

BUY EUROPEAN AND SUSTAINABLE ACT: ACCELERATING THE LOW-CARBON TRANSITION IN THE EUROPEAN UNION

Full report





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*This study has been supported by the European Climate Foundation.
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Executive summary

The objective of the study is to understand to what extent the introduction of a Buy European and Sustainable Act (BESA) on public procurement could accelerate the low carbon transition and resilience of some European economic sectors.

The Buy European and Sustainable Act (BESA) would be a European directive regulating how public authorities in EU member states award contracts for goods, services, and works by introducing additional environmental, carbon and local content criteria.

Public procurement is responsible for 10%¹ of the total carbon footprint of the European Union (EU) and its expenditures are equivalent to 15% of EU's GDP². If aligned with climate objectives, public procurement could play a significant role in creating markets for innovative low-carbon solutions and accelerating the shift of the European economy to climate neutrality. However, even though the Paris Agreement commits EU countries to sharp GHG emission reductions, 55% of public procurement expenditures are attributed to the lowest-price bidder³. Sustainable or green public procurement (GPP) can be used as a tool to mitigate the environmental impact of the public sector and to provide a strong market signal to accelerate the low carbon transition and resilience of economic sectors such as industry, construction, transport, energy, and agriculture. There is overall a very strong case for harnessing public procurement to help EU Member States meet their climate goals.

This study explores the value of GPP, and more precisely a hypothetical Buy European and Sustainable Act narrative: *What if the EU countries had decided to align their public procurement with their climate mitigation ambition at the time of the Paris Agreement, with full effect from 2019?*

The study covers all EU countries and relies on data from 2019 and 2021.

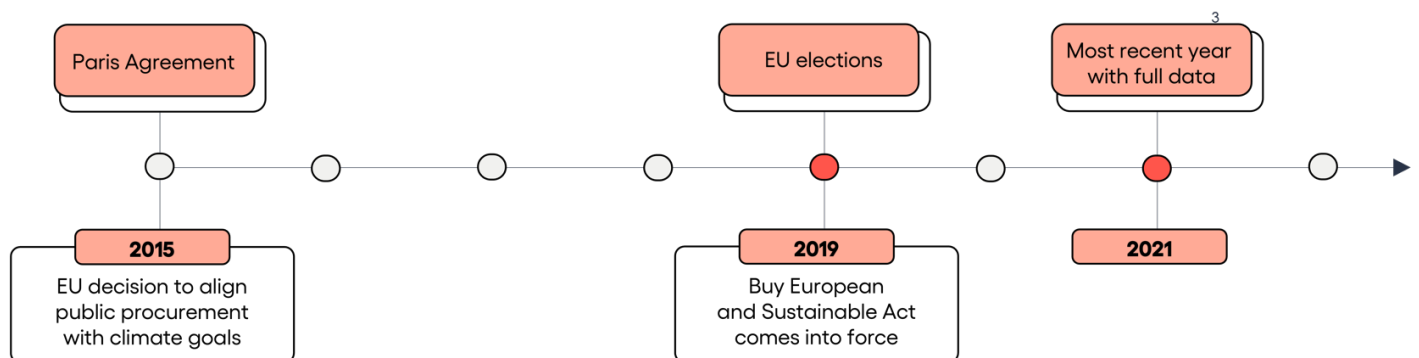
¹ Carbone 4 analysis based on Eurostat.

² OECD (2021). Government at a glance 2021: Size of public procurement.

³ European Commission (2022): Single Market Scoreboard: Access to public procurement.



Geographical and time scope: All EU countries, 2019 and 2021



The analysis focuses on products with a high GHG content, for which public purchasing is a significant market and where quantified criteria can be applied: steel, aluminium, cement, construction, vehicles, and food and catering services. These represent about 30% of the carbon footprint of public procurement. Although the analysis provides insight into the direct impacts of public procurement, it does not quantify broader leverage effects, and results should be taken as conservative.

The study defines public procurement criteria based on best practices in the EU economy. They are meant to send a strong market signal, to create economic outlets for the most virtuous players in the EU, and to encourage others to follow.

Two types of criteria are simulated:

- **Local content:** a minimum threshold is set for the European content of products purchased by public authorities. This criterion influences the geographical origin of the products purchased, and therefore all the indicators monitored (revenues of EU companies, jobs, GHG emissions).
- **Climate mitigation:** a maximum threshold is set for the GHG content or emissions in the use of goods acquired through public procurement.

The main analysis is done using socioeconomic and environmental data from FIGARO⁴ and EXIOBASE⁵ input-output tables. These large databases provide information on inter-country supply and demand, employment, and emissions.

⁴ <https://ec.europa.eu/eurostat/web/esa-supply-use-input-tables/information-data#figaro>

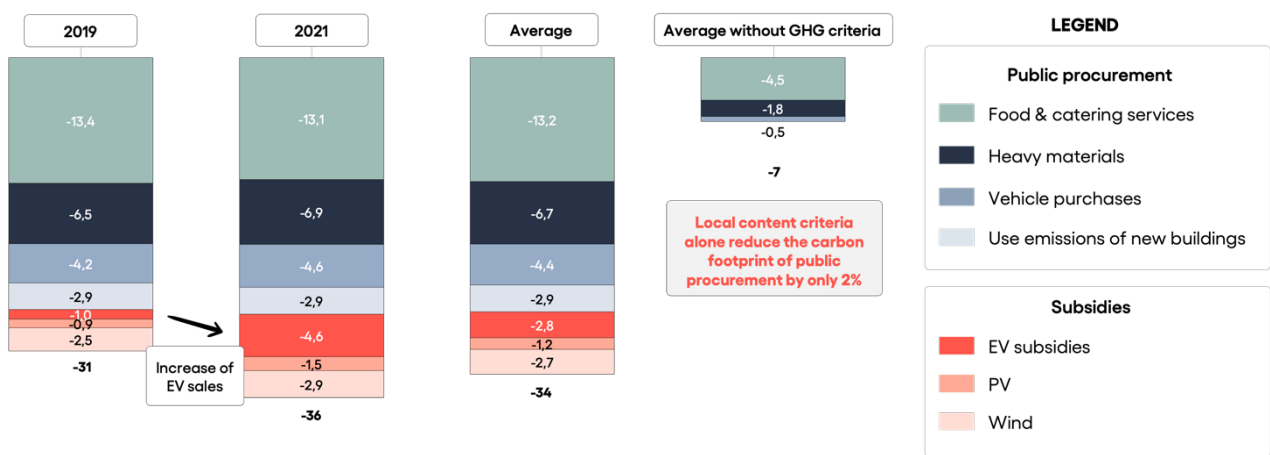
⁵ <https://www.exiobase.eu/>





If the Buy European and Sustainable Act described in this study had been implemented, it would have enabled a **34 MtCO₂e decrease of the EU's annual carbon footprint** since 2019, i.e. **9%** of EU's public procurement carbon footprint. This amounts to a **30% reduction** of the carbon footprint of public procurement in the activities covered in this study.

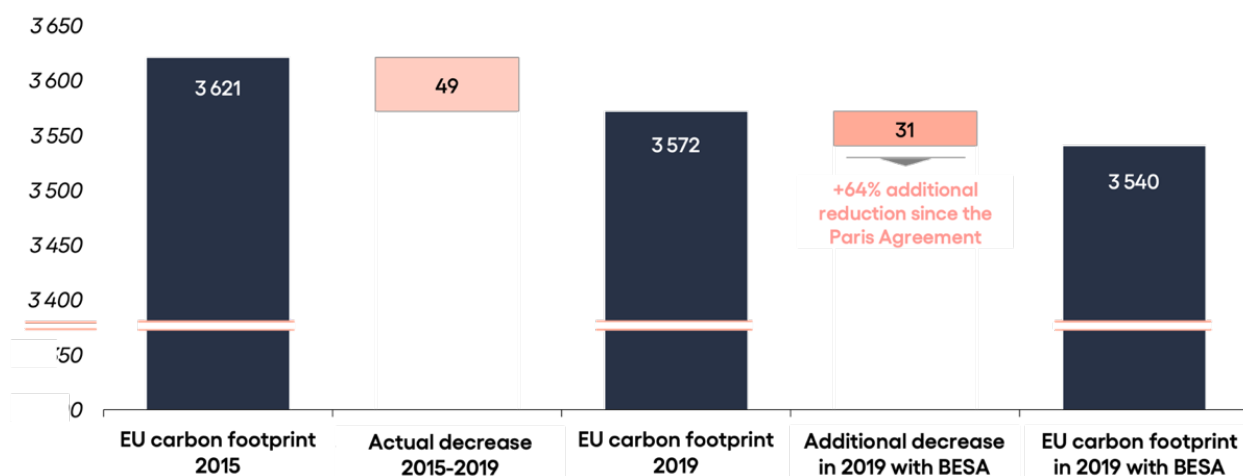
Summary of Buy European and Sustainable Act's annual carbon savings by sector | MtCO₂e



The scenario “Average without GHG criteria” corresponds to a scenario in which no climate criterion is applied, only the local content requirement. A local content requirement alone would have a limited impact on reducing the carbon footprint and must be complemented by carbon criteria to be effective.

If implemented in 2019, the BESA would have enabled an **additional 64% reduction in the EU's carbon footprint over the 2015-2019 period.**

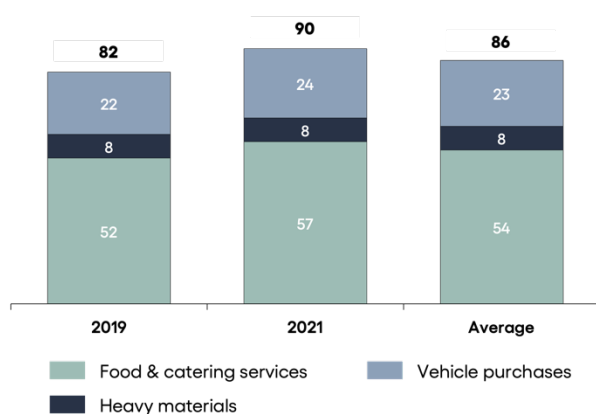
Comparison of the reduction in the EU's carbon footprint enabled by the BESA in 2019 with the actual reduction observed over the 2015-2019 period | MtCO₂e



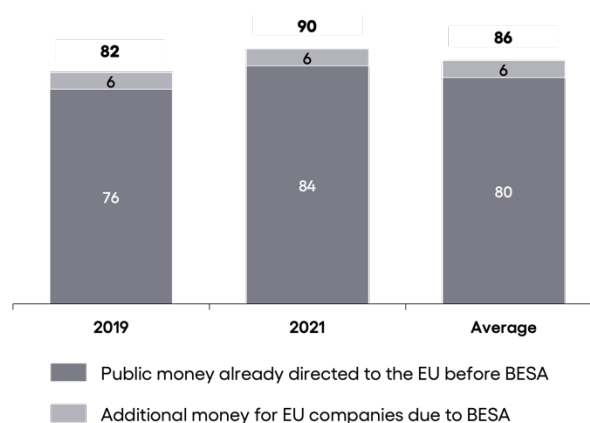
The climate benefits of BESA also apply to the EU's territorial emissions: the analysis shows that if the BESA had been implemented in 2019 and 2021, it would have reduced the EU's annual territorial emissions by an **average of 9 MtCO₂e**.

Beyond the reduction of the carbon intensity of public procurement, an important benefit of the BESA is the redirection of public procurement expenditures towards activities that accelerate the EU's low-carbon transition.

Volume of EU public procurement directed towards 'green' activities if BESA implemented - by sector | bn€



Volume of EU public procurement directed towards 'green' activities if BESA implemented - by type | bn€



On average, **86 bn€** are redirected annually towards the **promotion of 'green' activities** through Europe-wide public procurement due to the BESA. This includes a **6 bn€ annual sales increase for EU companies and an improvement in the EU's trade balance.**

This flow of money towards 'green' activities in the EU creates new, sustainable outlets for innovative European business, and gives the industry the visibility it needs to make significant investments favorable to the low-carbon transition. Sustainability criteria are essential for this, relocation criteria only do not enable significant investments towards a resilient industry in the EU. Similarly, the BESA could create many green jobs in the EU, averaging **384,000 over the years analyzed. 8% of this total (30,000 jobs)** corresponds to relocated jobs which are additional at the EU level. The development of these green jobs is essential for job security in the EU in a context of transition towards carbon neutrality. Public purchasing choices have an important role to play in supporting EU workers through changes in the economy and employment structure.

As of 2024, much of that potential remains untapped. It is not too late. There remains significant opportunity to effect meaningful change. Integrating ambitious sustainability and locality criteria into the Public Procurement Directive within the initial 100 days of the next Commission would create opportunities for European businesses and farmers committed to align with the objectives of the Paris Agreement. This proactive measure not only stimulates opportunities but also strengthens Europe's position as a leading supplier of environmentally conscious practices.

By elevating 'green' demand through the BESA, the EU industry gains the necessary momentum to invest in and promote low-carbon transition solutions, thus enhancing its competitiveness in the ongoing 'green race'.

Public procurement is a key tool in innovation policy. Not using it to its full potential to kick-start the transition would be a mistake in terms of aligning public policy with the European Union's climate objective. The EU is also an exception in its exclusion of local content criteria in public procurement; this departs from practices observed elsewhere, notably in China and the United States, where national companies benefit from preferential treatment in public procurement. This gap highlights the need for strategic recalibration to better align with sustainability imperatives while ensuring a level playing field for European businesses.

