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VALUE MAINTENANCE OR VALUE CREATION?

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Firms' response to the CO_2-performance ladder

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Abstract:

Firms need to implement major changes to reduce their CO_2 footprint. One method to incentivise them, is with the CO_2-Performance Ladder. The CO_2-Performance Ladder is a voluntary instrument indirectly empowered by financial benefits in tenders. To get a certificate on the CO_2-Performance Ladder, firms need to comply with requirements, of which requirements 4D and 5D demand companies to take initiative in reducing CO_2 emissions in their sector. The SKAO has little insight in how firms respond to these requirements, and what kind of initiatives are taken. However, the SKAO does suspect that some firms comply with minimal effort, and that some firms go beyond requirements. Furthermore, in literature little is known about how firms respond to unique policy such as the CO2PL. To provide insight in this knowledge gap, we pose the following research question: how do firms respond to meet the requirements 4D and 5D of the CO_2-Performance Ladder in the Netherlands?

To research this, we used and extended the framework of Wesseling et al. (2015) on firm response to public innovation policy. Furthermore, sixteen semi structured interviews were conducted and we were able to categorize all companies in the framework. However, we had to extend the framework to fully comprehend all empirical findings. We argue that firms use a combination of compliance and influence strategies, in which we discern between value maintaining or value creating activities. From the comparative case study, we found that in line with theory most firms use either a combination of value maintaining strategies; non-innovation combined with defensive influence strategies and start an initiative for legislation or relabel a client order, or use a combination of value creating strategies; incremental or radical innovation strategies combined with a proactive influence strategy and are intrinsically motivated or start an initiative for the business model. However, we found some firms do not follow what theory suggest.

From the findings, we suggest that other policymakers take lessons from the CO2PL. Especially the wide interpretation of CO_2 reducing innovations seems to be a fruitful concept of the CO2PL.

Abbreviations:
CO2PL: CO_2-Performance Ladder (CO_2-prestatie ladder
CB: certifying body (Certificerende instelling)
TC: technical committee (Technische commissie)
CCvD: Central College of Experts (Centraal College van Deskundigen)
SKAO: Foundation for Climate Friendly Procurement and Business (Stichting klimaatvriendelijk aanbesteden en ondernemen).

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1. Introduction

Climate change is commonly accepted as a big societal problem. This was recently backed by 195 countries signing the Paris agreement, in which they agreed to reduce CO_2 emissions to not exceed 2.0 degrees of global warming. One of the key inducers of climate change is CO_2 emissions, from which a large part is emitted by companies (Smale et al. 2006).

To decrease the amount of CO_2 emissions, governments often deploy public policy. According to Borrás & Edquist (2013), there are three categories of public policy: regulatory instruments, soft instruments, and economic and financial instruments. Regulatory instruments are based on setting regulations, and non-compliance can result in consequences, such as fines (Borras & Edquist, 2013). An example of regulatory instruments is the zero-emission vehicle (ZEV) mandate of California (Wesseling et al. 2015). This mandate forced companies to innovate and produce zero emission vehicles. Furthermore, an economic and financial instrument is based on incentivising firms. An example of such an instrument is a R&D subsidy. Firms can apply for certain R&D subsidies for investing in potential innovations they want to further develop. Soft instruments are for example environmental liability, eco-audits, voluntary commitments, and eco-labels (Rennings, 2000). These instruments allow firms to use their environmental performance for marketing purposes. Firms that comply with soft instruments, are often pioneers, whereas non-innovative companies are hardly engaged by these types of measures. An example of a soft instrument is the CO_2 Performance Ladder (CO2PL). The CO2PL is a voluntary instrument that stimulates companies to reduce their CO_2 emissions. The CO2PL distinguishes five different levels where each level consists of a set of requirements focusing on four different aspects: insight, reduction, transparency, and participation. The voluntary instrument is empowered by fictitious discounts in tenders. When firms climb higher on the ladder, the fictitious discount in tenders increases. The CO2PL will be further explained in the case description.

In the CO2PL, requirements 4D and 5D, require firms to start initiatives to develop measures that reduce CO_2 emissions in the sector. 4D states: "The company takes initiative in development projects that facilitate the sector in reducing CO_2 emissions". 5D states: "The company actively takes part in setting up a sector wide CO_2-emission reduction programme in collaboration with government and/or a NGO" (SKAO, 2015). This means that the initiatives should not only lead to reducing CO_2 in their own company, but in the whole sector. These requirements have been in place since the start of the CO2PL, however, little is known about the results of these requirements. The independent foundation for climate friendly procurement and business (SKAO), the organization responsible for the CO2PL, has little knowledge about how firms respond to the requirements 4D and 5D. The SKAO does however, have a strong feeling that some firms are complying with the requirements with minimal effort by, for example, reframing current products as CO_2 reducing innovation. The SKAO is interested to see if this presumption is true but would also like to know how these firms are able to meet the requirements and what their motivations are to comply with minimal effort. Furthermore, the SKAO is interested in the activities and the process of firms who go beyond requirements. These firms are putting a lot of effort and resources into meeting the requirements and go beyond the requirements, but do not get extra benefits over other firms. The SKAO would like to be able to reward these firms, but currently has no insight in who those firms are, how they operate and why they go beyond requirements. To provide insights into questions about these two types of response, the following research question is developed:

How do firms respond to comply with the requirements 4D and 5D of the CO2PL in the Netherlands and why?

1.1. Societal relevance

Global climate change is a huge societal problem and reducing CO_2 emissions is crucial to solving it. The CO2PL has, according to Rietbergen & Blok (2013), a great potential to reduce CO_2 emissions in the Netherlands. They find that companies participating in the CO2PL reduce CO_2 emissions at a rate that is twice as high as the national average. Although this 3.2% per year reduction is twice as high as other sectors (Rietbergen & Blok 2017), there still is potential to reduce more. This research will help

understand firms' response to requirements of the CO2PL. Furthermore, it will shed light on the practices of firms complying with minimal effort, and firms that go beyond requirements. With a better understanding of their responses, requirements can be shaped to increase the effort of firms that comply with minimal effort, but also to better be able to reward the firms that go beyond requirements. This will ultimately lead to a higher effectiveness of the CO2PL, i.e. increase the annual average CO_2 reduction rate.

1.2. Theoretical relevance

A lot of previous research on how firms respond to regulatory policies has been performed (Ambec et al. 2013; Horbach, 2012; Kemp, 2000; Jaffe & Palmer 1997; Gray & Deily, 1996; Ettredge et al. 2011). Some scholars for example researched technology forcing public policy and firm response through innovation and influence strategies (Wesseling et al. 2015) furthermore, some scholars researched compliance behaviour of companies and regulation success (Swift, 2000). Moreover, research on economic and financial instruments is also not new (Brown et al. 2007; Hall, 1993; Hall & Van Reenen, 2000; Feldman, & Kelley, 2006; Jordan et al. 1998) scholars have researched for example how firms respond to financial incentives to reduce pollution (Wang and Wheeler, 2005) and what method of policy worked best (Moledina et al. 2003). Furthermore, soft instruments have been researched before as well (Segerson, & Miceli, 1998; Delmas, & Terlaak, 2001; Delmas, & Montes-Sancho, 2010; Khanna, & Damon, 1999). For example, some scholars research what type of voluntary agreements were deployed before (Lyon and Maxwell, 1999) or how successful voluntary agreements are (Price, 2005). However, to our knowledge little research has been performed on how firms respond to soft instruments and voluntary agreements. With this research, we provide insight in how firms comply with a voluntary agreement and thereby add to the literature of firm response to voluntary agreements.

This case study is particularly fruitful because the CO2PL is a unique policy instrument. Most soft instruments are only based on voluntary participation. The CO2PL is also based on voluntary participation, however, the instrument is empowered by indirect financial benefits. Firms can get fictitious discounts in public tenders and subsequently can win a tender without being the "cheapest". This empowerment makes the CO2PL unique as a soft instrument. By researching how firms respond to this unique instrument, we are able to give insight how firms respond to such an instrument, and we add to the literature about firms' response to soft instruments.

One of the key contributions to the existing literature comes from the setup of the requirements in the CO2PL. The instrument leaves a wide interpretation of CO_2 reductions; wider than technological innovation. The CO2PL relies on the creativity and expertise of the companies to achieve CO_2 emission reductions beyond merely technological innovations. Previous research focussed on R&D and technological innovation in innovation policy to reduce CO_2 emissions (Wesseling et al. 2015, Swift, 2000, Schot & Geels 2008). By researching compliance other than merely technological innovation, we provide insight in how firms may comply in other ways than technological innovation. By doing so, we add to the literature about firm compliance to innovation policy.

Furthermore, the drivers of firms to develop environmentally friendly innovations is a relatively new literature focus, some authors already looked at the drivers for eco-innovations (Kesidou, & Demirel, 2012; Marin, 2014; Wilts et al. 2014). These all investigated the what the most important drivers were for firms to develop eco-innovations. However, none of these scholars looked at how these were linked to compliance strategies. We therefore add to the literature of firm response to voluntary agreements by linking the motivation for the innovations with compliance and influence strategies.

1.3. Setup of the thesis

In this report, first the case of the CO2PL is described in more detail. Here, we discuss the overall setup of the CO2PL and how it was developed. Followed by the theoretical concepts applicable for this research are described in section 3. In section 4 the methodology is discussed. After this, the results are discussed and analysed. Then a conclusion is presented, followed by a discussion of the research and lastly, in the appendices, the questionnaire and firm categorization can be found.

2. Case description

In 2009 ProRail, a semi-governmental agency responsible for the railway infrastructure in the Netherlands, introduced a new green public procurement scheme, the CO2PL (ProRail, 2009), in close collaboration with the market. With the CO2PL, ProRail aimed to encourage companies to focus on increasing the climate-friendly and energy-efficient performance in their supply chain. The CO2PL is a staged certification scheme and CO_2 management system which incentivises firms to manage their energy and CO_2 emissions. It is based on the Capability Maturity Model (CMM). The CMM distinguishes maturity levels that "indicate the capability of an organization to perform important processes to deliver a certain product or process" (Paulk, 1993). Companies are incentivised to increase their efforts to reduce CO_2 emissions because they can profit from having a CO2PL certificate. Firms are rewarded fictitious discounts in a tender if they have a certificate for the CO2PL. The higher a company is on the CO2PL the higher their fictitious discount can be in a tender. This can become as high as 10% fictitious discount.

The CO2PL was received enthusiastically by a large amount of companies. Quickly the number of participants rose and the sectors that were adopting the CO2PL diversified. Furthermore, Rijkswaterstaat, a governmental agency responsible for all infrastructure other than railway in the Netherlands, also wanted to use the scheme. Therefore, ProRail decided to establish the SKAO as independent organization that owns and manages the CO2PL.

As shown in figure 1, the CO2PL is divided into five levels. In these five levels four angles are provided on which firms must focus to improve its CO_2 management. These angles are: (A) acquiring insight in their own CO_2 emissions, (B) setting goals towards reductions of CO_2 emissions, (C) showing transparency in planned reduction measures and obtained knowledge, and (D) participating in and starting new initiatives aimed at reducing CO_2 emissions. To climb one step on the ladder, improvements on all four categories are necessary. What these improvements are and on what aspects, is all described in the handbook provided by the SKAO. To get a certain certificate for the CO2PL, companies are audited by a certifying body. A company decides for itself which level it thinks it is on. They must provide evidence that they are eligible for this certificate. If they do not comply with regulations, the auditor can give them a period to improve, or just deny the certificate. A company can only get the certificate level they set out to get. So, they do not automatically get a certificate for a lower level if they do not comply with the level they set out to get.

One key aspect of the CO2PL is that it is based on continuous improvement. This means that companies will be audited each year and they must each year improve their emission reduction. To do so, companies set a reduction goal in percentages for each year rather than one amount for one year. To make sure companies do meet requirements each year, a yearly audit is performed by an auditing company.

