Assessing the potential impact of the CO_2 performance ladder on CO_2 emission reduction

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Keywords

emissions inventory, certification, target, impact assessment, efficiency standards

Abstract

The aim of this research is to assess the potential impact of the CO_2 Performance Ladder on CO_2 emission reduction. The CO_2 Performance Ladder is a new green procurement scheme that has been adopted by several public authorities in the Netherlands; it is a staged certification scheme for energy and CO_2 management. The achieved certification level gives companies a certain competitive advantage in contract awarding procedures. While the scheme has been widely adopted by companies in the construction industry, other types of companies in the supply chain of the commissioning parties also participate. Currently, more than 190 companies participate in the scheme. The aggregate CO_2 emissions covered by the scheme are around 1.7 Mtonnes, which corresponds to almost 1 % of national greenhouse gas emissions in the Netherlands. Since the introduction of the scheme the total CO_2 emissions have decreased substantially. Nevertheless, these emission reductions should be interpreted with caution since emission reductions are dominated by a few companies and are affected to a large extent by economic activity. Companies participating in the scheme have set different types of CO_2 emission reduction targets with varying ambition levels. The projected impact of these targets on CO_2 emissions is in the range of a 0.5 %–1.3 % absolute emission reduction per year, with a most likely value of 1.1 %. The CO_2 Performance Ladder can therefore make a substantial contribution to achieving the CO_2 emission reductions for non-ETS sectors in the Netherlands up to 2020.

Introduction

GREEN PUBLIC PROCUREMENT

Green public procurement (GPP) is regarded as an important tool to stimulate sustainable consumption and production in the European Union. GPP is 'a process whereby public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured' (COM, 2008)[1]. GPP should contribute to reducing the environmental impact of products, works and services; stimulate technological innovation among companies; and reduce risks and costs for public authorities.

Sustainable production and consumption can be stimulated by including environmental criteria in various parts of the procurement process. EC (2011), UNDP (2008) and ICLEI (2007) provide a detailed description of how these environmental criteria can be used in procurement procedures. First, environmental criteria can be used as technical specifications for the product, service or work to be procured. These technical specifications may include compulsory environmental demands that must be met by the procured product, service or work. Second, environmental criteria can be introduced as selection criteria for candidates. These selection criteria can only be applied if specific environmental experience and competence is needed to fulfil the contract. Third, environmental criteria can be included as 'contract award criteria' if the contract is awarded in accordance with the principles of the 'economically most ad-

1. GPP is different from 'Sustainable Public Procurement' (SPP). SPP includes both environmental and social criteria in the purchasing decisions.

vantageous tender'. The economically most advantageous tender (EMAT) includes additional award winning criteria along with the aspect of price. Finally, environmental criteria can also be introduced as contract performance clauses that specify how the work or service will be performed.

INTRODUCTION TO THE CO_2 PERFORMANCE LADDER

In 2009 a new GPP scheme called the 'CO_2 Performance Ladder 1.0 (CO_2PL)[2]' was introduced by ProRail (ProRail, 2009). ProRail is a state-owned company in the Netherlands that is responsible for network infrastructure management, allocating rail capacity and traffic control on the Dutch railway network. The aim of the CO_2PL scheme is to encourage climate-friendly and energy-efficient performance of the companies in ProRail's supply chain. The CO_2PL is a staged certification scheme for energy and CO_2 management used in ProRail's procurement processes. The achieved certification level gives companies a certain competitive advantage in contracts that are awarded in accordance with the principles of the 'economically most advantageous tender'. The CO_2PL is not used as a contract performance clause, not as a criteria to select candidates for certain service and works contracts and not as a compulsory environmental requirement that the service or works contract must meet.

The potential environmental impact of this GPP scheme is expected to be considerable since the purchasing power of ProRail is so substantial. The annual budget for contracted goods, works and services is around €1.9 billion of which a large part is awarded through calls for tenders (van Dalen, 2012). The CO_2PL was received positively among ProRail's suppliers. In March 2011 a total of 88 companies already participated in the CO_2PL scheme (Dorée et al., 2012). Due to the increasing number of companies participating in the scheme and the potentially wider adoption of the scheme among other contractors, the 'Independent Foundation for Climate Friendly Procurement and Business (SKAO)' was established to take over the management of the CO_2PL scheme from ProRail in March 2011. SKAO published an update of the CO_2PL (2.0) in March 2011 (SKAO, 2011) making the CO_2PL more suitable for other commissioning parties too. Recently, Rijkswaterstaat (the executive arm of the Dutch Ministry of Infrastructure and the Environment) and some municipalities have also adopted the CO_2PL in their tendering procedures.

SOCIETAL AND SCIENTIFIC RELEVANCE OF THIS STUDY

The fast growing number of certified companies and adoption of the scheme among other commissioning parties shows that the CO_2PL is becoming a more mature and widely accepted instrument for GPP. From this perspective, SKAO even has the ambition to ensure that the scheme will become *the* standard for GPP in the Netherlands in certain areas like civil and hydraulic engineering[3]. However, the future success of the scheme calls for research to be carried out to confirm whether it is really functioning as intended. In other words, the wider adoption of the scheme is only legitimate if the CO_2PL is achieving a positive environmental impact. Thus, from a societal perspective, research into the potential impact of the CO_2PL on CO_2 emission reductions is very important.

Assessment of the scheme's potential environmental impact is also relevant from a scientific point of view. Only a limited number of studies about the CO_2PL have been published so far. Dorée et al., (2011) describe the rapid diffusion of the CO_2PL, address the use of the CO_2PL in bidding procedures, and analyse critical success factors of the CO_2PL. Veneberg (2010) gains insight into the effect of the CO_2PL on the contractor's strategy, organisation and work progress. Wortmann (2012) evaluates how (well) the CO_2PL is implemented by the certified companies. Goldberg (2012) compares the design features and model of the CO_2PL with other industrial supply chain initiatives. The review of the limited amount of literature published on the CO_2PL so far shows that there is still no insight as to whether the scheme will really lead to CO_2 emission reduction, which is the overall objective of the scheme.