Significant climate gains

- **34 MtCO₂e** average annual decrease of the EU's carbon footprint
- **9 MtCO₂e** average annual decrease of EU territorial emissions
- **+64%** of total EU carbon footprint reduction between 2015 and 2019
- **30%** reduction on the EU public procurement carbon footprint in the scope of the study
- **9%** reduction on the total EU public procurement carbon footprint

Positive economic and social impact

- **6 bn€** annual sales increase for EU companies and improvement in the EU's trade balance
- **86 bn€** mobilised annually for the rise of green activities through EU public procurement
- **30 000** additional jobs in the EU
- **380 000** additional jobs in green activities in the EU

Bringing innovations to market

- The public sector **aligns with a net zero objective** and **provides guidance** on low-carbon procurement, of use to **all economic actors**
- Increased demand for green products provides **certainty needed by European producers to invest and bring low-carbon innovation to scale**

Abbreviations

BESA	Buy European Sustainable Act
EED	Energy Efficiency Directive
EPD	Environmental Product Declaration
ESPR	Eco-design for Sustainable Products Regulation
EU	European Union
EV	Electric vehicle
FTE	Full-time equivalent
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GPP	Green Public Procurement
ISO	International Organization for Standardization
LCA	Life Cycle Assessment
LCC	Life Cycle Costing
MEAT	Most Economically Advantageous Tender
PEFCR	Product Environmental Footprint Category Rules
PEF	Product Environmental Footprint
PIANOo	Dutch public procurement expertise center
SDG	Sustainable Development Goal
SPP	Sustainable Public Procurement
TED	Tender Electronic Daily

Context

State of the industry

As the world mobilises to reach the goal of net-zero greenhouse gas emissions by the middle of the century, industrialised countries all strive to develop an industry providing low-carbon solutions. The European Union (EU) is no exception and has stepped up the pace, with the Net-Zero Industry Act adopted by the European Parliament in November 2023 which aims to accelerate the manufacturing of clean technologies in the EU. Public procurement can play an important role in fostering EU's industrial development towards low-carbon innovation.

The EU's industrial sector contributes more than 20% to the EU economy and supports around 35 million jobs. Despite this, the industry's share in GDP has declined steadily since the late 1970s, dropping from 28.8% by 1991 to 22.2% by 2020, reflecting a broader trend observed also in the United States. China remains an exception, with industry still accounting for 38% of GDP in 2020. The importance of industry varies between EU Member States, with countries such as Ireland and the Czech Republic seeing it represent more than 30% of GDP, while others like Belgium and Portugal are around 20%.

While European industrial policy is primarily the responsibility of the Member States, increasing global competition had led to intervention at EU level, particularly since the 1980s. The EU's industrial policy aims to enhance the overall economic environment, deeply integrating industry considerations into various policies. Recent strategies have focused on enhancing Europe's competitiveness in specific sectors through sectoral alliances, reducing dependence on strategic imports, and accelerating the environmental and digital transitions.

Direct greenhouse gas emissions from industry in the European Union amount to 20% (Eurostat). If we include indirect emissions, mainly related to energy production and the transport of materials and finished products, the figure is between 50 and 60%, depending on the source. This reduction is due to the efforts of industrial players (energy efficiency, process evolution), plant closures in Europe and relocations, with an increase in imports from outside the EU. To encourage European manufacturers to decarbonize heavy industry, the European Union has decided to shift its Emission Trading System away from free allocation of emission allowances to a full cost-pricing, and introduced the Carbon Border Adjustment Mechanism (CBAM) to avoid carbon leakage as a result. Sustainable public procurement (SPP) and Green Public Procurement (GPP) strategies could also be used to align with this industrial objective, by embedding environmental considerations into purchasing decisions.

State of public procurement in the EU

Public procurement is responsible for 10%⁶ of the total carbon footprint of the European Union (EU) and represents an amount equivalent to 15% of EU's GDP⁷. However, despite the Paris Agreement committing EU countries to drastically reduce their greenhouse gas emissions (GHG), 55% of public procurement is based solely on lowest price assessments⁸. Achieving GHG emission reductions through public procurement is a necessity for EU Member States to meet their climate targets. Sustainable or green public procurement (GPP) can be used as a tool to reduce the environmental impact of the public sector and to provide a strong market signal to accelerate the low-carbon transition and the resilience of economic sectors such as industry, construction, transport, energy, and agriculture.

To date, only a few countries, including France, Germany, the United States, South Korea, and Switzerland, have made the implementation of measures to promote the development of GPP mandatory. Setting mandatory requirements, developing standardized reporting methods, and providing more tools, resources, and training for GPP could accelerate and harmonize its uptake.

Objective and methodology

Objective

The objective of the study is to understand to what extent the introduction of a Buy European and Sustainable Act (BESA) on public procurement could **accelerate the low-carbon transition and resilience of some European economic sectors**. The Buy European and Sustainable Act (BESA) would be a European directive that would regulate how public authorities in EU Member States award contracts for goods, services, and works by introducing additional environmental, carbon and local content criteria.

Scope

We consider a hypothetical narrative: *What if the EU countries had decided to align their public procurement with their climate mitigation ambition at the time of the Paris Agreement, with full effect from 2019?*

The scope of our analysis considers 2019 and 2021 and covers all European Union countries.

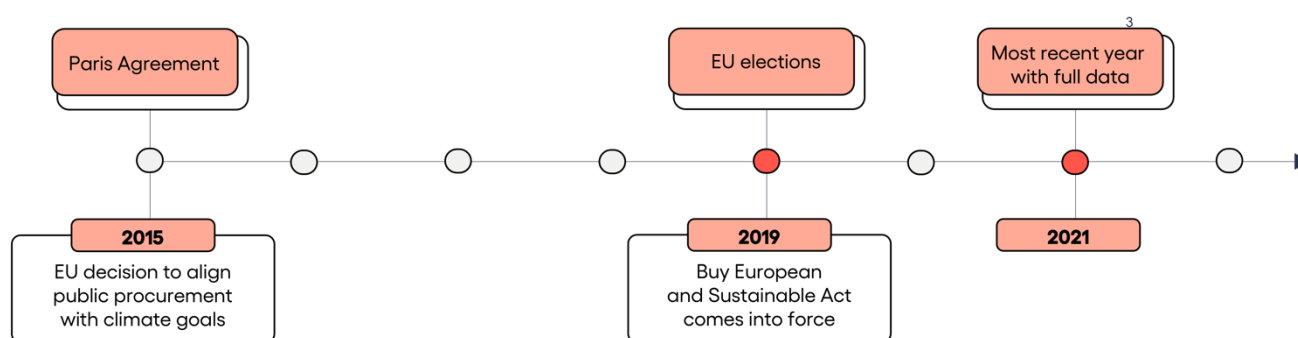
⁶ Carbone 4 analysis based on Eurostat.

⁷ OECD (2021). Government at a glance 2021: Size of public procurement.

⁸ European Commission (2022): Single Market Scoreboard: Access to public procurement.



Geographical and time scope: All EU countries, 2019 and 2021



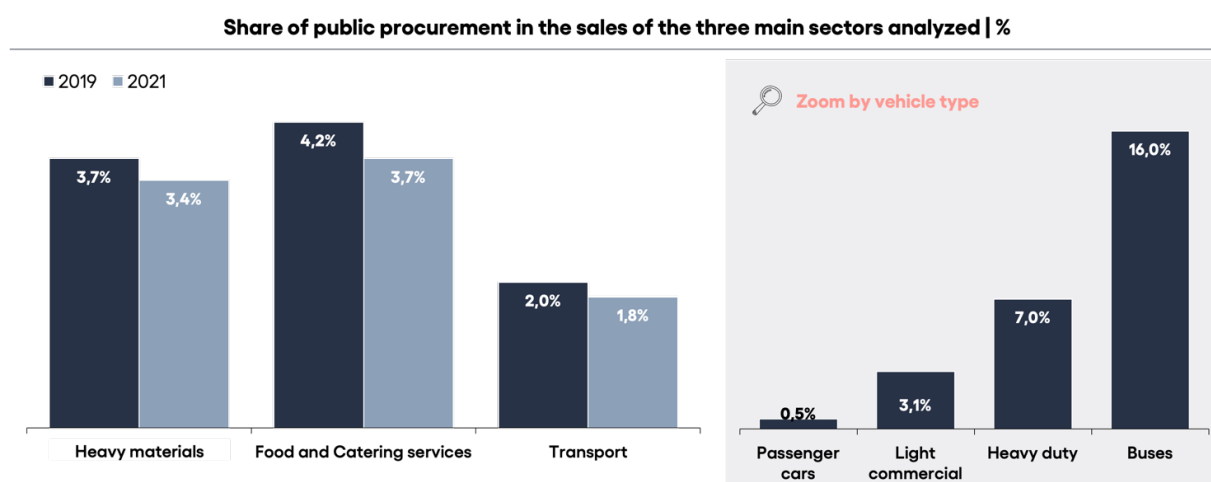
The key indicators used to assess the impact of the BESA are:

- Sales increase for EU-based companies (bn€)
- Public purchases benefiting activities that accelerate the EU's low-carbon transition (€ billion)
- Carbon footprint of EU public procurement (ktCO₂e)
- EU territorial emissions (ktCO₂e)
- Additional jobs in the EU (FTE)
- Additional jobs in green activities⁹ in the EU (FTE)

The study does not assume that all public procurement would introduce low-carbon criteria. The analysis focused instead on products with a high GHG content, for which public purchasing is a significant market and where quantified criteria can be applied. They have been selected based on an analysis of the main needs of the EU economy to accelerate decarbonization and increase resilience.

The corresponding economic sectors analyzed in this study are **heavy GHG-intensive materials, vehicles, food and catering services, and new buildings construction.**

Public orders represent between 1,8% and 4,2% of total orders for heavy materials, food and catering services and vehicles, among which large differences can be observed depending on the vehicle type (see figure below).



Sources: Analysis based on FIGARO and Exiobase data.
Right graph statistics on the French vehicle fleet from <https://www.statistiques.developpement-durable.gouv.fr/>

⁹ The term « green » used in this report refers to activities that contribute to the EU's environmental and climate objectives.

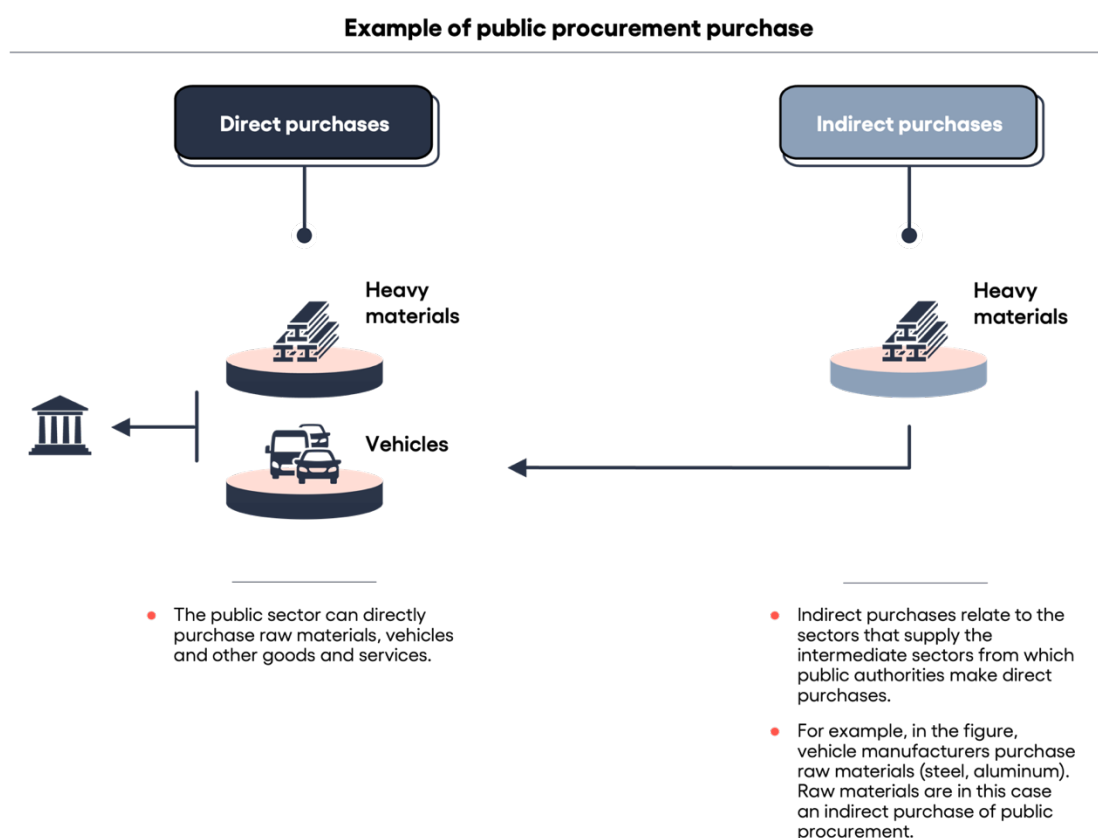
This scope represents **about 30% of the carbon footprint of public procurement**. Other purchase categories with a significant carbon footprint not covered in the study are:

- Public administration and defense, compulsory social security
- Education
- Human health activities
- Social work activities
- Fossil fuel purchases for existing public vehicles and public buildings
- Travel services excluding public vehicles

Moreover, some technologies crucial for the energy transition and subsidized by public expenses, such as electric vehicles (EV), Wind turbines and photovoltaic panels (PV), are specifically analyzed in the study.

Data sources

The main analysis is done using socioeconomic and environmental data from the FIGARO¹⁰ and EXIOBASE¹¹ input-output tables. These large databases provide information on inter-country supply and demand, employment, and emissions. The EXIOBASE database is used in a complementary way to base the analysis on detailed product-level data and complete GHG emissions. Both direct and indirect purchases are considered in the analysis. See the figure below for an explanation of the direct and indirect purchases.



¹⁰ <https://ec.europa.eu/eurostat/web/esa-supply-use-input-tables/information-data#figaro>

¹¹ <https://www.exiobase.eu/>

Besides the FIGARO and EXIOBASE input-output tables, other sources are used for complementary analyses on the manufacturing of EV's, PV panels and wind, and the energy use in buildings. For a comprehensive explanation of the methodology, please refer to the appendix. Several additional sources were used for these analyses besides the FIGARO and EXIOBASE databases¹².