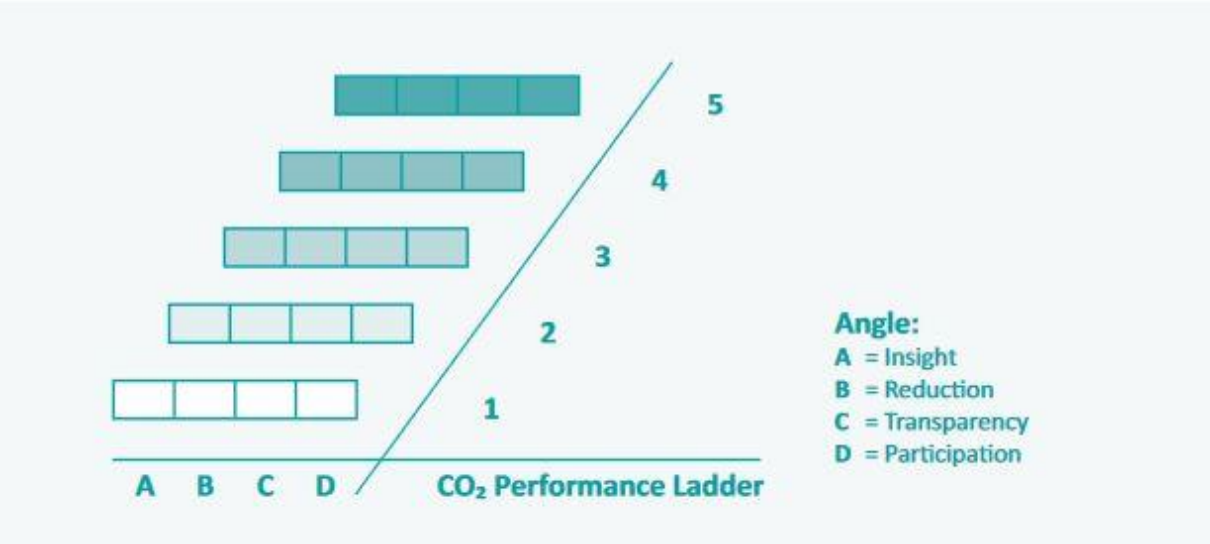

Figure 1: CO_2 Performance Ladder scheme (SKAO, 2015)

The handbook is a document that explains all the different requirements for each level. These handbooks have been in place since the start of the CO2PL but have been revised several times. The most recent handbook is version 3.0, and among other changes, introduces 'The measure list'. The measure list is a list of CO_2 reducing measures divided in three ambition levels, A, B, and C.

- If a measure is listed as category A, it means that the measure is 'standard' because more than 50% of the companies have implemented this measure.
- If a measure is listed as category B, it means that the measure can be described as 'progressive'. Only 20-50% of the companies have implemented the measure.
- If a measure is listed as category C, it means that the measure is very ambitious. The measure is only implemented by a few companies, so only a maximum of 20% of the companies have implemented it.

Requirements 4D and 5D focus on initiatives to reduce CO_2 emissions in a company and in the sector overall. The requirements state: 4D: "The company takes initiative in development projects that facilitate the sector in reducing CO_2 emissions". 5D: "The company actively takes part in setting up a sector wide CO_2-emission reduction programme in collaboration with government and/or a NGO" (SKAO, 2015). These requirements focus on getting firms to take initiative in developing CO_2 emission reducing measures. Preliminary desk research showed that this can be an innovation, however, some firms have taken initiatives that may lead to innovation in the future, but are no innovation themselves. Furthermore, the SKAO suspects that the quality of these initiatives differs. They suspect that some firms just comply with regulations, where other firms go beyond requirements in compliance. However, the SKAO does not have an idea about how firms shape their compliance and what kind of initiatives come out of this compliance. This research will provide insight in how companies comply with the CO2PL, and if adjustments to requirements need to be made to prevent compliance with minimal effort.

3. Theoretical framework

3.1. How firms respond to policy

The article of Oliver and Holzinger (2008) is particularly suitable to answer the research question. It explains what activities firms undertake in response to policy and what the nature of these activities is. The authors argue that firms generally undertake either value maintaining or value creating activities. Oliver and Holzinger (2008 p.4) define value creation as "the invention or reconfiguration of firm assets or competencies that constitute an original or unique addition to firm rents" and they define value maintenance as "the preservation of those firm assets and competencies that constitute the foundation of firm rents". So, firms are either focussed on increasing profits with new practices or maintaining profits with current practices. Firms do this by deploying a timed sequence of activities; i.e. they use specific strategies (Wesseling et al. 2015).

Previous research into how firms respond to sustainable innovation policies shows that firms often respond with a combination of strategies (Prakash, 2002; Oliver and Holzinger, 2008; Wesseling et al. 2015; Schuler et al, 2002). The framework of Wesseling et al. (2015), argues that companies deploy a combination of innovative and influence strategies. Building on their work, we argue that firms will respond to the CO2PL requirements with innovative activities, and at the same time, also engage in influence activities. Furthermore, minimal compliance in the CO2PL is not necessarily innovation; the requirements leave a broad interpretation of CO_2 reducing initiatives, which may lead companies to comply through other ways than innovation.

Moreover, Schuler et al. (2002) argue that if public policy is in place, companies will be actively influencing this policy to get a competitive advantage. Furthermore, in voluntary agreements such as the CO2PL it is also important to influence regulations (Lyon & Maxwell, 1999). This makes the literature on influencing public policy suitable for this research. Building on the work of Schuler et al (2002) and Wesseling et al (2015), we argue that firms deploy a combination of strategies in response to the CO2PL. Therefore, in the following three paragraphs, first the compliance strategies firms choose will be discussed, then the influence strategies firms deploy, and lastly the motivation to do so is discussed.

3.2. Compliance strategies

In the original framework, Wesseling et al (2015) discern between laggards and early movers as compliance strategy. Their case study researched several companies, who are active in the same market with the same product, and therefore they were able to determine the time to market of each company. In our case, firms are active in very different markets and have very different initiatives. Therefore, we will not be able to gather fruitful information about their time to market. We therefore categorize compliance strategies based on the newness of innovation; we discern between incremental and radical innovation. However, also some firms respond without innovating; compliance through non-innovation. These categories will be explained in the following paragraphs.

3.2.1. Non-innovation

Previous research on firms' compliance to innovation policy showed that firms relabel their current activities to comply. Some innovation policies attempt to incentivise firms to perform R&D activities through tax reliefs on R&D expenditures (Mohnen, & Lokshin, 2009). Often, this results in firms relabelling certain activities and expenditures as being necessary for R&D (Hall & van Reenen, 2010; Becker, 2015; Nguyen & van Reenen, 2016). We conceptualize this as non-innovation. The SKAO suspects firms to comply with the CO2PL through relabelling current practices. They want to know if it is possible for firms to present normal practices as being CO_2 emission reducing practices. With this, we add to the framework of Wesseling et al (2015); this framework was intended for innovation policy in where non-innovation was no option. Because the CO2PL leaves room for a wider interpretation of the requirements, we expect that some firms relabel current practices as being CO_2 emissions reducing practices.

3.2.2. Incremental innovation

Dewar & Dutton (1986), define incremental innovations as: simple adjustments or minor improvements in current technology; i.e. improving the current routines. Previous research finds that some firms comply with innovation policy by incrementally changing current practices, they make minor adjustments to, or improve, current activities (Foxon & Pearson). Furthermore, incremental innovations are usually extensions to current product offerings or minor extensions to existing processes (McDermot & O'Connor 2002). For the CO2PL, we expect that companies develop innovations that reduce CO_2 by improving products or processes they used or supplied, i.e. in their value chain. These initiatives are categorized as incremental innovation.

3.2.3. Radical innovation

Dewar & Dutton (1986) argue that radical innovations are: "fundamental changes that represent revolutionary changes in technology. They represent clear departures from existing practice". Previous research finds that firms develop new businesses and product lines based on breakthrough innovations (McDermott & O'Connor, 2002). Usually these types of innovations consist of the development and application of significantly new technologies or ideas. Furthermore, radical innovations can reshape the competitive landscape and result in new market opportunities (Zhou & Li, 2012). Previous research also finds that some firms comply with innovation policy through radical innovations (Tödtling, & Trippl, 2005). Therefore, we expect that firms may develop radical innovations to comply with the CO2PL.

3.3. Influence strategies

Hillman and Hitt (1999) begin their article by addressing that, since public policy can significantly affect the competitive environment of a firm, firms perform activities to influence the public policy decision. Furthermore, they find that the decisions policymakers make, can alter the size of markets by increasing or decreasing the market barriers. They argue that these changes can have a significant effect on the competitive position of a company. Therefore, it is of big importance for companies to influence political decisions and by doing so, strengthen their competitive advantage.

Weidenbaum (1980) argues that there are three main business responses to public policy: passive reaction, positive anticipation and policy shaping. The first two responses are reactive, with these responses firms put no direct effort into influencing the policy. The public policy shaping response is a proactive strategy where firms try to influence the policy making process. This response strategy is also the topic of Hillman and Hitt (1999), they have created a decision tree that shows the different decisions a company faces to build their political strategy.

In a more recent study, Oliver and Holzinger (2008) categorize 4 influence strategies: reactive strategies, anticipatory strategies, defensive strategies, and proactive strategies. Reactive and anticipatory strategies are influence strategies that are based on reacting to the changing policy environment. These strategies are similar to the reactive strategies proposed by Weidenbaum (1980). Firms that have a reactive strategy will not attempt to influence the policymaking process, but will react to the outcome of the policy. Nicolle (2004) showed that Barclays developed information technology to gather information to better comply with regulations, which resulted in an increased efficiency of the bank.

An anticipatory strategy, like the reactive strategy, does not involve influencing the policy making process, however, these firms gather information about changing policies, to prepare for coming changes. Or as how Oliver and Holzinger (2008 p.22) put it: these firms "combine and reconfigure internal and external resources to enhance external scanning and timely knowledge acquisition". For example, Toshiba gained first-mover advantages by utilizing early designs in acid-free and renewable batteries because they anticipated regulatory changes (Shrivastava, 1995).

In this research, we argue that when companies' response is reactive or anticipatory, they 'just' comply with the CO2PL. They are not active in trying to change requirements to gain competitive advantage, therefore these will be left out of the study. Furthermore, as Hillman and Hitt (1999) argue, if regulation becomes a big influence on day-to-day business, the passive political strategies will not be sufficient. The regulations of the CO2PL have significant effects on the day-to-day practices, therefore, in this research, we will discard these two strategies.

In contrast, a company with a defensive strategy does actively influence the policy making process. The company attempts to fend off any unwanted regulations to strengthen its competitive advantage. A clear example of a successful defensive strategy is the lobby of the tobacco industry over the past 50 years. Several big companies where able to fend off and delay regulation about smoking for years (Chaloupka et al. 2002). Brownell & Warner (2009) argue that these companies tried to obscure the fact that their products where dangerous and deadly. They were focussed on securing the least restrictive regulatory environment possible. Following the work of Wesseling et al. (2015) we argue that there are two types of defensive influence strategies: oppose and slow down. Firms perform activities to slow down or even totally oppose the instrument.

Similar, proactive influence strategies also actively influence the policy making process. However, different to the defensive strategies, with proactive strategies firms go beyond regulations to positively influence public image and gain a better competitive advantage. Also, because the firm itself is already able to comply, it can create significant costs for rivals in the same sector. Following the work of Wesseling et al. (2015) we argue that there are two types of proactive strategies: shape and support. Shaping strategies focus on adjusting the requirements so that it fits better to the company. Supporting strategies focus on promoting the instrument. Wesseling et al (2015) for example show that Nissan was a big supporter of the ZEV mandate. Nissan already produced an electric zero emission vehicle, and therefore already complied with regulations. Subsequently, Nissan was active to increase regulations, to thereby increase compliance costs of their rivals.