Also in the broader context of GPP, studies that have analysed the potential environmental impact are rare. Several studies investigated the use of environmental criteria (type, quality, occurrence, etc.) in GPP schemes; identified the range of product groups covered within GPP schemes and analysed the volume of green purchased goods in various Member States of the European Union, see e.g. Bouwer et al., (2006), PWC et al., (2009) and AEA (2010). Several studies that monitor the level of GPP have also been carried out in the Netherlands; see KPMG (2011), PWC (2009), BECO (2008) and Significant (2007). Other studies focused specifically on environmental aspects in construction contracts (Varnäs et al., 2009), studied the progress of GPP (Nissinen et al., 2009) or evaluated the enforcement of environmental requirements in GPP contracts (Faith-Ell et al., 2006).

Relatively few studies analysed the potential environmental impact of GPP schemes. Consultancy firm DHV (2009) estimated the potential environmental impact that could be achieved by including environmental requirements as technical specifications in *all* public procurement contracts in the Netherlands. The estimated impact on CO_2 emission reduction until 2020 is around 1.7 Mtonne by insisting on the purchase of green electricity, and 0.8 Mtonne by implementing obligatory energy efficiency measures. DHV (2009) did not evaluate the environmental impact of including environmental criteria as contract award criteria. PWC (2009) evaluated the impact of green procurement schemes on CO_2 emissions for 10 different product categories in various European Union countries in 2006/2007. Green purchasing of products has reduced CO_2 emissions by 47 % in the Netherlands. These estimated emission reductions are completely dominated by demanding the use of green electricity and energy efficiency measures in buildings (PWC, 2009). Neither DHV (2009) nor PWC (2009) investigated the impact of GPP schemes on CO_2 emission reduction by companies in the supply chain of commissioning parties.

RESEARCH OBJECTIVES

The CO_2PL scheme owner, commissioning parties, companies and other stakeholders participating in the CO_2PL are very much interested in the question whether the CO_2PL will reduce the environmental impact of the companies that partici-

2. ProRail published two more updates of the CO_2PL: CO_2PL 1.1 (September 2010) and CO_2PL 1.2 (December 2010).

3. In so far as GPP concerns the reduction of CO_2 emission from energy and materials.

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pate. The review of the published literature on CO_2PL and GPP shows that there is no insight as yet whether schemes such as the CO_2PL will really lead to a reduction in CO_2 emissions. The aim of this paper is therefore to assess the potential impact of the CO_2PL on CO_2 emission reduction. We will not focus on other potential effects of GPP schemes like the CO_2PL, for instance stimulating technological innovation among companies, limiting other environmental impacts or reducing risks and costs for commissioning parties.

METHODOLOGY AND DATA COLLECTION

The potential impact of the CO_2PL on CO_2 emission reduction will be assessed by aggregating the impact of individual business targets for CO_2 emission reduction on the CO_2 footprints of participating companies. The various CO_2 emission reduction targets will be collected from the companies' energy management plans. These plans, as well as the CO_2 footprints, must be made public on the websites of these companies. In a couple of cases we contacted companies requesting them to provide additional information about the type of target setting and CO_2 footprint. An up to date overview of all the certified companies in the scheme is published on the SKAO website[4]. Further information about the rationale of the CO_2PL has mainly been retrieved from documents published by ProRail and SKAO.

OUTLINE OF THE PAPER

The outline of this paper is as follows. Section 2 describes the rationale of the CO_2PL. Section 3 presents a descriptive analysis of companies currently participating in the CO_2PL. Section 4 provides insight into the aggregate CO_2 emissions covered by the CO_2PL and analyses the overall realised CO_2 emission reductions. Section 5 discusses the CO_2 emission reduction targets, ambition level and potential impact in greater detail. In section 6 we draw the conclusions.

Rationale of the CO_2PL

THE CONCEPT BEHIND THE CO_2PL

The CO_2PL is a staged certification scheme for energy and CO_2 management which is used in public procurement procedures. It is based on the concept of Capability Maturity Models (CMMs). CMMs distinguish well-defined maturity levels that 'indicate the capability of an organisation to perform important processes to deliver a certain product or a process' (Paulk et al., 1993). CMMs are often composed of five maturity levels: initial, repeatable, defined, managed and optimised. The certification scheme in the CO_2PL distinguishes five 'certificate levels'. These certificate levels indicate the evolutionary stage of a company towards achieving mature CO_2 management. The certificate levels contain key process areas an organisation should focus on to improve its CO_2 management. There are four key process areas distinguished in the CO_2PL: (A) drawing up CO_2 emission inventories; (B) setting and achieving CO_2 emission reduction targets; (C) transparency and communication of the company's CO_2 footprint and energy policy and (D) participation in (supply chain) initiatives. Each key process area contains an audit checklist with the specific requirements a company should meet for each certificate level. The audit checklists are published in the CO_2PL handbook (SKAO, 2011).

CERTIFICATION PROCESS

The certification process for assessing the maturity of a company's CO_2 management works as follows. First, the company must determine the organisational boundary in accordance with the methodologies described in the CO_2PL handbook (SKAO, 2011). The company then decides which certification level it wishes to obtain. The company prepares an internal audit document to ensure that the company's policies and processes comply with the requirements set out in the CO_2PL scheme. A portfolio of several audit documents, such as policy documents, technical reports, annual reports, communication procedures, etc., is prepared for the external audit. During the external audit all the specific requirements the company should meet to obtain the aspired certificate level are evaluated by an external party, the certification agency[5]. This agency awards points to all the elements on the audit checklist. A calculation procedure then determines whether the minimum requirements for the aspired certificate level have been fulfilled or not. More detailed information about the calculation procedures can be found in SKAO (2011). The certification process finally results in a so-called CO_2 certificate indicating the achieved certificate level. While the CO_2 certificate is valid for three years, assessments of compliance are still carried out every year.