Criteria for a Buy European and Sustainable Act

The study offers a concrete description of what a Buy European and Sustainable Act could look like. The BESA described here does not constitute an exhaustive plan for the decarbonization of the government. It is designed with the aim of leveraging public procurement to support European industrial policy objectives. This is why the analysis is focused on key products to accelerate the EU's low-carbon transition and increase its resilience, for which public procurement constitutes an important market and quantified criteria can be applied. The BESA defines public procurement criteria for the purchase of **heavy materials, vehicles, food and catering services, and new buildings construction**. These criteria are based on the best practices in the EU market. They are meant to send a strong market signal and create economic outlets for the most virtuous players in the EU. The energy renovation of public buildings, which is a key subject for the decarbonization of governmental bodies, is not included in the scope of the study because this goes beyond the scope of public purchases.

Two types of criteria are modelled:



Local content: a minimum threshold is set for the European content of products purchased by public authorities. This criterion influences the geographical origin of the products purchased, and therefore all the indicators monitored (revenues of EU companies, jobs, GHG emissions). This study does not consider locality criteria at the country level, but only at the EU level for the analyses.



Climate: a maximum threshold is set for the GHG content or emissions in the use of goods acquired through public procurement. We estimate the impact of this criterion on GHG emissions, under the existing structure of public procurement in 2019-2021 (no structural changes are assumed to take place because of this criterion).

To ensure the practical feasibility of meeting these criteria at the desired volume, implementing the system should be phased over several years to allow for necessary private investments. For instance, public purchasers could set a declining GHG-content trajectory over 5 years, with a binding constraint applied in from the 5th year onward.

¹² OECD (2024), CRREM (2023), IEA EV Outlook (2023), ICCT (2021), Our World in Data (2024).

Heavy materials

Sector	Criteria
Steel	<ul style="list-style-type: none"> Maximum carbon intensity of 0,5 tCO₂e/t for direct and indirect new purchased steel. 100% of steel purchased produced in EU (all transformation process).
Aluminum	<ul style="list-style-type: none"> Maximum carbon intensity of 4 tCO₂e/t for direct and indirect new purchased aluminum. 100% of aluminum purchased produced in EU (all transformation process).
Cement	<ul style="list-style-type: none"> Maximum carbon intensity of 0,45 tCO₂e/t for direct and indirect new purchased cement. 100% of cement purchased produced in EU (all transformation process).

The criteria target materials with high emissions, such as steel, aluminum, and cement, which respectively account for 4%, 3%, and 2% of European emissions¹³.

There is currently no universally agreed standard for low-carbon steel. Achieving a carbon intensity of 0.5 kgCO₂e/kg for steel is both feasible and ambitious¹⁴. Given that the current average carbon intensity in the EU is 1.7 kgCO₂e/kg, this criterion holds the potential to slash emissions by a significant 71% on the perimeter considered.

Similarly, we have used a threshold carbon intensity of 4 kgCO₂e/kg for aluminum, representing a 47% reduction on the European average of 7.5 kgCO₂e/kg, based on data from EU manufacturers and International Energy Agency (IEA) trajectories.

Cement, known for its challenging decarbonization process due to the use of clinker, has an average carbon intensity of 0,6 kgCO₂e /kg in the EU. Here, we propose a criterion of 0.45 kgCO₂e /kg, aiming to reduce emissions from cement by roughly 20%. This is feasible through the reduction of the clinker-to-cement ratio by adopting supplementary cement materials (SCMs) and utilizing low-carbon fuels¹⁵.

In comparison, the EU taxonomy is based on carbon intensities of 0.47 tCO₂e/t for cement and 1.5 tCO₂e/t for aluminum. There is no direct carbon intensity target for steel, but the criteria mentioned are compatible with the 0.5 tCO₂e/t threshold. The thresholds used in the study are therefore in line with the EU taxonomy for cement and steel, and more conservative for aluminum.

To ensure that these criteria have an impact on overall emissions, the EU ETS (Emissions Trading System) will have to take the BESA into account by reducing the total CO₂ cap. The implementation of these criteria would also enable the development of the low-carbon materials market, an important driver for the innovation needed to achieve carbon neutrality by 2050 at the latest.

Regarding the local content criterion, public procurement of these materials is predominantly originating from EU countries, with EU public procurement shares averaging 89% for steel, 89% for aluminum, and 94% for cement. A local EU content requirement of 100% thus appears reachable.

¹³ UNFCCC GHG data (2023)

NB: Carbon intensities mentioned correspond to embedded emissions from the extraction of raw materials to the manufacturing process and delivery (Cradle-to-Gate), including electricity emissions calculated based on average emission factor of the country of origin or actual emission factor in the case of direct technical connection or power purchase agreement.

¹⁴ IDDI, FMC, SteelZero, IEA and EU industry

¹⁵ IEA 2024

The EU's limited material extraction, processing, and recycling capacity pose significant risks to its supply of critical resources. In response, the Critical Raw Materials Act of March 2023 outlines a strategy and objectives for securing critical and strategic resource supplies by 2030. These regulations could potentially be applied to public procurement sooner through mechanisms such as the BESA.

Food and catering services

Sector	Criteria
Food and catering services	<ul style="list-style-type: none"> • 98% of food and catering services procured should be from European Union countries, which corresponds to the highest national rate, observed for Romania, in 2019 and 2021. • A 20% reduction in volumes of animal products procured, to be compensated by the public procurement of plant-based products. • 100% organic food or food grown using agroecological practices, which results in -20% GHG emissions for plant-based products¹⁶¹⁷¹⁸.

On average, 93% of the public procurement of food and catering services is sourced within EU countries. Implementing a reduction of 20%¹⁹ in animal products consumed would foster a shift towards a more vegetarian diet in public institutions, equivalent to incorporating one meat-free day per week.

Vehicle purchases

Sector	Criteria
Vehicle purchases	<ul style="list-style-type: none"> • 100% of public procurement demand for vehicles, transport equipment or maintenance should be from the EU. • Application of the Clean Vehicle Directive: <ul style="list-style-type: none"> • 40% of light duty vehicle purchases should be clean vehicles. • 15% of heavy-duty vehicles should be clean vehicles. • 60% of buses and coaches should be clean vehicles. • Weight reduction of around 20% for all other light duty vehicle purchases (60% of purchases).

On average, 88% of public procurement of transport services, including manufacturing, services, and maintenance, are from European countries. A local content requirement (i.e. from 88% to 100%) seems achievable.

Concerning sustainable purchasing criteria, the Clean Vehicles Directive, ratified by the European Parliament in 2019, was to be integrated into national legislation by 2021. Our analysis focuses on the impact of this directive, had it been implemented in 2019 and 2021. Specifically, the directive

¹⁶ ADEME (2020), Empreintes sol, énergie et carbone de l'alimentation

¹⁷ Guyomard H. et al. (2023) « The European Green Deal improves the sustainability of food systems but has uneven economic impacts on consumers and farmers », Communications Earth & Environment, 4(1), 358

¹⁸ Bellassen, V. et al. The carbon and land footprint of certified food products. J. Agric. Food Ind. Organization 19, 113–126 (2021).

¹⁹ This goal is advocated by various sources, including the IPCC AR6 WGIII report, Climate Change Committee (UK) and Haut Conseil pour le Climat (France).

requires that 40% of purchases of light vehicles, 15% of heavy vehicles and 60% of buses and coaches be clean vehicles, defined as follows:

Light vehicles	Heavy vehicles
<ul style="list-style-type: none"> Until 31 December 2025, no more than 50 gCO_{2e}/km From 1 January 2026, only zero emissions vehicles 	<ul style="list-style-type: none"> Use one of the following alternative fuels: Hydrogen, electric battery (including hybrid), natural gas, liquid biofuels, LPG, synthetic & paraffinic fuels.

The last proposed criterion on transport involves reducing the weight of the other 60% of total light-duty vehicles purchases by 20%. By prioritizing lighter vehicles, public procurement can decrease the life cycle emissions of light duty vehicles by approximately 25% if compared to average light duty vehicles.

Criteria on new buildings energy use

Sector	Criteria
Public buildings energy use	<ul style="list-style-type: none"> All new buildings should reduce their carbon intensity for use, compared to their countries average, by -67%.

Energy use in buildings represents almost 80% of total carbon lifecycle emissions of buildings in the EU. The proposed criterion is based on the CRREM²⁰ methodology and on the idea that public procurement should be 10 years ahead of the average on a 1.5°C scenario trajectory. The carbon intensity threshold should be reviewed every 5 years.

Beyond public procurement: PV, wind and electric vehicles benefiting from public subsidies in the EU

Low-carbon technologies such as PV, wind and electric vehicles are included in the analysis, although they are beyond the public procurement scope. The criteria on these sectors focus on relocalization of the production and carbon intensity, with the following thresholds:

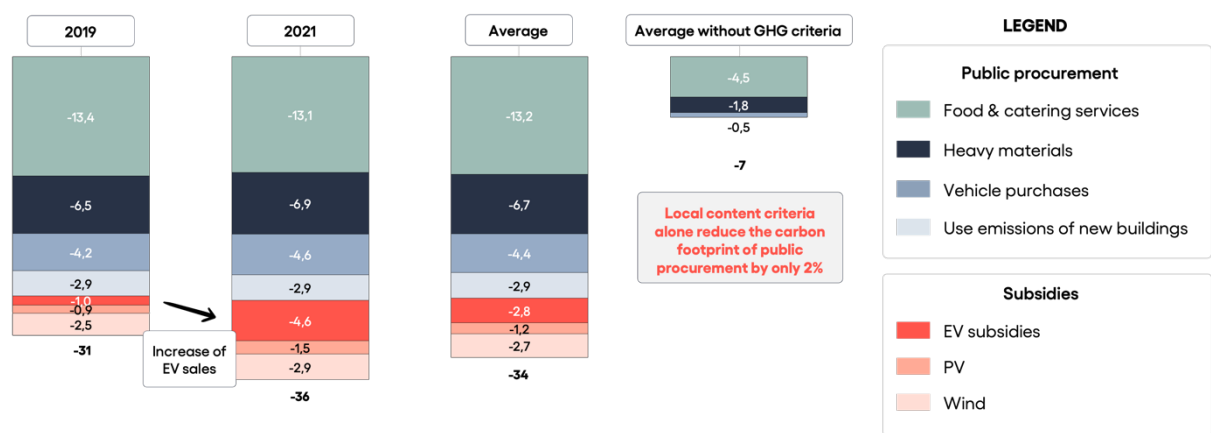
Sector	Criteria
PV	<ul style="list-style-type: none"> 40% solar panels installed should be manufactured in the EU with a maximum manufacturing carbon intensity of 75 kgCO₂/kW <i>The Net Zero Industry Act includes a target to achieve 40% manufacturing of clean technologies in the EU before 2030.</i> <i>The average solar panel manufacturing carbon intensity in the EU is 75 kgCO₂/kW, -70% carbon intensity compared to current 224 kgCO₂/kW average PV installed in Europe (90% manufactured in China).</i>
Wind	<ul style="list-style-type: none"> 100% of wind turbine manufacturing is done in the EU <i>This is already almost the case.</i> The criteria defined above for steel and cement apply
Electric vehicle	<ul style="list-style-type: none"> 50% of battery manufacturing for electric vehicles should originate from EU countries <i>The Net Zero Industry Act targets a minimum of 40% of battery capacity manufacturing before 2030. Under the IRA, 50% of the value of battery components must be produced or assembled in North America for EV subsidies.</i> The criteria defined above for steel and aluminum apply

²⁰ CRREM v2.02

Climate, economic and social impacts of the Buy European and Sustainable Act

If the Buy European and Sustainable Act as described in this study had been implemented since 2019, it would have enabled annually a 34 MtCO₂e decrease of the EU's carbon footprint, i.e. ~9% of EU's public procurement carbon footprint.

Summary of Buy European and Sustainable Act's annual carbon savings by sector | MtCO₂e



The “Average without GHG criteria” scenario corresponds to the modelling of a scenario where no climate criteria are included in the BESA, and therefore only relocation criteria apply. This shows that relocation criteria alone have a limited impact on reducing the carbon footprint and must be complemented by carbon criteria to be effective.

The “Food and catering services” shows the largest carbon savings with a difference of -23% compared to historical data. This effect is mainly due to the reduction of animal-based products and the increase of plant-based products. On country-level, Ireland and the Netherlands emissions are reduced the most, by 32% and 34% respectively, compared to historical data. For this category, 34% of the emissions reduction is due to the relocalization to European businesses, which has a significantly larger effect than for the other categories. If the animal-based product criteria is pushed further to a reduction of -50% (vs -20%), the carbon emissions decrease by 18 MtCO₂ instead of the 13 MtCO₂.

The carbon emissions reduction for heavy materials is around 50% compared to the historical emissions data. Relocalization reduces the emissions by 13%, thus most reduction is due to the carbon criteria. The criterion on steel has the largest effect in the heavy materials category. The carbon emission reduction is -70% on average for steel, -50% for aluminium and -35% for cement.

Vehicle purchases show the third largest emission reduction due to the BESA, mainly resulting from electrification of the vehicle fleet. This is a decrease of 17% on average compared to the historical

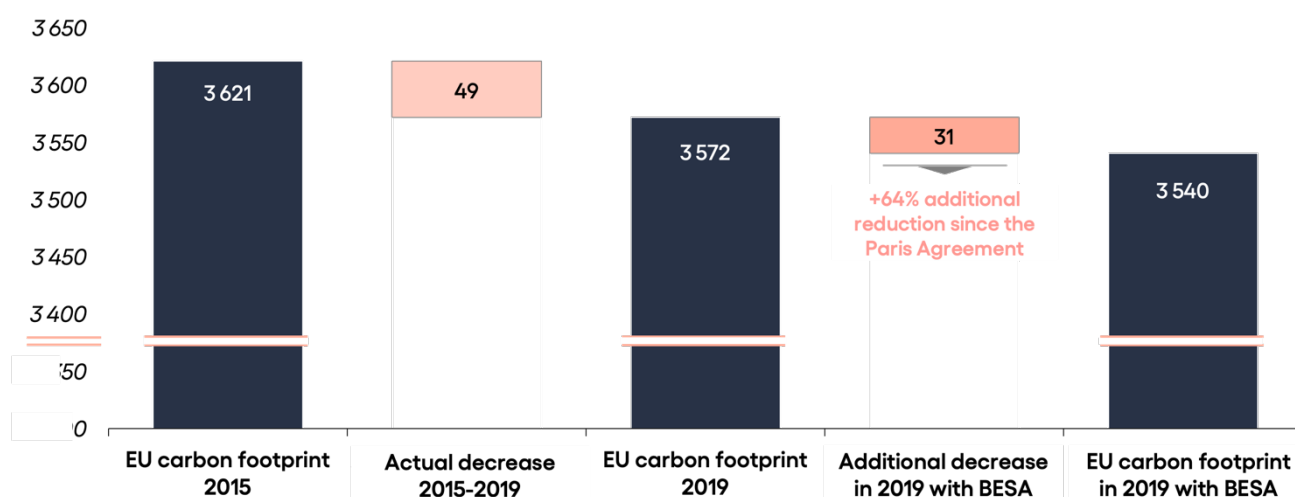
emissions, but there are large differences exist between countries. For example, France has a decrease of 22% of emissions, while Germany has a decrease of 6%.

