ask a lot of questions because this is a new situation and they want to get the most out of a tender. A procurement employee argues that the province will therefore have to provide answers to questions about, for example, the method of comparison and the means of proof that will be required. In addition, tenderers will ask about the evaluators to determine how to shape the tender and in what jargon they can best do so.

The pricing methodology chosen will have a major impact on tenders, with practice to show whether the notional discount compares with the price a tenderer has to make for its investments on the award criterion. After this, according to an employee, an economic and psychological game will emerge where each bidder will have equal opportunities to do something with CO_2 in addition to what with risk management. For instance, they themselves can weigh up whether to pursue the entire notional discount on risk management in order to become the most favourable tender. Or they calculate for themselves how favourable they will be if more or less effort is put into CO_2-reduction. A procurement employee states the following about tendering behaviour:

> *"There is a risk that including CO_2 in the award criteria could encourage opportunism among tenderers, a fact that can be anticipated in contract management with the necessary preparation. Also, I don't know whether market parties will be happy with this, that will also depend on the market."*

5.4.2. Identification of barriers and opportunities within procurement and tendering

Conducting the experiment has foreshadowed the second phase of mainstreaming carbon pricing within procurement, namely the 'implementation' phase. Several barriers and perspectives mentioned in the interviews of the first phase of 'preparation' were removed or adjusted after conducting the experiment. For instance, cognitive barriers around complexity, perception and information provision were removed by presenting a practical example to the civil servants. Legal perspectives were also adjusted because the practical example embraced more possibilities in procurement law than previously thought.

However, conducting the experiment and thus moving towards the implementation phase also created new assumed obstacles and perspectives. For instance, commissioning, and especially the lack of it within procurement, was mentioned as a major organisational barrier. For instance, one employee states:

> *"At the moment, the province does not have the principalship in-house that is needed for the contract management of a carbon pricing instrument. At the moment, the people involved in commissioning are mainly of a technical nature, sitting on functionality and not sustainability. Implementing it in the toolbox of procurement and then applying it requires a change of mindset in the commissioning team. It is important that this principalship is in the hands of a motivated person, someone who feels responsible and who wants to oversee the sustainability criteria."*

Besides this, a mismatch is also described between the principals within procurement, and the executive teams. For instance, one employee expresses the expectation that management will react enthusiastically and would want to implement it, but that in practice it will not be applied by the implementers, i.e. the purchasing teams. Also, the level of knowledge and low motivation on the subject would not contribute to successful implementation within the province at the moment. As a solution to the lack of knowledge and motivation within the organisation, it is suggested to work on a library of CO_2-standards from which implementers and evaluators can extract relevant applications. In general, in the area of recording and monitoring projects, there is much to be gained, where at the moment this is still mainly done manually.

Finally, other opportunities are also seen, which lie mainly in linking CO_2-pricing to legally imposed targets for steering emission reduction. Including CO_2 in tenders is seen as a logical part of this because it is one of the province's core tasks. One employee stated *that 'anything that helps to achieve these objectives, such as this CO_2-pricing instrument, can have a place in tenders'*. It is also stated several times that a CO_2-pricing can be linked to the new CSRI as a toolbox under the 'climate' theme.

5.4.3. Choices to be made in the implementation phase

Besides the design choices highlighted in section 5.1 in the preparatory context, the experiment identified different visions and perspectives, creating choices for the implementation phase. These choices could focus on the external propagation of *CO_2*-pricing, or instead focused on the internal options around starting up *CO_2*-pricing in the organisation. Below, different perspectives will be highlighted on the basis of which a province should make political choices, perhaps through the use of strategic decision making.

Fining or rewarding:
If a tenderer does not deliver what they promised in terms of CO_2-emissions, then there is a breach of contract and they are legally at fault. Sometimes they then rectify it, and sometimes this cannot be done and it comes down to commutation. It is mentioned several times that either way this situation costs time and money and the risk of this should be removed as much as possible. All civil servants conclude that it takes a lot of time and energy when a tenderer is found to be contractually in default, and that risk of this should be avoided as much as possible. Nonetheless, punitive measures will have to follow to prevent such a tender next time, and the whole thing no longer has a steering effect on the supplier, states one of the procurement staff: *'It's a cycle, it's steering for sure but it's also rewarding and punishing, otherwise it won't work either'*. As a methodology for penalisation, the another employee gives the example where failure to meet an enrolled promise, the notional discount at which the tender was awarded is imposed as a penalty. In the experiment, a fine equal to the attributed notional discount on the award criterion CO_2-reduction is mentioned as a potential measure. In this case, the preferred penalty is the CO_2 award of €875.

As a counterpart, the experiment mentions that from practical experience, fining is certainly not always the best tool to make bidders comply with contract management. For instance, it is told, *"often tenderers start pricing in that fine already, they know that something is a small fine and then they take it for granted"*. In addition, the province should first establish that the contract was not executed as required before actually sending a fine, two things that, according to one procurement officer, are often not carried out by the province, 'and bidders know that too'.

Instead of fining, it is therefore suggested to work with a bonus system. For the case of CO_2 as a quality criterion, one could choose to give a reward per tonne of additional demonstrated CO_2-reduction compared to a reference, which according to an employee could be, for example, *'fine'* the amount of the social cost, i.e. €875. It states:

> *"A bonus works more stimulating, because then they will run harder and demonstrate that they have done it', which in turn can also subsequently reduce the amount of work for the client. Take the example of electricity contracts where this has been done, and where this has provided an extra incentive for bidders to do more while facilitating contract management at the same time."*

Develop in-house or develop in collaboration:
Under certain conditions, the civil servants discussed consider it possible for the province itself to start including CO_2 in the award criteria. The main condition mentioned here is support within the provincial organisation. When most of the ideas are in line, only then can an instrument be widely promoted by the province of Utrecht, it is thought.

One employee did mention that the instrument will only really be successful the moment several provinces start using it as common practice, because *'the province will not make the difference here on its own'*. Another employee mentioned the driving role a province has in the field of innovation, saying that this role should not be underestimated:

> "What you often hear back is that provinces and collectives of provinces are leading, market players then say that parties like the province determine how they work."

The central government is mentioned as an important player that can provide guidance in developing a carbon pricing instrument, through an overall approach and a larger arsenal of projects. An employee also states that the central government is the appropriate player to help think about the questions surrounding the burden of proof.

The nature of a project: works, services or supplies
All civil servants were asked how they might adopt such an example in their own provincial context. In the province, a rough distinction is made between three types of public procurement: works, supplies and services. A majority of employees stated that the best place to start is with works, *'that's where the people who know most about it are and who are also already reasonably familiar with sustainability criteria'*. Examples cited include the construction of paving, as in roads, cycle paths, roundabouts and bridges, which are good places to experiment. It is said that relevant applications could be where one is dealing with a production or implementation process.

Another option mentioned is that you could perhaps apply it to deliveries. This concerns the literal deliveries of flooring, paper and other materials, which also release CO_2. As an additional example, mail delivery is mentioned as a possible good application for introduction. Finally, it is agreed that such an instrument is less applicable to services, because in practice it can quickly become discriminatory. Travel times and types of transport are more involved, and these are factors on which it is difficult to give point deductions or value judgements. He also considers it more far-fetched here and probably legally more difficult.

The size of a project
In addition to the nature of application, the size of application was discussed; here, too, there are differences of opinion. For example, one employee said that the province could best start by applying such an instrument in smaller projects, *'where you can say that if you don't implement something in a way, it will 100% certainly cause these emissions'*. From there you can expand the instrument, starting with pricing only parts of the total project package, on, say, emissions on transport, tools or other resources in implementation. In this way, the province can gradually learn and also based on certain elements such as transport, gradually design a model of standards and norms that can be expanded further and further. There is a warning about the level of detail to which larger projects around infrastructure and premises can penetrate, this is to the detriment of the work and control involved.

Another interviewee mentions the lack of commissioning in smaller projects at the moment as a reason to start with larger projects:

> *"Where there is professional commissioning authority in the form of contract management, supervision, and who is able to want to do that. Unless you have set up the organisation so that it always happens well, with the right people, the right motivation and your right resources."*

5.4.4. Final judgment, influence of experiment.

Asking about the potential, all three interviewees in the experiment state that the practical example has contributed to their knowledge base around the topic and that it has weakened or dispelled certain assumptions. Compared to the first interview, the experiment has provided a better picture of how CO_2-pricing is applied in practice in a tender. It concluded, for instance, that it 'simply fits into the toolbox of procurement', and that, provided there is a procurement lawyer looking on beforehand, it can be fine to apply. It is also stressed that it is really of our time to pay attention to these kinds of criteria and that it is hoped that this will happen more in the future. In addition to all the comments and criticisms about the experiment, another employee emphasised that there are opportunities in investing in such an instrument now. And that this investment now can ensure its continuous use later. In addition, this employee says that while setting up this kind of project is a lot of work and therefore costs time and money, setting it up is also just fun, and the province can be able to do it. In conclusion, there are many things to look out for but, it is stated:

"That should also not say that you should not start it or that it is a hopeless instrument, not at all. A lot of instruments have once found their way to a more accepted standard this way."

6. Results: Mainstreaming carbon pricing within the provincial organization.

This chapter builds upon the results of chapters 4 and 5 and widens its scope towards the mainstreaming process of carbon pricing throughout the organization as a whole. In doing focusing on the inter-sectoral perspectives, barriers and opportunities arising in the mainstreaming process. This chapter in particular focuses on mainstreaming carbon pricing throughout the provincial organization of Utrecht. Mainstreaming involves the sector wide implementation or application of carbon pricing instruments within the province. It answers the following sub-question:

How is the provincial state decision to adopt an internal carbon price received within the organisation, and in the multi-actor perspectives of people involved, what are barriers and opportunities to further mainstream this policy decision?

First of all chapter 6.1 sheds light on the introduction of carbon pricing within the organization of the province of Utrecht, by learning from four cases from the previous chapters. Chapter 6.2 sets apart the perspectives, barriers and opportunities that may influence the process of mainstreaming and does so by making distinctions between six different categories.

The last chapter of 6.3 zooms out on the provincial organization as a whole and tries to

6.1 Introducing carbon pricing in the organization: Lessons so far

This chapter, based on observations and interviews, reflects on how carbon pricing has been received in the province so far, what it has achieved and what lessons can already be learned. Drawing on mainstreaming and transition management theories, it reflects on four important and salient factors. These factors underpin the decision to apply the €875 in the SCBA and can be learned from for further implementation of carbon pricing. The four factors described stem from an observed practice in the province of Utrecht. First, the political and organisational aspects are explained in 6.1.1, where an official mandate may or may not contribute to good implementation. This is followed by a number of organisational, but mainly cognitive, aspects. Section 6.1.2 describes how the decision to implement the €875 led to a level of awareness and commitment. Section 6.1.3 then describes a degree of social learning as part of successful implementation. 6.1.4 reflects on the complexities and divisions around the goal of continuing to apply a concrete price of €875.