THE CO_2PL AND GREEN PROCUREMENT

The premise of the CO_2PL is that a company's CO_2 performance gives a competitive advantage in contracts awarded in accordance with the principles of the economically most advantageous tender. Therefore, the CO_2PL also includes a set of EMAT criteria at different CO_2 ambition levels which to a large extent are equivalent to the CO_2PL audit requirements at the five certificate levels. Companies tendering for a contract issued by Rijkswaterstaat or a municipal authority must specify the CO_2 ambition level at which a project will be realised. If the contract is awarded, the EMAT criteria (linked to the specified CO_2 ambition level) become binding contractual requirements. Within one year after the contract has been awarded, the contractor must demonstrate that he has complied with these EMAT criteria on project level as promised. A CO_2 certificate at an equivalent level counts as sufficient evidence that a company meets these EMAT requirements at project level. A CO_2 certificate has the advantage that once it has been obtained it can be used for other tendered projects as well. This should reduce the administrative burden for companies that frequently participate in public tenders. The CO_2PL is applied differently by ProRail in its procurement procedures. ProRail does not include EMAT requirements as additional award-winning criteria in procurement contracts but simply gives a competitive advantage to companies with a CO_2 certificate.

4. www.skao.nl

5. The certification agency will be authorised by the SKAO to certify companies in the CO_2PL.

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Table 1: CO_2PL and advantage in contract awarding.

Company	Bid	Certificate level	Fictitious discount	Fictitious bid	Contract award
A	€100K	3	4%	€96.00K	NO
B	€103K	4	7%	€95.79K	€103K
C	€101K	2	3%	€97.97K	NO

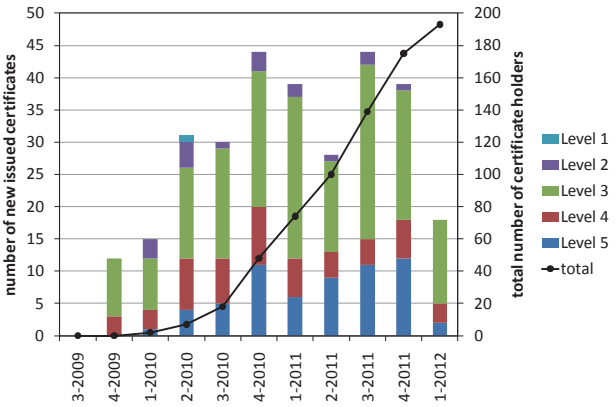

Figure 1: Issued certificates per quarter and total number of certificate holders.

ADVANTAGE IN AWARDING CONTRACTS

The CO_2 certificate level of the individual companies or the CO_2 ambition level stated in the EMAT procedure gives a certain advantage in the contract awarding procedure. How does it work? Let us suppose a contract is awarded on the basis of the lowest price (see Table 1). Three companies A, B and C tender for the contract and each make a bid. Company A, B and C are bidding €100K, €103K and €101K for the contract respectively. Normally, company A will be selected for the contract since their bid is the lowest. However, the CO_2 certificate level of the individual companies gives a certain advantage in the contract awarding procedure. For example, CO_2 certificate levels 1, 2, 3, 4 and 5 give 1, 3, 4, 7 and 10 % fictitious discount on the original bids. In our example, company A, B and C have reached certificate levels 3, 4 and 2 respectively. Thus the level 4 certificate of company B gives a 7 % fictitious discount on the original bid of €103K. The 7 % discount results in the lowest fictitious bid of €95.79K. Now, company B will be awarded a €103K contract.

Very often a consortium of companies tenders for a contract. In that case the advantage in the contract awarding procedure is determined by the company with the lowest certificate level. The commissioning party decides on the fictitious discount levels.

Characterising companies participating in the CO_2PL

TOTAL NUMBER OF CERTIFICATES

More than 300 certificates have been issued (see Figure 1) since the start of the CO_2PL in the fourth quarter of 2009. The total number of certificate holders is above 190 (date: February 2012)[6]. Many certificates were withdrawn because they were superseded by higher level certificates or by new certificates from parent companies. The majority of the companies (around 80 %) enter the CO_2PL scheme at certification level 3. On average it takes about 5 months to increase the certification level from level 3 to 4 and about 7 months to increase the certification level from level 4 to 5. The CO_2 certificates are issued by certification agencies. Currently eight authorised agencies may issue these certificates. KIWA, Det Norske Veritas Certification and KEMA Emissions Verification Service have served more than 80 % of the market to date. Recently, new authorised agencies like TÜV and Bureau Veritas have started offering their services.

COMPANY SIZE AND CERTIFICATION LEVEL

According to the SKAO CO_2PL handbook 2.0, companies must state the size of their company on the CO_2 certificate. SKAO distinguishes three size categories for companies: small, medium and large. The definition of company size is based on the company's CO_2 emissions. However, categorisation rules also depend on the company's main activity. On the one hand SKAO makes a distinction between companies that provide specific services and companies that supply products or deliver building and civil engineering works on the other hand[7]. See Table 2 for the specific details. Company size also determines whether specific certification scheme obligations are valid or not.

Table 3 shows the number of companies by certificate and company size category. The total number of companies is almost equally distributed among the three company size categories. The majority of the companies (57 %) have a certificate at level 3. A substantial number of companies did not report the size of their company.

TYPES OF INDUSTRY

Table 4 shows the number and percentage of companies that reported a specific SBI'08/NACE branch code on their CO_2 certificate[8]. Obviously, a large number of the companies participating in the CO_2PL operate in the construction industry since the CO_2PL was originally designed to stimulate CO_2 emission reduction and energy efficiency among ProRail contractors. 60 % of the companies that did report their NACE codes are engaged in work in the construction industry (F). The construction industry covers branch 41 (construction of buildings), 42 (civil engineering) and 43 (specialised construc-

6. It is important to mention here that a certificate can cover several companies.

7. Based on EC Directive 2004/17/EC on coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors (EC, 2004).

8. Note that firms can be active in several branches and can therefore give multiple SBI'08/NACE codes. Unfortunately, more than one third of the firms failed to report their SBI'08/NACE code. A substantial number of companies reported old SBI'93 codes instead of the new SBI'08 codes. SBI'93 codes have been converted to SBI'08 on the basis of CBS (2008).

