

Public Procurement for Climate Neutrality: a transformative policy instrument?

Deliverable 4.2

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WP 4

Report

31 July 2023

Document information

Project name:	4i-TRACTION
Project title:	Transformative Policies for a Climate-neutral European Union (4i-TRACTION)
Project number:	101003884
Duration	June 2021 – May 2024
Deliverable:	D4.2: Four case study reports on innovation, infrastructure, investment & finance and integration
Work Package:	WP4: Development of avenues for future EU climate and energy policy
Work Package leader:	Ecologic Institute
Task:	4.2: Quantitative and Qualitative Assessment of selected Core Instruments
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Peer reviewed by / on	Brendan, Moore; VUB; 05/2023 Pesu, Jarkko; University of Eastern Finland; 05/2023
Planned delivery date:	31.05.2023
Actual delivery date:	31.07.2023

Dissemination level of this report

PU	Public	x
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Suggested citation

Mähönen, Maiju., Martini, Leon., Gardiner, Jonathan., Lehtilä, Sara., & Görlach, Benjamin (2023): Public Procurement for Climate Neutrality: a transformative policy instrument? D4.2: 4i-TRACTION case study report. University of Eastern Finland & Ecologic Institute, Berlin.

Acknowledgements

The authors would like to thank Jarkko Pesu (UEF), Brendan Moore (VUB), Harm Rienks (WUR), Maarten de Vries, and Marieke Nauta (CE Delft) for their thorough review of an earlier draft. In addition, we would like to thank Aaron Best for his help with empirical challenges and all the other people that supported this report with their valuable inputs in interviews and workshops. All errors remain our own.

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 101003884.

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List of abbreviations

ACAN	Architects Climate Action Network
BCCA	The Buy Clean California Act
BNB	Bewertungssystem Nachhaltiges Bauen
BPQR	Best-price-quality-ratio
CARB	California Air Resources Board
CBAM	Carbon Border Adjustment Mechanism
CCU/S	Carbon capture, utilization and storage
CJEU	The Court of Justice of the European Union
COM	Commission Communication
CPA	Classification of Products by Activity
CPR	Construction Product Regulation
DGS	Department of General Services
DRI	Direct Reduced Ironmaking
EEA	European Economic Area
EFTA	European Free Trade Association
EMAS	EU Eco-Management and Audit Scheme
EN	European Standards
EPD	Environment Product Declaration
EPBD	Energy Performance of Buildings Directive
EPRS	European Parliamentary Research Service
ETS	Emissions Trading System
GFCF	Gross fixed capital formation
GHG	Greenhouse gas
GPA	WTO Agreement on Government Procurement
GPP	Green Public Procurement
IEA	The International Energy Agency
ISO	International Organization for Standardization
JRC-IPTS	Joint Research Centre's Institute for Prospective Technological Studies
LCA	Life Cycle Assessment
LCC	Life-cycle-costing
MAC	Marginal abatement cost
MEAT	Most Economically Advantageous Tender
NZE	Net Zero Emissions
NZIA	Net-Zero Industry Act
OECD	Organisation for Economic Co-operation and Development
PEFCR	Product Environmental Footprint Category Rules
PPCN	Public Procurement for Climate Neutrality
PPI	Public procurement of innovation
SCC	Social cost of carbon
SRPP	Socially responsible public procurement
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
TED	Tenders Electronic Database
TEU	Treaty on the European Union
TFEU	Treaty on the Functioning of the European Union
WTO	World Trade Organization

Executive summary

Focus of this report

In this report, we develop the concept of “Public Procurement for Climate Neutrality” (PPCN) – the strategic use of public procurement to create demand for selected low-emission goods and services. We start by arguing why public procurement should play a role in the EU’s climate policy, presenting key figures and arguments showcasing the strategic potential of procurement for emissions reductions. Then, we analyse how PPCN could be integrated in the EU’s current legislative framework, identifying different policy options, and discussing their respective strengths and weaknesses. Next, we argue why the construction sector should be one focus area for PPCN and estimate what PPCN could look like in the case of construction materials and assess the impacts it could have in this sector. Finally, we propose recommendations for policy.

Why should public procurement be a key climate policy instrument?

The majority of public procurement contracts across the EU are awarded based on price alone, thus do not take into account other criteria such as the quality of the tender or the environmental costs that occur over the project’s lifecycle. The potential of public procurement for environmental protection and the mitigation of climate change, which is commonly referred to as Green Public Procurement (GPP), has increasingly been recognised by governments and EU institutions. The European Commission has repeatedly acknowledged the strategic potential of public procurement and its intention to reform public procurement systems in communications such as the Green Deal, the Circular Economy Action Plan, and the Green Deal Industrial Plan. However, few concrete legislative proposals were made and the inclusion of environmental and climate considerations in procurement remains voluntary.

The greenhouse gas emission (GHG) footprint of public procurement is large, indicating substantial direct mitigation potentials. We provide an estimate of the public sector’s consumption and investment emission footprint associated with its procurement activities. Using Eurostat data, we estimate that public procurement is responsible for at least 11% of the EU’s GHG emissions. The vast majority (81%) of these emissions are concentrated in four spending categories, where public procurers are responsible for at least a quarter of total emissions in each (Figure ES.1).

While the Commission has been developing and updating GPP criteria to help procuring authorities procure goods, services, and works with a reduced environmental impact compared to more conventional options since 2008, the uptake of GPP has remained limited. Moreover, in light of the adoption of the Paris Agreement, the European Climate Law, and the Green Deal the currently applicable rules on public procurement, which were passed in 2014, are no longer fit for purpose.

Towards using public procurement for climate neutrality

In this report we argue that public procurement should be used more strategically in the EU to create demand for low-emission goods and services. To this end, we introduce the concept of “Public Procurement for Climate Neutrality” (PPCN). There are numerous arguments for a more strategic use of public procurement:

- EU public procurement is a large source of demand, accounting for 14% of EU GDP. It is moreover a major buyer of key emission-intensive products, such as structural steel or concrete. We argue that PPCN should be used where it can have the greatest effect on production, such as the construction sector.
- PPCN can guarantee demand for strategic low-emission goods that are not yet at technological maturity, thereby reducing uncertainties and technology costs which provides even greater incentives to invest. Through PPCN, lead markets can be created.
- PPCN can drive ambitious standards that will be adopted by the wider market later on. By ratcheting up these standards over time, public procurers in the EU can lead the way in the decarbonisation of key sectors, while also reducing the public sector’s emissions.

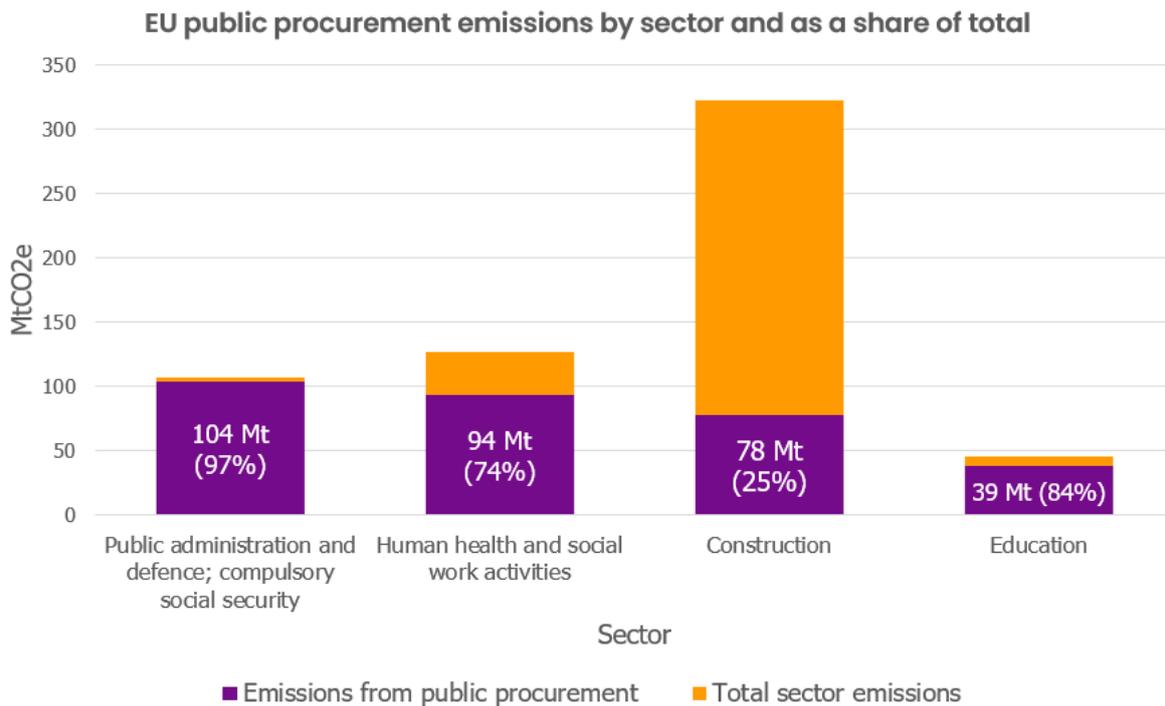


Figure 1: EU public procurement emissions by sector (MtCO_{2e})

Note: own calculation using Eurostat (2023a) data.

Based on our analysis, we conclude that public procurement can play an important role in supporting the attainment of the EU climate targets, but it is yet to be developed into a strategic

instrument for decarbonisation. To harness its potential, we consider that some changes in the EU legislative framework need to be made. This is necessary to:

- a) avoid fragmentation in the Single Market and to promote a level playing field,
- b) enable the EU to move consistently towards EU-level climate goals, and
- c) ensure the effectiveness of PPCN.

Our impact assessment for the building materials industry reveals that public procurers in the EU have a substantial influence in driving the transformation of key sectors through PPCN adoption. Policy implementation has the potential to yield significant emission reduction opportunities, of at least 21% and 18% of the EU's cement and steel sector emissions, respectively. Furthermore, the analysis demonstrates that the additional demand for green steel generated by PPCN is likely to be met adequately by the supply. It is clear that the benefits of adopting PPCN outweigh the direct (and short run) costs, even if only considering the climate benefits. Additionally, there are likely other economic advantages of PPCN, such as the lead markets and job creation.

Key recommendations

Based on our analysis, we suggest the following policy options for implementing PPCN in the EU:

1. The EU should introduce the concept of PPCN and incentivise procuring authorities to consider the climate effects of procurement by publishing updated guidance on the strategic use of GPP and PPCN.
2. The EU Public Procurement Directives should be revised in a targeted manner to facilitate a wider uptake of GPP and PPCN, including:
 - a general obligation for procuring authorities to take environmental considerations into account,
 - restricting the price-only assessment to pre-defined conditions, and
 - introducing an indicative adoption target and an obligation to draft National GPP Action Plans, including reporting on PPCN.
3. Mandatory PPCN rules should be introduced in sectoral legislation in areas which hold the most strategic potential to create demand for low-emission products. These rules should be introduced via PPCN criteria, PPCN targets, and sector-/product-specific PPCN requirements. We outline how and where these rules are best introduced and for what sectors.
4. To make PPCN work, the EU must ensure the enabling conditions are in place. These include the establishment of a common methodology for calculating the environmental footprint of products and projects, improving the capacity of procuring authorities, and providing clearer guidance on the implementation of PPCN.

1. Introduction

The public procurement rules of the European Union (EU) have traditionally centred around objectives of the functioning of the Single Market. However, there is an increasing focus on leveraging the potential of strategic public procurement in support of common societal goals, such as climate change mitigation. Public procurement holds significant transformative potential due to its ability to induce changes in government consumption and generate indirect market effects in response to increased demand for low-emission goods and services. We argue that public procurement should be used more strategically in the EU to create demand for low-emission goods and services. In this report, we introduce the concept of “Public Procurement for Climate Neutrality” (PPCN) to ingrate procurement with EU climate policy.

The EU Commission has acknowledged the strategic potential of public procurement for climate action and has also indicated its plans to propose legislation on green public purchasing in the context of the Green Deal. However, no concrete policy proposals in this regard have been made, leaving aside some targeted updates in the Energy Efficiency Directive and the Energy Performance of Buildings Directive as part of the Fit for 55-package. As the EU is looking at ways to match the green industrial competition from the US and China, the importance of strategic public procurement may increase in the future. Regardless, until now, practical action taken to incentivise the strategic use of public procurement in support of climate goals has been modest.

In recent years, emphasis has been on Green Public Procurement (GPP), which is aimed at promoting environmentally sustainable procurement in a broader sense. In practise, the application of GPP means applying GPP criteria laid down by the Commission for certain sectors or product groups. However, due to their voluntary nature, the use of GPP is highly heterogenous across and within Member States and has remained limited in general. A big challenge is that there is no coherent legal framework nor mandatory rules on GPP. While the currently applicable EU Public Procurement Directives allow the inclusion of climate considerations in the procurement process, there are no mandatory minimum requirements.

Stronger integration of climate objectives in the legal framework appears justified considering the developments in EU and international climate change law since the adoption of the directives in 2014. Overreaching action is needed to attain both the EU and Paris climate targets, and as we show in the report, public procurement has significant untapped emissions reduction potential particularly in certain sectors such as construction.

As said, the report develops the concept of “Public Procurement for Climate Neutrality (PPCN)” to address the challenges described above. The aim is to develop the concept of GPP a step further to target the climate effects of procurement specifically. We define PPCN as a strategic policy instrument and sub-type of GPP, whereby public authorities use public procurement for accelerating the decarbonisation of specific sectors or goods by introducing requirements relating to the climate-neutrality alignment of the procured goods, services or works. PPCN would be a policy instrument that stimulates demand for cleaner goods and

services with the aim of accelerating industry's transformation to climate neutrality. Hence, PPCN would work as a subset of GPP. EU-level action to introduce PPCN is needed to both ensure that Member States are moving together towards EU-level targets and that a level-playing field of competition in the Single Market is maintained. Undoubtedly, while PPCN may induce transformative change in given sectors, it is not sufficient on its own. Instead, it has the potential to play an important role in complementing the EU's climate policy mix aimed at reaching climate neutrality by 2050.

Box 1: The '4i' challenges – public procurement as a tool for climate policy integration?

The 4i-TRACTION project explores what transformative EU climate policy could look like around four cross-cutting core challenges – innovation, investment, infrastructure, and integration (the "4i's"). In previous work under this project (Görlach et al., 2022b), we developed and described four transformative climate policy avenues. Building on this work, in this report we investigate specific core policy instruments identified as playing a potentially transformative role for attaining a climate neutral EU. This case study looks at public procurement for climate neutrality as a form of policy integration. The other case studies assess innovation funding, integrated infrastructure planning, and transition plans for banks (see <https://www.4i-traction.eu/outputs>).

Climate policy integration is a key pre-requisite for transformative change in the EU. The effort to "systematically integrate climate considerations into different policies across various sectors at multiple levels of governance" is referred to as climate policy integration or mainstreaming (Görlach *et al.*, 2022a, p. 41). Green public procurement and what we refer to as public procurement for climate neutrality is a way to integrate climate considerations into public purchasing decisions, thereby taking an "all of government" approach to climate policy. Through the strategic use of public procurement to transform specific industries and sectors – what we refer to as Public Procurement for Climate Neutrality – climate considerations must be taken into account by all procuring authorities, down to the most local level of government. Doing so, public procurement is a key anchor for climate policy integration.

Structure of the report

In chapter 2 of the report, we discuss the arguments for why public procurement should play a strategic role in the EU's climate policy. We first outline the role of GPP in the EU today (2.1) followed by an estimation of the public's investment and consumption greenhouse gas (GHG) footprint (2.2). Then we provide arguments for using public procurement more strategically to transform specific industries (2.3) before discussing general challenges that GPP faces (2.4).

In chapter 3, we provide a legal analysis of the potential means to promote GPP and PPCN. First, we explain how GPP is situated within the current EU legislative framework on public procurement (3.1). Next, the concept of PPCN as a subset of GPP is introduced (3.2), followed by an analysis of the potential means to promote the uptake of PPCN via legislative changes (3.3). The final section provides a summary assessment of the different options discussed (3.4).

In chapter 4, we present a case study on the application of PPCN in the construction sector, specifically the construction material sector. We first outline why construction is a suitable focus area for PPCN (4.1) before describing two ways for implementing PPCN (4.2). Subsequently, we describe the potential and possible impacts of PPCN in construction with an illustrative impact assessment of a stylised PPCN application: the use of embodied emission limits on steel and cement (4.3).

In chapter 5, we present policy recommendations based on the analysis carried out in chapters 2-4. Finally, chapter 6 we close with an outlook on current EU policy efforts and future research.

2. Public procurement as a strategic policy instrument to transform industries

Public consumption and investment have always been used for collective goals and been a core tool of statecraft. The relevance of public spending for welfare provisions, economic policies, and macro-economic adjustments have been known since the advent of the modern state. More recent, however, is the recognition of the environmental effects of public spending along the full supply chain. Green Public Procurement (GPP) targets the environmental impact of public purchases and investments. In principle, the concept targets all environmental impacts, although in practice the environmental criteria applied tend to focus on individual pollutants or impacts. In this report, we focus on the climate impact of public procurement, and the role it can play in the mitigation of climate change.

Green public procurement is a so-called “demand-side policy instrument”. Several scholars and organisations have highlighted GPP as an important policy instrument for inducing structural change, especially in the industry and building sectors (such as Agora Energiewende & Wuppertal Institute, 2021; Lewis et al., 2023; Sapir et al., 2022; UNEP, 2022).

Conceptually, we can differentiate two ways in which GPP is important for climate mitigation (see Sapir et al., 2022). First, GPP is important for mitigation because of changes in government consumption patterns and a reduction in the associated environmental and climate impact. As the government switches from conventional to lower-emission products and services, its emission footprint decreases. This direct consequence of GPP is what Sapir et al. (2022) refer to as the “*consumption effect*”. The second way GPP is important is because of changes in production as suppliers respond to changes in demand, what can be referred to as the “*production effect*”. This indirect effect results in spill-overs on markets, changes in production patterns, innovation, and the creation of lead markets in response to increased demand for low-emission goods and services (Sapir et al., 2022). While, as we show in the following section, the consumption effect can bring substantial emission savings, we argue that the production effect can bring transformative change in specific industries. We therefore advocate for the strategic use of public procurement to incentivise changes in production (see section 2.3).

In this chapter, we will first outline what role GPP has played in the European Union today (2.1). Following this overview, we provide some estimates of public procurement’s climate and financial footprint, drawing on Eurostat data. This will give a better understanding of what the direct or “consumption effect” of more ambitious green public procurement policies would be (2.2). The third section outlines the arguments for using public procurement more strategically to elicit the indirect “production effect” (2.3). The last section discusses some general challenges that GPP faces (2.4).

2.1 Green Public Procurement plays a relatively small but increasing role in the EU

Public procurement remains an underutilised climate policy instrument in the EU. As we discuss in detail below, there is no coherent legal framework nor mandatory rules for GPP in the EU today. Procurers in the EU can incorporate environmental considerations for instance through the assessment of life-cycle cost in establishing the best price-quality-ratio (or BPQR) or by using the green public procurement criteria suggested by the Commission, but the inclusion of environmental considerations in the procurement process remains voluntary. Chapter 3 below describes the current legal framework for GPP in more detail. EU rules and regulations only set binding GPP rules in selected areas such as energy efficient lighting, the energy performance of buildings, and the procurement of clean vehicles.

The first EU-level policy action on greening public procurement was the 2008 communication by the EU Commission “Public procurement for a better environment” (European Commission 2008). The communication provided guidance on reducing the environmental impact of public consumption and how it can trigger innovation. Moreover, the Commission set an indicative target that by 2010 50% of all tenders should be compliant with core EU GPP criteria. Since then, the Commission has defined voluntary GPP criteria for priority sectors and product groups and provided informational and legal support to member states on the practical implementation of GPP. The Commission has tried to improve the voluntary uptake of GPP but has not made any mandatory legislative initiatives. The Commission's Joint Research Centre's Institute for Prospective Technological Studies (JRC-IPTS) is tasked with the criteria development process in accordance with the annual GPP work plan. Criteria setting follows the EU Ecolabel procedure with extensive stakeholder consultation. The EU Ecolabel is a voluntary scheme, the basis of which is however laid down in law, unlike the basis of the EU GPP criteria (see Regulation (EC) No 66/2010).

While the GPP criteria are developed and updated regularly by the Commission, their drafting process is not regulated by law and the use of the criteria remains voluntary. Legislative initiatives in public procurement have focused on harmonising rules across Member States to improve the functioning of the Single Market and on improving the uptake of best practices to increase efficiency, transparency, and reduce bureaucracy. Currently, the applicable general rules are laid down in Directive 2014/24/EU on public procurement, which was transposed into national law by April 2016 (see chapter 3). While public procurement rules have traditionally focused on objectives concerning the Single Market, one of the objectives of the revision of public procurement rules in year 2014 was to promote better use of public procurement in support of common societal goals (recital 2 of Directive 2014/24/EU).

Given its voluntary nature, the use of GPP is highly heterogenous across and within member states. Rosell (2021) investigated the adoption of GPP across the EU using the Tenders Electronic Database (TED). He found that GPP adoption is very moderate across Member States except for

some Nordic countries.¹ Using regression analysis, he established that GPP adoption positively correlates with the size of government, the level of economic development, the quality of governance, and the size of contracts. GPP adoption moreover increased over time and is more likely on a regional or local level, than on national or EU level.

From a different perspective, looking at the use of price as the only award criterion is instructive. Many Member States award the contract solely based on the price as the only award criterion. This does not mean that no environmental considerations are taken into account, as they can also be introduced via standards and requirements in the call for tenders, but it is reasonable to assume that countries that do not include GPP in their award criteria also do not use technical requirements in the calls. As can be seen in Figure 1, France or Croatia rarely award a contract only based on the price of the bid. In contrast, in Lithuania, Romania, and the Slovak Republic almost all contracts are awarded because the offer was the cheapest one available.

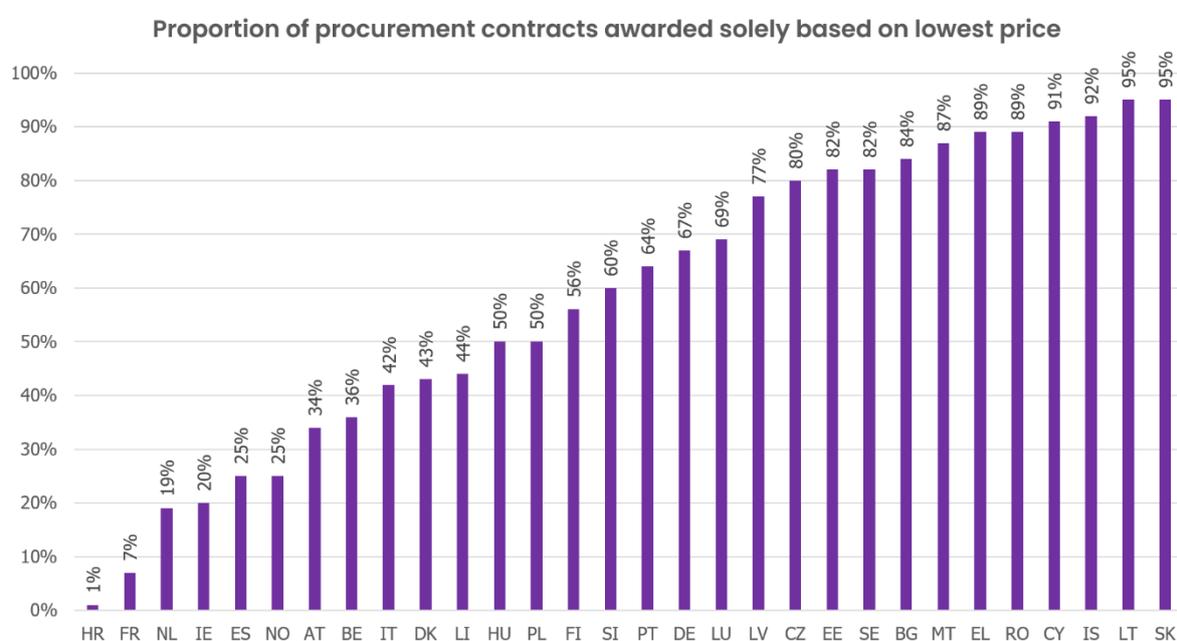


Figure 2: Proportion of public procurement contracts awarded solely based on lowest price, for the EU27 countries, Iceland, Liechtenstein, and Norway

Note: Adapted from European Commission (2022b).