6.1.1 Political and organizational: Hierarchical steering with an official mandate

A decision from the governing board or from the Provincial Council obliges the civil servants involved to delve into the subject in order to pursue decided objectives. An interviewed employee illustrates this for the cooperation between the Climate Central team and the mobility domain: '*There are now regular calls from that side where before it was the other way round*'. Interviews outside the province also mentioned that an official assignment from above can be very helpful so that this can be steered, executed and reported on, and faster delivery is also achieved. An external expert again emphasises that a kind of ambassador like a member of the provincial executive, such as Huib van Essen at the province of Utrecht, from 'above' is very effective and will also help in the further implementation or mainstreaming of CO_2-pricing. This form of hierarchical steering is

'normal' for regular core tasks of the province such as maintaining roads, but new for the topic of internalizing a CO_2-price for sustainability.

In general, initiating targets from the administrative organisation 'bottom-up' is seen as more difficult. A fellow employee, for instance, stated that an assignment from above, read: Provincial Executive, would help because, according to them: *'It makes things clearer. In that case, there are brackets through which I have more to say, and I am also authorised to do so'.*

Adjustments to the SCBA and its use are normally initiated and developed bottom-up from the civil servants working with the tool, in this case again from the mobility domain. For previous adjustments to the SCBA, for example, a process of several months was scheduled. According to an interviewed co-worker these adjustments are carefully, integrally and broadly discussed. Together with colleagues from all policy fields involved, an adjustment was then coordinated in several meetings: *'By looking together at how we shape adjustments and seeing if it fits with policy and practice'.* In this way, adjustments can be made in the civil service, or sometimes decision-making and confirmation can be sought from the Provincial Executive.

In practice, the manner of decision-making around the application of CO_2-pricing in the SCBA also was perceived in a negative way within the mobility domain, where the decision ends up. A mobility employee states that his team was negatively surprised by the rapid decision-making process and the minimal involvement of the mobility domain in this. It is mentioned here that the team responsible was only approached once during the preparation process, and that at that time they were not aware of the rapid process involved. It is also pointed out that people would have preferred that in addition to the involvement of mobility colleagues, it would also have been good to involve the support of a consultancy firm in the preparation process. This would have made it possible to understand in advance what the effect of different CO_2-prices would be. In this way, risks and uncertainties for civil servants could have been tested beforehand, something that has only been done now as a result of this study, and already several months after the decision.

As to whether the same decision of adjusting CO_2-prices would also have been taken from the mobility domain without an official mandate, the answer is that this *'would not be illogical'*. It is clear, however, that in that case it would have taken much more time, time that Climate Central staff considered costly. One staff member, for instance, stressed that the long timeframe of major transitions could be bridged precisely by getting an assignment from above and to include proper time for engaging departments in shaping adjustments. The main goal of team Klimaat Centraal, is to point the finger the at striving for faster changes , first of all because climate targets have to be met. Secondly because the approaching dissolution of the team at the end of 2024 also seems to play a role in this.

From interviews and observations, the perspectives and barriers described above do not seem to have resulted in serious obstacles to implementing new CO_2-prices in the SCBA. All the more so, according to an interviewed employee, the course of proceedings typifies the province's day-to-day business. It is mentioned several times, for instance, that the decision-making process often runs like this, quoting a fellow mobility worker:

> *"I and my colleagues are not paid to find something, but are paid to figure something out. Also, we are used to decision-making this way."*

While the official decision did not directly interfere with the extent and speed of application, it does bring up questions about the desirability of the way the decision around the €875 came about. Intrinsic motivation, from both the literature and interviewees, remains a key driver for the success

of such a carbon pricing instrument. A future decision could therefore take more into account in advance the possible impact such a decision could have on cognitive, social and organisational commitment to the topic now, and in the future. For now, a mobility employee stresses that the decision has been taken, and that *"there is no point in cycling backwards now"*.

Ultimately, the decision from Provincial Council in January 2023 on introducing carbon pricing ensured that the process from decision to implementation was relatively quick. Accompanying this decision was also the objective of exploring other fields of application of carbon pricing as a province. However, this second objective is, as one interviewed employee put it, *"too abstract and far too non-committal"*. As a result, one can say that it has been looked into, but then also immediately say alongside it that these other applications are not worth implementing. As a condition for the usefulness of a political decision, it can therefore be stated that the decision with such an objective should be clearly and constructively formulated.

6.1.2 Cognitive: Awareness raising

In addition to the mobility sector, other programmes, teams and individuals expressed an interest in participating in the decision-making process concerning the CO_2 price of €875. A Climate Central employee countered by stating that an invitation had been extended to everyone, but some individuals did not attend. This invitation referred to a workshop organised by Klimaatverbond Nederland during the development of the supporting report. This same provincial employee acknowledges that the moderate yield from the organisation may be due to the unfamiliarity and complexity of the topic of CO_2-pricing.

However, the decision and accompanying report did succeed in raising awareness, as many interviewees indicated. Klimaatverbond argues that the CO_2-price in a hypothetical application chosen in the province of Utrecht primarily serves to provide an overview and increase awareness of CO_2-emissions in the assessment framework. However, there is a difference in opinion regarding the impact of awareness-raising. In the interviews conducted, a distinction in sentiment regarding 'awareness' arises between individuals who played a direct or indirect role in the decision-making process and those who did not. This dissimilarity stems from the Provincial Executive's choice to practically enforce carbon pricing in mobility as well as the SCBA, which was explained in section 6.1.1 earlier. Awareness has been increased among those who have been directly or indirectly engaged with the Climate Central team and the Mobility sector, including external parties. The decision is expected to raise awareness among other parties further down the line. In interviews, it was mentioned that raising awareness is an effective first step in spreading the message about CO_2-pricing and the potential for behavioural changes. For example, a local government employee expressed this view.

> "While the concept of CO_2-emissions may be difficult to comprehend, quantifying social costs as €875 makes the impact more tangible, particularly among the practical Dutch."

People are becoming increasingly aware of the impact their actions have on the climate. Another employee emphasized that a CO_2-prize can aid in this awareness. It is suggested that this new CO_2-pricing scheme should be linked to behavioural changes that enable individuals to implement eco-friendly practices not just at a provincial level, but also in their personal lives.

Of those who have not previously been directly or indirectly involved with CO_2-pricing, it can be observed that their awareness of the subject does not immediately increase after the decision is made. For instance, an employee who is directly involved in the matter warns that she expects

awareness to have grown significantly only among a small group within the province. This is likewise confirmed several times in interviews with those who are not involved. For example, an employee in operational management stated that awareness has not yet been raised, explaining that the topic is mainly discussed at a higher level or project level, and those who need to work with it have not yet become aware of it. The procurement department, which is not currently involved in the subject, notes that CO_2-pricing raises many questions and is complex.

Thus, it does not raise awareness but rather provokes resistance.

However, there is a noticeable increase in climate and CO_2 awareness since the decision to promote mobility, as reported by an employee in an interview. The decision and subsequent price change have directly impacted them, resulting in heightened climate consciousness. *"Everyone is talking about it and it is at the forefront of everyone's mind again."* With this, there are also opportunities for potential further spread of the topic and behavioural change among those where the topic has been brought to attention.

6.1.3 Organisational and cognitive: Learning process as part of implementation

Through the lens of transition management, we can also look at the mainstreaming of carbon pricing in the province of Utrecht. As described in the theoretical framework, one of the phases of transition management consists of the operational part, where experimenting with carbon pricing can be part of a successful transition to an organisation where carbon pricing becomes a norm. In this study, experiments were used to create a picture of what is involved in implementing CO_2-pricing in the chosen policy practices of mobility and of procurement and tendering. In this way, the consequences that any implementation might entail have also been anticipated, in order to reflect and adjust accordingly.

When setting up these experiments, the external expert on sustainable procurement was asked what to bear in mind when implementing them. This expert warned that it is a danger to assume that civil servants of the province of Utrecht know a lot about the subject of CO_2-pricing, and that it is therefore important to keep it either small or specific. Also in the interviews with provincial employees it emerged that when getting acquainted with the instrument CO_2-pricing, it would be relevant to translate the theoretical material on the subject into what it means in practice for the people who will be working with it.

Already during the study, learning has been done by the various civil servants spoken to. This is mainly by doing experiments in the form of applying CO_2-pricing in old SCBAs and in a case study of procurement. These results are reflected on in more detail and per case study in chapters 4.5 and 5.5. For the SCBA, the experimentation and thus learning ensured that civil servants mobility were reassured about applying CO_2-pricing within their domain. For the Purchasing Department, the experimentation has ensured that civil servants have been able and willing to adjust assumptions, in favour of a more positive sentiment towards implementing CO_2-pricing in their domain. For both SCBA and Procurement, several new findings were also expressed in the interviews after the experiment, civil servants were able to give their own review on the instrument and also contributed ideas on other or new possibilities to equalise the instrument within the respective domain to a success.

6.1.4 Organisational and cognitive: Reflection on the goal of implementing a concrete CO_2-price

The decision and bringing it out into the open caused a stir internally and externally. One employee involved states that externally the reactions were mostly positive, where internally there were mostly questions around the extra work the decision would entail and the commitment to the decision, which many perceived as non-existent or minimal. The same employee also states *that "we had to do a lot of missionary work internally, to explain things about, for example, the consequences of the price"*, and was therefore mainly spreading knowledge and understanding and answering questions. Domains such as agriculture and procurement reacted with surprise and wondered how they should include CO_2-pricing, among all other responsibilities, when the decision does not yet interface with these respective domains at all. This indicates that a first introduction to CO_2-pricing often generates incomprehension and deterrence, a fact also experienced by almost all interviewees, and also reflected in meetings and other observations in recent months.

Despite the fact that the €875 post-decision price is only applied in the SCBA and will therefore only make the CO_2-factor more visible to a select number of people and programmes, one employee argues that this issue should concern everyone within the province. *'Even as a lawyer, or if you are working on cycling policy, this is exactly what you should be doing it seems to me'*, says the same employee. The mobility principal also says that these new awards 'are going to increase attention anyway, because big sums of money just get more attention'. As for the €875, an employee stresses that within the Climate Central team, they had underestimated the importance of the exact number '875'. For instance, an employee involved in the decision states the following:

> *"A lot of people also didn't realise the importance of it, maybe we ourselves didn't either, because we were shouting about SCBA all the time. But once you set a price for the SCBA you can't say 'for something else it doesn't apply', something is the social cost or it's not. And once you well say that €875 is the social cost then it's hard to say it doesn't apply to procurement. You can say we don't use it there, but the price would actually just be for it as well. Where before we thought of, all that commentary, it's just for the SCBA. Do we now think that it doesn't work like that, because if it does then it also applies to sustainable construction, it's actually for everything."*

Several domains like agriculture and business, as well as programmes around sustainability and circular stepped up to Climate Central with comments and questions about the application of this €875 within their field of work. These comments from other domains and programmes were initially refuted by Klimaat Centraal with the argument that the price, "is only about the SCBA". In reality, the price with underlying methodology is separate from the SCBA and, regardless of the field of application, the price expresses the literal social costs of a tonne of CO_2. This makes it difficult to say 'it doesn't apply to anything else', said a staff member directly involved, *'Something is the social cost or it is not'*.

