



# Evaluation of the CO<sub>2</sub> Performance Ladder

Results from a survey, case studies  
and a workshop



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# Evaluation of the CO<sub>2</sub> Performance Ladder

Results from a survey, case studies and a workshop

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# Summary

This study evaluates the effectiveness of the CO<sub>2</sub> Performance Ladder (CO<sub>2</sub> PL) in reducing CO<sub>2</sub> emissions, both at companies and in the supply chain.

The CO<sub>2</sub> PL is a carbon management system that can also be used as a procurement tool. Companies with a CO<sub>2</sub> PL certificate receive an advantage when bidding for a tender and this certificate is sometimes required in the tendering process. To obtain the certificate, companies must provide insight into their CO<sub>2</sub> emissions and set targets to reduce their emissions. The CO<sub>2</sub> PL is regularly updated and the requirements increase over time. The CO<sub>2</sub> PL is currently used mainly by authorities in the Netherlands, although a pilot in Belgium will end in 2023 and it is likely that Belgium will then broaden the use of the CO<sub>2</sub> PL.

The aim of the project is to better understand the effectiveness and additionality of the CO<sub>2</sub> PL to reduce CO<sub>2</sub> emissions. The study focuses on the impact on certificate holders, not on the tenderers. It builds on the findings of a previous [literature review](#) of evaluations of the CO<sub>2</sub> PL. The Phase I study showed no quantitative studies after 2017, and no quantitative studies on Scope 3 emissions were available. Recent agreements on CO<sub>2</sub> reduction, such as the National Climate Agreement in the Netherlands (2019), could influence the effectiveness of the CO<sub>2</sub> PL. This study aims to gain insight into the current impact (2022) and the impact on the supply chain (Scope 3 emissions).

## Evaluation methodologies

The evaluation was conducted by a survey of 488 CO<sub>2</sub> PL certificate holders (39% of all participants)<sup>1</sup>, six case studies with interviews, a survey of a control group of 97 companies that are not certificate holders, and a workshop with ten certified companies. The use of different methods helps to offset a bias that might be related to one specific approach. To ensure the correct interpretation of the surveys, follow-up interviews were sometimes conducted. The survey had a 40% response rate, which is considered high given the number of recipients, and suggests that the results are likely to be accurate. The control group survey has a low accuracy due to a low response rate of 22% and a smaller group size.

## Conclusions

*The main drivers for taking part in the CO<sub>2</sub> PL are its advantage in tenders (large companies), and because the CO<sub>2</sub> PL provides insight into emissions and a road map for CO<sub>2</sub> reduction (small companies).*

- The drivers for companies to use a carbon management system are legislation that prescribes reporting and/or a reduction of emissions, and the market value of sustainability.

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<sup>1</sup> There are five levels of certification with specific requirements and advantages for the certified company that increase with each level. Distribution of the survey: one participant certified at Level 1; one participant certified at Level 2; 242 participants certified at Level 3; 13 participants certified at Level 4 and 199 participants certified at Level 5. The level of certification of 32 companies is unknown.



*The CO<sub>2</sub> PL is an effective instrument for helping companies to reduce their Scope 1 and 2 emissions.*

- The CO<sub>2</sub> PL provides insight into companies' key emissions and helps to reduce them.
- The CO<sub>2</sub> PL has resulted in up to 3% annual additional emission reduction for Scope 1 and 2, based on the annual average emission reduction (7.7%) from the survey, and on the highest additionality measure (15-46%). No figures for the total CO<sub>2</sub> reduction can be given, because no standardised database on companies' emissions is available at the time of this study.

*The additionality of the CO<sub>2</sub> PL is lower than in previous studies.*

- The survey shows an additionality<sup>2</sup> of the CO<sub>2</sub> PL for Scope 1 and 2 of < 15 to a maximum of 46% with the measures taken. This is a slight decrease compared to previous literature (30-50%). This is likely to be due to the change in policies that provide a strong incentive to take certain measures. For example, government-funded high return on investment provide a strong incentive for in-company renewable energy production.

*Most companies did not use targets before joining the CO<sub>2</sub> PL.*

- The survey shows that most companies (small, medium and large) did not use targets before their certification. These results do not differ between sectors. This suggests that the CO<sub>2</sub> PL encourages the setting of targets. This result is based on a high number of respondents (398).
- Only half of the non-certified companies in the control group have targets for CO<sub>2</sub> reduction and only one-third of the applicants have a CO<sub>2</sub> management system. This is consistent with previous research by Rietbergen. This could be another indicator of the additionality of the CO<sub>2</sub> PL. It is important to note that the low number of respondents to this question in the control group indicates low accuracy.

*Targets are often set lower than the actual ambition level.*

- Companies report that they only set targets for the CO<sub>2</sub> PL that they are sure they can meet. They do not want to risk losing the CO<sub>2</sub> PL certificate by not meeting the targets. This is especially true for companies with a Level 5 certificate.

*No definitive conclusions can be drawn on the effectiveness of the CO<sub>2</sub> PL on Scope 3 emissions.*

- The measures that show a high additionality are more indirect measures, making it difficult to quantify effectiveness. Also, the number of respondents is much smaller (10 to 108; a number that varies per question) than for Scope 1 and 2, and consequently the uncertainty is higher. Finally, the results of the different methods vary slightly.
- According to respondents, interviewees and participants of the workshop, cooperation with supply chain partners is the most important measure they take. Participants indicate that this measure leads to discussion about sustainability with suppliers. A minority of the interviewees and workshop participants indicate new collaborations due to the CO<sub>2</sub> PL after certification.
- Although collaboration is expected to increase demand for environmentally friendly materials, the study also shows that the collaboration in itself does not lead to explicit agreements or contracts.
- The CO<sub>2</sub> PL gives insight in the key Scope 3 emissions. At company level, it is expected that insight and cooperation will lead to the selection of materials with lower environmental impact.

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<sup>2</sup> The CO<sub>2</sub> Performance Ladder is additional if without it a measure would not have been taken, would have been taken at a later stage, or to a lesser extent.

*In terms of changing attitudes within the organisation, most companies report a modest effect of the CO<sub>2</sub> PL.*

- Companies mention that initially the CO<sub>2</sub> PL was important for showing hot-spots for CO<sub>2</sub> reduction. This effect was reduced when the CO<sub>2</sub> PL was in use for longer.
- Companies that mention a lower effect, indicate that they were already aware of the importance of CO<sub>2</sub> reduction, or that cost efficiency is a more important driver.

*The impact of the CO<sub>2</sub> PL on reducing emissions in the supply chain (and heavy industry) is small compared to stricter procurement tools and national or EU level policy instruments.*

- This applies to the supply chain of certified companies. The certified companies indicate that tendering parties impose specific material requirements in projects and that those requirements are decisive for change in their supply chain.
- In the Netherlands other procurement tools, such as the Environmental Cost Indicator (ECI) (Milieukostenindicator (MKI) in Dutch) have stricter requirements for material emissions than the CO<sub>2</sub> PL. At a project level, these requirements outweigh the CO<sub>2</sub> PL certificate requirements.

## **Recommendations for the future**

The CO<sub>2</sub> PL is widely adopted in the Ground, Road and Waterway sector in the Netherlands, where it leads to additional CO<sub>2</sub> emission reductions for Scope 1 and 2. The CO<sub>2</sub> PL can increase its impact by expanding to other sectors; to companies across the supply chain; and to other countries, with a focus on Scope 1 and 2 emissions. In this way, the CO<sub>2</sub> PL could potentially contribute to an annual additional emission reduction of the additional companies' Scope 1 and 2 CO<sub>2</sub> emissions of up to a maximum of around 3%. Expanding the CO<sub>2</sub> PL to other countries could potentially contribute to CO<sub>2</sub> emission reductions abroad. The added value of adaptation of the CO<sub>2</sub> PL is highest for companies, sectors, and regions that have little insight in their emissions. There, the CO<sub>2</sub> PL can be used to provide insight and set targets for reducing emissions.

Efforts from the demand side (tendering parties) and external factors including other policies (such as EU Emission Trading System (ETS)) are necessary to reduce emissions in conventional heavy industry. Without these efforts, no emission reductions can be expected in heavy industry. The CO<sub>2</sub> PL facilitates the demand side through insight into material emissions. While other procurement tools may have stricter requirements, expanding the use of the CO<sub>2</sub> PL as a carbon management system to tendering parties can increase insight into the tendering parties' own material emissions and raise awareness of material requirements at project level.

To ensure ambitious targets, especially for Level 5 certified companies, it is recommended to explore whether the requirements for targets can be made more concrete. Another recommendation would be to set standards on how to select a target, such as the Science Based Targets initiative.

A standardised central database (especially on Scope 3 emissions) would make it possible to analyse absolute emission reductions and validate the theory of change. We recommend standardising the method of emission data production, collection and reporting.

Most companies are either certified at Level 3 or at Level 5. Currently the CO<sub>2</sub> PL has five certificate levels. We recommend simplifying the CO<sub>2</sub> PL to two levels.

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# 1 Introduction

## 1.1 Introduction

The CO<sub>2</sub> Performance Ladder (hereafter CO<sub>2</sub> PL) is an instrument that helps organisations to reduce their carbon emissions within the organisation, in projects and in business. The instrument can be used as a CO<sub>2</sub> management system as well as a procurement tool.

The IKEA Foundation recently awarded a grant to the Foundation for Climate Friendly Procurement and Business (SKAO)<sup>3</sup> to disseminate the CO<sub>2</sub> PL in Europe. In parallel with this grant, the Foundation would like to strengthen the evidence-based impact of the CO<sub>2</sub> PL.

The IKEA Foundation has requested CE Delft to conduct an independent and critical evaluation of the impact of the CO<sub>2</sub> PL as an instrument in the Netherlands. The IKEA Foundation and SKAO suggested a two-phase approach for this evaluation: a literature and data review (Phase 1) and an impact evaluation (Phase 2). In this report we highlight the findings of Phase 1 and present the findings of Phase 2. In addition to the report, there is a [report of Phase 1](#) (CE Delft, 2022b).

## 1.2 Goal of the project

The main goal of the project is to obtain insights into the benefits of the CO<sub>2</sub> PL and determine the additional impact of the CO<sub>2</sub> PL. The related overarching research question is: *‘To what extent is the CO<sub>2</sub> PL an effective instrument for reducing CO<sub>2</sub> emissions?’*

This leads to the following questions and sub-questions:

1. **What is the additional effect of the CO<sub>2</sub> PL on CO<sub>2</sub> emissions of participating companies?**
  - a What is the impact of the CO<sub>2</sub> PL on corporate carbon management for certified companies?
  - b What is the effect on reduction targets set by companies (Scope 1 and 2)?
  - c What is the effect on carbon reduction measures taken by companies (Scope 1 and 2)?
  - d How do these effects relate to the size of the company?
  - e How do these effects differ per sector?
2. **What is the additional effect of the CO<sub>2</sub> PL on CO<sub>2</sub> performance in the supply chain (Scope 3)?**
  - a What are the drivers for reducing CO<sub>2</sub> emissions when submitting a tender?
  - b What is the effect on the CO<sub>2</sub> performance of tendered projects?
  - c What is the effect of the CO<sub>2</sub> PL on supply chain cooperation?
  - d To what extent does this cooperation lead to CO<sub>2</sub> emissions reduction at these companies?
  - e Which other initiatives influence behaviour of the different supply chain partners?

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<sup>3</sup> In Dutch: Stichting Klimaatvriendelijk Aanbesteden en Ondernemen (SKAO).



3. What is the additional effect of the CO<sub>2</sub> PL on the mindset and behaviour of participants?
- a What are factors for changing the mindset about sustainability at companies?
  - b What is the contribution or effect of the CO<sub>2</sub> PL to this change?
  - c To what extent does behaviour change as a consequence of the mindset change and what are the implications?
  - d To what extent does the CO<sub>2</sub> PL lead to behavioural changes at companies?

### 1.3 Scope

This project focuses on the CO<sub>2</sub> PL as a CO<sub>2</sub> management system for companies and a Green Public Procurement (GPP) instrument for governments. This includes Scope 1, 2 and 3 emissions. However, SKAO also manages the CO<sub>2</sub> PL for governments to assist (local) government organisations to reduce emissions. CE Delft was asked by SKAO to evaluate the scheme for municipalities in a separate project (CE Delft, 2022a). The focus of this project is on companies.

### 1.4 Evaluation methodologies

There is no single method that answers all research questions. We use a combination of methods: a survey, case studies (desk research and interviews) and a live workshop. All research methods are applied to all research questions, with different emphases. The survey and workshop are best suited to answer research questions #1 and #3 respectively. The survey also covers research question #2 and #3, albeit with fewer questions and a lower number of respondents. Case studies are mainly used to answer research question #2, although the interviews address all three research questions. For the case studies, both CO<sub>2</sub> PL participants and non-participants are interviewed, the latter being the control group. More information about the methodology can be found in Chapter 2.

### 1.5 Structure of the report

**Chapter 2** describes the methodology. **Chapter 3** provides a short description of the CO<sub>2</sub> PL. **Chapter 4** highlights the results of Phase 1. **Chapters 5, 6 and 7** show the results of sub-question 1 (What is the additional effect of the CO<sub>2</sub> PL on CO<sub>2</sub> emissions of participating companies?); 2 (What is the additional effect of the CO<sub>2</sub> PL on CO<sub>2</sub> performance in the supply chain? (Scope 3); and 3 (What is the additional effect of the CO<sub>2</sub> PL on the mindset and behaviour of participants?). **Chapter 8** is a discussion of the results of Chapters 5, 6 and 7. **Chapter 9** contains the conclusions and gives an overview of the findings and recommendations.

## 2 Methodology

This chapter describes the different types of methodologies that were used in this research project. The information gathering for the project consisted of three steps: survey, case studies and a workshop. As such, this evaluation employs both quantitative and qualitative methods. The synthesis phase was used to consider all the research material in context, and to draw conclusions about the effectiveness and efficiency of the CO<sub>2</sub> PL.

### 2.1 Survey

The first step in gathering information for this research project was to conduct a survey. Surveys are a popular method of data collection as they allow for the collection of a large amount of data in a short period of time.

#### Survey setup

The purpose of this survey is to gather information on the effectiveness of the CO<sub>2</sub> PL from a large group of users. We use the survey to answer all three research questions, but the focus of is on Scope 1 and 2 emissions and carbon management practices.

We developed an online survey using the tool CheckMarket. The survey was written in Dutch, because the target group was Dutch companies. We asked SKAO to send a link to the online survey to all 1,250 participants of the CO<sub>2</sub> PL. The survey was sent on 13 July 2022, followed by a reminder on 15 August 2022. We closed the survey on 23 August 2022. 504 respondents completed (parts of) the survey.

In this study, we exclude municipalities and focus only on companies (488 respondents)<sup>4</sup>. Respondents were allowed to skip questions and some questions were only asked to a specific group of companies. Therefore, the number of respondents differs per question.

The survey covers:

- Reasons companies committed to the CO<sub>2</sub> PL.
- The CO<sub>2</sub> reduction measures (Scope 1 and 2) adopted or planned since the participant committed to the CO<sub>2</sub> PL.
- Other carbon management strategies used.
- The extent to which the CO<sub>2</sub> PL was the main driver for the carbon reduction measures. Would companies also have taken the measures without the CO<sub>2</sub> PL?
- Characteristics of the companies.
- How the CO<sub>2</sub> PL has influenced the mindset of the company and its employees.

#### Characteristics of respondents

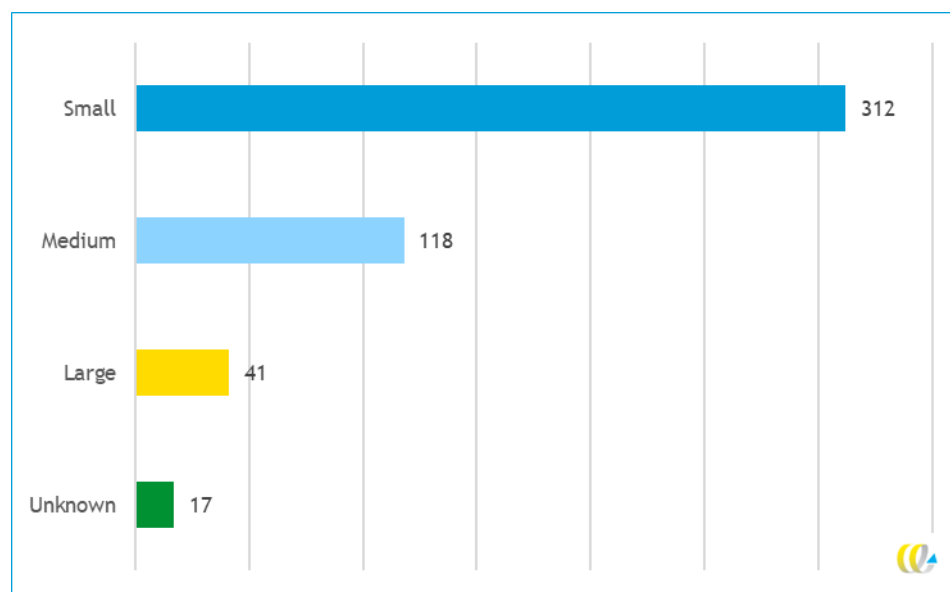
Here we describe some relevant information about the participating companies that took part in the survey.

Most companies (64%) are small organisations. Figure 1 shows the sizes of companies that participated in the survey.

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<sup>4</sup> Not all companies completed all survey questions, therefore it is possible that the N of a question is lower than 488.

Figure 1 - Size of the organisations<sup>5</sup>



N = 488.

The companies represent various sectors. Most companies operate in ground, road and water construction (GWW in Dutch), followed by consulting and engineering firms and specialised construction.

Table 1 - Number of participants in the (largest) sectors

Sector	Small	Medium	Large	Unknown	Total
Ground, road and water construction	102	12	43	5	162
Consultancy and engineering firms	46	2	9	1	58
Specialised construction	29	4	11	0	44
Green maintenance	31	1	6	4	42
Manufacturing industry	23	2	7	0	32
Other sectors	81	20	42	7	150

<sup>5</sup> Small organisation:

- Services: Total CO<sub>2</sub> emissions amount to no more than 500 tonnes per year.
- Working/supply: Total CO<sub>2</sub> emissions of the offices and industrial premises amount to no more than ( $\leq$ ) 500 tonnes per year, and the total CO<sub>2</sub> emissions of all building sites and production locations amount to no more than ( $\leq$ ) 2,000 tonnes per year.