The Green Deal was a missed opportunity to set more ambitious and mandatory rules for GPP. In the 2019 Green Deal Communication, the Commission acknowledged the role of public procurement for industry decarbonisation and stated its intention to propose legislative actions: “Public authorities, including the EU institutions, should lead by example and ensure that their procurement is green. The Commission will propose further legislation and guidance on green

¹ Note that Rosell (2021) defined public procurement as green if the call for tenders included keywords such as “environment” or “sustainable”. It is therefore only an estimation, because it (1) does not tell us if GPP is actually used, and (b) does not capture important GPP terms such as life-cycle costing, for example.

public purchasing” (European Commission 2019, p. 8). However, beyond tightening the rules on public purchasing regarding the energy efficiency performance of products, services, and buildings and the zero-emission requirements of new buildings, no new rules on GPP were proposed as part of the Fit for 55 policy package that is meant to deliver on the Green Deal.

In 2023, the Commission published the communication of the Green Deal Industrial Plan for the Net-Zero Age (European Commission 2023a), announcing a new policy package to accelerate industrial decarbonisation and strengthen the EU’s competitiveness in response to the US’ Inflation Reduction Act. In it, the Commission explicitly cites public procurement as an important lever to stimulate “demand for net-zero products at large scale” (European Commission 2023a, p. 5). While the Communication does not mention any specific actions or proposals, it states that “the Commission would define sustainability characteristics and possible requirements for net-zero products, using available legal tools and existing EU standards. It would promote a more predictable and uniform demand for net-zero solutions and allow public authorities to set out ambitious sustainability requirements” (European Commission 2023a, p. 5).

The following legislative proposal, the “Net-Zero Industry Act” (NZIA) (European Commission 2023b), which has the goal to strengthen Europe’s net-zero energy technologies manufacturing ecosystem, cites public procurement as a core driver of clean manufacturing investment. The NZIA focuses heavily on market access for net-zero technologies and sees public procurement as a major source of stable demand. However, the NZIA does not aim to make GPP mandatory or introduce more stringent criteria. Instead, the objective of the Act is to use public procurement as a means to increase the resilience of supply with net-zero technologies by diversifying supply. For eight net-zero technologies listed in the Annex, such as solar, wind, or battery technologies, it would require all tenders to include “sustainability and resilience requirements” in the award criteria (Article, 19).² Although this would make sustainability criteria mandatory for the selected technologies, they only make up a very small part of public spending. The resilience requirements may be a form of local-content requirements for technologies “where a single source supplies for more than 65% of the demand for a specific net-zero technology within the Union” (European Commission 2023b, p. 48).³

As this shows, the Commission has acknowledged the strategic potential of public procurement for climate action several times. Yet, its proposal in the NZIA does not address the majority of public consumption and investment. With the Green Deal Industrial Plan and the EU’s realisation that it needs to counter the US’ industrial policy approach, public procurement could emerge as having a more prominent role in the EU’s climate policy mix. However, in the absence of concrete policy proposals that tap its full potential, there is a need for adjustment. This report develops the concept of “Public Procurement for Climate Neutrality (PPCN)”, which harnesses the strategic potential of public purchasing to stimulate demand for cleaner goods and services with the aim

² They should make up between 15% and 30% of the award criteria, with higher priority to sustainability.

³ While some commentators see potential WTO incompatibility risks linked to the resilience requirements (Allenbach- Ammann, 2023), security of supply concerns are beyond the scope of this report.

to transform certain industries. In the following section, we provide estimates of the public's investment and consumption GHG emissions footprint, before discussing the arguments for why public procurement should play a strategic role in the EU's climate policy.

Box 2: Examples of Green Public Procurement across Europe

Because of the optional nature of GPP, the decision to use GPP largely depends on the member states. While many do not use their discretion and leverage public procurement for strategic goals, some member states have set ambitious targets and regulations.

The **Netherlands**, for example, uses what they refer to as Sustainable Public Procurement on a voluntary basis and 67% of all contracts between 2015 and 2020 included environmental criteria. The Dutch government provides various resources and support tools that are widely adopted by procurers. The CO₂ Performance Ladder and DuboCalc are used to calculate the environmental performance of products that are converted into price deductions for environmentally ambitious bids. This life-cycle-costing approach has proved effective at reducing emissions (Lewis & Machlowska, 2022).

In **Germany**, public procurement is highly decentralised, and the majority happens at the municipal level. Consequently, some states pursue very ambitious GPP goals and policies, while others do not. The state of Berlin, for instance, has a general obligation to procure the environmentally more sustainable bid. Moreover, the state administration sets minimum environmental requirements for certain products. It is regularly updated. For construction, the inclusion of environmental criteria is compulsory.

In **Scotland**, the Procurement Reform Act 2014 enshrines a sustainable procurement duty. It obliges the contracting authority to consider how it can improve the social, environmental and economic wellbeing of the area in which it operates before procuring. Each contracting authority is also required to explain how it intends to comply with the duty in its procurement strategy and report annually on progress made. Specific public procurement tools have been developed to help the procurers in the application of the duty.

In **Finland**, one of the objectives of the Procurement Act is to promote sustainable procurement. The Procurement Act also states that procurement units must strive to organize their procurement activities in such a way that procurement can be carried out taking environmental and social aspects into account (amongst other things). This is however more of a recommendation in nature and is thus not as strong of an obligation as that in place in Scotland, for instance, but it nevertheless may be seen to promote the use of GPP. In addition, guidance and support for the application of green public procurement is provided, for instance by the public procurement advisory unit, which is a joint project by the Association of Finnish Municipalities and the Ministry of Economic Affairs and Employment.

2.2 GPP to decarbonise public consumption

The objective of this section is to gain a sense of the economic and environmental importance of public procurement within the EU. Specifically, we provide an overview of the carbon footprint of public procurement and the extent to which GPP is already being implemented. This overview will allow us to provide an indication of the potential for mitigating GHG emissions through greening public procurement, and to identify points of intervention – such as sectors and technologies where the government has considerable influence to induce transformative change.

Scale of EU public procurement in terms of emissions and monetary volumes

In this section, we analyse the consumption effect of EU public procurement only, which refers to the emissions attributed to the consumption of goods and services by public bodies. Using Eurostat environmentally extended input-output data, we estimate that public procurement is responsible for at least 11% of the EU's greenhouse gas emissions. We arrive at this estimate by calculating the total emissions from government consumption across sectors and investment in construction (gross fixed capital formation). While no previous studies have provided a detailed breakdown of the public sector's consumption emissions footprint for the EU, similar studies have been conducted for jurisdictions other than the EU.

One study assessed green public procurement at the global level using UNFCCC emissions data and found that public procurement accounted for 15% of global GHG emissions. The vast majority of these emissions (70%) came from six sectors – defence, transport, waste management, construction, industrial products, and utilities. The study transformed emissions data from a production-based accounting framework to a consumption-based accounting framework to estimate the GHG footprint of the public sector, breaking down the emissions by sector, material, scope, and government shares (World Economic Forum, 2022).

Another study estimated the greenhouse gas footprint of public procurement in Germany, applying a consumption-based accounting approach using the global input-output EXIOBASE model (Chiappinelli et al., 2019). The study identified construction as a target sector for green public procurement, accounting for 14 MtCO_{2e} (12%) of total public procurement emissions in Germany, with the government responsible for 28% of these emissions. However, the analysis in this study was conducted only for the year 2011, the most recent year available in the emissions accounting data.

We adopt a similar approach, using Eurostat data on greenhouse gas emissions from final use of CPA08⁴ product categories for the EU27 (Eurostat, 2023a). The consumption-based data is

⁴ CPA08 product categories are defined using the EU statistical classification system (ESA, 2010). All product groups in the emissions data are labelled with these codes, and they can be traced back to their higher-level sector categories through the classification system, known as NACE Rev. 2.

generated through an input-output analysis with data available until 2019. To determine the emissions associated with EU public procurement, we estimate the emissions from government consumption and investment in construction.⁵ Emissions data for consumption is readily interpretable as it is already broken down by government, households and by product category. However, for estimating emissions from investment attributable to public procurement, we develop our own approach. For further details on our methodology for assessing the emissions footprint of public procurement, please refer to Annex 2 .

Breakdown of EU emissions by government, households, non-profits, gross fixed capital formation and sector (MtCO_{2e})

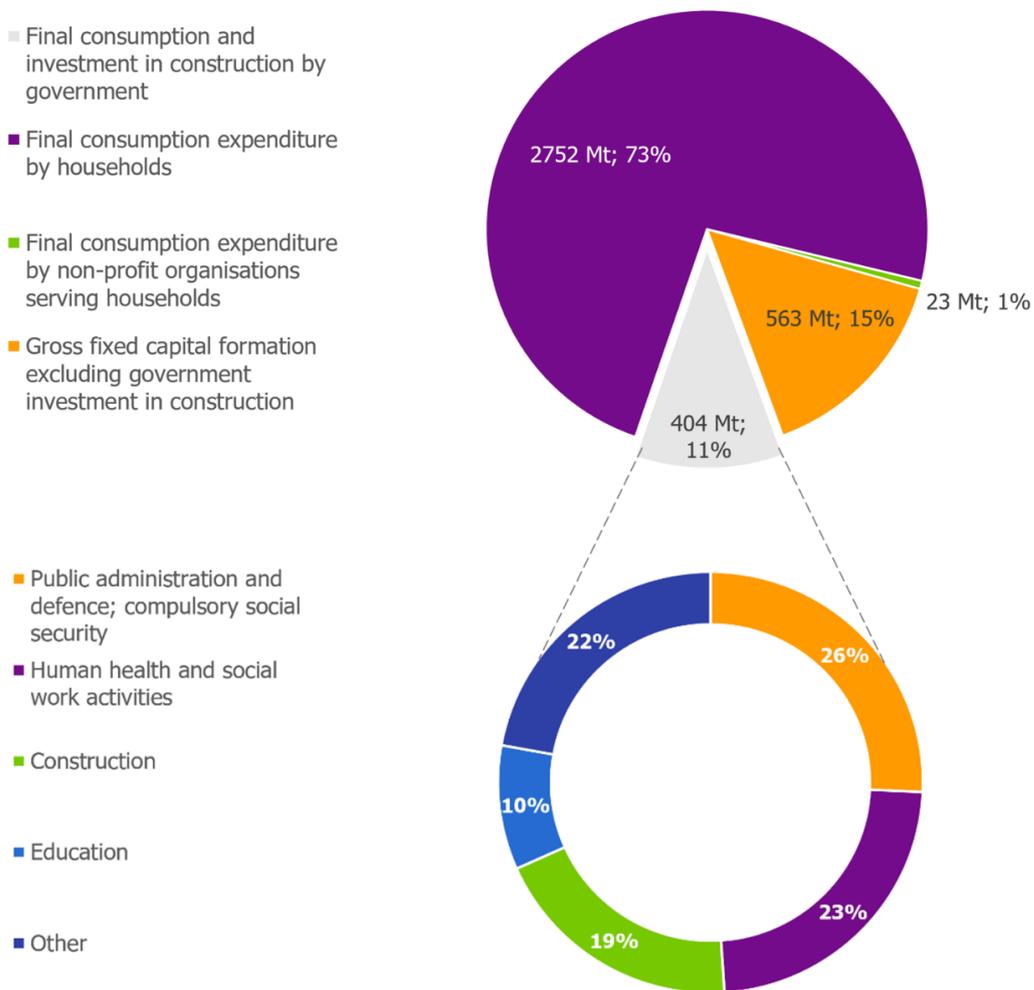


Figure 3: EU greenhouse gas emissions by function (MtCO_{2e})

Note: own calculation using Eurostat (2023a) data

⁵ We consider investment emissions because in some areas of public procurement, such as public construction projects (e.g., energy and transport infrastructure, social housing), emissions are frequently accounted for under gross fixed capital formation (otherwise referred to as investment).

As shown in Figure 3, emissions from government consumption and investment in construction represent at least 11% of total EU emissions. Our results are similar Chiappinelli et al. (2019), who found that public procurement emissions were at least 12% in Germany. Similarly, at the global level, the World Economic Forum (2022) determined that public procurement activities were responsible for 15% of GHGs, either directly or indirectly.

We also find that the majority (81%) of emissions attributable to public procurement are concentrated in four spending categories: public administration and defence, human health and social work activities, construction, and education. Furthermore, public procurers in the EU are responsible for at least a quarter of total emissions in each of these sectors (Figure 3). This gives them considerable leverage to support the transformation of these sectors, both by reducing the public sector’s own GHG emissions through the consumption effect and by guaranteeing demand for greener products, which can lead to spill-over effects on the rest of the market through the production effect.

Public procurement emissions from governments in the EU are highest for public administration and defence (purple bar) — where GPP has the largest potential consumption effect. While reducing the public sector’s emissions footprint through this effect is important, there is greater strategic potential for GPP in a sector such as construction that has large remaining sector emissions (orange bar) that could be reduced through the production effect.

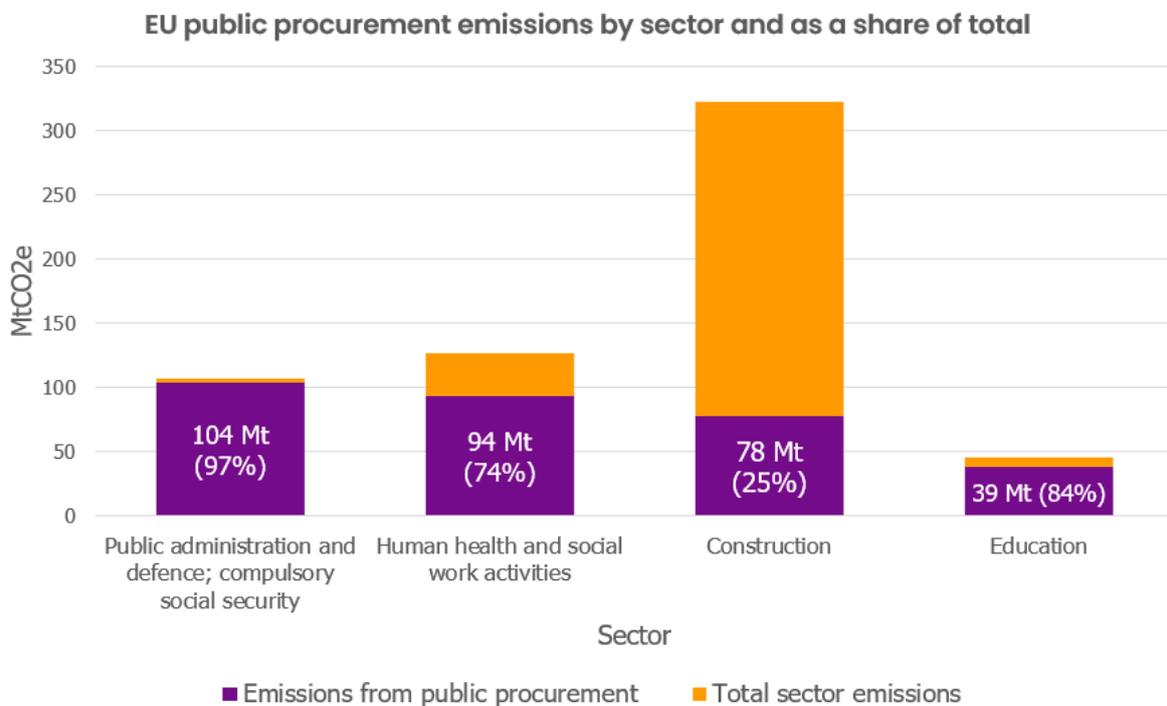


Figure 4: EU public procurement emissions by sector (MtCO_{2e})
 Note: own calculation using Eurostat (2023a) data.

In terms of monetary expenditures, governments in the EU procure goods and services amounting to €1.9 trillion each year, equivalent to 13.7% of GDP (OECD, 2021). Procurement industries thus wield significant influence over the industries they purchase from, particularly those reliant on public procurement, such as the construction sector, where public buyers account for around 25% of the industry's revenues globally (World Economic Forum, 2022). Lastly, public procurement spending varies substantially across member states, ranging from 9% as a share of GDP in Portugal to 20% in the Netherlands (OECD, 2021).

Data challenges with green public procurement

The uptake of green public procurement varies considerably across the EU, within its member states, and at different levels of governance. However, quantifying the extent of GPP uptake is challenging due to a lack of consistent data collection among procuring authorities, presenting a gap in the current GPP literature.

The most common approach used to assess the extent of EU GPP uptake is to examine award criteria in tenders published on the central TED database. Since reporting of GPP criteria is not mandatory across the EU, one way to categorise spending is by conducting key word searches in the award criteria. For example, Rosell (2021) applied this approach and searched for keywords such as 'environment' and 'sustainable' for all official European languages in the countries in the TED dataset, finding that environmental criteria appeared in between 0 and 15% of tenders depending on the Member State.

In the absence of reporting obligations, tenders rarely specify the materials or products being procured, let alone their embodied emissions. Additionally, only about 75% of tender data is correctly reported (Rosell, 2021). The main problem is that reporting is voluntary if it falls below a certain threshold specified in the EU public procurement directives⁶. Large portions of the database are unsuitable for analysis due to numerous input errors and lack of granular data in fields related to public procurement.

Another key data issue is that emissions data is generally reported at the production level, making it difficult to match with the sectors, products, or materials that the government consumes, as this would require accounting at the product level.

2.3 The opportunities of GPP: demand-pull

The argument for employing GPP to decrease the environmental footprint of public consumption (what we refer to as the "consumption effect") is obvious and strong. Yet in addition, public procurement can and should be used as a strategic policy instrument, using the indirect effect of demand creation on production patterns and technologies. A stable source of demand for cleaner

⁶ The thresholds vary between EUR 140,000 and EUR 5.4 million depending on the spending area and conditions.

products can trigger innovation and investment. We advocate for using the demand public procurement can create to strategically transform specific industries. Because the public sector is a major purchaser of some goods and services, it can exert substantial influence on the rate of transformative change in the industries where it represents a major share of demand. In the following section, we offer some arguments why public procurement should be viewed as a strategic policy instrument and should play a stronger role in the EU's climate policy mix.

Economists conventionally motivate policy interventions in terms of market failures. In this logic, the choice of a particular policy instrument should be guided by the extent to which it addresses these market failures (Tagliapietra & Veugelers, 2020). When it comes to the innovation of climate-friendly products and production methods there are numerous market failures that industrial policy and GPP more specifically can help to address.

First and foremost, demand is a key driver of investment and innovation (Edler & Georghiou, 2007; Grubb *et al.* 2021). Uncertainty about demand and future demand, in turn, can reduce incentives to invest. This is especially relevant in the later stages of innovation – in the commercialisation and diffusion of new products and processes (Grubb *et al.* 2021). By using its purchasing power, the government can step in and guarantee demand, thereby creating a critical market size and signal to private actors that investments will pay off quickly. This can help to create economies of scale and cost reductions (Chang & Andreoni, 2020; Uyarra & Flanagan, 2019). Market diffusion will only materialise if costs fall, and cleaner alternatives become competitive compared to conventional technologies. Therefore, public procurement has large strategic potential, because the size of demand and the associated market power can be an important signalling device for guiding private investment and innovation.

Another central market failure stems from unregulated environmental externalities (Popp, 2019). Because pollution is not adequately priced by the market, cleaner products have a disadvantage compared to conventional products. And because cleaner products and production methods are not rewarded, the incentive to innovate and invest is reduced compared to what could be expected if environmental externalities were fully reflected by market prices. In such a situation, there is an argument for policy intervention to level the playing field. This can be done by either pricing the externality through life cycle costing in the procurement process, by paying a premium for lower emission options, or through standards. Unpriced externalities are relevant across the whole innovation supply chain, as they reduce the incentive for new inventions but also depress the incentive to invest in the commercialisation and deployment of cleaner alternatives.

A last category of market failures relates to the generation of knowledge and provision of R&D. This market failure is especially relevant when it comes to the early stages of innovation (invention and demonstration). Because of the public good character of knowledge, the private innovator cannot fully capture all the benefits of innovation. This reduces the incentive to innovate for market actors (Popp, 2019). Specific forms of public procurement, such as public procurement of innovation (PPI) or innovation partnerships, can address this market failure. However, off-the-shelf procurement does not directly address the insufficient supply of knowledge.

However, if calls for tenders and the related award criteria clearly specify a demand for innovative products or production methods, public procurers can reduce uncertainty about future technological developments and provide directionality to the market (Chang & Andreoni, 2020; Mazzucato, 2013). Thus, they create demand for goods and services that fulfil certain characteristics, either directly through technical specifications and performance standards, or through the indirect spill-over effect of environmental considerations in the award criteria on production processes (Rainville, 2017).

Learning curves offer another way to look at the potential of public demand for climate neutrality. The costs of most technologies tend to fall with cumulative deployment (Grubb *et al.* 2021). This relationship is usually expressed in learning or experience curves and also referred to as “Wright’s law”. As the trajectory of clean technologies, such as those needed for Hydrogen-Direct-Reduced-Iron steel-making or low-emission cement, are described by learning curves (i.e., Wright’s law), policies that incentivise their deployment can have a substantial impact on the overall development of the technology, including its cost. Way *et al.* (2022) have shown that this relationship has been consistent for key clean energy technologies in the past.⁷ Accelerating the deployment of technologies can thus result in lower costs of the transition.

The transformative potential of a strategically used public procurement policy is premised on this relationship. Because targeted forms of public procurement increase the demand for a clean product substantially and increase cumulative production, they can accelerate the technology’s advancement on the learning curve. As a result, the costs of the technology will drop faster than they would do in the absence of a policy intervention.⁸ This results in the clean technology in question diffusing more quickly, which in turn accelerates the pace of the transformation.⁹ This is why we advocate for the strategic use of public procurement for specific sectors and key products in the form of PPCN.

The empirical evidence on the innovation effect of GPP is limited but supports the general argument for using the instrument more strategically (Chiapinelli, 2020). In recent years more scholars have investigated the effect of different public procurement modalities on innovation using surveys as well as econometric methods. However, only a few studies use causal inference techniques. This is mainly because of limited data availability.

Using casual inference econometric methods, Krieger and Zipperer (2022) find that GPP induces a demand pull for small and medium-sized enterprises. Firms that win GPP tenders tend to

⁷ See also Gerarden (2023) on the impact of demand and consumer subsidies for cost reductions in solar PV.

⁸ One should note that the transition to a clean economy will involve serious transition costs, which may be concentrated in certain industries, groups, and geographies.

⁹ Technological trajectories and future market conditions, however, are uncertain. This has different implications. Where learning-by-doing is a factor, well-designed and targeted support may at least accelerate the cost degeneration or may even be necessary for the technology to evolve in the first place, as the technology might otherwise fail to overcome the incumbent technologies in the dominant design (Unruh, 2000). Yet, given the uncertainty of technological development and the risk of regulatory capture / lobbying, there is no guarantee that technologies receiving public support would succeed, let alone that they would turn out to be the most efficient solution.

introduce more environmental product innovations than those that do not. However, they did not find a statistically significant effect on large firms, which may be due to public demand being less relevant for their revenues. They also did not find a statistically significant effect of winning GPP tenders on process innovation.

Box 3: Triggering innovation through demand-pull instruments

Innovation includes the various “processes that improve the realised characteristics of a technology (including cost) as it evolves from invention to widespread diffusion” (Grubb p. 3). In this respect, innovation is fundamental for climate neutrality, as conventional emission-intensive technologies must be replaced by cleaner, net-zero technologies (Görlach et al, 2022). Moreover, through the process of innovation, environmental regulation becomes cheaper over time (Popp, 2019).

Grubb et al. (2021) describe the traditional differentiation of innovation policy instruments into two categories. “Technology push” measures such as R&D funding aim at increasing the supply of innovation. “Demand pull” instruments, on the other hand, create a market for innovations. Demand pull instruments are considered important in the later stages of the innovation chain, when it comes to the commercialisation, deployment, and diffusion of new technologies. Here, demand and expectations about future demand are important as they guide investment decisions and contribute to the realisation of economies of scale. GPP is a demand-pull instrument because it aims to create demand and a market for products that have a reduced emissions footprint.

Public procurement can influence and incentivise innovation in several ways (Uyarra & Flanagan, 2010). It can have a direct demand-pull effect when the government buys an innovative product. But public procurement can also have indirect demand-pull effects, i.e., when public procurement leads to new innovations that are not procured directly.¹⁰ This may occur when the market for new goods is expanded, when the adoption of new or more stringent standards is facilitated, or through dynamic effects in the course of changes in market structure.

Aschoff and Sofka (2009) support this positive effect of public procurement on innovation. They find that public procurement of innovation (see textbox 3) influences innovation positively and is as effective as spillovers from funding public research at universities. Like Krieger and Zipperer (2022), they find that this effect is not homogenous across firms and most relevant for small enterprises. Aschoff and Sofka (2009, p. 1243) point to the importance of demand in explaining this effect: “The fact that orders are typically large and come from reliable public entities provides

¹⁰ Directly procuring products and services that are not yet commercially available is referred to as “public procurement of innovation” and usually referred to as a form of research and development policy.

these firms with the necessary planning reliability to engage in innovation activities which may otherwise be too expensive or risky.”