That there are various forms of CO_2-pricing with differing prices is one of the main principles and conclusions outlined in the report 'Rekening met de toekomst' by Klimaatverbond Nederland. However, in practice, these different pricing structures and costs only contribute to the complexity and lack of comprehension of the real message. In practice, the theory of CO_2-pricing is complex and challenging to disseminate. This is not only applicable to stakeholders who are new to the topic but also evident within Klimaatverbond Nederland itself. Recent discussions have arisen within Klimaatverbond on how to improve communication of the message on the Social Cost of Climate Change.

6.2 Perspectives, barriers and opportunities for mainstreaming

The implementation of CO_2-pricing in the SCBA has been completed and first experiments in practice have been reflected on in chapter 4.5. Now lies the task of exploring other fields of application where CO_2-pricing can be applied, in order to mainstream the instrument sector-wide within the provincial remit. The perspectives, barriers and opportunities that may influence the process of mainstreaming CO_2-pricing in the province have been investigated. Here, the province of Utrecht is in the first and second stages of mainstreaming named 'understanding' and 'planning'. Understanding here consists of problem detection, awareness raising and information gathering, about CO_2-pricing and the pros and cons of further implementing it. Planning revolves around the development of CO_2-pricing options, and the assessment and then selection of these options. The third and last phase of mainstreaming CO_2-pricing is 'managing' and includes the actual implementation of the instrumentation, monitoring its results and evaluating on the overall process. The province of Utrecht is yet not so far to reach this last phase and subprocesses of mainstreaming CO_2-pricing.

As explained in the literature (Runhaar et al., 2018), there are several factors that can hinder or encourage mainstreaming of CO_2-pricing, the so-called drivers and barriers. These can be divided into six different categories, all of which but one will be explained in the context of the province of Utrecht and based on data from the interviews.

6.2.1 Political factors:

Political barriers and drivers relate to political commitments that conflict or align with adaptation objectives. From political support for CO_2-pricing to the flexibility of legislative and policy context and the level of political stability. The province of Utrecht is first and foremost a political organisation, with the Provincial Councils forming the people's representatives of the province, and in that form being representatives of political support. The Provincial States determine and control the province's policy on key issues and are reconstituted every 4 years on the basis of provincial elections (Runhaar et al., 2018).

Political support for carbon pricing in the form of decision-making by the Provincial Executive ensured rapid implementation in the mobility domain, as is further described in Chapter 4 on the SCBA. In addition, several interviewees from both the province and external experts indicate that political support is also seen as necessary and useful for further mainstreaming. For example, an external consultant states the following:

> *"It helps a lot that there is someone who sticks his neck out in politics, and that this person acts as an ambassador. In Utrecht, for example, this is the deputy Huib van Essen. That support, especially from above, is very important. That way, you prevent doing something new from breaking down or being punished."*

Another policy officer within the province also states:

> *'It helps a lot if the provincial board has said we are going to do it this way. Suppose you want to do it with the DMJOP (Duurzame Meerjarenonderhoudsplan), it helps a lot if the provincial board has said, we will apply it, the more concrete the better. If the provincial board has said it then you really have to apply it, and that's going to help."*

The province of Utrecht is an organisation that can be structurally affected by political instability, where Provincial Councils are re-elected every four years, which can lead to new coalitions and thus

new policies. Within the province, there are domains such as mobility, procurement and facility management that are little affected by political fluctuations in their core tasks. In addition, there are also many temporary programmes, mostly climate-sustainability or nature-related whose existence cannot be considered by interviewees to be independent from the political coalition currently sitting in the Provincial Council. In the interviews and from observations, there are concerns about both the existence of the Climate Central programme and the continuation of applying carbon pricing within the organisation by provincial staff. This political instability can stand in the way of mainstreaming because it offers uncertainty in the longer term, but it can also be an additional incentive in the shorter term and promote quick implementation.

An example mentioned earlier in Chapter 5 dealt with legislative flexibility within procurement, where applying carbon pricing in procurement law was only seen as tenable in the second instance with a practical example. Another example of an observed obstacle in the process of mainstreaming comes from the question if there would be a follow-up assignment to Klimaatverbond Nederland, related to exploring further application areas of carbon pricing. Within the organisation, the question of whether this assignment could be quasi-tendered mainly encountered the inflexibility of the legislative context, causing the whole of potential mainstreaming to stall for months.

6.2.2 Organisational/institutional factors:

Organisational/institutional barriers and drivers relate not solely to the subject of CO_2-pricing, but the more give insight in the organizational layers of the province of Utrecht. Organizational factors can include fragmentation, lack of coordination and can relate to organizational structures, cultures, routines and practices. Institutional factors more relate to (incompetent) leadership, the lack of political support and public pressure or internal competition (Runhaar et al., 2018).

When asked about the organisational culture, it was mentioned that this is mainly characterised by the struggle with all the major tasks that the province of Utrecht has recently acquired. For instance, a policy officer stated that it is difficult for the provincial organisation to get a grip on the coherence of these tasks, and on clarity about who and what the province is, and what strategy it should adopt in this regard. The new increased focus on climate-related topics that include carbon pricing does not generate the same interest and perspectives throughout the organisation. Interviews with business management, for instance, indicate that many employees are not interested, informed or motivated to work on sustainability and climate because, for instance, functionality comes first. This is related to the internal competition of which domain and topic to prioritize at any given time. Similarly, another provincial employee on climate policy states the following:

> *"Intervening on climate now does not ensure that there will be results tomorrow, whereas tomorrow it will cause immediate whining, so also for a topic like carbon pricing. You then see internally that everyone thinks it should be done, but then hardly anyone likes the consequences."*

Then there is leadership and ownership, where there is a barrier for the province at the moment. Ownership is repeatedly emphasised by interviewees as an important link in putting the CO_2-pricing instrument on the agenda, and thereby mainstreaming it. A procurement employee, for instance, states that the first thing she needs from the provincial organisation when purchasing is some ownership. From this ownership within the provincial organisation as a whole, but precisely also from the ownership within the different domains, carbon pricing can be more easily

mainstreamed. An external expert also emphasises the importance of ownership from practical experience, saying:

> *"You need to know who wants to work on this, who thinks it is important and who can do it. It would therefore help to establish this ownership in the internal assignment cycle, so that there is a client at the front who says he is going to do it. From the political cycle, this could again be the deputy."*

Currently, ownership on the subject of CO_2-pricing lies mainly with one employee, and this is seen as a risk. The role and knowledge of this employee, province wide and in the different possible application areas of CO_2-pricing, is limited. Also, the loss of this ownership would have a negative impact on the progress of the implementation process. Spreading this ownership across the different possible application areas of CO_2-pricing, and getting more civil servants along who want to carry the same message, could become an important driver.

6.2.3 Cognitive factors:

The cognitive and informational barriers and drivers relate to the uncertainty, urgency, complexity and level of knowledge about, in this case, understanding of a CO_2-pricing instrument. The literature suggests that complexity of the topic is an important factor hindering further mainstreaming (Runhaar et al., 2018). The interviews reveal that both the topic of carbon pricing in itself and its application in the province's practice encounter a lot of misunderstanding. For instance, both those directly involved, such as employees of team climate central, and official procurement and operations staff, indicate that they find CO_2-pricing complex. Understanding the subject is extremely important in the mainstreaming phase of 'understanding', where a shared and clear problem definition is the basis for successful implementation.

The report from Klimaatverbond (Rekenen met de toekomst, 2022) has not been read, let alone understood, in its entirety by any of the interviewees. While it did lead to many questions to team Klimaat Centraal, questions that are also indicated to be found in the report. In interviews, the reason given for the intended complexity is that the topic of 'CO_2-pricing' in itself is perceived as far too broad, and thus inaccessible. A surplus of information makes it difficult for civil servants to filter out the information that is most relevant to them. For instance, one of the procurement staff states about the accompanying letter of the decision to apply €875 in the SCBA:

> *"I read the letter and I really had to read it three times. A layman who is not into this or knows nothing about sustainability is really not going to understand this. With those glasses I also read it and thought; 'but how?'."*

Officials from procurement, for instance, but also from business operations, indicate that translating the tool into practice is very important to understand the tool. Thus, it is stressed several times that the complex subject matter can be brought into a framed context, sometimes even down to the personal level. For a buyer, that means explaining what working with carbon pricing means for a buyer in practice. This research has already shown in the reflections of the experiments in chapters 4.5 and 5.5 that approaching civil servants with a practical example of CO_2-pricing helps to (partially) remove cognitive and informational barriers.

The quadrant designed by Klimaatverbond Nederland and illustrated in figure 2.1, according to the external consultants MVOI and Sustainable Procurement, provides a handy and helpful picture of the different application areas of CO_2-pricing. For civil servants, it may be especially valuable to zoom in directly on the part of the quadrant applicable to them, to avoid confusion.

Another cognitive barrier that has often been mentioned in employees perspectives is the uncertainty and urgency of implementing carbon pricing. Several civil servants indicate that, in their opinion, CO_2 is considered too late in a design or decision-making process, making CO_2-pricing an instrument that actually comes into play too late in the process. For instance, both procurement and mobility staff mention that the "*option of doing nothing on projects will ultimately yield the biggest CO_2 gain*".

The question of whether carbon pricing is the ultimate reduction tool is also imposed at various positions in the organisation, and whether other solutions and other instruments should not be looked at more. Investing in CO_2-storage and initiating other innovative ideas are mentioned here as potential reduction options. Because CO_2-pricing is new and much is still unclear, expectations and valuations are adjusted accordingly. One employee says: *'the more concrete it eventually becomes in practice, the higher I value the instrument'*.

The fact that provincial employees are risk-averse is often reflected in interviews, and also in observations such as in meetings, questions are often raised around the risks that carbon pricing poses to the province. The presence of risks is therefore a reason for many officials to adopt a cautious attitude. An external expert also named from his experience that many parties are risk-averse and therefore prefer to opt for certainty with a known and well-organised process, but that this can, for example, significantly thwart an innovation like carbon pricing. This external expert also states that removing risks is often not immediately possible, quoting:

> "Taking on these risks with trial and error is reserved for the pioneers willing to put energy, attention and perhaps a little more money into it."

Ultimately, the difference in perspective directly distracts attention from the need for a pricing instrument, and in doing so, it represents the mixed views around CO_2-reduction.

6.2.4 Resources:

Resources are needed to support the further mainstreaming of carbon pricing within the province. Resources include the necessary financial resources or grants, sufficient staff, information dissemination and access to knowledge and expertise (Runhaar et al., 2018).