Medium organisation:

- Services: Total CO<sub>2</sub> emissions amount to no more than 2,500 tonnes per year.
- Working/supply: Total CO<sub>2</sub> emissions of the offices and industrial premises amount to no more than ( $\leq$ ) 2,500 tonnes per year, and the total CO<sub>2</sub> emissions of all building sites and production locations amount to no more than ( $\leq$ ) 10,000 tonnes per year.

Large organisation:

- Services: Total CO<sub>2</sub> emissions amount more than 2,500 tonnes per year.
- Working/supply: Other.

Figure 2 shows the number of (first-time) certificates per year. The first companies joined the CO<sub>2</sub> PL in 2009, after which more companies joined until 2014. After 2014 the amount of companies joining each year varies.

Figure 2 - Response to the question: When did you join the CO<sub>2</sub> PL?

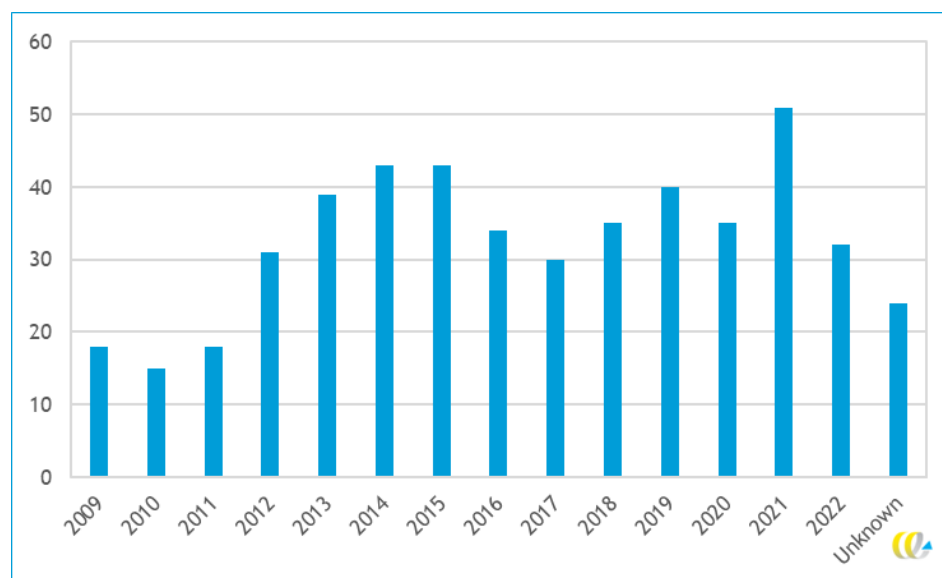


Figure 3 shows the certificate level of the companies at the start, and the level they currently hold. 193 companies (almost 40%) changed their certificate level. Most of them started at Level 3. Currently most of these companies have a Level 5 certificate.

Figure 3 - Change in certificate level

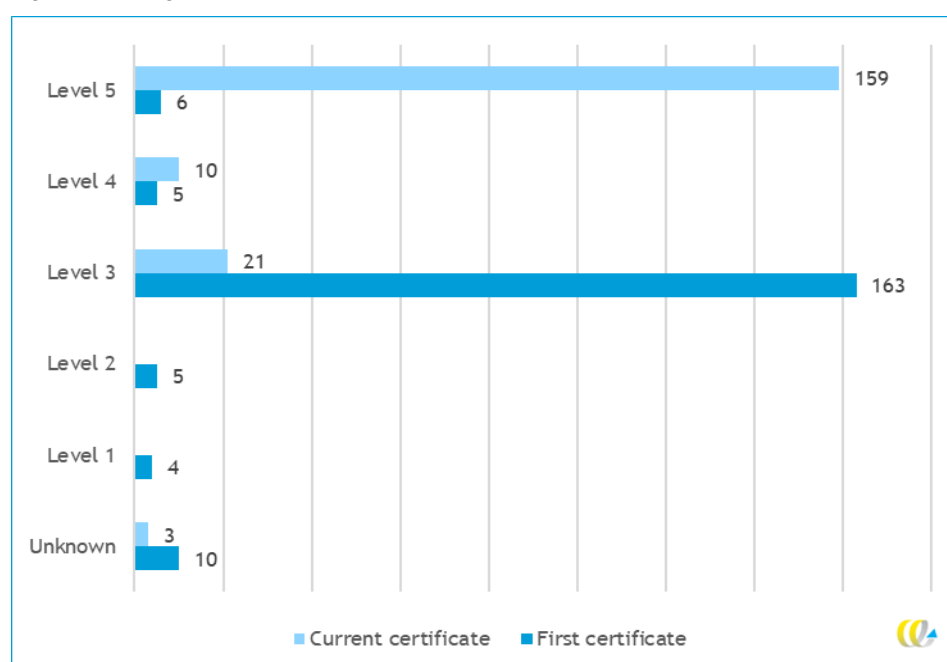
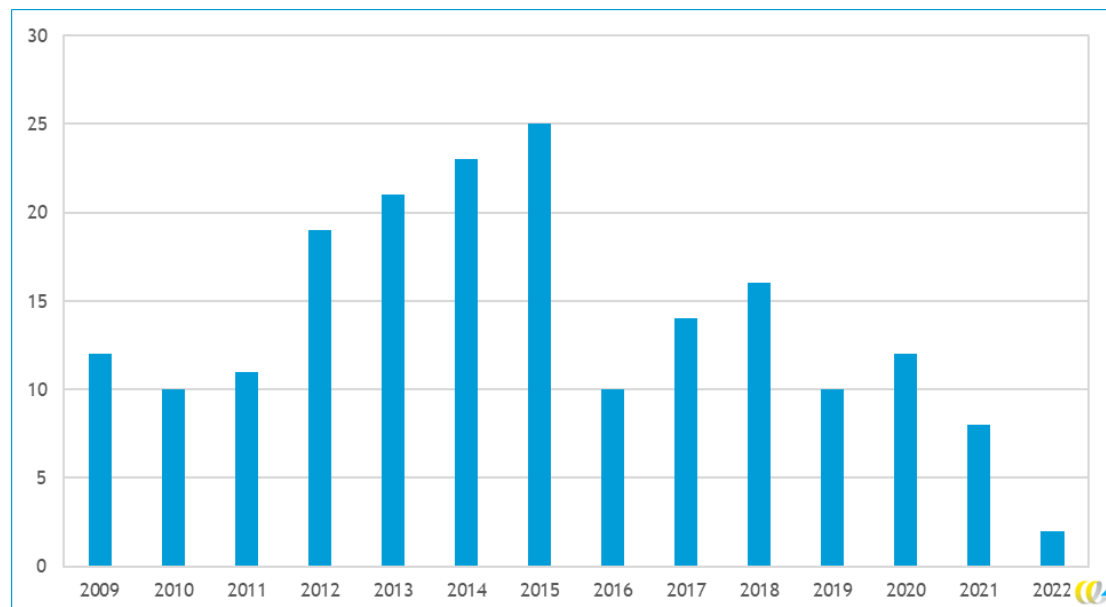


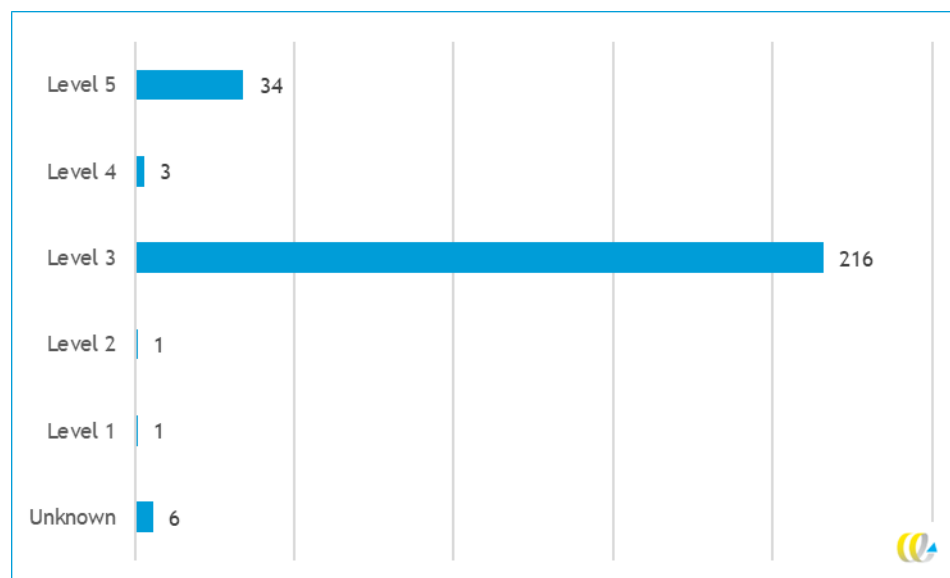
Figure 4 shows the year of the first certificate of companies that changed their certification level.

Figure 4 - Number of certified companies that changed their certification level in the given year



261 companies did not change their certificate level. Figure 5 shows the number of companies per certificate level. Most of them (almost 83%) are certified at Level 3.

Figure 5 - Level of certificate of companies that remain at the certificate level



## 2.2 Case studies

Case studies allow in-depth analysis of a small number of companies. This research uses case studies to analyse effects of the CO<sub>2</sub> PL on the supply chain. To cater for specific situations, the case studies vary in type and supply chain. The case studies include companies participating in the CO<sub>2</sub> PL, as well as of a governmental organisation that uses the CO<sub>2</sub> PL as a procurement tool. The aim of the case study method is to investigate the impact of the CO<sub>2</sub> PL on a micro-scale and obtain a more in-depth look at some aspects of the theory of change of the CO<sub>2</sub> PL.

Five case studies were conducted, each with its own focus (Table 2). The main focus of the case studies was the effect of the CO<sub>2</sub> PL on Scope 3 emissions<sup>6</sup> and supply chain cooperation, but changes in mindset and Scope 1 and 2 emissions were also addressed in interviews.

Table 2 - Overview sector per case study

Case study	Sector
1: Effect in supply chain (large company)	Construction sector
2: Effect in supply chain (small company)	Construction sector
3: Effect in supply chain in a sector other than construction	Engineering/consultancy
4: Effect for tenders and performance of water authorities	Local governments (two water authorities)
5: Effect of participation for multinational companies	Construction sector

In each case study we combined interviews with literature research. We studied relevant literature of the participating companies. Afterwards, we planned interviews. We asked SKAO for contact details and asked companies to connect us to suppliers and subcontractors.

## 2.3 Control group

This study also includes a control group of 97 companies that are not certified. These companies are in the process of certification for the CO<sub>2</sub> PL, but are currently non-participating companies. We sent them a short survey and asked them questions about their behaviour with regard to CO<sub>2</sub> emission reduction activities. All applicants were asked about the Scope 1 and 2 measures they had taken in previous years. Only applicants applying for Level 5 certification were asked about their Scope 3 measures.

This control group is comparable to the current certificate holders because both groups are interested in CO<sub>2</sub> reduction and the CO<sub>2</sub> PL. Therefore, we will compare the results with the main survey. 21 companies completed this short survey. This number is too low for a detailed quantitative analysis, but is high enough to provide some valuable insights. Two-thirds of the respondents were still in the process of certification, while the other third had already received their first certificate. Most applicants (19/21) applied for a Level 3 certificate; the other two applied for Level 5 certificate.

<sup>6</sup> On 1 January 2022 there are 445 companies certificated at Level 5.

6: Control group survey	Manufacturing (one company) Consulting and engineering firm (two companies) Others (four companies) General service industry (three companies) Ground, road and water construction (two companies) ICT (one company) Reparation and installation of machinery (one company) Technical service (two companies) House and utility construction (four companies)
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## 2.4 Workshop/interviews

On Tuesday, 13 September 2022, we organised a workshop for participants of the CO<sub>2</sub> PL to answer the questions about changes in mindset of companies. Ten CO<sub>2</sub> PL participants attended the workshop, selected via the survey<sup>7</sup>.

The aim of the workshop was to answer questions about changes in mindset of companies (cultural and behavioural change). Discussions involved topics such as developments over the past 10 years with respect to sustainability awareness in corporate culture, and the contribution of the CO<sub>2</sub> PL to that awareness and mindset. Eleven statements were presented to the participants in two groups over two sessions. They could indicate through coloured memos whether they agreed (green), were neutral (yellow) or disagreed (red) with the statement. The groups elaborated on their answers in the form of an open discussion.

The statements were:

1. Our procurement department has a sustainable procurement policy.
2. We have a corporate social responsibility manager (Maatschappelijk Verantwoord Ondernemen (MVO) in Dutch) who integrates sustainability.
3. We carry out projects more sustainably only if CO<sub>2</sub> PL is a requirement.
4. There is company-wide communication on CO<sub>2</sub> emissions and the CO<sub>2</sub> PL.
5. We consider sustainability broader than CO<sub>2</sub> reduction.
6. Employees talk about sustainability in their private lives.
7. Only the management and/or sustainability department is committed.
8. Employees participate in sustainability and give suggestions.
9. We ask our supplier for sustainable materials/products.
10. We have adapted our production/services.
11. Customer requirements determine what we can do in Scope 3, we have little influence on this.

<sup>7</sup> In the survey all respondents were asked to leave their contact details if they were willing to respond to further questions. Out of the positive respondents, ten companies agreed to attend the workshop.



## 3 CO<sub>2</sub> PL

This chapter provides a short description of the CO<sub>2</sub> PL. More detailed information about the instrument, theory of change and the mechanisms of the CO<sub>2</sub> PL management system and procurement instrument can be found in the Phase 1 report (CE Delft, 2022b).

### 3.1 SKAO

The Foundation for Climate Friendly Procurement and Business (SKAO) has been the owner and manager of the CO<sub>2</sub> PL since 2011. SKAO is an independent and not-for-profit foundation. It is responsible for the development, management and dissemination of the CO<sub>2</sub> PL as a carbon management system and procurement instrument, for stakeholder management research, and for providing information and a helpdesk (SKAO, 2020b).

### 3.2 The CO<sub>2</sub> PL as a carbon management system

The CO<sub>2</sub> PL is a CO<sub>2</sub> management system and a procurement instrument. As a management system, the CO<sub>2</sub> PL requires continuous improvement of insight, further CO<sub>2</sub> reduction measures, communication and operational management cooperation, not only in the execution of projects, but also in the value chain. The management system is a consistent ecosystem of arrangements and methods, and an organisational structure for methodical and systematic management and improvement of business processes to achieve objectives (SKAO, 2020a).

A CO<sub>2</sub> PL-certified organisation adheres to the requirements of the CO<sub>2</sub> PL. The CO<sub>2</sub> PL has five levels and four perspectives. Up to Level 3, an organisation that obtains a certificate on the Ladder reduces its own carbon emissions within its own organisation and projects (Scope 1 and 2 emissions<sup>8</sup>). From Level 4 and 5, the organisation also aims to reduce CO<sub>2</sub> emissions from the business chain and sector (Scope 3 emissions). The requirements for each level are based on four perspectives:

1. Insight: to determine different streams of energy and the carbon footprint of the organisation.
2. Reduction: to develop ambitious targets for the reduction of CO<sub>2</sub> emissions.
3. Transparency: to structurally communicate the organisation's policies of CO<sub>2</sub> reduction.
4. Participation: to take part in business sector initiatives to reduce carbon emissions.

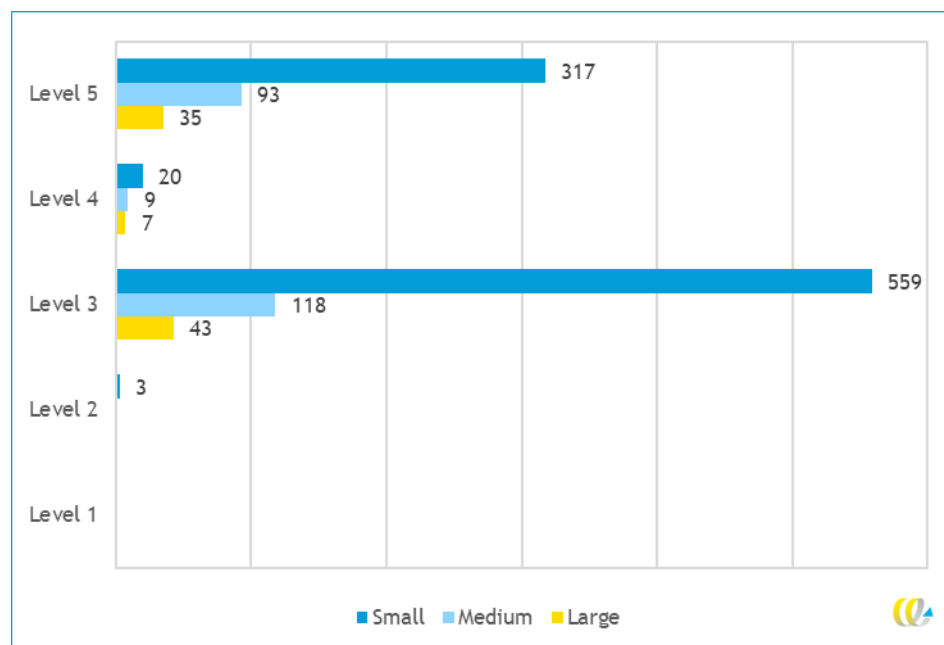
To remain certified, companies need to keep track of their emission reductions and are monitored annually on their efforts to meet their targets. In the Netherlands, more than 1,200 certificates have already been issued on the CO<sub>2</sub> PL as a carbon management system (SKAO, 2020b). Accredited Certifying Institutions (CIs) award the certificates to the companies. CIs are supervised by National Accreditation Bodies (NAB). These are governmental agencies that attest to the competence and impartiality of conformity assessment bodies. We see that small companies more often obtain a Level 3 certificate,

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<sup>8</sup> Scope 1 covers emissions from sources that an organisation owns or controls directly (e.g. burning fuel in fleet or vehicles). Scope 2 are emissions that a company causes indirectly when the energy it purchases and uses is produced (e.g. generation of electricity). Scope 3 emissions are all indirect emissions that occur in the value chain of the reporting company. These include both upstream and downstream emissions.

while bigger companies prefer the Level 5 certificate. We see that 37% of the certificates are Level 5 and 60% are Level 3.