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Table 2: Definition of company size category.

Company size category	Service sector	Building and civil engineering sector and other sectors supplying products
Small	Total CO_2 emissions < 500 tonnes/year	Total CO_2 emission from office space and business accommodations < 500 tonnes/year and total CO_2 emissions from building and production sites < 2000 tonnes/year
Medium	Total CO_2 emissions < 2500 tonnes/year	Total CO_2 emission from office space and business accommodations < 2500 tonnes/year and total CO_2 emissions from building and production sites < 10000 tonnes/year
Large	Total CO_2 emissions > 2500 tonnes/year	Total CO_2 emission from office space and business accommodations > 2500 tonnes/year and total CO_2 emissions from building and production sites > 10000 tonnes/year

Source: SKAO (2011)

Table 3: Number of companies by certificate level and company size category.

Type	level 1	level 2	level 3	level 4	level 5	Total	%
Unknown	0	0	20	2	1	23	12%
Small	0	2	28	2	22	54	28%
Medium	0	2	34	10	14	60	31%
Large	0	0	30	7	22	59	30%
Total	0	4	112	21	59	196	100%
%	0%	2%	57%	11%	30%	100%	

Table 4: SBI/NACE codes of participating companies occurring more than once.

SBI	Branch	N	share
8	Other mining and quarrying	2	1%
23	Manufacture of other non-metallic mineral products	4	2%
25	Manufacture of fabricated metal products, except machinery and equipment	9	5%
26	Manufacture of computer, electronic and optical products	2	1%
27	Manufacture of electrical equipment	4	2%
28	Manufacture of machinery and equipment n.e.c.	4	2%
33	Repair and installation of machinery and equipment	7	4%
39	Remediation activities and other waste management services	9	5%
41	Construction of buildings	26	13%
42	Civil engineering	55	28%
43	Specialised construction activities	37	19%
46	Wholesale trade, with the exception of motor vehicles and motorcycles	5	3%
49	Land transport and transport via pipelines	3	2%
50	Water transport	2	1%
62	Computer programming, consultancy and related activities	4	2%
70	Activities of head offices; management consultancy activities	3	2%
71	Architectural and engineering activities; technical testing and analysis	26	13%
74	Other professional, scientific and technical activities	2	1%
77	Rental and leasing activities	4	2%
81	Services to buildings and landscape activities	2	1%
	Other branches	12	7%
	SBI code not reported	71	36%

Table 5: Emission scopes as defined in the CO_2PL.

Scope 1	Scope 2	Scope 3
Fuel used (e.g. heating, generators) Business car travel Air conditioning refrigerants	Purchased electricity, steam Private cars used for business travel Business air travel	Business travel by public transport Commuter travel Waste disposal Paper used Electricity used at client sites Suppliers/outsourced emissions Other consumables …

tion activities). The 10 largest Dutch construction companies in terms of turnover all participate in the scheme. The total number of large construction companies in the Netherlands with more than 100 employees is however around 400 (CBS, 2012). Companies in the construction industry supply chain, such as manufacturers of concrete structures (SBI 23) or structural metal products (SBI 25) also participate in the CO_2PL. A relatively high percentage of participating companies (13 %) are consultancy firms (SBI 71) that provide technical services to commissioning parties. However, the CO_2PL scheme also includes companies that are not directly related to construction activities; i.e. companies providing other services like ICT, catering services, rental and leasing activities. It is also quite remarkable to see that there are also companies participating in the CO_2PL that never do business with ProRail (Wilbrink, 2012). There are also a small number of foreign companies that participate.

CO_2 emissions from companies in the CO_2PL

EMISSION SCOPES IN THE CO_2PL

CO_2 emission reporting in the CO_2PL is based on ISO 14064-1 and CO_2 emission factors published in the SKAO CO_2PL handbook (SKAO, 2011). ISO 14064-1 specifies principles and requirements at the organisational level for quantification and reporting of greenhouse gas (GHG) emissions. The CO_2 emission inventory (or CO_2 footprint) of certified companies consists of three types of emission: direct emissions (scope 1); indirect emissions (scope 2) and other indirect emissions (scope 3). Scope 1 emissions are direct emissions from sources either owned or controlled by the companies, such as emissions from using fuels in boilers, CHP plants and furnaces, emissions from business travel by car and the use of refrigerants. Scope 2 emissions are indirect emissions from the generation of purchased electricity consumed by the company. In the CO_2PL scheme companies must also report emissions from business air travel and emissions from private cars used for business travel as scope 2 emissions, while these types of emission are reported in scope 3 in the widely used GHG emission protocol (WBCSD/WRI, 2004). Scope 3 emissions are other indirect emissions resulting from the company's activities, but occurring from sources that are not owned or controlled by the company itself. Scope 3 emissions, for example, include emissions from business trips by public transport, the use of taxis, the production and extraction of purchased materials and waste disposal. Companies can reduce their emissions by energy efficiency measures or by changing the input mix of energy sources. Companies cannot reduce their emissions through offsetting.

REPORTING OBLIGATIONS

Key process A of the CO_2PL ('insight into CO_2 emissions') requires the identification, reporting and verification of the company's own CO_2 footprint and the CO_2 emissions in the supply chain. The precise reporting obligations depend on the certification level. Scope 1 and scope 2 emissions must be reported and verified for companies that wish to comply with level 3 certification. At level 4 certification companies must also have insight into the most important scope 3 emissions. Level 5 certification requires the annual reporting and verification of scope 1 and 2 emissions in conformity with ISO 14064-1 of at least 50 % of the principal suppliers[9].