First of all, mainstreaming CO_2-pricing requires direct financial resources, which will be credited, for example, to the allocation of working hours, or to an external or internal assignment. In addition, financial choices later in the process where CO_2-pricing will already actually be applied must already be taken into account, on the basis of which the organisation will be able to better estimate future financial consequences in advance. An external expert emphasises that the choice to apply carbon pricing can lead to making more expensive choices, but that this also depends on how you deal with design choices. Questions are raised about this by the expert are:

> *"Will you soon be obliged to choose the sustainable variant or will you have to put the difference in social costs between the most sustainable one and the one people choose into a fund? What happens if people don't choose the most sustainable option, or what if the most sustainable option is much more expensive in percentage terms?"*

Interviews reveal that the pressure of work has been increasing in recent years, partly due to the growing number of tasks being shifted onto the provinces from central government. Implementing a new instrument like carbon pricing has to be done from within the province, at the expense of employees' working hours. Both setting up such an instrument and rolling it out and mainstreaming

it in the organisation, and learning and informing what is involved will take hours. Currently, interviews and observations show that mainly one employee spends his time on carbon pricing. The loss of this person's work time (in fte) spent on implementing carbon pricing will make mainstreaming much more difficult. Thus it is important to find available hours within different domains to roll out carbon pricing.

Within the current labour market, it is very difficult to find enough suitable candidates; on the other hand, it is also stated that the shortage of staff is structural. In an interview with business management, it emerges that a vacancy for sustainability project leader has remained unfilled for more than a year, which has been to the detriment of the implementation of sustainability objectives. A procurement official also thinks it will be necessary to hire more people with the implementation of the approaching CSRI action plan. At the same time, it is hereby said by this employee:

> *"I just don't believe that hiring new people quickly is on the agenda, we are now in the middle of a reorganisation in which we may have to let people go, or be deployed differently."*

Mainstreaming carbon pricing is going to require investment in both staff and information and access to expertise. The driver of resources is thus very much related to the driver of timing, discussed in paragraph 6.2.5.

According to interviewees, the growing focus on sustainability, climate and the nitrogen issue in particular are all topics that have recently moved up the agenda, and ways are currently being sought to address these issues and integrate them into existing policy. Access to knowledge and expertise on the subject of carbon pricing is limited to non-existent in the province itself and is therefore obtained from outside, such as from Klimaatverbond Nederland. For mainstreaming, this lack of in-house expertise is a hindrance, and this also shows in the bogging down of the assignment in the quasi-procurement issue, which brought further research on carbon pricing to a standstill for months. Putting out assignments externally at the expense of knowledge building in one's own organisation created a path dependency in a vicious circle. A provincial employee describes this obstacle as follows:

> 'I find it complicated that we put many things away externally. Sometimes we say too easily that we are going to get knowledge from outside, while we do have our own knowledge as well. Often we put it away because it is not convenient in terms of time, and it will help us to do the research ourselves because then you have more knowledge development in your organisation."

6.2.5 Timing:

Timing is mentioned by literature as waiting and sustaining a momentum for implementation (Runhaar et al., 2018). Mainstreaming can be extra driven by, or been hindered by making or not making use of a window of opportunity.

First, there is momentum around factors within the province of Utrecht itself. Across the province of Utrecht, climate objectives are currently being worked on. Within business operations, for instance, new people are being hired to make ICT, commuting and the DMJOP more sustainable, and there is a new implementation plan for the CO_2-roadmap, which focuses on CO_2-reduction. According to the employee involved, this makes the current momentum an excellent opportunity to apply CO_2-pricing. However, the overall business operations of the provincial organisation still lacks a complete picture of its own CO_2-emissions. Where CO_2-pricing is to be applied internally, insight into CO_2-emissions is needed first. Emissions that are not transparent or defined cannot be clearly priced either. For business operations, it was stated in interviews that this insight into CO_2-emissions is currently incomplete. Only when this information is clear, which is expected to be during this year or next, can a start be made on pricing these CO_2.

The purchasing department is now working on fleshing out the 'climate' theme of the MVOI-actieplan, which will be completed by the end of this year. This MVOI-actieplan is where, according to procurement officials, CO_2-pricing should be introduced, and that makes the next few months a good time to link the CO_2-pricing instrument to the MVOI-toolbox. In addition, there are external factors from outside the province that can influence the timing of mainstreaming, especially affecting the external application of CO_2-pricing. In the procurement domain, for example, CO_2-pricing is externally deployed with parties outside the province. In an interview in procurement, the timing of implementation is mentioned as an important factor to look at, with regard to the situation in the bidders' market. When contracts are plentiful for tendering parties, it may not be worthwhile for these parties to innovate on CO_2-reduction, thus missing the goal of CO_2-pricing. In an interview, the following is said about the current momentum:

> "It does start to tilt now, that there is going to be less work again for tenderers. That would be a good time to introduce it again because tenderers will be looking for more work again."

7. Conclusion, discussion and recommendations.

This chapter begins with the executive conclusion, which answers the main and sub questions of the study. This is followed by a critical reflection of the findings, theory and methodology. This is followed by a discussion leading to suggestions for future research.

7.1 Conclusion

This research was initiated with the aim of contributing to the field of climate change mitigation. Specifically, it explores how a CO_2-pricing instrument can take shape in the provincial organisation, with the possible use of the recently adopted 'social' CO_2-price of €875. This part presents the conclusion of the research, meaning the answer to the research question: *'How can, with the help of two case studies, the transformation process regarding the implementation of an internal carbon price in the province of Utrecht be shaped, and what perspectives, barriers and opportunities arise in this transition?'* To provide an answer to this, a detailed answer to the three sub-questions will be provided first. Based in part on experimentation, these sub-questions will provide more information on the potential applications of carbon pricing in the two practical examples of SCBA and procurement. Sub-question one is answered in the context within the different other sub-questions. We will then zoom out to examine the provincial organisation as a whole for its potential to mainstream carbon pricing.

7.1.2 Sub question two: Making use of two experiments, how can the implementation of a carbon pricing instrument in the SCBA take shape, and what would be the consequences of this implementation?

The newly established prices were initially implemented in the SCBA tool of the Utrecht province in anticipation of the first real SCBA in progress. The implementation of the new prices required addressing various design choices, such as integrating SCC's new pricing methodology with the existing SCBA methodology focused on abatement costs. Additionally, future price trends were agreed upon to interpret the scenarios. A disclaimer will provide information to implementers. Based on the first two experiments, the consequences of the revised prices appear to be limited. Although the price of CO_2 has been made fairer and is also seen as a positive step by those involved in the interviews, the new prices have not yet had a significant impact on decision-making. For the interviewed policymakers, this has been mutually beneficial, as the revised prices provide a more equitable quantification of CO_2-, without necessitating significant policy alterations.

As for the recalculated SCBAs, the new carbon prices seem only to increase rather than decrease the results between alternatives. This is due to the fact that the alternatives are generally already aimed at reducing emissions. This seems to hold true for the Network Perspective Provincial Roads 2040, although there was an initial expectation that the new prices could differentiate between alternatives. The €875 CO_2-pricing potential is therefore unlikely to reveal significant discrepancies. At present, it will minimally affect decision-making and will not result in a different conclusion. This will require further exploration in future SCBAs. For the time being, it is widely accepted that the updated CO_2-price presents a more accurate reflection of reality and is a respectable execution of the recommendations put forth by PBL and CPB to incorporate social costs further into the SCBA. The absence of any apparent risks when using this price is favourable. The implementation of

equitable CO_2-pricing in the SCBA serves as a positive starting point for the potential embedding of CO_2-pricing company-wide.

Furthermore, the implementation of these prices has sparked both internal and external discourse concerning future SCBA. In this regard, the province of Utrecht intends to engage in discussions with other provinces, as well as PBL/CPB, responsible for standard concerns SCBA, regarding the CO_2-prices to be adopted. The revision of new CO_2-prices will not occur until at least 2024, offering opportunities to initiate discussions in the near future. The process has raised climate awareness within the mobility domain, also there are now more frequent and better consultations with for example the Klimaat Centraal team.

What the new pricing has instilled is an objective and committed attitude amongst civil servants. This awareness has the potential to yield positive outcomes within and beyond the province. For instance, the introduction of new awards can encourage people to assess their work critically and explore alternative approaches. The societal impact of this is currently disseminating both within and outside of the province; however, the specific implications of this are yet to become apparent. The use of internal carbon pricing in the SCBA can draw attention to at least one of the externalities being taken into account up to date calculations, specifically the impacts of carbon. Implementation of CO_2-pricing would make the Dutch government the first to allocate CO_2 a more equitable and comprehensive weighting. This move by the province could prompt a revision of the present methodology. In addition, officials suggest that CO_2-pricing may be the initial step in an ongoing process to modernize other components of the SCBA. The methodology of the SCBA is widely considered outdated in several other components and respects.

Main findings:

- The potential for carbon pricing in the SCBA as a carbon reduction instrument seems to be limited, although the new prices are seen as mutually beneficial, as the revised prices provide a more equitable quantification of CO_2-, without significant policy alterations.
- The new pricing methodology can be seen in line with the advice on quantifying broad welfare concepts in the SCBA.
- The actual implementation of carbon pricing in the SCBA has raised awareness and understanding among mobility policy makers.
- The adjustment of CO_2-pricing can be a good first step for future adjustments of other 'outdated' externalities in SCBA.

7.1.3 Sub question three: With the help of an experiment, how can the implementation of a carbon pricing instrument in procurement practices take shape, and what would be the consequences of this implementation?

In the preparation phase of applying a carbon pricing instrument in procurement and tendering processes, a number of choices already have to be made. First, there is the objective one wants to achieve, based on this the choice can be made to include or exclude CO_2- in award criteria, after which a choice is made for the price methodology. One can opt for the efficient cost methodology, where an efficient price will steer market innovation and maximum emission reduction, if properly applied. In addition, one can adopt the SCC, which is set at a CO_2- price of €875, in order to include social costs in the procurement process. The third choice at this stage is that of logarithmic or linear price distribution, with linear turning out to be the best choice for convenience. From the example discussed, many of these uncertainties in the choices also cannot yet be tackled; practice and reality will have to show what the actual effects of applying such an instrument are. Apart from this, several practical steps need to be taken, for instance to define a project's CO_2-reference value. Then, based on this, a contract requirement and a maximum and range of notional rebate should be determined. This roadmap is illustrated for the example used in the experiment.

There is no consensus on the position of the €875 CO_2-price among the procurement officers surveyed. Arguments for and against both pricing methods were given. The €875 price would provide a fair and representative picture of social costs, but it is also likely that this price will not encourage bidders to reduce CO_2. Efficient CO_2-pricing, on the other hand, may provide the necessary market steering, but may also exaggerate the CO_2 burden according to interviewees. There are different views on the consequences of implementation, all of which depend on how the instrument is put into daily practice. However, based on the example given, the assumed consequences are discussed. For example, it is expected that bidders will ask a lot of questions when using carbon pricing, so the province needs to be clear in advance about what is expected and required of bidders. Bidders may react differently depending on the pricing methodology used. With a relatively low notional discount for CO_2-reduction, bidders may not focus on CO_2-reduction because it does not pay off. If the CO_2-price is too high, there is a risk that an unfair and unrelated price will be charged for CO_2.