These findings must be interpreted with some caution, however. We cannot infer the effect that more ambitious and stringent GPP rules will have on innovation from the influence of *currently practiced* GPP on innovation, because, as argued above, GPP practices are heterogenous and unsystematic at the moment. Therefore, they do not send a clear enough demand signal to the private sector.

In sum, public procurement should be an important element in the climate policy mix because it addresses several market failures that dampen investments and innovation in clean technologies. By implicitly or explicitly pricing the cost of emissions, procurement can create a level playing field between clean and conventional technologies. By guaranteeing demand for cleaner products, it can reduce uncertainty that hinders investment. And by setting standards it provides direction to markets about the general demand for innovation. This combination of standard-setting, demand creation, and paying a green premium can drive innovation and investment.

2.4 Challenges and Risks for GPP

As we argue above, public procurement has strong potential for directly reducing the public sector’s emission footprint and for stimulating investment and innovation for cleaner technologies. But there are several challenges and risks of the policy instrument that must be addressed or overcome.

Costs

In surveys of procurers, a frequently identified barrier to the adoption of GPP is its perceived increased cost (Chiapinelli, 2020). This is a legitimate concern if one considers only price and short-term costs. However, the aspect of cost is less straight-forward than it seems. First, GPP does not need to be associated with increased costs. According to a recent study, 40% of public procurement emissions can be abated for less than \$15 per ton CO_{2e} (Mission Possible Partnership & World Economic Forum, 2022, p. 11). Moreover, GPP schemes can be designed in ways that lead to lower prices to the procurer. Chiappinelli and Seres (2021), rebuking earlier negative assessments of GPP’s cost-effectiveness, provide theoretical evidence that bid discounts to environmentally friendly products can decrease procurement costs. So, the common assumption that GPP pushes up costs for procurers is not necessarily true and can be remedied through careful procurement design.

Second, if more expansive concepts of costs are used, GPP tends to be associated with lower costs than conventional products. If the total cost of ownership is considered, for instance, more sustainable products that have lower operational costs tend to be more cost-effective than conventional products. Moreover, if the social costs of environmental externalities are considered,

conventional products lose their cost advantage. A study by Ökoinstitut (Gröger *et al.*, 2015) compared the life-cycle costs of conventional products that are commonly procured with more sustainable alternatives for the state of Berlin. In 10 out of 15 cases, the sustainable alternative had lower overall costs than the conventional ones if the social cost of carbon is considered. In the remaining five product groups, the more sustainable product becomes cost competitive when more environmental externalities than just climate change are considered. One should note that the study did not consider dynamic cost reductions. In the long-term, the benefits for society from reducing emissions substantially outweigh short-term cost increases. A report by BCG (Mission Possible Partnership & World Economic Forum, 2022), for example, estimates that if all of the global emissions associated with public procurement are abated by 2050, the costs of climate damages will be reduced by \$930 billion a year until 2050.

Finally, GPP and its demand pull can contribute to the realisation of dynamic cost reductions. As Popp (2019) argues, *ex ante* estimations of the costs of environmental regulations tend to overestimate the costs because they do not adequately capture the cost-reductions that stem from innovation and economies of scale. As the market for climate-friendly products becomes bigger, investments in production and innovation can lead to dynamic cost reductions as economies of scale are realised and learning-effects kick-in. Therefore, the short-run cost increases of GPP may be remedied by the medium-term cost reductions in cleaner technologies. The overall effect may be a net benefit for society as technological change is facilitated.

Administrative capacity

The second main challenge for the adoption of GPP relates to administrative capacity and expertise (Lewis *et al.*, 2023; Mission Possible Partnership & World Economic Forum, 2022). Survey research shows that many procurers cite lack of knowledge, expertise, and tools as a main barrier to the adoption of GPP (Chiapinelli, 2020; Chiapinelli *et al.*, 2019). GPP tends to involve more complex procurement processes and may require technical knowledge, such as the ability to interpret environmental product declarations. More extensive adoption of GPP and PPCN will most likely lead to an increase in the workload and administrative burden for procuring authorities. Without addressing the capacity of procuring authorities, adding complexity to the process may compromise efficiency and procurement outcomes. Increasing administrative capacity is therefore an important pre-requisite for a more widespread adoption of GPP. This will likely increase overall administrative costs.

Relatedly, public procurement tends to be highly decentralised in many Member States. While rules and regulations are set at EU or national level, implementation takes place at the regional and local level. For example, in Germany, only 12% of public procurement happened at national or federally centralised level (OECD, 2019, p. 97). This implies a high organisational effort and challenge to streamline public procurement practices across decentralised bureaucracies (Mission Possible Partnership & World Economic Forum, 2022). Connected to the challenge of

decentralisation is the challenge of subsidiarity in EU policy and especially with regards to public procurement, where Member States have considerable flexibility.

Data availability

Transparency and data availability is another barrier to GPP adoption. This is on the one hand a problem for policymaking and evaluation, but also a problem for procuring authorities. As pointed out in section 2.2, there is a lack of high quality, uniform data on green public procurement, the award criteria, the environmental footprint of products, etc. This complicates evaluating policies and procurement systems. Moreover, it poses a challenge for setting targets and tracking progress towards them.

For procuring authorities there is likewise a need for high quality data on the environmental impact of products and processes (Lewis et al., 2023, p. 48). Evaluating which bid is more environmentally sustainable or which one has a lower GHG footprint relies on full information about the environmental impacts of each bid. For this, there need to be systems to verify the environmental impact of products and services. Consequently, procurers need to be equipped with the tools and support systems to make informed decisions in the award of tenders. This includes for instance uniform life-cycle-assessment methodologies, reporting systems, certification systems, ecolabels, and Environment Product Declarations.

Overlapping policies

GPP is a policy instrument that tries to regulate a sector indirectly. It sets standards and rules that only apply to public procurement, but not for the rest of the economy. In this lies its potential – using public demand as a carrot to incentive suppliers to go beyond what is otherwise required – but also a risk. In the EU, and elsewhere, there are numerous policy instruments in place that try to address GHG emissions directly. GPP thus may overlap with other policies. This may increase the burden for regulated entities. But such a bifurcated regulatory system may also depress the efficiency of policies and increase costs. From an overall cost-effectiveness or efficiency point of view, public procurement may not be the most effective policy instrument (Halonen, 2021). In consequence, the advantages, and disadvantages of using public procurement including its interaction with other policy instruments must be assessed carefully.

The regulation of cement emissions is a good example. In the EU, the main policy instrument to lower the emissions of the cement industry is the Emissions Trading System (ETS), which puts a price on emissions. The EU ETS covers almost all cement production in the EU. While at the moment, most plants receive free allowances to prevent carbon leakage, this will be phased out by 2034. In the future, the Carbon Border Adjustment Mechanism (CBAM) will extend the carbon price also to imports, which will mean that most emissions associated with the consumption of cement will be covered by a carbon price. The gradual decline of the cap to zero, moreover, implies that the cement sector must be climate-neutral by 2038. From this perspective, adding

GPP rules for cement, such as limits on the embodied emissions, on top of the ETS or other sectoral legislation may not seem sensible. It will add to the compliance costs of regulated entities, create administrative costs for procuring authorities, and may distort the emissions market.

However, overlapping policies may not necessarily depress efficiency and can enhance effectiveness of policy instruments. The EU ETS is a supply-side instrument. GPP, in contrast, tackles demand. While the ETS does internalise the unpriced externalities to some extent, it may do so insufficiently to incentivise investments and innovation. As long as products such as low-emission cement are not cost-competitive *despite the ETS* and demand for it is insufficient, producers may not want to invest. Here, GPP that creates a stable source of demand for the cleaner option – and pays the associated green premium – can be complementary and incentivise investments in innovation and manufacturing capacity.

We want to stress at this point that GPP or PPCN are not silver bullets. They can play an important role in a policy instrument mix. Whether or not their application makes sense must be carefully assessed in light of existing regulation and the sector in question. In our opinion, the targeted use of public procurement can complement existing policies in important respects, especially by creating a market for low-carbon products. At the same time, the transaction costs for procuring authorities must be weighed against those created by other regulatory approaches. If an ambitious economy- or sector-wide solution can be found, it is clearly favourable to one that only tackles public procurement. However, in the absence of such policy, public procurement can pivot standards that the wider market will adopt only at a later stage.

Technological openness

One risk of public procurement for climate neutrality that must be mediated relates to technological openness. Depending on its design, public procurement can be technologically specific. Especially the use of technical specifications tends to involve the explicit choice for a given technology. This explicit setting of technological standards can limit innovation, as competition among technologies is constrained and the search for cleaner alternatives disincentivised. However, there are many ways to design GPP in a technologically open manner that does not discriminate against specific technologies but sets functional or performance requirements that can be met through any technology. Limits on the life-cycle emissions of building materials, for example, do not prescribe how the limit is to be reached but leave it open to market competition. Likewise, setting limits on the embodied emission of products is a technologically open regulation.

3. GPP and PPCN in the EU's legislative framework

In this chapter, we first outline how GPP is situated within the current EU legislative framework on public procurement (3.1). The second section introduces the concept of public procurement for climate neutrality (PPCN) as a subset of GPP. The following section provides an analysis of the potential means to promote the uptake of PPCN via legislative changes and compares different policy options (3.3.). The final section provides a summary assessment of the options discussed (3.4.).

3.1 GPP in the current legislative framework

The inclusion and consideration of environmental criteria in the public procurement process is allowed – but not mandated – by the Public Procurement Directives at all stages of the procurement process as long as the general principles of public procurement are respected (see e.g., Pouikli 2020 & Melon 2020). In this section, we describe the extent to which current EU rules on public procurement allow the consideration of environmental criteria, including climate criteria, in the procurement process.

Current legal framework

The currently applicable rules for public procurement are laid down in Directives 2014/23/EU, 2014/24/EU and 2014/25/EU (the Public Procurement Directives).¹¹ The EU rules on public procurement only apply to procurements which exceed the financial threshold amounts laid down in the directives. Public procurement processes must also always comply with the principles laid down in the Treaty on the Functioning of the European Union (TFEU), in particular those related to the free movement of goods, freedom of establishment and the freedom to provide services, as well as the principles deriving therefrom such as equal treatment, non-discrimination, mutual recognition, proportionality and transparency. This is also recognised in case law of the Court of Justice of the European Union (CJEU) and the provisions of the Public Procurement Directives, which specify how these principles are to be respected in practice.

Similarly, the WTO Agreement on Government Procurement (GPA) stipulates that public procurement processes must respect the principles of non-discrimination and transparency. However, according to previous research, the GPA has had “hardly any influence on climate-friendly public procurement practices in most countries because of its limited scope and coverage” (van Asselt et. al. 2006, p. 226). Hence, it will not be subject to further review here. It should

¹¹ Directive 2014/24/EU lays down the general rules on public procurement, while Directive 2014/25/EU applies to procurement by entities operating in the water, energy, transport, and postal services sectors. Directive 2014/23/EU applies to the specific case of the award of concession contracts.

also be noted that specific provisions on the consideration of environmental / climate effects in the context of public procurement have been added in some pieces of sectoral legislation. Examples of these will be listed below.

The general principles of public procurement are usually described with reference to Article 18 of Directive 2014/24/EU.¹² Accordingly,

- 1) the contracting authorities shall treat economic operators equally and without discrimination and shall act in a transparent and proportionate manner, and
- 2) the design of the procurement shall not be made with the intention of excluding it from the scope of the Directive or of artificially narrowing competition (Art. 18(1)).

These require, for instance, that prospective suppliers are treated in the same way regardless of factors that are not related to the procurement process, such as nationality, and that the procurement contracts are awarded based on previously indicated criteria. Interestingly, it has been argued that the emerging role of environmental (and social) considerations in awarding public contracts and the emphasis on strategic public procurement could imply that environmental progress has become a part of the principles of procurement law, considering also the non-economic policy goals of the Treaties (see e.g., Michaux & Gruyters 2020, p. 63). The obligation laid down in Art. 18(2) of Directive 2014/24/EU is of more relevance for this study. According to it, Member States shall take appropriate measures to ensure that in the performance of public contracts economic operators comply with inter alia the applicable obligations in the fields of environmental law established by Union law, national law, and by the international environmental law provisions listed in the annex of the Directive.¹³ However, the precise meaning and degree of this obligation is unclear, and leaves open the question of what its fulfilment in fact requires from Member States or contracting authorities (e.g., Andhov et. al. 2020, p. 36; Wiesbrock 2016, p. 80). Regardless, contracting authorities may exclude or may be required by Member States to exclude economic operators from the procurement process due to non-compliance with Art. 18(2).¹⁴ The exclusion is mandatory if non-compliance has led to an abnormally low tender.¹⁵

As mentioned, the EU Public Procurement Directives allow the consideration of environmental criteria at all stages of the procurement process, as long as the general principles of public procurement and treaty rules are respected. Therefore, environmental objectives can be considered when defining the eligibility criteria, the description of the subject, the technical specifications of the contract, the award criteria, or the performance criteria (e.g., Sjøfæll & Wiesbrock 2016, p. 18). In addition, the Public Procurement Directives explicitly facilitate the consideration of environmental criteria by allowing the use of environmental labels or the consideration of environmental costs in establishing the most economically advantageous tender

¹² Similarly in Art. 36 of Directive 2014/25/EU and Art. 30 of Directive 2014/23/EU.

¹³ Similarly in Art. 36(2) of Directive 2014/25/EU and Art. 30(3) of Directive 2014/23/EU.

¹⁴ Art. 57(4) of Directive 2014/24/EU, similarly in Art. 76(6) of Directive 2014/25/EU and Art. 38(7) of Directive 2014/23/EU.

¹⁵ Art. 69(3) of Directive 2014/24/EU and Art. 84(3) of Directive 2014/25/EU.

(MEAT) via life-cycle-costing (LCC). Climate effects are also explicitly recognised by allowing the consideration of “climate performance” in the technical specifications.

Generally speaking, the MEAT may be defined by using either price or cost. LCC allows calculating the cost of the tender covering “costs imputed to environmental externalities linked to the product, service or works during its life cycle, provided their monetary value can be determined and verified; such costs may include the cost of emissions of greenhouse gases and of other pollutant emissions and other climate change mitigation costs” (Art. 68 of Directive 2014/24/EU, similarly Art. 83 of Directive 2014/25/EU).

It should be noted that any procurement criteria introduced apart from qualifications must also always have a link to the subject matter of the contract. Some scholars have argued however that the link-to-subject matter requirement adds to the legal uncertainty of engaging in GPP due to its ambiguous nature (e.g., Melon 2020, p. 11, Andhov et. al. 2020, p. 38-39). As discussed below in section 3.3, the requirement de facto removes the ability to introduce requirements on general environmental responsibility policies if these go beyond the specific needs of the contracting authority (e.g., Sjöfäll & Wiesbrock 2016, p. 20).

The concept of GPP

Along with the regulatory framework, the EU makes use of the concept of GPP to promote environmentally sustainable procurement. GPP is currently defined as “*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*” (European Commission 2008, p. 4). To promote the implementation of GPP, the European Commission has set EU GPP criteria¹⁶ for certain sectors and product groups to facilitate the inclusion of green requirements in public procurement. The Commission has also issued guidance on the application of GPP (Buying Green Handbook¹⁷). In addition, the majority of EU Member States have a GPP National Action Plan¹⁸ in place, aimed at furthering the implementation of GPP. It should be noted that although the Public Procurement Directives only apply to contracts above thresholds laid down therein, GPP aims to cover all public procurement procedures above and below the thresholds (European Commission 2008, p. 5)

As discussed above, the uptake of GPP has nevertheless remained limited and incoherent across different Member States, partly due to the vague and discretionary nature of the applicable rules (e.g., Pouikli 2020, Melon 2020). Another challenge is how to ensure compatibility between different GPP schemes established in the Member States, as the level of ambition and implementation varies. As for instance Melon has argued, a clear EU legal framework would represent a nudge in the right direction to level out the disparities among EU Member States and

¹⁶ https://ec.europa.eu/environment/gpp/eu_gpp_criteria_en.htm

¹⁷ https://ec.europa.eu/environment/gpp/buying_handbook_en.htm

¹⁸ https://ec.europa.eu/environment/gpp/action_plan_en.htm

to possibly create positive spill-over effects to procurement outside the scope of EU level regulation (Melon 2020, p. 5). The legislative framework in general is a complex one and could need clarification to provide better legal certainty for procuring authorities on what they can do and how.

Finally, it may also be noted that how GPP is understood differs within the EU. For the Commission, it means applying all core GPP criteria of a product group. For some Member States, however, a tender may be considered as GPP when only one environmental criterion is used. Furthermore, in many countries, GPP targets apply to procurement in general rather than on specific products and services with high environmental impact (Axelsson et al., 2023, p. 3). Understanding GPP in a broader sense, where it could be seen to cover all procurement in which green considerations have played a notable role, would appear the preferable choice. In this approach, for instance the application of life-cycle-costing in the determination of MEAT could be considered as GPP also when there is no reference to established GPP criteria. This could make the promotion of GPP less reliant on the easily out-dated GPP criteria. The challenge with this option is to identify the exact conditions under which a procurement process may be titled as “green”.

3.2 Towards a strategic use of PPCN

When introducing the Public Procurement Directives, one of the aims was to allow procurers to use public procurement strategically to support societal goals such as the protection of the environment (European Commission 2011a, p. 2). However, soon after their adoption, the Commission recognised that Member States were not using the possibilities of strategic public procurement to their full extent (European Commission 2017, p. 3). As explained above, this observation still applies today. As Pouikli has put it with reference to Directive 2014/24/EU:

“it is evident that although the Public Procurement Directive officially recognized the crucial role in greening the public purchasing process and aspired to set an enforceable policy tool for achieving environmental objectives, the ambiguous formulation and the decision to subject its activation to the discretionary power of the contracting authorities led to the creation of a potentially dynamic – but full of legal uncertainties – toolbox” (Pouikli 2020, p. 16).

By the same token and considering all the above, we can conclude that the current legal framework is insufficient for effectively promoting climate neutrality through public procurement. In other words, without changing the existing framework, the full potential of public procurement as a strategic instrument to accelerate the decarbonisation of certain sectors will likely remain untapped.

Due to the complexity of the public procurement framework and the present challenges in the uptake of GPP, we propose implementing PPCN by incorporating it into the already existing framework. This is because introducing yet another separate construct of strategic public

procurement (along with GPP, socially responsible public procurement (SRPP) and public procurement for innovation (PPI)), would likely increase the administrative burden and go against the principles of better regulation due to further complicating the application of the public procurement framework. In addition, promoting climate neutrality may be seen as one important aspect of promoting procurement that is better for the environment in general. Hence, we suggest both clarification of the current rules and guidance as well as an introduction of a new tool of PPCN as a subset of GPP. One can place GPP, in turn, within the wider framework of sustainable public procurement (see e.g., Sjøfæll & Wiesbrock 2016, p. 4).

Therefore, we define Public Procurement for Climate Neutrality as follows:

PPCN is a strategic policy instrument and sub-type of GPP, whereby public authorities use public procurement for accelerating the decarbonisation of specific sectors or goods by introducing requirements relating to the climate-neutrality alignment of the procured goods, services or works.

The aim of PPCN is the creation of demand and corresponding incentives to invest and innovate. This implies that the application of PPCN must be sufficiently widespread among procurers to send clear and coherent signals to suppliers and producers. While PPCN is a strategic instrument with regards to a specific sector or good, it must have a sufficient coverage of procuring entities, i.e., all or a majority of procurers would need to use it. This is because the key mechanism of the instrument is the creation of demand so that it incentivises investments in innovation and manufacturing capacity. In addition, the signal to suppliers must be clear and coherent. Our approach does not suggest climate neutrality as the only or primary objective of public procurement. The issue is of aligning the public procurement framework with the attainment of EU climate targets and using its underutilised potential for transformation.

Table 1: Existing EU guidance and policy documents recognising the strategic potential of public procurement

Document	Mention of public procurement
Proposal for the Net Zero Industry Act COM(2023) 161 final	Would require awarding the contracts for specific net-zero technologies, such as solar and wind, considering the “sustainability and resilience contribution of the tender” (Article 19).
A Green Deal Industrial Plan for the Net-Zero Age COM(2023) 62 final	Acknowledges the role of public procurement in stimulating the demand for net-zero products at large scale.
Europe 2020: A strategy for smart, sustainable and inclusive growth COM(2010) 2020 final	GPP is mentioned as one of the measures to achieve sustainable growth and the Innovation Union, Resource-efficient Europe and Energy 2020 initiatives.

Document	Mention of public procurement
A new Circular Economy Action Plan for a cleaner and more competitive Europe COM(2020) 98 final	Proposes minimum mandatory green public procurement (GPP) criteria and targets in sectoral legislation and phase in compulsory reporting to monitor the uptake of Green Public Procurement (GPP).
The European Green Deal COM(2019) 640 final	Commission's roadmap for making the EU's economy sustainable, acknowledging that public authorities, including the EU institutions, should lead by example and ensure that their procurement is green.
Making Public Procurement work in and for Europe COM(2017) 572 final	Studies the possibilities for furthering the use of strategic public procurement in the EU.
Buying Green- handbook (2016)	Commission's main guidance document to help public authorities to buy goods and services with a lower environmental impact. Includes sector specific recommendations for buildings, food and catering services, road transport vehicles and energy-using products (such as lighting and IT equipment).
Collection of Good Practices on GPP, 2012	Selection of a number of examples of GPP in practice previously published by the European Commission.
GREEN PAPER on the modernisation of EU public procurement policy Towards a more efficient European Procurement Market COM(2011) 15 final	Includes a chapter on the "Strategic use of Public Procurement in Response to New Challenges", acknowledging that public authorities can make an important contribution to the achievement of EU's strategic goals by using their purchasing power to procure goods and services with higher "societal" value in terms of climate change.
Public procurement for a better environment COM(2008) 400 final	Provides guidance on how to reduce the environmental impact caused by public sector consumption and how to use GPP to stimulate innovation in environmental technologies, products, and services.
Staff Working Document accompanying COM(2008) 400 SEC(2008) 2126	Guidelines for public authorities on the definition and verification of environmental criteria, tools for stimulating GPP and examples for a number of product groups. It also offers legal and operational guidance.
Pre-commercial Procurement: Driving innovation to ensure sustainable high quality public services in Europe COM(2007) 799 final	Sets out a methodology for the procurement of research and development services that are exempt from the directives.

Own compilation.

3.3 Proposals for advancing PPCN via changes in the EU legislative framework

Although the currently applicable legislative framework on public procurement does allow the inclusion of environmental considerations in the procurement process, it is not mandatory, systematic, and lacks legal certainty. The need for a stronger integration of climate objectives in particular seems apparent considering the developments in the field of climate change law since the adoption of the currently applicable EU directives on public procurement in 2014.

First, both the EU and its Member States are now parties to the Paris Agreement and are thus obliged to support the attainment of its goals, most importantly the goal of keeping the increase in global average temperatures to well below 2°C above pre-industrial levels, aiming at 1.5°C.

Second, the EU has undertaken a major reform of its climate change law framework via the Fit for 55 package and the preceding introduction of the European Climate Law (2021/1119/EU) and the Governance Regulation (2018/1999/EU). The European Climate Law has an overreaching effect, as it lays down the binding EU-wide target of climate neutrality by 2050 (Article 2).

Overreaching action is needed on all fronts to attain these targets. And, as we show above, public procurement has significant untapped emissions reduction potential. Considering that no proposals on public procurement have been made under the EU's Green Deal, it is yet to be developed into a strategic instrument for decarbonisation. As observed by others, "new EU regulatory action in this field could unlock the potential of green public procurement and add an important element to the European Green Deal toolbox" (Sapir et al. 2022). In addition, the Commission has acknowledged in the Green Deal Communication that public authorities, including the EU institutions, should lead by example and ensure that their procurement is green (European Commission 2019, p. 8). In the same context, it was also stated that the EU's trade policy facilitates trade and investment in green goods and services and promotes climate-friendly public procurement (European Commission 2019, p. 21).

Furthering the uptake of GPP and PPCN as its subset is also supported by the fact that in terms of primary law, the codification of the principle of sustainable development in the Treaties may be argued to entail an all-encompassing legal duty to integrate environmental protection requirements into all policies and activities of the EU, including public procurement rules (Sjåfæll & Wiesbrock 2016, p. 6). This duty is derived from Article 3(3)¹⁹ of the Treaty on the European Union (TEU) on the one hand, and Article 11 of TFEU on the other. Article 11 TFEU is of particular significance, as it requires that "*environmental protection requirements must be integrated into the definition and implementation of the Union policies and activities, in particular with a view to promoting sustainable development*". The Article has been referred to by the Court of Justice of

¹⁹ According to which "[t]he Union shall establish an internal market. It shall work for the sustainable development of Europe based on balanced economic growth and price stability, a highly competitive social market economy, aiming at full employment and social progress, and a high level of protection and improvement of the quality of the environment. It shall promote scientific and technological advance."

the European Union (CJEU) in the famous case of *Concordia Bus Finland* (Case C-513/99), where it held that environmental protection criteria could be considered in connection to procurement, although the applicable directive at the time did not include a reference to environmental protection.