REPORTED CO_2 EMISSIONS

We were able to collect CO_2 emission inventories from 170 companies in the year 2010. The total CO_2 emissions reported in 2010 from these companies amount to 1.71 Mtonnes CO_2 and are broken down into scope 1 (71 %), scope 2 (15 %) and scope 3 emissions (14 %). Around 20 % of the certificate holders are responsible for almost 80 % of the total emissions reported. The suppliers that belong to the organisational boundary of Van Oord are particularly dominant in scope 1 emissions. These suppliers emit 177 ktonnes of CO_2 from the combustion of fuels for dredging activities. The company Fri-Jado has an 80 % share in scope 3 emissions, because it reports the GWP of refrigerants in their sold products (cooling plants). In total, 53 companies reported scope 3 emissions in 2010[10]. It appears that a substantial number of companies with a level 3 certificate do report scope 3 emissions even though this is not required by the scheme. We also collected CO_2 emission inventories from 122 companies in the year 2009. These 122 companies reported 1.54 Mtonnes CO_2 in 2009.

COMPARISON WITH NATIONAL EMISSIONS

Figure 2 shows the CO_2 emission in the construction branch according to the Dutch Pollutant Release and Transfer Register (PRTR, 2011). A distinction is made here between emissions from stationary sources and emissions from mobile sources

9. This requirement does not apply to small businesses.

10. The average share of scope 3 emissions in the total emissions reported is around 28 % in the companies that reported this type of emission.

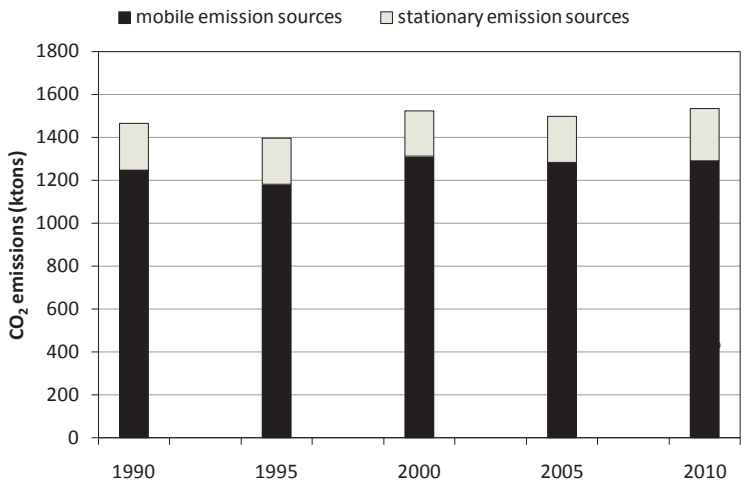

Figure 2: CO_2 emissions in SBI41-42-43 according to Pollutant Release and Transfer Register.

Table 6: CO_2 emissions of companies that reported in 2009 and 2010.

emission scope	2009 (ktonnes)		2010 (ktonnes)		Change (%)
scope 1		984		949	-3.5%
- van Oord	218		177		-19.0%
- rest of the companies	766		772		+0.9%
scope 2		238		208	-12.6%
scope 3		280		228	-18.6%
- Fri-Jado	225		180		-20.2%
- rest of the companies	54		48		-11.8%
Total		1501		1384	-7.8%

on site. CO_2 emissions have been more or less stable over the past 20 years, fluctuating between 1.4 to 1.6 Mtonnes. The total domestic GHG emission in the Netherlands in 2010 was 210 Mtonnes (CBS et al., 2012). The share of the construction branch being less than 1 %. The estimated CO_2 emissions from construction companies participating in the CO_2PL was above 970ktonnes in 2009[11]. These figures show that a substantial amount of the CO_2 emission in construction industries has not yet been covered by the CO_2PL. Around 30 companies in the top 50 largest construction companies (measured in terms of turnover) do not yet participate in the CO_2PL. These 30 companies are responsible for 15 % of the total turnover in the top 50. It must be pointed out that PRTR data and CO_2PL data are not fully comparable since the process of collecting, reporting and preparing data differs, and the organisational boundaries of companies may also be disparate.

CO_2 EMISSION REDUCTIONS

Table 6 shows the CO_2 emissions in scope 1, 2 and 3 from 110 companies that reported their emissions in 2009 and 2010. The total emission has decreased by 7.8 %[12]. The total of scope 1 emissions decreased from 984 to 949 ktonnes (-3.5 %). The scope 1 emissions – excluding Van Oord emissions – increased from 766 to 772 ktonnes (+0.9 %). Scope 2 emissions decreased from 238 to 208 ktonnes (-12.6 %). These emission reductions have been mainly achieved by switching from grey to green electricity. The scope 3 emission decreased by 18.6 % mainly thanks to the emission reduction achieved by Fri-Jado. These results should however be interpreted with caution. First, there are some weaknesses in terms of the validity and (un)certainty of the data (see next section). Second, it must be stressed that the calculated emission reductions are only based on a comparison of emission data in 2009 and 2010 and not a longer time scale. Third, it must be pointed out that the construction industry went through an economic decline in the years 2009 and 2010. Further research is needed to explain the decreasing emissions in scope 1 and 2 in more detail, e.g. the impact of changes in economic activity, fuel switching, energy efficiency improvement, etc.

VALIDITY AND (UN)CERTAINTY OF CO_2 EMISSION INVENTORIES

As explained in the previous section the reported CO_2 emissions and CO_2 emission reductions must be interpreted with caution. First, CO_2 emission inventories are primarily based on ISO 14064-1 and the CO_2 emission factors published in the SKAO CO_2PL handbook. Nevertheless, in some cases CO_2 emissions *were* reported on the basis of other standards with deviating emission scopes and different sets of CO_2 emission

11. Including emissions from those companies in construction industries that reported their NACE codes and also the emissions from other major construction companies that did *not* report their NACE code.