3.4. Motivation

Previous research show that drivers for eco-innovations can be categorized in three main categories: supply side drivers, demand side drivers, and regulation and policy drivers (Doran & Ryan, 2012). The authors argue that technological and organizational capability can be seen as supply side drivers. Furthermore, an example of demand side drivers is consumer demand for environmentally friendly products. Lastly, an example of regulation and policy drivers is public innovation policy or self-regulation with voluntary agreements. Ahmed & Kamruzzaman (2010) follow the delineation of three categories in their research to the main drivers for eco-innovations. They find four drivers to be the most important: economic factor, image, competition, and legislation. The economic factor describes that firms innovate because they think that they can reap financial benefits from it. Furthermore, some firms innovate because they feel that this will improve their corporate image. Also, some firms innovate to gain a competitive advantage over competitors. Lastly, some firms innovate because they are forced by legislation.

We argue that the initiatives the companies must start for the CO2PL can also be seen as eco-innovations, because new products, processes, or ideas will be developed to reduce CO_2 emissions in the sector. Therefore, we follow Ahmed & Kamruzzaman (2010) and expect that the main drivers for the initiatives in the CO2PL will be economic factor, image, competition, and legislation.

3.5. Conceptual framework

The different strategies and the motivations are combined into a conceptual framework of how firms respond to the CO2PL. Table 1 depicts the compliance strategy, the influence strategy and the motivation. The upper row shows the different compliance strategies, the middle row depicts the different influence strategies, and the third row presents the motivations of the firms. As addressed before, we expect firms to deploy a combination of different strategies in response to public policy. The columns depict the nature of the activities companies perform, either value maintaining or value creating. We argue that, different from the framework of Wesseling et al. (2015), value maintenance is in the CO2PL much more focussed on non-innovation than on incremental innovation strategies. The definition of value maintenance also supports this; value maintenance focusses on preservation of firm assets and competencies. When complying without innovation, firms do not have to change anything about their business, i.e. perform value maintaining activities, with an incremental innovation strategy, firms still innovate and incrementally change their products or processes. Furthermore, building on the work of Wesseling et al (2015), we expect these firms to use a defensive influence strategy. The authors show that with defensive influence strategies companies try to postpone or discard policies that force them to differentiate from the status quo. Moreover, we argue that the motivation for these

types of firms will be from legislation. They are forced by the CO2PL to take action in CO_2 reducing initiatives.

Moreover, we expect firms that are performing value creating activities to deploy either incremental or radical innovation strategies. This is in line with the definition of value creation of Oliver and Holzinger (2008) previously described. Firms invent or reconfigure firm assets or competencies. Furthermore, following the work of Wesseling et al. (2015), we argue that proactive influence strategies are part of value creation because the firm tries to shape public policy in such a way that it is beneficial to the firm. Also, we argue that these firms are motivated because of the economic factor, i.e. they believe they can yield financial benefits from the innovation. Furthermore, we argue that firms believe that they can gain a competitive advantage through the innovation.

However, it is possible, that firms deploy different combinations than what we expect. So, firms can deploy non-innovation strategies combined with proactive influence strategies and be motivated by regulation and vice versa. How firms combine these strategies to comply with the requirements of the CO2PL will be explored in the analysis part.

	Value maintenance		Value creation	
Compliance strategy	Non-innovation		Incremental innovation	Radical innovation
Influence strategy	Defensive strategy		Proactive strategy	
	Oppose	Slowdown	Shape	Support
Motivation	Legislation		Economic factor, competition or image	

Table 1: Conceptual framework

4. Methodology

4.1. Research design

The nature of our research is deductive; we used theoretical insights from existing scientific literature to derive the independent variables and their relations that we assess within this research (Bryman, 2015). The purpose of our research was to empirically explain how firms respond to the requirements of the CO2PL. For this purpose, a qualitative approach was most appropriate, since it allowed us to find a combination of different activities and the relations between these activities. Furthermore, it allowed us to find the motivations of firms to take initiative in the projects they perform. Since we intended to investigate how multiple companies respond to the case- specific issue of the CO2PL, we employed a multiple-case study design (Bryman, 2015). We employed this research design because it explicitly takes the contextual differences of each case (company) into account (Yin, 2013). As mentioned above, we set out to understand how firms respond, therefore the unit of analysis for our study was the firm.

4.2. Data collection

Data was collected through interviews with companies participating in the CO2PL. The interviews were conducted based on a semi-structured interview schedule (Bryman, 2015). We chose semi-structured interviews for two reasons. Firstly, the flexibility allowed us to react upon certain answers given by the interviewee (Perkins et al, 2004), this enabled us to ask follow-up questions and change the order of the questions when necessary (Bryman, 2015). Secondly, at the same time, the schedule provided structure to ensure the theoretical concepts could be measured. Therefore, a semi-structured interview schedule was most suited. To conform with our semi-structured approach, our interview guide (appendix A) followed a general schedule that involves all relevant theoretical concepts to answer our research question, but was flexible enough to change the order or ask additional questions for further elaboration by posing questions such as "why?" after each question (Bryman, 2015).

To find the most fruitful information from a company and its innovation we used the key-informant approach (Morgan & Hunt 1994). This means that we conducted the interview with the most knowledgeable people regarding the strategies and activities of the firm regarding the CO2PL. Therefore, the unit of observation was the project manager of the CO2PL. These employees had the most in-depth knowledge about the projects and were able the give the most valuable information. Interviews were held face-to-face to ensure that also non-verbal communication can be interpreted by the interviewer.

The interview guide used, can be found in Appendix A. The interview guide starts with several factsheet and general questions, to get the interviewee used to talking and the form of answering questions (Bryman, 2015). After this, some general questions about the CO2PL were asked. This will give a first insight to the attitude of the company towards the CO2PL. Subsequently, detailed questions about the initiative for the CO2PL were asked. Lastly, we asked about the influence strategies of the company, with questions about what they desire to change about the requirements and if they have acted to accomplish this.

4.3. Sample strategy

The companies were selected based on three criteria, firstly: their level on the CO_2 performance ladder; only companies with level 4 or 5 were selected. This research looked at the innovations companies introduce to comply with the requirements of the CO2PL. The requirements that state that firms need to introduce innovations are 4D and 5D. Companies that have a certification for level three or lower, do not have to comply with requirements 4D and 5D. Therefore, companies with level three or lower will not be able give insight about these requirements. Secondly, the handbook has been revised several times, with the introduction of handbook 3.0 also the measure list was included. The measure list is, as explained in the case description, a list of known CO_2 reducing measures. The researched requirements state that a new CO_2 reducing measure for the measure list must be implemented within 3 years. This adds to the complexity of complying with the requirements. Also, the requirements were altered slightly, therefore, interviewing companies based on older handbooks

would have given outdated information and would have biased the data. Therefore, we only focused on companies that have a certification based on handbook 3.0. Thirdly, the size of the company according to the CO2PL handbook; only firms who are categorized by the CO2PL handbook as 'big' were selected. The categorization of small and medium sized firms is based on the CO_2 emissions of a company. The CO2PL knows exemptions for small and medium sized firms (SMEs) with regards to requirements 4D and 5D. The SKAO has stated that the requirements expect projects that will be too complex for SME's to realise. These requirements are for that reason not applied to SMEs. Therefore, SMEs were excluded from this research. From the database of the SKAO, the following companies were selected based on the previous mentioned criteria, see table 2.

Sector	Number of companies
Engineering	4
ICT	4
Infrastructure	8
Marine contracting	5
Waste	4
Installation/ energy producer	2

Table 2: Interview sample gathered from the SKAO database.

Table 2 shows sectors of the different firms included in the population. What can be seen from this list, is that there was not one dominant sector. There was a good cross cut of several different sectors. These were all very different sectors and this allowed for a better generalizability of this study. Which will be further explained in section 4.6.

We have contacted all the companies in the population. Due to time restrictions and non-response, we have interviewed sixteen companies of the twenty-seven companies initially approached. Due to anonymity reasons, we do not disclose which companies exactly were interviewed. However, table 3 shows an overview of the sector of each of the companies, which are numbered:

Company number	Sector	Level
1	Engineering	5
2	Waste	4
3	Infrastructure	5
4	ICT	5
5	Infrastructure	5
6	Installation/ energy producer	5
7	Engineering	5
8	Infrastructure	5
9	ICT	4
10	Marine contracting	5
11	ICT	5
12	ICT	4
13	Waste	4
14	Engineering	5
15	Infrastructure	5
16	Marine contracting	5

Table 3: Interviewed companies

This overview shows that most firms are certified on level 5 of the CO2PL and that most firms are in the infrastructure sector. However, it also shows that there is a somewhat equal distribution over the different sectors.

4.4. Operationalization

Table 4 summarises the operationalisation of the main variables. The indicators of the innovation strategy concept were derived from the theory of Dewar & Dutton (1986). The indicators of the influence strategy concept are derived from the theory of Oliver and Holzinger (2008) and Hillman and Hitt (1999). Furthermore, the indicators for the motivations were derived from González-Benito & González-Benito (2006). The measurement consists of open questions which are based on the indicators. The following paragraphs explain the link between the selected indicators and the different dimensions from the theory.

For the innovation strategies, we propose one indicator; the newness of innovation. The indicator is derived from the research of Dewar & Dutton (1986). They argue that firms are either with small improvements to their current products or processes, or with significant differentiates from current practices.

The indicator for the influence strategy is based on the work of Oliver and Holzinger (2008). They argue that firms that use defensive strategies undertake activities to oppose public policy that threatens the status quo, whereas firms that use proactive strategies undertake activities to shape public policy in ways beneficial to the firm. An indicator for the influence strategy is therefore the company's activities, this is either shaping or opposing public policy.

For the motivation, we propose one indicator: the attitude towards the CO2PL. This is based on the work of González-Benito & González-Benito (2006), they argue that firms are either environmentally reactive or environmentally proactive. Therefore, the indicator used is the motivation to start the initiatives the companies perform for the CO2PL.

Concept	Indicator	Measurement
Compliance strategy	Newness of innovation	Question 3h, 3i
Influence strategy	Activities	Question 4a, 4b, 4c, 4d combination
Motivation	Motivation for initiative	Question 3b, 3c, 3f

Table 4: Operationalization table

4.5. Data analysis

Since our data is qualitative, we choose a qualitative content analysis method (Berg et al., 2004; Flick, 2009) to analyse the collected data. Every interview we conducted, was first transcribed and subsequently coded in NVivo. The coding was divided in three rounds; the first round of coding entailed open coding. The interview was screened for recurring phenomena and these were broken down in concepts. Second, axial coding was used to categorize the found concepts. Third, selective coding was used to further delineate the categories and link them to the theoretical concepts (Flick, 2009). This process was repeated for each of the companies separately.

4.6. Research quality indicators

According to Bryman (2012, p. 390), there are four research quality indicators for qualitative research. Several measures are undertaken in order to increase these.

4.6.1. Internal reliability

Reliability refers to the repeatability of the experiment by other researchers. To maximize the internal reliability, we can provide the transcripts of each of the interviews. This allows other researchers to perform the same experiment. To improve the willingness to participate of interviewees we have anonymised all transcripts.

4.6.2. Internal validity

The internal validity refers to the extent to which a causal conclusion based on a study is warranted. To increase the internal validity, we check for inter-coder reliability (Krippendorff, 2004). We have done this by letting two other researchers who were not involved in this research check our coding scheme. We found a score of 0,755 which shows that the two other researchers interpreted the data similarly. According to Krippendorff (2004), this is an acceptable score, however, motivation for the low score is advised. We found that the lower inter-coder reliability mostly comes from the interpretation of institutional innovation. The new concept proved to be hard to understand and further clarification was necessary to fully grasp the nature of the concept. However, still there were some differences in coding the data which led to the lower score.