It could be argued that the uptake of GPP could be better tackled by legislating at the national, regional, or local level, to allow for a more targeted set of rules easily fitted within the existing national legal framework and procurement culture. However, the results of EU GPP implementation suggest that both an overarching EU strategy and an umbrella framework are needed to avoid fragmentation (Melon 2020, p. 5). Coherent rules across the EU also play an important role in ensuring a level-playing field of competition in the Single Market and in enabling the EU to move together towards EU-level goals. If each Member State applies a different set of criteria, it hampers the functioning of the Single Market (similarly Kalimo et al. 2021, p. 89). Furthermore, the mere fact that environmental factors *can* be considered or that minimum environmental requirements *may* be exceeded does not generally lead to action in practise (see e.g., Kalimo et al. 2021, p. 61 and Palmujoki–Vartiainen 2020).

The issue of how to better promote the use of GPP via the EU legislative framework has been under contemplation by legal scholars in recent years. In this section, we assess some of the options discussed, namely 1) introducing minimum mandatory EU GPP/PPCN criteria for specific products or sectors, 2) introducing mandatory EU GPP/PPCN targets, 3) revising the current rules laid down in the Public Procurement Directives, 4) introducing specific GPP/PPCN requirements in sectoral legislation or 5) setting mandatory climate-related criteria for specific products or services. The aim is to identify the most promising options from the viewpoint of promoting PPCN.

Introducing minimum mandatory EU GPP/PPCN criteria

The idea of introducing mandatory GPP criteria or targets appears to be favoured by the Commission, who has indicated in that it will propose minimum mandatory green criteria or targets for public procurement in sectorial initiatives, EU funding, or product-specific legislation. According to the Commission, “such minimum criteria will ‘de facto’ set a common definition of what a ‘green purchase’ is, allowing collection of comparable data from public buyers, and setting the basis for assessing the impact of green public procurements” (European Commission 2020, p. 12).

Making **GPP criteria** for certain product groups or sectors mandatory has also been suggested by scholars. As the Commission is the one developing the criteria, it would quite naturally be in a position to provide guidance and support for their effective implementation (Pouikli 2020, p. 18). The existing EU GPP criteria have not been sufficient to incentivise the strategic use of public procurement, and they also provide no assurance as to legal compliance with public procurement rules (Melon 2020, p. 9). While making the use of GPP criteria mandatory would increase legal certainty and solve the issue in terms of legal compliance, the content of the criteria and related guidance would have to be clear and continuously updated. A Commission study on the application of four selected GPP criteria found that none of the criteria studied were up-to-date due to

changes in the regulatory context, technological developments, and other more specific factors (Delre et al. 2022). Hence, the introduction of mandatory GPP criteria would have to be coupled with a mechanism for their regular updating. In addition, although it may be argued that common criteria simplify the procurement procedure, making them mandatory would lead to an increase in administrative burden and should be compensated by targeting the GPP criteria to product groups with greatest overall positive environmental effects. Moreover, the effects on competition, costs, and the environment should be considered (Kalimo et al. 2021, p. 88).

Box 4: The EU's approach to GPP criteria

GPP criteria do not set out every aspect of a product's life cycle in detail. Rather, they focus on key aspects and aim to rely on published ecolabel and/or life cycle information. Ecolabels, such as the EU Ecolabel, may be granted by a third party to products or services meeting predefined objective environmental criteria. They often play a role in determining technical specifications or award criteria, or in verifying compliance.²⁰

Currently, two types of GPP criteria are introduced for each sector covered²¹:

Core criteria, which are planned with the intention that they should be suitable for use by any contracting authority across Member States. The core criteria address the key environmental impacts and are designed to be used with minimum additional verification effort or cost increase.

Comprehensive criteria are for those who wish to purchase the best environmental products available on the market today. The comprehensive criteria may require additional verification effort or an increase in cost compared to other products with the same functionality.

It would also be more feasible to limit the mandatory use to core GPP criteria, keeping the application of the more ambitious comprehensive GPP criteria voluntary. In the specific case of PPCN, more targeted **PPCN criteria** could be developed or the core GPP criteria could be revised to include the consideration of climate effects whenever applicable. The challenge in drafting the criteria is to balance between providing sufficient clarity and consistency of methods used without being too detailed and hence easily outdated or too labour-intensive for the procuring authorities. Too complex PPCN-criteria could also lead to smaller and less professional buyers becoming unable to continue to perform procurements. Furthermore, without regard to the needs, circumstances, and resources available to contracting authorities the criteria could lead to sub-optimal procurement. Hence, clear and well-thought assessment rules and methodologies for the application of the criteria must be established to make them feasible in practise (similarly e.g., European

²⁰ For more information, see e.g.: https://ec.europa.eu/environment/gpp/eco_labels.htm

²¹ See: https://ec.europa.eu/environment/gpp/gpp_criteria_en.htm

Commission 2011b, p. 64-68). A common methodology is also needed to ensure that the PPCN criteria are in line with the general principles of public procurement and do not hinder competition (similarly, Michaux & Gruyters 2020, p. 66). The use of PPCN criteria could be mandated by either adding a reference to the criteria or by giving the Commission the power to issue delegated acts on the criteria in applicable sectoral legislation. A softer option would be to issue guidance on the application of current EU public procurement rules, encouraging the use of GPP criteria and the more specific PPCN criteria and emphasising that it is in compliance with the general procurement rules.

In section 4, we argue that construction is a suitable sector for the application of mandatory GPP or more specific PPCN criteria.

Introducing minimum mandatory EU GPP/PPCN targets

When it comes to **GPP targets**, one way to approach them is to divide them into the following four categories 1) adoption targets, 2) industry-level targets, 3) project-level targets, and 4) product-level targets (Hasanbeigi & Shi 2021, Hasanbeigi et al. 2021). In essence, if set with the specific intention of accelerating decarbonisation, the same categorisation would work when thinking about the possibility of more specific **PPCN targets**. One possibility is also to set specific emissions reduction targets for public procurement (e.g., World Economic Forum 2022).

Adoption targets aim for a general level of application of GPP to be achieved by a certain date (Hasanbeigi & Shi 2021, p. 4). Adaptation targets concerning the uptake of GPP/PPCN in general would fit naturally in Public Procurement Directives, while the other types of targets fit better in sectoral legislation. In principle, adoption targets could also be sector specific, aiming for a certain percentage of application of PPCN in a given sector by a given date. Scholars have suggested mandatory targets set by the EU legislature, demanding a certain percentage of public procurement to be green with a phase-in provision requiring 100 % at a certain date (Andhov et al. 2020, p. 43, Melon 2020, p. 16, Pouikli 2020, p. 18). Examples of EU countries who have implemented such an approach include Sweden and the Netherlands. The Commission has also suggested a general adoption target in the past, although by means of soft law. An indicative target that 50% of all public tendering procedures should be green in the EU by 2010 was set in the 2008 Communication on GPP, “green” meaning compliant with core EU GPP criteria for ten priority product/service groups such as construction and transport. The target was not met, however, and monitoring its attainment proved challenging²². Hence, laying down an EU level GPP/PPCN target would necessitate developing clear EU-wide standardised criteria to allow monitoring and follow-up (Andhov et al., 2020, p. 43).

This points to the fundamental underlying problem: if there is no systematic data on the use of GPP in the Member States, setting targets (for either GPP or PPCN) makes little difference due to the inability to effectively monitor their attainment. Hence, setting a general GPP/PPCN target

²² See, for instance, https://ec.europa.eu/environment/gpp/studies_en.html

would require monitoring, reporting, and verification mechanisms to be developed. This also requires a clear definition of what procurement is considered as PPCN. A suitable mechanism for the monitoring and enforcement of the target could be making the currently voluntary National GPP Action Plans mandatory, as well as specifying the reporting requirements within them. This could also be considered if reporting on the application of GPP and PPCN were to be made mandatory in general, regardless of whether GPP/PPCN targets would be introduced or not. Provisions on Member States' obligations to produce such plans and the Commission's corresponding obligation to monitor and assess them could be inserted in Directive 2014/14/EU. Although most of the Member States (23/27) already have such plans in place, extending them would likely lead to an increase in administrative burden.²³ However, it goes without saying that to some extent, an increase in administrative burden would result from the implementation of any of the options discussed in this chapter.

When it comes to sectoral targets, *industry-level targets* are designed to increase the adoption of certifications that have been voluntarily developed by the industry. The certifications may either be developed through a consensus based standard development process with industry and stakeholders or be set by individual sectors or companies (Hasanbeigi & Shi 2021, p. 5). *Project-targets*, on the other hand, evaluate the environmental impact of an entire project instead of its individual components (Hasanbeigi & Shi 2021, p. 6). One example would be setting targets for the share of tenders that must include GPP/PPCN criteria in construction projects. Finally, *product-level targets* are the most specific ones as they concern specific product categories (Hasanbeigi & Shi 2021, p. 8). A product-level PPCN target could require that by a certain date, x % of steel procured must be low-carbon steel. An existing example of an EU-level target which could be characterised as a product-level PPCN target may be identified in legislation regarding the procurement of clean vehicles. The Directive on the Promotion of Clean and Energy-Efficient Road Transport Vehicles requires the Member States to reach minimum percentages of clean vehicles in the total number of road transport in their respective countries by assigned dates.²⁴

When thinking about the construction sector for instance, project-level targets may be more impactful than product-level targets as they allow for greater flexibility in the use of low emission materials and encourage overall emission reductions in the project concerned. The Netherlands uses project-level environmental assessment in bid evaluation with the help of two instruments developed for this purpose, the CO₂ Performance Ladder and DuboCalc. Finland is also developing dedicated criteria for low carbon construction, which will become mandatory in public construction projects.²⁵ The drawback of project-level targets is that they require conducting an environmental impact assessment for each new project bid, whereas a product-level analysis can be performed once per product and reused for future bids involving the same product (Hasanbeigi & Shi 2021, p. 6). The merits of product-specific targets are that they allow precision and expression of

²³ See https://ec.europa.eu/environment/gpp/action_plan_en.html

²⁴ Article 5 of Directive (EU) 2019/1161 of the European Parliament and of the Council of 20 June 2019 amending Directive 2009/33/EC on the promotion of clean and energy-efficient road transport vehicles.

²⁵ <https://ym.fi/vahahiilinen-rakentaminen>

quantitative values and appear to fit well with introducing product-specific emissions reduction targets (Hasanbeigi & Shi 2021, p. 8). In general, product-level policies may also be less complex and thus easier to implement (Hasanbeigi & Shi 2021, p. 9). On the other hand, project analysis ensures that substitute materials are not given an unfair advantage and allow for a cross-industry comparison of products (Hasanbeigi & Shi 2021, p. 9).

Finally, one option is to set **emissions reduction targets in public procurement** instead of targets regarding the application of GPP/PPCN. Here, the prerequisite is the ability to monitor the emissions of the procurement to which the target applies. To determine an emissions reduction target for procurement in the construction sector for example necessitates that the materials that generate the sector's emissions and the percentage of the total emissions each material is responsible for are identified first. Then, an emissions reduction target could be set based on an assessment of emissions reductions needed in the construction sector to limit the global warming to 1.5°C (World Economic Forum 2022, p. 18-19).

Revising the Public Procurement Directives

Another way to further the uptake of GPP/PPCN would be to introduce mandatory elements in the Public Procurement Directives along with other targeted changes aimed at making the consideration of environmental and climate impacts a default element of procurement. The proposals discussed in this regard would push for a wider uptake of GPP and PPCN in general, and hence they could be complemented by more specific sectoral rules. One advantage of introducing changes to the general public procurement rules aimed at furthering the uptake of GPP/PPCN is that they may incentivise companies to compete on environmental quality and be less likely to lead to a decrease in tenders compared to very specific requirements. However, they do not guarantee that a procurement meets a certain environmental level in the same way as minimum requirements (see similarly Kalimo et al. 2021, p. 86).

According to some scholars, the starting point could be introducing a general obligation to procure sustainable outcomes within the structure of the EU Public Procurement Directives (e.g., Andhov et al. 2020, p. 44-45). This could be similar to Scotland's sustainable procurement duty discussed above. There is also relevant experience on general mandatory requirements at the Member State level. For instance in Denmark, central government entities and municipalities are subject to a "comply or explain" principle that obliges them to apply social clauses in relevant procurements or to explain why they decided not to do so (Andhov et al. 2020, p.44). The Austrian procurement law (*Bundesvergabegesetz* 2018) in turn obliges all procurement authorities to take environmental aspects into account and specifies that attention should be paid in particular to ecological aspects. National experts have expressed a similar idea of **a general obligation to take environmental considerations into account in all public procurement with major environmental impacts and a corresponding obligation to provide reasons if not doing so** (Alhola, 2023). It would have to be clear that this obligation would cover the consideration of climate effects, too, with view of aligning procurement with climate neutrality. This would require the

contracting authorities to consider whether there are any low-emission options available and provide reasons if those options were not used (Alhola 2023). The model would recognise the fact that it is not always possible for the procurer to choose the low carbon option if it does not yet exist on the market or if it is difficult to source in a cost-efficient manner (Alhola 2023). A horizontal clause would also support the introduction of more targeted sector specific GPP/PPCN rules.

Another option discussed is limiting the use of price-only assessment, in other words making the application of MEAT based on cost and best price-quality ratio mandatory or at least limiting the use of price-only assessment. In practise, this would mean applying life cycle costing and/or taking note of environmental considerations as an indication of the quality of the tenders (similarly Wiesbrock 2016, p. 85). It is important to note that it would have to be made clear that a MEAT assessment must include an assessment of environmental/climate effects (Alhola 2023). The European Parliament suggested the removal of the lowest price criterion already in 2011 (European Parliament 2011). Even though the Member States may decide to forbid the use of lowest-price award or to limit its use, it is once again optional.

An option in this respect would be making the application of LCC, which allows calculating the cost of the tender incorporating the environmental costs linked to the product or service in question, a default procedure whenever appropriate. This requirement should be aimed at "product groups with the most significant environmental effects", which necessitates a way to define and make such product groups known, as well as providing support for the LCC calculations (Kalimo et al. 2021, p. 71). Before introducing mandatory LCC or establishing LCC as the default, ecolabelling should be fully embraced and standardised LCC measuring tools should be further-developed (Andhov et al. 2020, p. 46), building on the already existing LCC calculation tools²⁶ and methods for measuring environmental performance such as the Product Environmental Footprint (PEF). Others have recommended that the LCC methodologies should be sector-specific (Michaux & Gruyters 2020, p. 69). A common methodology is needed to avoid the potential conflict of LCC with the general principles of public procurement and to ensure the openness of competition (Michaux & Gruyters 2020, p. 66).

Considering the above, the most feasible option could be **limiting the application of MEAT based on price only to pre-determined situations** where environmental requirements are set by other means than the award criteria or where it can be shown that environmental considerations do not play a role in the procurement in question. The use of the lowest-price criterion is likely to make potential tenderers cut down costs to the detriment of environmental protection standards (Andhov et al. 2020, P. 46). It has also been shown that the emphasis on price has hindered the adoption of sustainable public procurement (Andhov et al. 2020, p. 6). As Wiesbrock argues, major differences in the regulation of the award of public contracts will potentially lead to a complex regime liable to contradict the simplification objectives and to prevent a level playing field (Wiesbrock 2016, p. 90). Continuing to allow opting for the lowest-

²⁶ See https://green-business.ec.europa.eu/green-public-procurement/life-cycle-costing_en

price option with no safeguards that environmental protection requirements are considered in the procurement process may undermine GPP adoption (Pouikli 2020, p. 20). Furthermore, in the light of EU's international and internal climate obligations and targets, it may be seen as illegitimate to maintain the lowest price criterion, without assurances of accounting for environmental concerns at the tendering stages (similarly, Melon 2020, p. 15).

On the other hand, it is also possible to set mandatory environmental requirements and then compete on price with all tenders already complying with the mandatory requirements (Kalimo et al. 2021, p. 75; Alhola 2023). It could be considered whether price-only as an award criterion could still be used under some pre-determined conditions, for example in cases where a high level of environmental performance could be ensured through standardised eco-labels (Alhola 2023). In other words, there could be other safeguards to ensure that environmental protection requirements are considered in the procurement process (Andhov et al. 2020, p. 46). Hence, competing on price is not necessarily counterproductive to the objectives of GPP/PPCN.

On a more general level, there would also appear to be a need for **clarifying the meaning of principles of procurement**, as referred to above. This is referred to in Article 18(2) of Directive 2014/24/EU, which states that:

“Member States shall take appropriate measures to ensure that in the performance of public contracts economic operators comply with applicable obligations in the fields of environmental, social and labour law established by Union law, national law, collective agreements or by the international environmental, social and labour law provisions listed in Annex X.”

The provision is binding on the Member States and obliges them to seek compliance with the relevant norms (Wiesbrock 2016, p. 79-80), but many have pointed out the need to normatively clarify what it necessitates in practise (Wiesbrock 2016, p. 80-81, Melon 2020, p. 16, Pouikli 2020, p. 17-18). The current ambiguity of the provision has been argued to undermine its effectiveness and lead to divergent rules being applied across Member States (Wiesbrock 2016, p. 80). What is expected from Member States and procurers could be clarified by amending the provision. To promote the consideration of climate effects, the Paris Agreement and the European Climate Law could be added in the respective annexes of the Public Procurement Directives by means of a Commission delegated act (similarly, Bogojevic 2019, p. 181). While welcomed from the viewpoint of legal certainty, this would not have a direct effect on the promotion of PPCN.

A similar notion applies to the final point often discussed, which is **omitting or relaxing the “link to subject matter” criterion**. The criterion necessitates that the award criteria are linked to the subject matter of the contract and is one of the conditions for the acceptability of green award criteria developed by the CJEU (for more, see e.g., Michaux & Gruyters 2020, p. 63). In practice, this removes the ability to introduce general environmental responsibility policies of the economic operators to the extent they address matters beyond the specific needs of the contract (Semple 2016, p. 50). For contracting authorities, drawing the line between which requirements have a link to the subject matter is not straightforward. For instance, the use of LCC may weaken

the link to subject matter (Michaux & Gruyters 2020, p. 64). It has been argued to lead to a chilling effect on contracting authorities otherwise ready to buy sustainably (Andhov et. al. 2020, p. 38). Some have suggested the omission of the criterion (Andhov et. al. 2020, p. 38-39, p. Melon 2020, p. 11) and others have favoured applying the criterion more loosely (Semple 2016). The application of a strict version may create difficulties in achieving the objectives of GPP, while abandoning or loosening the criterion too much may pose problems, for instance, for the verification of criteria (Semple 2016, p. 50). The risk in relaxing or omitting the link to subject matter is the introduction of arbitrary criteria or criteria which are difficult to verify or compare between tenders, which may lead to discrimination. What is clear, however, is that a very strict interpretation of the criterion may hinder the effective use of GPP or PPCN. Semple provides an example, which is of relevance when thinking of promoting PPCN, too:

“In the case of renewable electricity, the criterion limits schemes designed to encourage investment in renewable energy. A contracting authority is free to require that all or a given percentage of the electricity it purchases is produced from renewable sources. However, it cannot distinguish between bidders in awarding the contract based on how large the renewable energy share is in their total production or who invests more in new generation capacity – unless this in some way affects the subject matter of the contract i.e., the electricity which it is purchasing.” (Semple 2016, p. 66)

Lastly, it should also be noted that should the application of GPP become mandatory, a definition of GPP should be included in the Public Procurement Directives. The sub-definition of PPCN should likewise be inserted or the fact that GPP also mandates the specific consideration of climate effects should be made explicit.

Introducing GPP/PPCN requirements in sectoral legislation

Another option discussed is introducing specific GPP/PPCN requirements in sectoral legislation in a targeted manner. This would mean setting environmental/climate requirements regarding the procurement of specific products or services within the sector concerned. As illustrated in the table below, sector specific GPP rules already exist in some parts of EU sectoral legislation. Existing examples include for instance the Directive 2010/31/EU on the Energy Performance of Buildings and the Directive 2012/27/EU on Energy Efficiency. Both have been subject to a revision as part of the Fit for 55-package, with final agreement pending. Both also already included rules related to public procurement, which have been subject to updates. For instance, the new Energy Performance of Buildings Directive will require Member States to ensure that from 2028 all new buildings owned by public bodies would be zero-emission buildings. The Energy Efficiency Directive in turn will require that Member States ensure that contracting authorities and contracting entities purchase only products, services, buildings, and works with high energy-efficiency performance (in tenders above the EU thresholds), unless it is not technically feasible. The PPCN requirements could also be more specific, such as setting emissions intensity limits for procured building materials.

As of now, it appears that the experience gained by the implementation of mandatory sectoral GPP rules is limited and cannot give a clear picture of the potential benefits and the side effects of the extension of mandatory GPP provisions (Pouikli 2020, p. 17). Melon (2020) has compared experiences with a set of mandatory sectoral GPP rules and argued that they can yield positive results in a relatively short timeframe, while also being prone to having unexpected drawbacks and needing continuous refining. Regardless, Melon (2020, p. 12–15) concludes that mandatory legislation does appear to incentivise market developments in providing environmentally friendly solutions as well as increased engagement with GPP. In a Finnish study on the carbon and environmental footprint of public procurement, the inclusion of product or sector specific requirements in public procurement was recommended if the following conditions are met (Kalimo et al. 2021, p. 85):

1. the benefits resulting from the environmental requirement must be proven to be greater than the resulting disadvantages in a product group-specific evaluation;
2. there is already, or can be seen to be, significant competition on the market among new solutions that meet environmental requirements;
3. the share of public sector demand in the market must be significant in relation to the total market demand.

It should be emphasised that these conditions should be paid attention to also when laying down potential mandatory PPCN criteria or PPCN targets, product-level targets in particular.

However, public procurement may also be used more strategically, as also recognised in the Finnish study: “[a]lternatively, the public sector can consciously strive to create a market and set an example as an early adopter” (Kalimo et al. 2021, p. 85).

In general, it has been argued that mandatory minimum product requirements would increase the environmental sustainability and predictability of procurement and create scale advantages for product suppliers. Some challenges are that too restrictive product requirements decrease the level of flexibility of the procurement and may lessen the number of tenders and competition, leading to more expensive prices and potentially lower quality. It could even be possible that there is no economic operator which would be able to issue a tender at a reasonable price. However, in the longer run, the requirements would likely incentivise the markets to innovate and to develop new solutions to match the new requirements (Kalimo et al. 2021, p. 82-83). Moreover, suppliers can adjust their practices if the product requirements are announced early and gradually phased in. The careful design of product requirements can thus mediate some of the risks.

The introduction of product requirements necessitates both the existence of verification means and assessing whether the respective market is mature enough to respond, and whether a sufficient level of competition could be maintained (Alhola 2023). Providing more informational support to procurers on how climate aspects could be considered in specific product groups also plays an important role (Alhola 2023). The Finnish study recommended inserting product-specific

requirements on public procurement in sectoral legislation, possibly by means of framework laws which allow the introduction of more specific requirements by decrees for instance (Kalimo et al. 2021, p. 108-109). This could be equivalent to introducing product-specific public procurements rules in sectoral directives or regulations and issuing commission delegated acts on the more specific requirements.

