DeCarb-Pro

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DeCarb-Pro
Decarbonise public procurement in NWE – account for the future

Deliverable 1.1.1

Targeted inventory of experiences and opportunities of CO_2 pricing in local procurement in PP regions

June 2024

DeCarb-Pro partnership

Climate Alliance Netherlands (Lead Partner) | Climate Alliance | South East Energy Agency (SEEA) | Municipality of Amsterdam | City of Essen | City of Paris | Arnhem-Nijmegen Green Metropolitan Region | Foundation HIER Klimaatbureau | Strasbourg Eurometropolis | Climate Agency Wiesbaden | Flux50 | Climate Agency Strasbourg

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Executive Summary

This deliverable aims to inform and support public authorities and stakeholders who are interested in understanding the meaning and opportunities of the integration of carbon pricing into public procurement. For this purpose, authors screened, identified and consolidated the current literature available, and gathered info on existing carbon pricing activities, together with available instruments like the Dutch CO_2 Performance Ladder and the French I4CE climate budgeting method, through a survey (see Appendix) sent to all partners.

This deliverable is structured in the following sections:

- Introduction to carbon pricing, challenges and key observations
- Existing experiences in NWE
- Tools available

The results of this investigation will feed into *Activity 1.4 Develop a common strategy: How can LAs include carbon pricing in procurement activities*.

1. Why carbon pricing

BOX I – Why put a price on carbon?

By putting a price on carbon and other GHG emissions, public authorities can:

Raise the local authority budget through generated revenues. Carbon pricing revenues present opportunities to address unique challenges towards local energy reduction and achieve economic and environmental gains.

Anticipate future changes. In the coming years, there will probably be more mandatory forms of carbon pricing. By starting now with voluntary carbon pricing, public authorities and organizations can already prepare for the impact of mandatory CO_2 pricing.

Bring innovation in all project phases. Carbon pricing helps to reduce GHG emissions throughout the several phases and components needed to successfully implement and monitor a project, stimulating innovation within enterprises and LAs.

Make climate action fairer. Pricing forces those most responsible for causing climate change to take on the greatest financial responsibility for change.

Raise revenues for just climate action. Standards, taxes, trading systems and other tools have the potential to bring in significant funding, which can enable the implementation of climate actions including vulnerable and low-income groups.

Accelerate private-sector transitions to net zero. It sends a clear signal to major emitters, such as large building owners and polluting industries, on the need to change their practices.

Force greater disclosure and awareness about the carbon footprint of organisations, buildings, activities and more. Measurement and disclosing emissions as part of pricing schemes can itself improve transparency and accelerate action, as well as inform climate policy.

Trigger national or global action by demonstrating the viability of pricing policies.

Reduce costs of climate change. The longer we wait to reduce our emissions, the more expensive it will become. Carbon pricing is emerging as an efficacious, cost-effective and equitable key mechanism for speeding up the transition to a low-carbon economy.

Mitigating climate change requires a rapid reduction of greenhouse gas (GHG) emissions. Carbon pricing, the pricing of GHG emissions, is one of the policy instruments in the government's toolkit to pursue the path to a climate neutral society and is mainly advocated because of its high effectiveness and efficiency (Goulder & Parry, 2008; Baranzini & Carattini, 2017; Stiglitz et al., 2017).

In Europe, the first steps towards a carbon price have already been taken in several countries, where the issue of emission rights has led to a market price for CO_2 emissions (the European Emission Trading System or EU ETS).

The amount of carbon pricing schemes is increasing in EU and around the world. The [World Bank](https://carbonpricingdashboard.worldbank.org/what-carbon-pricing) report *State and Trends of Carbon Pricing 2023*[1] states that **there is a growing consensus among both governments and businesses on the fundamental role of carbon pricing in the transition to a decarbonized economy**. Furthermore, it shows that governments are prioritizing direct carbon pricing policies to reduce emissions, even in difficult economic times. **In most cases, carbon pricing is also a source of revenue, which is particularly important in an economic environment of budgetary constraints**[2].

As of 2024, 50 countries and 39 subnational jurisdictions globally directly price carbon, covering over 12.8 $GtCO_2e$ and representing 24% of global GHG emissions (World Bank, Carbon Pricing Dashboard)[3].

There are 75 instruments implemented, of which 36 are emission trading systems (ETSs), and 39 are carbon taxes (see Figure 1). Carbon prices range from US$ 0.46/tCO_2e to US$ 167/tCO_2e, with most of the regulated emissions priced below US$ 50/tCO_2e (see Figure 2). The cumulative value of carbon pricing initiatives alone was US$ 104 billion in 2023 (World Bank, 2024)

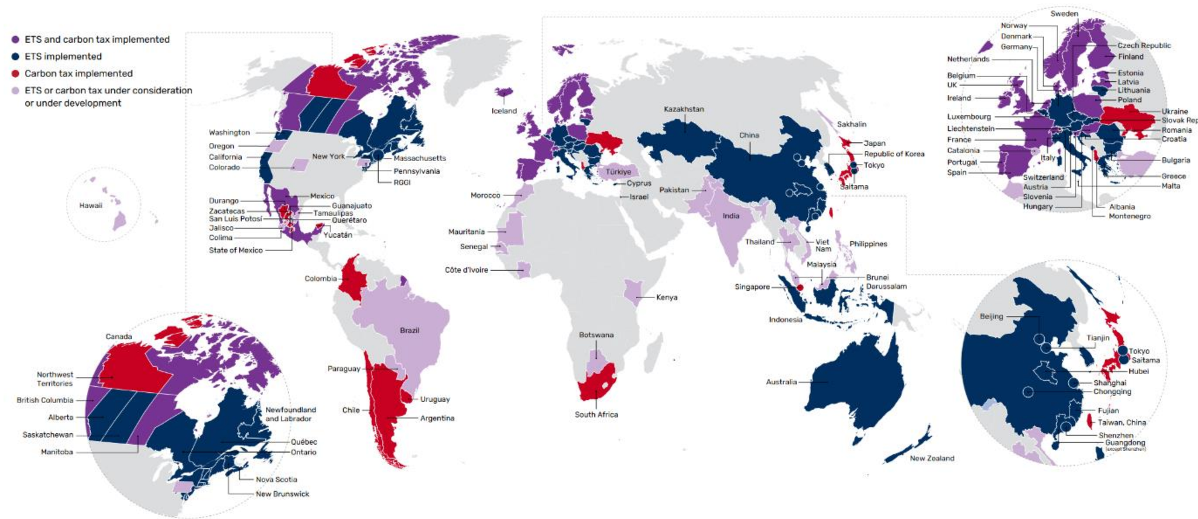

Figure 1 - Map of carbon taxes and ETSs. Source: World Bank, 2024 - https://carbonpricingdashboard.worldbank.org/compliance/instrument-detail).

[1] https://carbonpricingdashboard.worldbank.org/what-carbon-pricing
[2] https://carbonpricingdashboard.worldbank.org/what-carbon-pricing
[3] https://carbonpricingdashboard.worldbank.org/compliance/instrument-detail

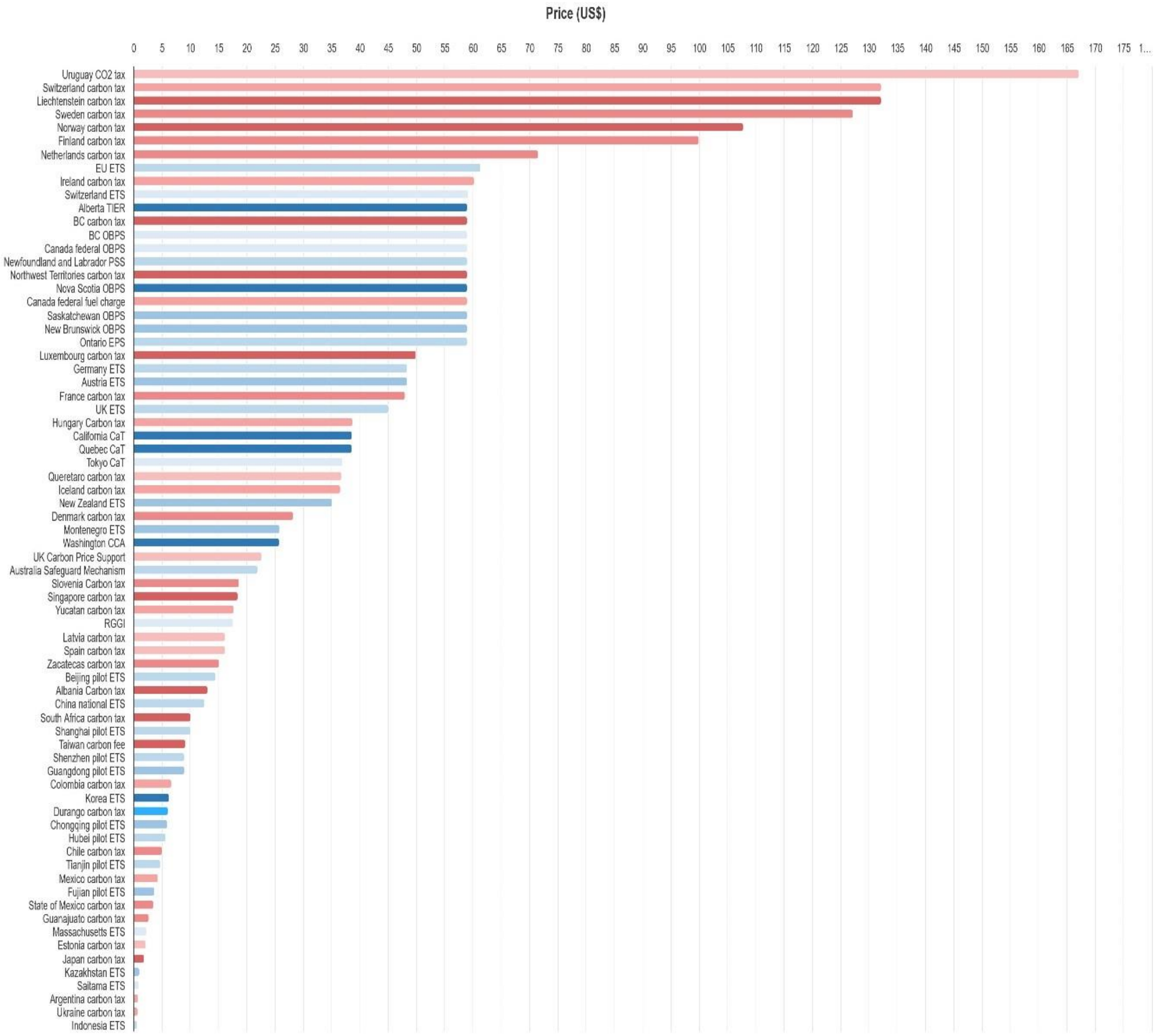

Figure 2 - Prices in ETSs and Carbon taxes in 2024 in US$/t$CO_2$e. Source: World Bank, 2024

Reasons behind a price on carbon lie in the principle to internalise all costs in the final price of products and services produced and provided within the market. Besides the standard costs (administration and management, raw materials and energy, taxes, etc.), it is necessary to include external costs (or shadow costs) generated by the whole production/service cycle, such as environmental and social costs.

These external costs reflect the socio-economic impact that will occur based on expected climate change, translating the expected social-environmental damage into economic costs (Figure 3). For example, how much damage is caused by sea level rise and what does it cost to limit that damage? Or, how much does it cost to adapt cities and dwellings to a changing climate? What is the impact on people's health, their productivity and medical costs? What do these damages mean for our environment and economy?

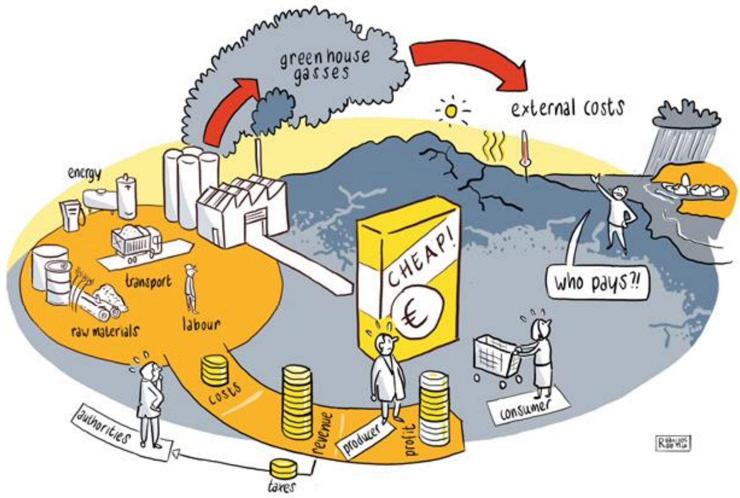

Figure 3 - Accounting for the future. Source: The price of climate (Klimaatverbond Nederland, 2020).

Carbon pricing mechanisms have a profound impact on industries, public authorities, and economic sectors, influencing investment decisions, production processes, and overall competitiveness. The economic consequences of carbon pricing extend beyond emission reductions, shaping the landscape of businesses.

Governments, the private sector, and others are thinking about carbon markets and pricing in increasingly sophisticated ways. Direct carbon pricing is being viewed through a broader lens, not only as a key mitigation policy but also as a tool to raise revenue, drive innovation, and help deliver on broader sustainability and development goals.