Moreover, the analysis on the electric vehicles subsidized in the EU shows that the criteria tested in this study can result in a 13% reduction on the total carbon footprint of electric vehicles purchased in the EU. The improvement of the carbon intensity of the battery has a significant effect on this result.

Considering only the criteria related to public procurement, i.e. excluding subsidies, the average annual carbon footprint reduction obtained with the BESA is 27 MtCO₂e, i.e. an 8% reduction in the carbon footprint of public procurement.

If implemented in 2019, the BESA would have enabled an additional 64% reduction in the EU's carbon footprint over the 2015-2019 period.

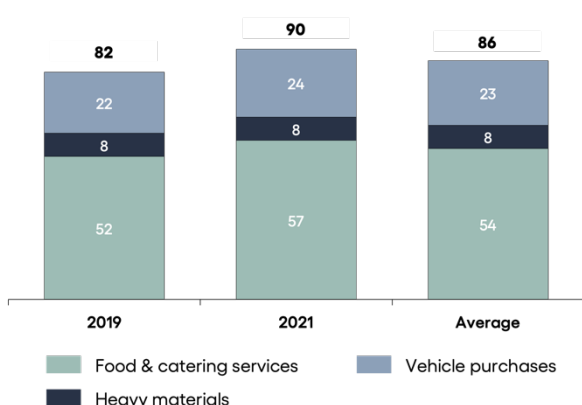
Comparison of the reduction in the EU's carbon footprint enabled by the BESA in 2019 with the actual reduction observed over the 2015-2019 period | MtCO₂e



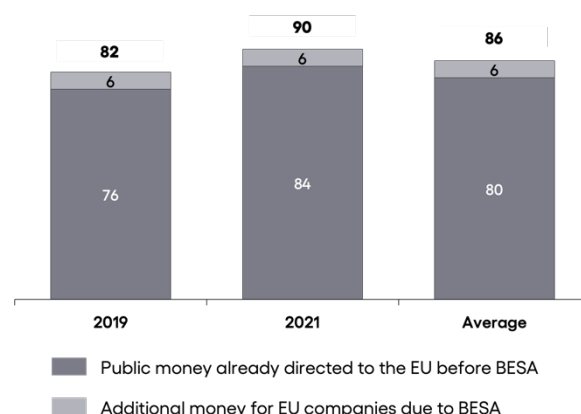
The implementation of a Buy European and Sustainable Act, as described in this study, could therefore have led to significantly higher reductions in the EU's carbon footprint than those observed over the 2015-2019 period. This additional theoretical reduction made possible by the BESA over the period 2015 - 2021 is 24%. However, it should be noted that the reduction due to the BESA remains limited compared to the EU's total carbon footprint (~1%).

Beyond the reduction of the carbon intensity of public procurement, an important benefit of the BESA is that it redirects money spent on public procurement towards activities that accelerate the EU's low-carbon transition.

Volume of EU public procurement directed towards 'green' activities if BESA implemented - by sector | bn€



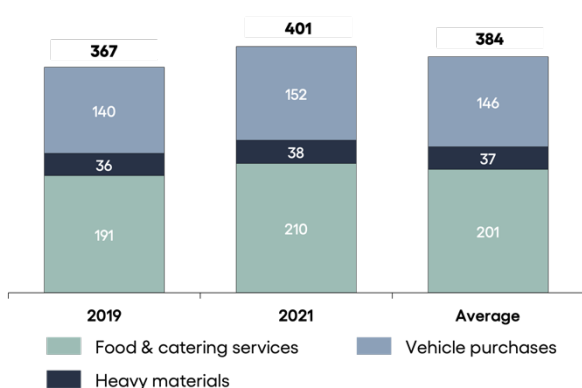
Volume of EU public procurement directed towards 'green' activities if BESA implemented - by type | bn€



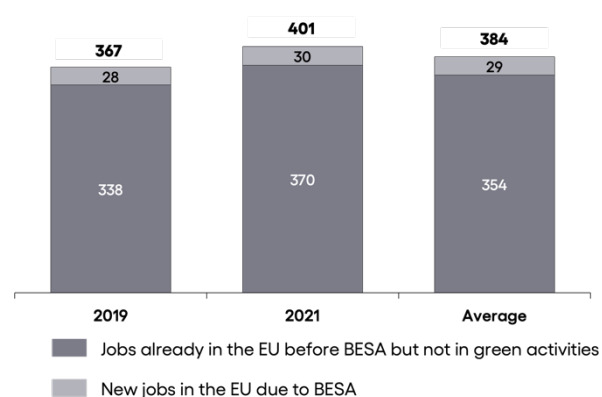
This flow of money towards 'green' activities in the EU creates new, sustainable outlets for these players, and gives the industry the visibility it needs to make significant investments favorable to the low-carbon transition. Sustainability criteria are essential for this, as relocation criteria alone do not allow for significant investment towards a resilient industry in the EU. Results show a total increase of 54 billion euro directed towards food and catering services following the BESA procurement criteria. In the case of vehicle purchases, it shows 23 billion euro redirected to the electric vehicle industry or vehicles using alternative fuels. €8 billion euro is redirected from current heavy material manufacturing methods to low-carbon production of cement, aluminium and steel.

Similarly, the BESA could create many green jobs in the EU, averaging 384,000 over the years analyzed. 8% of this total corresponds to relocated jobs which are additional at the EU level.

Additional jobs in 'green' activities in the EU if BESA implemented - by sector | Thousands FTE



Additional jobs in 'green' activities in the EU if BESA implemented - by type | Thousands FTE



These 384,000 new green jobs in the EU break down as follows:

- 201,000 jobs in agriculture and catering services, mainly for sustainable crop production using agro-ecological practices, or in the plant-based industry
- 37,000 jobs in the EU industry for low-carbon material production
- 146,000 jobs for the manufacturing, sale and maintenance of European electric vehicles

The development of these green jobs is essential for job security in the EU in a context of transition towards carbon neutrality. The choices made for public procurement have an important role to play in accompanying UE workers through changes in the economy and employment structure.

Finally, the following table summarizes the values of key indicators calculated at EU level to assess the impact of the Buy European and Sustainable Act:

KPI	2019	2021	Average	Avg. Without GHG criteria
Sales increase for EU companies bn€	6,1	6,1	6,1	6,1
Public purchases benefiting activities that accelerate the EU's low-carbon transition bn€	82	90	86	-
Decrease of EU public procurement carbon footprint MtCO _{2e}	31	36	34	7
Decrease of EU territorial emissions MtCO _{2e}	8	10	9	-4
Additional jobs in the EU thousands FTE	28	30	29	29
Additional jobs in green activities in the EU thousands FTE	367	401	384	-

If the Buy European and Sustainable Act as described in this study had been implemented since 2019, it would have enabled significant climate benefits including:

- **34 MtCO_{2e}** average annual decrease of the EU's carbon footprint.
- **9 MtCO_{2e}** average annual decrease of EU territorial emissions.
- **+64%** of total EU carbon footprint reduction between 2015 and 2019.
- **30%** reduction on the EU public procurement carbon footprint in the scope of the study.
- **9%** reduction on the total EU public procurement carbon footprint.

It should be noted that relocation criteria alone have a limited effect on carbon footprint reduction and must be supplemented by carbon criteria to be effective.

The Buy European and Sustainable Act would also have positive economic and social impact while accelerating the transformation of the EU economy towards greater resilience and compatibility with carbon neutrality:

- **6 bn€** annual sales increase for EU companies and improvement in the EU's trade balance.
- **86 bn€** mobilized annually for decarbonization through Europe-wide public procurement.
- **30 000** additional jobs in the EU.
- **380 000** additional jobs in green activities in the EU.

Even if not quantified in this analysis, the leverage effect of such a policy could be significant. The new channels created by this scheme could encourage similar action from the private sector and accelerate the development of a low-carbon industrial ecosystem. Increasing 'green' demand would give the EU industry the means to invest and the visibility needed to become a leading supplier of low-carbon transition solutions.

Building a global approach to green public procurement in Europe

Currently, GPP is a voluntary practice in the EU, with the exception for some mandatory requirements introduced in sectoral directives. However, the role of GPP as a key tool in the EU's efforts to become a more resource-efficient economy is recognized in several legislative documents (Directive 2014/24/EU). To be effective, therefore, the BESA must be part of a more global vision of public procurement. It must be accompanied by clear governance, shared, and harmonized objectives and tools to support public purchasers in implementing these objectives at national and local levels.

GPP indicators typically measure two dimensions of GPP: implementation and impact. Implementation indicators measure progress in setting up the institutional arrangements for GPP systems, their operational performance, and the market response. Impact indicators measure the contribution of GPP reforms to fiscal, economic, environmental, and social development objectives.

Transforming public procurement practices can play a key role in achieving a greener and more sustainable future in two ways:

- Assessing the total cost of ownership over the life cycle of the product, including energy use, maintenance, and disposal costs, rather than prioritizing the lowest price, which can lead to the selection of products and services that are not environmentally friendly.
- Incorporating environmental and social sustainability criteria into procurement processes, including energy efficiency, carbon footprint, fair labor practices and local sourcing.

We therefore have every interest in developing a broader legal framework for public procurement that includes environmental criteria such as those mentioned earlier in the report. This approach will strengthen the development of green public procurement in Europe and make it a pillar of national policies in this area.

Here are some key elements of an effective governance framework for GPP.

- **Governance:** Establishing unified governance structures at both national and European levels to streamline procurement-related matters, ensuring coherence between environmental, economic, and procurement policies. This involves promoting cooperation between public actors to harmonize approaches and support the adoption of green procurement practices across Member States. More coordination is needed within EU institutions, expert groups, and Member States.

Sweden has established a comprehensive governance framework for sustainable procurement, which incorporates principles of transparency, accountability, stakeholder engagement, and performance monitoring.

- **Clear policy objectives:** Setting clear and specific environmental objectives and targets for GPP, such as reducing greenhouse gas emissions, minimizing resource consumption, promoting renewable energy, and supporting sustainable supply chains.

The European Union's Green Public Procurement (GPP) policy sets clear environmental objectives and targets for public procurement in all Member States. It provides specific criteria and guidance for different categories of products and services to help public authorities achieve environmental objectives in their purchasing decisions. The problem is the lack of implementation within Member States, targets that may not be ambitious, and competition on the European market from cheaper products that are not subject to the same constraints.

- **Stakeholder engagement:** Engaging with stakeholders, including government agencies, industry associations, environmental organizations, and civil society groups, to foster collaboration, gather input, and promote awareness and acceptance of GPP initiatives. Engaging stakeholders from different sectors, including government agencies, procurement professionals, private sector suppliers, and civil society organizations, to build support for GPP reforms. Platforms like the 'Green Purchasing Network' in Japan provide a collaborative environment for stakeholders to advocate green procurement practices, share resources, and recognize good practices.

The UK Sustainable Procurement Task Force brings together government departments, industry associations, NGOs, and other stakeholders to work together to promote sustainable procurement practices. It provides a platform for dialogue, knowledge sharing and joint initiatives to promote environmental sustainability in public procurement.

- **Transparency and Accountability:** Ensuring transparency and accountability in GPP processes through mechanisms such as public reporting, disclosure of procurement decisions, stakeholder consultation, and mechanisms for addressing complaints and grievances related to environmental performance and compliance.

In the Netherlands, the 'Sustainable Procurement Program' includes robust transparency and accountability mechanisms to ensure that public procurement processes are aligned with environmental objectives and promote sustainable outcomes. Some of the key features of transparency and accountability in this program include public reporting, performance monitoring, compliance mechanisms and stakeholder engagement.

- **Legislation and Regulations:** Enact laws and regulations that mandate or incentivize public authorities to integrate environmental criteria into their procurement processes. This may include requirements to consider lifecycle environmental impacts, to set minimum environmental standards, and to give preference to products and services with eco-labels or environmental certifications. Embed GPP firmly within procurement legislation, utilizing existing legal frameworks with provisions for value for money considerations to integrate GPP practices. Examples from South Korea and China demonstrate mandatory procurement requirements for green products and services, ensuring their uptake in public procurement processes.

The US Federal Acquisition Regulation (FAR) includes provisions such as Executive Order 13693, which requires federal agencies to prioritize sustainability and green purchasing practices. It requires agencies to consider environmental factors in procurement decisions and promotes the use of environmentally preferable products and services.

In Japan, the basic policy of the Act on Promoting Green Procurement specifies eco-friendly goods, etc. as designated procurement items that should be favored in public procurement. The Ministry of the Environment annually reviews the designated procurement items and their evaluation criteria. The number of designated procurement items has increased to 274 in 21 categories in 2017, from 101 in 14 categories in 2001. Overall, Japan's Green Procurement Act demonstrates how regulatory measures can effectively promote green public procurement by establishing mandatory requirements, incentivizing innovation, leveraging environmental labeling schemes, and providing support for capacity building and implementation.

- **Procurement Tools and Guidelines:** Developing procurement tools, guidelines, and best practices to assist public authorities in integrating environmental criteria into their tendering, contracting, and supplier management processes. This may include templates for green specifications, model contract clauses, and online resources for identifying green products and suppliers.

The US Environmental Protection Agency's (EPA) Environmentally Preferable Purchasing (EPP) program provides guidance, tools, and resources to help federal agencies integrate environmental criteria into their procurement processes. These include product specifications, purchasing guidelines, case studies, and training materials to support green purchasing decisions.