Table 2: Sector specific GPP rules in the EU

Legislation	Relevance
Directive 2019/1161/EU on Clean Vehicles	The directive entails minimum procurement targets for clean light-duty vehicles including i.e. that contracting authorities and contracting entities take into account lifetime energy and environmental impacts, emissions and pollutants when procuring certain road transport vehicles
Directive 2009/28/EC, recast 2019, on the promotion of the use of energy from renewable sources	Sets mandatory national targets for share of electricity from renewable sources, rules on guarantees of origin and sustainability criteria for biofuels and bioliquids.
Directive 2012/27/EU (amended 2018) on energy efficiency	<p>The Energy Efficiency Directive requires central government authorities to only purchase highly energy-efficient products, services and buildings. Annex III of the Directive sets out the approach which applies to each product/service sector.</p> <p><i>Revision under the Fit for 55 negotiations: amongst other changes, the requirement will extend from central government authorities to all contracting authorities and entities, unless it is not technologically feasible. It will also extend to works.</i></p>
Directive 2010/31/EU, recast 2018 on the Energy Performance of Buildings	<p>The directive requires that all new buildings occupied and owned by public authorities need to be nearly zero-energy buildings. The directive provides indicators and thresholds for energy efficient construction, including future mandatory requirements for nearly zero buildings.</p> <p><i>Revision under the Fit for 55 negotiations: amongst other changes, the revised directive will require that from 2028 new buildings owned by public bodies should be zero-emission buildings and that from 2030 all new buildings should be zero-emission buildings. It will also require calculating the global warming potential of buildings and disclosing it through the energy performance certificate of the building.</i></p>

Legislation	Relevance
The Energy Labelling Directive 2010/30/EU (amended 2017)	The Energy Labelling Directive provides for an energy label to be attached to the product, which helps end users to select energy efficient products. An energy label must be attached to the products for which energy labelling regulations for specific product groups have been issued. The label shows the energy consumption of the product during its use on a scale from A to G.
Directive 2012/19/EU on waste electrical and electronic equipment	Directive providing for the separate collection, treatment, and recovery of waste electrical and electronic equipment, and setting relevant design requirements.
Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment	The directive sets requirements for manufacturers, importers and distributors of electrical and electronic equipment regarding hazardous substances identified in the Directive, and rules regarding the CE marking
Regulation No 66/2010 on the EU Ecolabel	The EU Ecolabel and EU GPP criteria are harmonised to the extent possible.
Regulation No 995/2010, Timber regulation	Provides a framework for ensuring legality of timber available on the EU market. Lays down the obligations of operators who place timber and timber products on the market.
Directive 2009/125/EC establishing a framework for the setting of eco-design requirements for energy-related products (recast)	The Eco-design Directive provides the main framework for the development of environmental criteria for energy related products
Regulation No 1221/2009 on the voluntary participation by organisations in the Community eco-management and audit scheme (EMAS)	The EMAS Regulation provides reference to how EMAS may be taken into account in public procurement
Directive 2008/98/EC Waste Framework Directive	Sets the basic concepts and definitions related to waste management and lays down waste management principles such as the “polluter pays principle” and the “waste hierarchy.”
Regulation No 106/2008 on a Community energy-efficiency labelling programme for office equipment	The Energy Star Regulation sets mandatory GPP requirements for office equipment purchases.
Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals	Manufacturers are required to register the details of the properties of their chemical substances and safety information in a central database

Own compilation.

Setting generally applicable, mandatory requirements for products or services in sectoral legislation

Finally, the last option that we want to briefly acknowledge is to focus on greening the market as a whole by introducing **product or service requirements in sectoral legislation that are not just applicable to public procurement**. This option could make it easier for the procuring entities to apply GPP/PPCN due to having more green and low-carbon products available in the market. According to some scholars, the most efficient option would indeed be to include environmental criteria directly in sectoral legislation setting an industry-wide standard for all suppliers, and not only those supplying the public sector (Halonen 2021, p. 552).

At the same time, this takes us away from the idea of using public procurement strategically to create niche markets and push low-emission products and processes down the cost curve. It can be argued that there is a need for requirements targeted at procurement. Setting generally applicable criteria may be challenging in many ways, while requirements on public procurement may be more feasible and stricter in the short-term. For example, the public sector could lead the transition to the use of electric vehicles, even though it is not yet possible to set a general requirement according to which all vehicles on the market should be electric (see e.g., Kalimo et al. 2021, p.82). We therefore do not consider this option further in the report.

3.4 Summary assessment of the legislative means to support the uptake of PPCN

Having discussed the different potential means to promote the uptake of PPCN, this section summarises the key points of each option and assesses their respective strengths, weaknesses and enabling conditions, as well as transformative impact.

The table below shows first how each of the potential means to promote the uptake of PPCN could be implemented in practise. In analysing the strengths, weaknesses, and enabling conditions of the options, attention has been paid to their practical feasibility, legal feasibility, and potential market effects. Whereas the other benchmarks are quite self-explanatory, potential market effects may require further explanation. In that regard, we have for instance considered the ability of the option to promote competition and a level-playing field or to send signals for industry. We have also analysed the potential for transformative impact of each option in hypothetical terms. Transformative impact is understood as an ability to change markets and induce emissions reductions across the Single Market, the level of which can vary depending on for instance the bindingness or environmental stringency of the option.

It should be noted that to some extent all the options discussed would lead to an increase in administrative burden and costs, especially at early stage.

Table 3: Summary assessment of the means discussed to promote PPCN via legislative changes

	<u>Practical implementation</u>	<u>Strengths</u>	<u>Key enabling conditions and potential weaknesses</u>	<u>Transformative impact</u>
Mandatory PPCN criteria	<p>Drafting and making the use of core GPP criteria or specific PPCN criteria for certain product groups mandatory.</p> <p>The use of the criteria could be mandated by either adding a reference to the criteria or by giving the Commission the power to issue delegated acts on the criteria in applicable sectoral legislation. A softer option would be to issue guidance on the application of current EU public procurement rules, encouraging the use of GPP criteria and the more specific PPCN criteria.</p>	<p>Would increase legal certainty and ensure that the application of the criteria is in line with procurement rules.</p> <p>Existing experience in drafting and applying the GPP criteria.</p> <p>Ensures coherence and effectiveness of the consideration of climate effects in procurement.</p>	<p>Criteria must be regularly updated to maintain their functionality.</p> <p>Will expand the workload of the contracting authorities. Cannot be too strict and must be targeted to sectors with high environmental impact.</p> <p>If no general obligations for GPP/PPCN are introduced in addition, this approach may be limited to specific sectors or environmental impacts.</p> <p>Depending on the design, may decrease competition and increase prices in the short run.</p>	<p>Depends on what criteria are made mandatory.</p> <p>Ability to accelerate the uptake of GPP/PPCN across the EU.</p> <p>Would set minimum environmental/climate requirements for key product groups.</p>
Mandatory GPP/PPCN targets	<p>GPP/PPCN targets could be set at different levels: adoption targets, industry-level targets, project-level targets, product-level targets, or emission reduction targets.</p>	<p>Would provide a clear sense of direction and oblige the procuring authorities and MS to report on the attainment of the targets.</p> <p>Gives MS flexibility in setting criteria that suit their processes.</p> <p>Could be set at different levels based on the readiness of the</p>	<p>Effective monitoring, reporting, and verification mechanisms systems are a necessary precondition.</p> <p>Requires the availability of data to effectively monitor their attainment.</p> <p>Fragmentation in PPCN systems across EU.</p>	<p>Would send a clear signal to the industry and a clear benchmark for governments with accompanying monitoring and reporting.</p>

	<u>Practical implementation</u>	<u>Strengths</u>	<u>Key enabling conditions and potential weaknesses</u>	<u>Transformative impact</u>
		market and the procuring authorities that apply them.	Requires definition of minimum standards for what qualifies as GPP/PPCN.	
Revising the general rules of the Public Procurement Directives	<p>Most feasible options:</p> <p>(a) introducing an obligation to take environmental considerations into account in all public procurement or at least in procurement with major environmental impacts, and to provide reasons if not doing so.</p> <p>(b) limiting the application of MEAT based on price only to pre-determined situations where environmental requirements are set by other means than the award criteria or where it can be shown that environmental considerations do not play a role in the procurement in question.</p>	<p>Would push for a wider uptake of GPP and PPCN in general.</p> <p>Would support the introduction of more specific sectoral, PPCN rules.</p> <p>Compared to the risks of (too strict) mandatory product requirements, may be less prone to decrease the number of tenders.</p> <p>May create incentives for companies to compete by being more ambitious in terms of environmental quality.</p>	<p>Would necessitate clear guidance and support to the procuring authorities.</p> <p>Compared to more targeted rules, do not similarly ensure that the chosen tender meets a set of environmental or climate criteria.</p>	Potential to make the consideration of climate effects a default element in all procurement, which would transform the day-to-day application of procurement rules.
Introducing product- or sector-specific PPCN requirements	Adding targeted PPCN rules in sectoral directives or regulations for key sectors or products.	<p>Creates clear signals to the market.</p> <p>Has the potential to increase the sustainability and predictability of procurement and create scale advantages for product suppliers.</p> <p>In the long run, could incentivise the markets to innovate and to shift to more sustainable options.</p>	<p>Need to be carefully tailored to the specificities of the sectors.</p> <p>Requirements need regular updating and means of verification.</p> <p>Depending on design, may decrease competition and lead to higher prices in the short run.</p>	Can create a stable source of demand for low-emission products, incentivising innovation, and investment.



4. PPCN to drive transformation in the construction industry?

In this report, we have argued that public procurement should be used more strategically in the EU to create demand for low-emission goods and services. Moreover, we have laid out options how GPP and the more targeted PPCN can be promoted and anchored in the EU's legal framework. However, the application of GPP is wide and ranges from office stationery to buildings and bridges. Here we look at a sector that is especially relevant for climate neutrality and where public procurement has enough leverage to have a transformative impact, as it accounts for a significant share of overall demand: construction and building materials. We first outline why construction is a suitable focus area for PPCN (4.1) before describing two general ways for implementing PPCN (4.2). Lastly, we estimate the potential of PPCN in construction with an illustrative impact assessment of a stylised PPCN application: the use of emissions intensity limits on steel and cement (4.3).

4.1 Why PPCN should focus on construction

We argue that construction should be a focus area for PPCN. Construction is a major source of GHG emissions. Public buildings such as schools, universities, hospitals, or public administration, but also civil engineering works such as roads, railways and bridges are energy and material intensive to build. As we have shown in section 2.2, they represent one of the biggest sources of public-procurement-related emissions: About one fifth (19%) of the EU's public procurement emissions are associated with construction. The potential to reduce emissions in the construction sector is widely acknowledged, as is the importance of public procurement for doing so (UNEP, 2022). Reducing emissions in construction is consequently essential for reaching climate-neutrality in the public sector and the whole economy.

Steel and cement (mostly as concrete) are the “heavyweights” of building material's embodied emissions.²⁷ Together their production accounts for 13.5% of global GHG emissions. According to a study by Agora Industry (2022, p. 22, 40), 36% of the EU's steel emissions and more than 80% of the EU's cement emissions can be attributed to construction. 56 million tonnes (Mt) of steel were used in construction in the EU in 2019. The cement consumption of construction is even bigger (though not as emissions intensive): in 2019, 84 Mt were used for buildings, 50 Mt for infrastructure, and another 30 Mt for maintenance (Material Economics, 2019, p. 159). A large share of this can be attributed to *public* construction projects.

²⁷ Embodied or embedded emissions are the GHGs emitted during the whole life cycle of a product or material, so including the emissions occurring during the extraction of raw materials, the manufacturing, and the disposal of the waste at the end of its lifetime.

But focusing on construction is not just important because it constitutes a major part of public procurement emissions. PPCN in construction can also accelerate the transformation of the basic materials industry. This is because a large part of construction's emissions is embodied in the basic materials used, such as iron & steel (18%) and cement (24%), but also other materials (35%) including aluminium and glass (Mission Possible Partnership & World Economic Forum, 2022). Embodied emissions can account for up to 75% of a building's emissions over its lifetime (ACAN, 2021, p. 11).

Decarbonising virgin materials will be essential for reaching climate neutrality. But progress has been slow. For cement, annual emissions intensity reductions of 3% through 2030 will be necessary to align with the IEA's Net Zero Emissions by 2050 scenario (IEA, 2022a). However, the emissions intensity of cement production globally has increased by 1.5% annually between 2015 and 2020 (IEA, 2022b). Consequently, cement production must change fundamentally. Up until now, driven partly by rising CO₂ prices in the EU ETS, the focus of the industry has been on incremental improvements - improving the energy efficiency of kilns, switching fuels (including biomass and waste co-firing), and lowering the clinker content. Yet to arrive at significantly lower emissions near zero emission production routes will be necessary. These include new binders to replace limestone and process-related emissions, improved recycling of concrete, carbon-reinforced concrete, and CCU/S to absorb process emissions. However, few low-emission technologies have reached technology readiness levels for commercialisation (Chan *et al.*, 2019; de Bruyn *et al.*, 2020).

For steel, the emissions intensity of crude steel also needs to decline by 3% a year between 2020 and 2030 in the IEA's NZE 2050 scenario (IEA, 2022c). Incremental changes through energy efficiency improvements and fuel switching have largely been exhausted and offer only very limited potential to reduce emissions further. This means that innovative near zero emission technologies must be deployed at speed and scale. Low-emission steel production options are more mature than is the case for cement. Several low-emission steel projects have been announced in recent years. The most promising technologies include hydrogen-based direct reduction, electrolysis of iron ore, CCU/S, and high-quality electric arc furnace routes (Chan *et al.*, 2019; de Bruyn *et al.*, 2020).

Cement and steel plants have long technical and economic lifetimes, which means that any new investment in conventional technologies is at locking-in high emissions – or of ending up as a stranded asset. In the EU, 48% of steel production capacity and 30% of cement production capacity requires reinvestment (Agora Energiewende & Wuppertal Institute, 2021, p. 40). However, because of uncertainty about future climate policy and the currently existing premium on low-emission steel and cement, investors need certainty that there is sufficient demand to invest. This is where PPCN can play a strategic role: PPCN can create demand for low-emission steel and cement, therefore creating a strong signal for the industry to invest and innovate. In other words, PPCN in construction can induce changes in production patterns in the whole basic materials industry.

Doing so, PPCN can substantially contribute to the transformation of the basic material industry. Most building codes and regulations focus on operational emissions that result from heating and electricity consumption of buildings. The embodied emissions of building materials remain under-addressed, however (UNEP, 2022). According to UNEP (2022, p.79), public procurement is an important lever to decarbonise building materials and accelerate the transformation of the basic materials industry. Likewise, several studies including Agora Energiewende and Wuppertal Institute (2021), Lewis *et al.* (2023), or New Climate Institute (2020) sees it as an important tool to accelerate the transformation of industry.

In principle, there could be a risk that PPCN using strict criteria would create an imbalance between demand and supply, where demand growth (far) exceeds the available supply, pushing up prices and therefore costs of public building projects, and generating windfall profits for the (few) suppliers. This risk, however, seems manageable: particularly in steel, but also in cement, all major producers have tabled plans to expand their production capacities for low-carbon production methods in the coming years, meaning that supply of these products is adaptable and can expand. Furthermore, while public building projects constitute a sizeable share of total demand (and large enough to have some leverage), public demand is not the dominant source of demand in the respective markets. Finally, if and where public demand should lead to an increase in the price of low-emission products, this can be seen as an intended feature rather than a problem: the higher price is also part of the signal for other investors to turn their plans into reality and expand production, thus increasing supply and helping to lower the price.

At the same time, while it can play a decisive role, PPCN alone will not be sufficient to drive the transformation. Rather, a suite of policy instruments will be necessary. PPCN is an example of a demand-pull instrument that generates (guaranteed) demand for climate-friendly products. Equally important are technology-push instruments that boost the supply of green technologies. In addition, there need to be measures to improve material efficiency and circularity to decrease absolute consumption levels of virgin materials (Agora Industry, 2022). In addition, there must be an enabling framework that provides the necessary conditions, including a steady and competitively priced supply of renewable energy and green hydrogen, as well as the necessary infrastructure for clean energy and CO₂.

In the following section, we describe two general ways by which PPCN can be used to address the embodied emissions of steel and cement. After we have mapped out and discussed these options, we will exemplify the transformative potential with an illustrative case study on the use of emissions intensity limits.

4.2 Options for PPCN in construction

Generally, there are two options for introducing PPCN for key construction materials. First, authorities issuing a call for tenders can include technical requirements that set limits on the embodied emissions of selected building materials. And second, the award decision by either

providing a bid discount to lower-emission products or applying a broader definition of costs using a life-cycle-costing approach in determining the best-price-quality-ratio. The two options operate on different levels: limits on embodied emissions target products, while life-cycle-cost approaches tend to target the full project. Moreover, because technical specifications are obligatory requirements that a bidder must fulfil to be eligible, they are guaranteed. Award criteria, in contrast, are incentives. They are a means to compare which of the bids that meet the technical specifications performs best in terms of some desired characteristics. The two approaches are not exclusive and can be combined. Moreover, they can both be specified as EU core or comprehensive GPP criteria. Limits on embodied emissions can be introduced via sectoral legislation. In this section we describe the two options and discuss their respective strengths and weaknesses. The following section then estimates the potential impacts if limits on embodied emissions on key construction materials were to be introduced in public procurement.

Embodied emission limits in technical specifications

PPCN for key building materials can be established in the form of technical specifications in the call for tenders. Technical specifications are requirements or standards that tenders must fulfil in order for their bids to be considered. In this sense, they function as knock-out criteria, because all bids that do not meet the requirements will not be considered (Rainville, 2017). Procuring authorities can set limits on the embodied emissions of steel and cement in the technical specifications. This approach is practiced in California, where the Buy Clean California Act (BCCA, see text box 6) sets Global Warming Potential limits – limits on the embodied GHG emissions – on key construction materials.

Technical specifications can be combined with other selection methods, such as the identification of MEAT based on life cycle costing or other environmental aspects in the determination of the best price-quality ratio. That means, tenders that meet the technical requirements can still be assessed and compared against each other based on the specified award criteria.

Among those bidders that meet the technical requirements, competition can take place for the economically most advantageous tender. But by specifying the allowable embodied emissions of key materials such as structural steel or concrete, public authorities can make sure they only select bidders that use low-emission materials. This, in turn, signals to potential investors that there will be guaranteed demand for low-emission materials, and thereby gives them an incentive to invest and innovate in low-emission production.

Emissions intensity limits require mechanisms to establish, verify, and document the embodied emissions of the products in question. Environment Product Declarations (EPDs) are an established way to report on the life-cycle-impact, including the embodied GHG emissions, of products. An EPD is a document that reports on the environmental impact of a product over its life cycle and is independently verified. EPDs follow methodologies that are standardised by ISO

norms.²⁸ EPDs consist of a product description, life-cycle-assessment data, as well as the required documentation, such as test certificates (see Box 5).

Embodied emissions intensity limits²⁹ can be set in numerous ways. One approach is to limit the allowable maximum emissions intensity with reference to the industry's average or the best-in-class production plants, i.e., to use a benchmark. An aspirational benchmark would set the limit below the best-in-class commercially available technology, requiring further improvements of the technology over time. Contractors would have to prove their compliance with the emissions intensity limits using, for example, Environment Product Declarations. For example, the Californian BCCA sets GWP limits for procured products at the facility-specific GWP for each material. Setting the limit at the average means that only the best-performing half of supply can be used in public construction works. The GWP limit could also be set at a more stringent and ambitious level, i.e., relative to the average emissions of the 25% / 10% / 5% of best-performing plants. When setting the limit, it should be ensured that enough supply qualifies while maintaining the incentive to switch production methods. The limits would need to be periodically updated in line with the benchmarks and communicated in a clear and predictable manner.

Through its procedures for allocation of free emission allowances in the EU Emissions Trading System (ETS), the EU has gathered extensive experience and rich data on benchmarking for specific products and installation types. To reduce the risk of carbon leakage, most industrial emitters in the EU ETS receive free allowances. However, to maintain an incentive to reduce emissions, the number of free allowances per installation is calculated using a benchmark that is based on the average emissions intensity of the 10% of the best-performing facilities for 52 products. Plants that are less efficient than this benchmark receive fewer allowances than they would need to cover their emissions, and hence need to purchase the remainder on the market. Member states and EEA-EFTA countries collect plan-specific emissions intensity data and report it to the Commission. In short, the EU has the experience and a monitoring and reporting system to model the standard setting for PPCN on.

Another option is to base the emissions intensity limits on emission reduction requirements implied by climate-neutrality scenarios or derived from technology-readiness forecasts. The IEA (2022a), for instance, estimates that the emissions in the steel and cement sectors must fall by 3% per year on average until 2030. That means, emissions must be 21% below 2023 levels in 2030. This can serve as the baseline for setting the limits on embodied emissions and complemented with technology-readiness assessments. As with benchmarks, compliance with the limits can be proven with Environment Product Declarations, EPD's.

No matter how the limits are set, the process must be transparent, predictable, and clearly communicated. The goal is to send signals to investors and producers, to incentivise them to

²⁸ The ISO 14025:2006 standard establishes type III environmental declaration programmes. EPDs for construction products are specified in ISO 219304. All EPDs are based on the ISO 14040 series of standards that establish LCA methodologies.

²⁹ Embodied emissions intensity limits are sometimes referred to as Global Warming Potential limits (GWP limits) or limits on embedded emissions that capture the footprint of all GHG of a product.

invest in clean technologies and manufacturing capacity. Therefore, the limits must be predictable, so they know by when they will have to meet stricter limits, but also when there will be guaranteed demand. Investments have long lead times. Setting the limits well in advance and communicating them clearly is therefore key. Likewise, it is important that the process for setting the limits is transparent, so producers know what assumptions have been made and how the limits will be adjusted over time.

The use of embodied emissions limits could be established in two ways. First, they can be included as part of the GPP or more specific PPCN criteria for the construction/building materials sector. At present, GPP criteria are voluntary. For the emission limits to become mandatory, further changes in the regulatory framework would need to happen, as we describe in chapter 3. An alternative to making the application of the criteria mandatory in their entirety would be to set targets for the share of tenders that must include GPP/PPCN criteria in construction projects. This would potentially be a much weaker mechanism, since it would leave the choice and specification of criteria to the procuring authorities.

Box 5: Environmental Product Declarations

An Environment Product Declaration (EPD) is a standardised document with information about product's environmental and human health impact. An EPD is produced based on life cycle assessment (LCA) calculations. LCA calculates the environmental footprint of a product throughout its whole lifecycle. Construction EPDs are based on ISO 14040/14044, ISO 14025, EN 15804 or ISO 21930 standards (BPIE 2021).

The use of EPDs is voluntary. However, the Construction Product Regulation (CPR) supports their use: "For the assessment of the sustainable use of resources and of the impact of construction works on the environment Environmental Product Declarations should be used when available." (Recital 56). Some Member States, for example France and Belgium, require the use of EPDs by law (OneClick LCA 2022).

EPDs are a tool for manufacturers to report objective, third-party verified data about their products and to demonstrate their commitment to sustainability goals. Every EPD includes a product's carbon footprint, in other words, Global warming potential (GWP). EPDs provide important information for the construction sector and help in choosing materials and products that lead to the lightest environmental load. Therefore, EPDs can support carbon emission reduction by providing data and impacts of different materials and products within the construction industry.³⁰

³⁰ For more information, see e.g.: <https://www.environdec.com/all-about-epds/epd-applications#marketandlegalregulations>

Another way would be setting emissions intensity limits for procured materials in sectoral legislation, which could be characterised as setting product-specific PPCN requirements.³¹ The Construction Product Regulation (CPR) regulates the marketing of construction products in the EU and lays down harmonised rules on how to express their performance in relation to their essential characteristics. Where no standards exist, harmonised standards or European technical assessment documents³² as their alternative must be used to define the essential characteristics of construction products in relation to their performance. In other words, the CPR currently harmonises the assessment methods for the performance of construction products without setting EU-wide requirements for these products (EPRS 2022, p. 3-4). Importantly, however, at the time of writing (May 2023) the CPR is currently under revision and new rules on directly applicable product requirements may be introduced.

The EU Commission proposal for the revision of the CPR tabled in March 2023 includes new rules for the promotion of environmental and climate objectives. The proposed new CPR would introduce rules on how to express the environmental and climate performance of construction products in relation to their essential characteristics, as well as the establishment of environmental and climate product requirements (European Commission 2022a, Art. 1). For instance, it would define environmental obligations for manufacturers, including the obligation to declare the mandatory sustainability characteristics set out in Annex I, the global warming potential, and performance-based requirements or the minimum recycled content of the construction product (European Commission 2022a, Art. 22). Furthermore, all products covered by the CPR would need to satisfy the generic, directly applicable requirements and the respective product family or category requirements set out in Annex I. The Commission would be empowered to adopt delegated acts defining the Annex I requirements more precisely. Consequently, emissions intensity limits used for PPCN could be introduced in the Annex I of the revised CPR or Commission delegated acts elaborating on the requirements laid down therein.

To introduce emissions intensity limits in any form, improving the data base is essential. A key enabler in this regard would be mandatory reporting for life-cycle emissions of construction products. Environment product declarations (EPDs) could be one tool for this. EPDs are not mandatory under the CPR, whereas the manufacturer shall draw up a declaration of performance “[w]hen a construction product is covered by a harmonised standard or conforms to a European Technical Assessment” (CPR Art. 3). Standard EN 15804 is commonly used to produce EPDs for construction products in the EU, but it is not covered by the current CPR standards (see also Boverket 2020, p. 80-84). Therefore, introducing a requirement to declare the environmental

³¹ Technically, they would no longer be technical specifications of calls for tenders in the sense that procuring authorities can choose to set these. Instead, they would become directly applicable rules for all procurers and bidders to follow.