Internal carbon pricing is not limited to the internal policies of public authorities. Carbon pricing can also be applied to the procurement of products and services, leading to an effective climate policy. When assessing offers, the public governments (such as towns, cities, metropolitan cities, regional governments) can use carbon pricing to include both the quality requirements and the level of CO2 emissions in decision-making. It buys a product or service, and it buys emission reduction. The total costs – cost price minus saved climate costs - then determine the choice for the 'best' product and the 'best' provider. For example, a product or service with a higher cost price in the tender can still be cheaper because it causes less CO_2 emissions[4].

The increasing consensus on carbon pricing is visible also in the **private and business sector**. Many sustainable frontrunner businesses already use internal carbon pricing to anticipate the impact of

[4] https://carbonpricingdashboard.worldbank.org/what-carbon-pricing

future mandatory carbon prices on their operations and as a tool to identify potential climate risks and revenue opportunities[5]. Long-term investors use carbon pricing to analyse the potential impact of climate change policies on their investment portfolios, allowing them to reassess investment strategies and reallocate capital toward low-carbon or climate-resilient activities[6].

1.1 Challenges associated with carbon pricing mechanisms

Several challenges are associated with carbon pricing mechanisms. We identified the following ones.

- **Setting the right price.** Determining the optimal carbon price that reflects the true cost of emissions while not impeding economic growth is a delicate balancing act.
- **Public resistance** represents an important factor for the political reluctance to implement more ambitious carbon pricing policies. Many people are not aware of or do not believe in the positive impact of carbon pricing or at least underestimate it[7].
- **Low level of socio-political support** for carbon pricing measures, due to the entrenched commercial interests of certain business actors.
- **Potential impact on industries and international competitiveness**. Industries with high carbon intensity may face increased production costs, potentially leading to concerns about competitiveness in the global market. Research suggests that balancing the need for emission reductions with the preservation of economic competitiveness requires careful policy design, including provisions for affected industries and international collaboration.
- **Equity and social impacts**. By increasing the costs of carbon-intensive products such as energy and transport, low-income individuals can be disproportionately affected.
- Difficulties in accurately quantifying carbon emissions can make it difficult to **assess the appropriate level of carbon pricing**, as it will be difficult to calculate and monitor the Baseline Emission Inventory and the reduction achieved.
- **Changing economic (and political) perspective.** Human and economic perspectives are the main target for most public administrators. Carbon pricing indirectly introduces a way of thinking based on environmental (and social) perspective.
- **Collaboration between different city departments**. The implementation of carbon pricing in procurement usually requires extensive collaboration between the sustainability and procurement departments. Currently, this is not always the case, especially within the larger organisations, where it can be hard to know or identify who is working on similar projects or processes. Different departments sometimes speak a 'different language', or they simply do not come into contact that easily.

[5] https://carbonpricingdashboard.worldbank.org/what-carbon-pricing
[6] https://carbonpricingdashboard.worldbank.org/what-carbon-pricing
[7] Thalmann, 2004; Kallbekken & Sælen, 2011; Carattini et al., 2017; Baranzini & Carattini, 2017; Bergquist et al., 2022; Douenne & Fabre, 2022; Ewald et al., 2022.

Further details on barriers associated with carbon pricing into public procurements are described in the *DeCarb-Pro Deliverable 1.1.3 - Conclusions on administrative and legislative barriers*.

1.2 Key observations to apply carbon pricing on public procurement

In order to apply carbon pricing in public procurement, we identified the following key observations.

- Understanding the cultural, political, institutional and economic drivers and conditions of **public acceptability of carbon pricing** is crucial to start with the process.
- Given the creation of the new EU emissions trading system (EU ETS2) from 2027 onwards, **carbon pricing will become increasingly relevant in both policy and public debate**. In addition to the EU ETS, countries can develop their own carbon pricing policy, with a higher price level.
- **Procurement is not the only process where methods to reduce CO_2 add value**. Before a tender process is started, investment decisions have to be taken and designs will be made on a drawing board. All these earlier processes are of importance, to arrive at a successful tender comprising of sustainable goals. Furthermore, on execution of the contract tendered, one wants to have tools to measure and monitor the success of obtaining the sustainable goals, envisaged by the tender.
- **Policy consistency is crucial**. To enhance the efficacy of carbon pricing, local, regional and national authorities should **integrate it into a comprehensive strategy** (eg. National Energy and Climate Plans, Regional Climate and Energy Strategies, Local climate and energy action plans). Ensuring consistency and coherence with other environmental and economic policies is crucial for effective carbon pricing, which should encompass supportive measures including just-transition policies to assist low-income households and vulnerable workers.

2. Carbon pricing in the EU policy agenda

In July 2021, the European Commission adopted the European Green Deal for reducing greenhouse gas emissions by at least 55% by 2030, compared to 1990 levels. **Carbon pricing is an important element in the EU Green Deal**. Currently, only certain businesses in the energy and heavy industry sectors pay for their emissions, and they do so under the **EU Emission Trading System (EU ETS)**.

The EU ETS, established in 2005, still represents a central pillar of the EU's climate change strategy, and a crucial mechanism for cost-effectively reducing GHG emissions from the regulated sectors. The system covers approximately 45% of emissions from energy, manufacturing, and intra-EEA aviation. The EU ETS evolved through different phases, as summarized below.

The **first phase** of the EU ETS (pilot phase, 2005-2007) primarily focused on data gathering, learning, and building the proper infrastructure for monitoring GHG emissions, reporting, and verification.

The **second phase** (2008-2012) coincided with the first commitment period of the Kyoto Protocol, where emissions reduction goals had to be met by the Member States.

The **third phase** (2013-2020) produced the following adjustments of the EU ETS:

- creation, through a single Union Registry, of a centralized system;
- single EU-wide emissions cap in place of the previous framework of national caps;
- auctioning as the default method for allocating allowances;
- inclusion of installations for carbon capture, transport, and storage. The production of petrochemicals, ammonia, nonferrous and ferrous metals, gypsum, aluminium, as well as nitric, adipic, and glyoxylic acid (various thresholds) was also included;
- establishment of a carbon leakage list that enabled installations in sectors considered to be exposed to a risk of carbon leakage to obtain a higher proportion of the free allowances; and 300 million allowances set aside to support innovative renewable energy and carbon capture and storage (CCS) technologies through the NER 300 initiative.

The **current fourth phase** of the EU ETS (2021-2030) aims to increase the pace of emission reductions, create better-targeted rules on carbon leakage, and finance low-carbon innovation.

An **additional reform** was developed (2023 revisions of the ETS Directive), **establishing a new emissions trading system named ETS2**, separate from the existing EU ETS.

This new system will cover and address the CO_2 emissions from fuel combustion in buildings, road transport and additional sectors (mainly small industry not covered by the existing EU ETS). The carbon price set by the ETS2 will provide a market incentive for investments in building renovations and low-emissions mobility. The ETS2 will become fully operational in 2027, with a carbon price ceiling of €45/t CO_2 emitted that will apply for the first three years (2027-2030).

3. Different forms and shapes of carbon pricing

Carbon pricing can take different forms and shapes distinguishing between a notional or real application on the one hand, and between an internal or external focus on the other (Figure 4):

- **Notional (left side)**: here, no direct cash flows are prompted. The carbon price serves, for example, to help create awareness and insight into what the organisation's GHG emissions mean in financial terms. It can help to give GHG emissions a firmer position in decision-making processes;
- **Real (right side)**: in this application, direct cash flows *are* generated. Therefore, this form of carbon pricing has a more direct impact on the economy, for instance by introducing a tax or emissions trading scheme like EU ETS;
- **Internal (bottom)**: focusing on the own, internal organisation, for example by doing carbon accounting on the budget, besides the normal accounting;
- **External (top)**: when parties outside of the own organisation (such as contractors in a tender process) are involved in the process.

In practice, carbon pricing is composed by a combination of two elements, e.g. notional and external, or real and internal. This creates four types of carbon prices.

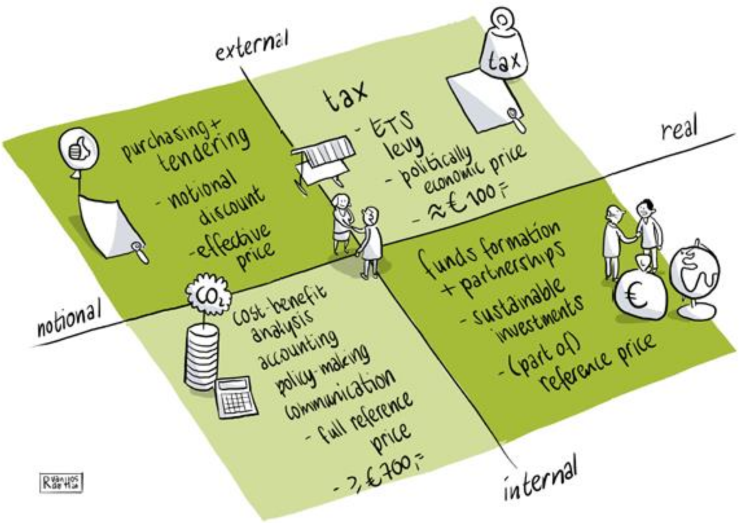

Figure 4 - Quadrant carbon pricing approaches. Source: Accounting for the future. The price of climate (Klimaatverbond Nederland, 2020).

- An **Emissions Trading System (ETS)** is a system where emitters can trade emission units to meet their emission targets. To comply with their emission targets at least cost, regulated entities can either implement internal abatement measures or acquire emission units in the carbon market, depending on the relative costs of these options. By creating supply and demand for emissions units, an ETS establishes a market price for GHG emissions. The two main types of ETSs are cap-and-trade and baseline-and-credit:

  - **Cap-and-trade systems**, which apply a cap or absolute limit on the emissions within the ETS and emissions allowances are distributed, usually for free or through auctions, for the amount of emissions equivalent to the cap.
  - **Baseline-and-credit systems**, where baseline emissions levels are defined for individual regulated entities and credits are issued to entities that have reduced their emissions below this level. These credits can be sold to other entities exceeding their baseline emission levels.
- A **carbon tax** directly sets a price on carbon by defining an explicit tax rate on GHG emissions or—more commonly—on the carbon content of fossil fuels, i.e. a price per tCO$_2$e. Notable examples include Sweden's carbon tax, initiated in the early 1990s[8]. It is different from an ETS in that the emission reduction outcome of a carbon tax is not pre-defined but the carbon price is. Several countries have successfully implemented carbon taxes, providing valuable insights into their efficacy.

  Concerning DeCarb-Pro countries, in Ireland a carbon tax was introduced in 2010 (see chapter 5.2), and in France there is a domestic consumption tax on energy products, on natural gas and on coal (see chapter 5.4).

- A **crediting mechanism/incentive fund** designates the GHG emission reductions from project- or program-based activities, which can be sold either domestically or in other countries. These credits can be used to meet compliance under an international agreement, domestic policies or corporate citizenship objectives related to GHG mitigation.
- **Internal carbon pricing** is a tool an organization uses internally to guide its decision-making process in relation to climate change impacts, risks and opportunities.
  - For **governments**, the choice of carbon pricing type is based on national circumstances and political realities. In the context of mandatory carbon pricing initiatives, ETSs and carbon taxes are the most common types. ETSs and carbon taxes are increasingly being used in complementary ways, with features of both types often combined to form hybrid approaches to carbon pricing.
  - GHG emissions can also be indirectly priced through other **policy instruments** such as the removal of fossil fuel subsidies and energy taxation.
  - The research shows that corporate adoption of carbon pricing is rising, with the number of **companies** using or planning to use an internal carbon price increasing 80% over just five years. This includes nearly half of the world's 500 biggest companies. Some companies use the carbon price they face in mandatory initiatives as a basis for their internal carbon price. Some companies adopt a range of carbon prices internally to consider different prices across jurisdictions and/or to factor in future increases in mandatory carbon prices[9].

Three main approaches to set the internal carbon price

[8] https://www.government.se/government-policy/swedens-carbon-tax/swedens-carbon-tax/
[9] https://www.cdp.net/en/research/global-reports/putting-a-price-on-carbon

- **Estimates of the social cost of carbon**: the social cost of carbon reflects the value of global damages caused by a ton of GHG emissions. This approach is subject to a high level of uncertainty as it relies on forecasts of the state of the economy, demographic changes and the cost of adaptation measures.
- **Estimates of the marginal abatement cost**: the internal carbon price can be derived from the marginal abatement cost of meeting a national emission reduction target. Estimates of this cost are based on expectations of the cost of emission reduction technologies.
- **The current and estimated future market values of emissions allowances**: internal carbon prices can also be based on the market prices of emissions allowances.

In the first case, we need to avoid reaching the 2°C global warming limit by 2050, because reaching this limit would result in significant environmental and social damages that can't be undone. So, each ton of GHG emission bringing us closer to the threshold should be more expensive.

In the latter two cases, the costs of mitigation actions are expected to be higher as the cheaper actions are already put in place. For example, once energy savings measures are put in place in a building, to reduce GHG emissions further, the householder might need to renovate it. In the first case, costs increase as future emissions are expected to cause greater damage for each ton of GHG emitted. In the latter two cases, costs are higher as marginal abatement becomes more expensive over time.

4. Carbon pricing in public procurements

In the European Union, government expenditures on goods, services, and works represented about 15% of the GDP in 2021 (OECD, 2022). Public procurement contributes approximately 15% to worldwide GHG emissions (WEF, 2022). Sustainable public procurement is therefore a critical strategy to support the reduction of GHG emissions related to government activities.

Governments and public authorities can also use internal carbon price for GHG emission reduction and decision making purposes, including decisions in the context of procurement and tendering, such as assessing the climate impact of investments on infrastructure in project appraisals.