Figure 6 - Distribution levels of the certified organisations (01-01-2022), by company size



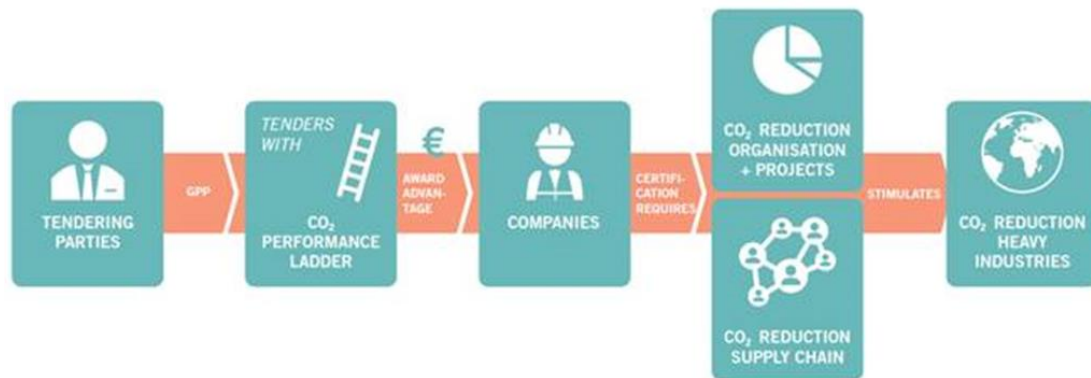
Source: SKAO.

### 3.3 The CO<sub>2</sub> PL as a procurement instrument and the ‘theory of change’

SKAO has based the CO<sub>2</sub> PL on the theory of change. The CO<sub>2</sub> PL aims to drive change by stimulating structural CO<sub>2</sub> reduction through public procurement. Commissioning parties using the CO<sub>2</sub> PL as a Green Public Procurement (GPP) instrument give companies an advantage based on their CO<sub>2</sub> PL certificate level. Most tenders that include an advantage are public tenders.

In tenders, companies can receive an advantage for achieving a certain CO<sub>2</sub> PL level. Companies must comply with CO<sub>2</sub> emissions criteria within a year of winning a tender, by providing a project statement or a CO<sub>2</sub> awareness certification. They can also choose their level of ambition and receive an advantage on tender prices, where the level of ambition becomes a performance requirement and failure to comply with the requirement may result in a penalty. According to the theory of change, the financial advantage provided by the CO<sub>2</sub> PL in tenders encourages companies to decarbonise and innovate their projects, supply chain and heavy industry. This should be accelerated because companies on higher CO<sub>2</sub> PL levels cooperate and incentivise each other, through the commissioning parties that apply the CO<sub>2</sub> PL as a Green Public Procurement (GPP) instrument.

Figure 7 - Theory of change



Source: SKAO.

## 4 Literature review

This chapter highlights the most important findings of the literature analysis. More information about the factors influencing the uptake of the CO<sub>2</sub> PL, the uptake of the CO<sub>2</sub> PL as a carbon management system and GPP instrument and other effects can be found in the Phase 1 report (CE Delft, 2022b).

### 4.1 Factors influencing the uptake of the CO<sub>2</sub> PL

Studies show that the CO<sub>2</sub> PL has been increasingly adopted by firms as a response to climate change (Rietbergen, 2015) and driven by the potential competitive advantage of the CO<sub>2</sub> PL in tender contracts (Rietbergen et al., 2016). Most companies were driven by the competitive advantage that being certified at a certain level has in tenders. Secondary reasons for certification include wanting to become a frontrunner, positioning the company as green, pressure from peers and pressure from consortium partners (Rietbergen, 2017).

### 4.2 Uptake of the CO<sub>2</sub> PL CO<sub>2</sub> management system

A study of Rietbergen, Opstelten and Blok shows that the CO<sub>2</sub> PL has been responsible for a strong shift towards more mature energy management and enhancing CO<sub>2</sub> emission reduction among construction and civil engineering firms. Most likely this would not have been achieved by other contextual drivers alone (Rietbergen et al., 2016). Another study concludes that the CO<sub>2</sub> PL (Handbook 2.2) has mainly improved energy management practices at an administrative level. The CO<sub>2</sub> PL has been responsible for a shift towards more mature energy management among construction and civil engineering firms that otherwise would not have occurred. The potential effect of the CO<sub>2</sub> PL in reducing Scope 1 and 2 CO<sub>2</sub> emissions, based on an ex ante impact assessment, is estimated at between 0.8%/year and 1.5%/year, with a most likely value of 1.3%/year (Rietbergen, 2015).

### 4.3 Uptake of the CO<sub>2</sub> PL GPP instrument

The first tendering procedures in which the supplier submitted CO<sub>2</sub> PL certificates took place in 2009; six out of fifteen projects of ProRail were tendered with the CO<sub>2</sub> PL. At the end of 2009, twelve contractors had certificates and a year later the number issued had passed 100. In March 2011, 138 certificates had been issued, of which 50 had been upgraded. 88 certificates were authorised and active. Most of them were for Level 3 or above.

Three-quarters of the companies applying for the first certificate assessed themselves as Level 3. The incentives for companies to embrace the scheme were sufficient. Tenders awarded to a CO<sub>2</sub> PL certificate holder comprised 92% of tendered work (Dorée et al., 2011). In 2016, the CO<sub>2</sub> PL was used in 9.3% of the tenders in TenderNed. 75 different commissioning parties used the CO<sub>2</sub> PL in tenders (Significant et al., 2017).

In some market segments, nearly all companies have a performance certificate at the highest level. In such a situation, if the CO<sub>2</sub> PL is used only as a GPP tool, the certificate is a prerequisite rather than an instrument that gives you an advantage in the tendering process (Everaars, 2022).

## 4.4 Effect of the CO<sub>2</sub> PL on CO<sub>2</sub> emission reduction

The effect of the CO<sub>2</sub> PL on CO<sub>2</sub> emission reduction has only been quantitatively examined in one study. This study (Rietbergen et al., 2016) shows that before 2016, about 30-50% of the measures are identified as additional (Scope 1 and 2). In the period 2010-2013, the annual CO<sub>2</sub> emission reduction rate due to energy efficiency improvement and fuel switching was 3.2% per year. In an initial estimate, the study shows *that about 1.0-1.6%/year of this reduction can be attributed to the CO<sub>2</sub> PL*. The study focuses on the construction sector and civil engineering companies and is based on interviews, a descriptive analysis of energy efficiency and CO<sub>2</sub> emission reduction measures, and quantitative analysis of CO<sub>2</sub> emission reductions. Total emissions in the water construction sector decreased by 7.8%/year in the period 2010-2015 (Scope 1 and 2), the ratio of emissions per euro or turnover of 3.5%/year in 2010-2015 (Rietbergen, 2017).

No quantitative effects of Scope 3 emissions are known. Companies indicate that the supply chain initiatives would have taken place even if the CO<sub>2</sub> PL did not exist (Rietbergen, 2017). However, obtaining quantitative insights into the chain emissions is, for most companies, the most important added value of the CO<sub>2</sub> PL (Rietbergen, 2017). This conclusion is confirmed by Simon Goes (2017). He shows that most initiatives for the 4D and 5D angle were motivated by factors other than the CO<sub>2</sub> PL.

In 2022, CE Delft examined the quantitative and qualitative effects of the implementation of the CO<sub>2</sub> PL in municipalities (CE Delft, 2022a). Eighteen municipalities were certified by 1 September 2022. Six municipalities were interviewed (CE Delft, 2022a). The study shows that the surveyed municipalities reduced their CO<sub>2</sub>-emissions by 23.9% in the period 2018-2020 (12.8%/year). Most reductions took place in Scope 1. In this study, it was not possible to examine the additional effect of the CO<sub>2</sub> PL. However, many municipalities observed a sharp reduction in CO<sub>2</sub> emissions in the year of certification or the following year.

## 4.5 Other effects

Besides energy efficiency, there are studies on other effects of the CO<sub>2</sub> PL. For example, Phair (2018) shows that most companies perceive CO<sub>2</sub> and circular economy management as two separate fields. A 2020 study (RIVM et al., 2020) shows that the uptake of the CO<sub>2</sub> PL in the programme of requirements sometimes results in a product that is more circular in nature than the market standard. CE Delft concludes that the CO<sub>2</sub> PL has a measurable effect on the choice of the power product (CE Delft, 2016). In total, about 1,600 GWh of electricity is purchased by the companies on the CO<sub>2</sub> PL in 2016. Most companies on CO<sub>2</sub> PL that do not yet purchase green electricity (approximately 600 GWh) want to switch to green electricity. However, the total electricity purchased by CO<sub>2</sub> PL companies is too small to draw quantitative conclusions about the effect on market prices of the various types of Guarantees of Origin (GvOs) (CE Delft, 2016).

According to the study by CE Delft (2022), the most important effects of the CO<sub>2</sub> PL for municipalities are:

- Because municipalities certify themselves for the CO<sub>2</sub> PL, they set goals for CO<sub>2</sub> reduction. All municipalities are on track to meet their goals.
- The certification gives municipalities insight into their CO<sub>2</sub> reduction. As a result, they are better able to discuss targets and identify measures.
- The Plan-Do-Check-Act cycle of the CO<sub>2</sub> PL ensures robust reduction targets and monitoring within the municipal organisation. This ensures a focus on CO<sub>2</sub> reduction in the long term.

- Some municipalities find the CO<sub>2</sub> PL complex or the administrative burden high. Nevertheless, in general municipalities indicated that the CO<sub>2</sub> PL has added value for their organisation.

#### **4.6 Subjects not covered in existing literature**

Literature sources do not yet provide insight into the effects along the supply chain, sectors other than water and construction, the results of a control group and the effects on the mindset. The coming chapters report on the findings during our own study and the research questions as posed in Section 1.2.

# 5 CO<sub>2</sub> PL's additional effect on emission reduction by participating companies

## 5.1 Introduction: research question and methods

This chapter is centred around the following research question and sub-questions: **'What is the additional effect of the CO<sub>2</sub> PL on the CO<sub>2</sub> emissions of participating companies?'**

- a What is the impact of the CO<sub>2</sub> PL on corporate carbon management for certified companies?
- b What is the effect on reduction targets set by companies (Scope 1 and 2)?
- c What is the effect on carbon reduction measures taken by companies (Scope 1 and 2)?
- d How do these effects relate to the size of the company?
- e How do these effects differ per sector?

Multiple methods are applied to answer the research question and sub-questions. These are a survey among 488 participating companies<sup>9</sup>, five case studies on participating and non-participating companies, a workshop with ten participants from various companies and a control group survey. The following paragraphs address the results, per method, regarding the additionality of the CO<sub>2</sub> PL on CO<sub>2</sub> reduction among participating companies. The survey is considered to be the main method for answering this research question.

## 5.2 Results from the survey

### Reason for certification

Participating companies were asked to give all reasons for certification including their main reason. Figure 8 shows the most common reasons and the number of companies to whom the reason applies. The light blue shows all reasons mentioned and the dark blue shows the number of times it was mentioned as the main reason. The most frequently mentioned reason is 'the benefits from procurement', followed by 'the organisation's need to reduce CO<sub>2</sub> emissions'. This finding applies to all organisation sizes (small, medium, large) and sectors.

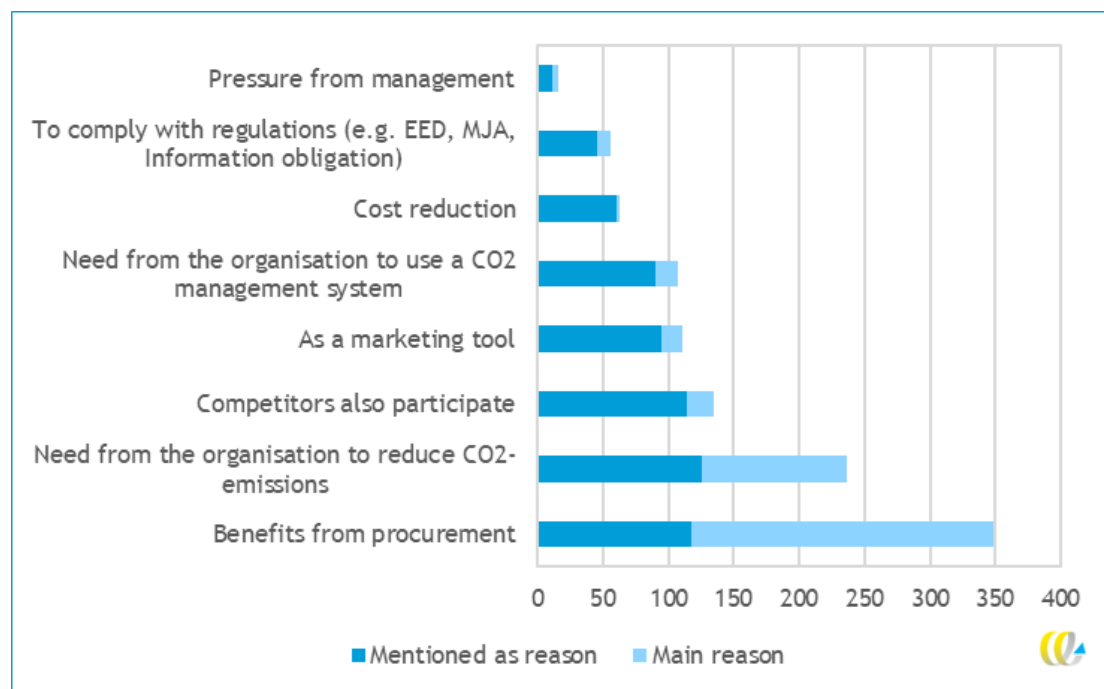
The results of the control group survey show that applicants' main reason for certification is the requirement in some tenders (7/21). Other important reasons are the organisation's need to reduce emissions (5/21) and the fictive discount in tenders (3/21). This is comparable to the participants.

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<sup>9</sup> The survey was sent to all certificate holders on 13 July 2022, and a reminder on 15 August 2022. We closed the survey on 23 August 2022. 504 respondents have filled in the survey, including 488 companies.



Figure 8 - Response to the question: 'What are reasons for you to use the CO<sub>2</sub> PL and what is the most important reason for you to use the CO<sub>2</sub> PL?'



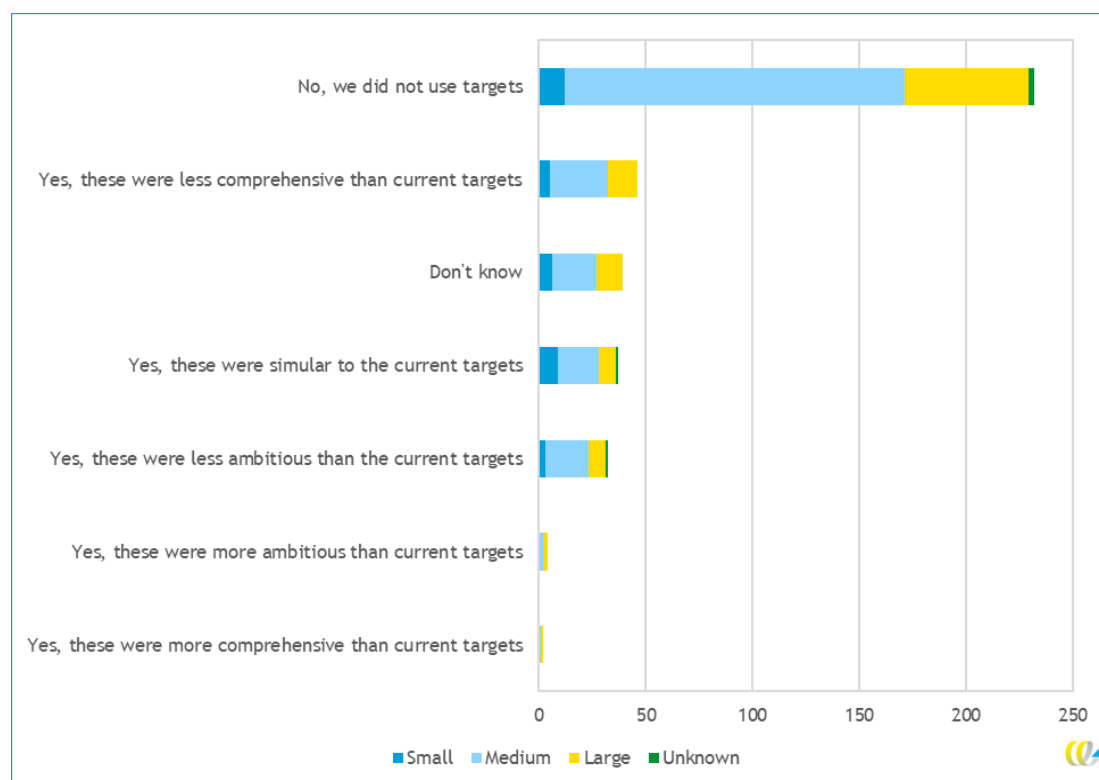
N = 488.

Companies had the opportunity to add customised answers to the question. A notable result is that many companies mentioned that a reason for their participation in the CO<sub>2</sub> PL because it is required by their customers.

## Targets

The survey also sought to gain insight into the impact of the CO<sub>2</sub> PL on the use of CO<sub>2</sub> reduction targets. Therefore, we asked participating companies if they were using reduction targets prior to participating in the CO<sub>2</sub> PL. Figure 9 shows the result. It appears that most companies (small, medium and large) did not use targets before their certification. These results do not vary between sectors.

**Figure 9 - Response to the question: 'Did you also use CO<sub>2</sub> reduction targets prior to your participation in the CO<sub>2</sub> PL? (by company size)**



N = 392.

## Effect on measures taken

### Textbox 1 - Most important measures according to respondents

Respondents were asked about the most important measures they had taken to reach their Scope 1 and 2 targets. They were allowed to mention up to three measures. They identified the following measures as the most important:

1. Purchase of green electricity and/or Dutch GvOs (106 times).
2. Electrification of cars (99 times).
3. Reduction of fuel use/efficient driving (62 times).
4. Use of biofuels (42 times).
5. Pv panels (38 times).

The top 10 was completed by: energy efficient machinery (27); electric machinery/tools (23); insights/awareness (21); more sustainable buildings (16); LED (11).