Presenting a practical example in which carbon pricing was applied ensured that all civil servants involved got a better and more complete picture of the subject matter and its impact in practice. By directly applying the subject of CO_2-pricing to practical examples, barriers and uncertainties can be mitigated or removed at an early stage, so that after this, the focus can immediately be on where the pain points are. Legal doubts from the preparatory phase, about the proportionality and procurement law side of CO_2-pricing, are largely removed in the experiment. It has also been estimated and learned how bidders might react to such an example from the experiment.

Instead, uncertainties do remain and new barriers have been raised as a result of learning about an example. Currently, the province does not have the people, knowledge and resources to develop a carbon pricing tool internally. To support, external expertise can be brought in, budget can be made available from the board or additional people can be hired. There are also fears that the civil service organisation has low motivation, which would make CO_2-pricing difficult to implement in practice. On the other hand, civil servants come with the idea of starting with a library of roadmaps and monitoring projects, from which relevant knowledge, skills and practices can be extracted. Each tender where carbon pricing has been applied can be used to support a larger library of frameworks, guidelines and spreadsheets. Each subsequent tender can then be implemented more easily and carbon pricing can be applied more widely.

The experiment has brought CO_2-pricing within procurement to a preparatory phase, where new choices have also surfaced for the next implementation phase. These include choices about fining or rewarding through the SCC, the development of such an instrument, and the nature and size of an initial project. There is potential for the province when it comes to setting up a carbon pricing instrument in procurement. Pushing through a change in mentality in the province and creating support is cited as the most important basis for this. With its booster role, the province has the opportunity to spur innovation with such an instrument. They can start this solitarily or in partnership, with the latter increasing the chances of success. Applying CO_2 in the award criteria is seen as something that suits this moment with the CSRI and a stagnating labour market. In addition, it fits this time when the province has committed to its own and national CO_2-reduction targets. In conclusion, the instrument as presented fits within the toolbox of procurement and would also be a logical step for future procurement policy and to fulfil the MVOI. Introducing a new instrument like this involves risks and setting up and experimenting requires not only time, money and resources, but above all courage from a provincial organisation.

The experiment involved working transparently and submitting all appendix 2 documents to civil servants. This experiment contributed in many ways to both the research, and the civil servants' own awareness and information. The use of a realistic project makes the use of CO_2- in the award criteria easily imaginable for the respondents. All in all, it can therefore be said that the experiment contributed to the transition process. Assumptions have been removed or adjusted and lessons have been learned. In its place, constructive comments have flowed back, which can be addressed in subsequent phases, especially the implementation phase. Various new perspectives, such as a reward system or penalty system based on the SCC, or take the creation of a library for the purpose of a CO_2-pricing instrument, are valuable contributions that contribute to theory from practice.

Main findings:

- Implementing carbon pricing in procurement requires a relatively high level of knowledge, skills and intrinsic motivation from the staff involved.
- Due to different views and interpretations of carbon pricing options, the province of Utrecht needs to make several design choices based on its objectives and ethical principles.
- In procurement, the experiment has raised the potential for CO_2-pricing, challenged old assumptions among participants and offered new options for the next phase of implementation.
- Envisioning and experimenting with CO_2-pricing within both cases contributed to the overall transition process, having increased knowledge and understanding among participants.

7.1.5 Sub question four: Based upon mainstreaming and transition theories what identified perspectives, barriers and opportunities arise in the process of mainstreaming a carbon pricing instrument in the organization of the province of Utrecht?

CO_2-pricing can find a place within many policy areas, and where certain conditions can be met, mainstreaming of the instrument can be encouraged. This involves conditions seen as perspectives, barriers and opportunities, and these are divided into five different categories.

First, there are political factors that influence the degree of mainstreaming of CO_2-pricing. For the province of Utrecht, this concerns, for instance, the political support from the Provincial Executive, which is seen by many interviewees as an essential factor for successful implementation. If there is no clear mandate from the politicians here, practice has shown that the mainstreaming process can be delayed for months. Experiences in the preparatory phase of CO_2-pricing in SCBAs show that an official decision and the recruitment of an external partner for support led to the necessary speed in the process; from knowledge development on CO_2-pricing to application of the instrument in practice. A process that civil servants also acknowledge would not have happened so quickly if such an instrument had been argued and developed according to the traditional route within the province itself. During the study, the provincial elections added to the fear of a political landslide that would affect the continuation of the assignment around CO_2-pricing.

Secondly, the provincial organisation and its employees currently experience a lot of pressure from a multitude of assignments and responsibilities that suppress the implementation of a new subject. CO_2-pricing also lacks leadership and ownership within the various domains. These organisational obstacles can be tackled by aligning ambitions and goals as an organisation. Mainstreaming CO_2-pricing in Utrecht province requires the entire organisation to move along in this transition. Broadly supported ambitions and motivations of departments, programmes and individuals are important as a first building block. Employees are expected to put themselves in a position to make the new field their own, which will require crossing many cognitive barriers.

Complexity of the subject and lack of understanding of the practical application of CO_2-pricing is perhaps the biggest barrier in this area. By translating the theory of CO_2-pricing into what its use means in practice for an involved employee, a bridge can be built to greater understanding and thus growing motivation and ambition. Through experiments, this research has shown that specifying the subject to one's own daily practice can count on more support and understanding. In practice, it will take time, money and risks for the province of Utrecht to make this translation. Other cognitive identified barriers relate to the urgency and uncertainty of implementation. The discussion on the use of the SCC of €875 and its position in the different domains reflects this complexity, urgency and uncertainty.

Fourth, the availability of sufficient covering funds is important in potentially successfully mainstreaming a CO_2-pricing instrument. While the province has released budget to investigate CO_2-pricing, the available knowledge in the organisation is not yet present. At the moment, the responsibility for the subject mainly lies with one person where hiring new people is probably still on the back burner. For successful mainstreaming, more man hours, finances and expertise will have to be freed up in each domain concerned. Lastly, momentum is considered important here, for the SCBA and for procurement, the good moments from which to mainstream CO_2-pricing seem to present themselves quickly. Elsewhere, such as in internal business operations, the proper insight into the company's own CO_2-emissions is currently lacking, which is necessary to realise an effective use of CO_2-pricing.

The province itself must set an example, i.e. have its own understanding of emissions known. They themselves also have to meet the requirements from which they impose them on other parties. As for CO_2, there are many national and provincial targets with a timeline within which the implementation of CO_2-pricing could have a place. Should such a pricing instrument bring about a relevant decrease in emissions elsewhere in the province, then it may be worthwhile to look into an official decision for other application areas as well. This may be subject to further research. Applying pricing by subtopic creates a learning and change process that can gradually lead to its embedding.

Main findings:

- Lessons can be learned from the (fictional) implementation processes within SCBA and procurement. These relate, for example, to the impact of an official decision, communication and dissemination of knowledge on the issue, learning from experiments and discussions on the social price of CO_2.
- Prospects, barriers and opportunities for integrating carbon pricing into the organisation were identified and structured according to the following five categories: political, organisational, cognitive, resources and momentum.
- Carbon pricing can be applied in different ways and in different policy areas within the organisation, with a good understanding of one's own carbon emissions being essential.
- The use of carbon pricing is only effective if the organisation as a whole is committed to the transition. Broadly supported ambitions, with departments and staff empowered to own this new area.
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7.1.6 Answering the main question: 'How can, with the help of experimenting, the transformation process regarding the implementation of an internal carbon price in the province of Utrecht be shaped in SCBA and procurement practices, and what consequences, perspectives, barriers and opportunities arise in this transition?'

First of all, the transformation process seems to be consisting of three main elements which can be divided into a preparatory phase, an application phase and reflecting and monitoring phase. These phases are in line with the four stages from transition management theory. At the basis is that implementing and internalizing carbon pricing requires a relatively high level of knowledge, skills and intrinsic motivation from the staff involved. Getting staff on one line is even more important in procurement then within mobility because of the close relationship between the practice of carbon pricing and the practice of procurement. Views and interpretations on carbon pricing options differ within the provincial organization. For carbon pricing to be implemented, several design choices have to be made based upon the provinces objectives and ethical principles.

The potential for carbon pricing in the SCBA as a carbon reduction instrument seems to be limited, although the new prices are seen as mutually beneficial, as the revised prices provide a more equitable quantification of CO_2-, without significant policy alterations. The new pricing methodology provides a better interpretation of the CO_2 factor, in line with the advice on quantifying broad welfare in SCBA. The implementation has too raised awareness and understanding among mobility policy makers. The adjustment of CO_2-pricing can be a good first step for future adjustments of other 'outdated' externalities in SCBA. In procurement, the experiment has raised the potential for CO_2-pricing, challenged old assumptions among participants and offered new options for the next phase of implementation.

Envisioning and experimenting with CO_2-pricing within both cases contributed to the overall transition process, having increased knowledge and understanding among participants. Lessons can be learned from the (fictional) implementation processes within SCBA and procurement. These relate, for example, to the impact of an official decision, communication and dissemination of knowledge on the issue, learning from experiments and discussions on the social price of CO_2. Prospects, barriers and opportunities for integrating carbon pricing into the organisation were identified and structured according to the following five categories: political, organisational, cognitive, resources and momentum. Carbon pricing can be applied in different ways and in different policy areas within the organisation, with a good understanding of one's own carbon emissions being essential. The use of carbon pricing is only effective if the organisation as a whole is committed to the transition, with broadly supported ambitions, and with departments and staff empowered to own this new area.

7.2 Discussion

The results of this study illustrate the potential of an instrument such as CO_2-pricing. Such an instrument is only one example of a wide range of concepts in climate change science and practice. In line with the 'polluter pays' principle, a decentralised government such as the Province of Utrecht can choose to use CO_2-pricing as part of a broader strategy to ultimately meet regional, national and international climate targets. The IPCC (2021) mentioned already that single standalone adaptation and mitigation strategies will not protect people from the already inevitable consequences that climate change is bringing. The province of Utrecht is currently investigating which climate protection measures fit into provincial policy. The most logical thing would be to look not just at CO_2-pricing, but at a combination of different measures and instruments, where CO_2-pricing can be part of a larger library. The strategy of simply not implementing projects or purchasing products has too been much discussed in recent months.

Bento & Gianfrate (2020) concluded that the success of the Paris agreements will largely depend on how the true cost of carbon will be internalized. For the province of Utrecht as a first decentralized governmental body, it proved a big step to implement this true costs from theory to practice in the SCBA, although it resulted in a fictious application which will not directly steer at emission reductions. For procurement practices too, internalizing the true costs of carbon as set on 875 euros proved not to be too effective on steering on emission reductions. Thus requiring looking beyond the true costs on carbon in the SCC for a price steering on effective emission reduction potential. Internalizing carbon pricing can be seen as a smaller method linked to a larger approach to combat climate change, since awareness is built in the process and understanding on the true effects of climate change is illustrated by the SCC price (Swart & Raes, 2007).