³² The European technical assessment (ETA) is an alternative for construction products not covered by a harmonised standard, providing information on their performance assessment. For more information, see: https://single-market-economy.ec.europa.eu/sectors/construction/construction-products-regulation-cpr/european-assessment-documents-and-european-technical-assessments_en.

characteristics of construction products would require a revision of harmonised standards covered by the CPR so that they refer to EN 15804, which lays down the procedure for EPDs.

The sustainability of building materials is also considered in the proposal for the revision of the Energy Performance of Buildings Directive (EPBD), which addresses greenhouse gas emissions during the whole lifecycle of buildings (European Commission 2021).³³ According to the proposed Art. 7(2), Member States shall ensure that the life-cycle Global Warming Potential (GWP) is calculated in accordance with Annex III and disclosed through the energy performance certificate of the building. Compared to emissions intensity limits, this approach is different in the sense that it does not set a limit to allowed emissions directly, but requires the calculation of the GWP, which brings together greenhouse gas emissions embodied in construction products with direct and indirect emissions from the use stage (proposed recital 9).

If emission limits are supposed to have a transformative impact, in line with our strategic conception of PPCN, they must be adopted and applied as widely as possible. Only when the limits cover a large enough share of public demand for steel and cement will they send a strong and clear signal to producers and potential investors to induce corresponding changes in supply. Ensuring a transformative impact also requires that emission limits are made mandatory – at least for certain categories of tenders: leaving their application to the discretion of each procuring authority again would dilute the signal and undermine the needed clarity.

In principle, there could be a risk that PPCN using strict criteria would create an imbalance between demand and supply, in the way that demand growth (far) exceeds the available supply, pushing up prices and therefore costs of public building projects, and generating windfall profits for the (few) suppliers. This risk, however, seems manageable: particularly in steel, but also in cement, all major producers have tabled plans to expand their production capacities for low-carbon production methods in the coming years, meaning that supply of these products is adaptable and can expand. Furthermore, while public building projects constitute a sizeable share of total demand (and large enough to have some leverage), public demand is not the dominant source of demand in the respective markets. Finally, if and where public demand should lead to an increase in the price of low-emission products, this can be seen as an intended feature rather than a problem: the higher price is also part of the signal for other investors to turn their plans into reality and expand production, thus increasing supply and helping to lower the price.

To balance the administrative burden for procuring authorities, emissions intensity limits could become mandatory only for certain tenders. For example, they could (initially) be made mandatory for construction and civil engineering projects above a certain value. Limiting them only to large projects reduces the administrative burden for procuring authorities but preserves the incentive function and the transformative leverage. Over time, as experience grows and the market

³³ See provisional agreement here: <https://www.consilium.europa.eu/en/press/press-releases/2022/10/25/fit-for-55-council-agrees-on-stricter-rules-for-energy-performance-of-buildings/>

matures, this could then be extended to include also a larger share of public investment, i.e., also medium-sized to smaller projects.

Box 6: Buy Clean California sets limits on embodied emissions of key materials

California is one of the first jurisdictions to tackle embodied emissions of building materials in public works with the passage of the Buy Clean California Act (BCCA) in 2017. The BCCA establishes the setting of maximum acceptable Global Warming Potential of four eligible building materials: structural steel, concrete reinforcing steel, flat glass, and mineral wool board insulation. The limits are set by the Department of General Services (DGS) in consultation with the California Air Resources Board (CARB) and are updated on a regular basis in line with technological trends. Compliance with the BCCA is checked using Environment Products Declarations (EPDs). Contractors must submit facility specific EPDs for the specified materials and products used before they are accepted for installation. Since the BCCA, many other US states have pursued similar policies and under US President Biden, a federal Buy Clean Task Force was established.

Award criteria

Introducing PPCN at the bid evaluation or award stage is another option.³⁴ PPCN criteria at the award stage create an incentive, in that bids of suppliers with a smaller climate impact will be evaluated more favourably. In consequence, the contract is not just awarded based on price but a combination of considerations, including environmental impacts, quality, aesthetics, innovation impacts, social, or cultural factors. The contracting authority then awards the tender based on the “best-price-quality-ratio” (BPQR).

In fact, the European Commission recommends considering the life-cycle cost in the tender evaluation as part of their core GPP criteria. Life cycle assessments and costing monetises environmental impacts such as the global warming potential to establish the “true cost” of the bid. Doing so, the price of the bid is adjusted to take environmental and other costs of the bid into account. Procuring authorities may choose to set the life-cycle-cost as their only award criterium. However, usually more award criteria are considered including aspects relevant for low-emission construction such as durability, the share of recycled material, or design consideration, along criteria not directly relevant for climate mitigation.

Importantly, incorporating PPCN through award criteria is to a large extent already possible under the currently applicable legal framework. However, because it is voluntary and, in most cases, decided by individual procuring authorities, it is applied unsystematically and highly heterogeneous

³⁴ Bid “evaluation stage” and “award stage” are generally the same thing and used interchangeably here.

across the EU. In this sense, the use of award criteria would have to change substantially for it to have a transformative impact.

The BPQR can generally be established through two ways: weighted criteria or bid discounts. Weighted criteria specify how much weight each award criteria receives. For example, the cost may account for 50% of the award criteria, while social criteria account for 25%, and aesthetics for the rest. The bid with the best weighted average is awarded the tender. For bid discounts, the environmental impact or other desired criteria of the bid is quantified and monetised. This is then used to discount the bid and the applicant with the lowest discounted bid wins the contract.

Award criteria can be mobilised strategically to accelerate the transformation of the basic material industry in two ways. either through (a) considering the life-cycle cost and / or (b) rewarding tenders that use low-emission steel and cement in their projects with bid-discounts or weighted criteria. In principle, the two approaches can also be combined.

Box 7: Practice examples: award criteria to decarbonise public construction

Award criteria are used across the EU to tackle construction emissions. The Netherlands uses life-cycle costing and bid discounts extensively in their procurement of construction and civil engineering projects. Procuring entities use the CO₂ performance ladder, a CO₂ management system and procurement tool to establish the performance of organisations and projects. Depending on how they score along the CO₂ performance ladder, the bidders are awarded a discount on their bid. The better their performance, the higher the award advantage. In addition to rewarding organisational performance, the Netherlands uses DuboCalc, an environmental cost calculator that establishes and compares the cost of civil engineering projects. The two elements are included as key award criteria and used in combination with other criteria to establish the best-price-quality-ratio.

Like the Netherlands, the state of Berlin has a system to establish the BPQR of construction projects. All procuring authorities have to consider the LCC in the bid evaluation. Moreover, for the procurement of buildings, the “Assessment System for Sustainable Building” (Bewertungssystem Nachhaltiges Bauen, BNB) is mandatory, which was established by the Federal Ministry of the Interior. The BNB is system for evaluating tenders along ecological, economic, socio-cultural, and technical dimensions. It gives different weights to these categories and points for different characteristics within each category.

The first approach – giving substantial weight to the life-cycle cost of a project or product – will reward those with a comparatively smaller environmental impact. While this approach takes a more holistic approach to environmental impacts and monetises various environmental externalities than just the embodied emissions of building materials, it has two major drawbacks if the intention is to use it strategically for steel and cement. First, procuring entities rarely procure the building materials directly. Rather, they procure the project as a whole. This means that the

use of LCC in award evaluation will have an unclear incentive on the steel and cement sector, as the embodied emissions of the materials only accounts for a fraction of the whole project's emissions. Even if this share may be very large for some projects, the incentive signal to the suppliers of cement and steel-based materials is less clear. Conversely, the reward to suppliers in the tender evaluation for using clean steel and cement in their projects may be relatively small.

Second, the strategic use of PPCN is targeted intentionally and specifically at the production emissions of the materials used: the very intention is to provide a targeted incentive for producers. An LCC assessment, however, sums up emissions over all phases of the product life cycle: thus, alternatives using conventional materials (with higher embedded emissions) but creating fewer emissions in the use or disposal phase could be evaluated similarly. This would be fine if the objective was simply to lower the environmental footprint of public procurement – but as discussed above, the strategic idea behind PPCN is to intentionally target the production process.

Third, and related to the previous drawbacks, the LCC is rarely the only criterion in award evaluation. That means, the ability to score on all other award criteria beyond LCC diminishes the importance (and hence dilutes the incentive) of using construction materials with low embodied emissions. This is especially relevant when the LCC is only one among many criteria but contributes substantially to increasing the overall price of the bid, which may be the case for low-emission building materials initially.

However, strategic incentives to decarbonise construction materials could be incorporated by setting standards for their emissions intensity outside of the LCC, as a separate award criterion (with appropriate weight). This would still give a signal for investment and innovation decisions, similar to technical requirements but less binding; the strength and clarity of this signal would depend on the weight attached to the criteria in the overall evaluation. The Commission could set benchmarks for the embodied emissions of key materials. Tenders that meet the benchmarks can then be rewarded with direct bid discounts or in the weighted criteria so that points are added to the score for establishing the BPQR. The benchmarks could be set like the technical requirements discussed above. They should increase in stringency over time and in a predictable manner. Furthermore, these trajectories should be periodically reviewed and updated to reflect technological and market trends.

Award criteria need not be limited to reductions in embodied emissions of materials. They can also be used to incentivise other important innovations and structural changes in the construction sector that will be needed in the transformation to climate neutrality. For example, increasing the uptake of recycled materials and recycled content in virgin materials will be crucial for decarbonising the sector (Agora Industry, 2022). Rewarding the use of recycled materials can incentivise their uptake and trigger innovations in the sector, from new ways to incorporate recycled materials to design innovation that aim at new ways of constructing. For example, recycling of concrete may be a way to cut emission reduction up to 70% compared to ordinary Portland Cement (Chan et al., 2019, p. 50). Encouraging the uptake of recycled concrete by

providing a bid-discount in adequate tenders may be a way to increase uptake and boost the market for recycled concrete.

Box 8: What policy avenue does PPCN align with?

In previous work (Görlach *et al.*, 2022b), we describe four policy avenues for attaining accelerated climate neutrality in the European Union that are based on differing approaches towards climate policymaking: The Green Economic Liberalism policy avenue is structured around market-based policy instruments, relies on private initiative to drive the transition to climate neutrality, and sees government intervention as needed and justified only where markets fail to deliver good outcomes. The Green Industrial policy avenue aims to actively build a green economy through fostering breakthrough innovations and scaling existing solutions. The Directed Transition policy avenue wants to foster technological change through active government intervention in the form of standards and mandates and the direct, managed phase-out of fossil technologies. Finally, the policy avenue Sufficiency and Degrowth aims to address climate change by reducing material and energy use, including via methods that could reduce economic activity.

While GPP can be reconciled with all policy avenues, its strategic use as a core policy instrument in the form of PPCN fits best with the Green Industrial Policy policy avenue. This is because PPCN is an industrial policy instrument that aims at the creation and direction of markets for cleaner products. It can play a constitutive role in an active state strategy to create green economies and industries by guaranteeing demand for clean technologies and products thereby stimulating investment, while at the same time guiding the direction of innovation and markets through standards. Because PPCN must be used in a concerted portfolio of measures that transform the industrial base, it fits best in a policy avenue where the state plays an active role in the allocation of resources. Different varieties of PPCN may make sense in this policy avenue. However, they must send clear signals to the industries in question, so the use of technical specifications and bid discounts may be the favoured variants under this policy avenue.

But PPCN and GPP can also play their part in other policy avenues. The use of life-cycle costing aligns well with the logics of Green Economic Liberalism, which builds on internalising the external costs of economic activities. To the extent that externalities are not internalised already, GPP can play an important role in adjusting the price of bids by their environmental cost. Likewise, GPP can play a role in the Directed Transition policy avenue, which focuses on the direct phase-out of fossil fuels and technologies. While this policy avenue would also involve direct regulation of the sectors and industries in question, it may feature more stringent standards in the public sector first. Finally, the Sufficiency and Degrowth policy avenue is based on a general shift towards more sustainable consumption patterns, which is why it would also mandate public consumption to shift to more sustainable patterns. However,

as the policy avenue expresses a more sceptical stance towards (technological) innovation, it also is more reserved vis-à-vis the notion of using public demand for greening industries in the first place.

4.3 Assessing the impact of PPCN in the construction sector

To demonstrate the potential of adopting PPCN in a sector where the instrument can be used strategically, we analyse a stylised form of PPCN with emissions intensity limits for key building materials in the construction sector. As shown in chapter 2, construction has strategic potential for PPCN due to its high share in public procurement and its ability to also drive indirect emissions reductions through the production effect. Due to data availability and methodological limitations, we are restricted to analysing only one stylised type of PPCN and thus do not provide an impact assessment of more complex policy options such as the use of LCC in the award criteria or bid discounts.

We assess the impacts of imposing limits on embodied emissions for both cement and steel products – the two building materials responsible for the highest share of the construction sector’s emissions (World Economic Forum, 2022, p.8).³⁵ To assess the emissions reduction potential of imposing intensity limits, we provide a range of scenarios with varying degrees of ambition. We selected our scenarios by thinking back from the end, asking what emissions reductions would be required to achieve climate neutrality by 2050. According to the IEA’s Net Zero Emissions by 2050 scenario, both cement and steel need to achieve annual emissions intensity reductions of 3% until 2030, taking 2020 as its departure point (IEA, 2022a; IEA, 2022b; IEA, 2022c).

The transformative scenario we provide aligns with the IEA’s Net Zero Emissions scenario, specifying that emissions for cement and steel in public procurement must be reduced 30% by 2030, and entirely (100%) by 2050. This scenario also aligns with the EU’s climate neutrality goal, which requires that net emissions are reduced zero by 2050. The incremental scenario represents incomplete implementation of PPCN and would require few changes to current regulations. However, this scenario is unlikely to drive the innovation and investment in construction sector technologies required for the transformation.

We estimate that adopting PPCN in the construction sector can lead to a reduction of at least 21% and 18% in the EU’s cement and steel sector emissions, respectively, compared to a business-as-usual scenario with no PPCN implementation. This would be realised if the stringency of emissions intensity limits were ratcheted up over time from now until 2050 under the transformative scenario. These calculations only account for the direct emissions attributed to

³⁵ It is important to note that the analysis presented here is a stylised illustration. Steel and cement are basic materials that are processed into various products used in construction, including structural steel, concrete reinforcing steel, pre-cast concrete, ready-mixed concrete, asphalt-concrete, and many others. In reality, limits must be established for each of these various products and sub-types. In this analysis, we provide a top-down assessment based on a simplified, illustrative scenario.

public consumption of cement and steel in the EU. The full emission reduction potential is likely even greater due to indirect effects when the demand generated by public procurement spills over to the rest of the basic materials market. Due to the uncertainties involved with estimating the production effect, we do not provide numbers for this.

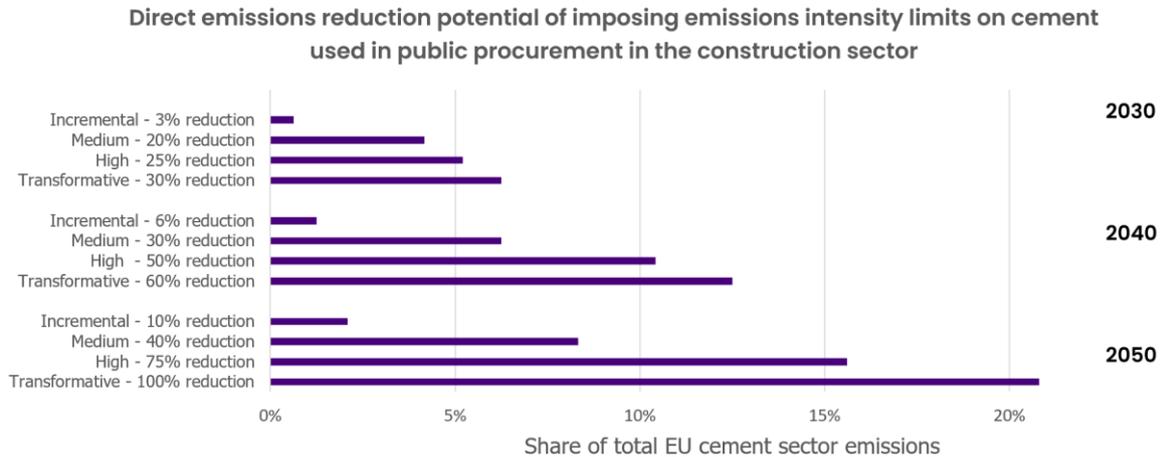


Figure 5: Direct emissions reduction potential of imposing emissions intensity limits on cement used in public procurement in the construction sector, as a share of the total emissions of the EU cement sector (%).

Note: Own calculation using data from Material Economics (2019)

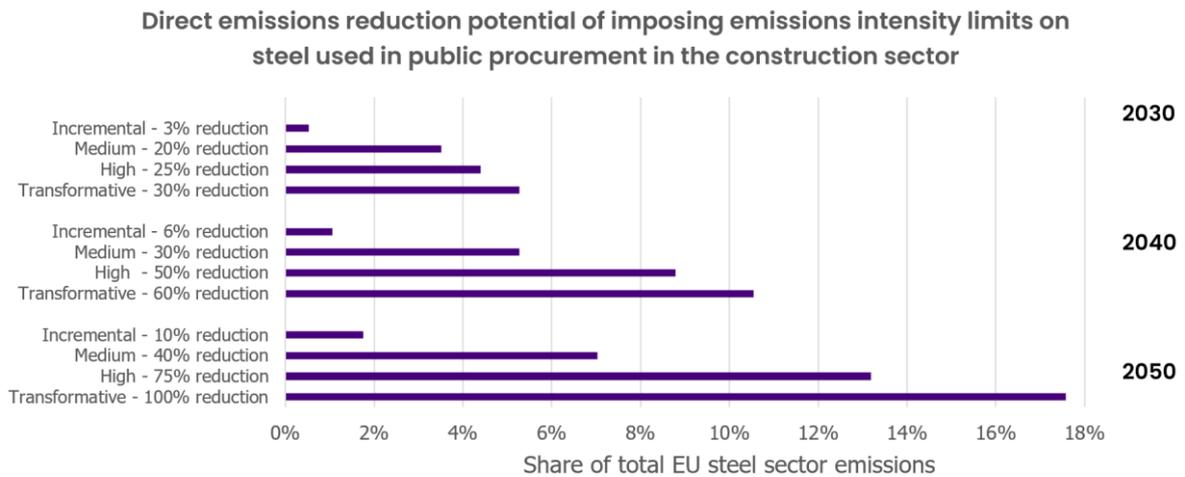


Figure 6: Direct emissions reduction potential of imposing emissions intensity limits on steel used in public procurement in the construction sector, as a share of the total emissions of the EU steel sector (%).

Note: Own calculation using data from Material Economics (2019)

For the emissions analysis, we established our baseline using estimates of cement and steel production and emissions intensities at different time periods. These estimates are taken from an

analysis by Material Economics (2019). We performed linear extrapolation between estimates where yearly estimates were not available.³⁶ The estimates used are for the EU28 (hence do not exclude the UK). Furthermore, the results are based on estimates of production activity and are assumed to be equivalent to measures of consumption activity. Due to data limitations, we do not adjust for these differences in our analysis, hence only a rough estimate is provided to illustrate the scale of the impacts from PPCN implementation. Our results could represent a slight overestimation due to the inclusion of UK, or a slight underestimation due to accounting only at the production level (with lower emissions intensities and consumption volumes). For more information on our methodology, see Annex 2 .

In 2050, all government demand for cement and steel in the EU will need to be met by low-carbon products. In our analysis, we assume that the government represents approximately 40% of the cement industry's demand (Mission Possible Partnership, 2022)³⁷. Expected demand for clean cement induced by PPCN in the transformative scenario reaches up to 17 Mt per year by 2030, or 1.3 billion EUR if based on the price of conventional cement in 2021. By 2040 this would reach up to 34 Mt (2.6 billion EUR), and by 2050 up to 59 Mt (4.6 billion EUR). This signal represents around 10% of expected EU cement production volumes by 2030, 19% by 2040, and 32% by 2050.

For steel, we assume that the government accounts for approximately 25% of the industry's demand. In the transformative scenario expected demand creation for clean steel reaches up to 5.0 Mt by 2030, or 4.6 billion EUR if based on the price of conventional steel in 2021.³⁸ By 2040 this reaches 11 Mt (10 billion EUR) and by 2050 18 Mt (16 billion EUR). This signal represents around 3% of expected EU steel production volumes by 2030, 6% by 2040 and 9% by 2050. By 2021, EU steel companies had already announced plans to build 28 Mt of green steel (hydrogen-based DRI) capacity by 2030 (Agora Industry, 2022, p.29). Therefore, if all public procurement goes climate-neutral then there should be sufficient supply in the market to meet this demand. Public procurement related low-emission steel demand induced by PPCN in 2030 would account for approximately 18% of the announced 28 Mt annual low-emission steel capacity in 2030. The demand signal offered through PPCN enhances the chances that the 28 Mt in the pipeline is built, and it encourages new capacity additions. PPCN adoption would accelerate the transformation of the basic materials industry – a necessary condition given that the 28 Mt of green steel already announced amounts to only 15% of expected production in 2030.

³⁶ This approach is likely to have a low margin of error because the projections for steel and cement production and emissions intensities do not change by a high order of magnitude between now and 2050. According to projections provided by Material Economics (2019), steel production is projected to increase by approximately 10% and cement by 14% by 2050. Similarly for emissions intensities, which are projected to decrease by 11% for steel and by 9% for cement by 2050 (Material Economics, 2019).

³⁷ In a study conducted by BCG and the World Economic Forum, it was estimated that the public sector accounts for 40-60% of global concrete demand. Considering that cement is primarily used for producing concrete, we chose to adopt a conservative estimate of 40% for the public share of the cement sector demand.

³⁸ For both steel and cement we assume that the current market price for conventional steel/cement will be the price paid for green steel/cement across time. There is high uncertainty as to whether and how long it will take for these prices to converge in the future.

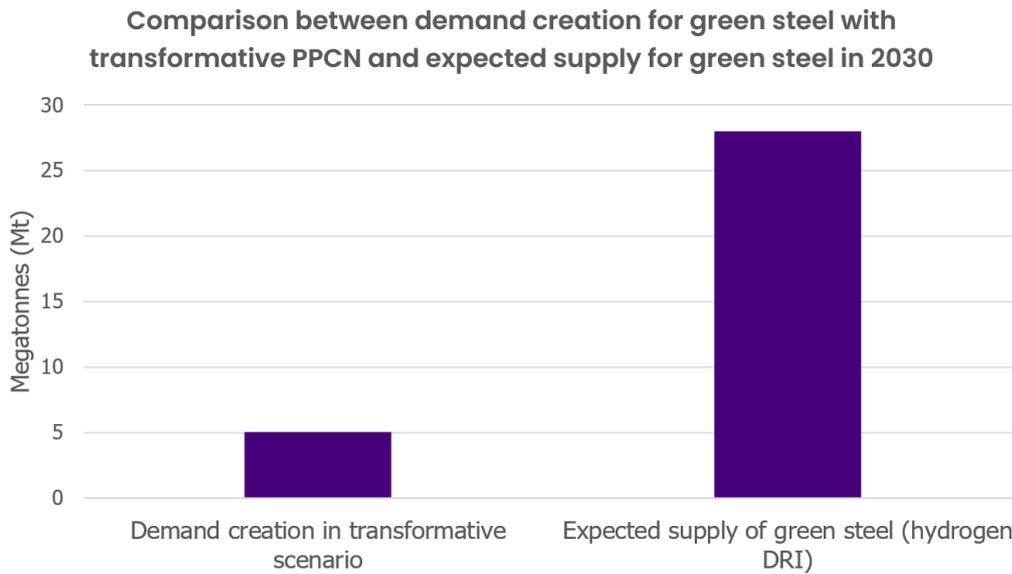


Figure 7: Comparison between demand creation for green steel under the transformative PPCN scenario in 2030 and the expected supply for green steel based on announcements already made, expressed in Mt of steel consumed or produced annually by 2030.

Note: Own calculation. Data from Material Economics (2019), Agora Energiewende & Wuppertal Institute (2021)

The additional cost increases from procuring green technologies, over conventional technologies, i.e., the level of subsidy that is given to producers in key sectors with transformative potential, can be referred to as the *green premium* (World Economic Forum, 2022). For PPCN implementation, we can assess the green premium for key building materials using marginal abatement cost projections for likely replacement technologies.