4.6.3. External reliability

The external reliability of this research is, due to the qualitative nature of this study, rather limited. Especially the coding and data analysis of the open questions is subjective. To remedy this problem, all interviews have been fully transcribed anonymously and shared on request, this increased the replicability of our study. Furthermore, the general interview guideline is provided and our underlying theoretical reasoning, methods of data collection, and the data analysis are clearly explained above.

4.6.4. External validity

This research focused only on the response strategy of firms participating in the CO2PL. Therefore, the generalizability of this study is rather limited. However, due to the small number of firms eligible for this research, about half of the firms within the population were interviewed. Companies that are considering certification on the CO2PL in the future, must get certified based on handbook 3.0. So, for firms participating in the CO2PL now and in the future, this research will be generalizable.

5. Results

In coding the interviews and labelling the company initiatives, we found that a lot of information is lost by maintaining the previously developed model. Through iterative labelling of the data we found that the value maintaining initiatives are not only relabelling of current practices, we also found that, companies engage in initiatives that we labelled as 'think tanks'. These think tanks are collaborations between different companies in where they discuss and come up with plans on how a sector could emit less CO_2. However, we did also found firms that relabel their current practices to comply with the requirements of the CO2PL. Companies present normal business as being a CO_2 reducing initiative.

For the value creating strategies, we also found differences in how companies comply with the CO2PL. Firstly, we found that as expected, firms comply through technological innovations. However, we also found that some firms comply with initiatives that require institutional change. Furthermore, we found that these innovations differ in newness, some companies incrementally improved their current products or processes, and some companies developed radically new innovations. This is in line with what we expected from the theory.

From the gathered data, we found two of the four motivations suggested by theory; legislation and economic factor. However, we found for the CO2PL that the economic factor can be split in two categories: client order and business model. We did not find any firms that were motivated by competition or image to start an initiative.

5.1. Non-innovation compliance

As described in the case description, not only innovations are accepted as initiatives to reduce CO_2 in the supply chain or sector. We have found two types of initiatives that are focused on compliance but are no innovations themselves. We argue that these initiatives can be categorized as think tanks and relabelling current routines. With these initiatives, companies show that they work on CO_2 reduction without achieving this. They present the intention of value creation without differentiating from the status quo. Therefore, we argue that these strategies are value maintaining.

First, we found think tanks as initiatives to comply with the CO2PL. In these think tanks companies come together to talk and make plans about how they can come to a sustainable future. The result of these think tanks are agreements and plans to reduce CO_2 emissions in the future, and often these results can lead to CO_2 reducing innovations, however the think tanks do not produce innovations themselves. Therefore, we categorize these as not being innovation.

Second, some firms have relabelled current routines or normal business as an initiative for the CO2PL. More specifically, some firms have relabelled client orders to also include a CO_2 emissions reduction. However, these client orders were not focussed on reducing CO_2 but the reduction was a side benefit. The company relabelled the client order to include CO_2 emission reduction. These client orders themselves might be innovations, however these innovations are not focussed on CO_2 emissions reductions, therefore we categorize these as not being innovation.

5.2. Innovation compliance

Some companies innovate to comply with requirements. We have divided these innovations in two categories: technological innovations and institutional innovations. Furthermore, we found that the delineation based on the newness of innovation can be found in the initiatives of the CO2PL. We found that some firms improve current activities and some companies differentiated from current activities or radically changed a product, process, or idea therefore we made the distinction in radical and incremental innovation.

5.2.1. Technological innovation

Several companies have taken initiative in developing technological innovations that reduce CO_2 emissions. For this category, we follow Garcia & Calantone (2002, p112) who used the OECD description of a technological innovation: "technological innovations comprise new products and processes and significant technological changes of products and processes". We also found that we can categorize some initiatives as incremental innovations and some as radical innovations.

5.2.2. Institutional innovation

Some companies have developed initiatives that require institutional innovation. Many scholars researched institutional change or institutional entrepreneurship, i.e. how institutions change over time, and how actors can influence this. However, few scholars define institutional innovation, therefore we combined the definition of innovation and the definition of institutions. The definition of innovation of Thompson (1965 p.36), "the generation, acceptance and implementation of new ideas, processes, products or services", is particularly suitable because institutional innovation is not aimed at a process, product, or service, and the notion that innovation can also entail a 'new idea' makes it possible to develop a definition for institutional innovation. Furthermore, Raiser (1997) labels institutions as 'rules of the game' meaning the way people interact with each other.

We have combined these two definitions into the following definition of institutional innovation: "the generation, acceptance, and implementation of an idea that results in a change of the rules of the game."

5.3. Influence strategy

In labelling the data we found that the influence strategies; oppose, slowdown, shape and support, from the work of Wesseling et al. (2015) were sufficient to categorize the different influence strategies performed. However, we argued in the theoretical framework that no-influence strategies were unlikely to happen. From the data, we found that two companies deployed no-influence strategies. Therefore, we argue that this type of strategy should be considered, and we have added this to the new model.

5.4. Motivation

In coding and labelling the data, we found that the delineation of firm motivations for the initiatives they start, was not completely sufficient. We found that indeed some firms start initiatives because of the CO2PL. Furthermore, firms start initiatives because of the economic factor, however, we found that we can delineate this category further in client order and business model. As mentioned above some firms relabelled a client order as an initiative for the CO2PL. Furthermore, some firms take initiative because they believe that they can reap the benefits in the long term. We argue that the motivation to start this initiative is financial. However, we argue that the nature of this financial benefit is inherently different. Therefore, we argue that the client order is based on value maintenance, and the business model is based on value creation. Moreover, we found a type of motivation that was not previously described in the literature. We found that some firms are intrinsically motivated for the initiatives they perform. We found that most firms who are intrinsically motivated, also take initiative in value creating initiatives. Therefore, we have categorized intrinsically motivation as value creation. Contrary to what literature suggest, we did not find any firms with image or competition as motivation for starting an initiative. Therefore, we have left these out of the new framework.

6. Analysis

6.1. Innovation strategies

In appendix B, the initiatives that firms take in order to comply with 4D and 5D requirements of the CO2PL are described and categorized. We have placed these initiatives in a new framework, see figure 2. We have found four think tank initiatives, of which one is started for the CO2PL (legislation) and three are started from intrinsic motivation. Furthermore, we found two companies that relabelled a customer order to comply with requirements. We have found a lot of companies that comply with technological innovations; we have found thirteen initiatives that can be categorized as technological innovations. From this thirteen, three can be categorized as radical innovations and ten as incremental innovations. In the category institutional innovation, we have found seven initiatives, of which one is a radical institutional innovation and six are incremental innovations.

Compliance strategy	Non-innovation		Technological innovation		Institutional innovation	
	Think tank	Relabelling current routines	Incremental innovation	Radical innovation	Incremental innovation	Radical innovation
Motivation						
Client order		12: Health platform (4d) 13: E-Workspot School (4d)				
Legislation	15: Sustainable supplier (4d)		6: Air treatment filters (4d) 9: Asphalt transport kilometres (4d) 3: Asphalt mixture (1) (5d)		1: Carpooling platform (4d)	
Intrinsically motivated	8: Concrete agreement (5d) 13: U15 (4d) 4: Travelling different (5d)		9: Asphalt mixture (2) (5d) 7: Database supply chain analysis 5: Reuse old roof felt (4d) 8: Concrete mixture (4d) 7: Electric fleet 6: Sustainable advisory team (5d)	15: Bio composite material (5d)	3: The new use of machinery (4d)	
Business model			11: Washing of ash (5d) 4: Smart Grid (4d)	14: Pellets from coffee (4d) 14: Upcycling plastic (5d)	10: Levelling energy demand (4d) 2: Carbon capture (4d) 1: Sustainable square (5d)	16: New approach coastal protection (5d)

Figure 2: A redesigned framework in which the initiatives provided by the companies are plotted. The x-axis shows the method of meeting the requirements and the y-axis shows the motivation for why an initiative was started.

Figure 2 shows the innovation strategies the companies deploy with their motivation to do so. In this overview, not one category is clearly dominant. The initiatives are divided over most categories. The first thing worth to mention, is that some companies have initiatives that are categorized as think tanks, but at the same time have initiatives that are categorized as innovation. Companies 4, 8, and 15 all have an initiative in the think tank category, but also have an initiative in the category of innovation. Of which the initiative of company 15 is categorized as radical. We argue that having an initiative that can be categorized as think tank, does not decrease the value of their initiative categorized as innovation. Therefore, in following models these think tank initiatives will discarded.

All, but one, initiatives started for legislation, started from other requirements of the CO2PL. This is either the supply chain analysis or the footprint analysis. One could argue that these analyses are a good starting point for the initiatives. Moreover, two companies are categorized as relabelling current routines. They both relabelled a client order to comply with regulations. Furthermore, figure 2 shows that a lot of companies are intrinsically motivated about the initiatives they do. However, it must be noted that several companies addressed that despite being intrinsically motivated, they also had a business case for their initiative.

To conclude, we can see that some companies use value maintaining initiatives and some companies use value creating initiatives to comply with the requirements of the CO2PL. This is in line with what theory prescribes.

6.2. Influence strategy

We have categorized the influence strategies of the companies. We have found two companies that deploy an opposing strategy, three companies that try to slow down the CO2PL, two who had no influence strategy, nine that were shaping the requirements of the CO2PL, and none who supported the CO2PL. This gives the following table:

	Value maintenance			Value creation	
Influence strategies	**Opposition**	**Slowdown**	**No influence**	**Shape**	**Support**
Company	11 16	12 13 14	2 5	1 3 4 6 7 8 9 10 15	

Table 5: influence strategies of the companies. Each number represent a company.

Several important issues must be noted from table 5: first, two companies deploy an opposing strategy. These are both marine contracting companies. They have, in collaboration with their branch organization, Rijkswaterstaat and the SKAO, commissioned a research into the effectiveness of the CO2PL for marine contracting companies. The companies believed that their scope 1 emissions are that dominant, that focussing on scope 3 emissions would lead to no significant emission reductions (Rietbergen, 2017-2). According to one interviewee, "the intention of the research was to show that there is no significant benefit of levels 4 and 5 for marine contractors, and that there is no reason to certify themselves beyond level 3 because they have no scope 3 emissions". The research of Rietbergen (2017-2) showed that the marine contractors also had a large amount of scope 3 emissions, lager than scope 1 and 2 combined. According to company 11, this is exactly the opposite of what the companies and their branch organization were trying to prove. This is a clear example of an opposing influence strategy.

Second, some firms use a slowdown influence strategy. One clear way of how they do this, is by asking questions about issues in the requirements with regards to their own company. When a CB (certifying body) is not able to make a clear decision about the question, the CB will discuss this in a meeting with the TC (technical commission). The technical commission meets once every two to three months and consists of representatives of the CBs. In this meeting, they discuss complex requirement issues, and harmonise how to handle such an issue in the future. So, this means that when a company lays down a complex issue it can take months before this issue is resolved, and the CO2PL is slowed down.

Third, two firms have argued that they have never shared their opinion or issues with people of the CO2PL. They just comply with requirements. We expected this not to occur, because the CO2PL is set up as a management system, and has considerable impact on the day-to-day business. According to Hillman & Hit (1999), this means that firms will be actively influencing regulations.

Fourth, the largest part of companies is categorized as having a shaping influence strategy. Several companies' branch organizations have a representative in the CCvD (Central College of Experts). This group is responsible for the operational management of the CO2PL. They are primarily responsible for keeping the CO2PL up to date. In other words, they decide what the requirements look like. One interviewee said, "I'm part of the CCvD, and we for example set up a workgroup to see how we could recreate distinctiveness in the CO2PL". This is a clear example of how companies deploy shaping strategies.