This study was committed to applying the theory of policy processes around the mainstreaming of climate adaptation (Uittenbroek et al., 2013). Although this theory was also considered applicable to climate mitigation, the choice of replacing climate adaptation with CO_2-pricing was considered too specific to the concept of climate mitigation. This meant that not all parts of the theory were found to be equally applicable to this research, and choices were made, for example, in interpreting the different stages of mainstreaming and the associated mainstreaming drivers and barriers that may or may not make mainstreaming CO_2-pricing successful.

Throughout the study, it was difficult to link the theory derived from the theoretical framework to what could be seen in practice. This was partly due to the researcher's limited knowledge of the subject matter, which ranged from economic theory to theories of public administration, transition

and sustainable procurement. Also, the two different cases that were eventually chosen were not only different in terms of scientific theory, but both proved difficult to analyse and structure in the same way. Finding the right structure, especially to record, took time and was puzzling. In retrospect, either more similar cases could have been studied or a denser structure could have been consulted beforehand. The intention was to use the different phases of the mainstreaming model and the associated barriers and opportunities to structure and analyse the organisation as a whole and the different areas within it. In practice, the different phases turned out to be strongly interrelated, so that a more integrated approach was the solution. Mainstreaming theory was thus abandoned in the case studies specifically and replaced by more general design choices to be made in the transition to the implementation of a CO_2-pricing instrument.

7.3 Contribution to theory

This research has identified ways in which the goal of climate change mitigation through emissions reduction can be achieved, and in this way empirical learning has taken place. It has contributed to transition management theory by shaping and testing specific price implementation experiments as part of an organizational transition. For example, informing and educating employees is a first step. This is a way of learning about climate change, challenging assumptions and raising awareness. This involves taking risks. This is followed by instrumentation, the development of a range of tools. Here, it is important to first implement and run the tool in an experiment in practice, before a 'real project' is carried out.

Due to the research methodology, the identification and assessment of mainstreaming barriers and opportunities is mainly based on perspectives and observations, e.g. from the interviews. This shows that there is no straightforward ranking for categorising mainstreaming barriers and opportunities, but that the categories overlap and intertwine in the process underlying mainstreaming. The factor of workers' support within the category of 'cognitive factors' and the factor of politicians' support within the category of 'political factors' are found to be fundamental to the goal of climate change mitigation through emissions reduction.

As mentioned in the theoretical framework, the theory of mainstreaming has so far mainly focused on climate adaptation, not on climate mitigation. With the research object being the climate mitigation instrument of carbon pricing being possible mainstreamed, this research has contributed to the extension of mainstreaming theory in regards to the field of mainstreaming climate mitigation(-instruments).

7.4 Limitations of the research

This research aimed to contribute to the scientific literature on the implementation, execution and mainstreaming of carbon pricing in provincial practice. In doing so, the study developed new insights both for the scientific base and for policy-making and practical applications for, among others, the Province of Utrecht and the Climate Alliance of the Netherlands. However, the results of this study also have their own limitations that need to be mentioned.

The first limitation concerns the number and selection of civil servants of the Province of Utrecht as interviewees. The employees surveyed are only a part of the total number of civil servants in the province of Utrecht. They were selected on the basis of advice and knowledge of the researchers personal supervisor within the province. All selected respondents did have exactly the right

functions and perspectives within the province, and thereby provide a representative image of the represented policy domains within the provincial organization of Utrecht. For mobility this meant only one civil servant was participating in the interviews and experiment. To fill in on this gap, this one civil servant was too asked to speak for his colleagues in his department. All together this means that the selected interviewees represent only a small group, so there is a possibility of a sample or selection bias. In addition to selection bias, efforts were made to properly filter respondents' data textually, filtering opinions from evidence and argumentation. This is a risk inherent in doing interviews and this is also where the following limitation comes in.

A second limitation relates to the time frame in which this research took place and the ongoing transition process in which the province of Utrecht found itself. Carbon pricing is a complex and wide-ranging issue, and the interviewees have gradually received more information and knowledge on the subject over the past few months. The transition process has also led some interviewees to change their minds and/or opinions on the subject in recent months, which means that some of the statements and quotes in this study are tied to a snapshot in time. These are arguments for more longitudinal case study research in the future.

A last limitation where there is room for improvement is in the addition of more theory, particularly around procurement practices. The procurement case study emerged as the research progressed, so the necessary theoretical underpinning was lacking and the findings were mainly empirical. Theories on sustainable procurement could have been usefull for this reason. The lack of theory in this area of study meant that it was not possible to delve deeper into this policy area to find out what CO_2-price internalisation could achieve and how best to do it.

7.5 Recommendations for science

Recommendations for the scientific literature can build on the limitations of this study just discussed. There are two main lines of interest here, methodology and theory. In terms of methodology, it has been discussed that current research is subject to changes in the transition process. This research is limited by its timeframe. This relates to changes in policy occurring, but more importantly to changes in discourses and opinions in the organisation. A longitudinal study could therefore bring more order and structure to the long-term study of the internalisation of a carbon price. It would need to follow developments in the different case studies as well as developments in the organisation. This could involve a study of several months or even years in order to understand the 'living' processes of transitions in the organisation. Another methodological recommendation is to involve respondents differently. Many more respondents within the province could have been involved in the study through an open survey. In particular, this would have yielded more results in identifying and breaking down the different perspectives, barriers and opportunities that may stand in the way of mainstreaming carbon pricing.

A second key recommendation concerns the scientific literature used. Mainstreaming theory has mainly been used to describe the extent to which climate adaptation or mitigation is mainstreamed into existing processes. The experiments, interviews and observations in this study have provided an exploratory picture of how carbon pricing as an instrument can be mainstreamed in the province of Utrecht and what is needed to achieve this. For example, two case studies examined how these policy areas deal with certain barriers to the internalisation of carbon pricing as a climate change instrument. In this way, not only were the factors that act as barriers assessed during the mainstreaming process, but an inventory was also made of what is needed in advance as a basis for successful mainstreaming. The study contributes to the academic literature on mainstreaming and

its barriers, but further research is needed to investigate the practical effects of mainstreaming. Therefore, a first recommendation is to explore additional research in other sectors or in other countries where carbon pricing is more advanced its implementation process. Lessons can then be learned from these success stories. A second recommendation focuses on linking the different barriers/enablers together to see how these factors (may) interact.

At last, in this study, a lot of research has been done on the perspectives, barriers and opportunities if CO_2-pricing is to be promoted and integrated into the provincial organisation. This has been done so making use the theory of Uittenbroek et al. (2013) and Runhaar et al. (2018). However, the research does not necessarily provide in-depth insights into how or why these barriers arise. Other research disciplines from organisational science or public administration may offer deeper perspectives to clarify organisational or institutional change. It would also be interesting to see how the same barriers and opportunities occur in other examples of organisations. In this way, future studies could reveal certain patterns and distinguish between common and rare factors. These findings could facilitate the further dissemination and implementation of carbon pricing to extend the principles of 'fair carbon pricing' and 'the polluter pays'.

7.6 Recommendations for practice

First of all, it should be stressed that the research, and the experiments in particular, were perceived as positive overall. As mentioned above, the experiments helped to increase knowledge on the subject and to dispel certain assumptions. Stakeholders indicated that the experiments were helpful, particularly in providing a picture of CO_2-pricing and in answering the frequently asked question: "What does the application of carbon pricing mean for us in practice?' Based on this research, it is recommended that the experiments be continued and extended to real projects within provincial policy-making. For the case study of SCBA, the experiments fulfilled certain assumptions. The experiment fits well with the wish expressed by the official to have the CO_2-price calculated in advance in the future, for example by an external consultancy. In the case of procurement, the experiment could be extended by also working with the so-called 'calculation sheet' and involving market parties, even if initially through a market consultation. Another recommendation would be to link the experiments to a 'living process', so that the actions before and after the experiments are also structured within a larger framework. It remains vague what will be required of policy-makers after such an experiment, because the research is actually ahead of the transition process in which the province finds itself. Some pre-planning, perhaps with deadlines and in the form of change management or transition management, could be a welcome addition to get civil servants involved in the process. Another recommendations would be to make a dedicated policy and formulate a strategy for internal and external purposes. One could then work with programmes, trainings, committees and departments where projects are ignited, set-up and further monitored.

For the case study on CO_2-pricing in procurement, a fictitious preparatory phase using an experiment contributed to hopeful results. If there are indeed experiments with the first real projects, it would be interesting to examine these projects with the same lens, in order to compare and test the results with this study. It will also be interesting for the SCBA to observe and investigate how the new CO_2-prices will affect future real projects in the province of Utrecht. The province of Utrecht is ambitioning to lobby its carbon pricing ideals towards other decentralized government bodies. It would be recommended to research these other organizations and set apart these findings against the findings of this research. More research into implementations processes may stimulate mainstreaming among other (governmental) organizations. The interviews, which asked

about the perspectives, barriers and opportunities associated with CO_2-pricing, provided a personal and detailed picture. Future research could, by for instance setting up a survey, provide a more detailed and disaggregated picture of the nature and specificity of these perspectives, barriers and opportunities by surveying a much larger proportion of provincial officials.