The participating companies implemented Scope 1 and 2 measures. These measures should lead to emission reduction. However, some measures might also have been taken without the company being CO<sub>2</sub> PL certified. To verify this, we asked the companies whether they would have taken each measure if they were not participating in the CO<sub>2</sub> PL. Figure 10 shows the response to this question. The green/yellow bar shows the effect of the CO<sub>2</sub> PL; the measure would not have been taken or it would have been taken a later date/to a lesser extent. However, the orange and red bar shows that some measures would also have been taken because of other initiatives or at their own initiative. Therefore, the orange and red colours show the free riders and green and yellow are additional.

**Figure 10 - Response to the question: 'For each measure taken, what would you most likely have done if you had not participated in the CO<sub>2</sub> PL? (Scope 1 and 2)?**

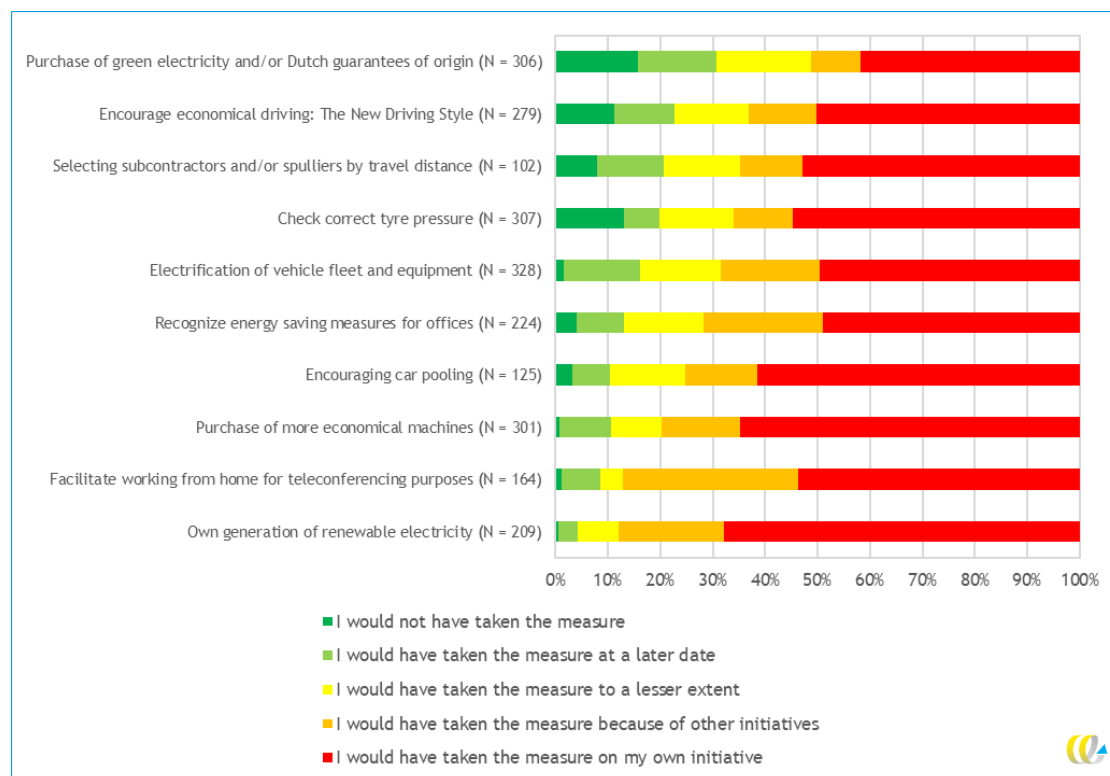


Figure 9 shows that the additionality of the CO<sub>2</sub> PL for most of the measures is less than 50%. We elaborate this in Table 3.

#### Textbox 2 - The difficulty of hypothetical questions

In the survey participants are asked about their behaviour without the CO<sub>2</sub> PL, which is a hypothetical situation. There is always a risk that the answer given may differs from the actual behaviour. This can cause biases in different directions. On the one hand, people can give socially acceptable answers, because they don't want to be judged as a free rider. This can overestimate the additionality of an instrument. On the other hand questions about hypothetical behaviour are not always easy to answer, because the referred situation is not isolated and the instrument can have changed their mindset. This can lead to an underestimation of the additionality. Therefore, it is always useful to check if the answers are intuitive and to verify them using multiple research methods, including interviews (in case studies), a workshop and a control group survey.

Table 3 shows the additionality per measure for small and large companies. Additionality means that the measure would not have been taken; or would have been taken at a later time or to a later extent. The lower boundary of the bandwidth shows the share of respondents saying they would not have taken the measure (full additionality). The upper band also includes companies that took the measure at a later date/to a lesser extent (partial additionality).

From Table 3 we see that the lower boundary of additionality for most measures is relatively low, for some it is even close to 0%. Additionality is highest for the purchase of

green electricity and/or Dutch guarantees of origin. Participants indicated, in an open question, that the most important measures for reducing emissions are: electrification of vehicle fleet and equipment, own generation of renewable energy (pv panels) and purchase of fuel efficient machines. Additionality for the own generation of renewable electricity is the lowest. This implies that most companies would have taken the measure regardless of the CO<sub>2</sub> PL.

In the table, we also compare small and large companies. We see that additionality differs per type of measure. From the results we also see that large companies took measures more often because of other initiatives, while small companies took measures at their own initiative.

**Table 3 - Additionality per measure, small and large companies**

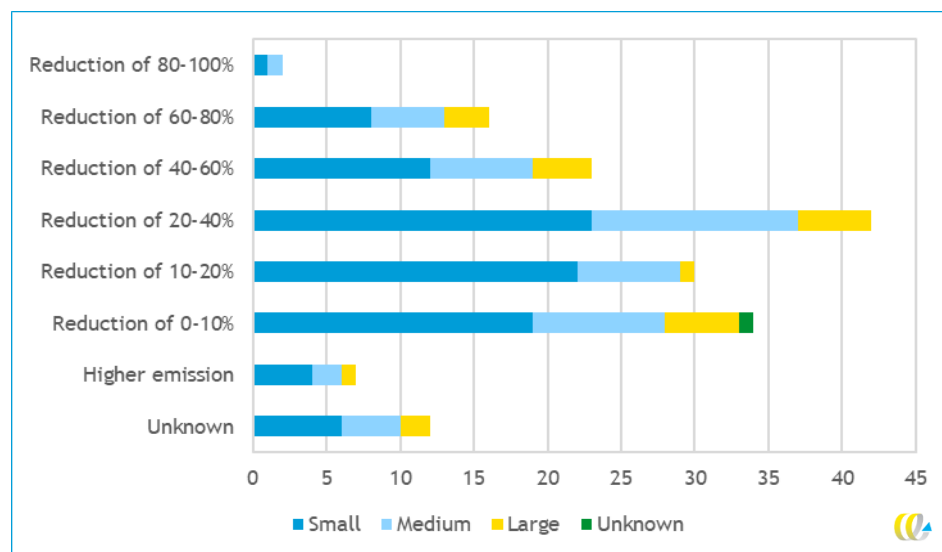
	Small companies	Medium companies	Large companies
Recognised energy saving measures for offices	6-29%	2-30%	0-18%
<b>Electrification of vehicle fleet and equipment</b>	<b>1-32%</b>	<b>2-30%</b>	<b>0-26%</b>
Facilitate working from home for teleconferencing purposes	2-15%	1-12%	0-12%
<b>Own generation of renewable electricity</b>	<b>0-12%</b>	<b>2-14%</b>	<b>0-7%</b>
<b>Purchase of green electricity and/or Dutch guarantees of origin</b>	<b>18-48%</b>	<b>10-46%</b>	<b>6-45%</b>
Encourage economical driving: The New Driving Style	12-39%	8-21%	18-41%
Selecting subcontractors and/or suppliers by travel distance	9-33%	4-30%	14-71%
Encouraging car pooling	4-25%	0-23%	0-13%
Check correct tyre pressure	16-37%	6-25%	5-23%
<b>Purchase of more economical machines</b>	<b>8-14%</b>		<b>7-17%</b>

In different sectors, we see some differences. Most respondents work for consultancy companies and in the ground, road and waterway (GWW in Dutch) sector. We see that in general, additionality is higher for the GWW sector and other sectors and lower for the consultancy sector. The exception is the selection of subcontractors and/or suppliers by travel distance: compared with other sectors additionality for this issue is much higher at consultancy companies.

## Effect on CO<sub>2</sub> emissions

We asked the companies about their realised emission reductions in Scope 1 and 2 since the start of the CO<sub>2</sub> PL. Most of them achieved reductions of 20-40%, followed by reductions of 0-10%. Most of these companies have a Level 5 certification. The average reported gross annual reduction was around 7.7% (median 5%). Large companies show an even distribution between reductions of 20-40% (five companies) and reductions of 0-10% (five companies). Small companies are more likely to report reductions of 10-20%, followed by reductions of 20-40% and reductions of 0-10%.

**Figure 11 - Response to the question: What is the realised emission reduction with respect to Scope 1 and 2? (by company size)**

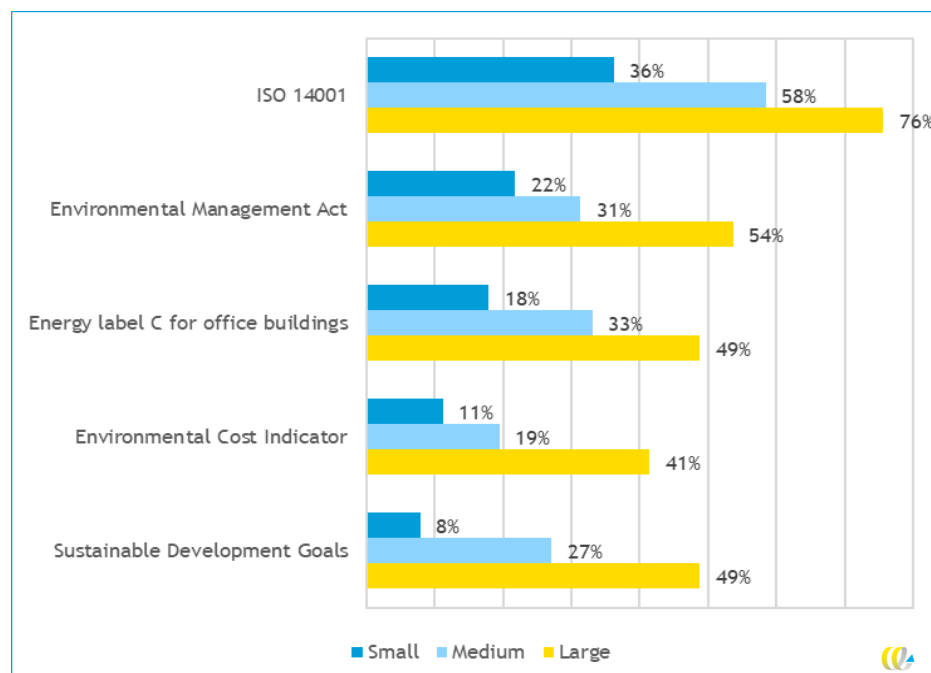


N = 166.

## Importance of other initiatives

Some measures would have also been taken without the CO<sub>2</sub> PL. Besides the CO<sub>2</sub> PL, companies also commit to other initiatives. Therefore, survey participants were asked which other initiatives they would have participated in. The companies could give multiple answers to this question. Most of them adhere to ISO 14001, followed by the Environmental Management Act (Wet milieubeheer) and Energy Label C for office buildings.

**Figure 12 - Top 5 other initiatives taken by companies, by company size**



N = 471.

We asked companies about the impact of the different initiatives on their CO<sub>2</sub> reduction compared to the CO<sub>2</sub> PL. All respondents (488) were asked: ‘to what extent do the initiatives affect your CO<sub>2</sub> reduction compared to the CO<sub>2</sub> PL?’ (much more impact, more impact, comparable, less impact, much less impact).

Table 4 shows the net score per initiative. The net score is the difference between the number of respondents indicating that the CO<sub>2</sub> PL has (much) less impact and the number of respondents saying the CO<sub>2</sub> PL has (much) more impact. The higher the net score, the more important is the initiative compared to the CO<sub>2</sub> PL. A negative net score shows that the CO<sub>2</sub> PL is more important.

Table 4 shows that most of the initiatives are less important than the CO<sub>2</sub> PL. Exceptions are Science-Bases Target Initiative (SBTi), Environmental Cost Indicator, MJA3/MEE (Multiyear agreement on energy efficiency), Stimular Environmental Barometer and the Concrete Agreement. The initiatives with the lowest net score are also most often mentioned as other initiatives.

**Table 4 - Net score importance of initiatives compared to CO<sub>2</sub> PL**

Initiative	Net score	Number of times mentioned
SBTi	44	16
Environmental Cost Indicator (ECI/MKI)	20	78
MJA/MEE	8	12
Stimular Environmental Barometer	2	52
Concrete agreement	1	27
Local climate/energy agreements	-5	20
Energy label C	-16	123
ISO 50001	-20	16
EED-audit	-22	81
GRI-reporting	-23	26
Sustainability scan	-27	23
Sustainable Development Goals (SDG's)	-32	83
Environmental Management Act	-35	131
ISO 14001	-36	217

Nevertheless, we also asked the companies which initiative was the most important for CO<sub>2</sub> reduction.

The survey question was ‘Which of the initiatives you mentioned are leading for the reduction of CO<sub>2</sub> emissions?’ The number of respondents were 301, this includes companies that are certified at Level 1, 2, 3, 4 and 5.

The ranking is as follows:

1. CO<sub>2</sub> PL.
2. Environmental Cost Indicator (ECI/MKI).
3. ISO 14001.
4. Stimular Environment Barometer.
5. Others.
6. Sustainable Development Goals.
7. Science-Based targets Initiative (SBTi).
8. Environmental Management Act (Wet milieubeheer).
9. EED-audit.

10. Concrete Agreement.
11. GRI report.
12. Local Climate/energy agreements.
13. Energy label C for office buildings.
14. ISO 50001.
15. MJA3/MEE.

The results between the two questions differ, indicating a difference in interpretation of the question. A possible explanation for the difference is that the answers differ for Scope 1 and 2 emissions, and for Scope 3 emissions. For example, respondents of the last question could have considered Scope 1 and 2 emissions, and not Scope 3 emissions.

### **Main results from control group survey**

The short survey among applicants for the CO<sub>2</sub> PL (companies that are not yet certified) suggests that it has more impact than was expected based on the results of the main survey. Firstly, it shows that the number of (Scope 1 and 2) measures taken by applicants is particularly low compared to participants. Despite the fact that this could indicate the added value of the CO<sub>2</sub> PL, we should be cautious in our conclusions due to the low number of the participants (21). Secondly, the results show that only half of the applicants are using targets for CO<sub>2</sub> reduction and that only one-third of the applicants have a CO<sub>2</sub> management system. This is consistent with the results in Figure 9 and previous research by Rietbergen. This could be another indicator for the additionality of the CO<sub>2</sub> PL.

## **5.3 Results from the case studies**

All interviewed companies have Level 5 CO<sub>2</sub> PL certificates, except for the water authorities, one of which has a Level 3 certificate and one is not certified. Below we describe our findings on the additional impact of the CO<sub>2</sub> PL on Scope 1 and 2 CO<sub>2</sub> emissions of participating companies within companies. These include common findings across the case studies and highlight differences within the common findings.

### **CO<sub>2</sub> PL provides insight into CO<sub>2</sub> emissions (in the beginning)**

The CO<sub>2</sub> PL is used as a corporate carbon management system at most companies interviewed and studied in the case studies. These include one small and one large construction company, one water authority, one non-construction company and one international (construction) company.

All construction (small, large, international) companies and the non-construction companies indicated that the CO<sub>2</sub> PL's main contribution was to provide insight into the companies' CO<sub>2</sub> emissions. For example, the small construction company mentioned that the CO<sub>2</sub> PL provided it with the insight that its fuel use was their largest share of emissions, which it then decided to reduce.

The companies mentioned that the added value of the CO<sub>2</sub> PL was mainly at the beginning, when the insight was gained.

Both water authorities use the CO<sub>2</sub> PL for procurement of their projects. One water authority does not use the CO<sub>2</sub> PL to gain insight into its own emissions. Both water authorities use a monitoring tool named the *Klimaatmonitor Waterschappen* to gain insight



in their emissions. One water authority is certified at Level 3, so that it can gain insight into its own emissions and as an extra administrative measure.

### **CO<sub>2</sub> PL is not the main driver (anymore) for setting the actual reduction targets (Scope 1 and 2)**

When first certified, the CO<sub>2</sub> PL provided insight that helped the companies to set targets.

All companies (except the water authorities) indicate that the level of ambition is kept low. The construction companies pointed out the benefit of being CO<sub>2</sub> PL certified is to be allowed to tender or have a competitive advantage at tenders. Once a certain level of certification is reached (three or five), the most important objective is to maintain this level, so as not to be disadvantaged in tenders. This is an important motivation to communicate targets that can easily be reached.

The larger companies, construction and non-construction, mentioned that CO<sub>2</sub> emission reduction targets are set by the board for commercial or intrinsic reasons. These are then imposed on the subsidiaries. The less ambitious of the existing targets are then communicated to the CO<sub>2</sub> PL for certification, to ensure that the targets can be met.

The small construction company set a modest emission reduction target of just a few percentage points over three years. The company is internally more ambitious and takes measures that could well lead to higher emission reductions, but will only set a reduction target that it is sure it will meet. It is also motivated by the fear of losing the CO<sub>2</sub> PL certificate if the CO<sub>2</sub> PL reduction target is not met.

The international company mentioned the extension of its certificate for its activities in Belgium. There, not all companies are certified, and their certificate could therefore provide an advantage (if mentioned) compared to other companies.

The water authorities show a difference in their target ambitions compared to the other case studies, and compared to each other. Noteworthy is the level of ambition of the non-certified water authority: its target (100% carbon and energy neutral in 2025) is more ambitious than the target of the certified water authority (energy neutral in 2030 and 100% circular in 2050). However, these targets are set for the long term and for Level 3 certification (or no certification), whereas other companies are certified at Level 5. Targets for Level 5 certificate – as opposed to Level 3 – are binding.