- **Capacity Building and Training:** GPP capacity-building programs should provide public procurers with the motivation and skills needed for green procurement. Provide training and capacity-building programs for procurement officials to enhance their understanding of environmental issues, sustainability principles, and the practical implementation of green procurement practices.

The Green Purchasing Network (GPN) in Japan provides training programs, workshops, and educational resources for procurement professionals in the public and private sectors. These initiatives help build capacity and expertise in green procurement practices, including understanding environmental criteria, assessing product sustainability, and implementing green procurement strategies.

The Korea Environmental Industry and Technology Institute conducted a survey to assess the training needs of contracting authorities. The survey covered GPP awareness, motivations for purchasing green products, and what would facilitate GPP. The survey revealed that the main motivation was that the government required mandatory green purchases and monitored implementation.

- **Goals, Monitoring and Evaluation:** Most countries have national plans for public procurement with some focus on environmental considerations or mention public procurement in national sustainability plans. These plans take different forms, from mentions that GPP should be developed to concrete targets and actions.

Establishing mechanisms to monitor and evaluate the implementation of GPP policies and practices, including tracking procurement expenditures, the assessment of environmental performance indicators, and conducting periodic reviews to measure progress and identify areas to improve. Set clear goals and targets for GPP practices and establish robust monitoring and reporting systems to track implementation and impact. This includes developing national plans targeting public procurement with a focus on environmental considerations and strengthening monitoring systems to collect data on GPP practices systematically. Utilizing e-procurement systems can facilitate data collection, reporting, and integration of green criteria

into procurement processes. E-procurement systems can facilitate routine data collection and reporting on GPP practices.

The 'Sustainable Procurement Program' in Sweden includes regular monitoring and reporting on the environmental performance of public procurement activities. It tracks key indicators such as greenhouse gas emissions, energy consumption and resource use to assess the effectiveness of green procurement policies and identify opportunities for improvement.

- **Carbon Benchmarks and Targets:** Setting EU-level carbon benchmarks and targets for each product category to guide procurement decisions and promote environmental sustainability. In addition, the introduction of reward schemes at the Member State or EU level for the best-performing offers can incentivize compliance with green procurement practices and drive innovation towards more sustainable solutions.
- **Market Development and Innovation:** Support market development and innovation for green products and services through measures such as research and development funding, pilot projects, public-private partnerships, and strategic procurement initiatives aimed at stimulating demand for sustainable goods and technologies.

The Green Public Procurement Partnership (GPPP) in South Korea promotes collaboration between government and industry stakeholders to develop and commercialize green products and technologies. It provides financial support for research and development, pilot projects and innovation initiatives aimed at meeting the environmental needs of public procurement markets.

By integrating these elements into a comprehensive governance framework, policymakers can help drive the transition towards more sustainable and environmentally responsible public procurement practices.

An in-depth analysis of the public procurement landscape has confirmed that while GPP is increasingly seen as an essential policy tool for achieving climate change goals, its implementation remains highly fragmented within and across the countries studied.

We have just outlined the key areas that need to be worked on to promote GPP. To achieve this, we recommend:

Governance

1. Promote cooperation and coordination to reconcile environmental and economic objectives with public procurement policies and practices:
 - i. at European level, between European agencies and between Member States
 - ii. at national level
 - iii. at regional and local level
2. Strengthen international cooperation to harmonize approaches and spread best practice. Each country has taken steps, some of which could be replicated in other countries. Some countries, such as South Korea, seem to be further ahead than others and could serve as a "model".

Legislation and Regulations

3. 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. This would require the contracting authorities to consider whether there are any low-carbon options available regarding the procurement in question.
 - i. Require bidders to comply with best environmental standards to be eligible for contract awards. Restricting price-only evaluation to limited, predefined conditions. This would mean that the definition of the most economically advantageous tender based on price alone would be limited to situations where environmental requirements are set by means other than award criteria, or where it can be demonstrated that environmental considerations do not play a role in the procurement in question.
 - ii. Require procurers to reject abnormally low bids due to non-compliance with environmental regulations or standards.
 - iii. Require procurers to award contracts based on LCC.
4. Establish, in cooperation with stakeholders, EU-level carbon benchmarks and targets for each product, as well as mandatory minimum carbon criteria at product level, to be progressively strengthened as European manufacturing capacity expands and European industry decarbonizes.
5. An obligation to draft National GPP Action Plans

Procurement Tools and Guidance

6. Develop European and national tools for public purchasers and companies to carry out life cycle analysis and measure the carbon intensity of a product.
7. Develop harmonized national training programs.
8. Create incentives:
 - i. Define any preferences or set asides for green procurement or specific groups, how these should be applied, and arrangements for periodic review.
 - ii. Specify any price preferences for green products, services, and works, how these should be applied, and arrangements for periodic review.

Goals, Monitoring and Evaluation

9. Indicative adoption targets would require a specified percentage of all procurement above the EU thresholds to be GPP by 2030 and 2040, aiming at fully climate-neutral procurement by year 2050.
10. Set out processes to verify compliance with environmental criteria, including ecolabels, tests, reports, and certifications. If ecolabels are used as selection criteria, allow suppliers to submit “equivalent” proof of compliance.
11. Valuing and rewarding the best performing bids, in the points awarded in calls for tender.
12. Establish minimum thresholds for penalties at EU level for failure to meet established criteria.

13. Develop harmonized EU-wide systems for GPP definitions, monitoring methodologies and reporting to measure progress.
14. Introduce mandatory annual reporting at EU level on the environmental impact of Member States' public procurement and the use of GPP.

The development of green public procurement (GPP) systems is not a straightforward, uniform process. Governments initiate GPP from different starting points, follow different trajectories, prioritize different aspects and are at different stages of implementation.

Effective GPP reform requires a cultural shift within organizations, moving procurement from a mere compliance exercise to a strategic endeavor. Communication and change management play a key role in facilitating this transformation. Assessments of GPP practices highlight both strengths and weaknesses and guide the formulation of GPP strategies and action plans that guide the reform process and gradually broaden its scope. The goal of these reforms is to integrate GPP seamlessly into modern procurement practices.

Green public procurement is a way for Member States and the European Union to encourage the emergence of low-carbon industries while supporting European industry.





Additional costs due to the Buy European and Sustainable Act

Costs associated with green public procurement are not expected to increase much across key sectors due to BESA implementation.

For the procurement of heavy materials, the extent of the 'green premium' varies significantly depending on the material and 'green' demand. Production methods requiring technological shifts, such as transitioning from Blast Furnace - Basic Oxygen Furnace route (BF-BOF) to Electric Arc Furnace route (EAF) for steel production or incorporating renewable energy and recycling, may incur price increases²¹. However, the additional costs should be evaluated on the final product price increase and not on material price increase.

For the transport sector, adopting low-carbon steel for vehicle manufacturing is projected to have minimal impact on final product prices, with an estimated increase of approximately 1%²². Focusing on electric vehicles, when including both the manufacturing and usage costs, the Total Cost of Ownership (TCO) is typically 1%-20% higher than that of combustion vehicles, depending on factors such as mileage and vehicle type²³. Batteries constitute a substantial part - between 10-30% - of the total cost of electric vehicles. It should be noted that battery manufacturing within the EU carries a premium of around 20% compared to manufacturing in China, which could increase EV prices by 2-6%²⁴. In addition, fuel savings (which are largely imported) are strategically and macroeconomically a very beneficial consequence of transport electrification. This is not modeled in this study.

In the construction industry, adopting green practices can result in higher upfront expenses, but could provide substantial savings in the long term. Efforts to implement energy-saving measures are balanced to produce lasting benefits. The World Economic Forum estimates that incorporating sustainability measures can increase construction costs by 1-3%²⁵.

The financial implications of the transition to a sustainable diet, characterized by reduced meat consumption, organic farming, and agroecology, remain ambiguous in the literature. While some studies predict negligible or minimal overall cost effects, others indicate potential increases in spending. Key determinants influencing outcomes include reducing consumption of animal products, which can mitigate costs, as well as efforts to reduce food waste, an important lever for cost reduction, with approximately 7% of volumes lost during the consumption phase. Additionally, the relative price of sustainable products compared to conventional alternatives varies over time and depends on the product and the country. Beyond the cost on public procurement, the spread

²¹ McKinsey (2022)

²² CEPS (2024), Sandbag (2024)

²³ IEA TCO tool, Leaseplan (2022)

²⁴ Bloomberg (2023)

²⁵ World Economic Forum (2022)

of sustainable and healthy diets could have a positive impact on medical and social spending, which has not been quantified in this study.

These additional costs remain limited compared to the inflation rates that public procurement has faced in recent years, which have exceeded 9% in the EU in 2022²⁶.

The criteria for subsidies (EV and renewables) do not necessarily entail additional costs for public authorities, depending on the level of subsidy chosen.

Limits of the study

There are some limitations to this study, which are described in this section in order to anticipate opportunities for further development.

In this study, a defined scope of public procurement is chosen to apply relocation and sustainability criteria. The selected sectors are based on an analysis of the main needs of the EU economy to accelerate decarbonization and increase resilience. This study does not constitute an exhaustive action plan for the decarbonization of public procurement, which would then have to cover all sectors.

Current impact modeling is mainly based on monetary data. The use of physical emission factors (measured in kgCO₂e/tons or units) would allow a more precise calculation of the GHG impacts. This requires using input-output tables with physical data in addition to monetary data, which is not yet possible on the scope covered by this study, FIGARO and EXIOBASE being monetary input-output tables.

In addition, as this study focuses on GHGs as an environmental issue, complementary dimensions such as biodiversity, water consumption and critical resources could be explored as a complement.

The models are based on publicly available data and could be refined locally based on the most accurate data available from local administrations and authorities. Impacts could also be modeled prospectively, as the impact of the criteria on electric vehicles and low-carbon electricity generation will increase significantly in the future.

Although the analysis provides insight into the direct impacts of public procurement, it does not quantify broader leverage effects. It is a conservative approach. Further analysis of how public purchasing decisions influence supplier behavior, industry standards and market dynamics could reveal significant additional benefits beyond the immediate scope of purchasing actions.

The indirect impact of GHG criteria on suppliers switching and relocating production has not been modeled. The consequences of improved trade balances and health gains are not calculated.

The perception that sustainable products and services are more expensive is considered one of the main obstacles to green public procurement²⁷. However, the impact of BESA criteria on public procurement costs is not modelled in this study. Modelling price dynamics with an input-output table would require too many assumptions. Therefore, an estimate of the additional costs per sector has been carried out, based on an analysis of the literature.

²⁶ Eurostat 2023

²⁷ UNEP 2017



Appendix

1. EU industry and food production context

State of the EU industry

EU industry accounts for:

- More than 20% of the EU economy,
- Around 35 million jobs,
- 80% of EU goods exports.

EU industry holds a leading position in global markets for high-value-added products and services, such as: pharmaceuticals, mechanical engineering, etc.

According to World Bank statistics, industry in the European Union will fall from 25.5% to 22.2% of European GDP between 2000 and 2020 (including construction). A similar trend can be observed in the United States, and China is no exception, although industry will still account for 38% of its GDP in 2020.

The importance of the industrial sector also varies between EU Member States. In two countries - Ireland and the Czech Republic - it accounts for more than 30% of GDP. By contrast, it accounts for less than 20% of GDP in nine other Member States, including Belgium (19.5%), Portugal (19.4%), the Netherlands (17.8%) and France (16.4%). Industry is also the largest employer in several Eastern European countries. However, at European level, industry now accounts for less than 22% of employment, compared with more than 27% twenty years ago.

Although industry still makes a significant contribution to the European economy, its share has been declining steadily since the late 1970s. The decline in industry's share of GDP has been heterogeneous across European countries. The share of industry in gross value added followed this downward trend in all Western European countries during the 2000s. The only exception was Germany, where this share remained unchanged. In the eastern part of the EU, this trend is less pronounced. Although the declining importance of industry can be explained by a stronger contribution of services to GDP growth.

The geography of European industry was initially defined around an almost continuous corridor where Europe's industrial heartland has traditionally been located, from north-west England to northern Italy through the Benelux countries, but has been changing rapidly, with an eastward shift towards new Member States and emerging regions in central Europe in recent decades. Industry accounts for a large share of their total value added. However, their share of total EU industrial production remains low.

EU industrial policies

Industrial policy is essentially the responsibility of the Member States. However, since the 1950s, the European Community has limited the practice of public intervention (state aid) within the single market to encourage and promote competition between states. As global competition intensified in the 1980s, industrial policy became an increasingly important issue for Europe.

As the Union's powers in this area are limited, its industrial policy is essentially horizontal: it aims to promote the overall economic environment of the sector. The consideration of industry is therefore "deeply integrated into other EU policies such as trade, the internal market, research and innovation, employment, environmental protection and public health", according to the European Parliament's website. Over the past decade, European industrial policy has taken the form of a series of guidelines and horizontal plans.

A new industrial strategy was proposed by the Commission in March 2020. It aims to fund sectoral 'alliances' to improve European competitiveness in specific areas, from clean hydrogen to satellites. It gives member states more flexibility to use of state aid in these sectors. The strategy also emphasizes the protection of European intellectual property to ensure a level playing field globally.

Without calling these objectives into question, new ones have been added when the strategy is updated in May 2021. Meanwhile, the H1N1 pandemic has highlighted other weaknesses in the European single market, such as a shortage of masks, a lack of medicines and difficulties in producing the first doses of vaccine. The Commission has drawn lessons and proposed new measures in three areas.

The first is to "strengthen the resilience of the single market", particularly in times of crisis. At a time when 2020 has been marked by supply restrictions and border closures, the European executive is considering an emergency instrument for the single market that would guarantee the free movement of goods and services in the event of future crises. The legislative proposal, once expected to be ready in the first quarter of 2022, has been postponed until the last quarter of the year. Other tools mentioned include "out-of-court dispute resolution systems" to deal with late payments or the risk of insolvency for SMEs.