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9. Appendices

9.1 Recalculations of SCBA

Doorrekening MKBA N201 Fase 3

Variant 3	**OUDE CO2 WLO**					**NIEUW CO2, 875 euro per ton 2022**			
	W+B oorspronkelijk					**W+B oorspronkelijk**			
			Hoog		**Laag**			**Hoog**	**Laag**
	Klimaat (CO2)	€	1,59	€	0,48	Klimaat (CO2)	€	9,36	€ 11,01
	Totaalsaldo	**€**	**39,14**	**€**	**-15,13**	**Totaalsaldo**	**€**	**46,91**	**€ -4,59**
	Baten/Kosten verhouding		**1,39**		**0,85**	**Baten/Kosten verhouding**		**1,47**	**0,95**
	OUDE CO2 WLO					**NIEUW CO2, 875 euro per ton 2022**			
	Correctie voor reductie van afstand door strekking voor auto					**Correctie voor reductie van afstand door strekking voor au**			
			Hoog		**Laag**			**Hoog**	**Laag**
	Klimaat (CO2)	€	2,39	€	0,72	Klimaat (CO2)	€	14,06	€ 16,57
	Totaalsaldo	**€**	**55,09**	**€**	**-1,24**	**Totaalsaldo**	**€**	**66,77**	**€ 14,61**
	Baten/Kosten verhouding		**1,56**		**0,99**	**Baten/Kosten verhouding**		**1,67**	**1,15**
Variant 5	**OUDE CO2 WLO**					**NIEUW CO2, 875 euro per ton 2022**			
	W+B oorspronkelijk					**W+B oorspronkelijk**			
			Hoog		**Laag**			**Hoog**	**Laag**
	Klimaat (CO2)	€	3,00	€	0,90	Klimaat (CO2)	€	17,66	€ 20,83
	Totaalsaldo	**€**	**-4,44**	**€**	**-37,84**	**Totaalsaldo**	**€**	**10,22**	**€ -17,92**
	Baten/Kosten verhouding		**0,95**		**0,54**	**Baten/Kosten verhouding**		**1,12**	**0,78**
Variant 6	**OUDE CO2 WLO**					**NIEUW CO2, 875 euro per ton 2022**			
	W+B oorspronkelijk					**W+B oorspronkelijk**			
			Hoog		**Laag**			**Hoog**	**Laag**
	Klimaat (CO2)	€	2,61	€	0,78	Klimaat (CO2)	€	15,38	€ 18,14
	Totaalsaldo	**€**	**67,90**	**€**	**11,29**	**Totaalsaldo**	**€**	**80,67**	**€ 28,64**
	Baten/Kosten verhouding		**1,79**		**1,13**	**Baten/Kosten verhouding**		**1,94**	**1,33**

Source: Decisio, 2023

Doorrekening MKBA Netwerkperspectief Provinciale Wegen 2040

Resultaat voor herberekening
WLO-Hoog

WLO HOOG

	Effecten ten opzichte van referentie/ 0 alternatief				
Kenmerk	**Scenario 1 - Leefbaarheid**	**Scenario 2 - Doorstroming**	**Scenario 3 - veiligheid**	**Scenario 4 - gezonde mobiliteit**	Opmerkingen / bespreek punten
Kosten	177	2.809	5.118		
Investeringskosten	65	1.572	2.959		
Beheerkosten/ Life cycle costs	46	1.125	2.120		
Saldo exploitatiekosten/opbrengsten	66	111	40		
Exploitatiekosten	66	-	-		
Exploitatie inkomsten	-	-111	-40		
Directe Effecten	-2.488	2.741	2.382		
Personenauto: reistijdeffecten	-1.956	2.720	1.900		
Vracht: reistijdeffecten	-760	787	537		
Personenauto: accijnzen	-287	810	317		
Saldo ritkosten/accijnzen personenauto					
Personenauto: ritkosten	717	-2.025	-792		
Saldo ritkosten/accijnzen personenauto					
Vracht: accijnzen	18	-14	38		
Vracht: ritkosten	-29	22	-60		
Personenauto: betrouwbaarheid	-134	336	335		
Vracht: betrouwbaarheid	-55	105	117		
Effecten op reistijden OV	-	0.	0.		
Effecten op fietsverkeer	+	0.	0.		
Indirecte effecten	-333	292	306		
15% van reistijdeffecten	-333	292	306		
Externe effecten	-169	-284	49		
Personenauto: CO2-emissies	89	-181	-71		
Vracht: CO2-emissies	17	11	-31		
Personenauto: Luchtkwaliteit	9	-19	9		
Vracht: Luchtkwaliteit	8	-15	-2		
Effect geluidgehinderden	39	-34	-33		
Effect verkeersveiligheid	-321	-46	177		
Wildongelukken (oversteekbaarheid fauna)	+	0/-	0/-		
Andere effecten	-	-	-		
Saldo (Totaal) gemonetariceerde effecten	-2.155	-80	-2.372		
Baten / kosten verhouding	-16,8	1,0	0,6		

Resultaat na herberekening
WLO-Hoog

WLO HOOG

	Effecten ten opzichte van referentie/ 0 alternatief				
Kenmerk	Scenario 1 - Leefbaarheid	Scenario 2 - Doorstroming	Scenario 3 - veiligheid	Scenario 4 - gezonde mobiliteit	Opmerkingen / bespreek punten
Kosten	177	2.809	5.118		
Investeringskosten	65	1.572	2.959		
Beheerkosten/ Life cycle costs	46	1.126	2.120		
Saldo exploitatiekosten/opbrengsten	66	111	40		
Exploitatiekosten	66	-	-		
Exploitatie inkomsten	-	-111	-40		
Directe Effecten	-2.486	2.741	2.392		
Personenauto: reistijdeffecten	-1.956	2.720	1.900		
Vracht: reistijdeffecten	-760	787	537		
Personenauto: accijnzen	-287	810	317		
Saldo ritkosten/accijnzen personenauto					
Personenauto: ritkosten	717	-2.025	-792		
Saldo ritkosten/accijnzen personenauto					
Vracht: accijnzen	18	-14	38		
Vracht: ritkosten	-29	22	-60		
Personenauto: betrouwbaarheid	-134	336	335		
Vracht: betrouwbaarheid	-55	105	117		
Effecten op reistijden OV	-	0.	0.		
Effecten op fietsverkeer	+	0.	0.		
Indirecte effecten	-333	292	305		
15% van reistijdeffecten	-333	292	305		
Externe effecten	276	-930	-367		
Personenauto: CO2-emissies	454	-525	-362		
Vracht: CO2-emissies	87	58	-157		
Personenauto: Luchtkwaliteit	9	-19	9		
Vracht: Luchtkwaliteit	8	-15	-2		
Effect geluidgehinderden	39	-34	-33		
Effect verkeersveiligheid	-321	-46	177		
Wildongelukken (oversteekbaarheid fauna)	+	0/-	0/-		
Andere effecten	-	-	-		
Saldo (Totaal) gemonetariseerde effecten	-2.720	-768	-2.789		
Baten / kosten verhouding	-14,3	0,7	0,6		

(Source: Arcadis, 2023)

9.2 Procurement experiment format

Experiment

Europese aanbesteding het vervangen van de oeverconstructie Merwedekanaal, traject 14

Binnen het provinciale meerjarenprogramma onderhoud (PMO) is een oeververvangingsproject opgenomen dat ligt in de gemeente Vijfheerenlanden. Het betreft de oevers van het Merwedekanaal Traject 14 met een te vervangen lengte van circa 13 Km, die over hun levensduur heen zijn.

Maatschappelijke waarde/beleidsdoelstellingen
Aanbesteder heeft kader stellende inkoopdoelstellingen geformuleerd voor de periode 2022-2025 die gericht zijn op het opleveren van zo veel mogelijk maatschappelijke waarde door het inkoopproces. Het zijn de volgende vijf doelstellingen:

1. We kopen maatschappelijk verantwoord in: duurzaamheid en sociaal verantwoord. Aanbesteder heeft zich gecommitteerd om met ingang van 2015 100% duurzaam in te kopen. Onder duurzaamheid verstaat Aanbesteder: minst belastend voor mens, milieu, klimaat en leefomgeving.
2. We maken optimaal gebruik van de kennis en vernieuwing in de markt.
3. We richten onze inkoopprocessen doelmatig en doeltreffend in.
4. We geven het MKB een eerlijke kans.
5. We zijn een goede opdrachtgever.

Inschrijvingsprijs is gebonden aan een plafondbedrag van: € 14 miljoen

CO_2-beprijzing: twee vormen

Effectieve CO_2-beprijzing:

CO2-beprijzing in de vorm van fictieve CO2-korting Het doel van een fictieve CO2-korting is om in een aanbesteding de CO2-uitstoot mee te nemen als onderscheidend criterium tussen inschrijvers, zodat de aanbieding met de laagste CO2-uitstoot het project gegund krijgt. De CO2-uitstoot in tonnen CO2 wordt omgerekend naar een monetair bedrag – kortom; een fictieve CO2- waarde of 'fictieve CO2-korting' – en wordt van de inschrijvingssom afgetrokken. De inschrijver met de laagste 'evaluatieprijs' (inschrijvingssom – fictieve korting) is de winnaar en krijgt het werk gegund voor de hoogte van de inschrijvingssom. Er wordt dan in de aanbesteding een zogeheten 'fictieve CO2-korting' toegekend per ton CO2. Hierbij wordt veelal gekeken naar de CO2-reductie ten opzichte van een referentie.

Definitief Zodanig kan een partij geselecteerd worden die een project uitvoert met de beste verhouding tussen prijs en CO2-uitstoot. In dit onderzoek staat deze vorm van CO2-beprijzing centraal en richt zich op de effectiviteit. Een effectieve fictieve CO2-korting is die waarde waardoor een duurzamere keuze gemaakt wordt. De prijs is daardoor fluïde omdat energie-intensieve projecten vaker een hogere CO_2-prijs krijgen toegewezen dan energiearmere projecten.

De maatschappelijke kosten van € 875,- als CO_2-beprijzing:

Een tweede methodiek, is gebaseerd op de maatschappelijke kosten van klimaatverandering, verhouden aan de kosten die iedere verdere ton CO_2-uitstoot met zich meebrengt. Het is daarmee gerelateerd aan de kosten die klimaatverandering gaat meebrengen, en is berekend over effecten van bijvoorbeeld zeespiegelstijging, impact op landbouw en andere veelal negatieve effecten op de economie. Deze prijs is op basis van vele wetenschappelijke modellen en het rapport 'rekenen met de toekomst' vastgesteld op € 875,- en overgenomen door de provincie Utrecht in de MKBA. Het grootste verschil met effectieve CO_2-beprijzing is dat deze prijs een vaste waarde kent, en niet afhankelijk is van het project en een daarbij vastgestelde hoge of lage CO_2-prijs. Het is immers niet bedoeld om direct te sturen op de meest CO_2-arme inschrijving, maar heeft als doel slechts de maatschappelijke kosten van klimaatverandering tot uitdrukking te laten komen in een inschrijving.

VOORBEELD 1: Een effectieve CO_2 prijs van 8000

Gunningscriterium Duurzaamheid: efficiënte CO_2-prijs

5.4.2 G.2. Duurzaamheid: CO2 reductie

Inschrijver dient een berekening, volgens het model Rekenblad, in te dienen van de hoeveelheid CO2 reductie.

Het beoordelingsteam bestaat uit vertegenwoordigers van het projectteam. Het gunningscriterium G.2. Duurzaamheid zal worden beoordeeld door tenminste 3 personen. Iedere beoordelaar zal individueel beoordelen en een motivatie opstellen waarin wordt aangegeven of de door inschrijver aangegeven hoeveelheid CO2 reductie ten opzicht van de referentie realistisch is.
Nadat ze hiermee klaar zijn worden de beoordelingen met de beoordelaars besproken en geoordeeld of de onderbouwing voldoende is.

De hoeveelheid CO2 reductie vertegenwoordigt een fictieve korting die in mindering wordt gebracht op de inschrijfsom, waardoor een fictieve inschrijfsom ontstaat.

Indien inschrijver een model Rekenblad indient waarbij wordt aangegeven dat de hoeveelheid CO2 reductie ten opzicht van de referentie minder dan 300 ton bedraagt en de beoordeling wijst uit dat het realistisch is, blijft de maximale meerwaarde € 4.000.000,00.