Using carbon pricing into public procurement means determining the GHG emissions associated with the supply chain of the product or service object of the procurement, multiplying these by a carbon price and then factoring these carbon costs into decisions on tender bids or using them internally to steer cash flow decisions[10]. It can be applied in different forms, such as for information purposes, as a financial steering instrument, or for ranking tender bids.

Carbon pricing can thus be used to steer decisions on product and service procurement towards options with a lower carbon footprint. These include decisions by government departments and agencies, which can use carbon pricing in this way to reduce the footprint of their activities.

Procurement departments or agencies can use internal carbon pricing in different forms.

- It can be applied for **information purposes**, using publicly available data to calculate the carbon costs of the product and get an idea which product have the biggest carbon footprint. This will allow the procurement department to get an overview of the carbon impact of changes in the catering assortment in the company restaurant, for example, or buying refurbished instead of new office furniture, without distinguishing between suppliers.
- It can be applied as a **financial steering instrument**. Based on the (estimated) carbon footprint of all the goods and services procured, an organization can calculate the attendant carbon costs and actually pay these, through payment into a ‘climate fund’, for example, which the organization can then use to invest in carbon-cutting projects.
- It can be applied for **ranking tender bids**. Tender offers are evaluated on the specific carbon footprint of the product, service or work they are supplying, possibly with reference to a minimum criterion. For fair comparison of footprints, it is important that the same assumptions and choices are employed in all calculations (eg. using a full life cycle assessment (LCA) or Product Category Rules (PCR) for standardized carbon footprint calculation). In the construction and civil engineering sector, PCR are already in use for systematic calculation of a product’s climate footprint (as well as other environmental

[10] https://klimaatverbond.nl/wp-content/uploads/2020/12/CE-Delft.-2020.-CO2-beprijzing-bij-provincies-Eindrapport-clusters-catering-meubilair-en-textiel.pdf

impacts) so this can be factored into procurement decisions. In the Netherlands this is already being done, using the Environmental Cost Indicator (ECI, Dutch acronym: MKI) calculated by the so-called SBK method.

During the tender process, local authorities would probably find challenges to award exact CO_2 reduction, as it is difficult to compare reduction rates proposed by the different companies participating (for some companies it is easier to reduce than others, and this could lead to unfair process, against equality principle in procurement laws). Moreover, the evaluation and monitoring of the reduction require expertise and quite many human resources not available in most of local authorities. To overcome those barriers, local authorities can use specific tools - such as the CO_2PL - built on certification on organisational level and third party verification.

The **internalization of shadow costs** represents another approach to link carbon pricing with public procurements. From DeCarb-Pro experience, the municipality of Amsterdam internalizes shadow costs with 3 different methods (see chapters 5.5.1 and 5.5.2):

- Use of CO_2 performance ladder
- Including shadow pricing in internal decision-making
    - Method based on prevention costs
    - Method based on Social Cost Benefit Analysis (SCBA)
- The Environmental Cost Indicator (ECI)

5. Carbon pricing experiences in NWE

In this chapter existing carbon pricing activities, collected in DeCarb-Pro Project Partner countries, are reported, together with available instruments like the Dutch CO_2 Performance Ladder and the French I4CE climate budgeting method.

5.1 Belgium

In Belgium there is no explicit carbon pricing policy (except the EU ETS), but only an implicit carbon price[11].

In the road transport sector fuel excise taxes result in a net carbon price of more than 200 euro per tonne CO_2e, in contrast to the building sector where the price is less than 6 euro per tonne (OECD, 2022).

More than three quarters of all GHG emissions in Belgium are energy emissions, i.e. they occur from the combustion of fossil fuels. The other emissions mostly come from industrial processes, waste and agriculture. 65,5% of the energy emissions are not covered by the EU ETS[12].

CO_2PL implementation in Belgium

Following a successful pilot of the CO_2 Performance Ladder (CO_2PL) in Belgium[13], the tool is being implemented structurally since 2023. The implementation is being coordinated by BENOR in Belgium, in collaboration with SKAO as the scheme owner and manager[14]. Currently more than 17 procuring authorities use the Ladder in their procurement, with approximately 35 tenders having been launched, and 70 organisations gained certification. The pilot was well-received by procuring authorities and companies alike, as confirmed in the evaluation conducted in 2023[15]. Procuring authorities are now developing strategies to structurally implement the CO_2PL in their tenders going forward, with the Flemish Public works and mobility department committing to using the Ladder in all tenders above €5 million from the start of 2025. Some regional authorities already use the tool, while local authorities, like cities and municipalities, are still in discovery phase.

11 https://www.belspo.be/belspo/brain2-be/projects/reports/E4BEL_StateOftheArt_en.pdf
12 https://climat.be/doc/landscape-carbon-energy-pricing-taxation.pdf
13 http://media.co2-prestatieladder.nl/media/2024/CO2%20Performance%20Ladder%20in%20Belgium%20-%20results%20pilot%20phase%20EN.pdf
14 https://www.co2-prestatieladder.nl/en/news-item/benor-coordinate-co-performance-ladder-belgium
15 https://media.co2-prestatieladder.nl/media/2024/CO2%20Performance%20Ladder%20in%20Belgium%20-%20results%20pilot%20phase%20EN.pdf

5.2 Ireland[16]

Irelands Government negotiated an exemption until 2030 for the ETS2 because it has a national Carbon Pricing system established with higher rates than those anticipated by the EU.

The **Irish carbon tax** was introduced in 2010 in the context of a deep economic recession, and it extended its scope to all fuels used in sectors not covered by the EU ETS[17]. The tax initially applied to liquid and gaseous fuels at the rate of €15 per tonne of carbon dioxide (CO_2). It was extended to solid fuels in 2013 (although initially at a lower rate). There were phased increases of the tax to reach €26 per tonne in 2020.

The carbon tax is divided into Solid Fuel Carbon Tax which applies to coal and pet and Natural Gas Carbon Tax, which applies to natural gas supplied to consumers. Mineral Oil Tax applies to petrol, auto-diesel and marked gas oil. Natural gas applied to vehicles falls as well under the Mineral Oil Tax[18].

Revenue from the carbon tax is used to mitigate the impact of higher taxes on vulnerable households and communities, which helps increase social acceptability.

CitizenInformation.ie informs that the **tax rate of carbon emission** is **€56/tCO_2 emitted**[19] on 11.07.2024).

The Organization for Economic Cooperation and Development (OECD) and the International Programme for Action on Climate (IPAC)[20] stated that *Ireland introduced a carbon tax in 2010. It gradually increased its rate and extended its scope to all fuels used in sectors not covered by the European-wide cap-and-trade system. The government committed to progressively raise the carbon tax rate* ***to reach EUR 100 per tonne of carbon dioxide by 2030****, while recycling revenue to prevent fuel poverty, finance climate-related investment and ensure a just transition. This is expected to help reduce greenhouse gas emissions in line with Ireland's targets to 2030 and 2050.* However,
The Economic & Social Research Institute Ireland (ESRI) stated that ***the real cost of carbon, if accounting for its warming impact, is likely somewhere in the range of €150-€200 per tonne***[21]**.**

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[16] credible carbon tax trajectory for Ireland (oecd.org)
[17] Excise Duty rates (revenue.ie)
[18] https://www.revenue.ie/en/companies-and-charities/excise-and-licences/excise-duty-rates/mineral-oil-tax.aspxhttps://www.revenue.ie/en/companies-and-charities/excise-and-licences/excise-duty-rates/mineral-oil-tax.aspx
[19] https://www.citizensinformation.ie/en/money-and-tax/tax/motor-carbon-other-taxes/carbon-tax/#:~:text=is%20carbon%20tax.-,Rates,the%20supplier%20of%20the%20fuel
[20] A credible carbon tax trajectory for Ireland (oecd.org)
[21] https://www.esri.ie/

CO2PL Pilot in Ireland[22]

The Irish Green Building Council (IGBC) is running a pilot in Ireland in collaboration with SKAO to bring the CO_2 Performance Ladder (CO_2PL) to Ireland. As part of the European project to implement the CO_2PL in Europe[23]. The first Irish tenders with the CO_2PL have been published by Transport Infrastructure Ireland (TII)[24]. These first tenders using the CO_2PL in Ireland focus on an Infrastructure project in County Kildare, road construction and management and in tenders for a transport system supply framework, starting with one for roadside telephone supply and installation. Other contracting authorities are interested in using the CO_2PL[25].

[22] https://www.igbc.ie/
[23] https://www.co2-prestatieladder.nl/en/news-item/co2-performance-ladder-be-implemented-europe
[24] https://www.tii.ie/
[25] https://www.co2-prestatieladder.nl/en/implementation-ireland

5.3 Germany

The German government in 2019 adopted its fuels emissions trade law (Brennstoffemissionshandelsgesetz - BEHG), which introduced a CO_2 price on fuels used predominantly for heating and transport as a key instrument to help reach its climate targets. It starts with a fixed price, which increases every year before allowances are auctioned from 2026 onwards.

As well as all EU Member States, Germany participates in the EU ETS, which sets an overall limit on GHG emissions from power stations, energy-intensive industries and intra-European commercial aviation. However, until 2021, GHG emissions from the transport and building heating sectors had no German or EU-wide price. These two sectors largely rely on fossil fuels and were responsible for more than a third of Germany's greenhouse gas emissions in 2022[26].

The national ETS for transport and heating fuels will exist in parallel with the EU ETS and cover the bulk of the GHG emissions not included in the EU ETS.

The German Federal Environment Agency (UBA) developed a methodology to calculate environmental costs (Methodenkonvention 3.0 zur Ermittlung von Umweltkosten)[27]. It considers the current state of research and helps determine environmental pollution costs according to uniform and transparent criteria. The methodology contains methods for estimating environmental costs according to different types of environmental damage (Methodenkonvention 3.0: Methodische Grundlagen[28]), and cost rates (M Methodenkonvention 3.1: Kostensätze[29]). The latter contains best practice cost rates for environmental costs referring to conventional air pollutants, nitrogen, phosphorous, electricity and heat production, transport, agriculture and building materials.

The national CO_2 price for the year 2022 described by UBA is €809/tCO_2[30]. From 2027, the national CO_2 price will be replaced by the EU ETS2 (running separately from the existing EU ETS), which includes emissions in the buildings and transport sectors.

Finally, it worth mentioning that the largest contribution of carbon pricing to a national budget was registered in Germany, where the national ETS and the EU ETS together made up around 4% of government revenue in 2023[31].

[26] https://www.umweltbundesamt.de/themen/klima-energie/treibhausgas-emissionen
[27] https://www.umweltbundesamt.de/daten/umwelt-wirtschaft/gesellschaftliche-kosten-von-umweltbelastungen#methodenkonvention-zur-ermittlung-von-umweltkosten-des-umweltbundesamtes
[28] https://www.umweltbundesamt.de/publikationen/methodenkonvention-30-zur-ermittlung-von-0
[29] https://www.umweltbundesamt.de/publikationen/methodenkonvention-umweltkosten
[30] https://www.umweltbundesamt.de/daten/umwelt-wirtschaft/gesellschaftliche-kosten-von-umweltbelastungen#klimakosten-von-treibhausgas-emissionen
[31] Umweltbundesamt, "New Record Revenue in Emissions Trading: Over 18 Billion Euros for Climate Protection", January 2024, https://www.umweltbundesamt.de/presse/pressemitteilungen/neue-rekordeinnahmen-im-emissionshandel-ueber-18; German Federal Ministry of Finance, "Preliminary Annual

CO_2PL Pilot in Germany

In Germany the CO_2PL will be pilot implemented coordinated by the Collaborative Centre for Sustainable Consumption and Production (CSCP)[32] in cooperation with SKAO. Starting in august 2024 the CO_2PL is expected to be implemented in procurement activities of interested contracting authorities as the Municipality of Dortmund, Municipality of Essen, Autobahn GmbH, the Regions Nordrhein-Westfalen and Rheinland-Pfalz, among others.

Financial Statements of the 2023 Federal Budget", January 2024, https://www.bundesfinanzministerium.de/Content/DE/Pressemitteilungen/Finanzpolitik/2024/01/2024-01-16-vorlaeufiger-jahresabschluss-bundeshaushalt-2023.html

[32] https://www.cscp.org/

5.4 France

France has incorporated forms of carbon pricing in its regulation. First, the EU ETS applies to 20% of France's GHG emissions in 2022, and 80% of its industrial emissions[33]. There is also a carbon component in the domestic consumption tax on energy products (TICPE), on natural gas (TICGN) and on coal (TICC). Since 2019, its price is 44,6 €/tCO_{2e}. Finally, a tutelary carbon price was estimated in 2018 by applying the method of marginal abatement cost (value for 2030 is around 250€/tCO_2e). Other indirect taxes are bound to GHG emissions, like taxes on low-emissions vehicles.

As regards the **carbon component in the domestic consumption tax** on energy products (TICPE), on natural gas (TICGN) and on coal (TICC), the price of 2019 of 44,6 €/tCO_{2e} should have risen to 100€/tCO_2 by 2030. However, due to important social strikes to protest against this raise, in 2019, this carbon tax was frozen to 2019 levels. Indeed, studies show that this tax has more impact for people with low revenues and also for those living in rural areas[34]. More than 90% of firms are exempt from the scheme because they are subject to the EU ETS[35].