The second is to reduce Europe's dependence in strategic sectors. Out of 5,200 products imported into the EU, the Commission has identified 137 on which the EU is highly dependent - half of them from China. These include raw materials, active ingredients in medicines and high-tech components such as semiconductors. Of these, 34 cannot be replaced by an EU-produced equivalent, making the EU particularly vulnerable in the event of a crisis. The Commission therefore aims to diversify international supply chains, through international partnerships. It is also continuing to develop industrial alliances to increase its autonomy in strategic areas: processors and semiconductor technologies, industrial data, cloud and edge technologies, space launchers and zero-emission aviation.

The third aspect of this update is to accelerate the environmental and digital transitions. This should include the co-creation of "transition pathways" in partnership with industry, public authorities, social partners and other stakeholders, and the definition of a coherent regulatory framework to achieve the objectives of the European Digital Decade and the fit for 55.

To encourage European manufacturers to decarbonize their production, the European Union has also introduced the Carbon Border Adjustment Mechanism (CBAM). This measure is accompanied by changes to the European carbon quota market. By confirming that a price has

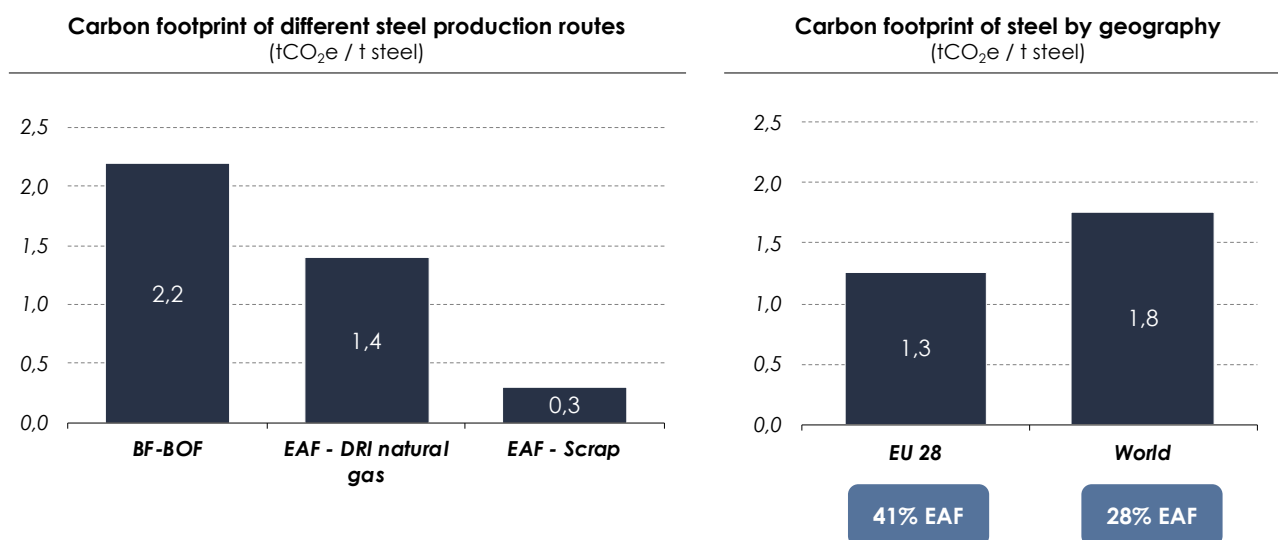
been paid for the embedded carbon emissions generated in the production of certain goods imported into the EU, the CBAM will ensure that the carbon price of imports is equivalent to the carbon price of domestic production and that the EU's climate change targets are not undermined.

Context for steel production in Europe

The steel industry holds a significant position within the European Union, contributing approximately €143 billion in Gross Value Added and providing employment to over 306,000 individuals directly. Despite Europe's production accounting for 7.2% of global steel output, this share is on a declining trajectory, resulting in an increasing reliance on imported steel to meet domestic demands. This dependency on imports underscores a critical challenge for the region's industrial autonomy and security.

Furthermore, the steel sector plays a notable role in environmental considerations, accounting for around 4% of European emissions and contributing to 18% of the carbon footprint associated with construction activities. Emissions are mainly due to the energy-intensive processes involved in steel production, in particular the operation of furnaces.

In terms of inputs and imports, the European steel industry faces a complex landscape. While approximately 12 million tons of iron ore are extracted within the EU, the bulk of the raw material—about 130 million tons—is imported. In addition, a significant part of steel production relies on recycled scrap steel, amounting to 70 million tons. This highlights the importance of strategic planning to ensure a stable and sustainable steel supply for Europe's industrial needs.



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There is not a single benchmark for low-carbon steel. Numerous industry initiatives exist which benchmarked low-carbon steel. The table below summarizes these different initiatives. The table also includes one policy that has defined low-carbon steel benchmarks for several products.

²⁸ EUROFER & World Steel Association

Initiative / policy	Type	Carbon limit
FMC	Public – private	Near zero emissions steel: 100-400 kg CO₂e/t.
IDDI	Public	Near zero emission steel: 50-400 kg CO₂e/t. Low emission steel: 800-2400 kg CO₂e/t.
SteelZero	Private	Low emission steel: 200-1400 kg CO₂e/t.
Buy Clean California Act	Public	Global warming potential limit for concrete reinforcing steel, hot-rolled steel, hollow structural steel, steel plate: 890-1490 kgCO₂e/t.

Context for cement production in Europe

The cement and concrete industry within the European Union contribute significantly to the economy, generating approximately €56 billion in Gross Value Added and providing employment to approximately 1,1 million individuals through direct and indirect roles. Despite the EU27 accounting for 4.2% of global cement production, there is a notable trend of increased import within the local market, indicating shifts in supply dynamics. Cement, while predominantly a local market, is witnessing an uptick in imports, reflecting evolving trade patterns.

Moreover, cement production carries substantial environmental implications, accounting for 2% of European emissions and contributing to 24% of the carbon footprint associated with construction activities. These emissions primarily stem from the energy-intensive kiln and preheater processes during manufacturing, as well as process-related emissions resulting from the decarbonation of calcium carbonate. The industry's heavy reliance on fossil fuels, particularly coal, alongside waste and biomass for kiln operations, further exacerbates its environmental footprint.

As with steel, there is no single benchmark for low-carbon cement. The same initiatives have classified low-carbon and near-zero cement. See the table below.

Initiative / policy	Type	Carbon limit
FMC	Public – private	Near zero emissions cement: 184 kg CO₂e/t.
IDDI	Public	Near zero emission cement: 40-125 kg CO₂e/t. Low emission cement: 250-750 kg CO₂e/t.
ConcreteZero	Private	Low emission concrete: As close to zero as possible with at least 90% mitigation.
General Services Administration - Buy Clean Initiative	Public	Low embodied carbon concrete: 242-414 kg CO₂/m³.

Context for aluminum production in Europe

Aluminium demand is expected to increase by 50%²⁹ by 2050 and plays a significant role in the energy transition, as an important material for solar, wind, EV's and heat pumps. Primary aluminium emissions in the EU already decreased 55 percent since 1990, however EU production is not increasing – since 2008 as reduction of 30%³⁰ - and more and more aluminium is imported in the EU. The EU aluminium industry encompasses more than a thousand companies, directly employs about 230.000 employees and is indirectly responsible for around 1 million jobs.

Context for vehicle manufacturing in Europe

The transport sector is a significant contributor to the European Union's greenhouse gas emissions, accounting for 12% of the total. Until the full internal combustion engine ban in 2035 (for light-vehicles), transport emissions not suddenly disappear. A new EU directive focusing on the procurement of light and heavy-duty vehicles is set to be enacted. Across most EU countries, targets have been established, aiming for a substantial 38,5% adoption rate of clean light-duty vehicles, and aiming for a clean vehicle share of 15% for trucks and 65% for buses by 2026. This reflects the urgency to curb emissions from heavy-duty vehicles which account for over a quarter of EU road emissions and 6% of total EU emissions.

The transition to electric vehicles faces its own environmental challenges. The manufacturing process of electric vehicles tends to be more emissive than that of internal combustion engine vehicles due to battery production and increased metal usage. To mitigate this, there's a pressing need for batteries manufactured with lower carbon-intensive materials. Such batteries have the potential to reduce the total carbon footprint of vehicle manufacturing by 42%.

In line with this, the EU should establish ambitious carbon performance thresholds for batteries, fostering the development of a European low-carbon battery industry. Public procurement can play a pivotal role in creating an active market demand for low-carbon manufactured batteries and vehicles, driving innovation and sustainability in the automotive sector.

Moreover, to ensure transparency and accountability, all batteries entering the EU market will be required to possess a unique battery passport by February 1st, 2027. This passport must include crucial information such as performance classification for carbon impact, electrochemical performance, and durability requirements, enabling consumers to make informed choices and fostering confidence in the transition towards cleaner transportation technologies.

Context for food production and catering services in Europe

The food and agriculture sector in Europe plays a multifaceted role, both economically and environmentally. Accounting for approximately 3% of the EU's GDP, with crop output representing the majority at 55%, and animal output at 36%, the sector is a significant contributor to the European economy. However, despite its economic importance, employment in agriculture has been steadily declining, from 6.4% in 2005 to 4.2% in 2020, albeit with significant variations among European countries.

Organic farming, while making slow progress, accounted for 9.1% of cultivated land in 2020, with fresh vegetables and cereals representing notable shares of organic cultivation. The Buy European

²⁹ European Aluminium 2024

³⁰ FACE (2019): The EU aluminium industry. The impact of the EU trade measures on the competitiveness of downstream activities.

Act, crucial for promoting local agriculture, must incorporate criteria on organic food to support this sector further.

Additionally, there is a pressing need to reduce dependence on long-haul transportation to enhance the resilience of regional and local food systems, particularly given the sector's significant greenhouse gas emissions, primarily originating from livestock and fertilizers. Importantly, the EU's reliance on imports of plant proteins for livestock production underscores the necessity for the Buy European Act to support EU plant protein production.

Furthermore, addressing the environmental impacts of livestock production, such as emissions from feed and enteric fermentation, is crucial, with potential solutions like using non-deforesting soy to reduce the carbon footprint of conventional chicken. Moreover, ensuring food quality and nutritional standards in public procurement, including minimum shares of organic food and responsible sourcing practices, is essential for promoting healthier diets and supporting sustainable agriculture. Additionally, initiatives to promote fair remuneration for farmers, development of short supply chains, and diversification of agricultural crops are integral to building resilient and sustainable food systems in Europe.

2. Benchmark of public procurement policies

Definition of Green public procurement

Public procurement refers to the process by which government agencies, public sector organizations, and other publicly funded entities acquire goods, services, or works from external suppliers or vendors. It encompasses the entire cycle of acquiring goods or services, from the initial identification of needs, through the tendering or bidding process, to the awarding of contracts, and finally, to the delivery or implementation of the purchased goods or services.

The primary goal of public procurement is to obtain the necessary goods and services to fulfill the mandates and deliver services to citizens, while adhering to principles of transparency, fairness, and efficiency. While traditional public procurement may consider factors such as cost, quality, and delivery time, it may not explicitly prioritize environmental sustainability or social responsibility.

Sustainable public procurement (SPP) is “a process whereby public organizations meet their needs for goods, services, works, and utilities in a way that achieves value for money on a whole life- cycle basis in terms of generating benefits not only to the organization, but also to society and the economy, whilst minimizing damage to the environment” (UNEP 2011). SPP shifts the focus of procurement from seeking the lowest cost to achieving value for money. It uses the procurement function strategically to achieve policy objectives linked to the three pillars of sustainable development: economic, environmental, and social.

GPP is a component of SPP that uses public sector purchasing to achieve environmental policy objectives. GPP involves the integration of environmental considerations into the public procurement process. The aim of GPP is to minimize the environmental impact of government purchasing activities by selecting goods, services, and works that have a reduced environmental footprint throughout their lifecycle. GPP involves considering factors such as energy efficiency, resource conservation, waste reduction, recyclability, and the use of environmentally friendly materials. The goals of GPP include promoting sustainable consumption and production patterns,

supporting the transition to a low-carbon economy, and contributing to broader environmental and climate objectives.

Procurement approaches are constantly required to meet fundamental criteria such as price, quality, delivery timeframes and service levels. In addition to meeting the latter, sustainable procurement is also required to meet new criteria rooted in sustainable development and social responsibility, in-keeping with the overall life cycle and economic outlook.

Green Public Procurement (GPP) - a more environmentally rigorous category within Sustainable Public Procurement - is important for reducing environmental impacts, targeting aspects such as low-carbon products, water efficiency, use of hazardous substances, waste management and climate impacts.

Our focus is on green public procurement. However, there are other aspects that can be considered in this approach:

- Circular procurement: An economy that is restorative and regenerative by design, aiming to keep products, components and materials at their highest utility and value always, distinguishing between technical and biological cycles (ISO 20400, 2017).
- Social returns on investment: This means creating more employment opportunities for people who are disadvantaged in the labor market. When awarding contracts, public purchasers can encourage or require contractors to employ vulnerable groups in the execution of the contract.
- Sustainable label: Wide range of sustainable labels and standards that can be requested when purchasing goods, services or works.
- Innovation procurement: Refers to the use of sustainable sourcing to stimulate innovation in supply chains to achieve greater shared value and create new markets.

State of Green public procurement in the EU

Currently, GPP is a voluntary practice in the EU, except for some mandatory requirements introduced in sectoral directives. However, the role of GPP as a key tool in the EU's efforts to become a more resource-efficient economy is recognized in several legislative documents (Directive 2014/24/EU).

In 2003, the European Commission in its Communication on Integrated Product Policy (IPP) encouraged Member States to draw up publicly available National Action Plans (NAPs) for greening their public procurement.

At European level, GPP is managed by the Directorate-General for Environment (DG Environment) and the Directorate-General for Internal Market, Industry, Entrepreneurship & SMEs (DG Grow). Two groups support the work on GPP: the Informal Green Public Procurement Advisory Group, which advises the Commission on the development and implementation of GPP policy, and the Commission's Government Expert Group on Public Procurement, which advises the European Commission on its public procurement policy.