EMVI criterium	Maximale te behalen monetaire meerwaarde in Euro
G.1. Risicobeheersing: 4 OG-risico's	€ 4.000.000,00
G.2. Duurzaamheid: CO2 reductie	€ 4.000.000,00

5.4.2.1 Fictieve korting G.2. Duurzaamheid

De fictieve korting voor gunningscriterium G.2. Duurzaamheid is gerelateerd de hoeveelheid uitstoot CO2. De korting is als volgt:

Een CO2 uitstoot lager dan 800 ton geeft een fictieve korting van € 8.000,- per ton tot een maximum van 4 miljoen euro. Dit houdt in bij een verlaging van de uitstoot naar 300 ton of minder zal de maximale korting zijn bereikt.

De korting zal lineair worden uitgerekend. Hieronder ziet u een uitwerking:

Hoeveelheid CO2 uitstoot (in Ton CO2)	Fictieve korting op de inschrijvingssom	
800 of meer	EURO 0,=	geen meerwaarde
300 of minder	EURO 4 miljoen	maximale meerwaarde
500 (Voorbeeld Inschrijving)	EURO 2,4 miljoen	voorbeeld inschrijving

5.4.3 Fictieve inschrijvingsprijs

Prijs;

P.1. Inschrijvingsprijs € .....

Kwaliteit;

G.1. Risicobeheersing: 4 OG-risico's fictieve korting € ..... -/-

G.2. Duurzaamheid: CO2 reductie fictieve korting € ..... -/-

Fictieve inschrijvingsprijs € .....

De inschrijver met de laagste fictieve inschrijvingsprijs zal worden gegund.

Voorbeeld 2: Een maatschappelijke CO_2 prijs van 875
(Naar het eerdere besluit van de PU)

5.4.2 G.2. Duurzaamheid: CO2 reductie

Inschrijver dient een berekening, volgens het model Rekenblad, in te dienen van de hoeveelheid CO2 reductie.

Het beoordelingsteam bestaat uit vertegenwoordigers van het projectteam. Het gunningscriterium G.2. Duurzaamheid zal worden beoordeeld door tenminste 3 personen. Iedere beoordelaar zal individueel beoordelen en een motivatie opstellen waarin wordt aangegeven of de door inschrijver aangegeven hoeveelheid CO2 reductie ten opzicht van de referentie realistisch is.
Nadat ze hiermee klaar zijn worden de beoordelingen met de beoordelaars besproken en geoordeeld of de onderbouwing voldoende is.

De hoeveelheid CO2 reductie vertegenwoordigt een fictieve korting die in mindering wordt gebracht op de inschrijfsom, waardoor een fictieve inschrijfsom ontstaat.

Indien inschrijver een model Rekenblad indient waarbij wordt aangegeven dat de hoeveelheid CO2 reductie ten opzicht van de referentie minder dan 300 ton bedraagt en de beoordeling wijs uit dat het realistisch is, blijft de maximale meerwaarde € 437.500,-.

EMVI criterium	**Maximale te behalen monetaire meerwaarde in euro**
G.1. Risicobeheersing: 4 OG-risico's	€ 4.000.000,-.
G.2. Duurzaamheid: CO2 reductie	€ 437.500,-.

5.4.2.1 Fictieve korting G.2. Duurzaamheid

De fictieve korting voor gunningscriterium G.2. Duurzaamheid is gerelateerd aan de hoeveelheid uitstoot CO2.
De korting is als volgt:

Een CO2 uitstoot lager dan 800 ton geeft een fictieve korting van € 875,- per ton tot een maximum van € 437.500,-. Dit houdt in bij een verlaging van de uitstoot naar 300 ton of minder zal de maximale korting zijn bereikt.

De korting zal lineair worden uitgerekend. Hieronder ziet u een uitwerking:

Hoeveelheid CO2 uitstoot (in Ton CO2)	Fictieve korting op de inschrijvingssom	
800 of meer	EURO 0,=	Geen meerwaarde
300 of minder	EURO 437.500,=	Maximale meerwaarde
500 (Voorbeeld inschrijving)	EURO 262.000,=	Voorbeeld inschrijving

5.4.3 Fictieve inschrijvingsprijs

Prijs;

P.1.	Inschrijvingsprijs		€ .....
Kwaliteit;			
G.1.	Risicobeheersing: 4 OG-risico's	fictieve korting	€ ..... -/-
G.2.	Duurzaamheid: CO2 reductie	fictieve korting	€ ..... -/-

		Fictieve inschrijvingsprijs	€ .....

De inschrijver met de laagste fictieve inschrijvingsprijs zal worden gegund.

Vragenlijst:

Voorbeeld 1: 8000

Op basis van marktconsultaties en onderzoek blijkt dat een CO_2 reductie tussen de 800 en 300 ton als realistisch wordt geacht. Met het gelijktrekken van de gunningscriteria valt ook voor CO_2 een maximale fictieve korting van 4 miljoen te halen. Omgerekend is dat 8000 euro per ton CO_2 reductie als fictieve korting.

- Wat is je eerste reactie bij dit voorbeeld?

- Kun je je voorstellen welke reactie inschrijvers zouden kunnen geven op het uitvragen en uitdragen van dit gunningscriterium?

- Hoe zouden inschrijvers vervolgens kunnen inspelen op deze gunningscriteria?

- Welke mogelijke scenario's zou je kunnen omschrijven in de vorm van daadwerkelijke inschrijvingen?

Kijkend naar de eerder beschreven maatschappelijke waarden en beleidsdoelstellingen:
- Vind je CO_2-beprijzing in dit voorbeeld passen bij de beschreven waarden en doelstellingen?

- Hoe kansrijk acht je dat deze vorm van beprijzing gaat zijn?

Voorbeeld 2: 875

Met een fictieve korting van 875 per Ton CO_2 reductie, zouden de maatschappelijke kosten van CO_2 een plek kunnen krijgen in gunningscriteria. De prijs is hiermee stuurt hiermee niet direct op duurzame keuzes en zal wellicht geen verschil maken, maar het is wel de eerlijke prijs waar intern mee gerekend kan worden.

- Wat is je eerste reactie bij dit voorbeeld? – ook in relatie tot het voorgaande voorbeeld?

- Kun je je voorstellen welke reactie inschrijvers zouden kunnen geven op het uitvragen en uitdragen van dit gunningscriterium?

- Hoe zouden inschrijvers vervolgens kunnen inspelen op deze gunningscriteria?

- Welke mogelijke scenario's zou je kunnen omschrijven in de vorm van daadwerkelijke inschrijvingen

- Hoe zou volgens jou deze vorm van beprijzing de uitkomst van een inschrijfproces kunnen beïnvloeden?

Nu je beide CO_2 prijzen met achterliggende methodiek en gedachte hebt ervaren, welke prijs vindt je het best passen om te rekenen voor CO_2 in gunningscriteria?
- Vind je het belangrijk dat de duurzaamste optie wordt gegund?
- Of vind je het belangrijk dat er met een eerlijke prijs wordt gerekend die de maatschappelijke kosten vertegenwoordigt?

Kijkend naar de eerder beschreven maatschappelijke waarden en beleidsdoelstellingen:
- Vind je CO_2-beprijzing in dit voorbeeld passen bij de beschreven waarden en doelstellingen?

- Hoe kansrijk acht je dat deze vorm van beprijzing gaat zijn?

Kijkend vanuit jouw rol als:

Jurist:
Kun je mij vertellen welke vragen dit voorbeeld allemaal bij je oproept?

Op welke manier zal jouw functie te maken krijgen met het toepassen van CO_2 als gunningscriterium? – Wat betekent het in de praktijk voor jou?

Op welke punten zullen deze voorbeelden raken aan het aanbestedingsrecht?

Op welke manier zal eenzelfde voorbeeld stand houden binnen dit aanbestedingsrecht?

Wat zou jij van de provincie nodig hebben om CO_2 in gunningscriteria toe te passen?

- Het je zelf andere ideeën over hoe CO_2 in gunningscriteria kan worden meegenomen?

Centraal contractmanager:

Kun je mij vertellen welke vragen dit voorbeeld allemaal bij je oproept?

Op welke manier zal jouw functie te maken krijgen met het toepassen van CO_2 als gunningscriterium? – Wat betekent het in de praktijk voor jou?

Wat zou jij van de provincie nodig hebben om CO_2 in gunningscriteria toe te passen?

- Het je zelf andere ideeën over hoe CO_2 in gunningscriteria kan worden meegenomen?

Senior inkoper:

Kun je mij vertellen welke vragen dit voorbeeld allemaal bij je oproept?

Op welke manier zal jouw functie te maken krijgen met het toepassen van CO_2 als gunningscriterium? – Wat betekent het in de praktijk voor jou?

Wat zou jij van de provincie nodig hebben om CO_2 in gunningscriteria toe te passen?

- Het je zelf andere ideeën over hoe CO_2 in gunningscriteria kan worden meegenomen?

Waar elders in het inkoopproces acht je het meenemen van CO_2 relevant of interessant?

Scenario 1:

Met bovenstaande voorbeelden in het achterhoofd, kun je een recente inkoop/aanbesteding bedenken waar mogelijk ook CO_2 meegenomen zou kunnen worden in het inkoopproces/gunningscriterium?

Welke casus zou dit dan zijn?

Waarom denk je aan dit voorbeeld?

Hoe zou CO_2 hierbinnen een rol kunnen krijgen?

Hoe kansrijk acht je deze vorm van CO_2-beprijzing in dit scenario?

9.3 List of interviewees

9.3.1 External experts

NR	NAME	ORGANISATION	FUNCTION	DATE(S)
1.	Sibren Vegter	Decisio	Senior Advisor	09-05-2023
2.	Hans Bloemendaal	PIANOo	Advisor Sustainable Procurement and Tendering	17-05-2023
1.	**CHANTAL SCHRIJVERS**	**TAUW**	**ADVISOR MVOI**	**26-04-2023 22-05-2023**

9.3.2 Provincial Employees

NR	NAME	TEAM/DOMAIN	FUNCTION	DATE(S)
2.	Rick Umboh	Business operations/ Hard services	Facilities coordinator	05-05-2023
3.	Derk Dohle	Mobility	Mobility and waterways commissioner	10-05-2023
4.	Saskia Kemperman	Team Klimaat Centraal	Program manager	18-04-2023
5.	Alexander Heusschen	Team Klimaat Centraal	Strategic policy advisor climate (mitigation)	20-04-2023
6.	Merel Tilstra	Business operations / Team Klimaat Centraal	Policy officer climate	16-05-2023
7.	Rick van Wilgen	Business operations	Central contract manager	15-05-2023 28-06-2023

8.	Arno van Brakel	Business operations	Senior purchasing officer	15-05-2023 27-06-2023
9.	Sharon Takens	Business operations	Procurement legal expert	15-05-2023 27-06-2023
10.	Stephanie de Koning-Gillissen	Business operations	Director MVOI	30-05-2023

NOTE: THIS TABLE WAS CREATED BY THE AUTHOR OF THIS RESEARCH

9.4 Organogram of Provincie Utrecht