Fifth, it is also important to notice that there are no companies that support the requirements without any reservations or changes they want to make. Several firms do argue that the CO2PL is a good instrument to start working on structural CO_2 reductions, which indicates a support influence strategy. However, they often also have tried to influence the SKAO in changing requirements for the better. Therefore, we argue that there are no companies with a pure support influence strategy.

To conclude, in line with theory we have found companies that use opposing, slowing down, and shaping influence strategies. However, unlike what theory prescribes, we have found companies that have no influence strategy. Furthermore, we did not find any company that deploys a supporting influence strategy.

6.3. Innovation vs influence strategies

Now that the innovations and the influence strategies are known for each company, we can visualize the combination of the two strategies. To visualize these strategies, we opt that the newly developed model in figure 2 is too complex. This would give a skewed view of the innovation strategies versus the influence strategies. Therefore, we use the model developed in the first framework to plot the influence strategies. Below, the new framework is included (figure 3). We have added the 'no influence' to the influence strategies row.

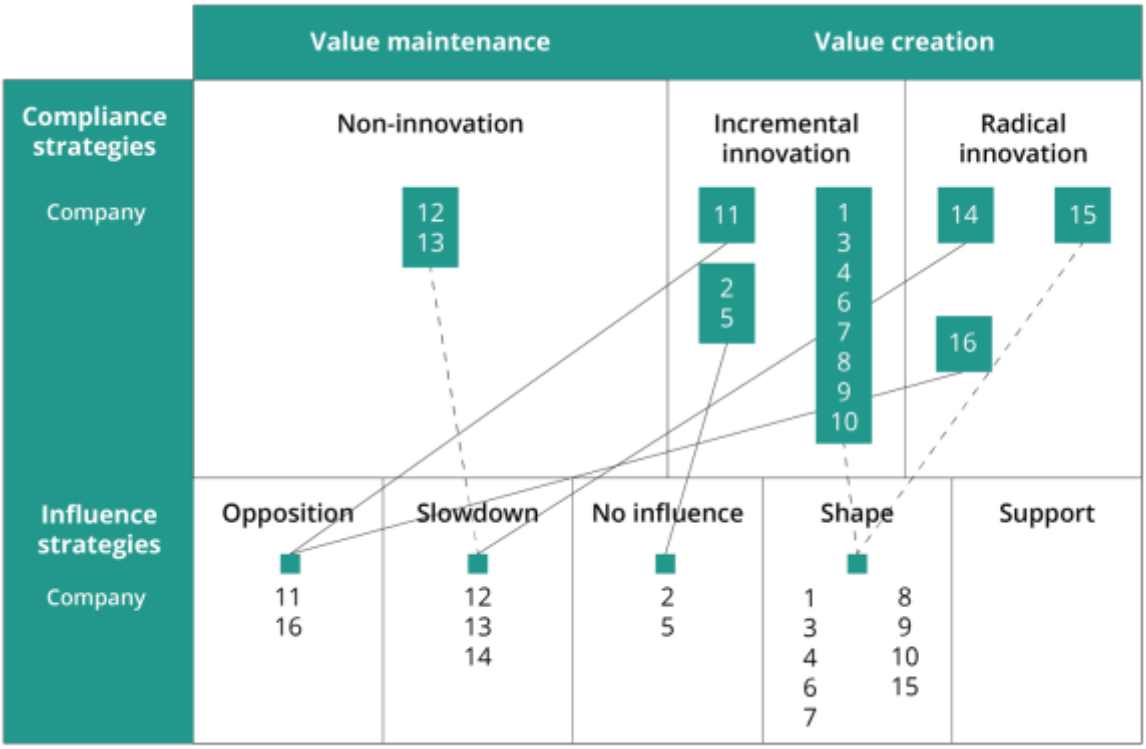

Figure 3: Company plot of their innovation strategy versus their influence strategy. Each number represent a specific company.

In figure 3, the first row shows the differentiation between value maintenance and value creation. The third row shows the different innovation strategies the companies deploy. The innovation strategy category is simplified by arguing that initiatives that are categorized as compliance are all value maintenance initiatives. Furthermore, initiatives that are categorized as innovation are combined into two categories of value creation. We have kept the differentiation between incremental and radical because this provide fruitful insight. The third and fourth rows show the different influence strategies deployed by the companies. These are the same as in table 5.

In the paragraph 6.1, we argued that some firms comply to requirements with think tanks and innovations, but that the think tank initiatives do not decrease the value of the innovations, therefore we have left out the think tank initiatives of companies 4, 8, and 15 in this model.

What the figure clearly shows, is the complexity of combinations of innovation and influence strategies companies use to comply with the requirements. Firstly, the two companies that use a value

maintaining innovation strategy both use a slowdown influence strategy. Another noteworthiness is that both these firms relabelled a client order as an initiative for the CO2PL. It is in line with expectation that these firms used a value maintaining innovation strategy combined with a value maintaining defensive influence strategy. Furthermore, most companies that use value creating innovation strategies, incremental or radical innovation, also use proactive influence strategies. This combination was also expected from previous research.

However, some companies use value creating innovation strategies and at the same time use defensive influence strategies. As shown in figure 3, the companies 11, 16, and 14 developed an incremental or radical innovation, and tried to oppose or slowdown the CO2PL. This combination is contrary to what theory suggest.

To conclude, most firms respond with a combination of strategies that is in line with what theory prescribes. However, three firms deploy a value creating innovation strategy combined with a defensive influence strategy. This is in contrast to what theory prescribes. Interesting to see is why these companies use this combination of strategies. To further analyse this, we have incorporated the motivation of the firms in the framework of figure 3, which will be discussed in the next paragraph.

6.4. Innovation strategies, influence strategies and their motivation

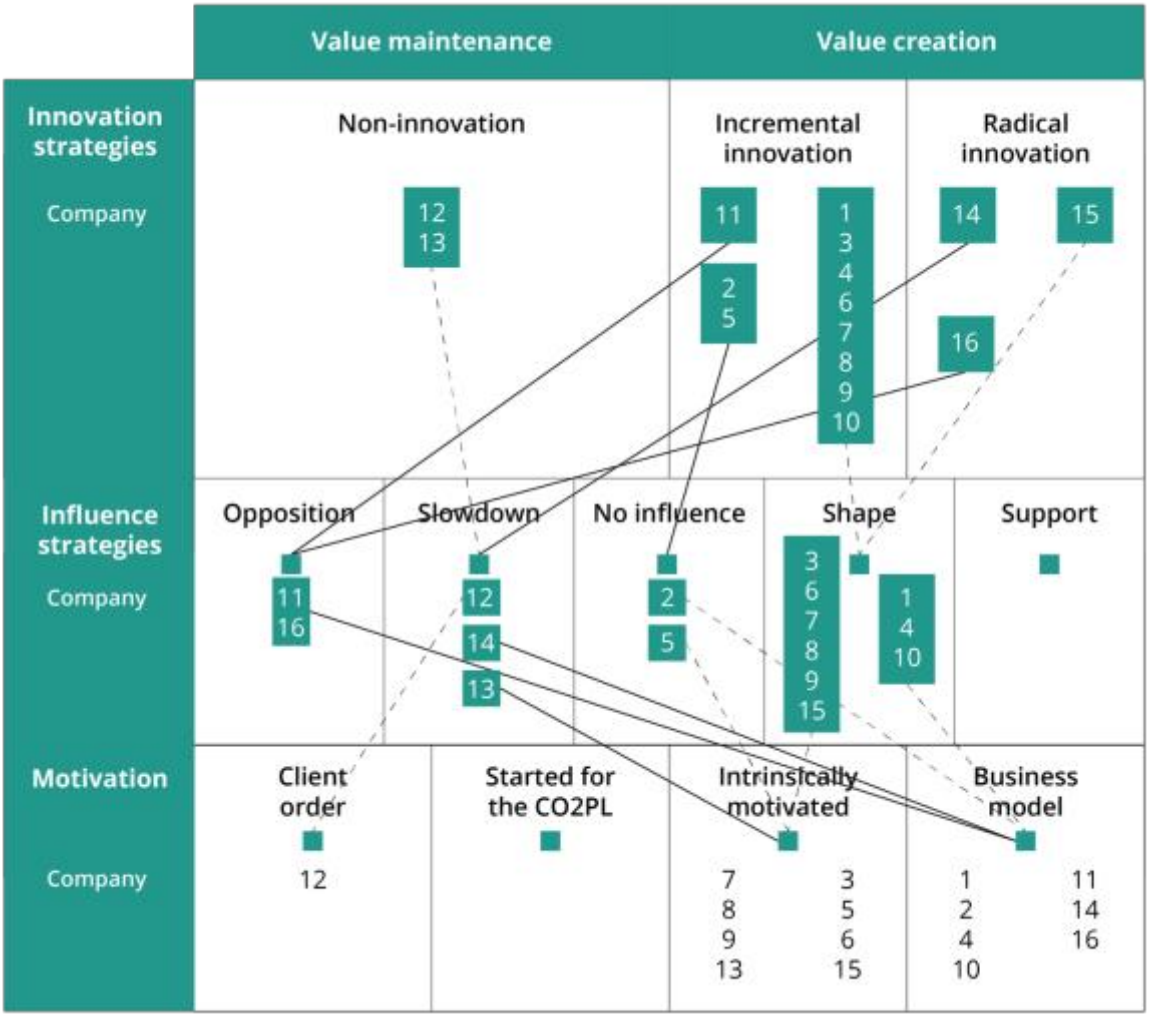

Figure 4: companies' innovation strategies, influence strategies and their motivation for an initiative. (only the most innovative innovations are presented)

Figure 4 includes the motivations of companies compared with the combination of innovation and influence strategy. Some notabilities come to mind from this figure. Firstly, most companies develop value creating innovations, combine this with a value creating influence strategies, and have value

creating motivations for it. More specifically, most firms developed an incremental innovation, deployed a shaping influence strategy and were intrinsically motivated to start this innovation.

We argue that every strategy combination that does not cross over the line between value maintenance and value creation, can be expected from the literature. In the theory section, we discussed that firms use a combination of either value maintaining strategies and value creating strategies. In figure 4, one can see that value maintaining strategies are in the left column, and value creating strategies are in the right column. When a firm crosses over from the left column to the right column, they use a combination of strategies that was not expected based on the literature. A few firms cross over from one column to the other, for example, companies 11, 14, and 16 have developed either an incremental or radical innovation (value creation), have a defensive influence strategy (value maintenance), and are motivated by their business model (value creation) to perform this initiative. This is an unexpected combination of strategies. The individual comments from the interviewees show that they argued that everything they had to do for the CO2PL, they already did before they were certified. The firms already developed sustainable innovations which they could use to comply with the CO2PL. For example, company 11 argued: "A company does not take initiative merely because the CO2PL wants them to, they will do this only based on their business model". The company argues that the CO2PL has no effect on their company beyond administrative burden, and is therefore opposing the instrument.

Furthermore, company 13, deploys a combination of two non-innovation initiatives, a slowdown influence strategy and is intrinsically motivated for their initiative. This is also a combination that is not in line with what theory suggests.

To conclude, most firms have an expected combination between their motivation and their influence strategy. However, the combination of value creating strategy compared to defensive influence strategies is not in line with what theory suggest. This will further be discussed in the discussion section.

7. Conclusion

This research aimed at answering the research question: "How do firms respond to meet the requirements 4D and 5D of the CO2PL in the Netherlands?". Sixteen companies were questioned in comprehensive semi-structured interviews. The results led to a framework of different combinations of strategies firms deploy for the CO2PL. The SKAO suspected that some firms complied with minimal effort. According to our research, of the sixteen companies interviewed, two companies can be categorized as complying with minimal effort. These were companies that relabelled current practices and tried to slow down the instrument. One of the companies however was intrinsically motivated. The rest of the companies respond to the requirements of the CO2PL with either technological or institutional innovations. Of which we argue that companies 10, 14, and 16 go beyond requirements. Thus, the most important contribution of this research is that it provided the SKAO insight in that most companies respond to the CO2PL requirements 4D and 5D with proper innovation.