## **5.4 Results from the workshop**

Ten people attended the workshop, representing companies of various levels of certification, sectors and sizes. Typically, the smaller companies were certified at Level 3 and the larger companies at Level 4 and 5. During the workshop, participants were mainly invited to speak about the CO<sub>2</sub> Performance Ladder and cultural change, although the workshop also gave some insight into the CO<sub>2</sub> PL as a carbon management system:

- The smaller the company, the more difficult it is to manage the administration of the CO<sub>2</sub> PL. One company mentioned that it is a balancing act between insight, sustainability and administrative burden. The majority of the smaller companies admitted that the investment in consultants, additional paperwork and extra audits makes them reluctant to go to Level 4 or 5. However, when a company has a CO<sub>2</sub> PL certificate it does not have to perform an Energy Efficiency audit (EED audit) for all

locations, saving paperwork. In addition, Rabobank offers financial benefits to a company certified at Level 5.

- The CO<sub>2</sub> PL mainly helps to gain insight and ensure that measures for Scope 1 and 2 emission reductions, such as renewable electricity contracts, are kept in place.
- Some developments occur more or less autonomously, such as changing company cars from ICE to fully electric, or solar panels. This is not driven by the CO<sub>2</sub> PL, but because price parity and technical developments make for a positive business case.
- Replacing old diesel construction machines with electric ones is a common investment. But for some construction works no feasible electric alternatives are available as yet. High diesel and gas prices (currently) help the drive towards electrification.
- The companies see obtaining the certificate as a one-off effort. After that, there is not necessarily a sustained effort towards sustainable measures. Companies that have had the certificate for 10 years sometimes wonder whether there is still an added value in keeping it. Not many tenders won by having the certificate. It seems more part of the marketing of a company, showing that it is doing something good.

## 5.5 Discussion and conclusion

Here we discuss the combined results of the three research methods applied for answering the research question on the additional effect of the CO<sub>2</sub> PL on the CO<sub>2</sub> emissions of participating companies. Note that this concerns Scope 1 and 2 emissions in the direct sphere of influence of the company: emissions from energy/fuel consumption for their own operations and transport movements.

### Motivations to participate in the CO<sub>2</sub> PL

The most frequently mentioned main reasons for participating in the CO<sub>2</sub> PL are the benefits from procurement and the need of the organisation to reduce CO<sub>2</sub> emissions. This is in line with previous research by Rietbergen (2015) and Rietbergen et al. (2016), which stated that a response to climate change and potential competitive advantage in awarding contracts are the main reasons. Other reasons, such as a marketing tool or because other companies participated, were also mentioned. Comparable motivations were mentioned as secondary reasons by Rietbergen (2017). We also looked into the differences between organisation size and the sectors. We did not notice any differences.

### Impact of the CO<sub>2</sub> PL on corporate carbon management

A much repeated comment during in-depth interviews with eight participants and the workshop with ten other participating companies is that they see the added value of the CO<sub>2</sub> PL in gaining insight into the Scope 1 and 2 emissions, especially insights into where they can make the largest reductions. As a carbon management system, the CO<sub>2</sub> PL helps to provide insight into company emissions and it helps increase the motivation of the management team to take decisions on measures, as part of the Plan Do Check Act cycle. The results of the control group survey show that only one-third of the applicants (companies who are not certified as yet) are using a carbon management system. This could indicate the added value of the CO<sub>2</sub> PL.

## Effect on reduction targets set by companies

Most companies (small, medium and large) did not use targets before the CO<sub>2</sub> PL. These results do not differ between the sectors. The year of certification also makes no impact on the reduction targets set. After certification, the less ambitious of the existing targets are often communicated to the CO<sub>2</sub> PL for certification, to ensure that the targets can be met.

## Quantitative carbon reduction in participating companies (Scope 1 and 2)

Average annual reduction as indicated by companies in the survey was around 7.7% (median of 5%). In part, these reductions are caused by policy measures such as subsidies and legislation on CO<sub>2</sub> standards, and by a change in public perception on sustainability. Nevertheless, some of the emission reduction can be attributed to the CO<sub>2</sub> PL (additionality). The results are similar to previously recorded numbers. A previous study by Dr M. Rietbergen about the impact of CO<sub>2</sub> PL (Handbook 3.0) in the water construction sector (Rietbergen, 2017), found that the CO<sub>2</sub> footprint of a large part of the companies within this sector decreased by 7.8%/year in the period 2010-2015 (Scope 1 and 2).

## Additionality of measures taken by companies (Scope 1 and 2)

The main measures in Scope 1 and 2 with relatively high additionality are the purchase of electricity or Dutch guarantees of origin (GoOs) and the electrification of cars: up to almost 50% respectively over 30% of the respondents of the survey indicate they would either not have taken the measure or taken it to a lesser extent or at a later time without the CO<sub>2</sub> PL. For the purchase of GoOs, the results are in line with the study of Rietbergen et al. (2016), which showed that the CO<sub>2</sub> PL particularly stimulated the purchase of green electricity and the adoption of various behavioural measures.

The survey found that the additionality for own generation of renewable electricity is lowest (less than 12%). This means that 88% of the companies would have taken the measure even without the CO<sub>2</sub> PL. Own generation of renewable electricity can be seen as an example of an autonomous development. This is not driven by the CO<sub>2</sub> PL, but simply by the price parity and technical developments that make this an attractive measure.

Each measure has a different additionality and each measure has a different CO<sub>2</sub> reduction. Between < 15% up to a maximum of 46% of the companies indicate that they would not have taken the measure or would have taken it at a later time or to a lesser extent without the CO<sub>2</sub> PL. This additionality is slightly lower than results from previous studies. Rietbergen et al. (2016), showed an additionality between 30-50% for Scope 1 and 2 emissions, whereas we found (< 15% to a maximum of 46%) per measure. *CO<sub>2</sub> reduction attributed to the CO<sub>2</sub> PL cannot be more than 46% of the 7.7% annualised reduction: i.e. less than 3.5%.*

It appears from the results of the control group survey among applicants (companies who are not certified yet) that the number of (Scope 1 and 2) measures taken by applicants is particularly low compared to participants. Despite the fact that this could indicate the added value of the CO<sub>2</sub> PL, we should be cautious with our conclusions because of the relatively low number of applicants that completed the survey (21).

## Effect related to size of the company and sector

There is a difference in company size in terms of the reasons for taking measures. Large companies are more likely to have taken measures because of initiatives other than the CO<sub>2</sub> PL, whereas small companies would have taken measures more often. Medium-sized companies show results that fall in between small and large companies. Out of all respondents, 41 were large companies. Large companies in the Netherlands are obliged to adhere to other regulations, such as an EED audit, more often than small companies. Some medium-sized companies may also be required to follow other regulations.

We see that, in general, additionality is higher for the waterworks and (road) construction sector and other sectors, and lower for the consultancy sector.

# 6 CO<sub>2</sub> PL's additional effect in the supply chain

## 6.1 Introduction

In this chapter, we look into the additional effect of the CO<sub>2</sub> PL on the CO<sub>2</sub> performance in the supply chain (Scope 3). This is examined by means of measures taken as an effect of the CO<sub>2</sub> PL. However, the Scope 3 measures do not necessarily lead to measurable CO<sub>2</sub> reductions. Additionality is therefore not always quantifiable in terms of Scope 3 CO<sub>2</sub> reduction.

The research question we address in this chapter is:

**'What is the additional effect of the CO<sub>2</sub> PL on the CO<sub>2</sub> performance in the supply chain (Scope 3)?'**

- a What are the drivers for reducing CO<sub>2</sub> emissions when submitting a tender?
- b What is the effect on the CO<sub>2</sub> performance of tendered projects?
- c What is the effect of the CO<sub>2</sub> PL on supply chain cooperation?
- d To what extent does this cooperation lead to CO<sub>2</sub> emissions reduction within these companies?
- e Which other initiatives influence behaviour of the different supply chain partners?

Note that the CO<sub>2</sub> emissions in the supply chain (Scope 3) are covered by the CO<sub>2</sub> PL at Levels 4 and 5. Companies certified at Level 5 must set targets and take measures to reduce their Scope 3 emissions. Certification at lower levels does not include Scope 3 emissions; only the direct emissions from own activities (Scope 1 and 2).

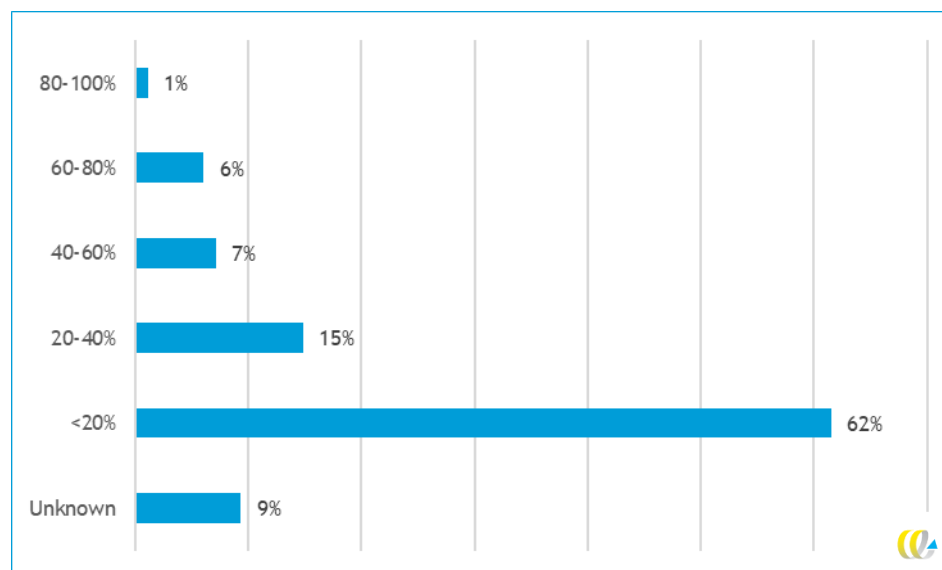
We used multiple methods to answer the research question and sub-questions. These methods include a survey among 488 participating companies, of which 199 are certified at Level 5 and 13 Level 4; five case studies on participating and non-participating companies, a workshop with ten participants from various companies and a control group survey. The following paragraphs address the results, per method, regarding the additionality of the CO<sub>2</sub> PL on CO<sub>2</sub> reduction in participating companies.

## 6.2 Results from the survey

### Tenders

488 companies completed the survey. 330 companies (67%) participate in tenders where the CO<sub>2</sub> PL is used. Of this sample, 10 companies are certified at Level 4 and 172 companies at Level 5. Figure 13 shows the proportion of tenders where the CO<sub>2</sub> PL is used (only Level 4 and 5 certificated companies). For most companies, this is less than 20% of the total number of tenders.

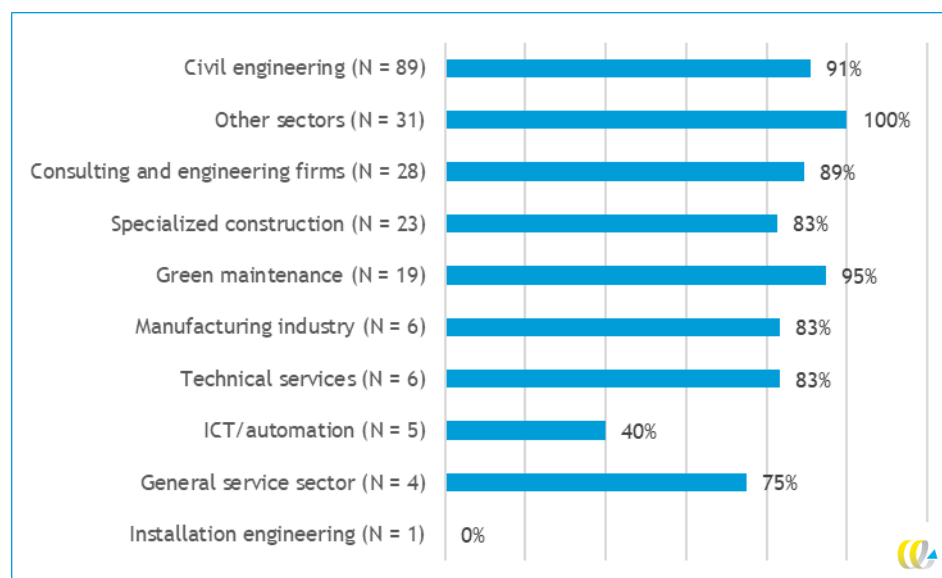
**Figure 13 - Response to the question: 'In what proportion of the tenders you bid on, on average, is the CO<sub>2</sub> Performance Ladder used annually?' (only Level 4 and 5 companies)**



N = 172.

According to the results of the survey, about 89% of the Level 4 and 5 participants participate in tenders in which the CO<sub>2</sub> PL is used. Figure 14 shows the share of the companies per sector. Supported by a high number of observations, the share seems to be relatively high for civil engineering companies. The results suggest that the share is lower for specialised construction companies. For some sectors, such as ICT/automation and installation engineering, the proportion of companies that participate in tenders in which the CO<sub>2</sub> PL is used seems to be rather low. However, the number of observations for these sectors are too low to draw conclusions from.

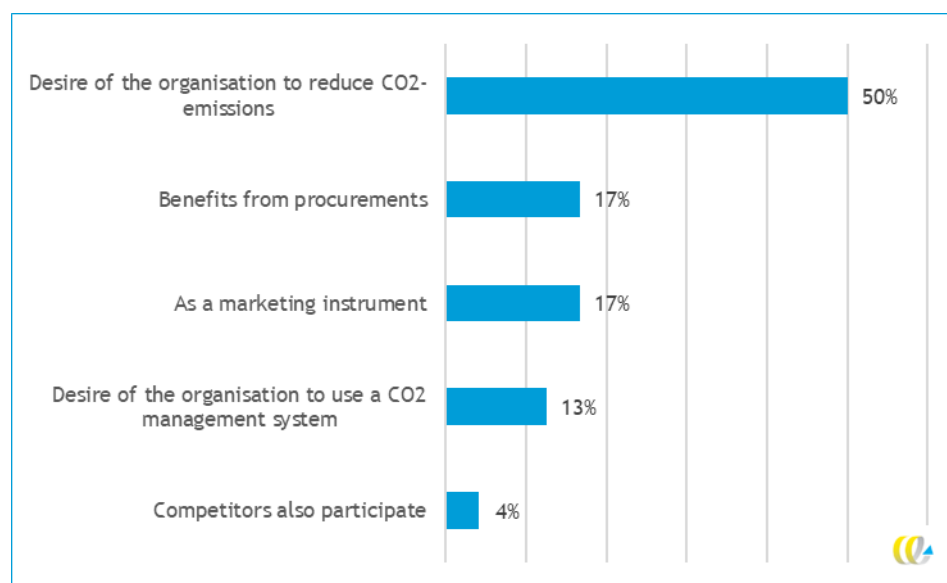
**Figure 14 - Share of (level 4 or 5 certified) companies that participate in tenders in which the CO<sub>2</sub> PL is used, per sector**



N = 212.

Figure 15 shows the reasons for certification for companies that do not participate in tenders in which the CO<sub>2</sub> PL is used (only Level 4 and 5 companies). The most important reason seems to be the desire of the organisation to use a CO<sub>2</sub> management system.

**Figure 15 - Reasons for companies who do not participate in tenders in which the CO<sub>2</sub> PL is used (only Level 4 en 5 companies)**



N = 24.

## Effects on measures taken

### Textbox 3 - Most important measures according to respondents

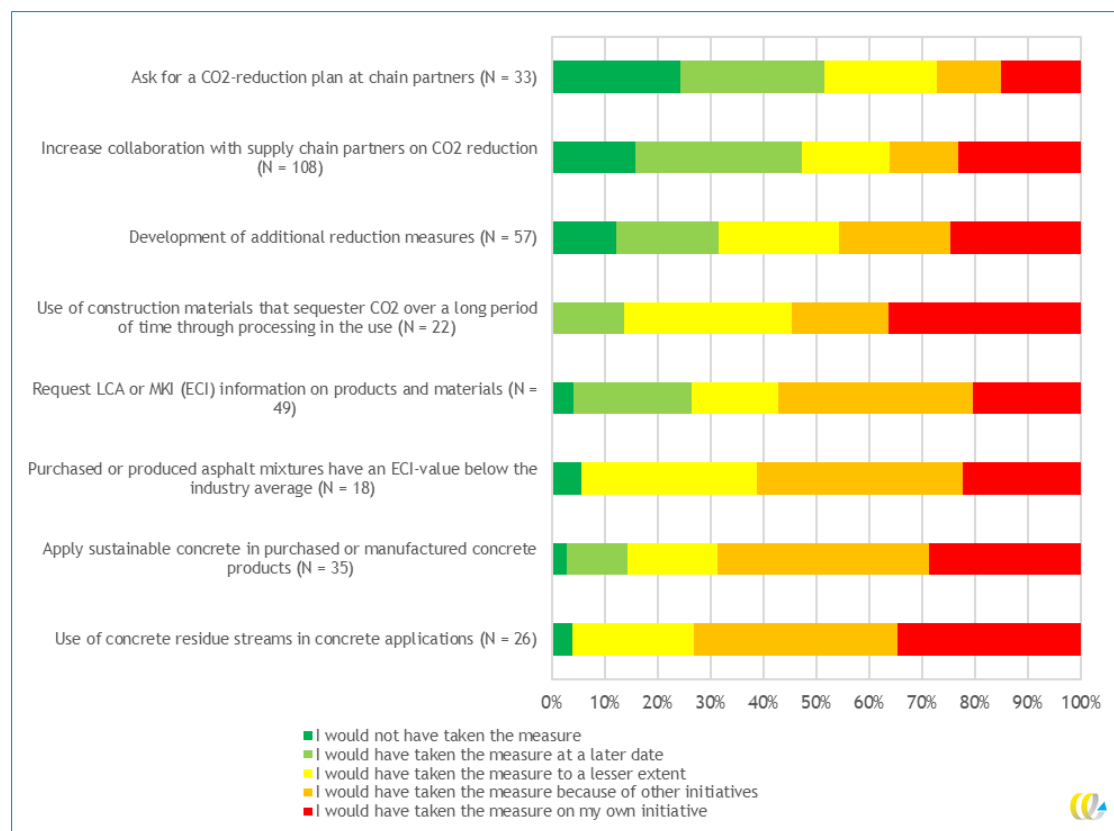
Respondents were asked about the most important measures they had taken to reach their Scope 3 targets. They were allowed to mention up to three measures in an open question format. The following measures are identified as the most important:

1. Collaboration with supply chain partners (17).
2. Reduction of impact commuting (14).
3. Waste management (13).
4. Choice of more sustainable suppliers (10).
5. Procurement of sustainable resources/materials (e.g. concrete) (8).