The **tutelary carbon price** was estimated in 2018 in the Quinet report[36] by applying the method of marginal abatement cost: the cost of actions needed to reach carbon neutrality by 2050 is estimated to set the value of a tonne of CO_2e. The value for 2030 is around 250€/tCO_2e (Figure 5). The 2018 value was taken into account to set the carbon component on energy taxes but there is no other use of this value in the French regulation so far.

Other indirect taxes are **bound to GHG emissions, like taxes on low-emissions vehicles.**

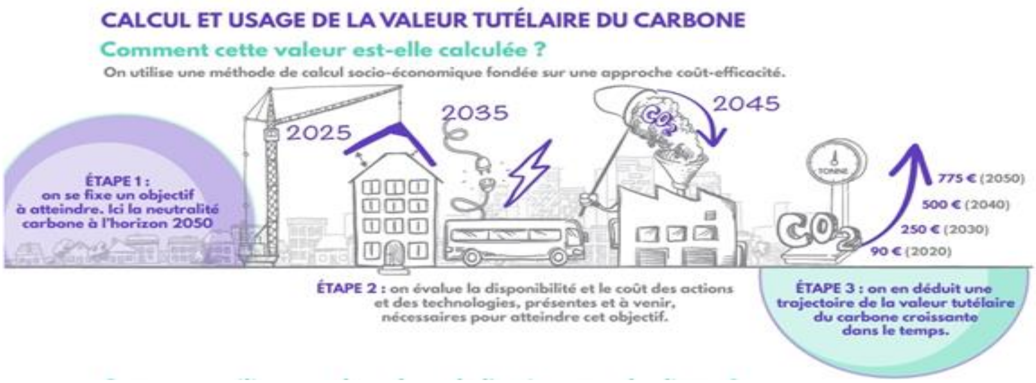

Figure 5 - Steps to calculate and use the tutelary carbon price (France Strategie[37])

[33] https://www.ecologie.gouv.fr/marches-du-carbone
[34] Khan P., Mariton H., Pascal M. (2022). Les outils de regulation economique du carbone (economie.gouv.fr)
[35] COMBET E., JOLIVET P. (2022). POUR UN CONTRAT SOCIAL DE TRANSITION Propositions pour une réforme équitable de la valeur du carbone
[36] https://www.strategie.gouv.fr/sites/strategie.gouv.fr/files/atoms/files/fs-the-value-for-climate-action-final-web.pdf
[37] https://strategie-gouv.tumblr.com/post/182914866862/la-valeur-de-laction-pour-le-climat-cest-quoi

Locally, there is a scheme to promote socially and economically responsible public procurement (in French, SPASER). It was reinforced on July 1st, 2023, to become mandatory for all buyers whose budget is superior to 50 million euros (before the threshold was 100 million euros). From August 21st, 2026, there will be an obligation for all buyers to introduce environmental considerations while shaping the procurement process, at least one environmental criterion and at least one performance conditions that takes account of the environment.

The law states "*Life cycle costing covers, insofar as they are relevant, all or some of the following costs in the life cycle of a product, service or work: […] Costs attributed to environmental externalities and linked to the product, service or work during its life cycle, provided that their monetary value can be determined and verified. These costs may include the cost of greenhouse gas emissions and other polluting emissions, as well as other climate change mitigation costs". The State should also provide buyers with operational tools for defining and analysing the life cycle cost of goods for the main purchasing segments. These tools must be made available by January 1st, 2025, at the latest (article 36 of the law). There is also an obligation to use bio-sourced or low-carbon materials in at least 25% of major renovations and new buildings procured under public contracts. This obligation will come into force on January 1st, 2030 (Article 39 of the law)*[38].

Method for Budget Climate Assessment (BCA)[39]

The budget climate assessment (BCA) is a method developed within a project carried out as a collaboration between I4CE, five local authorities, France Urbaine, and the French Mayors' Association (AMF) to examine the impact on the climate of all expenditure included in the budget of a local authority. It consists of an analysis of the budget line by line, based on a list of actions that are rated highly favourable, favourable, neutral or unfavourable for the climate. The method is compliant with the EU taxonomy, and it addresses the topics of climate (climate mitigation and adaptation) and biodiversity.

The EU Taxonomy regulation, put in place in 2020, is a classification system that defines criteria for economic activities that are aligned with a net zero trajectory by 2050 and the broader environmental goals other than climate. It provides a general framework to tag budget items as green. At national level, **France has experience in green budgeting, conducting green budget tagging, ex-ante environmental impact assessments and ex-post environmental evaluations**[40]. **The budget climate assessment is the first attempt to provide a local application of these approaches.**

[38] Modifications apportées au Code de la commande publique par la loi dite « Climat et résilience » et son décret d'application.
[39] https://www.i4ce.org/wp-content/uploads/I4CE-Budget-climate-assessment-methodology.pdf
[40] Boutron, C. (i4CE). June 2023. Greener, better, stronger: Factors for the successful implementation of green budgeting in EU Member States.

This method is the result of a project carried out as a collaboration between I4CE, five local authorities, France Urbaine, and the French Mayors' Association (AMF). The local authorities associated with the project are the European Métropole of Lille, the Métropole of Lyon, the Eurométropole of Strasbourg, the City of Paris and the City of Lille. The project was jointly funded by EIT Climate-KIC, Ademe, partner local authorities and I4CE. Its development started in 2019.

The aim of a budget climate assessment is to examine the impact on the climate of all expenditure included in the budget of a local authority. It consists of an analysis of the budget line by line, based on a list of actions that are rated highly favourable, favourable, neutral or unfavourable for the climate. The rating of actions was elaborated with the pilot cities and is transparent and based on science. It is compliant with the EU taxonomy. When the impact on climate is uncertain, they are rated as undefined. The results provide a better understanding of the coherence of expenditure with reaching climate goals, so as to make enlightened budget decisions. It can also help analysing opportunities for redirecting expenditures to favourable projects for climate.

The current method addresses climate issues (climate mitigation and adaptation). There is also a method on biodiversity.

The method can be applied to primary budget to give an insight on future expenditures and/or on financial reports (ex-post analysis).

The BCA must not be used for different goals, namely:

- Setting a 'carbon budget', or a limit on greenhouse gas emissions (in tonnes of CO_2) in a region in a given timeframe;
- Setting a 'climate budget', or calculating the budget (in euros) that represents actions planned by a local authority solely as part of its climate policy.

This budget climate assessment exercise cannot be used to compare the efforts (or results) of different local authorities. Indeed, their competencies might differ as well as the management method. However, it should be used internally to monitor developments year on year.

In 2023, 11 out of 13 regions in France applied the method, as well as 30% of French cities. A simplified version of the method is due to become mandatory. In fact, article 191 of the 2024 finance law mentions the obligation for all French local authorities with more than 3,500 inhabitants to append to their budget a statement entitled "Impact of budget on ecological transition". The implementing decree is expected to be published in June 2024.

CO_2PL Pilot in France

Coordinating partner ASEA[41] launched a pilot project with the CO_2 Performance Ladder (*l'Échelle de Performance CO_2*) in France. ASEA specialises in sustainable procurement and has an extensive network in this field. They have established a consortium with OBsAR (*Association pour les achats responsables)*[42] and influential stakeholders from different sectors and amongst them three large pilot organizations committed and ready to start using the Ladder in their tenders: UGAP (the national agency for public procurement)[43], RTE (the electricity transmission system operator)[44], La Poste (the national postal service provider)[45] and RESAH (association for the public health, sector & non profit)[46]. And other interested contracting authorities to follow, e.g. Municipality of Lyon. An Advisory Board has been established with all pilot organizations and the SME PactePME (the French association supporting the SME sector in their decarbonisation strategies)[47].

41 https://www.co2-prestatieladder.nl/fr/mise-en-oeuvre-en-france and https://www.asea.fr/lancement-en-france-de-lechelle-de-performance-carbone/
42 https://www.obsar.asso.fr/
43 https://www.ugap.fr/
44 https://www.rte-france.com/en/home
45 https://www.laposte.fr/
46 https://www.resah.fr/
47 https://pactepme.org/

5.5 The Netherlands

Some experiences of carbon pricing applied by public authorities are available in the Netherlands. The Amstel, Gooi and Vecht Water Authority uses a carbon price of € 875 per tonne CO_2-eq based on the social costs approach (see BOX II – Example from the province of Utrecht), while many other Dutch governmental organisations use the Environmental Cost Indicator (ECI), which includes a carbon price based on prevention costs. The CO_2 prices in the Netherlands are centrally prescribed by the Central Planning Bureau (CPB) and the Netherlands Environmental Assessment Agency (PBL) on the basis of three different WLO (Prosperity and Living Environment) scenarios.

Some experiences of carbon pricing applied by public authorities are available in the Netherlands. The following doesn't represent an exhaustive overview of all Dutch governmental organisations applying carbon pricing. There is also a demand for standardizing and connecting the various sustainability instruments, such as The New Normal (‘Het Nieuwe Normaal’). This standard was created by evaluating construction projects of participating parties. Based on knowledge and experiences of real construction projects, the indicators were examined, the performance levels and the assessment methods were determined.

According to the carbon pricing quadrant (combination of two elements, internal/external and real/notional), figure 6 shows the different forms of carbon pricing already applied. The municipality of Amsterdam appears twice, meaning that they currently apply carbon pricing in multiple ways. In this Figure, there is a distinction between the social costs and prevention costs approach in the upper left quadrant. The Amstel, Gooi and Vecht Water Authority uses a carbon price of € 875 per tonne CO_2-eq based on the social costs approach (see BOX II – Example from the province of Utrecht. Social costs of climate change), while many other Dutch governmental organisations use the Environmental Cost Indicator (ECI), which includes a carbon price based on prevention costs.

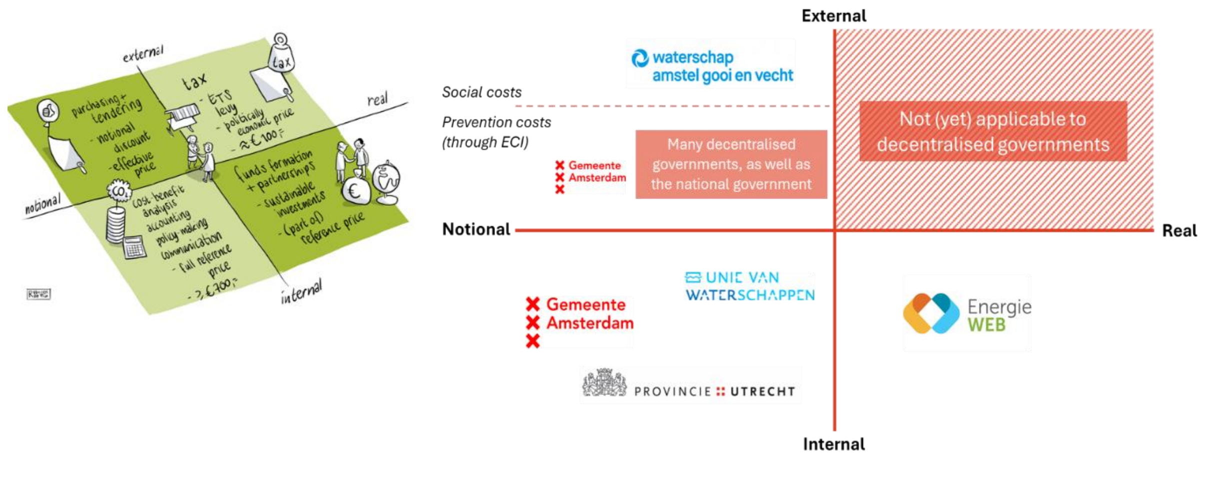

Figure 6 - Use of different carbon pricing forms in the Netherlands (own elaboration).

The **CO_2 prices** in the Netherlands are centrally prescribed by the Central Planning Bureau (CPB) and the Netherlands Environmental Assessment Agency (PBL) on the basis of three different WLO (Prosperity and Living Environment) scenarios drawn up in 2015 (Low, High and the 2°C scenario)[48].

The municipality of Amsterdam has replaced the price from initially used 2°C lower limit scenario, used since 2016, with the price from the 2°C upper limit scenario from April 2023 onwards (Table 1). The Dutch government is expected to revise the prescribed WLO scenarios in 2024 in order to meet the higher ambition within the European context. The price of €1,000 per tonne of CO_2-eq. in 2050 will be more in line with the municipality's objective in 2050 (Table 1 and Table 2).

	Greenhouse gas reduction in the Netherlands in 2030 compared to 1990	Greenhouse gas reduction in the Netherlands in 2050 compared to 1990	Price in €/tCO₂-eq. in 2015 (in 2015 prices)	Price in €/tCO₂-eq. in 2030 (in 2015 prices)	Proce in €/tCO₂-eq. in 2050 (in 2015 prices)
Low	30%	45%	€12	€ 20	€ 40
High	40%	60%	€ 48	€ 80	€ 160
2-degrees lower limit	45%	~80%*	€ 60	€ 100	€ 200
2-degrees upper limit	45%	~95%*	€300	€ 500	€ 1.000

*Table 1 – GHG reduction ambitions, CO_2 prices and different climate scenarios in Amsterdam (CPB & PBL, 2016). * Values are not reported as such in the studies but have been interpreted following consultation between the authors of these studies and the researcher (CE-Delft) who published this table.16b).*

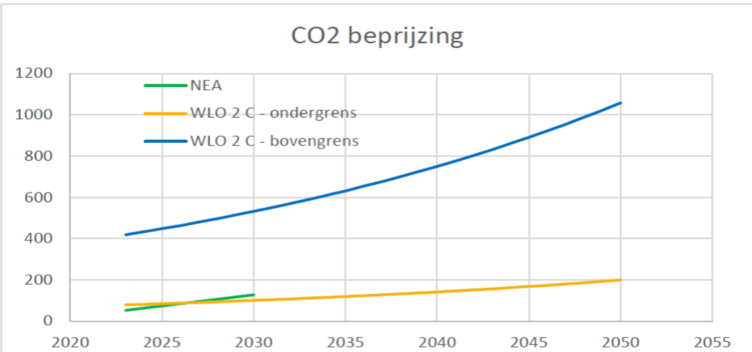

Table 2 - The costs per ton of CO_2-emissions used by the Dutch Emissions Authority (NEA) and the prevention costs per ton of CO_2-emissions for the WLO 2°C lower limit and the WLO 2°C upper limit scenario. The WLO 2°C upper limit scenario is used by the municipality of Amsterdam since April 2023 to determine value creation in investments in sustainable energy and logistics

[48] These scenarios are currently under review, as they originate from before the Paris Agreement and do not take the goals set (and other relevant policy developments) in it into account. The CPB and PBL are set to publish a new set of scenarios by the end of 2024.