8. Discussion

8.1. Theoretical implications

In this research, as a basis we have used an existing framework of innovation strategies and influence strategies firms deploy in response to a voluntary instrument. We added motivational categories to this framework to also find why firms do this. From previous research, we expected firms to respond through either a combination of value maintaining activities, or a combination of value creating strategies. Through our detailed analysis of the initiatives, we refined the framework created by Wesseling et al (2015). The inclusion that some firms comply without innovating, or comply with institutional innovation was not included in Wesseling et al.'s (2015) framework. We argue, that this is inherent to the type of policy. As discussed in the introduction, the ZEV-mandate was a technologic standard, the CO2PL allows for a much wider interpretation of CO_2 emissions reducing initiatives. This adds to the literature, by showing that the framework of Wesseling et al. (2015) is not sufficient for a policy instrument such as the CO2PL. Future research is necessary to see whether this newly developed framework is generalizable beyond the CO2PL.

Furthermore, the results show that most of the interviewed companies comply with innovation, either incremental or radical. We argue therefore that the requirements work in incentivising companies to start CO_2 reducing initiatives. More specifically, we show that most companies do not comply with minimal effort. We argue that the main reason for this is the setup of the requirements. The requirements leave a wide interpretation of CO_2 reducing initiatives which enables companies to develop initiatives that are relevant to their own business.

The previous paragraphs show that our theoretical framework was largely correct; to comply with requirements most companies used either a combination of the different value maintaining strategies, or companies used a combination of value creating strategies
However, some companies did not follow this notion.

We found companies that had no influence strategy, they complied without trying to influence the instrument. This may be explained by the fact that they did not have large issues in complying with the requirements and therefore had no need to change requirements. Before, we followed the reasoning of Hillman and Hitt (1999) who argued that when policy is of big influence on the day-to-day practices, firms will try to influence this. We expected the CO2PL to have such a big influence, and therefore we discarded these influence strategies. However, our research shows that some firms do not influence the CO2PL and therefore, we should have followed the categorization of Oliver and Holzinger (2008) who already displayed anticipatory and reactive strategies, where firms comply with regulations without influencing.

Furthermore, we found a combination of value creating innovations and value maintaining influence strategies. Wesseling et al (2015) argued that this is an unlikely combination and we therefore did not expect this combination. The reason for this contradictory may be unique to the CO2PL; these specific companies argued that the CO2PL does not incentivise them to innovate or perform CO_2 reducing innovations, they experienced the CO2PL merely as an administrative burden. The framework of Wesseling et al. (2015) is based on policy with large impact on firm behaviour. With the CO2PL, this large impact is according to some companies missing. Therefore, we add to the literature by addressing that when impact of an instrument is low, companies may use other response strategy combinations than with previous research. However, future research should address if these issues are specific for the CO2PL or that this happens in other policy instruments as well. Moreover, future research should address why firms still deploy opposing strategies when they can comply easily.

Moreover, one company's initiative was categorized as being value maintaining, furthermore, their influence strategy was categorized as value maintaining, however, the interviewee expressed that they were intrinsically motivated about the initiative; the interviewee argued that they participated in the initiative because they feel that sustainability is an important topic, and that firms must engage to reduce their CO_2 emissions. However, the interviewee also argued that they were in the CO2PL for the financial benefits in tenders. Therefore, we argue that the interviewee is not intrinsically motivated about the CO2PL, but is for the initiative that they perform. We therefore add to the literature by showing that firms can perform initiatives for different reasons than for why they are participating in voluntary agreements such as the CO2PL. However, since this was only one case, the generalizability

of this finding is rather limited. Future research should address if this combination is specific for this case, or even specific for the CO2PL, or that this happens more often.

Moreover, we found no companies that deploy a support influence strategy. This is not in line with what theory suggests. Two possible causes come to mind with this issue; research setup and sample size. First, Wesseling et al (2015) found support strategies in response to the ZEV mandate, however, their research setup was different from ours. They used a database of comments to gather data on the influence strategies of car companies. We however, used semi-structured interviews to gather data. This difference may have influenced the comments companies make. Furthermore, because we anonymized all interviewees completely. They may be more open about the actual influence activities firms perform, compared to the comments gathered by Wesseling et al (2015). Second, the sample in this research was sixteen companies, a larger sample of companies may have revealed some firms using support strategies.

We have made a categorization of the motivations firms have, to start certain initiatives. A big portion of the companies is intrinsically motivated. Why these companies are intrinsically motivated was not researched. However, several companies addressed that they felt that sustainability was a big issue for the future, and that firms need to take responsibility for their actions. Furthermore, some companies argued that in the future people do not want to work at a company that is very pollutant. However, future research should provide insight in the reasoning for why firms are intrinsically motivated for such initiatives.

In the newly developed model, we have categorized think tanks as being value maintaining initiatives. This is true when an initiative is set up just for compliance for the CO2PL. However, when a company is in a think tank initiative to promote or achieve sustainable development for their sector, one could argue that this should be categorized as value creating activities. The results of such think tank initiatives could be radical innovations which can have significant effect on the companies participating in the think tank initiative. Furthermore, one could argue that the think tank initiatives that are started from intrinsic motivations, should be categorized as being value creating initiatives. We however, categorized the think tank initiatives based on the initiative themselves; since these initiatives are no innovations themselves, we categorized them as value maintenance compliance strategies. Future research should address what the results of these initiatives are and what the impact on the companies will be.

8.2. Policy implications

The goal of this study was to provide the SKAO insight about how the companies comply with the requirements 4D and 5D of the CO2PL. The SKAO suspected that firms tried to comply with minimal effort. We argue that the firms that perform value maintaining activities try to comply with minimal effort. However, we also argue that companies who perform innovations and non-innovations, cannot be categorized as complying with minimal effort. This results in only two companies who comply with minimal effort through relabelling of current practices out of the sixteen interviewed. Therefore, we argue that the requirements of the CO2PL are successful in incentivizing firms to develop CO_2 emission reducing initiatives. We therefore argue that other policy makers can learn from the CO2PL on how to set up successful sustainable innovation policy.

Furthermore, we found, that strictly speaking, no company performs initiatives that go beyond requirements. This is because the requirements on how to comply leave a wide interpretation. However, we do argue that some companies perform initiatives that are more risky and have a larger impact on CO_2 reductions than others. In that light, we argue that three companies go beyond requirements. One company developed two radical technologic innovations, one company developed an incremental institutional innovation that can result in very large CO_2 emission reductions, and one company developed an initiative that can have very large impacts on theirs and the sector's day-to-day practices. We argue that these companies should be rewarded for their initiatives beyond the financial benefits in tenders. However, due to the complex nature of rewarding companies, we do not have a detailed plan on how to do so. One method that comes to mind that is well within the capabilities of the SKAO is publicity for these companies. The SKAO can use its own communication channels to provide publicity for these companies' initiatives. However, further research should provide a detailed reward scheme for these companies.

.

Some companies argued that there is a lacking number of tenders granted with the fictitious discount. A few companies even argued that if this would not increase, they would quit from the CO2PL for their company. Their main driver for this is large amount of reports and documentation that needs to be provided as evidence that they are active in reducing CO_2 emissions. They argued that sometimes the administration does not outweigh the financial benefits in tenders. Therefore, we recommend that the SKAO attempts to increase the number of commissioning parties that use the CO2PL and its financial benefits in tendering processes. With more tenders with fictitious discount, these firms will stay certified, and maybe even more join.

Moreover, we found that most firms are intrinsically motivated about the initiatives that they perform. This is a new development in sustainable innovation. This can greatly influence future innovation policy. When policy makers can depend on firms being intrinsically motivated, they can relax future innovation policy. Furthermore, at a certain point, policy will no longer be necessary to incentivise firms to develop sustainable innovations. Firms will do this from their intrinsic motivation. For other policymakers, it may be fruitful to support intrinsically motivated firms and try to increase other firms' intrinsic motivation. However, we have not researched how intrinsic motivation can be increased, future research should provide insight in this mechanism.

8.3. Limitations

This research has some noteworthy limitations. First, we set out to have an equal distribution over all sectors present in the CO2PL, however due to non-response and not willing to cooperate of some companies we did not achieve this. We were able to interview 2 marine contractors, 4 ICT companies, 3 engineering companies, 2 waste disposal companies, 4 infra companies, and 1 installation company. Furthermore, we set out to have at least three companies in each sector to achieve triangulation of the data sources. However, we also did not achieve this; for the marine contractors, waste disposal companies, and the installation company triangulation is not possible. In these sectors, only limited companies responded or were willing to cooperate. This may bias the information per sector; some of the findings may be based on chance, or unique to that specific company. Therefore, the generalizability of this study is limited. Especially sectorial differences should be handled with caution.

Second, we have only interviewed companies that were able to comply with the CO2PL. We have not included companies that were not able to comply. This might present a biased view of the strategies deployed. These companies may have deployed very different combinations of strategies to comply with the CO2PL. Furthermore, the CO2PL is a voluntary agreement, meaning that firms can quit whenever they want. We have not interviewed companies that have stepped out of the CO2PL, however, these companies could provide insight in why they stopped, and what kind of initiatives they developed before. Therefore, future research should also address companies were not able to comply or that stopped with the CO2PL.

Third, the CO2PL is a unique policy instrument. It is a voluntary agreement but empowered by financial benefits in tenders. The uniqueness of this policy instrument makes it questionable whether these findings are generalizable to other policy instruments. We argue that the financial empowerment creates an indirect business case for companies to perform initiatives. By taking initiative they comply with the CO2PL. Furthermore, initiatives that before were not financially feasible, may, through the empowerment of the CO2PL, now be feasible. These can be initiatives firms were motivated about doing, but were not able to get a business case for. However, future research should provide insight whether this empowerment has such influence. Subsequently, it should also enlighten whether these findings are generalizable beyond the CO2PL or are a result of the empowerment and therefore unique to this instrument.

Fourth, we deployed the key informant approach to interview the people with the most knowledge about the CO2PL in relation to the company. However, these are also the ones who are often most motivated for these activities. This could bias their answers about the motivation to develop an innovation. The interviewee may be intrinsically motivated; however, his CEO may feel differently about this, and may have other motives for developing the innovation. Some findings may

therefore be biased, which hampers the reliability of our research. Future research with different employees or even management should provide insight whether the findings for the motivations are generalizable beyond the interviewee.