It is possible that Scope 3 measures would have been taken even without the CO<sub>2</sub> PL. Therefore, companies were asked which measures they would have taken since their certification and whether they would have taken the measures even if they not participated in the CO<sub>2</sub> PL. Figure 16 shows the result of this question. The green and yellow bars show the effect of the CO<sub>2</sub> PL if the measure would not have been taken or would have been taken at a later date/less often. The orange and red bars show that some measures would also have been taken without the CO<sub>2</sub> PL (because of other initiatives or at the company's own initiative). Most of the measures do not directly affect CO<sub>2</sub> emission reduction, which makes it hard to measure additionality.



**Figure 16 - Response to the question: ‘For each measure taken, what would you most likely have done if you had not participated in the CO<sub>2</sub> PL?’ (Scope 3; Level 4 and 5 participants)**



We see that additionality appears higher than for Scope 1 and 2 measures. For the most important measure according to participants (collaboration with supply chain partners) the additionality is 15-62%. Whether this collaboration leads to additional CO<sub>2</sub> emission reduction does not follow from the survey. The share of respondents saying they would not have taken this measure without the CO<sub>2</sub> PL (fully additional) is 15%. The percentage increases to 62% if companies that said they would have implemented the measure at a later date or to a lesser extent are included. The number of participants that answered the question on this specific measure is 108. For the other measures the number of respondents is lower. It should be noted that the number of participants taking this measure is much lower than for the Scope 1 and 2 measures. The number of participants is too low to analyse the differences between size and sector.

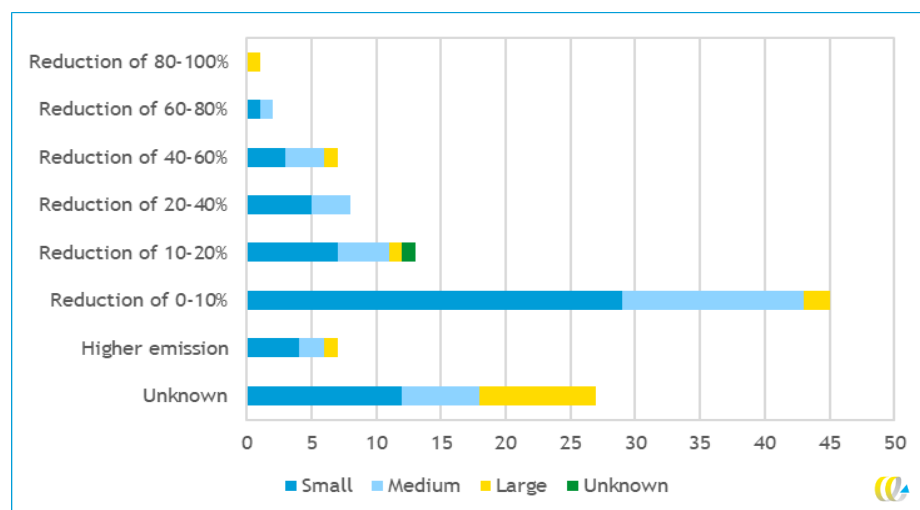
#### Textbox 4 - The difficulty of hypothetical questions

In the survey, participants are asked about their behaviour without the CO<sub>2</sub> PL, which is a hypothetical situation. There is always a risk that the given answer differs from the would-be actual behaviour. This can cause biases in different directions. On the one hand, people may give socially acceptable answers as they do not want to be judged as a free rider. This may overestimate the additionality of an instrument. On the other hand, questions about hypothetical behaviour are not always easy to answer, because the situation referred to is not isolated and the instrument may have changed their mindset. This may lead to an underestimation of the additionality. Therefore it is always useful to check whether the answers are intuitive and to verify them using multiple research methods, including interviews (in case studies) and a workshop.

## Effects on CO<sub>2</sub> emissions

We asked the 110 Level 4 and 5 companies about their realised emission reduction in Scope 3 since the start of the CO<sub>2</sub> PL. Most of them achieved a reduction of 0-10%. For a relatively large share the emission reduction is unknown. The average emission reduction for Scope 3 is 2.6% per year (median 1.25%).

**Figure 17- Response to the question: 'What is the realised emission reduction with respect to Scope 3?'**  
(Level 4 and 5 companies, by company size)

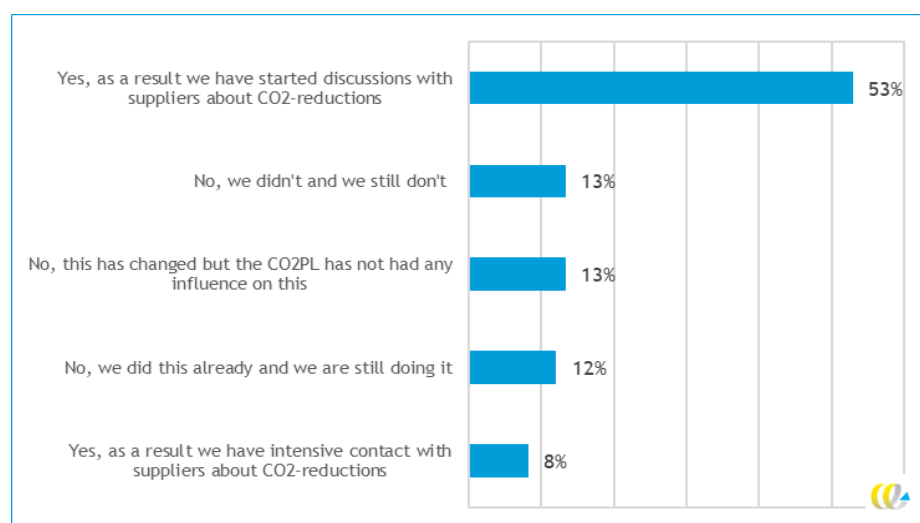


N = 110.

## Supply chain

The CO<sub>2</sub> PL has led to a change in contact with the suppliers. More than half of the participants stated that the CO<sub>2</sub> PL has led to the start of discussions with the suppliers about CO<sub>2</sub> reduction. Also, 8% stated that the CO<sub>2</sub> PL has led to more intensive contact.

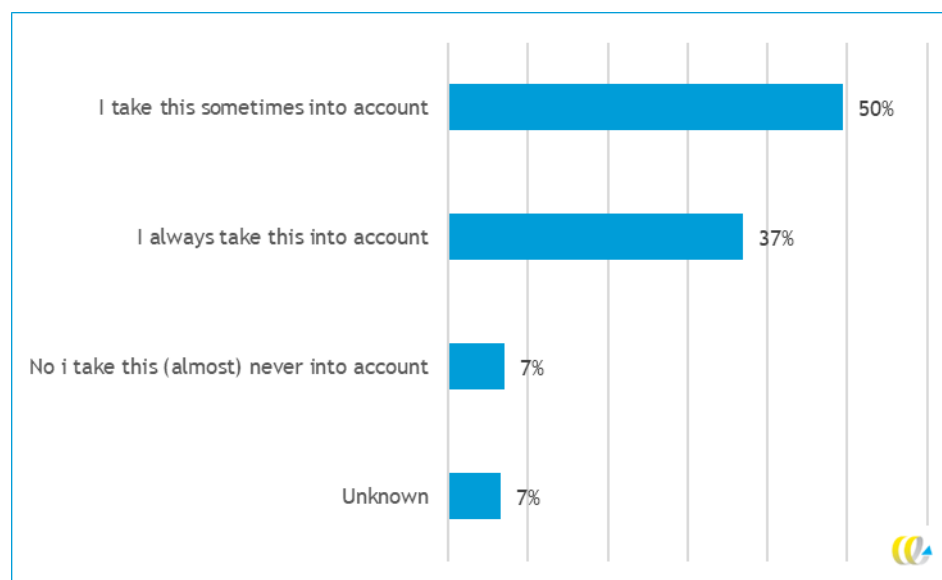
**Figure 18 - Response to the question: 'Has your participation in the CO<sub>2</sub> PL led to a change in contact with suppliers (downstream and upstream) about supplier CO<sub>2</sub> reductions?'**



N = 157.

More than 85% of the participants (sometimes) take emission reduction into account when executing projects and/or producing products.

Figure 19 - Response to the question: 'To what extent do you take the reduction of emissions into account when executing projects or producing products?'



N = 200.

### 6.3 Results from the case studies

Here we discuss the main insights that were shared by the companies and the water authorities that took part in the case studies. We highlight common insights into Scope 3 emissions and where they differ between the companies.

#### Project based requirements, and not the CO<sub>2</sub> PL, drive CO<sub>2</sub> emission reduction (Scope 3) in tenders

The companies we interviewed indicate they have little control over material use within projects further down the supply chain. The procuring party decides what materials should be used, which are specifically mentioned in the project. This is particularly true for the smaller construction company and the non-construction sector companies.

Tendering parties and certified companies note the important role of the tendering party in determining the sustainability level of a project. For tendering parties, the use of local, often smaller companies, can be another important consideration in tenders (as mentioned by both water authorities). The water authorities in the case studies ask for a certain certification level in tenders, not as a knock-out criterion but as an advantage, while still allowing (small) companies to compete at lower levels or without certificates. The main added value of the CO<sub>2</sub> PL, according to the water authorities, is that it forces tendering parties to start thinking about CO<sub>2</sub> reduction. This was not mentioned by the other companies.

The large construction company mentioned that in the construction sector, most companies are certified, and they mention that most tendering parties mention the CO<sub>2</sub> PL as a knock-out criterion in tenders. In these tenders, the CO<sub>2</sub> PL is not a leading instrument in the procurement process for selecting the project with lowest impact (Scope 1, 2 and 3 emissions). The decision is often based on costs and on other sustainable standards or the company's own standards that are set by the commissioning party, for example the Environmental Cost Indicator (ECI) is used by ProRail and the Department of Waterways and Public Works.

The small construction company indicated that municipalities do not often use the CO<sub>2</sub> PL certificate as a procurement advantage. They indicated that they see no added value in the supply chain due to this. The large construction company sees no added value in the Level 5 certification. It's motivation to remain certified is to not be at a disadvantage in tenders. This does not apply to Belgium, where certification can still be an advantage for companies in tenders.

The small construction company mentioned that actual collaboration and Scope 3 CO<sub>2</sub> reductions for Scope 3 take place at project level, whereas the CO<sub>2</sub> PL requires annual targets. For projects, the availability of personnel, money and biofuels/electric equipment are other bottlenecks that were mentioned. The same bottlenecks were mentioned by the large construction companies in the Netherlands and Belgium.

### **Effects of the CO<sub>2</sub> PL on target setting (Scope 3)**

Targets for Scope 3 mainly follow from goals formulated because of other motivations, for example targets based on the SBTi or existing policies and activities. The large construction company active in Belgium indicated that the SBTi is their main driver for target setting. One engineering company also mentioned the SBTi of the international group as the source for target setting. The other engineering company mentioned that targets are retrieved from activities they already participated in for Scope 3 reductions. This company did state that without the CO<sub>2</sub> PL they would not have set a Scope 3 target.

Companies set relatively low targets compared to their actual ambitions to meet the requirements of the CO<sub>2</sub> PL, but not be outcompeted because of high costs of sustainable extra measures. The companies communicate less ambitious targets or fewer targets to the CO<sub>2</sub> PL than the actual targets they have set based on other motivations. For example, in Case study 1 (A.2), the company said that they have more targets than they use for the CO<sub>2</sub> PL. In Case study 2 (A.3), the company reported that they set a target that was easy to achieve. The same holds for the non-construction companies.

The additional effect of the CO<sub>2</sub> PL for CO<sub>2</sub> emissions when submitting a tender lies in the carbon management system: it allows companies to reduce emissions within the company, but not within the supply chain.

The large construction company pointed out that they see a large difference between competitors, all certified on Level 5, in terms of ambition and approach toward CO<sub>2</sub> emission reduction.

## **The CO<sub>2</sub> PL did not lead to additional initiatives/collaborations in the supply chain**

Initiatives were of added value when the CO<sub>2</sub> PL was first created, when awareness of sustainability was lower. Nowadays, collaborations between companies on the topic of sustainability is common, according to the interviewed companies. Certified companies communicate existing initiatives for the CO<sub>2</sub> PL, rather than setting new ambitions for collaboration.

The large construction company mentioned with regard to collaborations that it looks at the level of ambition of other companies. It does not collaborate with companies that are less ambitious, even if that company holds a Level 5 certificate. An example was mentioned of a company in the same sector.

According to the interviewed certified companies (not the water authorities), their Level 5 certification on the CO<sub>2</sub> PL does not influence the behaviour of subcontractors and suppliers. The same applies to situations where they are the subcontractor themselves.

The small construction company tries more with regard to collaborations than with regard to the CO<sub>2</sub> PL, although ambitions are difficult to achieve at project level, where other requirements guide the materials and equipment used.

## **6.4 Results from the workshop**

The workshop involved ten participants from various levels of certification, sectors and company sizes. The workshop provided insights into the effects of the CO<sub>2</sub> PL in the supply chain, although the main topics of the workshop were the overall effectiveness of the CO<sub>2</sub> PL as an instrument and the effect on mindset and behaviour. The insights regarding the supply chain are as follows:

- The CO<sub>2</sub> PL certificate alone does not create an incentive within the project to reduce emissions. Within tenders, the ambition level set by the commissioning party is the main driver to reduce carbon emissions in a project or in the use of products (construction works). Tender requirements and regulations are often linked to other initiatives.
- The participants have opportunities to influence the environmental impact of materials/products which rank lower in the materiality analysis (for example clothing or coffee). For raw materials, such as steel and concrete, demand and supply depend on other factors such as tender requirements, availability and cost, and these are more difficult to influence.
- In Scope 3, other factors such as employment and price play an important role in the discourse companies have around whether to change their products or not. The CO<sub>2</sub> PL ensures uniformity and prevents fragmentation among commissioning parties. However, the CO<sub>2</sub> PL does not automatically lead to carbon reduction. Many investments have a long payback period (5-10 years), while a (government) procurement has a shorter lead time. As a result, it is not always profitable to make investments for a certain tender. However, this can be encouraged when there is a long-term cooperation. Furthermore, there is not always a level playing field with foreign countries.

## **6.5 Discussion and conclusion**

Additional effects of the CO<sub>2</sub> PL on the supply chain are measured in Scope 3 emission reductions, through tendering projects and in-company measures. Only companies certified at Level 4 and 5 are required to report on their Scope 3 emissions. Fewer companies are

certified at Level 4 and 5, and the measures they report on are not all quantifiable. As a consequence, less quantitative data could be gathered from the survey, and overall results have a larger uncertainty on the additional effect of the CO<sub>2</sub> PL on the supply chain than for the additionality on Scope 1 and 2 emissions in companies (Chapter 5).

Based on 110 respondents, the average annual emission reduction for Scope 3 emissions is 2.6% (median 1.25%) per year, though for a relatively large share the emission reduction is unknown. This emission reduction is realised due to a multitude of motivations and initiatives of which the CO<sub>2</sub> PL is one. Emission reduction for Scope 3 appears to be small. Other principles, such as reducing the use of carbon intensive materials, should have a stronger effect. To realise these principles, regulation and project-specific procurement requirements are necessary. It is unlikely the CO<sub>2</sub> PL can realise a significant emission reduction in Scope 3 emissions, but it does lead to insights into Scope 3 emissions and communication in the supply chain.

According to the survey, additionality for Scope 3 measures (not emissions) seem higher than for Scope 1 and 2, but is based on a far lower number of respondents (18 to 110 depending on the measure). Scope 3 measures include non-quantitative measures such as collaboration with supply chain partners, which does not in itself lead to emission reduction. The measure ‘collaboration with supply chain partners on CO<sub>2</sub> reduction’, has an additionality of 15-62% from the survey. This is not in line with the case studies and the workshop, where companies indicated that existing initiatives/collaborations are often communicated. During interviews in the six case studies with companies certified at Level 4 or 5, companies indicated that these collaborations did not lead to measurable CO<sub>2</sub> emission reductions.

Around 67% of the companies participate in tenders. For those companies not participating in tenders, the main reason for participating in the CO<sub>2</sub> PL is the need to use a CO<sub>2</sub> management system or to comply with regulations such as EED or MJA.

In general, companies have two ways of influencing Scope 3 emissions: 1) redesign: selecting other, less CO<sub>2</sub> intensive materials for their products; 2) trying to influence suppliers to reduce CO<sub>2</sub> emissions of their (conventionally selected) materials. From the interviews and workshop it became apparent, however, that influence of companies on Scope 3 emission reduction is limited:

- In the construction sector, the Scope 3 emissions reductions are realised in projects. The CO<sub>2</sub> PL does not drive the reduction of supply chain emissions in projects.
- The choice of materials for smaller construction projects is often determined in advance by the commissioning party.
- In tenders, commissioning parties set specific requirements for materials that either might not be sustainable, or the budget dedicated to sustainable materials is too low to be able to compete.
- About 50% of certified companies have intensive contact with suppliers about CO<sub>2</sub> reduction. The CO<sub>2</sub> PL may therefore encourage communication with partners, but nothing can be concluded about the additionality of actual CO<sub>2</sub> reduction achieved by the company. In interviews and the workshop, companies both large and small, indicated little influence on collaborating partners.

The case studies revealed that the ambitions of targets for Scope 3 communicated to the CO<sub>2</sub> PL are lower than their actual ambitions. This was also mentioned in general (for Scope 1, 2 and 3 targets) during the workshop.

### **The importance of the CO<sub>2</sub> PL for Scope 3 emission reduction**

In the interviews and the workshop, the ECI/MKI was mentioned as more important in tenders and specific projects for Scope 3 emissions; the CO<sub>2</sub> PL as important for the reduction of Scope 1 and 2 emissions.

In the survey, companies were asked about the importance of the CO<sub>2</sub> PL for CO<sub>2</sub> reduction (Scope 1, 2 and 3) in comparison to other initiatives. SBTi and ECI/MKI were mentioned as more important (this question was answered by 302 companies). In the interviews and the workshop, the ECI/MKI was mentioned as more important in tenders and specific projects (Scope 1, 2 and 3), and the CO<sub>2</sub> PL for company emissions (Scope 1 and 2).