12. If we exclude the two most dominant companies in terms of CO_2 emission in scope 1 and scope 3 (Van Oord and Fri-jado) the total CO_2 emission has decreased by 2.8 %.

factors[13]. Due to the lack of detailed emission inventories we were unable to properly investigate the impact of using other reporting standards on the aggregated CO_2 emissions, the distribution of CO_2 emissions among the emission scopes, and the calculated emission reductions. Second, since the introduction of the CO_2PL some of the CO_2 emission factors have been updated. The updating of these factors may require a recalculation of the CO_2 footprint in the reference year[14]. As yet we have no insight into the impact of the updated CO_2 emission factors on aggregate CO_2 emissions covered by the CO_2PL and calculated emission reductions. Third, organisational boundaries may have changed; this also requires a recalculation of the CO_2 footprint. At this moment the extent to which the CO_2 footprints in the year 2009 and 2010 are fully comparable in this respect is not yet clear. Fourth, to comply with certification level 3 – key process A ('insight into the carbon footprint'), companies can opt for an emission verification statement according to ISO 14064-3 drawn up by an independent institution. This requirement is however not obligatory at level 3 and may therefore have an impact on the validity and uncertainty of the CO_2 emission inventories. Fifth, errors in scope 3 emissions may occur given that emissions in the supply chain can be counted more than once, i.e. as the scope 1 or scope 2 emissions of other companies. It is thought that the impact of double counting scope 3 emissions is only moderate. Finally, there are other concerns regarding the (un)certainty of emission reporting, such as the choice of emission factors, the uncertainty in emission factors, uncertainties in the collected data; and the extrapolation of emission data (ProRail, 2010).

CO_2 emission reduction targets

OBLIGATIONS REGARDING THE FORMULATION OF REDUCTION TARGETS

Setting CO_2 emission reduction targets in the CO_2PL is part of key process B ('reduction'). The exact requirements depend on the certification level. At certification level 2 companies must formulate qualitative objectives for energy efficiency improvement and renewable energy that must be signed by management. Quantitative reduction targets must be formulated separately for scope 1 and 2 CO_2 emissions for companies that wish to be certified at level 3. The emission reduction targets must be ambitious and comparable with other companies in the sector. At level 4 companies must also set quantitative reduction targets for emissions in the supply chain. There are no additional obligations regarding the setting of reduction targets at level 5. Obligations regarding progress reports, the constant search for improvements and the realisation of emission reduction targets are other important aspects of key process B.

ANALYSIS OF CO_2 EMISSION REDUCTION TARGETS

Analysis of the CO_2 emission reduction targets of companies participating in the CO_2PL reveals that the scope of the reported targets can differ greatly. First , there are companies that report aggregated CO_2 emission reduction targets covering emissions within the entire company's boundary. Second, some companies set separate CO_2 emission reduction targets for emission scopes 1, 2 and 3. Finally, there are companies that have set separate targets for specific emission sources like the electricity they purchase.

The companies participating in the CO_2PL scheme have set different types of quantitative targets for CO_2 emissions[15]. About 40 % of these companies have set volume targets for CO_2 emission reduction, such as 'the total CO_2 emissions in 2020 must be reduced by 10 % compared with the reference year 2009' or 'CO_2 emissions must be reduced by 2 % on an annual basis'. About 20 % of the certified companies have formulated CO_2 emission reduction targets measured against full time equivalents (FTE)/worked hours/productive hours, such as 'CO_2 emissions per FTE must be reduced by 15 % in 2015 compared with the reference year 2009'. Roughly 15 % of the companies have set economic intensity targets, such as 'the CO_2 emission per € turnover must be reduced by 12 % in 2012 compared with the reference year 2009'. Physical CO_2 efficiency targets, like 'the CO_2 emissions per tonne of product must be reduced by 10 % in 2013 compared with the reference year 2009' have been set by very few companies (3 %). Also a small number of companies (8 %) only reported targets for specific emission sources. In that case, CO_2 emission reduction targets are often measured against different types of activity indicators, such as the total number of car kilometres travelled, the number of running hours, or the total square metres of office space. The rest of the companies (15 %) either did not (need to) report any targets, or only reported energy (efficiency) targets; they did however report other types of CO_2 emission reduction targets or ambiguous targets. We also investigated the time frame within which the targets must be achieved. The majority of companies have set short-term targets. On average, the targets must be achieved within a period of five years. Around 15 % of the companies have set targets that extend beyond a 10-year time frame. Most of the companies have chosen 2009 or 2010 as the reference year against which the target achievement will be measured. The rest take other years as the reference, do not report a reference year or use a rolling base year.

AMBITION LEVEL OF CO_2 EMISSION REDUCTION TARGETS

The CO_2PL requires that the CO_2 emission reduction targets are ambitious and comparable among the companies in the sector. Figure 3, Figure 4 and Figure 5 present frequency histograms of the three major types of reduction targets for scope 1 and scope 2 emissions[16]. For example, 20 of the companies that had formulated a volume target for CO_2 emission reduction report a reduction target in the range of 1.5 – 2.0 % a year. The volume-weighted average ambition for CO_2 emission reduction is 2.0 % per year. This only covers CO_2 emissions in scope 1 and 2. Volume targets for the reduction of emissions from specific sources, such as the combustion of fossil fuels to generate electricity, can be much more aggressive: up to 8 % per

13. An alternative reporting standard is, for instance, the GHG Protocol 'A corporate accounting and reporting standard' (WBCSD/WRI, 2004). See ERM (2010) for an overview of company GHG reporting methodologies.

14. Recalculation of the CO_2 footprint is only required if CO_2 emission factors for dominant emission sources have been updated.

15. For a taxonomy of quantitative targets for industrial energy use and CO_2 emission reduction see Rietbergen & Blok (2010).