Example sectoral legislation introducing mandatory GPP rules in Europe

- **Energy Performance of Buildings Directive (EPBD):** a directive aimed at improving the energy efficiency of buildings within the EU. It was first introduced in 2002 and has been revised several times since then, with the latest version being adopted in 2018. The main objectives of the EPBD include:
 - Setting minimum energy performance standards for new and existing buildings.
 - Promoting the cost-effective improvement of the energy performance of buildings.
 - Increasing awareness of the energy performance of buildings among owners and tenants.
 - Encouraging the use of renewable energy sources in buildings.
- **Construction Product Regulation (CPR):** a regulation that governs the marketing and use of construction products within the EU. It aims to ensure that construction products placed on the EU market meet certain essential requirements related to health, safety, environmental protection, and performance.

CPR applies to a wide range of construction products, including materials, components, and systems used in buildings and civil engineering works. Examples of covered products include cement, steel, insulation materials, doors, windows, and electrical wiring.

Key aspects of the Construction Products Regulation include CE Marking, Declaration of Performance (DoP), Harmonized Technical Specifications, Assessment and Verification of Constancy of Performance (AVCP).
- **Energy Efficiency Directive (EED):** directive aimed at promoting energy efficiency and energy conservation across various sectors of the economy. It was first adopted in 2012 as part of the EU's efforts to achieve its energy and climate objectives, including reducing greenhouse gas emissions and enhancing energy security.

The main objectives of the Energy Efficiency Directive include:

 - Energy Efficiency Targets
 - Energy Efficiency Targets
 - Energy Audits
 - Renovation of Buildings
 - Public Sector Leadership

Overall, the Energy Efficiency Directive plays a significant role in driving energy efficiency improvements and helping the EU meet its energy and climate objectives. By promoting energy savings, reducing energy consumption, and enhancing the competitiveness of the EU economy, the directive contributes to a more sustainable and resilient energy system.
- **Clean and Energy-Efficient Road Transport Vehicles Directive:** a directive aimed at promoting and stimulating the development of a market for clean and energy-efficient vehicles in the EU. It sets minimum national targets for the procurement of clean vehicles. The targets are defined as a minimum share of clean vehicles in the aggregate public authorities and certain public transport operators across a Member State.

It sets minimum public procurement targets for light-duty vehicles (cars and vans), trucks and buses for 2025 and 2030. The European Commission encourages the sharing of knowledge and best practice between Member States with a view to promoting the purchase of clean and energy-efficient road transport vehicles.
- **Battery directive:** a directive aimed aims to regulate the manufacture, marketing, and disposal of batteries and rechargeable batteries within the EU to minimize their environmental impact.

Key objectives of the Battery Directive include:

- Reduction of Hazardous Substances
- Collection and Recycling Targets
- Labeling Requirements
- Responsibility of Producers
- Promotion of Research and Development

Since its adoption, the Battery Directive has been supplemented by additional regulations and guidance documents to address emerging challenges and promote the circular economy principles in the battery industry. In December 2020, the European Commission proposed a revised Battery Regulation aimed at further strengthening the sustainability and competitiveness of the battery value chain in the EU.

Overall, the Battery Directive plays a crucial role in ensuring the safe and environmentally sound management of batteries and accumulators throughout their lifecycle, from production to disposal, contributing to the EU's broader environmental and waste management objectives.

- **Eco-design for Sustainable Products Regulation (ESPR):** a directive that sets ecological standards for the design of certain product groups in the member states of the European Union. It will replace the current Eco-design Directive (2009/125/EC).

The regulation governs virtually all products placed on the market or put into service in the EU, not limited to consumer products. There are only very limited exclusions (e.g. food, feed, medicinal products). The implementation of ESPR will follow a prioritization approach, according to multi-annual Commission working plans. Even the most sophisticated and complex systems such as space technologies or medical devices may be regulated at some stage.

GPP indicators typically measure two dimensions of GPP: implementation and impact. Implementation indicators measure progress in setting up the institutional arrangements for GPP systems, their operational performance, and the market response. Impact indicators measure the contribution of GPP reforms to fiscal, economic, environmental, and social development objectives.

Transforming public procurement practices can play a key role in achieving a greener and more sustainable future in several ways:

- Assessing the total cost of ownership over the life cycle of the product, including energy use, maintenance, and disposal costs, rather than prioritizing the lowest price, which can lead to the selection of products and services that are not environmentally friendly.
- Incorporating environmental and social sustainability criteria into procurement processes, including energy efficiency, carbon footprint, fair labor practices and local sourcing.

Governance

In many countries, the responsibility for procurement-related matters is divided between different ministries, which can impede ambitious policy processes. National efforts to develop GPP goals, policies, tools, and support mechanisms add to the EU-level efforts, creating a complex governance landscape which is difficult for procurement offices to track and can hamper cross-Member State coordination.

The challenge is therefore to promote cooperation and better coordination between public actors to reconcile environmental and economic objectives with procurement policies and practices. The need for coordination is felt at both national and European level. There is a need for greater cooperation between Member States to harmonize approaches and support the uptake of green public procurement.

Stakeholder engagement

Stakeholder mapping can help identify which stakeholders are likely to support GPP reforms, which are likely to oppose them and the reasons for their positions. Although many GPP initiatives may be driven by personal motivations of purchasers who have initiated green tenders on a voluntary basis, the integration of GPP practices into the mainstream requires the cooperation of various stakeholders. These stakeholders include individuals or entities potentially affected by the implementation of GPP reforms, such as government policy makers, the management, and staff of procuring entities, procurement professionals, private sector suppliers and contractors, households, and civil society organizations.

The Green Purchasing Network in Japan serves as a collaborative platform that brings together stakeholders from various sectors, including the private sector, central and local governments, and civil society. Established in 1996 during the early stages of GPP reforms, the Network played a key role in the enactment of Japan's 2001 Green Purchasing Promotion Law. Its primary mission is to promote green purchasing among central and local governments, businesses, and consumers. The Network achieves this by advocating green procurement practices and providing guidelines and resources on sustainable purchasing. Over the years, the Network has evolved to take a more hands-on approach, helping local governments to develop procurement policies, manuals, and training materials. It also manages an online database of green products and services and organizes Green Purchasing Awards to recognize good practice by both manufacturers and consumers.

Regulation

GPP needs to be firmly embedded in procurement legislation. Typically, the legal framework for public procurement provides sufficient flexibility to integrate GPP practices, often through value for money (VfM) provisions. An examination of this framework allows for the identification of appropriate regulatory mechanisms to support GPP. Once a supportive regulatory framework for GPP has been established, the specifics such as its application, scope, approach, and methods can be defined through policy rather than through strict regulation.

In the Republic of Korea, the 2005 Act on Promotion of Purchase of Green Products requires government agencies to purchase products and services with Korea Ecolabels where they have been issued. In China, green procurement was initially voluntary, but since 2007, public entities

have been required to purchase products on the Energy Conservation Product List in nine product categories (computers, monitors, printers, lamps, air conditioners, electric heaters, televisions, urinals, and faucets).

Goals and monitoring

In most of the studied EU Member States, GPP is voluntary beyond the mandatory requirements introduced in EU Directives, making it difficult to spread GPP practices. Most countries have national plans targeting public procurement with some focus on environmental considerations or mention public procurement in national sustainability plans. Monitoring and reporting systems are often an area of weakness in GPP systems. In many countries, monitoring is carried out on an ad hoc basis, if at all.

While GPP is increasingly upheld as a tool to support decarbonization, data is lacking on its practices, impact, and mitigation potential. Monitoring and reporting systems are often an area of weakness in GPP systems. In many countries, monitoring is carried out on an ad hoc basis, if at all. Several countries in East Asia, like South Korea, have put in place more systematic arrangements with sophisticated online monitoring platforms linked to their e-procurement systems.

E-procurement systems can facilitate routine data collection and reporting on GPP practices. E-procurement systems can collect information on tender specifications, the tendering process, and contract performance. The integration of green criteria in routine reporting can facilitate the estimation of environmental impacts.

Carbon benchmarks and targets need to be set at EU level for each product. It is also possible to introduce reward systems at Member State or EU level for the best performing offers.

Examples

Statutory reporting requirements: Japan's Green Procurement Law imposes reporting requirements on central government ministries and their agencies. Each entity must establish and publish an annual GPP plan with procurement targets for the priority products and services defined by the central government in its national GPP policy. At the end of the year, each agency must report on its performance to the Ministry of Environment and publish its results. Local authorities are invited to voluntarily report on their GPP implementation by answering an annual questionnaire.

Dedicated monitoring system: The government of the Republic of Korea monitors GPP implementation across 30,000 procuring entities using its GPIS-I online monitoring system. The system monitors two key GPP indicators: the number of agencies submitting GPP implementation plans and performance reports; and purchases of green products (units and expenditure on eco-labeled products, percentage of green purchases compared to total expenditure in priority product groups).

GPIS-I gathers data from three different data sources:

- 1) Central government procurement through the Republic of Korea's e-procurement system (KONEPS), compiled monthly in an Excel file and integrated into GPIS-I.

- 2) Low-volume purchases through the country's e-shopping mall "Green Market," automatically tracked and transferred to GPIS-I.

Direct procurement by entities using their own systems, tracked by each entity, and manually input into GPIS-I.

Zoom on GPP policies in South Korea and the Netherlands

In examining the current landscape of Green Public Procurement (GPP) practices across various countries, notable differences exist in policy frameworks, mandatory rules, support mechanisms, and monitoring systems. Countries like South Korea and the Netherlands show robust GPP policies, underscored by the development of specialized tools and frameworks.

The Netherlands, for instance, emphasizes Sustainable Public Procurement (SPP), exemplified by its Dutch National Action Plan on Sustainable Public Procurement 2021-2025. This plan focuses on activating internal customers, fostering commitment through a manifesto, sector-specific agreements, and integrated sustainable procurement practices. While not setting specific national targets, the Dutch government aims to mainstream SPP, aligning with overarching sustainable and fair goals such as climate and circular economy targets.

Key tools in the Netherlands include an online GPP criteria search tool called the CO2 Performance Ladder, enhancing procurement transparency and incentivizing environmentally responsible bids. Moreover, the Dutch government employs the DuboCalc software for rapid sustainability assessments in construction projects, integrating environmental considerations into bid evaluation processes.

Crucially, the Netherlands prioritizes monitoring and accountability through tools like the SPP self-assessment tool, ensuring continual evaluation and improvement. Transparency is further promoted through platforms like TenderNed, centralizing procurement information and fostering fair competition among suppliers.

Similarly, the Republic of South Korea strategically employs public procurement to drive sustainable development. Originating with policies favoring veterans' products in 1981, South Korea's GPP journey gained traction with the 2005 Act on Encouraging the Purchase of Green Products. This legislation spurred the development of eco-labeled products, aligning with national priorities for socio-economic and environmental advancement.

South Korea's pioneering use of e-procurement systems, notably KONEPS and the Green Procurement Information System, underscores its leadership in GPP implementation and monitoring. By mandating annual GPP implementation plans and performance reports across all government levels, South Korea ensures systematic progress tracking and accountability.

Furthermore, South Korea's emphasis on eco-labeling schemes and GPP training for public officials reflects a holistic approach to capacity building and market stimulation for green products. The country's commitment to monitoring indicators like green procurement quantity and environmental impact underscores its dedication to sustainable procurement practices.

Life Cycle Costing (LCC) is rarely used in public procurement and public institutions have yet to fully understand its potential value for sustainable procurement. Life Cycle Costing (LCC) and

Ecolabels are integral components of Green Public Procurement (GPP), enhancing the evaluation and selection of environmentally sustainable products and services.

LCC, a methodology assessing total costs over an item's life cycle, aids procurers in making informed decisions by considering long-term environmental and economic impacts. While countries like the United States, Japan, Switzerland, and Norway routinely apply LCC methodologies, simplified frameworks and online tools facilitate its adoption across various product categories, streamlining procurement processes.

Ecolabels, on the other hand, communicate a product's environmental attributes, facilitating easy identification of sustainable options. Nations like Korea and Brazil boast comprehensive eco-labeling schemes, bolstering market demand for green products and incentivizing eco-friendly production practices. The Republic of Korea's Green Product Information System stands out for providing detailed assessments of eco-labels, aiding consumers, and businesses in making environmentally conscious choices.

Overall, the integration of LCC and ecolabels into GPP frameworks promotes sustainability by guiding procurement decisions towards products with optimal environmental performance and market transparency.

In summary, while the Netherlands excels in tools facilitating procurement decision-making and monitoring, South Korea showcases strategic policy development and comprehensive implementation frameworks. Both countries serve as exemplars in advancing GPP practices, embodying the global shift towards environmentally responsible procurement strategies.

3. Methodology of the quantitative analysis

FIGARO & EXIOBASE analysis

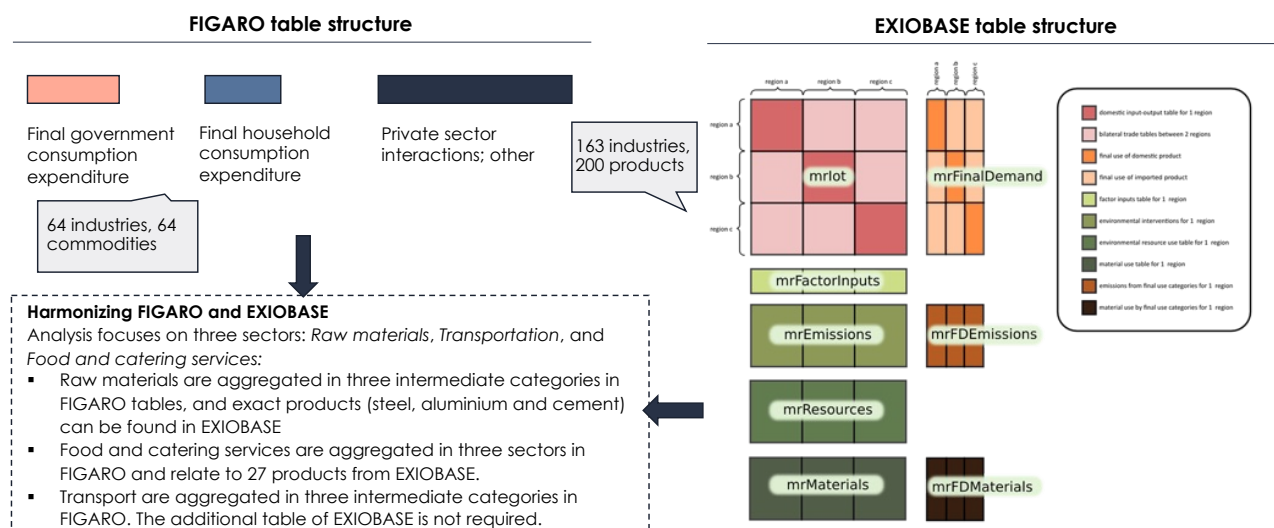
The main analysis is done using socioeconomic and environmental data from FIGARO³¹ and EXIOBASE³² input-output tables. The public expenses from the FIGARO database are analyzed, including:

- Purchases of public-related sectors, accounted for in proportion to the share of public purchases:
 - Public administration and defense; compulsory social security
 - Education
 - Human health activities
 - Residential care activities and social work activities without accommodation
 - Creative, arts and entertainment activities; libraries, archives, museums, and other cultural activities; gambling and betting activities
 - Sports activities and amusement and recreation activities
 - Activities of membership organizations
- Public investments (Gross Fixed Capital Formation) for construction are counted in proportion to the share of public investments.