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10. Appendix

Appendix A: Questionnaire

1. Factsheet informatie:
    a. Wat is u naam en achternaam?
    b. Hoe lang werkt u al bij dit bedrijf?
2. Generieke vragen:
    a. Kunt u uw huidige functie beschrijven?
    b. Hoe lang bent u al bezig met de CO2PL?
    c. Wat is uw algemene indruk van de CO2PL?
    d. Wat zijn volgens u, de grootste voordelen en nadelen van de CO2PL? Waarom?
    e. Wat is de algemene houding van de rest van het bedrijf naar de CO2PL (en de maatregelen)?
3. CO2PL initiatief specifieke vragen:
    a. Was het voor jullie een grote uitdaging om aan de eisen 4D en 5D te voldoen?
    b. Kunt u het proces beschrijven van hoe jullie tot de initiatieven voor eis 4D en 5D zijn gekomen?
    c. Waren er meerdere opties om verder te ontwikkelen? Zo ja, waarom is specifiek voor deze gekozen?
        i. Hoeveel andere opties hadden jullie als initiatief?
        ii. Welke selectiecriteria waren er gebruikt om de juiste innovatie te kiezen?
    d. Wat is de invloed van de publicatieplicht op het wel of niet selecteren van een initiatief?
    e. Welke belanghebbenden zijn er betrokken bij de innovatie? Waarom die? en hoe gevonden? (Mede-initiatiefnemers, ngo's, overheid)
    f. Was er een sluitende business case voor deze innovatie? (Zou de innovatie winstgevend zijn?) En is dit gerealiseerd in de praktijk?
        i. Als er geen sluitende business case was, waarom hebben jullie hem dan alsnog doorgevoerd? (Hopen jullie de investering op een andere manier terug te verdienen?)
    g. Is er een specifiek deel van het R&D-budget gereserveerd voor de innovatie van de CO2PL? Hoeveel is dat ongeveer?
    h. Is de innovatie radicaal nieuw voor het bedrijf? Waarom wel/niet)?
        i. Bouwt de innovatie voort op de basis competenties van jullie bedrijf? Hoe?
        ii. Is er al een grote markt voor de innovatie? (En was die er al voordat jullie ermee begonnen?)
        iii. Wat was de impact van de innovatie op de organisatie?
    i. Wat waren de grootste uitdagingen die jullie moesten overkomen met het ontwikkelen van deze innovatie? En hoe hebben jullie dat gedaan?
    j. Tot wat voor maatregel leidt dit in de maatregellijst?
    k. Wat zou u anders hebben gedaan als u nu terugkijkt op het hele traject?
4. Beïnvloeding vragen:
    a. Als u iets aan de eisen 4D en 5D zou kunnen veranderen, wat zou u dan wijzigen? Waarom?
        i. Vind u dat de eisen van de CO2PL in lijn zijn met de praktijk? Waarom?
    b. Heeft u of het bedrijf dit standpunt gedeeld met de SKAO of andere belanghebbende (CI's, adviseurs)? Hoe?

c. Heeft uw bedrijf ooit geprobeerd om de SKAO te overtuigen de eisen aan te passen?
d. Zo ja, heeft de SKAO uw aanwijzingen overgenomen?
e. Weet u van andere organisaties dat zij de CO2PL proberen aan te passen, bijvoorbeeld door advies of voorkeuren te geven?
    i. Zijn er collectieven van bedrijven (bijv branchevereniging) die zich uitlaten over het succes of falen van de CO2PL?
    ii. Zijn deze collectieven (branchevereniging) actief bezig met het beïnvloeden van de eisen van de ladder, (kunt u hier een voorbeeld van geven)?

5. Innovatiestrategie specifieke vragen:
    a. Is innovatie belangrijk voor de business van het bedrijf? Waarom?
    b. Is duurzaamheid of het verduurzamen daarbij vaak een start voor nieuwe innovaties? Waarom?
    c. Heeft het bedrijf een duidelijk gecommuniceerde innovatiestrategie? Kunt u deze beschrijven?
    d. Is er een jaarlijks innovatie en R&D-budget? Kunt u een indicatie geven van de grootte van dit budget?
    e. Heeft het bedrijf een speciale afdeling of medewerkers voor innovatie? Om hoeveel man gaat dit?

Appendix B: Company initiatives

In the first column, the company number is presented, followed by an explanation of the initiative in the second column. In the third column, we argue the innovation strategy this initiative can be categorized under. In the fourth column, the motivation of the company is presented and categorized.

Company	Initiative	Innovation strategy	Motivation
1	**Carpooling platform**: the company developed an app that allowed their employees to easier carpool together. The platform tells which colleague lives close to you and at what office he works. If colleagues than find people that live close by and work at the same office, they can carpool to the office together. This app was first deployed within their own company, this turned out to be a success. Therefore, now they are deploying this app in collaboration with another company at the financial district in Amsterdam-South	This app changes how people interact in travelling to work. Generally, people are alone in their car, with this app people that do not know each other are facilitated to travel together. Therefore, we categorize this as being **institutional innovation.** Furthermore, we argue that this is an **incremental innovation**, the app does not have any effect on the core competences of this company, and the company's partner already had the competences to build such an app.	The interviewee said: "this was just an initiative for our own employees, this costed us money without any returns. That is what I like about the company, that they also just do these initiatives". Also, "we started this initiative from a chain analysis for the CO2PL". Therefore, we argue that this initiative was **started for the CO2PL.**
	Sustainable square: This is a collaboration project of seven squares in large cities around the world, one of which Schouwburgplein in Rotterdam. The project in Rotterdam is a collaboration project between different parties at the square and outside of it. The goal is to make a climate neutral and sustainable square by 2030. They do this by looking at energy production, energy storage and energy efficiency.	We argue that this is an **institutional innovation** because the companies on this square are going to collaborate to make a specific area climate neutral. We argue that this changes the way neighbouring companies interact with each other. Furthermore, we argue that this is **incremental innovation** because the company is facilitating this transition with its own knowledge.	The company's motivation for this initiative becomes clear from the following quote: "we are in this project to learn and acquire knowledge so that in the future we can create business with it". Therefore, we argue that the motivation for this initiative is in the **business model**.
2	**Carbon capture:** This company has now started a pilot project in collaboration with TNO to capture CO_2 emissions. Furthermore, the company has created a market for CO_2. Greenhouse horticulture in the Netherlands is a big customer in buying CO_2 to pump this into their greenhouses. So, company 2 tries to capture CO_2 emissions and sell this to greenhouse horticulture companies.	We argue that this is an **institutional innovation** because the company developed a new market for CO_2. Furthermore, the company argues that: "we are trying to create an economy for CO_2, so that it can be used as a raw material". We argue that this changes how people look at CO_2 emissions and therefore	The motivation of this project is first business, the company is investing 20 million euros and wants returns on this investment. This is supported by a quote from an interviewee: "at some point we figured we want to capture CO_2, but we also want to have a business case for it". Therefore, we argue that the motivation for starting this initiative is the **business model.**

		changes the institutions. Furthermore, we argue that this is an **incremental innovation** because the gasses coming out of the chimney, are already filtered 3 times. We argue that this is an extra step in the cleaning process.	
3	**Asphalt mixture:** this company developed a new asphalt mixture. This mixtures reduce CO_2 emissions in two ways. First, this mixture can be produced partly with recycled old asphalt. This means less raw materials are necessary, and less waste is produced. Second, the asphalt mixture can be produced at a lower temperature. The lower production temperature has a direct effect on the energy demand for this production process.	We argue that this initiative can be categorized as being **incremental technologic innovation**. The company already produced asphalt before, they incrementally improved their existing product base.	The interviewee argues that they started this initiative from their intrinsic motivation. He said: "Asphalt is a big part of our footprint so we feel that it is important to reduce this, this is also in line with our mission statement". Their mission statement says: resource positive, climate positive and enhancing life. Therefore, we argue that this initiative was started from their **intrinsic motivation**.
	New use of machinery: Company 3 has used the principle of "the new driving" and used this for their machinery. They called this "het nieuwe draaien" or the new use of machinery. They developed a training programme to teach machinist how to use their machine in such a way that they are most energy efficient. The challenge of this initiative is greater than that of the new driving. The culture in the construction sector and infrastructure sector was that the more fuel you had used, the harder you had worked. This lead to machines using much more fuel than necessary. The companies that initiated this project, set out to change this culture.	We argue that this is an **institutional innovation.** The initiative was focussed on culture change and a change in what is perceived as valuable. We argue that by doing so, they have changed the rules of the game. Furthermore, we argue that this is an **incremental innovation**, people change their behaviour in using machinery they already used before. So, the company improved existing institutions.	This company was one of the pioneering companies that was involved before it was clear what the magnitude of saving would be. This argues for intrinsic motivation. The mission statement of this firm also under scribes the intrinsic motivation, the company wants to be resource positive, climate positive and enhancing life. Therefore, we categorize this initiative as being **intrinsically motivated.**
4	**Traveling differently:** This initiative focusses on how people travel. To promote more sustainable methods of travel, several companies signed the 'Dutch sustainable mobility plegde 2020'. The goal of this pledge is to explore the potential of a sustainable shift in business mobility. By joining the pledge the national emissions of CO_2 can be reduced by 400kton per year by 2020 (interviewee 4).	The result of this pledge is that companies start thinking about other ways to travel and act upon this. Innovation in this initiative is therefore indirect, and we categorize this initiative as being a **think tank.**	From internal documents, it becomes clear that the company entered this pledge because of the COP21 in Paris. Companies felt they had to act and show that they were willing to reduce emissions. Therefore, we categorize the motivation for this initiative as **intrinsic motivation.**
	Smart Grid: a collaboration project in the development of smart grids. The project develops and tests a series of new, scalable, and by users promoted services based on the energy	The company facilitates the ICT environment; therefore, we argue that this is a **technologic innovation**. Because the company is an	The motivation of the company becomes clear from a quote of the interviewee, who said: "We are frontrunners and we want to stay frontrunners". We therefore argue

	infrastructure of the future. These tests happen at two pilot projects in Utrecht (LomboxNet) and Amersfoort (AmersVolt). A big part of this project is the co-creation with citizens. They argue that in the collaboration with surrounding citizens they can come to quick and strong solutions. This company facilitates the ICT environment of the smart grid.	ICT-service company and already has the competences of IT building, that this innovation is an **incremental innovation**.	that the company is in this initiative from **intrinsic motivation**.
5	**Reusing roof felt:** roof felt contains bitumen. Because the production of bitumen is high in CO_2 emissions, the company looked at whether they could reuse this bitumen. They have developed a technique in which they break down the roof felt and are able to retrieve the bitumen. The bitumen can subsequently be used for production of new roof felt, but also to produce asphalt.	We argue that this is an **incremental technologic innovation**, because the company already had the technique to break down demolition materials. They improved this process by separating the bitumen. Therefore, we see this as an incremental technologic innovation.	The motivation of this initiative is a combination of two categories. The interviewee argued that: "all projects have a closing business case, otherwise we would not bother". However, the interviewee also said that: "the manager of the demolition department is always involved in reducing CO_2, energy reduction, separating materials etc. And he does most of this from intrinsic motivation". Therefore, we categorize this as being **intrinsically motivated**. But with an overlap to business model
6	**Air treatment filters:** Air treatment machines contain filters to clean the air going into a building. When these filters become full and get clogged, more energy is needed to pump air through. Therefore, this company developed a measuring system that can detect whether the filter is getting full, they can swap the filter out at the right moment to achieve the highest energy efficiency. Furthermore, they have developed in collaboration with a filter producer a filter which is more energy efficient.	We argue that this is an **incremental technological innovation**, since it is in line with the core competences of the company. The producer keeps producing filters, may it be with an extra feature, and the installation company keeps installing and maintaining filters, albeit at the right moment via meters.	The interviewee argued that this initiative was started for the CO2PL. The interviewee said: "We already had the intention to research this, however we never did. The CO2PL provides that extra stimulant". With this quote, we argue that this initiative was **started for the CO2PL.**
	Sustainable advisory team: In collaboration with a radio station, this company set up a sustainable advisory team. This team consist of several employees from the company that give advice to companies on how they can become more sustainable. The advisory team produces, in collaboration with the client, an advisory report on how to technologically and financially become more sustainable. The client does not have to pay for this advice	We argue that this is an **incremental technologic process innovation**. The company has changed its method of advisory activities.	The motivation for this company to do this, can be explained by the following statement: "the only reason we do this initiative is for image building". We argue that this is **intrinsic motivation**.
7	**Electric car fleet:** Company 7 is an advisory and engineering company and mobility is their biggest emission factor. The company has a fleet of about 600 lease cars. The interviewee said that they	We argue that this is an **incremental institutional innovation**. The interviewee argues that the electric cars have substantial impact on	The motivation for this initiative is clear from the interviewee's statement. He says: "this is an initiative from the CEO, he finds this important and has