16. Targets for scope 3 emissions were not taken into account in this research. Targets for scope 3 emissions often aim at the reduction of emissions from specific sources, like paper usage.

year. Some companies have formulated the ambition to become climate neutral in the longer term by including measures for CO_2 compensation. The average ambition level of CO_2 emission reduction targets measured against full time equivalents or hours (worked) is 2.3 % a year (see Table 7). Companies that have formulated economic intensity targets aim to reduce their CO_2 emissions by 1.9 % per € turnover on average. None of the companies reported that turnover figures will be adjusted for inflation. The forecast inflation rate of 1.5 % (CPB, 2011) almost completely outweighs the ambition level of these economic intensity targets.

ASSESSING THE POTENTIAL IMPACT OF CO_2 EMISSION REDUCTION TARGETS

Table 7 shows the ambition levels of three different target types and the projected impact of these targets on scope 1 and scope 2 emissions. The impact of volume targets for CO_2 emission reduction will – in the case of full compliance – only depend on the ambition level of the target. The projected CO_2 emission reductions are therefore -2.0 % per year. The impact of CO_2 emission reduction targets measured against FTE or hours worked will depend on the ambition level of the target, the projected production volume and the projected number of FTEs working in the construction industry. The projected impact of these targets is calculated on the basis of our own trend analysis of CBS data (CBS, 2012), TNO projections (2010) and EIB forecasts (2011). The impact of these targets on CO_2 emission reduction is estimated at -1.1 % to -1.8 % per year in average growth scenarios. In the event of high economic growth and increased labour productivity the impact is estimated at -0.1% per year. Low economic growth and a limited increase in number of FTEs will result in a 2.0 % CO_2 emission reduction per year. The impact of CO_2 emission reduction targets measured against turnover will depend on the ambition level of the target, the projected figures for turnover and projected figures for inflation. It is estimated that CO_2 emissions will increase by 0.6 % to 1.6 % per year in average growth scenarios. In the case of high and low economic growth these targets will result in an increase of CO_2 emissions by 2.3 % and 0.4 % respectively. The total potential impact of the CO_2PL is the weighted average of the projected emission reduction targets. The weights are based on the total CO_2 emission of companies that have set the specific target type. The projected CO_2 emission reduction is estimated at 0.5 % – 1.3 % a year with a most likely value of 1.1 %[17, 18, 19].

We must however keep in mind that the projected impacts of the targets are based on forecasts in the construction sector only, while companies operating in other sectors also participate. Nevertheless, many of the companies from other sectors are in the construction business supply chain and growth rates of turnover and FTE are therefore expected to be similar. Furthermore, we must stress that the projected impacts of the CO_2PL are only based on those companies that have set targets like the ones presented in Table 7. However, the CO_2 emission covered in this analysis represents more than 80 % of scope 1 and scope 2 emissions. We therefore expect that the exclusion of companies that have set other types of targets or targets for specific emission sources will not significantly change the re-

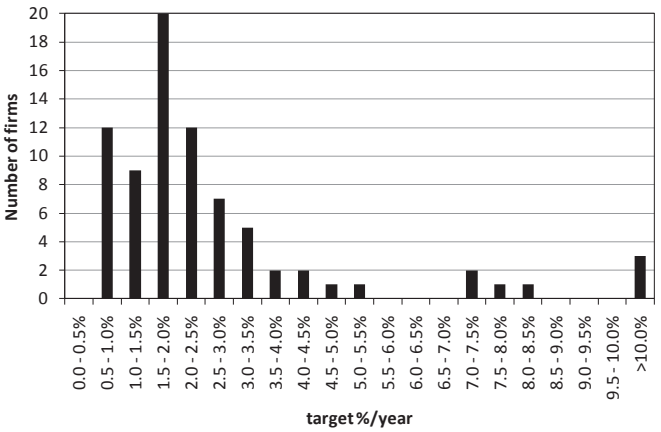

Figure 3: Histogram of volume targets for CO_2 emission reduction.

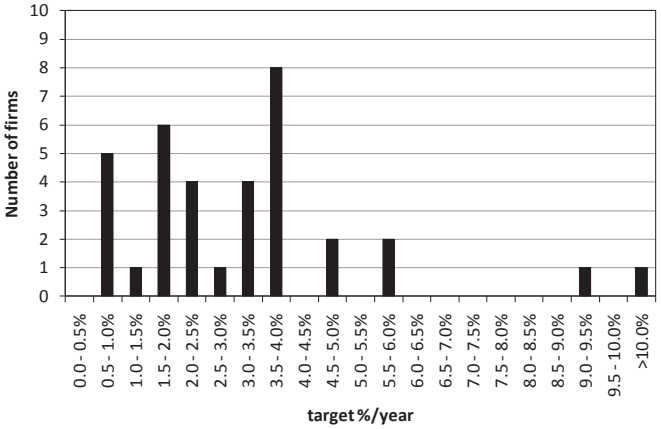

Figure 4: Histogram of CO_2 emission reduction targets measured against FTE.

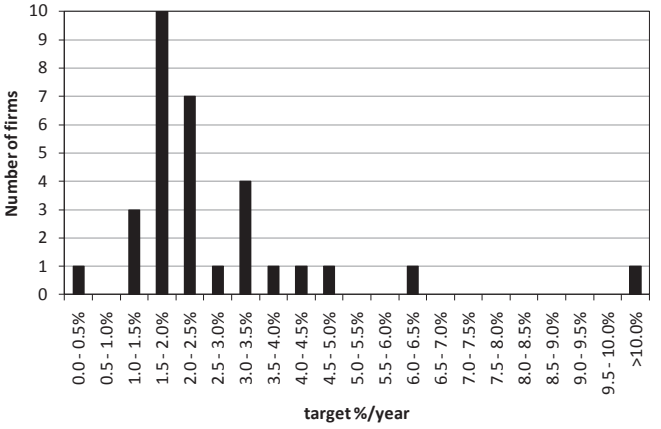

Figure 5: Histogram of CO_2 emission reduction targets measured against turnover.