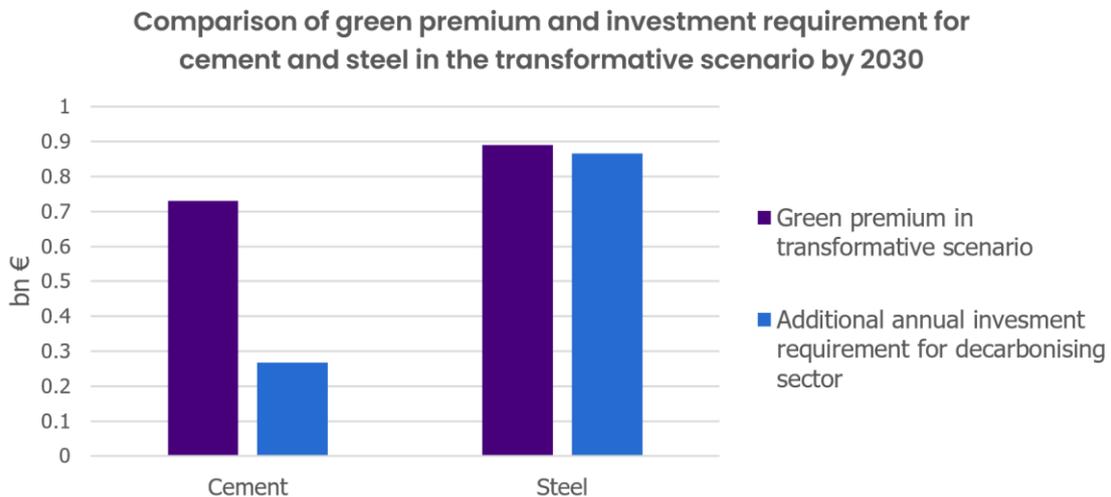


Figure 8: Comparison of green premium and investment requirement for decarbonising cement and steel under the transformative scenario in 2030.

Note: Own calculation. Data from Material Economics (2019), Agora Energiewende & Wuppertal Institute (2021)

For instance, if the government procures 17 Mt of green cement annually in 2030 (representing 30% of total cement public procurement in construction), and the marginal abatement costs for mitigating GHG emissions in cement production are estimated at around 70 EUR/tCO₂ (Agora Energiewende and Wuppertal Institute, 2021, p.26), the estimated green premium for procuring cement in the transformative scenario is roughly 0.7 billion EUR per year. For steel, with abatement costs estimated at 100 EUR/tCO₂ in 2030 and expected public demand in the construction sector of 5.0 Mt, the additional costs to public procurers will be roughly 0.9 billion EUR per year. While these amounts are not insignificant by themselves, they represent a minimal share of total EU public procurement spending.³⁹

To put these numbers into greater context, the EU Innovation Fund is expected to provide around EUR 3.8 billion support annually until 2030 (assuming an average carbon price of 75 EUR/tCO₂) (European Commission, 2023c). Hence, if less than half (42%) of these funds were used for procuring green cement and steel, EU governments could reduce these emissions by over 5% in each sector by 2030, driving down technology costs and aligning with a transformative pathway consistent with climate neutrality.

To ensure full decarbonisation of the steel sector by mid-century, investment levels need to increase by between 25-65% relative to the baseline scenario (with continued use and replacement of conventional technologies). This increase amounts to 0.6 – 1.2 billion annually by 2030⁴⁰. Hence, if the transformative pathway is taken – reducing steel emissions from public procurement by 30% within the next 7 years (2030) – then around three quarters (74%) if not all of the required investments for decarbonising the steel sector would be met through the green premium paid from adopting PPCN.

While the cost increases associated with procuring clean steel and cement pose significant barriers to full implementation of PPCN, the benefits of reducing these emissions would far outstrip the costs, even if only accounting for the climate benefits accruing from direct mitigation due to PPCN. For instance, with a social cost of carbon (SCC) of 215 EUR/tCO_{2e} and a pure time preference discount rate of 1% in 2030 (German Environment Agency, 2020), the climate benefits to society of reducing emissions through PPCN in the construction sector would be 2.2 billion EUR for cement and 1.9 billion EUR for steel. If the discount rate used was instead 0% (treating future generations with the same weights as the present), with a corresponding SCC of 700 EUR/tCO_{2e}, the climate benefits would increase to 7.3 billion EUR for cement and 6.2 billion EUR for steel.

³⁹ It should be noted that there is high uncertainty associated with using estimates of MACs for both steel and cement. The cost optimal technology choice, as determined by current forecasts and their associated MACs, is subject to change depending on factors such as electricity prices, carbon prices, and future macroeconomic conditions. Furthermore, it is important to highlight that the MAC for cement is lower than the prices observed in the EU ETS since March 2022. This implies that it should already be more cost-effective for market participants to adopt these technologies over conventional alternatives. However, it is likely that cement abatement costs have significantly increased since the beginning of Europe's energy crisis, which has led to volatility in energy markets since the MAC assessment was conducted.

⁴⁰ The wide range of potential values depends on many factors including electricity prices, circularity levels, deployment of CCS, and advancements in new process innovations.

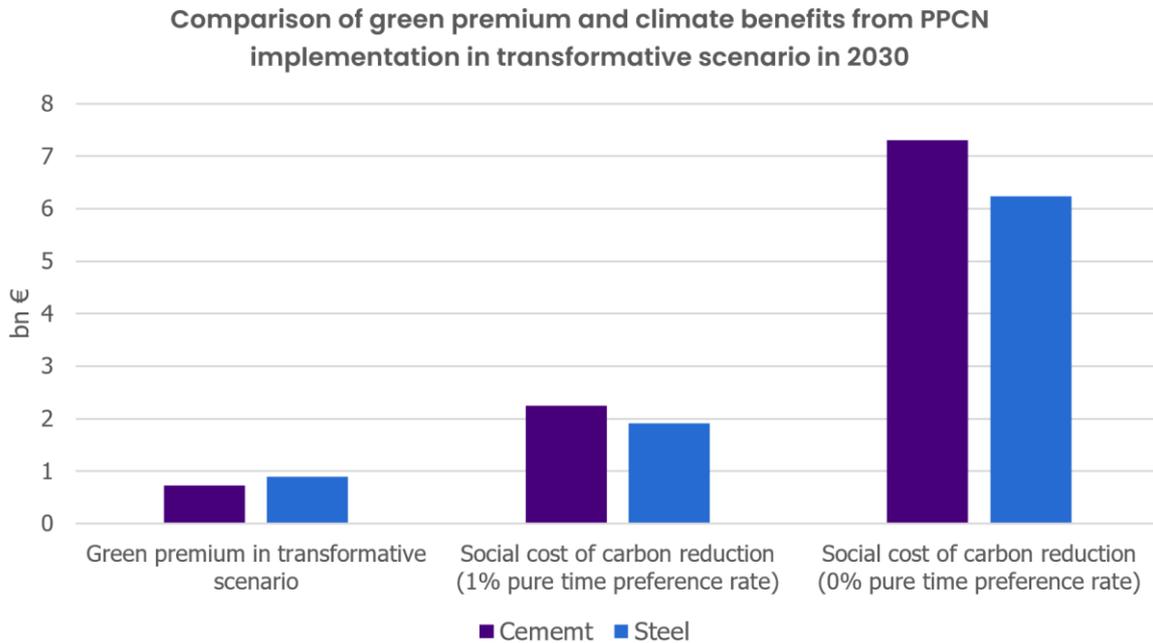


Figure 9: Comparison of green premium (extra cost of procuring green cement/steel over the conventional alternative) and climate benefits (reduction in social costs) from PPCN implementation under the transformative scenario in 2030.

Note: Own calculation using data from Material Economics (2019), Agora Energiewende & Wuppertal Institute (2021), German Environment Agency (2020)

The results of this analysis confirm that public procurers in the EU have a substantial influence in driving the transformation of the basic materials industry through PPCN. Policy implementation has the potential to yield significant emission reduction opportunities, of at least 21% and 18% of the EU’s cement and steel sector emissions, respectively. Furthermore, the analysis demonstrates that the additional demand for green steel generated by PPCN is likely to be met adequately by the supply. It is clear that the benefits of adopting PPCN outweigh the direct (and short-run) costs, even if only considering the climate benefits⁴¹. Additionally, the economic advantages, such as generating lead markets and job creation, should not be overlooked.

⁴¹ It should be noted that we did not consider the likely increase in administrative costs that would result from PPCN adoption.

5. Policy recommendations for PPCN in the EU

Public procurement can be an important tool to promote the attainment of the EU climate targets. This concerns the potential to reduce emissions directly – from buildings and vehicles operated by the public sector for example. But even more important are the indirect effects, whereby public procurement can create a stable, predictable demand for climate-neutral products. In this way, public procurement can be crucial for the emergence of lead markets for climate-neutral products and complement supply-oriented policies that promote innovation and investment into climate-neutral production technologies. Yet the potential of public procurement for addressing climate change remains mostly untapped, especially as a strategic tool to create demand for key technologies.

There are several arguments why the EU should oblige public authorities at all levels to consider climate effects in procurement decisions. First, EU level guidance and rules are needed to avoid fragmentation in the Single Market, as differences in procurement regulation may lead to a patchwork of different rules liable to unlevel the playing field. Second, EU-level rules enable the EU to move consistently towards EU-level goals, in this case those on climate change. Third, the mere fact that climate factors can be considered in procurement does not mean that action would be taken in practice. This is exemplified by the fact that the uptake of voluntary GPP has been more modest than expected. And finally, the currently applicable Public Procurement Directives do not reflect the (substantial) developments in climate change law since 2014, most importantly the adoption of the European Climate Law and the Paris Agreement.

To address these issues, we present the following policy recommendations based on the analysis carried out in this report.

A. Introducing the concept of PPCN in EU public procurement policy

The EU should adopt the concept of PPCN as a subset of GPP and incentivise procuring authorities to use public procurement more strategically as a tool to drive transformative change and reduce emissions in the process. Hence, we recommend publishing updated guidance on the strategic use of GPP and introducing PPCN as its subset.

- The **Commission Communication on GPP should be updated and PPCN should be introduced** in this connection. The latest Communication dates from the year 2008. In addition to reducing the climate-effects of procurement directly, the Commission should explain how PPCN can be used strategically to create demand for climate-neutral products, including the identification of priority sectors, goods, and services.
- The implementation of PPCN should be supported by **more practical guidance**, for instance in the Buying Green Handbook, providing concrete examples of the implementation of PPCN.

Already now, procuring authorities can choose to adopt PPCN by, for instance, laying down requirements on the emissions intensity limits of construction materials in the technical specifications or award criteria.

- The new guidance should be brought forward to the industry and procuring authorities in a proactive manner accompanied with a plan on how to provide support for implementation at the Member State level.

B. Revising the Public Procurement Directives to increase the uptake of GPP and PPCN

To create a systemic change in the current procurement practises for climate neutrality, the regulatory framework should be changed. The changes suggested here would push for a wider uptake of GPP and PPCN in general but also support the introduction of more specific sectoral rules. The Public Procurement Directives could be revised to include:

- **A general obligation to take environmental considerations (including climate effects) into account** in all public procurement or at least in procurement with significant environmental impact, coupled with a corresponding obligation to provide reasons if not doing so. This would require the contracting authorities to consider whether there are any low-carbon options available regarding the procurement in question and provide reasons if those options were not used.
- **A restriction of price-only assessment** to limited, pre-defined conditions. This would mean that the definition of the most economically advantageous tender (MEAT) based on price only would be limited to situations where environmental (including climate) requirements are set by other means than the award criteria, or where it can be shown that environmental considerations do not play a role in the procurement in question. In light of the EU's climate commitments and the need for a transformative change, adhering to the lowest price criterion without consideration of climate effects means foregoing the transformative potential of PPCN and undermining the EU's climate agenda.
- **Indicative adoption targets** with accompanying monitoring and reporting. Indicative adoption targets would require a specified percentage of all procurement above the EU thresholds to be GPP (including PPCN) by 2030 and 2040, aiming at fully climate-neutral procurement by year 2050. Once reporting on the use of GPP and PPCN has been improved and more ambitious rules have been introduced, the target could become binding.
- An **obligation to draft National GPP Action Plans**, including reporting on PPCN, could be introduced to ensure monitoring of the targets. The plans should include a strategy on how the adoption of GPP and PPCN as its subset will be increased and report on progress towards the PPCN target. The reporting requirements should start from a rather general level and be potentially extended if more mandatory rules on GPP and PPCN are introduced.

C. Introducing mandatory PPCN rules in sectoral legislation in areas which hold the greatest strategic potential

PPCN holds strategic potential by creating a stable, predictable demand for products produced in a climate-neutral way. This demand is essential to complement supply-oriented interventions that aim at fostering technological innovation and investment. To use this strategic potential of PPCN, sectoral PPCN rules should be introduced in a targeted manner. For this, the following options may be considered:

The introduction of (mandatory) PPCN criteria

- The criteria would model the current GPP criteria targeted at specific products but with focus on climate effects, aiming at creating demand for low-emission products. The criteria should be dynamic and regularly adjusted in line with market, technology, and legislative developments. Regular updates of the PPCN-criteria by the European Commission would ensure that use of the criteria does not result in sub-optimal outcomes or lock procurement into outdated preferences. The criteria would have to provide a common methodology which would be administratively feasible for the contracting authorities and economic operators. A common methodology is also needed to ensure that the PPCN criteria are in line with the general principles of public procurement and do not hinder competition.
- Some of the criteria could be voluntary like the current GPP criteria, but at least the core GPP criteria or the more specifically targeted PPCN criteria should be made mandatory for certain sectors or product groups. One suitable sector for mandatory PPCN criteria would be the construction sector, as argued above.
- It must be ensured that the reporting and verification systems needed to apply and monitor the criteria are in place first, and the criteria should also be accompanied with clear guidance.

The introduction of PPCN targets

- Industry, project, or product-level PPCN targets could be introduced to further incentivise the use of PPCN. An example of a PPCN product target would be requiring that a certain percentage of steel used in public construction or other public procurement is climate neutral, as a way of creating guaranteed demand (e.g., 50% by 2030). An example for a sector target would be that a share of tenders must include PPCN criteria in construction projects, for example.
- The targets should be announced early and phased-in with sufficient time to allow market adjustments. At the same time, public procurement as a strategic tool should lead the market, i.e., targets and shares should be significantly higher than the industry average.

Sector- or product-specific PPCN requirements in sectoral legislation

- The sector- or product-specific PPCN requirements would be narrower in scope than the PPCN criteria. An example of a product specific PPCN requirement would be setting emissions limits on procured building materials in the Construction Products Regulation.

Mandatory PPCN rules should be used only in sectors and for product categories where:

1. They result in a clear **strategic climate benefit**, i.e. where there is a competing low-emission or climate-neutral technology alternative that is within reach of replacing the incumbent, fossil option.
2. The **public sector accounts for a substantial share of overall demand** of the product, i.e., the public sector has some degree of market power.
3. The public sector procures **large volumes** and where the products in question have a relatively **high level of embodied emissions** (if produced with conventional technologies).
4. Mandatory PPCN rules are **relatively easy to implement** for the sector and no other demand-pull instruments with the same effect are easier to implement.

To enhance the effectiveness of PPCN, **sequencing is important**. Generally, reporting and verification systems should be established and phased-in first, before mandatory PPCN criteria are implemented. The criteria should be phased-in with **sufficient lead-time to allow market adjustments**. While they should be set as early as possible, they may only become binding at a later stage to allow supply to adjust.

D. Developing the tools, support, and capacity to implement GPP and PPCN

The policy changes in the legislative framework are important for improving the adoption of GPP generally and for PPCN more specifically. But they are insufficient on their own. Several enabling conditions must be met for GPP and PPCN to become widely used. Procuring authorities need reliable information to base their award decisions on. Heterogenous standards increase compliance cost for suppliers and decrease the overall efficiency of GPP. Therefore, methodologies for establishing, reporting, and verifying the environmental impacts of products must be harmonised at the EU level and its uptake improved. Moreover, procuring authorities must be adequately staffed and trained to implement PPCN and GPP. Consequently, the following enabling conditions must be addressed:

- The Commission should set **harmonised standards for calculating the environmental footprint** of products and projects. To this end, the use of the standardised LCA methodology, the Product Environment Footprint method, should

become mandatory. In addition, the Commission should expand the Product Environmental Footprint Category Rules (PEFCR) to more areas such as transportation and make their application mandatory across the EU (see also Lewis et al., 2023).

- The Commission should **develop and mandate the uptake of Environmental Product Declarations** for key product groups, for instance, in the Construction Product Regulation.
- The Commission should **provide accessible guidelines** for the application of GPP / PPCN to procuring authorities, including on the GPP / PPCN criteria, as well as the verification and compliance procedures.
- Member States must **increase the capacity of procuring authorities** to implement GPP / PPCN. This requires adequate staffing. But even as important is the training of staff in GPP / PPCN rules. How GPP / PPCN criteria can be best included in tenders, what tools can be used to establish environmental impacts, and how GPP is executed should become standard in the training of procurement officers. Moreover, GPP competence centres and helpdesks can provide important support and regular training and Member States must make sure they are used by procurers.

6. Conclusion

In this report, we have shown that public procurement has significant potential for reducing emissions both directly in the public sector and indirectly across markets via the production effect. We have argued that public procurement should be used much more strategically to create demand for low-emission products, especially in the construction sector, where we have shown its potential with an impact assessment of a stylised policy option. Furthermore, while the EU's climate legislation and policy has increased both in ambition and scope, the EU public procurement rules have remained largely unchanged, and are therefore in need of alignment.

These points are well-known to the European Commission, as public procurement has frequently been mentioned in key Communications. However, so far, only modest progress has been made in addressing them at the EU level. Recent legislative initiatives such as Fit for 55 or the Net Zero Industry Act missed the opportunity to launch concrete initiatives on public procurement. In this report, we have argued that the EU should realise the strategic potential of public procurement for climate action through targeted changes in the legislative framework and by adopting "Public Procurement for Climate Neutrality (PPCN)", to use public procurement in a deliberate way to accelerate the transformation of key industries.

There are still some notable research and evidence gaps when it comes to Green Public Procurement. First, the data availability – regarding tender award criteria, technical requirements, environmental footprint, etc. – must be substantially improved to allow for more granular and rigorous empirical research on the impacts and effectiveness of public procurement.

Second, there are several pressing research questions that we were unable to address in this report. They include the question of transaction costs and implementing more ambitious climate requirements in public procurement than in the rest of the market. This also relates to the question how GPP / PPCN interacts with other climate policies: Is public procurement an effective policy instrument relative to other climate policy instruments? Moreover, a major challenge for realising the potential of public procurement is decentralisation, which undermines the market power of public demand – how can this challenge be mitigated? With regards to determining the most sensible PPCN criteria, there is a need to understand how they can best support the circular economy. This is especially relevant in the construction sector, where PPCN criteria can support or hinder the push towards more circularity.

Finally, there are some legal questions that must be explored in more detail. If more ambitious and mandatory rules are introduced to better align procurement with climate neutrality, the question of compliance and the potential need for sanction mechanisms will likely materialise as a future research need. Another open question is whether EU Treaties and the general principle of subsidiarity could allow the mainstreaming of climate considerations in all procurement in the EU, covering also procurement below the thresholds laid down in the Procurement Directives.

7. References

- Agora Industry. (2022). Mobilising the circular economy for energy-intensive materials. How Europe can accelerate its transition to fossil-free, energy-efficient and independent industrial production.
- Agora Energiewende and Wuppertal Institute. (2021). Breakthrough Strategies for Climate-Neutral Industry in Europe: Policy and Technology Pathways for Raising EU Climate Ambition.
- Allenbach-Ammann, J. (2023, March 7). The “Buy European” clauses in the Net-Zero Industry Act. Euractiv. <https://www.euractiv.com/section/economy-jobs/news/the-buy-european-clauses-in-the-net-zero-industry-act/>
- Alhola, K. (2023, April 6). National expert interview.
- Andhov, M., Caranta, R., Stoffel, T., Grandia, J., Janssen, W. A., Vornicu, R., Wiesbrock, A. (2020). Sustainability through public procurement: the way forward – Reform Proposals, University of Copenhagen.
- Architects Climate Action Network (ACAN). (2021). The Carbon Footprint of Construction. https://www.architectscan.org/_files/ugd/b22203_c17af553402146638e9bc877101630f3.pdf?index=true
- Aschhoff, B., & Sofka, W. (2009). Innovation on demand — Can public procurement drive market success of innovations? *Research Policy*, 38(8), 1235–1247. <https://doi.org/10.1016/j.respol.2009.06.011>
- Axelsson, K., Piirsalu, E., Nilsson Lewis, A., Kaaret, K., Torrer Morales, E. (2023). Green Public Procurement: A lever for mitigating European greenhouse gas emissions, SEI policy brief.
- Bogojevic, S., Groussot, X., & Hettne, J. (2019). *Mapping Public Procurement and Environmental Law Intersections in Discretionary Space*. Oxford. Hart Publishing Ltd.
- Buildings Performance Institute Europe (BPIE). (2021). Addressing the Hidden Emissions in Buildings: Status quo, gaps and recommendations for Environmental Product Declarations and Whole-Life Carbon. Fact Sheet.
- Chang, H.-J., & Andreoni, A. (2020). Industrial Policy in the 21st Century. *Development and Change*, 51(2), 324–351. <https://doi.org/10.1111/dech.12570>
- Chiappinelli, O. (2020). Determinants and Effectiveness of Green Public Procurement Adoption. In K. F. Zimmermann (Ed.), *Handbook of Labor, Human Resources and Population Economics* (pp. 1–15). Springer International Publishing. https://doi.org/10.1007/978-3-319-57365-6_300-1
- Chiappinelli, O., Gruner, F., & Weber, G. (2019). Green Public Procurement: Climate Provisions in Public Tenders Can Help Reduce German Carbon Emissions. *DIW Weekly Report*. https://doi.org/10.18723/DIW_DWR:2019-51-1
- Chiappinelli, O., & Seres, G. (2021). Optimal Discounts in Green Public Procurement (Discussion Paper No. 1983; DIW Discussion Papers). DIW. https://www.diw.de/de/diw_01.c.830049.de/publikationen/diskussionspapiere/2021_1983/optimal_discounts_in_green_public_procurement.html
- Court of Justice of the European Union. (2002). C-513/99: Concordia Bus Finland, ECLI:EU:C:2002:495.
- de Bruyn, S., Jongsma, C., Kampman, B., Görlach, B., & Thie, J. (2020): Energy-intensive industries – Challenges and opportunities in energy transition, study for the committee on Industry, Research and Energy (ITRE), Policy Department for Economic, Scientific and Quality of Life Policies, European Parliament, Luxembourg. https://www.ecologic.eu/sites/default/files/publication/%5Bcurrent-date%3Ajust_year%5D/70001-Energy-intensive-industries.pdf

- Delre, A., La Placa, M. G., Alfieri, F., Faraca, G., Kowalska, M. A., Vidal Abarca Garrido, C., & Wolf, O. (2022). Assessment of the European Union Green Public Procurement criteria for four product groups. JRC science for policy report.
- Eurofer. (2022). European Steel in Figures 2022. Brussels. <https://www.eurofer.eu/publications/brochures-booklets-and-factsheets/european-steel-in-figures-2022/>
- European Commission. (2023a). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions: A Green Deal Industrial Plan for the Net-Zero Age. COM(2023) 62 final. https://commission.europa.eu/document/41514677-9598-4d89-a572-abe21cb037f4_en
- European Commission. (2023b). Proposal for a regulation of the European Parliament and of the Council on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem. Net Zero Industry Act. COM(2023) 161, SWD(2023) 68. https://single-market-economy.ec.europa.eu/publications/net-zero-industry-act_en
- European Commission. (2023c). What is the Innovation Fund? European Commission - Climate Action. https://climate.ec.europa.eu/eu-action/funding-climate-action/innovation-fund/what-innovation-fund_en.
- European Commission. (2022a). Proposal for a regulation of the European Parliament and of the Council laying down harmonized conditions for the marketing of construction products, amending Regulation (EU) 2019/1020 and repealing Regulation (EU) 305/2011. COM(2022) 144 final. {SEC(2022) 167 final} - {SWD(2022) 87 final} - {SWD(2022) 88 final} - {SWD(2022) 89 final}. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022PC0144>
- European Commission. (2022b). Single Market Scoreboard: Access to public procurement. Single Market Scoreboard. https://single-market-scoreboard.ec.europa.eu/business-framework-conditions/public-procurement_en
- European Commission. (2021). Proposal for a directive of the European Parliament and of the Council on the energy performance of buildings. COM (2021) 802 final. {SEC(2021) 430 final} - {SWD(2021) 453 final} - {SWD(2021) 454 final}. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021PC0802>
- European Commission. (2020). Communication from the Commission to the European Parliament, the Council, The European Economic and Social Committee and the Committee of the Regions. Sustainable Europe Investment Plan/European Green Deal Investment Plan. COM(2020) 21 final. <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0021>
- European Commission. (2019). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, and the Committee of the Regions: The European Green Deal. COM/2019/640 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588580774040&uri=CELEX%3A52019DC0640>
- European Commission. (2017). Communication from the Commission to the European Parliament, the Council, The European Economic and Social Committee and the Committee of the Regions. Making Public Procurement work in and for Europe. COM(2017) 572 final. <https://eur-lex.europa.eu/legal-content/en/ALL/?uri=CELEX:52017DC0572>
- European Commission. (2011a). Proposal for a directive of the European Parliament and of the Council on public procurement. COM(2011) 896 final: {SEC(2011) 1585 final} {SEC(2011) 1586 final}. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2011:0896:FIN>
- European Commission. (2011b). Commission Staff working paper impact assessment. Accompanying the document Proposal for a Directive of the European Parliament and of the Council on Public Procurement and the Proposal for a Directive of the European Parliament and of the Council on procurement by entities operating in the water, energy, transport and postal sectors. {COM(2011) 896