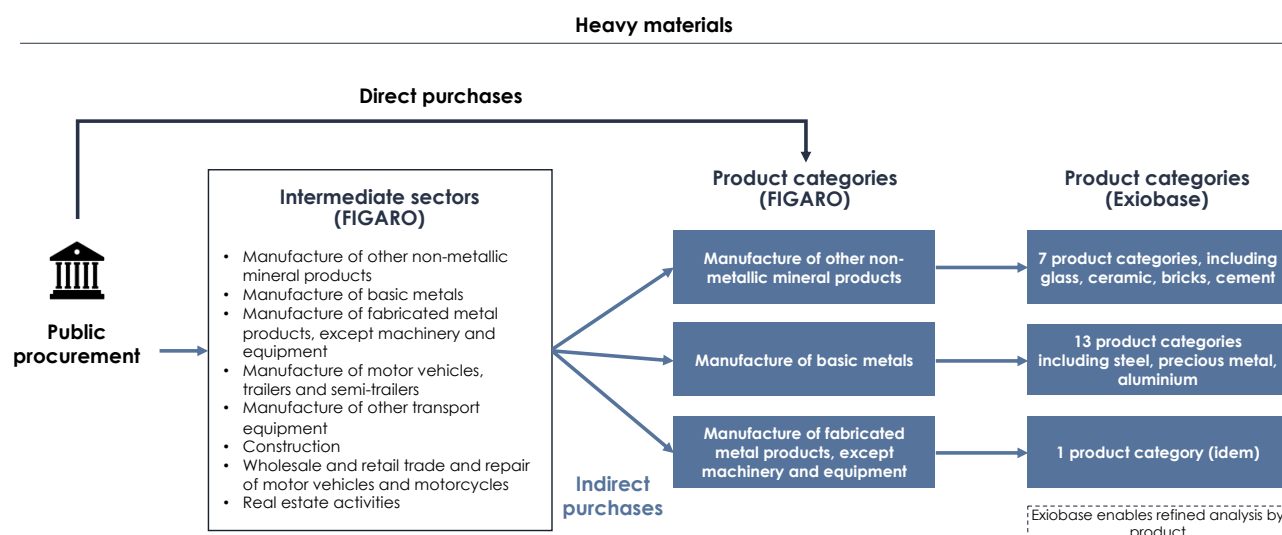
³¹ <https://ec.europa.eu/eurostat/web/esa-supply-use-input-tables/information-data#figaro>

³² <https://www.exiobase.eu/>

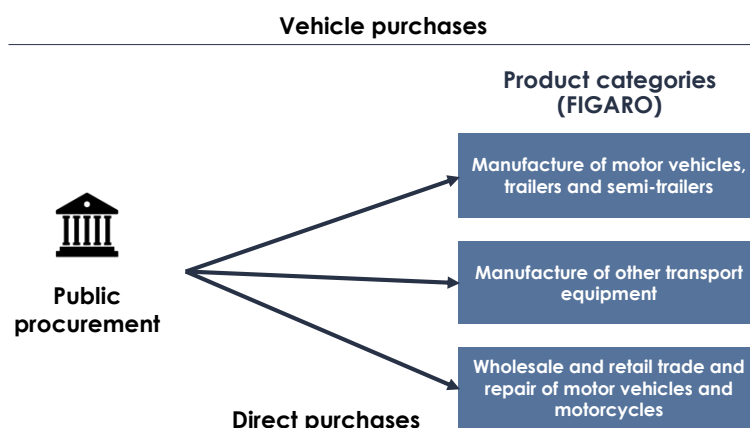
The FIGARO data is aggregated by large product or service categories, therefore EXIOBASE is used to refine the analysis and have more details per product. This is done for each relevant sector from FIGARO.



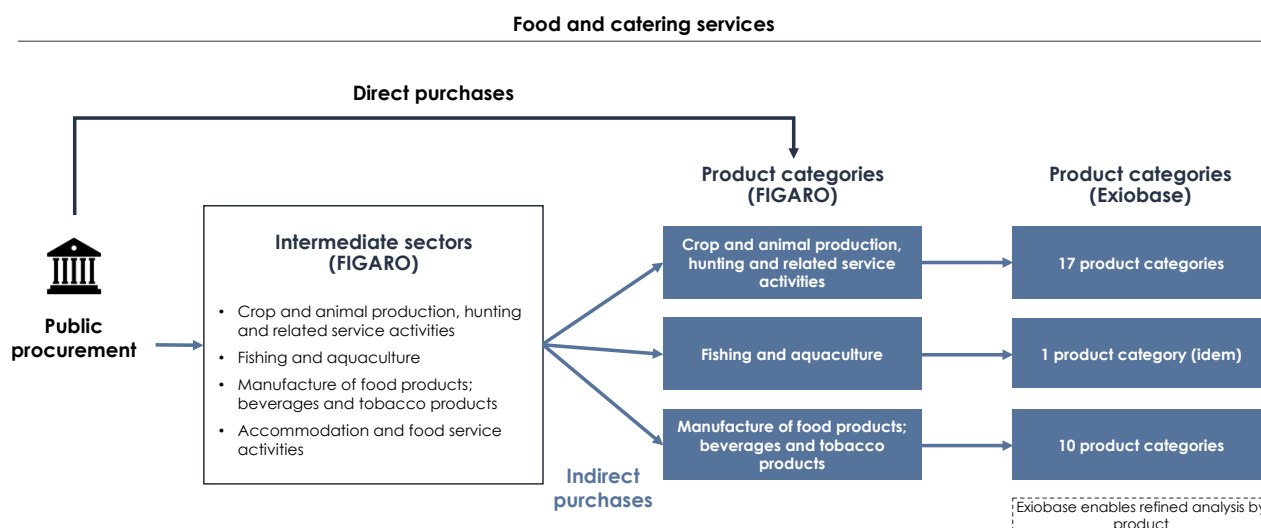
The figure below gives an overview of the intermediate and product sectors selected from FIGARO for the heavy materials category. If public procurement buys from an intermediate sector, there is an indirect purchase to the product categories. The column on the right shows the EXIOBASE categories used to refine the large FIGARO product categories.



For transport, the following FIGARO categories are included. Only direct purchases from FIGARO are included and EXIOBASE was not required for a more detailed analysis.

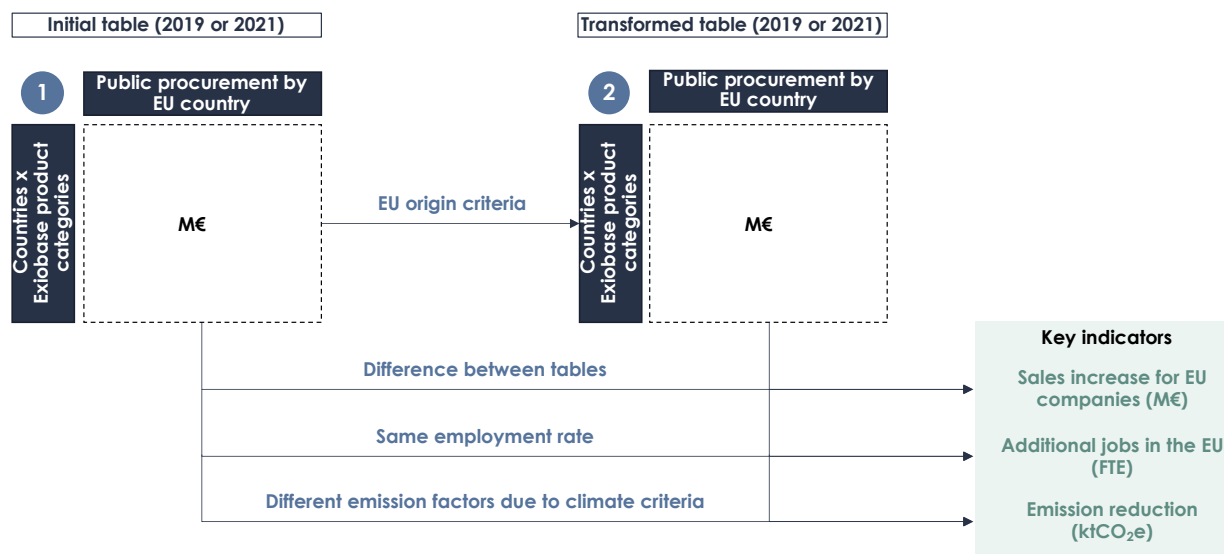


Lastly, the Food and catering services category uses both intermediate sectors and EXIOBASE product categories.



The methodology for calculating key indicators is illustrated in the figure below. The combined tables of FIGARO and EXIOBASE data per country are transformed by applying the locality criteria. Subsequently, different emission factors are applied to this new table depending on the climate criteria. By comparing the original table and the modified table, the results for the different key indicators are obtained.

Approach to calculating indicators based on FIGARO & Exiobase data



Complementary analysis

Complementary to the FIGARO analysis, four analyses were done to understand the impact of BESA: Manufacturing emissions of EV's, emissions of building use, and manufacturing of PV panels and wind turbines.

In the analysis on the transport, the impact of carbon intensity criteria on Electric vehicles is calculated, and the impact of the procurement of 'clean' vehicles in 2019 and 2021. For these complementary analyses different sources are used next to FIGARO and EXIOBASE. For the analysis of the manufacturing of electric vehicles and buses, the number of EV sold per country is taken from the IEA EV data outlook. The emission reduction is calculated by using European battery carbon emission intensities and low-carbon manufacturing emission factors for steel and aluminium.

For the second analysis, the effect of the Clean Vehicle Directive is calculated by applying its criteria to all public purchased vehicles in Europe in 2019 and 2021. This is done by using the new passenger, light commercial, medium and heavy-duty vehicle registration from the ACEA, the European Automobile Manufacturers' Association³³. The French government statistics database provides the public procurement share of total new vehicle registration. This ratio from the French Statistics agency is applied to each country³⁴.

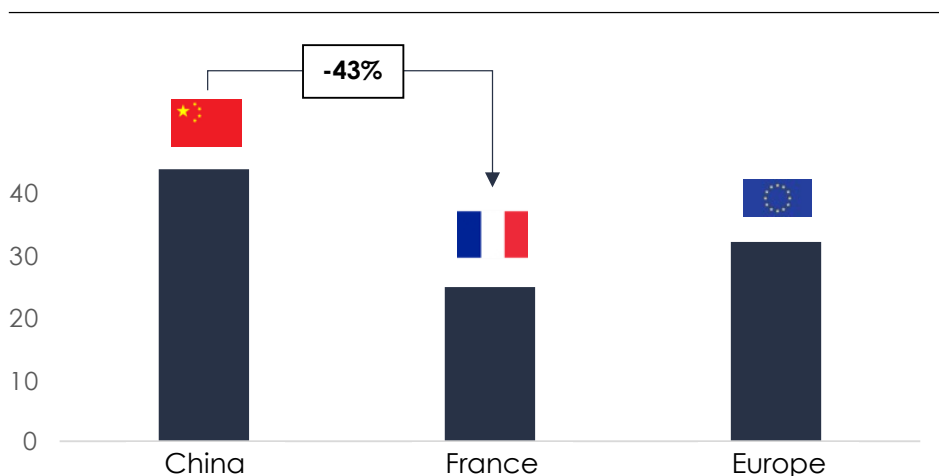
The analysis on buildings focuses on the energy intensity of the energy use of new buildings. The energy used in new public procured buildings is calculated with specific energy intensity country data from CRREM (Carbon Risk Real Estate Monitor). CRREM data provides energy and carbon emission intensities per square meter. Moreover, specific data per type of building and per country is available. Stricter carbon intensities are introduced for all building type and all EU countries.

³³ <https://www.acea.auto/>

³⁴ Ministère de la transition écologique : Données sur le parc de véhicules en circulation au 1er janvier 2022

The last analysis is focused on the technologies enabling the energy transition, PV panels and wind turbines. The objective is to quantify the impact of a reduction of the carbon intensity of the manufacturing. Carbon emissions for the manufacturing of PV panels can differ greatly depending on the electricity mix of the country of production, as can be seen on the graph below. The manufacturing emissions of wind turbines depend significantly on the steel and aluminium emissions. The criteria on the heavy materials are used on the manufacturing of wind turbines, while the average emission factor for solar panels depending on the country of origin³⁵ is used to calculate the effect of the criteria. The analysis is applied on the renewable energy capacity (MW) added in European Union countries in 2019 and 2021³⁶.

Emissions related to the manufacturing and transport of solar panels by panel origin (in gCO₂-eq / kWh)



³⁵ ADEME

³⁶ Our World in Data



Carbone 4 is the first independent consultancy specialised in low carbon strategy and adaptation to climate change.

Constantly on the lookout for low amplitude signals, we deploy a systemic view of the energy-climate issue and put all our rigour and creativity to work to transform our clients into leaders in the climate challenge.

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