17. 0.5 %–1.3 % of the CO_2 emissions covered by the CO_2PL in 2010 correspond to 8–22 ktonnes. The CO_2 emissions of ProRail are 77 ktonnes in 2010.

18. The projected absolute impact of the CO_2PL would be higher if the CO_2 emission reduction targets measured against turnover were based on constant prices, thus excluding inflation. In that case, the projected total impact of the CO_2PL on CO_2 emission reduction would range from 0.9 % to 1.8 % per year.

19. It can be argued that the estimated impact on CO_2 emission reduction may not be fully attributed to the CO_2PL. However, the impact of other drivers for CO_2 emission reduction is expected to be rather limited since no specific policy or measures for the construction industry have been implemented as yet. Moreover, only a small number of companies participating in the CO_2PL also participate in Long-term Agreements on energy efficiency.

Contents Keywords Authors

Table 7: Ambition level and projected absolute impact of various target types per year.

target type	ambition level	projected absolute impact of the target on CO_2 emissions				
CO_2	-2.0%	-2.0%				
		BAU[1] FTE[2]	BAU high[1] FTE low[2]	BAU low[1] FTE low[2]	EIB[3]	TNO[4]
CO_2/hour	-2.3%	-1.8%	-0.1%	-2.0%	-1.1%	-1.8%
		BAU[5]	BAU high[5]	BAU low[5]	EIB[3] CPB[6]	TNO[4] CPB[6]
CO_2/€ turnover	-1.9%	1.1%	2.3%	0.4%	1.6%	0.6%
Total		-1.1%	-0.5%	-1.3%	-0.8%	-1.2%

[1] The projected BAU growth of the production volume or turnover in constant prices is 1.3 %/year. The projected BAU growth rate is based on the average annual growth of turnover in the construction industry (3.0 %/year) and the average annual inflation in the period 2004–2011 (1.7 %/year) (CBS, 2012). The BAU high growth scenario and BAU low growth scenario assume an annual increase in the production volume of 2.6 %/year and 0.65 %/year respectively.

[2] The projected annual FTE growth rate is around 0.7 %/year. This growth rate is based on trend analyses of FTE data in the construction industry in the period 1995–2010 (CBS, 2012). The FTE high growth scenario and FTE low growth scenario assume an annual increase in FTE of 1.4 %/year and 0.35 %/year respectively.

[3] EIB (2011) projects an annual FTE growth rate of 0.8 %/year in the period 2010–2016. The annual growth of production value in constant prices in the period 2010–2016 is forecast at 2.1 %/year according to EIB (2011).

[4] TNO (2010) envisages an annual FTE growth rate of 0.4 %/year in the period 2010–2015. The annual growth of production value in constant prices in the period 2010–2015 is forecast at 1.0 %/year according to TNO (2010).

[5] The projected BAU growth rate is based on the average annual growth of turnover at current prices in the construction industry (3.0 %/year) in the period 2004–2011. The BAU high growth scenario and BAU low growth scenario assume an annual increase in production volume of 4.3 %/year and 2.4 %/year respectively.

[6] The annual growth of turnover in current prices is estimated by including the projected inflation rate in the projected annual growth rate of the production value in constant prices. CPB (2011) estimates the project annual inflation rate in the period 2011–2015 at 1.5 %/year.

sults. This analysis did not include targets for the reduction of scope 3 emissions. These targets are often aimed at reducing CO_2 emissions from specific sources such as paper, waste or other purchased materials. This type of emission sources makes it difficult to assess the potential impact on CO_2 emission reduction.

COMPARISON WITH NATIONAL AND EUROPEAN CO_2 TARGETS

In 2007 the European Union agreed on the target to reduce EU GHG emissions by at least 20 % below the levels seen in 1990 by 2020 (COM, 2007). The European emission-trading scheme was adopted (EC, 2003) in order to reduce GHG emissions of large installations/plants in the energy and industrial sector. ETS sectors aim at a 21 % GHG emission reduction in 2020 compared to 2005 emissions. The EU Effort Sharing Decision (EC, 2009) establishes annual binding GHG emission targets for non-ETS sectors, including the construction industry, in the EU Member States for the period 2013–2020. The Netherlands needs to reduce its GHG emissions in non-ETS sectors by at least 16 % in 2020 compared to 2005 emission levels. Emission reductions can to a certain extent also be achieved by carbon offsetting. CO_2 emissions must be reduced by at least 1.4 % per year from 2010 onwards to reach the CO_2 emission ceiling for all non-ETS sectors in 2020[20]. The most likely projected impact of the CO_2PL, i.e. a 1.1 % CO_2 emission reduction per year, is lower than the average required emission reduction rate of 1.4 % per year. However, it must be emphasised that there are no separate CO_2 emission reduction targets for the specific non-ETS sector. Therefore, the sectors concerned do not necessarily have to contribute equally to achieving the overall target.

20. Based on GHG emission data from CBS et al. (2012).

Conclusions

The aim of this research was to assess the potential impact of the CO_2 Performance Ladder (CO_2PL) on CO_2 emission reduction. The CO_2PL is a new green public procurement scheme that was introduced in the Netherlands by ProRail. Currently, more than 190 companies participate in the scheme, a large number of which operate in the construction industry. The total CO_2 emissions emitted by these companies exceeded 1.7 Mtonnes in 2010, corresponding to almost 1 % of the national GHG emissions. The projected impact of the CO_2PL on CO_2 emission reduction among these companies is 0.5 %–1.3 % a year, with a most likely value of 1.1 %. An annual 1.4 % reduction in GHG emissions must be achieved from 2010 onwards in order to reach the Dutch emission ceiling for non-ETS sectors (including the construction industry) in 2020. The CO_2PL can therefore make a substantial contribution to achieving these emission reduction targets for the sectors involved.

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Acknowledgements

The authors would like to express their thanks to Gijs Termeer, Sible Schöne and Johan van Dalen for their valuable feedback.