Tools for assigning social costs of CO_2-emissions and for sustainability goals

Shadow costs are internalized in the municipality of Amsterdam with two different methods:

- Including shadow pricing in internal decision-making
    - Method based on prevention costs
    - Method based on Social Cost Benefit Analysis (SCBA)
- Environmental Cost Indicator (ECI)

Tool 1 - Including shadow pricing in internal decision-making

The first method is based on **prevention costs.** This relates to the costs that must be incurred to achieve the agreed goal (e.g. a CO_2 reduction or a reduced environmental impact) in the chosen timeline. The most expensive available technology(s) used to achieve the policy objectives are included in the calculation. These costs are then calculated back to today (e.g. with a Net Present Value calculation) in € per unit of the externalized costs (e.g. € / ton of CO_2-emissions). An example of the use of prevention costs can be found in a price determination for a ton of CO_2[49].

The second method is based on **Social Cost Benefit Analysis (SCBA)**, in which the costs and benefits of human actions are no longer externalized. The costs of the damages created by these actions or emissions are calculated. The outcome of a SCBA reflects the willingness of this generation to bear costs now and thus to avoid the costs for future generations. This method often leads to higher values than those calculated with the prevention costs method. This is partly because the costs occurred remain for much longer and lie further in the future. Therefore, the SCBA method is highly dependent on the discount rate, chosen in its calculations. See Box II below with an example from the province of Utrecht.

49 https://amsterdam.raadsinformatie.nl/document/12581888/1/230223+Bijlage+3_BRIEF+afhandeling+motie+Groen+toe
Passingsregel; as discussed in the meeting of the municipal board on 13th of April (#5 on the agenda). https://amsterdam.raadsinformatie.nl/vergadering/1099187

BOX II – Example from the province of Utrecht Social costs of climate change

In the Netherlands, the **social cost benefit analysis (SCBA)** is a well-established method to inform decision-making processes for national, regional, and local governments. SCBAs are often done for infrastructural or area development projects. The idea behind an SCBA is to analyse the broad societal benefits and costs of different scenarios, ranging from effects on area accessibility and travel time to impact on air quality and GHG emissions.

The province of Utrecht conducts SCBAs for infrastructure projects. Questions were raised in the provincial council about the **carbon price level** used in SCBAs, namely that they seemed quite low – €20-80 per tonne CO_2eq – compared to higher price levels suggested in the literature at the time. This resulted in a **decision made by the administration to recalibrate the carbon price level used in SCBAs**. The province commissioned Klimaatverbond to draft recommendations on a new carbon price level, considering several aspects: price level in line with 1,5°C target, references used to establish the carbon price level needed to consider future developments, needed to include a comprehensive description on the various approaches to carbon pricing and the impact of certain choices on the final price level. Klimaatverbond wrote an extensive report on this, based on scientific and governmental documents and interviews with provincial employees. This resulted in the **recommendation: a carbon price level of € 875,- per tonne for the year 2022 to be applied in SCBAs, rising linearly to nearly € 980 in 2050.** Several key choices led to this price level.

The **first** was the choice for the general approach: either prevention costs (only taking into account what is needed to reach the mitigation target(s)) or the social costs (also looking at the damages caused by carbon emissions and the impact on the environment and society). As the application in the province of Utrecht explicitly focuses on the social costs and benefits of certain developments, the social costs approach was viewed as the right fit. Within this approach, Klimaatverbond chose to use the model developed by the German Environmental Agency (Umweltbundesamt) as the baseline (see chapter 5.3).

The **second** key choice was how to weigh the welfare of current generations as compared to the welfare of future ones: either prioritise the welfare of current generations over that of future ones, or give equal weighting. The recommendation was to give equal weighting, on the basis of intergenerational equality.

The **third** important matter was that of so-called tipping points, which are not included in the German model. Tipping points are certain critical points of no return in our global ecological systems, leading to further exacerbate climate change (for example the melting of permafrost because of rising temperatures, resulting in massive methane emissions which contribute to further warming).

Based on the hefty risks related to these tipping points and scientific literature on this, the recommendation was to add a risk premium of 25% to the price level in the German model. All these choices combined led to the final recommendation of € 875,- per tonne CO_2-eq.

This recommendation also included the proposal to update the carbon price level every two years, as to keep it up to date. The province adopted both parts of the recommendation.

This carbon price is currently only used in SCBAs. The province of Utrecht and Klimaatverbond are presently looking into how carbon pricing could also be integrated in other levels and processes of decision-making, including actual procurement and tenders.

Tool 2 - The Environmental Cost Indicator (ECI)

The Environmental Cost Indicator (ECI) - referred to in Dutch as the MKI (Milieu Kosten Indicator) - is a shadow price to quantify the negative effects that any product will have on the environment. It is derived from the Life Cycle Assessment (LCA) method based on the European EN 15804 standard[50]. In the Netherlands a weighing factor is added, in order to compare the different environmental impacts that arise from the EN 15804 standard. The ECI value can be calculated as an indicator for the environmental impact of the scope of a project, which uses an accumulation of products (and processes).

The ECI is expressed in euros. These euros represent a social value, assigned to a number of environmental effects, similar to the monetary values arising from a Social Cost Benefit Analysis (SCBA). These euros are not economical euros in trade (yet).

The lower the ECI value, the lower the environmental impact of (the scope of) the project. The total calculated environmental costs are a quantitative indicator of the environmental impact of the project (amongst others, the greenhouse effect, human toxicity, eutrophication, acidification, ozone layer depletion and eco-toxicity) based on the entire life cycle of the product(s) used in the project.

For the preparation and use of Environmental Product Declarations (EPDs) for the environmental performance of construction works and buildings in the Dutch context, EN 15804 has been included in the Dutch ECI calculation methodology, by means of the LCA calculations and supplemented with scenarios applicable specifically to the Netherlands. Originally developed for buildings, the ECI methodology comprises nowadays of all infrastructural works.

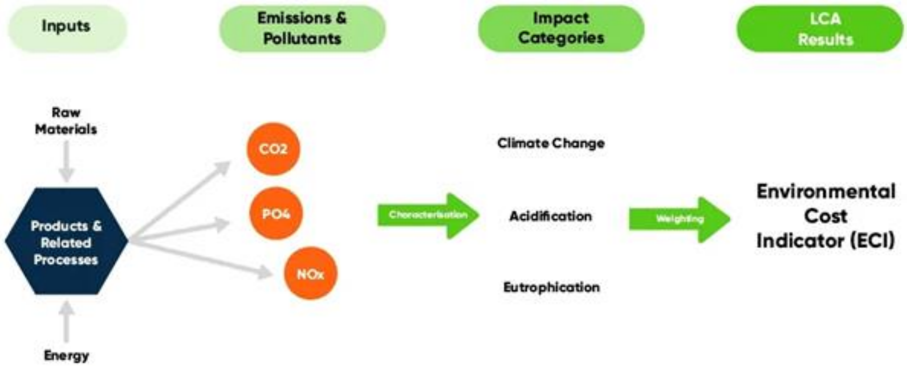

Figure 7 - Environmental Cost Indicator (ECI) Calculation. Source: https://ecochain.com/blog/environmental-cost-indicator-eci/

[50] LCA is a systematic analysis, a set of procedures for compiling and examining the inputs and outputs of materials and energy, and the associated environmental impacts, such as embodied and operational CO2eq emissions, directly attributable to a product, activity, or process throughout its lifecycle according to ISO 14040: 2006, EN-ISO14044-2006+A2-2020, EN15804-2012+A2-2019, and EN15978-2011.
Whereas EN15804-A2-2019 is the standard for Environmental Product Declarations (EPD), a transparent and standardised way of providing data about the environmental impacts of a product through the product life cycle.

The Assessment Method of Environmental Performance of Construction Works[51] (Bepalingsmethode, previously known as SBK Bepalingsmethode) describes how the life cycle analysis (LCAs) should be carried out and which shadow prices should be used per type and unit of environmental effect to arrive at the total ECI value. The Assessment Method is an elaboration for the Dutch context from the international standard EN 15804 and is managed by the Dutch National Environmental Database Foundation (NMD)[52].

Calculating the (total) ECI value is facilitated with the nationally used software program Dubocalc[53]. Dubocalc was developed on behalf of Rijkswaterstaat (the Dutch national road authority) and is used as a software instrument when the environmental impacts of different materials need to be added and/or when the National Environmental Database (NMD) needs to be used.

The use of Dubocalc is not mandatory in all cases. In these situations, a simplified calculation can also be made, for example, in Excel. To perform this simplified calculation in a traceable manner, any Dutch client can provide a mandatory Excel format to be used. Ideally, in that case, the client will have carried out the ECI reference calculation in that same Excel format and will include it with the tender.

[51] https://milieudatabase.nl/milieuprestatie/bepalingsmethode/ (version 1.1 of March 2022 in Dutch)
[52] See Nationale Milieudatabase | environmental performance of buildings
[53] https://www.dubocalc.nl/en

BOX III – Tools for measuring CO_2-emissions and ECI for equipment and materials in Amsterdam

Measuring CO_2 emissions and ECI for Paving materials

Objective of the tool: Map the CO_2 emissions and environmental costs indicator (ECI) caused by the use of new and (re)used paving materials. The indirect emissions and environmental impact due to the purchase of these materials by the municipality of Amsterdam can be monitored in this way.

Usage: The tool comes in an Excel workbook (A web version is presently being developed). You will need to know, how much of which type of paving material will be or has been used in the project and whether it concerns new or reused material. You also need to know what happens to the material released from the project. The CO_2 emissions and the ECI of the used materials are calculated and accumulated over the whole project. In many cases this information can be found in the database incorporated with this tool. If the necessary information is not incorporated, it is possible to add your own data - supported by an Environmental Product Declaration (EPD) - in a propriety data sheet.

Calculation: To calculate the CO_2-emissions, data is used from life cycle assessments (LCAs) of the phases A1-A3 with regard to the GWP (Global Warming Potential) category. The LCAs come from:

1. the producer or supplier,
2. scientific reports or
3. from the Dutch National Environmental Database (NMD)

Measuring CO_2 emissions and ECI for equipment

Objective of the tool: Map the CO_2 emissions and environmental costs caused by the use of equipment on the project site and for the logistics toward and from the project site. The direct emissions and environmental impact due to the use of all equipment by the contractor of the municipality of Amsterdam can be monitored in this way. For the environmental impact also NOx'en and ultra fine particulate emissions (PM10) are being estimated.

Usage: The tool comes in an Excel workbook (A web version is also available nationally[54]). You will need to know how much equipment is used and which type of engine or power source will be or has been used for the project. You also need to map all logistic movements from and towards the project and all use of equipment on the project site. The CO_2 emissions (and NOx) of the used equipment are calculated and accumulated over the whole project. In many cases this information can be found in the database incorporated with this excel tool. Though the web version should provide you with the latest data agreed upon.

Calculation: To calculate the CO_2 emissions, data is used by the Dutch TNO institute. On the Excel sheet a disclaimer is added that the calculations are only indicative, and that actual emission values can only be measured in situ.

[54] https://www.noxestimator.nl/

Procurement Instruments

The municipality of Amsterdam has been improving the sustainability of its public procurements by using and linking specific tools with the procurement processes.

- The CO_2 Performance Ladder
- Environmental Cost Indicator (ECI)
- Internal price for CO_2 emissions

In general, the municipality of Amsterdam finds that the CO_2 performance ladder is mostly used for the procurement of services, goods and works, as it gives an indication of the performance of the company tendering (up to level 3, Scope 1-2 GHG Protocol) and the supply chain in which the company is involved (levels 4-5, including scope 3 GHG Protocol).

Instrument 1 - Using the CO_2 performance ladder in procurement

To apply the CO_2 performance ladder as a quality criterion in a tender, a number of steps should be followed, covering the three phases of policy, tender and implementation.

- **POLICY**

  STEP 1 - POLICY FRAMEWORK FOR THE CONTRACTING AUTHORITY
  Draw up an implementation and policy framework aimed at CO_2 reduction.

  This is the moment in time when choices are being made about the procurement strategy of the organisation. In which (type of) projects to procure sustainable to stimulate CO_2 reduction? Part of this is the choice whether to request the CO_2 performance ladder as a MEAT (quality) criterion.