# 7 Mindset and behaviour

## 7.1 Introduction

In this chapter we analyse the additional effect of the performance ladder on the mindset and behaviour of participants. Cultural change on CO<sub>2</sub> emissions includes raised awareness and behavioural change of company employees at all levels. This includes shifting CO<sub>2</sub> reduction measures from being the responsibility of one department or corporate sustainability being incorporated in decision making at executive level and among procurement and field staff.

The research question and sub-questions we address in this chapter are:

**‘What is the additional effect of the performance ladder on the mindset and behaviour of participants?’**

- a What are factors for changing the mindset about sustainability within companies?
- b What is the contribution or effect of the CO<sub>2</sub> PL on this change?
- c To what extent does behaviour change as a consequence of the mindset change and what are the implications?
- d To what extent does the CO<sub>2</sub> PL lead to behavioural changes within companies?

We used multiple methods to answer the research question and sub-questions.

These methods include a survey among 488 participating companies, five case studies on participating companies; a workshop with ten participants from various companies and a control group survey. The following paragraphs address the results, per method, regarding the additionality of the CO<sub>2</sub> PL on the culture within participating companies.

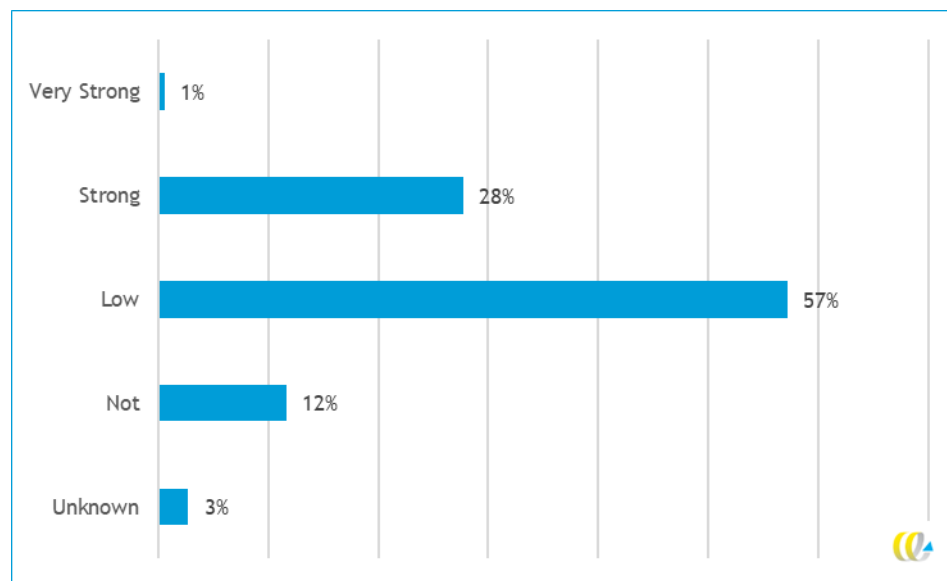
## 7.2 Results from the survey

### Mindset within organisation

Over two-thirds of the companies that answered the question: ‘To what extent has the CO<sub>2</sub> PL affected your organisational culture?’ stated that the CO<sub>2</sub> PL did not affect it (12%) or marginally affected it (57%) (see Figure 20). Some of these companies mentioned that climate awareness already was high within the company to begin with. Another reason given was that, for the company, cost efficiency is a more important driver for taking CO<sub>2</sub> reduction measures. Some indicated that only the company’s management team is involved in the topic. On the other hand, over a quarter of the respondents replied that the effect of the CO<sub>2</sub> PL on the mindset is strong, indicating the CO<sub>2</sub> PL is driver for learning about (the importance of) CO<sub>2</sub> reduction.



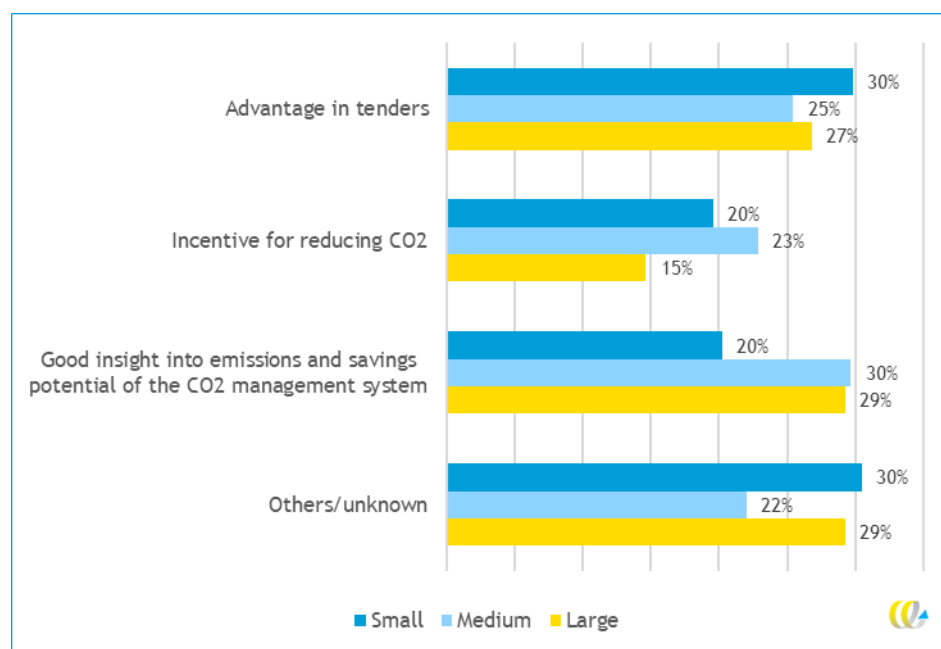
Figure 20 - Response to the question: To what extent has the CO<sub>2</sub> PL affected your organisational culture?



N = 367.

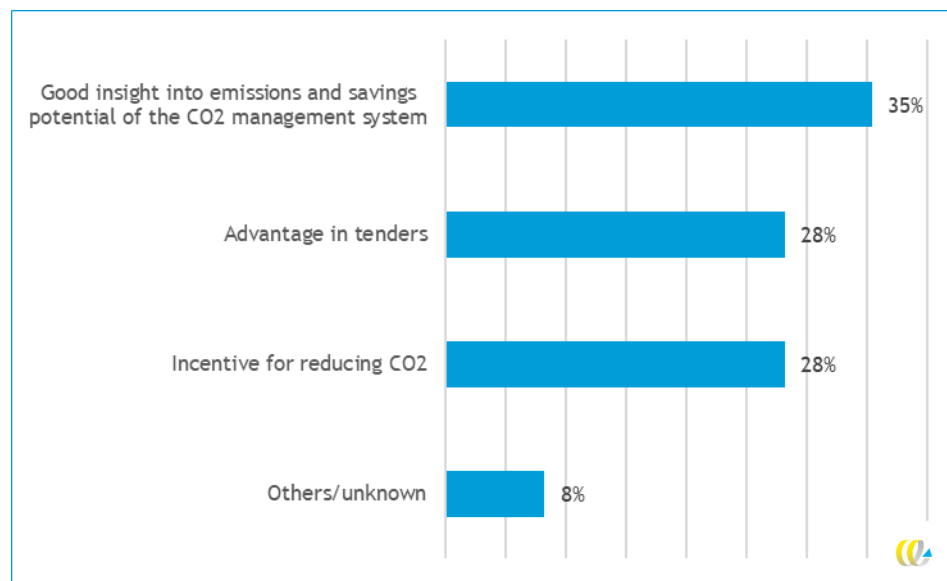
We also asked about the benefits of participating in the CO<sub>2</sub> PL to the companies' business operations. For most companies, the main benefit is the insight the CO<sub>2</sub> PL brings on the companies' own (Scope 1 and 2) emissions and the advantage in tenders. The incentive of needing to reduce CO<sub>2</sub> emissions is more important for small and medium companies than for larger companies.

Figure 21 - Response to the question: What is the main benefit of participating in the CO<sub>2</sub> PL to your business operations? (by company size)



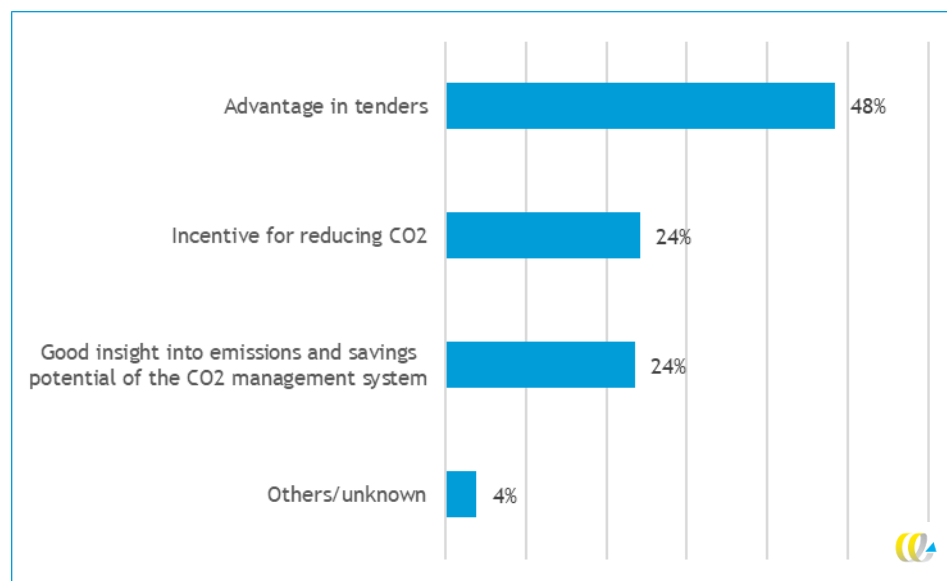
N = 488.

**Figure 22 - Response to the question: Main benefits for participating companies at Level 3**



N = 195.

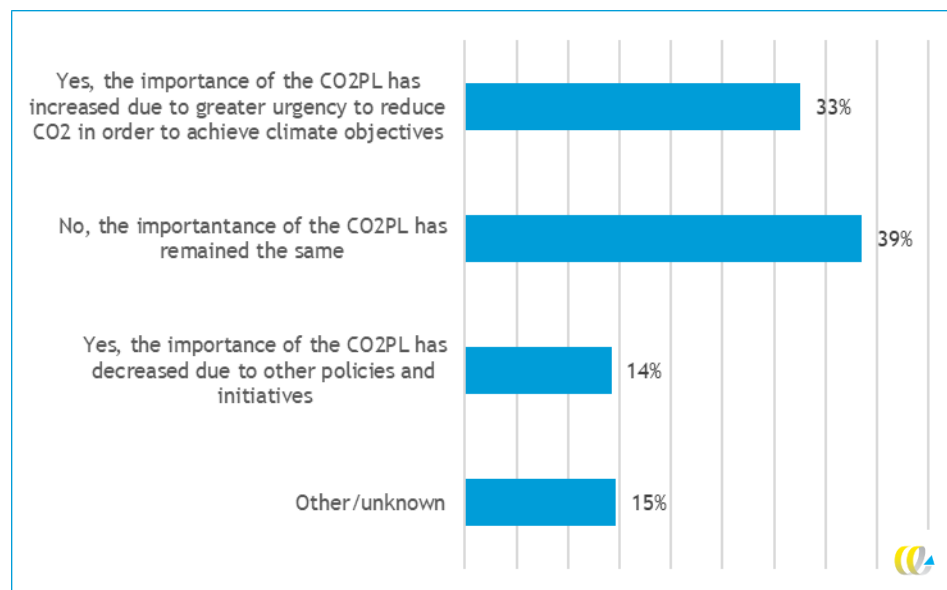
**Figure 23 - Response to the question: Main benefits for participating companies at Level 5**



N = 157.

We cannot conclude whether the perception of the urgency of the CO<sub>2</sub> PL has changed in recent years. About one-third indicated that the urgency remains the same. However, one-third of the participants also indicated that the urgency has increased. Only 14% stated that the importance has decreased.

Figure 24 - Response to the question: Has the perception of the urgency of CO<sub>2</sub> PL changed in recent years?



N = 157.

## Results from the control group survey

In the control group survey, about half of the respondents said that awareness with respect to sustainability is limited within their company. Although this particular question was not asked in the main survey, this share seems rather low compared with the impression that was left behind from the case studies.

## 7.3 Results from the case studies

The cases studies did not focus on a change in mindset. Nevertheless, a few questions were asked about the role of the CO<sub>2</sub> PL to raise awareness about CO<sub>2</sub> emission reduction. The insights from all cases studies are summarised here.

### CO<sub>2</sub> PL contributes to increased awareness at the start of certification

The effect of the CO<sub>2</sub> PL on the mindset within the company was considered positive in the first few years after certification. The CO<sub>2</sub> PL provided insight into the company's emissions and showed the hotspots for reduction. This contributed to an increased awareness. Also, the CO<sub>2</sub> PL contributed to spreading awareness on sustainability in general within the organisation. Both large and small companies indicated the impact of the CO<sub>2</sub> PL on gaining insight into Scope 3 emissions and on raising awareness within the organisation. No difference was found between the sectors.

The companies (all except the water authorities) mentioned that the contribution of the CO<sub>2</sub> PL towards an increased awareness occurred at the start of the certification procedure. Nowadays, as mentioned by the interviewed companies, it is hard to distinguish between the influence of the CO<sub>2</sub> PL and the influence of public awareness on sustainability.

For large construction companies, the impact of the CO<sub>2</sub> PL was especially significant in the beginning when the CO<sub>2</sub> PL was launched and many of the companies participated.

However, now that most companies (especially larger construction companies) are certified and have met the initial goals, the added value of the CO<sub>2</sub> PL has decreased in recent years.

### **CO<sub>2</sub> PL in procurement contributes to increased awareness at the water authorities**

The water authorities mention an increase in awareness due to the CO<sub>2</sub> PL. They state that everybody in the company is aware of the CO<sub>2</sub> PL and takes CO<sub>2</sub> emissions into account. According to the water authority that is not certified but uses the CO<sub>2</sub> PL as an advantage in their tenders, the CO<sub>2</sub> PL provides tools and knowledge to employees (likely the procurement department). Following the use of the CO<sub>2</sub> PL for procurement, they started to address their own CO<sub>2</sub> emissions.

## **7.4 Results from the workshop**

From the workshop it followed that the CO<sub>2</sub> PL is considered to be a CO<sub>2</sub> management system, rather than a system of awareness and cultural change. The CO<sub>2</sub> PL is especially important for understanding and providing insight into emissions, underpinning the findings from the survey and interviews.

The workshop participants mentioned that sustainability often comes from intrinsic motivation. Commitment to sustainability varies from person to person. The companies fulfil the requirement to communicate, but to what extent this is picked up varies per person/department. The impact of the CO<sub>2</sub> PL on the company's culture is perceived differently per participant. Some mentioned there is some effect of the CO<sub>2</sub> PL in raising awareness. Others mentioned that the motivation for CO<sub>2</sub> reduction is completely intrinsic.

All companies communicate company-wide to all employees about the CO<sub>2</sub> PL, as the CO<sub>2</sub> PL requires companies to do so. For example, communications are about goals and reductions achieved. As a beneficial side effect, this communication encourages people to talk about it within the company. The participants perceived a difference between office and field staff. In general, the first group is easier to reach and more inquisitive whereas field staff tend to be spread across diverse locations and are implementation-oriented (focused on the daily job).

More than raising awareness, the certificate serves as an aid to get everyone on the same page. Every participant can demonstrate the CO<sub>2</sub> reduction accomplishments, and the instrument ensures uniformity and prevents fragmentation within companies.

Specifically, the Safety Culture Ladder was mentioned a few times as an exemplary instrument for cultural change within an organisation. The Safety Culture Ladder is an instrument to measure safety awareness, attitude and behaviour in companies.

## **7.5 Discussion and conclusion**

The conclusions of this part of the research give insight into the *perception* of the company culture, and the *perception* of the influence of the CO<sub>2</sub> PL upon it. Many different influences might work together to develop this change in mindset and behaviour, including a different perspective on sustainability within society and the market value of sustainability among others. Besides, the perception of culture is a subjective matter, because a person within a company is inherently part of a culture.

The perception of the effect of the CO<sub>2</sub> PL on the change in mindset and behaviour differs between the participating companies. In the survey, more than two-thirds of the companies (N=367) stated that the CO<sub>2</sub> PL has had a low effect on the organisational culture or that the CO<sub>2</sub> PL has not affected the organisational culture. More than a quarter of the respondents indicate a strong effect.

During the workshop, participating companies expressed various perceptions. Some indicated a negligible influence and explained that there were other drivers, such as intrinsic motivation or a change in the societal perception of sustainability. Others attributed cultural change to communication, which is part of the CO<sub>2</sub> PL requirements. Nevertheless, for most companies the main benefit is the insight the CO<sub>2</sub> PL brings into their own emissions (Scope 1 and 2) and the advantage in tenders. The incentive to reduce CO<sub>2</sub> emissions is more important for small and medium-sized companies than for larger companies.

Communicating the CO<sub>2</sub> PL within the company helps to raise awareness, though it can be hard to reach the field staff. A consistent signal that followed from the workshop (with ten participants at various levels of certification) was that the certificate, more than raising awareness, is an instrument that ensures that everyone is on the same page. As added value, at Level 3, good insights into emissions and reduction potential, and the incentive to work towards reaching that potential, were mentioned as another more important benefit of the CO<sub>2</sub> PL. At Level 5, the advantage that is given in tenders becomes more important.

## 8 Discussion

In this chapter, we discuss the findings from our study and how they relate to findings from previous studies.

The average annual reduction as indicated by companies in the survey was around 7.7% (median of 5%). Dr M. Rietbergen carried out a study about the effect of CO<sub>2</sub> PL (Handbook 3.0) in the water construction sector (Rietbergen, 2017). He concluded that the CO<sub>2</sub> footprint of a large proportion of the companies within this sector decreased by 7.8%/year in the period 2010-2015 (Scope 1 and 2).