	have the goal to electrify this fleet of lease cars, and have it completely electric by 2020. To find what kind of issues this brings the company starts with a pilot project for 30 cars. They have a six-month pilot period for 30 employees in which they can test and evaluate having an electric car.	how people use mobility and what the company must provide for, charging stations and alternative transport for holidays. Because employees are already used to lease cars, we argue that this is an improvement on their normal car lease programme and therefore is categorized as an incremental innovation.	commissioned this change". Therefore, we categorize this as **intrinsically motivated.**
	Supply chain analyses database: The CO2PL requires companies to perform supply chain analyses. These analyses are published on the website of the SKAO. The documents are published; however, it is hard to get good information from them. Company (7) argued that this is a waste of good information, and is building a database in where all these supply chain analyses are uploaded. They say that the goal is that every infrastructural project in their design phase gets checked with this database. The interviewee gave an example: "when designing a bridge, a designer can check what the CO_2 impact is of using wooden railing compared to using steel railing or other materials. This provides designers better info about the CO_2 impact of their design."	We argue that this initiative should be categorized as an **incremental technological innovation.** With the development of this database, the designing process can be improved and the CO_2 impact of a design can be checked more easily. So, the company does not change anything about their core competences, they simplify the designing process.	The motivation for this initiative can be derived from the following quote: "the supply chain analyses are provided on the website of the SKAO, publically available. However, there are a lot of documents and searching in them and getting the right information is really time consuming, we feel that this information can be of much more value. Therefore, we are building this database". We argue that this quote shows that the company is **intrinsically motivated** to do this initiative.
8	**Concrete agreement:** The concrete agreement is a national supply chain agreement focused on sustainable growth of the concrete sector. According to MVO-Nederland, the most important points in the agreement are, CO_2-reduction, circularity, natural capital and social capital. With this agreement, they aim to cost affectively have a significant positive impact on society through innovations, knowledge and a will to cooperation.	We argue that this initiative itself is no innovation and results of this initiative will consist of plans to reduce CO_2 emissions. Therefore, we categorize this initiative as a **think tank**. Furthermore, the interviewee (8) from this company said: "we are now working on the concrete agreement. We are currently waiting on the final text for the concrete agreement, when that is clear we have a standard or measure we can work towards". This quote shows, that they do not innovate within the concrete agreement itself, but that the result will be a plan on how to perform in the future	The motivation of company to be participating in the concrete agreement is clearly explained by the interviewee: "we have a lot of technological knowledge about concrete, and by participating in this concrete agreement we can share this knowledge, and steer the agreement". Furthermore, according to the interviewee the company has a goal to become the most sustainable concrete builder by 2025. Therefore, we categorize this as being **intrinsically motivated.**

	Concrete mixture: this initiative deployed a concrete mixture to a different type of products. The mixture is different from normal concrete in that it includes geopolymer. By adding this geopolymer to the concrete mixture, less Portland cement is necessary. The production of Portland cement is one of the biggest CO_2 emitters in the world, so reducing the demand of Portland cement leads to CO_2 emissions reduction. This mixture with geopolymer is not new, however, this company is the first to use this mixture for constructive concrete.	We argue that this is an **incremental technologic innovation**. The company already produces concrete now, and they improved this by changing the mixture of concrete.	The mission statement of this company shows, according to the interviewee, why the company is involved in this initiative: "we want to be the most sustainable concrete builder by 2025". We argue that this can be categorized as **intrinsic motivation**.
9	**Transport km's reduction**: Company 9 produced a supply chain analysis in for their asphalt production. In which they found that a large portion of the CO_2 emissions come from transport of the asphalt. They argue that efficiency improvements can be found in the reduction of kilometres' empty trucks drive back. When re-asphalting a road, the top layer is taken off. This top layer needs to be transported somewhere. The company improved their logistics by having trucks that brought new asphalt, take old asphalt back. They could do this for about 5% of the trucks bringing new asphalt.	We argue that this is an **incremental technologic innovation**, because the company by readjusting their logistics could improve transport efficiency. This was an incremental improvement.	The motivation to do this initiative comes from the CO2PL. The company performed a supply chain analysis and found that a large portion of their emissions come from transportation. This led them to this initiative. We therefore argue that the motivation for this initiative can be categorized as **started for the CO2PL.**
	Asphalt mixture: just like company 3 this company developed a new asphalt mixture. This mixture reduces CO_2 emissions in two ways. First, this mixture can be produced partly with recycled old asphalt. This means less raw materials are necessary, and less waste is produced. Second, the asphalt mixture can be produced at a lower temperature. The lower production temperature has a direct effect on the energy demand for this production process.	We argue that this initiative can be categorized as being **incremental technologic innovations.** The company already produced asphalt before, they incrementally improved their existing product base.	The interviewee, said that they started this project for the CO2PL. The starting point for this initiative was the supply chain analysis they produced for the CO2PL. They found that asphalt production costs a lot of energy and found in this a good initiative for the CO2PL. A quote from an internal document from this company supports this: "the supply chain analysis of asphalt has lead us to research the potential reduction of new bitumen". We therefore argue that the motivation for this initiative comes **from the CO2PL**.
10	**Levelling energy demand**: Company 10, is developing an initiative that focusses on levelling energy demand. This company set out to tackle peak load in the energy infrastructure from the demand side. They developed an initiative in where they try to have	We argue that this is an **institutional innovation** because the neighbouring companies need to change the way they work and fit this to other companies. We argue that this changes the	The motivation of the company to perform this initiative is shown by the following quote from the interviewee: "It is partly a learning project for us, so that we in the future can create new business with this". We

	companies on one industrial park collaborate and discuss about their energy demand. They argue that when companies collaborate and be flexible in when they use their machines, they can create a stable energy demand for the total industrial park. To help the companies achieve this, company 10 build an ICT platform.	rules of the game in how companies interact with each other. Furthermore, we argue that this is an **incremental innovation** for the company because they are active in ICT services and they have built an ICT platform. This is not radically different from their normal activities.	categorize this initiative therefore, as motivated from the **business model**.
11	**Washing ash sand:** Company 11 is an excavation company and marine contractor. They retrieve a lot of sand from sea. To use this sand for building, they need to wash the sand. They have a classification and cleaning system for sand. The initiative this company has developed uses this classification and cleaning system for a different material. The company processes ashes from waste burning facilities. The ash is residue of waste burning, the company collects and cleans this residue to produce material that is usable for building. The company argues that this reduces CO_2 emissions because less sand needs to be retrieved from the sea.	To implement this process, the company did not have to change anything to their system. They could use the system as it was for cleaning a different material. Therefore, we argue that this is an **incremental technologic innovation.**	The motivation for this project is clearly explained by the interviewee: "only when something adds to the business model, we will engage in a project". Therefore, we argue that this initiative is started for the **business model**.
12	**Health platform:** This company developed a health platform for a client. It incorporates a video calling feature, that allows health providers to have contact with patients without having to visit them. They build this feature as a request for the client who was looking for a way to spend time more efficient. This results in travelling less kilometres. The interviewee (12) said that the client did not ask for a CO_2 emission reduction, nor is it aware of this label of CO_2 emission reduction being put on this technology	We argue that this is **relabelling of current routines**. The company is an ICT company that build an ICT-platform for a client with no intentions to reduce CO_2 emissions, therefore we see this initiative as relabelling of current routines. The interviewee (12) also acknowledges this: "this feature reduces the amount of times a health provider has to visit a health beneficiary, and we have coupled that with CO_2 reduction. Less travel can mean less emissions".	The company developed this initiative as a **client order**.
13	**E-workspot:** This initiative was a client order. By building this E-workplace, the client avoided a large investment to replace all their hardware. The ICT-company who build this solution, labelled this as being CO_2 emission saving, because less hardware needed to	We argue that this is **relabelling of current routines**. The company is an ICT company that provided an ICT solution to a client with no intention to reduce CO_2.	This was a **client order**.

	be bought. However, CO_2 reduction was never the intention of the client's order. Furthermore, the interviewee (13) said: 'how the requirements are set up now, we just look for something that we can use for the CO2PL, instead of thinking of your own initiative'.		
	U15: The U15 is a network of employers that try to reach sustainable mobility (Interviewee 13). They argue that the sustainable mobility does not only reduce CO_2, it can also bring cost reductions, decrease travel time, and increase accessibility. Members of the U15 discuss how they can reach this and make concrete plans to do so. Subsequently, individual members of the U15 perform projects to improve the sustainability of their mobility	We argue that like the concrete agreement, the results of this initiative consist of plans to reduce CO_2 emissions. This is not innovation therefore, we categorize this initiative as a **think tank.**	The interview argues that: "I am in the board of the U15, not because of the CO2PL, but because I find this important". We therefore, categorize that the motivation for this initiative is **intrinsic motivation**.
14	**Coffee pellets:** the waste product of coffee, coffee grounds, can be pressed into pellets. This company has built a factory to produce coffee waste pellets. These pellets can be used in a pellet furnace. CO_2 reduction comes from less transport, less new wooden pellets are necessary and waste is reduced. The coffee ground is waste from large companies where employees drink a lot of coffee.	We argue that this is **radical technologic innovation,** because the firm had to build a new factory to produce these pellets. Furthermore, they had to convince companies to separate the coffee ground they produced from the rest of their garbage.	The motivation from this project comes, according to the interviewee, from the **potential business.** The interviewee said: "we have one employee that is concerned with business innovation, he tries to create business cases for the company… so that is how we worked on a project to recycle coffee grounds"
	Upcycling plastic: This company set out to upcycle old plastic into new high quality plastic. They have built a factory that is able to process about 100kTon of plastic per year.	We argue that this is a **radical technologic innovation**. They had to build a new facility for this initiative. Since the activities are radically different from their core-business we argue that this is a radical technologic innovation.	The motivation for this initiative is clearly explained by the interviewee: "if a business case is closing, we will do the project". He also says, "that is why we do not have any initiative specifically for the CO2PL, we always do it when there is a business case". Therefore, we categorize the motivation for this initiative as **business model**
15	**Sustainable supplier:** The website of the sustainable supplier website allows suppliers to show they commit themselves to CO_2 reduction. Buying companies can check this website to see which suppliers have committed themselves to CO_2 reduction, so they can easier select a sustainable supplier. The platform 'sustainable supplier' also helps supplier to become sustainable. They do this by addressing these questions: how do you realize a sustainable business; how do you prove this? The platform	This initiative results in that more suppliers are concerned with sustainability and reduce their CO_2 emissions. However, no direct innovations come from this initiative. Therefore, we have categorized this initiative as a **think tank**.	This initiative was set up **for the CO2PL**. A quote from the interviewee supports this categorization: "we have set up this initiative as a result of the CO2PL certification".

	helps supplier to achieve this.		
	Bio composite: One employee was involved in the landfill department and involved in a department concerned with biomass and residues. The employee developed a new material made from biomass; a bio composite. For this new material, they also found a use in the products they used in their core business. The company was able to use the bio composite to make lamp posts	We argue that this is a radical innovation because the company previously was mainly concerned with advisory and engineering activities. With this initiative, they are producing their own products. These new activities are radically different than the activities performed before. Therefore, we argue that this initiative is a **radical technologic innovation.**	The motivation for this project we derive from the following quote: "I don't believe that we have a solid business case at his moment". Combined with the following statement: "one employee was really motivated to develop this material", we argue that this initiative is started from **intrinsic motivation.**
16	**Building with nature:** Their initiative is a designing philosophy that focusses on using forces of nature for coastal protection. They look at what directions the current flows to and how they can use this for their benefit. By doing so, they can much more effectively perform coastal protection. They spray sand on one spot, and let the natural forces spread this sand along the coast. This project has one pilot project in the Netherlands which is executed and is now monitored.	We argue that this initiative is a **radical institutional innovation**, because if this pilot is a success, the impact on how coastal protection is designed can be huge. This could impact the whole way of thinking about coastal protection. Collaboration between marine biologist and coastal engineers is necessary to have the right knowledge. Therefore, we argue that this is a radical institutional innovation.	The company has taken initiative in this project because they feel that "this may have a huge impact on our market and for our way of working, therefore we feel that it is important to be part of this". We argue that this statement shows that the company is participating in this initiative for their **business model.**

Appendix C: Interviews

The transcripts are available on request.