  STEP 2 - CONSIDERATIONS OF THE USE OF THE CO_2 PERFORMANCE LADDER

  Consider for each tender whether the use of the CO_2 Performance Ladder makes sense for the specific project. The CO_2 performance ladder is requested by default in tenders for the department of engineering from the Municipality of Amsterdam. This policy is in place since 2022 to create certainty and clarity for the private companies in the market.

- **TENDER**

  STEP 3 - PREPARATION OF THE TENDER

  Prepare the tender using the CO_2 Performance Ladder MEAT criterion; include the relevant texts in the tender documents and determine the amount of the award advantage.

  STEP 4 - PUBLICATION OF THE TENDER

  Publish the tender with the CO_2 Performance Ladder award criterion and indicate that CO_2 reduction is being managed and rewarded.

STEP 5 – TENDER

Receive the tenders. In them, the tenderers state the implementation level that they will achieve in the project. At the time of tender, companies do not yet need to be in possession of a CO_2 Awareness Certificate or project statement.

STEP 6 – AWARD

Assess the tenders and consider the award advantage. The stated implementation level corresponds to the amount of the award advantage. Award the project to the tenderer with the Best Price Quality Ratio.

STEP 7 - CONTRACT CLOSING

Conclude the contract with the winning tenderer. The implementation level proposed by the tenderer is an integral part of the contract and must be achieved.

- **IMPLEMENTATION**

STEP 8 - PROJECT IMPLEMENTATION

The contractor carries out the project. It organises the project so that it meets the requirements of the implementation level and keeps a project file for this purpose. If necessary, the client and contractor have a dialogue about measures and CO_2 reduction in the project to meet the ambition level advertised in the tender.

STEP 9 - DEMONSTRATION OF THE IMPLEMENTATION LEVEL

Receive the project statement or a CO_2 Awareness Certificate by which the contractor demonstrates that the agreed implementation level has been met. For long-term projects, the contractor must demonstrate within one year of awarding that the agreed implementation level has been achieved and subsequently maintained for the project duration. For projects with a duration of less than one year, the agreed implementation level must be met upon delivery. In both cases, the implementation level assessment is the responsibility of an external and independent party: a Certifying Institution.

STEP 10 – PENALTY

If a company is unable to provide proof, impose the sanctions set out in the tender documents.

Instrument 2 - Using the ECI in procurement

A protocol describes the general requirements and principles when applying the ECI in a tender and the realization of a project and will therefore be an appendix to an agreement and the tender guidelines. Additional project-specific requirements and principles regarding the ECI are stated in the project documents. In case of the use of the ECI as an EMVI criterium (MEAT), the award aspects (scoring) will be provided in the tender guidelines. The ECI process requirements will be found in the agreement.

An ECI calculation can be drawn up either for the entire scope of the project, or for specific/relevant parts of the project. It is obvious to focus on the most relevant parts of the project. On the one hand, the focus on the most impactful product categories of the project brings the required effort in line with the (possible) ECI reduction of the project. On the other hand, to make sure that there is no ambiguity about which materials, processes, etc., fall within or outside the scope of the ECI calculation.

The ECI can be used as a tender requirement and is occasionally used for tenders that consist mainly of the acquisition of materials and goods. Here a maximum allowable ECI can be included as a tender requirement and included in the final contract, including contract penalties should the ECI deviate from the ECI tendered by the contractor. For a clear scope description, the client (the municipality) can include a reference ECI calculation with the request. All tenderers must apply the same scope in their ECI calculation.

The ECI as a criterium for an EMVI evaluation in a tender process is not (yet) obligatory for tenders of the municipality of Amsterdam. Making this obligatory, will serve the sustainability goals of the municipality, too.

BOX IV – Example from Amsterdam

Tender and contract phase with EMVI-criterium

The tender phase with an EMVI-criterium. The tenderer should be asked to prepare and submit an ECI calculation as part of the tender, taking into account the following:

Scope: The ECI calculation considers several predetermined parts of the project scope and excludes all other parts of the project scope.

Life Cycle Analysis: The ECI calculation is based on either the entire or on subsequent phase(s) of the life cycle, as indicated by the client.

Lifespan: In the ECI calculation, a predetermined (project) lifespan of the project result is used.

Fill-in sheet: The registration consists of the ECI calculation in the Fill-out sheet ECI calculation, to be completed by the Tenderer. There is an option in the fill-in sheet to register with a different ECI value than the one resulting from the calculation. In that case it must be substantiated why this deviation was chosen.

Reference: The Contracting Authority (client i.e. municipality) has drawn up a reference ECI calculation and added it as Appendix to the tender.

The contract phase after a tender with an EMVI-criterium. The following requirements are given in the contract regarding the ECI and its usage.

I. The Contractor must not exceed the ECI value offered with its Offer.

II. The offered ECI value is a contractual requirement and is part of the quality system and work process of the Contractor.
   a. Each deviation report must indicate whether the deviation has consequences for the ECI value offered in the Offer;
   b. Each request for change (Dutch: Verzoek tot Wijziging - VTW) must indicate whether the change has consequences for the ECI value offered in the Offer.

III. The Contractor must notify the client of a partial management plan Environmental Cost Indicator (ECI). This plan may be part of the project management plan. The ECI partial management plan contains at least:
   a. An overview of the ECI contract requirements with the proposed verification method and planning;
   b. The deployment of project team members who, in accordance with the quality management system, realize the ECI task and (help) prepare, check and release the ECI calculations, including the tasks and responsibilities of these persons regarding the ECI task;
   c. The scope of the ECI calculation and its relationship with the context as shown in the Requirement Specification, including an explanation of the interpretation of the scope by the Contractor, including an explanation of parts placed outside of scope or choice of items;
   d. The method for substantiated demonstration of the quantities and types of materials entered in the ECI calculations during the design and realization phase of the project;
   e. An overview of supporting documents for the ECI value to be achieved that will be submitted at the reporting moments;
   f. The LCA experts who will draw up and test any own life cycle analyses;
   g. A planning of products relating to ECI that are brought to the attention of the Client;
   h. An approach and planning for activities in the context of contract management, such as interaction, recording agreements, testing and audit;
   i. A risk analysis and associated control measures to ensure compliance with the ECI value offered with its Offer;
   j. An approach to how (potential) ECI exceedances is dealt with as a result of Deviations and Changes.

IV. From the start of realization to delivery, the Contractor periodically brings an ECI progress report to the attention of the Client. This report is in line with the regular progress process and may be part of the general progress report. The ECI progress report contains at least:
   a. The ECI calculation in both spreadsheet and Dubocalc format, based on the most recently available design and/or realization data;
   b. Any deviations from the working method as described in the ECI sub-management plan, including substantiation;
   c. A forecast based on the progress of work carried out, which also discusses any exceedance/undershoot per component and the consequences thereof for the ECI;
   d. Improvement measures and progress thereon, if the forecast shows that the offered ECI value may not be achieved;
   e. Substantiation of the ECI value of new or different items (so-called own LCAs) in accordance with the Determination Method;
   f. An overview of proposed and agreed (scope) changes and their implications for the ECI value to be achieved.

V. The Contractor must notify the Client of a UO ECI report as part of the Implementation Design (UO). The report must clearly substantiate what the ECI of the Implementation Design is based on the scope used. The UO ECI report contains at least:
   a. The ECI calculation in both spreadsheet and Dubocalc format, based on the Implementation Design;
   b. Verified (scenario) LCA reports of new or deviating items (own LCAs) in accordance with the Determination Method;
   c. A clear overview of the types and quantities of materials and chosen implementation method in the Implementation Design;
   d. A substantiation that makes clear how the structure of the ECI calculation is representative of the chosen implementation method;

e. An overview of proposed and agreed (scope) changes and their implications for the MKI value to be achieved;
f. A risk analysis and associated control measures for compliance with the ECI value offered with its Offer based on the Implementation Design.

VI. The Contractor must notify the Client of a final Environmental Cost Indicator report upon delivery of the Work. The report must clearly substantiate what the ECI of the completed Work is based on the scope used. The ECI final report contains at least:
a. An overview of proposed and agreed (scope) changes and their implications for the ECI value to be achieved;
b. An overview of the realized types and quantities of materials and implementation method, in which changes compared to the Implementation Design can be clearly traced;
c. A file with all supporting documents in accordance with the Environmental Cost Indicator sub-management plan;
d. The ECI calculation in both spreadsheet and Dubocalc format;
e. Verified (as-built) LCA reports of new or deviating items (own LCAs) in accordance with the Determination Method.

VII. If the ECI value based on the actual realized scope exceeds the offered ECI value, a fine of 1.5 times the difference between the fictitious discount achieved upon tender and the fictitious discount to be converted based on the realized ECI will be imposed. Example: Notional discount achieved upon registration: € 900,000; Calculated fictitious discount based on realized ECI: € 500,000; Difference between fictitious discounts: € 400,000; Fine amount: (1.5 * € 400,000 =) € 600,000

Instrument 3 - Using an internal price for CO_2-emissions

The municipality of Amsterdam uses the application rule for sustainable investments as a guideline for the internal CO_2 price. The goal of the internal CO_2 price is to create insight in the societal costs of an investment. With this insight, the municipal board can decide not only based on the economic costs, but also on societal costs.

For example: civil servants prepare the investment request for new emission-free vehicles. Previously only the financial business case was presented to the municipal board to approve (or not). With CO_2 pricing, the investment request now includes additional information on how much societal costs these emission-free vehicles will have. This scenario is compared to vehicles that are commonly used, i.e. running on fossil fuels. In this way, the municipal board can compare both the economic (short-term) costs as well as the societal (long-term) costs.

The internal CO_2 price is used to create insight in the costs of emitting carbon dioxide, but it is not used (yet) to create real economic cash flows. It is an instrument to provide information for the decision-makers, to compare options.

In time, the internal CO_2 price could play a more formal role in the organization. For example, by integrating the carbon footprints of investments in the budgeting. The municipality of Amsterdam will evaluate the use of internal carbon pricing in 2024.

BOX V – Example from Amsterdam

‘Reuse, unless…’ program

‘Reuse, unless…’ is a program currently in place in the municipality of Amsterdam about a circular work methodology in road pavements (asphalt not included). Whereby, for any road project, project managers have to first use existing material that is technically, environmentally, and aesthetic sufficient to be reused and can only buy new material when such material is not available.

For the road projects using the ‘Reuse, unless …’ circular methodology, there are presently four main instruments foreseen in CO_2 and ECI pricing in procurement:

- The first one is the application of the CO_2 Performance ladder.
- The second one is a Net Present Value calculation expressing the social value of the CO_2 and ECI-reduction achieved by a project in the investment decisions preceding the procurement.
- The third instrument is using CO_2 and ECI-pricing as an EMVI- benchmark (Economisch Meest Voordelige Aanbieding - in English: Economically Most Advantageous Offer) in Procurement.
- The fourth instrument is using CO_2 and ECI-pricing as a requisite in the tender, for which noncompliance means refusal of the offering made by the respective tenderer.

6. Tools available

6.1 The CO_2 Performance Ladder

Over the last 15 years, the CO_2 Performance Ladder (CO_2PL)[55] has developed into a key Green Public Procurement (GPP) tool and the number one CO_2 management system in the Netherlands and Belgium. Over 300 public procuring authorities use the CO_2PL as a GPP tool in their procurements; more than 5000 organisations are certified on the CO_2PL of which 75% are Small and Medium Enterprises. More than 70 Dutch municipalities, provinces and water boards are CO_2PL-certified themselves to create CO_2 awareness and insight in their own organisations CO_2 impact.

Dutch municipalities, provinces and water boards have been using the CO_2 Performance Ladder (CO_2PL) in two manners: (i) in procurement, to stimulate sustainability in their tenders, and (ii) by certifying as local authorities themselves to have a carbon footprint for their own organisations, helpful to guide the policy process towards local sustainability (including procurement).

The CO_2 Performance Ladder is an instrument that helps organisations mapping their CO_2 footprint and initiating actions to reduce that footprint. To reduce their carbon emissions in the organisation itself, in projects and in the business sector. It is a third-party certified system that ensures that a certified organisation continuously monitors progress and adjusts its ambitions, searches for improvements and takes real reduction measures.

The instrument is used as both a CO_2 management system as well as a procurement tool[56]. With a certificate on the Ladder, organisations can receive an award advantage for their registration on tenders. The CO_2 Performance Ladder can be used for the procurement of services, goods as well as works. As it gives an indication of the performance of the organisation tendering (GHG scope 1&2, up to level 3 CO_2PL) and the supply chain in which the company is involved (GHG scope 3, levels 4-5 CO_2PL).

Award advantage in tenders

Certified organisations receive a fictitious discount on the registration costs of tenders. With a certificate on the Ladder, organisations are rewarded with a concrete award advantage during the tendering process. The higher the level an organisation has on the CO_2 Performance Ladder, the higher the award advantage. By asking for the CO_2 Performance Ladder as an Award (MEAT)

[55] https://www.co2-prestatieladder.nl/en and https://testimonials.co2performanceladder.com/
[56] https://www.co2-prestatieladder.nl/en/what-is-the-ladder

criterium, you give the market party with a high ambition level a bigger chance of winning a tender competition.

Organisations that obtain a certificate on the Ladder will experience this as an investment that is immediately returned in terms of low energy costs, material savings and innovations. The Ladder's main objective is to stimulate organisations to gain insights into their CO_2 emissions, and to continuously seek opportunities to cut back these emissions in the organisation and consequently within projects.