The survey shows an additionality of < 15 to 46% depending on the measure. This is slightly lower than previously found in the study by Rietbergen. In 2016, a study by Rietbergen et al. (2016), evaluated the impact of the CO<sub>2</sub> PL (Handbook 2.2) on improving energy and carbon management and CO<sub>2</sub> emission reduction in construction and civil engineering companies (ex-post). The study showed that, before 2016, about 30-50% of the measures were identified as additional (Scope 1 and 2). In the period 2010-2013, the annual CO<sub>2</sub> emission reduction rate due to energy efficiency improvement and fuel switching was 3.2% per year. In a first estimation, the study showed that about 1.0-1.6%/year of this reduction can be attributed to the CO<sub>2</sub> PL.

The slight decrease in additionality can be attributed to various causes. These can be explained by a change in motivation to take a measure. For example, for solar panels, prices have continued to fall since 2016 and taking the measure becomes interesting from a business case perspective. Also, more legislation is in place that certain companies have to adhere to. Companies that were already certified before 2016 and took part in this 2022 survey, may have taken measures that were not yet mandatory through legislation (such as energy efficiency).

On the other hand, the results of the control group survey among applicants (companies who are not certified as yet) show that the number of (Scope 1 and 2) measures taken by applicants is particularly low compared to participants. Despite the fact that this could indicate the additionality of the CO<sub>2</sub> PL, we should be cautious with our conclusions due to the relatively low number of applicants that completed the survey (21).

The main contribution of the CO<sub>2</sub> PL is its use as a carbon management system. As a result, the CO<sub>2</sub> PL helps companies to gain insight and realise CO<sub>2</sub> reduction. This is in line with a previous study showing that the CO<sub>2</sub> PL has been responsible for a strong shift towards more mature energy management and enhancing CO<sub>2</sub> emission reduction among construction and civil engineering firms that most likely would not have been achieved by other contextual drivers alone (Rietbergen, Martijn G. et al., 2016). The results of the control group survey show that only one-third of the applicants has a CO<sub>2</sub> management system. This could explain the additionality of the CO<sub>2</sub> PL with respect to using a carbon management system.

Reasons for companies to join the CO<sub>2</sub> PL are most often the procurement benefits and the need of the organisation to reduce CO<sub>2</sub> emissions. This is a slightly different finding than in previous studies. In the past, most companies were driven by competitive advantage. Wanting to become a leader, positioning the business as a green company, pressure from peers and pressure from consortium partners were secondary reasons for certification (Rietbergen, 2017).

This difference in motivation can be attributed to different times, where a stronger sense of urgency about reducing CO<sub>2</sub> emissions has emerged in the public debate, increasing intrinsic motivation and the market value of participating in CO<sub>2</sub> reduction. Also, there is more legislation in place to hold companies accountable for reducing CO<sub>2</sub> emissions.

The effects of the CO<sub>2</sub> PL on Scope 3 emissions have not yet been assessed in existing literature. For Scope 3 emissions, the results show that instruments other than the CO<sub>2</sub> PL are more effective: for example, ECI appears to be more effective at a project level. Companies explained that, especially for Scope 3 emissions, external factors influence the achievable reduction. Within the construction sector, Scope 3 emissions comprise emissions from materials and from fuel for (outsourced) equipment. Reduction of these emissions takes place through projects for commissioning parties. Whether companies can reduce the Scope 3 emissions depends on whether the procuring parties offer space for innovative emission-reducing but often more costly solutions (market pull). The Environmental Cost Calculator (ECI/MKI) is often mentioned by companies as being a more important instrument than the CO<sub>2</sub> PL for reducing emissions. Also, the availability of fuels, machinery and materials is an important factor.

The impact on most polluting industries (such as concrete and steel) through pushing by CO<sub>2</sub> PL participants is small. The power of procurement of the CO<sub>2</sub> PL is not effective in the sense of pushing for alternative low-CO<sub>2</sub> materials. Its effectiveness lies in the fact that by setting an award or qualification requirement, companies participate in the CO<sub>2</sub> PL and thereby reduce the company's Scope 1 and 2 emissions.

The perception of the effect of the CO<sub>2</sub> PL on changes in mindset and behaviour differs between the participating companies. In the survey, most companies report a modest or no effect of the CO<sub>2</sub> PL on a change in mindset about sustainability within companies, though more than a quarter indicate a strong effect. In the workshop, some stated a negligible influence and mentioned other drivers such as intrinsic motivation or change in societal perception of sustainability. These differences in perception could be explained by timing: (1) when a company first starts with the CO<sub>2</sub> PL there might be a raised awareness; (2) a recent increase in public awareness, which could be having a stronger effect than the CO<sub>2</sub> PL, especially for companies that have been certified for several years.

# 9 Conclusions and recommendations

## 9.1 Introduction

In this chapter, we report the overall conclusions of the evaluation and provide recommendations for improvement of the CO<sub>2</sub> PL as an instrument and for further research. Our conclusions are centred around the main research question:

*“To what extent is the CO<sub>2</sub> PL an effective instrument for reducing CO<sub>2</sub> emissions?”*

The CO<sub>2</sub> PL is considered effective if it leads to emission reductions that otherwise would not have been realised through direct measures, effective emission reduction in the supply chain and changes in behaviour affecting CO<sub>2</sub> emissions.

From the Phase I study, we found no quantitative studies after 2017 and no quantitative studies on Scope 3 emissions. Recent agreements on CO<sub>2</sub> reduction, such as the National Climate Agreement in the Netherlands (2019), could influence the effectiveness of the CO<sub>2</sub> PL. Below, we provide the main conclusions of current effects (2022) and of effects in the supply chain (Scope 3 emissions).

## 9.2 Conclusions on the effectiveness of the CO<sub>2</sub> PL

The main motivations to join the CO<sub>2</sub> PL are its advantage in tenders and because the CO<sub>2</sub> PL provides insight into their emissions and points the way to CO<sub>2</sub> reduction.

This is a finding across sectors and organisation sizes. It is in line with studies by Rietbergen, (2015) and Rietbergen et al. (2016), which suggest that the main reasons are a response to climate change and the potential competitive advantage in tenders.

Interviewed companies mentioned that through the management system, the CO<sub>2</sub> PL helps to gain insight into most relevant Scope 1 and 2 emissions at the start of the certification process. It also helps to keep track of reductions and to keep reduction measures in place.

Most companies that use the CO<sub>2</sub> PL as an environmental management system did not previously have a management system. This was confirmed by the results of the control group survey among applicants (companies that are not certified as yet) that show that only one-third (7 out of 22) of the applicants is using a CO<sub>2</sub> management system. Most companies are either certified at Level 3 or at Level 5.

The CO<sub>2</sub> PL is an effective instrument for helping companies to lower Scope 1 and 2 emissions.

Companies report that they are taking more reducing measures for Scope 1 and 2 emissions and that they are taking them sooner due to the CO<sub>2</sub> PL. Most companies report that their



Scope 1 and 2 emission reduction are 20-40% since the first year of certification. On average this is a reduction of around 7.7% (median 5%) per year (compared to 7.8% according to Rietbergen (2017)).

Certified companies reduce emissions by taking measures that are listed in the CO<sub>2</sub> PL. These measures are additional if companies would not have taken the measure at all without the CO<sub>2</sub> PL (fully additional) or took them at a later time/to a lesser extent (partly additional). Results on the additionality of the CO<sub>2</sub> PL differ per size and sector of the company. Small companies more often state that they would have taken the measures on their own initiative, while bigger companies would have taken the measures because of other initiatives. For most measures, additionality is higher for small companies. Per sector, we see higher additionality in the ground, road and waterway sector and other sectors than in the consultancy sector.

Regarding Scope 1 and 2 emissions, additionality is the highest for buying green electricity or Dutch Guarantees of Origin (additionality of 15-46%). Additionality is lower for electrification of the car fleet (additionality 2-32%), generating own electricity (pv panels) (additionality 0-12 %) and using more energy efficient machinery (most important measures according to participants) (additionality 1-21%). This difference could be explained by the year in which the study was performed, as sustainability measures have become common practice, cost efficiency has increased and/or regulations have become stricter due to other policies. On the other hand, the results of the control group survey among applicants (companies who are not certified as yet) show that the number of (Scope 1 and 2) measures taken by prospective applicants is particularly low compared to participants. While this could indicate the additionality of the CO<sub>2</sub> PL, we should be cautious drawing this conclusion because of the relatively low number of applicants that completed the survey (21).

The additionality of the CO<sub>2</sub> PL to take the measures for Scope 1 and 2 is found lower than in previous studies.

The actual emission reduction attributed to the CO<sub>2</sub> PL will be much lower, as the additionality of measures is relatively low (less than 15-46%) compared to previous studies. Rietbergen et al. (2016), found that about 30-50% of the measures are identified as additional (Scope 1 and 2). CO<sub>2</sub> reduction attributed to the CO<sub>2</sub> PL cannot be more than 46% out of 7.7% annually: which is less than 3.5%.

The CO<sub>2</sub> PL helps with setting targets.

Around 60% of the small and medium-sized organisations had no targets before participating in the CO<sub>2</sub> PL. This is lower for large organisations: 34% had no goals prior to joining the CO<sub>2</sub> PL. These results do not vary between the sectors. This suggests that the CO<sub>2</sub> PL encourages the setting of targets. This result is based on a high number of respondents (398).

Companies indicate the ladder can be helpful in setting (new) targets. The accountability for targets means that the plan-do-check-act (PDCA) cycle needs to be followed and that this also happens in practice.

Only half of the non-certified companies in the control group have targets for CO<sub>2</sub> reduction and only one-third of the applicants have a CO<sub>2</sub> management system. This is in line with previous research from Rietbergen. This could be another indicator for the additionality of the CO<sub>2</sub> PL. It is important to note that the low number of respondents to this question in the control group gives low accuracy.

The targets are often set lower than the actual ambition level.

In terms of the ambition level of the targets, the companies report that they only set targets for the CO<sub>2</sub> PL that can definitely be met. They do not want to risk losing the CO<sub>2</sub> PL certificate by not meeting the targets. Targets therefore often are set lower than the companies' ambition level. This is especially true for the companies certified at Level 5 that participate in tenders where the CO<sub>2</sub> PL is a requirement. Losing the certificate would result in a significant penalty in tendered projects.

No definitive conclusions can be drawn on the effectiveness of the CO<sub>2</sub> PL on Scope 3 emissions.

Level 4 and 5 participants state that their average Scope 3 emissions reduction since their participation is between 0-10%. This is lower than the Scope 1 and 2 emissions reduction. There are no notable differences relating to size and sector analysed due to the low number of respondents.

The additionality for Scope 3 measures following the survey seems higher than Scope 1 and 2. Participants mention cooperation with supply chain partners as the most important measure taken (additionality: 15-62%). The relationship of this collaboration to emission reductions is not directly quantifiable. Participants also state that this measure leads to discussion about sustainability with suppliers, but that it does not lead to explicit agreements such as contracts.

The interviewed companies stated that collaboration with companies on the topic of sustainability is more prevalent than in the past. They mentioned increased societal awareness on climate change and the market value of sustainability as reasons for the increased prevalence of these type of partnerships.

Because the number of respondents in the survey is much smaller (10-108, depending on the measure) than for Scope 1 and 2, the uncertainty for Scope 3 is higher. Therefore, no definitive conclusions can be drawn on the percentual emission reduction achieved by the CO<sub>2</sub> PL and on the general effectiveness of the CO<sub>2</sub> PL on Scope 3 emissions.

It's difficult to make definitive statements about the absolute reduction in Scope 3 emissions without consistent data. Phase I revealed that there is currently no consistent published data available for Scope 3 emissions. Certificate holders publish various data and (progress)reports, such as the material emissions report and Life Cycle Assessment (LCA) report. The publications show inconsistencies between methods, annual reporting, categories, structure of reporting and organisational boundaries. In order to make accurate conclusions about Scope 3 emission reduction, it is essential to have a consistent set of data for analysis.

The influence of the CO<sub>2</sub> PL, following from the theory of change, in the reduction of emissions in heavy industry is found to be small compared to more stringent National or EU level policy instruments.

For Scope 3 emissions, pull factors from the market (requirements by tendering parties) have much more influence in the reduction of emissions in heavy industry than push factors by CO<sub>2</sub> PL participants. Certified companies mention they have little influence in material requirements in the tendering process, which are set by the tendering party. The tendering party either uses other sustainability indicators or project specific requirements. For example, companies consider the Environmental Cost Calculator (ECI/MKI) to be a more important instrument than the CO<sub>2</sub> PL in reducing emissions.

Participating companies indicate that their influence on a project level is small as long as most tendering parties still select projects based on the lowest costs. Companies also mention that their influence on the most polluting industries, e.g. the concrete and steel industry, is small. The added value of the CO<sub>2</sub> PL can therefore be better seen as activating companies to start thinking about CO<sub>2</sub> emission reduction and implementing structural policies. In the longer term, collaboration with suppliers can lead to emissions reduction in the supply chain. Nevertheless, efforts from the demand side (tendering parties) and other external factors such as other policies are essential to significantly reduce emissions in heavy industry.

On the change in mindset within the organisation, most companies report a modest effect of the CO<sub>2</sub> PL.

Most companies (more than half of the companies in the survey) report a modest effect of the CO<sub>2</sub> PL on the change in mindset about sustainability within companies. Results differ per company and are strongly related to the mindset of individuals. While more than half of the companies in the survey indicate a minor effect on the change in mindset, a little over a quarter of the respondents in the survey indicate a major effect.

Following the workshop and interviews, participants mention that the CO<sub>2</sub> PL was important for identifying the hot-spots for CO<sub>2</sub> reduction in the beginning. They mention a high awareness throughout the company, but sometimes with the exception of colleagues ‘in the field’ who operate the machinery. Some indicate that only the management is involved. Companies that mention a low effect said that they were already aware of the importance of CO<sub>2</sub> reduction, or that cost efficiency is a more important driver for taking measures than the CO<sub>2</sub> Performance Ladder.

The internal communication requirements for the CO<sub>2</sub> PL help companies communicate about emission reductions, but participants state that the effect of these measures strongly depends on the type of employee. The effect of a change in mindset on actual CO<sub>2</sub> emission reduction is very difficult to quantify, unless specific behaviour is mentioned. This was beyond the scope of this research.

### 9.3 Recommendations

The main added value of the CO<sub>2</sub> PL is on Scope 1 and 2 emissions. The CO<sub>2</sub> PL gives insight into a companies’ carbon emissions, especially when a company first joins the CO<sub>2</sub> PL. One of the biggest benefits of the CO<sub>2</sub> PL according to certified companies is the carbon

management system. At the moment, the CO<sub>2</sub> PL is widely adopted in the ground, water and road sector. It could be valuable to further implement the CO<sub>2</sub> PL as a carbon management system for other sectors, where there is a need for the organisation to reduce CO<sub>2</sub> emissions. This should have a positive impact on CO<sub>2</sub> reduction through a wide implementation of measures with high additionality, such as the purchase of green electricity (Guarantees of Origin). Currently, the CO<sub>2</sub> PL is used as a carbon management tool by municipalities (including smaller and medium-sized cities up to 163 thousand inhabitants) throughout the Netherlands. Expanding the use of the CO<sub>2</sub> PL to other municipalities in the Netherlands could increase the impact of the CO<sub>2</sub> PL as a carbon management tool, and potentially help to achieve larger emission reductions.

A focus on broadening the adaptation of the CO<sub>2</sub> Performance Ladder along the supply chain and in multiple sectors, and a focus on Scope 1 and 2 emissions in doing so, can contribute to a reduction in companies' Scope 1 and 2 CO<sub>2</sub> emissions of up to around ~3%. To achieve a 55% reduction of CO<sub>2</sub> emissions in 2030 in line with the Dutch climate agreement, the annual reduction percentage for all emissions in the Netherlands should be 5% of the emissions in 2020, or 6% based on emissions of each prior year. This is assuming these reduction percentages were realised from 2020 onwards. Where this is not the case, the percentage for the coming years should be higher.

SKAO is considering introducing the CO<sub>2</sub> PL to other countries. Policies on CO<sub>2</sub> reductions for companies differ between countries. These policies can provide conditions that facilitate the adoption of measures in the CO<sub>2</sub> PL. The study shows a change in specific additionality for some measures (for example own generation of electricity through solar panels) as compared to previous studies. National policies are an important driver to facilitate cost effectiveness for measures, as can be seen with solar panels. As the business case becomes positive for solar panels, there is less need for another instrument such as the CO<sub>2</sub> PL in order to adopt the measure. It is possible that in other countries, such as Belgium, national policies are not yet in place, and the CO<sub>2</sub> PL could provide a motivation to implement measures or to discuss current policies. However, EU policies are likely to become more important than national policies in the future. This recommendation therefore only applies to the near future.

The targets are not as ambitious as they could be, because participating companies fear losing their certificate when targets are not met. A recommendation is to discuss with the Science-Based Targets initiative the actions of companies that have set science-based targets. The principle is the same: if companies do not meet the targets, they can lose the 'approved' status and their listing, but companies listed in SBTi may not immediately lose their listing.

The direct actual reduction in Scope 3 emissions due to the CO<sub>2</sub> PL is likely to be small. Companies indicated that they often report existing collaborations via other initiatives to the CO<sub>2</sub> PL. The CO<sub>2</sub> PL could show additional value in Scope 3 if implemented in sectors where there are very few initiatives, and where there is a need for collaboration in the supply chain. To implement CO<sub>2</sub> emission reduction in Scope 3 in practice, collaboration is necessary between the company and suppliers upstream, but also between the company, the client/owner/user and the end-of-life treatment facilities downstream.

One way to reduce emission reductions along the supply chain would be to make measures on collaboration in the supply chain more concrete, for example in the form of contracts on the use of recycled materials. This will probably only work if other policies on emission reduction for heavy industry exist (for example a high EU ETS price) so that materials

become available; and if this is made a specific requirement in tenders so that costs can be covered.

The effects may differ between different companies, whether they are business to business, business to company or business to government. Further research on these differences could provide clues on which type of company to focus on.

A standardised central database (especially on Scope 3 emissions) would make it possible to analyse absolute emission reductions and validate the theory of change. We recommend standardising the method of emission data production, collection and reporting.

Most companies are either certified at Level 3 or at Level 5. Currently the CO<sub>2</sub> PL has five certificate levels. We recommend simplifying the CO<sub>2</sub> PL to 2 Levels.

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