- final} {SEC(2011) 1586 final}. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011SC1585&>
- European Commission. (2008). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions. Public procurement for a better environment. COM(2008) 400 final: {SEC(2008) 2124} {SEC(2008) 2125} {SEC(2008) 2126}. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52008DC0400>
- European Parliament. (2011). European Parliament resolution of 25 October 2011 on modernisation of public procurement. 2011/2048(INI). <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52011IP0454>
- Eurostat. (2023a). Eurostat database. Emissions of greenhouse gases and air pollutants from final use of CPA08 products - input-output analysis, ESA 2010. Accessed January 18, 2023. https://ec.europa.eu/eurostat/databrowser/view/ENV_AC_IO10_custom_5010739/default/table?lang=en
- Eurostat. (2023b). Eurostat database. Investment share of GDP by institutional sectors. Accessed May 25, 2023. https://ec.europa.eu/eurostat/databrowser/view/sdg_08_11/default/table
- Gerarden, T. D. (2023). Demanding Innovation: The Impact of Consumer Subsidies on Solar Panel Production Costs. *Management Science* 0(0). <https://doi.org/10.1287/mnsc.2022.4662>
- German Environment Agency. (2020). Methodological convention 3.1 for determining environmental costs. Umweltbundesamt. Germany <https://www.umweltbundesamt.de/publikationen/methodenkonvention-umweltkosten>.
- Görlach, B., Hilke, A., Kampmann, B., Kulovesi, K., Moore, B., & Wyns, T. (2022a). Transformative climate policies: a conceptual framing of the 4i's. 4i-TRACTION Deliverable D 1.1. Ecologic Institute; Berlin. <https://www.4i-traction.eu/outputs/transformative-climate-policies-conceptual-framing-4is>
- Görlach, B., Martini, L., Faber, R., Best, A., Fontanet Pérez, P. (2022b): Report on core instruments and avenues for transformative climate policies. 4i-TRACTION Deliverable 4.1. Ecologic Institute; Berlin. <https://www.4i-traction.eu/outputs/policy-avenues-towards-climate-neutral-europe>
- Gröger, J., Stratmann, B., & Brommer, E. (2015). Umwelt- und Kostenentlastung durch eine umweltverträgliche Beschaffung; Kurzfassung; im Auftrag der Senatsverwaltung für Stadtentwicklung und Umwelt Berlin. Öko-Institut e.V. Freiburg/Berlin.
- Halonen, K. M. (2021). Is public procurement fit for reaching sustainability goals? A law and economics approach to green public procurement. *Maastricht Journal of European and Comparative Law*, 28(4), 535–555.
- Hasanbeigi, A. & Shi, D. (2021). Target Setting for Green Public Procurement Programmes, A White Paper. October 2021.
- Hasanbeigi, A., Nilsson, A., Mete, G., Fontenit, G., & Shi, D. (2021). Fostering industry transition through green public procurement: A "How to" guide for the cement & steel sectors. June 2021.
- IEA. (2022a). Net Zero Emissions by 2050 Scenario (NZE). International Energy Agency. Paris. <https://www.iea.org/reports/global-energy-and-climate-model/net-zero-emissions-by-2050-scenario-nze>
- IEA. (2022b). Cement. International Energy Agency. Paris. <https://www.iea.org/reports/cement>
- IEA. (2022c). Iron and Steel. International Energy Agency. Paris. <https://www.iea.org/reports/iron-and-steel>
- Kalimo, H., Alhola, K., Virolainen, V.M., Miettinen, M., Pesu, J., Lehtinen, S., Nissinen, A., Heinonen, T., Suikkanen, J., Soukka, R., Kivistö, T., Kasurinen, H., Jansson, M., Mateo, E., & Ünekbas, S. (2021).

- Hiili- ja ympäristöjalanjälki hankinnoissa : lainsäädäntö ja mittaaminen (HILMI), Valtioneuvoston kanslia.
- Krieger, B., & Zipperer, V. (2022). Does green public procurement trigger environmental innovations? *Research Policy*, 51(6), 104516. <https://doi.org/10.1016/j.respol.2022.104516>
- Mélon, L. (2020). More Than a Nudge? Arguments and Tools for Mandating Green Public Procurement in the EU. *Sustainability* 12, 1–24.
- Michaux, L., & Gruyters, J. (2020). Life Cycle Costing: The Final Step Towards a True Rule of Reason in Public Procurement Law? *European procurement & public private partnership law review*, 15 (1), 61-69.
- Mission Possible Partnership. (2022). *Low Carbon Concrete and Construction; A Review of Green Public Procurement Programmes*, June 2022.
- NewClimate. (2020). *Decarbonisation pathways for the EU cement sector: Technology routes and potential ways forward*.
- Nilsson Lewis, A., Kaaret, K., Torres Morales, E., Piirsalu, E., Axelsson, K. (2023). *Green Public Procurement: a key to decarbonizing construction and road transport in the EU*. Stockholm Environment Institute. <https://doi.org/10.51414/sei2023.007>
- Nilsson Lewis, A., Kaaret, K. & Piirsalu, E. (2022). *Decarbonizing the EU's Road and Construction Sectors Through Green Public Procurement: The Case of France and Germany*. SEI brief. Stockholm Environment Institute, Stockholm. <http://doi.org/10.51414/sei2022.044>
- Nilsson Lewis, A. & Machlowska, M. (2022). *Decarbonizing the EU's road and construction sectors through green public procurement: the case of Sweden and the Netherlands*. Policy brief. Stockholm Environment Institute, Stockholm. <http://doi.org/10.51414/sei2022.026>
- OECD. (2021). *Government at a Glance 2021*. Organisation for Economic Co-operation and Development. https://www.oecd-ilibrary.org/governance/government-at-a-glance-2021_1c258f55-en
- OECD. (2019). *Public Procurement in Germany: Strategic Dimensions for Well-being and Growth*, OECD Public Governance Reviews. OECD Publishing, Paris. <https://doi.org/10.1787/1db30826-en>
- OneClick LCA. (2022). *Construction carbon regulations in Europe: review and best practices*, October 2022.
- Palmujoki, A., & Vartiainen, N. (2020). *Ympäristönäkökohtien huomioiminen julkisissa hankinnoissa*, Edilex.
- Pouikli, K. (2020). *Towards mandatory Green Public Procurement (GPP) requirements under the EU Green Deal: reconsidering the role of public procurement as an environmental policy tool*. Era Forum.
- Popp, D. (2019). *Environmental Policy and Innovation: A Decade of Research* (Working Paper No. 25631). National Bureau of Economic Research. <https://doi.org/10.3386/w25631>
- Procurement Resource. (2022). *Procurement Resource Center. Cement and Steel price trends*. <https://www.procurementresource.com/resource-center>
- Rainville, A. (2017). Standards in green public procurement – A framework to enhance innovation. *Journal of Cleaner Production*, 167, 1029–1037. <https://doi.org/10.1016/j.jclepro.2016.10.088>
- Rodrik, D. (2014). *Green industrial policy*. *Oxford Review of Economic Policy*, 30(3), 469–491. <https://doi.org/10.1093/oxrep/gru025>
- Rosell, J. (2021). Getting the green light on green public procurement: Macro and meso determinants. *Journal of Cleaner Production*, 279, 123710. <https://doi.org/10.1016/j.jclepro.2020.123710>
- Sapir, A., Schraepen, T., & Tagliapietra, S. (2022). *Green Public Procurement: A Neglected Tool in the European Green Deal Toolbox?* *Intereconomics*, 2022(3), 175–178.

- Semple, A. (2016). *The link to the subject matter: A glass ceiling for sustainable public contracts? Sustainable public procurement under EU law: new perspectives on the state as stakeholder.* Cambridge University Press.
- Sjåfell, B., & Wiesbrock, A. (2016). *Why should public procurement be about sustainability? Sustainable public procurement under EU law: new perspectives on the state as stakeholder.* Cambridge University Press.
- Tagliapietra, S., & Veugelers, R. (2020). *Bruegel Blueprint: A green industrial policy for Europe.*
- United Nations Environment Programme. (2022). *2022 Global Status Report for Buildings and Construction: Towards a Zero-emission, Efficient and Resilient Buildings and Construction Sector.* Nairobi.
- Uyarra, E., & Flanagan, K. (2010). Understanding the Innovation Impacts of Public Procurement. *European Planning Studies*, 18(1), 123–143. <https://doi.org/10.1080/09654310903343567>
- van Asselt, H., van der Grijp, N., & Oosterhuis, F. (2006). Greener public purchasing: opportunities for climate-friendly government procurement under WTO and EU rules. *Climate Policy*, 6(2), 217-229.
- Way, R., Ives, M. C., Mealy, P., & Farmer, J. D. (2022). Empirically grounded technology forecasts and the energy transition. *Joule*, 6(9), 2057–2082. <https://doi.org/10.1016/j.joule.2022.08.009>
- Wiesbrock, A. (2016). *Socially responsible public procurement: European value or national choice? Sustainable public procurement under EU law: New perspectives on the state as stakeholder.* Cambridge University Press.
- World Economic Forum. (2022). *Green Public Procurement: Catalysing the Net-Zero Economy, White Paper, January 2022.*
- Chan, Y., Petithuguenin, L., Fleiter, T., Herbst, A., Arens, M., & Stevenson, P. (2019). *Industrial Innovation: Pathways to deep decarbonisation of Industry. Part 1: Technology Analysis.* Report submitted by ICF Consulting Services Limited and Fraunhofer ISI to the European Commission, DG Climate Action.

Annex 1 – Overview table of GPP in current legislative framework

Table A1: Summary: Provisions of the Public Procurement Directives related to the possibilities of PPCN

Legislation	Relevance	Articles relevant for GPP
Directive 2014/24/EU on Public Procurement	General rules and the main regulatory framework for public procurement in the EU	<p>Art. 18 / general public procurement principles, i.a. the requirement to comply with applicable obligations in the fields of environmental law</p> <p>Art. 31 / allows the establishment of an innovation partnership as one way to arrange the tender. Innovation partnerships can be suitable where the current state-of-the-art in a sector is not advanced enough to meet the environmental challenges identified by a public authority.</p> <p>Art. 40 / allows preliminary market consultation with suppliers in order to get advice, which may be used in the preparation of the procurement procedure. Contracting authorities may for example seek or accept advice from independent experts or authorities or from market participants</p> <p>Art. 42 / possibility to include environmental characteristics in technical specifications</p> <p>Art. 43 / eco-labels</p> <p>Art. 56(1) / Contracting authorities may decide not to award a contract to the tenderer submitting the most economically advantageous tender where they have established that the tender does not comply with the applicable obligations referred to in Article 18(2)</p> <p>Art. 57(4) / possibility to exclude an economic operator from participation in a procurement procedure due to non-compliance with relevant environmental laws (obligations laid down in Art. 18.2)</p> <p>Art. 62(2) / possibility to require compliance with quality assurance standards and environmental management standards</p> <p>Art. 67 / Contract award criteria: When assessing the most economically advantageous tender, contracting authorities shall use contract award criteria that may include also environmental characteristics. The most economically advantageous tender shall be identified on the basis of the price or cost, using a cost-effectiveness approach, such as life-cycle costing in accordance with article 68.</p> <p>68 / Life-cycle costing shall cover parts or all of the costs over the life cycle of a product, service or works, borne by the contracting authority or other users. These costs may comprise for instance costs imputed to environmental externalities, such as cost of emissions of greenhouse gases and of other pollutant emissions and other climate change mitigation costs</p>

Legislation	Relevance	Articles relevant for GPP
		<p>Art. 69(3) / possibility to reject the tender, where it is established that the tender is abnormally low because it does not comply with applicable obligations, i.a. in the fields of environmental law, referred to in Article 18(2)</p> <p>Art. 70 / possibility to include environmental considerations in the conditions for performance of a contract</p>
<p>Directive 2014/25/EU on procurement by entities operating in the water, energy, transport, and postal services sectors</p>	<p>“The utilities directive”, the other main legislative act for public procurement in EU</p>	<p>Art. 36 / general public procurement principles</p> <p>Art. 49 / innovation partnership</p> <p>Art. 58 / preliminary market consultation</p> <p>Art. 60 / possibility to include environmental characteristics in technical specifications</p> <p>Art. 61 / eco-labels</p> <p>Art. 76 (6) / Contracting entities may decide not to award a contract to the tenderer submitting the best tender where they have established that the tender does not comply with the applicable obligations referred to in Article 36(2).</p> <p>Art. 80 / allows the use of exclusion grounds listed in Art. 57 of Directive 2014/24/EU</p> <p>Art. 81 / possibility to require compliance with environmental management systems or standards</p> <p>Art. 82 / when assessing the most economically advantageous tender, contracting authorities shall use contract award criteria that may include also environmental characteristics. The most economically advantageous tender shall be identified on the basis of the price or cost, using a cost-effectiveness approach, such as life-cycle costing in accordance with Article 83.</p> <p>Art. 83 / Life-cycle costing shall cover parts or all of the costs over the life cycle of a product, service or works, borne by the contracting authority or other users. These costs may comprise for instance costs imputed to environmental externalities, such as cost of emissions of greenhouse gases and of other pollutant emissions and other climate change mitigation costs.</p> <p>Art. 84 (3) / possibility to reject the tender, where it is established that the tender is abnormally low because it does not comply with applicable obligations, i.a. in the fields of environmental law, referred to in Article 36</p> <p>Art. 87 / possibility to include environmental considerations in the conditions for performance of a contract</p>

Legislation	Relevance	Articles relevant for GPP
Directive 2014/23/EU on the award of concession contracts	Applicable to concession contracts. Covers also works or services concessions in the fields of water, energy, transport, and postal services referred to in Annex II in the Directive 2014/23/EU.	<p>Art. 30(3) / General principles of the concession contracts</p> <p>Art. 36(1) / technical and functional requirements for concession contracts, which may include i.a. environmental and climate performance levels</p> <p>Art. 38(7a) possibility to exclude from participation in a concession award any economic operator due to non-compliance with relevant environmental laws (obligations laid down in Art. 30.(3)</p> <p>Art. 41(2) / Concessions shall be awarded on the basis of objective award criteria, which may include, inter alia, environmental- related criteria.</p>
Directive 2009/81/EC on the coordination of procedures for the award of contracts by contracting authorities or entities in the fields of defence and security	The directive applies to contracts for the procurement of military equipment, works and services and to sensitive purchases with a security purpose. The directive sets specific procurement rules for the defence and security sectors.	<p>Art. 18 / possibility to include environmental characteristics in technical specifications, also the use of eco-labels</p> <p>Art. 20 / possibility to lay down special conditions relating to the performance of a contract which may include environmental considerations</p> <p>Art. 24 / a contracting authority may state in the contract documents, or be obliged by a Member State so to state, the body or bodies from which a tenderer may obtain the appropriate information on the obligations relating to environmental protection</p> <p>Art. 42 / evidence of economic operators' technical abilities may include an indication of environmental management measures</p> <p>Art. 47 / when the award is made to the most economically advantageous tender, contract award criteria may include environmental characteristics and lifecycle costs.</p>

Legislation	Relevance	Articles relevant for GPP
<p>Remedies Directive (Directive 89/665/EE) for the public sector</p>	<p>Public procurement review procedures are intended to guarantee effective remedies for complaints in public procurement. The directives set minimum national</p>	
<p>Remedies Directive (Directive 92/13/EEC) for the utilities sector</p>	<p>review standards to ensure that rapid and effective means of redress are available in all EU countries</p>	
<p>Directive 2009/81/EC (defence and security procurement) also includes rules to be applied to reviews</p>		



Annex 2 – Methodology

Detailed methodology on quantitative work (Chapters 2.2 and 4.3)

Chapter 2.1: Methodology for assessing the emissions footprint of public procurement.

To estimate the emissions associated with EU public procurement, we adopt a consumption-based emissions accounting methodology. We use Eurostat data on greenhouse gas emissions from the final use of CPA08 product categories for the EU27 (Eurostat, 2023a). The Eurostat dataset is available until 2019, which is the year we use to assess the emissions footprint of public procurement in the EU.⁴² The data is based on a global environmentally extended input-output analysis, considering all emissions that occur along the supply chain of a product or service. The analysis assigns emissions of products and services across the EU to aggregates of final demand categories (according to their final expenditures).⁴³ This dataset includes emissions embodied in trade, which is not considered in production-based emissions accounting.

The emissions data associated with public procurement is predominantly recorded under consumption. Emissions data for consumption is readily interpretable as it is already broken down by government, households, non-profit organisations and by product categories. However, not all emissions from public procurement are captured within the consumption category of the emissions data. For some purchasing areas, such as public construction projects (e.g., energy and transport infrastructure or social housing), emissions are frequently accounted for under gross fixed capital formation (GFCF), also known as investment.⁴⁴ These emissions are significant and are therefore accounted for.

GFCF encompasses investment in fixed assets from government, businesses, and households. Government investment in the EU accounts for roughly 13% of total GFCF (Eurostat, 2023b). However, there is no information available on the government shares of GFCF for the product groups where public procurement creates fixed assets (e.g., construction projects, machinery). Therefore, it is not possible to directly assign emissions from public procurement that fall under investment. Chiappinelli et al. (2019) have estimated that most government investment in GFCF, at least in Germany, comes from investment in construction. Furthermore, the construction sector is emissions-intensive and represents almost half (48%) of total GFCF emissions in the EU. It is therefore likely that the construction category in the dataset contains almost all public

⁴² Using data from 2019 (rather than 2023) will likely have only a marginal impact on the inferences from our analysis since public procurement emissions by sector have remained relatively constant over the preceding five years.

⁴³ Final demand categories are defined as 'CPA08 products' using the EU statistical classification system (ESA 2010). All product groups in the emissions data are labelled by these codes, and through the classification system, they can be traced back to their higher-level sector categories (NACE Rev. 2).

⁴⁴ GFCF is an aggregation of investment in buildings, structures, and other product groups such as machinery and equipment, mineral exploration as well as computer software, intellectual property, or land management. GFCF represents a key component of GDP.

procurement emissions that are categorised as GFCF. Due to data limitations in measuring the small levels of public procurement emissions that fall under other investment categories in GFCF (e.g., machinery, equipment, intangible assets), we only consider the investment category for construction. Furthermore, two other significant sources of public emissions that may also fall under investment and are not covered are defence (through the production of vehicles and weapons) as well as public transport vehicles (buses, trains etc.). Therefore, our estimate of the total emissions related to EU public procurement is a conservative one.

To estimate the government share of construction emissions, we applied an external estimate of 20-30% for the government share in the construction industry demand globally, using lower and upper bounds. This range was established in a global analysis of public procurement by the World Economic Forum and the Boston Consulting Group (World Economic Forum, 2022). It is likely that the true government share for the EU lies somewhere within this range, as EU government investment represents around 13% of total GFCF, and most of these activities are concentrated in construction (which accounts for 48% of GFCF emissions) (Chiappinelli et al., 2019; Eurostat, 2023a).

Chapter 4.3: Methodology for estimating the impacts of PPCN implementation in the construction sector

To demonstrate the potential of adopting PPCN in the construction sector, we analyse a stylised form of PPCN with increasing emissions intensity limits for key building materials. To calculate the **direct emissions reduction potential** from imposing emissions intensity limits on the consumption of cement and steel, we took the product of the following variables: prescribed reduction in percentage terms⁴⁵; annual cement/steel emissions in the construction sector from public procurement. To estimate the annual cement/steel emissions at different time periods, we took the product of the following variables:

EU cement/steel production; Share of construction in total cement/steel production⁴⁶; public share of cement/steel demand⁴⁷; emissions intensity of cement/steel. For this analysis we relied on estimates from Material Economics (2019) – taking linear extrapolation for years where estimates were not provided.

Overall emissions in the cement and steel sectors were assumed to be constant from now until 2050 in our baseline scenario. Emissions intensities decrease slightly, by 0.3% per year for cement

⁴⁵ We provide a range of scenarios with varying degrees of ambition (prescribed reduction). We selected our scenarios by thinking back from the end, asking what emissions reductions would be required to achieve climate neutrality by 2050.

⁴⁶ 80% for cement, taken from Material Economics (2019, p. 159).

37% for steel, taken from analysis by Eurofer (2022, p. 26)

⁴⁷ Public procurement accounts for around 25% of total construction industry revenues (World Economic Forum, 2022). We used this value as our estimate for the public share of steel demand.

However, for cement almost a third (30%) of the material use comes from civil engineering projects, which is predominantly developed by government. Hence, the share of government in the cement sector is likely much higher. Other estimates range from 40-60% (Global Efficiency, 2021; Mission Possible Partnership, 2022) We took the lowest value in this range, hence providing a conservative estimate.

and by 0.5% per year for steel to account for slight increases in production levels towards 2050. The estimates used are for the EU28 (hence do not exclude the UK) and could represent an overestimation. Our estimates of emissions reductions are based on estimates of production volumes and production emission intensities. These estimates are assumed to be equivalent to volumes and embodied emission of consumed steel and cement, which may also constitute an underestimation.

To assess **demand creation in 2030**, we took the product of: total EU cement/steel consumption; public share of cement/steel consumption; share of construction in total cement/steel consumption; prescribed emissions reductions; price per unit⁴⁸.

To calculate the **additional costs of implementing PPCN** relative to current public procurement practices, i.e., the green premium, we took the product of: marginal abatement cost (MAC) for zero emissions cement/steel; public cement/steel demand creation in 2030 transformative scenario (volume); emissions intensity of cement/steel. It is important to note that the only costs considered are the abatement costs from implementing PPCN, and that we do not consider additional costs such as the increased administrative burden. Hence, our estimates of the additional costs of implementing PPCN could represent an underestimation. Furthermore, we only make estimates of the green premium for 2030. For 2050 this exercise would be inappropriate, because if the government started procuring the green technologies much earlier than what is currently projected, then the MAC estimates and associated green premium in 2050 would be lower.

For the green premium calculations, we took estimates of the MAC for cement/steel assessed by Agora Energiewende and Wuppertal Institute (2021, p.26). For cement we used the estimated MAC for its potential replacement with carbon capture with the oxyfuel process. For steel we used the MAC estimated for its potential replacement of direct reduction with hydrogen.⁴⁹

To estimate the **climate benefits from PPCN** implementation, we used social cost of carbon (SCC) estimates assessed by the German Environment Agency (2020) and multiplied these by the emissions reduction potential of cement/steel in the transformative scenario.

We must note that there are significant challenges involved with this analysis, including uncertainties in future demand, future costs, technological change, investments triggered, in different time periods, causal effects of policy as well as interactions with other policies.

⁴⁸ We assumed that the (2021 Q4 average) market price for regular cement/steel in Europe will be the price paid for green cement/steel in 2030 (Procurement Resource, 2022).

⁴⁹ It should be noted that there is high uncertainty associated with using estimates of MACs for both steel and cement. The cost optimal technology choice, as determined by current forecasts and their associated MACs, is subject to change depending on factors such as electricity prices, carbon prices, and future macroeconomic conditions. Furthermore, it is important to highlight that the MAC for cement is lower than the prices observed in the EU ETS since March 2022. This implies that it should already be more cost-effective for market participants to adopt these technologies over conventional alternatives. However, it is likely that cement abatement costs have significantly increased since the beginning of Europe's energy crisis, which has led to volatility in energy markets since the MAC assessment was conducted.

About the project

4i-TRACTION – innovation, investment, infrastructure and sector integration:
TRANSformative policies for a ClimaTe-neutral European UnION

To achieve climate neutrality by 2050, EU policy will have to be reoriented – from incremental towards structural change. As expressed in the European Green Deal, the challenge is to initiate the necessary transformation to climate neutrality in the coming years, while enhancing competitiveness, productivity, employment.

To mobilise the creative, financial and political resources, the EU also needs a governance framework that facilitates cross-sectoral policy integration and that allows citizens, public and private stakeholders to participate in the process and to own the results. The 4i-TRACTION project analyses how this can be done.

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement **No. 101003884**.