The ladder systematics in short

The CO_2 Performance Ladder is a CO_2 management system that consists of 5 levels. Up to level 3, an organisation that obtains a certificate on the Ladder reduces its own carbon emissions within the organisation and all its projects. From level 4 and 5, the organisation also aims to reduce CO_2 emissions from the business chain and sector. An organisation that is certified on a certain level (and all previous levels) adheres to the requirements of the CO_2 Performance Ladder. These requirements are based on four angles, namely:

Insight: *Determining the energy flows and the carbon footprint;*
Reduction: *developing ambitious targets for the reduction of CO_2 emissions;*
Transparency: *Structural communication about the organisation policies of CO_2 reduction;*
Participation: *Participation in business sector initiatives with regards to the reduction of carbon.*

Each certified organization is audited annually by an independent and accredited Certification Body. A certified organization is therefore guaranteed to have a working CO_2 management system for the organization and its projects, which is tested annually for ambitions, reductions and continuous Improvement[57].

The CO_2 Performance Ladder as a Green Procurement Instrument

The CO_2 Performance Ladder is an GPP instrument that focuses on reducing the energy consumption and CO_2 emissions of companies, their projects and supply chains. The Ladder may be used in all product categories to manage CO_2, climate, environment, energy and sustainability.

The CO_2 Performance Ladder tender tool is intended to be used as a Most Economically Advantageous Tender (MEAT) award criterion in tenders. The tool acts as a positive incentive by rewarding and encouraging CO_2 reduction with an award advantage. The higher

[57] All CO2PL Certified organisations, contracting authorities and projects can be found on: https://www.co2-prestatieladder.nl/en/participants

organizations‘ CO_2PL certified level the higher the award advantage. This is often more effective than punishing or forcing companies, employees and sectors to get moving[58].

The contracting authority evaluates the received offers on a Tender in the context of the best price-quality ratio (MEAT) and awards the contract to the best bid. The CO_2PL implementation level proposed by the winning bidder during the tender (including the underlying levels) will explicitly become an integral part of the contract upon award.

MEAT IMPLEMENTATION LEVELS	NOTIONAL DISCOUNT ON THE TENDER PRICE
Implementation level 1	€10.000 (1%)
Implementation level 2	€20.000 (2%)
Implementation level 3	€30.000 (3%)
Implementation level 4	€50.000 (5%)
Implementation level 5	€80.000 (8%)

Figure 8 - Example of a valuation table: Tender with an estimated value of 1 million euros.

The CO_2 Performance Ladder Certification as Public Authority

In addition to procurement tool the CO_2PL is a recommended CO_2 management system for public authorities themselves to gain insights in the CO_2 impact of their own organisation and activities as well as a structural approach to CO_2 reduction. The Plan-Do-Check-Act (PDCA) steering cycle will help your organisation to implement your approach towards CO_2 emissions in a structured manner. This way, you will keep control of your implementation process and achieve continuous improvement of your approach towards CO_2 emissions and performance. And a Valuable step towards more CO_2 awareness and, eventually, a CO_2 pricing strategy.

[58] See CO2 Performance Ladder Procurement Guide, p. 15-22: https://media.co2-prestatieladder.nl/media/Procurement%20Guide.pdf

6.2 Method for Budget Climate Assessment (BCA)

BOX VI – The method for Budget Climate Assessment

What is the method for the Budget Climate Assessment?

A budget climate assessment aims to qualify the impact on the climate of each item of expenditure included in a local authority's budget. It involves a line-by-line analysis of the budget, based on a list - or taxonomy - of actions considered to be favourable, neutral or unfavourable for the climate.

The results provide a better understanding of the consistency of spending with the achievement of climate objectives, to inform budgetary decisions.

The complete method can be found here https://www.i4ce.org/wp-content/uploads/I4CE-Budget-climate-assessment-methodology.pdf

The I4CE method wishes to answer one question only: is this expenditure going to lower GHG emissions?

If it is, then is it in line with the National Low Carbon Strategy (or more locally with the Eurometropole's climate plan, adopted in December 2019 and revised in March 2023)? Strasbourg has already tested this method on the 2019 administrative accounts of the City and Eurometropole of Strasbourg (investment and operation) during the exploratory work to develop the method in 2020 and during the presentation of the investment section of the 2022 budgets of the City of Strasbourg and the Strasbourg Eurometropole. Here, the method has been applied to the preliminary budget for 2024 of both local authorities.

Experience in Strasbourg

Analysis of the operating section in Strasbourg for 2024

When applying the I4CE method, it is necessary to exclude from the analysis all expenditures corresponding either to human resources costs (including allowances, contributions, pensions, travel expenses, etc.) or to various accounting entries that do not correspond to actual expenses.

Very favourable expenses amount to 2.4 million, or 0.9% of the total. This includes funding for the Climate Agency and subsidies paid to associations involved in education for sustainable development.

Expenditure considered as conditionally favourable amounts to 73.2 M€, i.e. 28.1% of the total. Most of this relates to the financing of the active mobility budget for public transport and cycling policies. In addition, there is the collection, sorting and reduction of waste, tree-lining, support for recycling and re-use, and changes to agricultural and food practices and local ecology.

Expenditure considered as **neutral** amounted to 150.3 M€, i.e. 57.8 % of the total. This expenditure accounts for the majority of the Eurometropole's operating expenditure and corresponds to the major public policies for which the metropolitan authority is responsible (urban waste management, public heritage, prevention, town planning, social economy, sport, etc.). These operations are "neutral" overall, as they have no significant impact on the climate.

Unfavourable expenses represent 34.3 M€, or 13.2% of the total. This mainly concerns fossil fuel purchases (including the sharp rise in the price of gas and petrol), bins for the non- recoverable part of household waste, management of roads and motorways (they are now under our jurisdiction due to a state transfer) or car parks. They also cover the subsidy to the tourist office and the airport, as well as various expenses such as communication (printing, newspapers, servers, etc.) and logistics. These expenses are not in line with the National Low Carbon Strategy (and therefore to the Strasbourg Eurometropole's climate plan).

Analysis of the investment section in Strasbourg for 2024

Investments in BP 2024 amounts to 320.3 M€. The breakdown using the I4CE method gives the following results.

Expenditure considered to be **very favourable** amounted to 63.6 M€, or 19.9% of total investment. This relates primarily to mobility, tram-related developments and the cycling master plan. This is followed by the acquisition of electric vehicles and energy-efficient renovation of the city's buildings.

Expenditure considered to be **conditionally favourable** amounted to 33.8 M€, or 10.5% of total investment. This includes the TSPO (transport in proper site in Strasbourg’s West wing) project, the redevelopment of outdoor spaces, the installation of bio-waste collection bins, the upgrading of the A35 motorway and aid to private individuals as part of the Low Emissions Zone.

Neutral expenditures amount to 187.1 M€, or 58.4% of total capital expenditure. This expenditure accounts for the majority of the Eurometropole's capital expenditure. It concerns, for example expenditure on construction projects or functional improvements to buildings, land reserves, expenditure on road maintenance or the development of outdoor public spaces (roads, public spaces in municipalities) and the upkeep and maintenance of buildings.

Unfavourable expenses amount to 29.5 M€, or 9.2% of total capital expenditure. This mainly concerned road projects and the acquisition of diesel, petrol or low-efficiency vehicles (only for special vehicles). Digital projects and blue bins (for the non-recyclable part of household waste) complete this section. These expenditures are not in line with the National Low Carbon Strategy (and therefore the Strasbourg Eurometropole climate plan).

Expenditure considered to be undefined amounted to 6.2M€, or 1.9% of total investment. From a methodological point of view, some of this expenditure is classified as "undefined" when its impact on the climate cannot be assessed. This includes, for example, expenditure on IT infrastructures and comprehensive urban renewal projects that bring together a wide variety of projects that are difficult to classify.

Focus on analysis of expenditure on building works in Strasbourg

In conjunction with the Architecture and Heritage Department, an I4CE assessment of each type of work was carried out. It was decided to allocate to each a percentage of expenditure considered to be neutral and **very favourable** as described in Table 3.

There are ranges in this rating because, regardless of the type of work involved, a case-by-case analysis is carried out to determine the climate impact of the expenditure.

Type of work	Neutral	Very favourable
Construction of a new building	80-90%	10-20%
Global renovation (energy, accessibility, safety)	50-70%	30-50%
Global renovation with extension	70-100%	0-30%
Energy renovation	10-30%	70-90%
Heritage renovation including energy renovation	50%	50%
Other (multiple renovations, compliance with standards)	80-90%	10-20%

Table 3 – CBA for each type of work carried out bu the Strasbourg Eurometropole

Overall, for 2024, 86% of work expenditures were considered neutral and 14% **highly favourable**. The scale of the work to expand a sports stadium, a vast operation that cannot fit into a single category, can explain this preponderance.
The construction of new buildings amount to 15% of the total expenditures, with 10% of **favourable expenses** due to the high standards of insulation used in new buildings to save energy.
30% of the global restructuring is considered **highly favourable**, corresponding to emissions not generated by the decision to renovate rather than construct a new building.

93% of the energy renovation work is considered **highly favourable.**

Experience in Paris

Since 2020, the City of Paris has carried out an annual climate assessment of its main budget to highlight the extra-budgetary impacts of the expenditure incurred and reinforce the coherence and transparency of municipal action. This analysis of administrative accounts is based on the Institut de l'Économie pour le Climat (I4CE)'s methodology. It provides an annual assessment of the impact of the local authority's operating and capital expenditure in terms of greenhouse gas (GHG) mitigation, using a rating system that categorizes expenditure as very favourable, favourable, neutral, unfavourable or undefined. The constant evolution of our internal processes ensures more reliable results, saves time and increases the proportion of expenditure analysed.

Within the scope of analysis of the 2022 financial records, the carbon impact of 94,7% of expenditures has been assessed thanks to a continuous process of in-depth analysis of expenditure lines carried out prior to the analysis, and the involvement of the City's various departments. Dialoguing with these departments enables us to assess the content of each budget line in greater detail, to better qualify the impact of the various items of expenditure, and to raise their awareness of the approach and the carbon impact of their departments' expenditure.

The results obtained in 2022 confirm the trends observed in previous years, as well as the robustness of the method used. They highlight a high proportion of “neutral” expenditure in terms of greenhouse gas mitigation (65,2%). These are mainly cultural and social expenses, but also property management expenses and expenses linked to security, upkeep and maintenance.

How to connect the budget climate assessment to procurement policy?

When an expenditure is associated with a procurement policy, the budget climate assessment can be used to identify the impact of procurement expenditures on GHG emission and qualify whether their impact is positive, negative, neutral. This can be a first step before examining the opportunity to address a carbon pricing index to such procurement.

6.3 The Environmental Cost Indicator (ECI)

The Environmental Cost Indicator (ECI) - referred to in Dutch as the MKI (Milieu Kosten Indicator) - is a shadow price to quantify the negative effects that any product will have on the environment. It is derived from the Life Cycle Assessment (LCA) method based on the European EN 15804 standard (EPD (EN 15804) - Environmental Product Declaration). In the Netherlands a weighing factor is added, to compare the different environmental impacts that arise from the EN 15804 standard. The ECI value can be calculated as an indicator for the environmental impact of the scope of a project, which uses an accumulation of products (and processes).

The ECI is expressed in euros. These euros represent a social value, assigned to several environmental effects, similar to the monetary values arising from a Social Cost Benefit Analysis (SCBA). These euros are not economical euros in trade (yet).

The lower the ECI value, the lower the environmental impact of (the scope of) the project. The total calculated environmental costs are a quantitative indicator of the environmental impact of the project (amongst others, the greenhouse effect, human toxicity, eutrophication, acidification, ozone layer depletion and eco-toxicity) based on the entire life cycle of the product(s) used in a project.

For the preparation and use of EPDs for the environmental performance of construction works and buildings in the Dutch context, EN 15804 has been included in the Dutch ECI calculation methodology, by means of the LCA calculations and supplemented with scenarios applicable specifically to the Netherlands. Originally developed for buildings, the ECI methodology comprises nowadays of all infrastructural works.

The 'Assessment Method for Environmental Performance of Construction Works[59]' describes how the life cycle analysis (LCAs) should be carried out and which shadow prices should be used per type and unit of environmental effect to arrive at the total ECI value. The total ECI value being the summation of the 11 monetarized environmental impacts (Table 5). The Determination Method is an elaboration for the Dutch context from the international standard EN 15804 and is managed by the Dutch National Environmental Database Foundation (NMD)[60].

[59] https://milieudatabase.nl/milieuprestatie/bepalingsmethode/ (version 1.1 of March 2022 in Dutch)
[60] See Nationale Milieudatabase | environmental performance of buildings

	Impact Category	Unit	Weighting the ECI €/kg-eq
1	Climate change – total - GWP 100 years	kg CO_2-eq	€ 0,05
2	Ozon layer depletion	kg CFC11-eq	€ 30,00
3	Acidification	Kg SO2	€ 4,00
4	Eutrophication	kg PO4-eq	€ 9,00
5	Photochemical ozone formation	Kg C2H4	€ 2,00
6	Depletion of abiotic raw materials, minerals, and metals	kg Sb-eq	€ 0,16
7	Depletion fossil fuels	kg Sb-eq	€ 0,16
8	Human toxicity	kg 1,4 DB-eq	€ 0.09
9	Ecotoxicity (freshwater)	kg 1,4 DB-eq	€ 0,03
10	Ecotoxicity (seawater)	kg 1,4 DB-eq	€ 0,00001
11	Ecotoxicity (terrestrial)	kg 1,4 DB-eq	€ 0.06

Table 5 - The 11 LCA categories according to the EN 15804 with their weighting factor to calculate the ECI for specific product.

Calculating the (total) ECI value is facilitated with the nationally used software program Dubocalc. Dubocalc was developed on behalf of Rijkswaterstaat (The Dutch national road authority) and is used as a software instrument when the environmental impacts of different materials need to be added and/or when the National Environmental Database (NMD) needs to be used.

The use of Dubocalc is not mandatory in all cases. In these situations, a simplified calculation can also be made in, for example, Excel. To perform this simplified calculation in a traceable manner, any Dutch client (authority) can provide a mandatory Excel format to be used. Ideally, in that case, the client (authority) will have carried out the ECI reference calculation in that same Excel format and will include it with the tender.

ECI weighting factors for the 19 environmental impacts i.e. the 19 LCA categories according to the EN 15804+A2 (Table 6) have yet to be published.

	Impact Category	Unit
1	Climate change – total	kg CO_2-eq
2	Climate change – fossil	kg CO_2-eq
3	Climate change – biogenic	kg CO_2-eq
4	Climate change – land use and change to land use	kg CO_2-eq
5	Ozon layer depletion	kg CFC11-eq
6	Acidification	mol H^+-eq
7	Freshwater eutrophication	kg PO4-eq
8	Seawater eutrophication	kg N-eq
9	Land europhication	mol N-eq
10	Photochemical ozone formation	kg NMVOC-eq
11	Depletion of abiotic raw materials, minerals, and metals	kg Sb-eq
12	Depletion of abiotic raw materials, fossil fuels	MJ, net cal. val.
13	Water use	m^3 world -eq
14	Fine Particulate emissions	Illness incidence
15	Ionizing radiation	kBq U235-eq
16	Ecotoxicity (freshwater)	CTUe
17	Human toxicity, carcinogenic	CTUh
18	Human toxicity, non-carcinogenic	CTUh
19	Land-use related impact / soil quality	Dimensionless

Table 6 - The 19 LCA categories in line with the EN 15804+A2

6.4 Carbon Pricing Incidence Calculator

MCC Berlin in cooperation with GIZ's Leonie Kirchhoff, Gregor Sahler and colleagues, came up with the idea of an interactive and publicly accessible platform (GIZ 2021). The **Carbon Pricing Incidence Calculator** works out – for over 80 countries – how carbon pricing would affect the population and how governments can design mechanisms that are socially equitable.

It is a useful tool for **increasing acceptance among the population**. The digital calculation tool developed together with MCC models the socioeconomic impact of carbon pricing and various compensation measures on different households.

The tool can be used by governments, unions, business associations and both welfare and environmental groups to negotiate a socially equitable approach to climate financing policy. 'If the implications are discussed and any adverse impacts avoided right from the start, the mechanism is more likely to be accepted among the population and by decision-makers,' explains Sahler. In turn, that boosts the chances of reforms being introduced that not only protect the climate but also – in the ideal scenario – reduce social inequality.

6.5 Carbon Pricing Dashboard

The **Carbon Pricing Dashboard** provides details about direct carbon pricing instruments and carbon markets around the world. The dashboard includes data published in the World Bank's State and Trends of Carbon Pricing Report and is structured into two main sections: compliance instruments and carbon crediting markets.

Data available: (i) details on carbon taxes and emissions trading systems. This includes detailed information and visualizations on design attributes, GHG emissions coverage, price, and revenue; (ii) information and visualizations regarding crediting mechanisms (international, independent, and governmental), including issuances. This section also includes information regarding participation in cooperative approaches under Article 6.2 of the Paris Agreement.

Appendix

Survey to gather information among DeCarb-Pro partners on carbon pricing experiences accessible here.

Glossary

Developed under DeCarb-Pro, Work Package 2.

Green House Gases (GHG)[1]: GHGs are atmospheric gases that absorb and emit radiation within the thermal infrared range and that contribute to the greenhouse effect and global climate change. Many different GHGs are produced as a result of human activities, including:
Carbon dioxide (CO_2)
Methane (CH_4)
Nitrous oxide (N_2O)
Hydrofluorocarbons (HFCs)
Perfluorinated compounds:

- Sulphur hexafluoride (SF_6)
- Nitrogen trifluoride (NF_3)
- Perfluorocarbons (PFCs)

Fluorinated ethers (HFEs)
Perfluoropolyether's (e.g., PFPEs)
Chlorofluorocarbon (CFCs)
Hydrochlorofluorocarbon (HCFCs)

CO_2 versus CO_2eq: **CO_2** is the formula for the gas **Carbon Dioxide. CO_2eq** stands for "Carbon Dioxide Equivalent" and **expresses** the Global Warming Potential (**GWP**). CO_2eq is the calculation unit for the emissions of any number of Greenhouse Gases (GHG). These emissions quantities, the GWP Impact, are then converted into carbon dioxide equivalents expressed in "CO_2e" or "CO_2eq". CO_2 emissions are the dominant part of total global GHG (CO_2eq) emissions, which is why other GHGs are also expressed in these terms.

Carbon: 1. Synonym, 2. Chemical element

1. The term is usually used as a Synonym to describe carbon dioxide (CO_2) in a short form.
2. A chemical element: C is the formula for the element Carbon. 1kg C = 3.67 t CO.

Global Warming Potential (GWP100): A **relative** and **unitless index** of how much a given mass of GHG is estimated to **contribute to global warming**. It is measured against CO_2, which has a GWP of 1. GWP100 means the contribution of GHG emissions to the greenhouse effect averaged over a period of 100 years.

GHG Emission: Green House Gases (GHG) **emitted**, **originating in human activity** and their effect on the climate. Natural origins are excluded (e.g. volcanic eruptions), at least within DeCarb-Pro, as these emissions lie outside the scope of the project.

Life Cycle Analysis (LCA): LCA is a **systematic analysis**, a set of procedures for compiling and examining the **inputs** and **outputs** of materials and energy, and the associated **environmental impacts**, such as embodied and operational CO_2eq emissions, directly attributable to a product, activity, or process throughout its lifecycle according to ISO 14040: 2006, EN-ISO14044-2006+A2-2020, EN15804-2012+A2-2019, and EN15978-2011.
Please Note: In general the full stage LCA (Product, Use and End of Life stage) is meant. If you look only at certain stages, please be explicit on what system boundaries you use.

LCA versus Carbon Footprint: A **LCA** systematically analyses **multiple** environmental **impacts** of a product, activity, or process over its entire life cycle. On the other hand, **Carbon Footprint** (see Carbon Footprint definition) analysis is a **mono-criterion** analysis focused on only one environmental impact: climate change by carbon emission (equivalents).

Significant Energy Users (SEU): SEU is an energy user that accounts for **substantial** energy **consumption** and/or offers considerable potential for energy performance improvement. Similar to a "Carbon Hotspot".

Carbon Hotspot: Carbon Hotspots represent **carbon-intense elements** which are used **in big quantities.** Carbon Hotspots can be used to identify possible **quick wins,** where significant carbon reductions of these Carbon Hotspot are possible, when measurement data is more easily available.

Identifying the Carbon Hotspots within your organisation can help to set priorities in decision making and in policy making.

Carbon Price (IPCC): The price for avoided or released CO_2 or CO_2-equivalent emissions. This may refer to the rate of a carbon tax, or the price of emission permits. In many models that are used to assess the economic costs of mitigation, carbon prices are used as a proxy to represent the level of effort in mitigation policies.[2] It may also refer to the "effective price" or "full reference price", used as a proxy for the damage caused by emitted carbon emission.[3]

External Costs: Costs that are not included in the market price of the goods and services being produced. In terms of Carbon Price this refers to mostly environmental and social costs. These are the costs of consuming and producing fossil-based energy and materials and their impact on the climate as a results of release GHG.

DeCarb-Pro related definitions

Project specific DeCarb-Pro Carbon Pricing: In simple terms, carbon pricing involves putting a price tag on a certain amount (usually a tonne) of CO_2 or CO_2eq. Currently, environmental costs are often not considered in our market economy – these are so-called 'external costs'. Putting a price on carbon provides a means to start 'internalising' these costs into (financial) decision-making, enabling the decision-maker to better take into account some of the environmental aspects, making socially responsible policy and decisions easier[4]. There are two main approaches to carbon pricing, coming from different perspectives. The first is that of **abatement costs**, which specifies the costs of avoiding the emission of a tonne of CO_2(eq). The second goes by several names: **damage costs**, or **social cost of carbon**. These assess the costs of (avoided) damages resulting from the emission of a tonne of CO_2(eq).[5] Between, but also within these two approaches, the carbon price level can differ dramatically, depending on which factors you take into account, and how you go about various components of the calculation (e.g. the discount rate you use).

Carbon Budgeting: A Carbon Budget represents the total amount of GHG emissions (tCO_2eq) that may be released during an agreed period.
Structure of a Carbon Budget: Set boundary for evaluate/compile GHG emission Data (E.g.: organisation or territorial view, Scope 1,2 and 3, etc.), collect accredited data, calculate a Baseline GHG Emission Inventory (BEI), set reduction targets, monitor & report.

Methods to compile data: Spend-based, Activity-based (average data), Supplier-specific, Hybrid (mix of Spend, Activity and Supplier based data), organisation/department based.

General def. Procurement: Essentially, ***Procurement is the act of obtaining goods or services, typically for business purposes***[6]. Further in-depth definition: *Procurement is the process of* ***locating*** *and* ***agreeing to terms*** *and* ***purchasing goods, services, or other works*** *from an external source, often with the use of a* ***tendering*** *or competitive bidding process. There are different procurement designs established for different* ***scopes of tendering and purchasing***[7]**.**

Public Procurement: The process by which public authorities, such as government departments or local authorities, purchase work, goods or services from companies[8].

Green Public Procurement: Procuring goods, services and works with a reduced environmental impact throughout their life cycle[9].

Tender: The term Tender usually refers to an invitation to bid for a project. Tendering usually refers to the tender process and is part of the Procurement Process.

The **procurement process:** Procurement involves every activity involved in obtaining the goods and services an organisation needs to support its daily operations, including sourcing, negotiating terms, purchasing items, receiving and inspecting goods as necessary and keeping records of all the steps in the process.[10]

Procurement process steps: identifying scope and needs, market research on availability, **pre tender process**: internal preparation, pre-estimation, defining award criteria, **tender process:** preparing tender documents, request for tender, evaluate tender, award tender, followed by the **purchasing process**.

The procurement process **does not include preliminary measures** and circumstances like development of policy and guidelines as a basis for carrying out the procurement process itself and **measures after completion**, e.g. monitoring and ongoing supplier relationship.

Project specific DeCarb-Pro "Procurement Framework"[11]:

The **Procurement Framework** describes the essential structures of the policies, regulations, legislation and guidelines in addition to the phases of the procurement process that are established and apply to the implementation of procurement. Within the DeCarb-Pro *WP2 Pilot Definition Version 2*[12], we have outlined a couple of processes of the procurement framework to focus on.

Planning for Procurement focuses on the organisation's strategy and policies. These components lay the foundation for processes such as procurement, therefore strategy and policy lie within the scope of the DeCarb-Pro project. Note: But Enforcement and Stimulation lie outside the scope of DeCarb-Pro.

Procurement Planning includes basically everything a governmental organisation does in terms of projects it executes. In general terms this comprises various stages: (pre)feasibility, (investment) decision, design, realisation, monitoring, and maintenance. An organisation can do all of this by itself, or it can outsource (parts of) projects to third parties.

Design for Procurement and **Tendering**. This can include all phases of the **Procurement Process** of a project or only some or individual phases (e.g. design and realisation), depending on what the organisation wants to procure. E.g.: The governmental organisation provides input regarding what they wish or require from potential contractors, who want to execute a certain project. The actual contractor(s) deliver certain services or works to the governmental organisation.

Distinction between Planning and Design:

Planning: The act of deciding how to do an object, project, or process.

Design: Creating an appropriate form and function of an object or process.

Multiple Definitions or interpretations

Some concepts we use within DeCarb-Pro have different definitions and interpretations. These definitions may differ from country to country, and from organisation to organisation. Therefore, when discussing these concepts within the DeCarb-Pro partnership, it is essential to be clear about which definition or interpretation you use..

Carbon Footprint[13]: The carbon footprint describes the carbon emissions caused **directly and indirectly** by a person, organisation, event, or building. In some cases, a footprint only includes scope 1 and 2 emissions, in some cases scope 3 is also included. Furthermore, sometimes it is **only CO_2 related,** while in other cases **other GHGs are also included** (so in that case 'Carbon' is really used as a synonym, as described earlier in this document)**.**

Categorisation of scope 1-3 emission: There are two main perspectives form which to define and calculate scope 1, 2, and 3 emissions: from the organisational perspective (examples: GHG Corporate Standard, CO_2 Performance Ladder) and from the geographical/territorial perspective (example: Covenant of Mayors SECAP). The categorisation of scope 1-3 differs significantly between these two perspectives, which is why both are explained shortly below. Furthermore, there might be slight differences between different methodologies that reason from the same perspective.

Organisational perspective (used by e.g. GHG Corporate Standard and CO_2 Performance Ladder)

Concept of "scope" To help delineate direct and indirect emission sources, improve transparency, and provide utility for different types of **organisations** and different types of climate policies and business goals, three "scopes" (scope 1, scope 2, and scope 3) are defined for GHG accounting and reporting purposes. The categorisation of the scopes is based on the **degree of financial and/or operational influence** the organisation in question has on (sources of) emissions.

Scope 1: Direct GHG emissions: Direct GHG emissions occur from sources that are owned or controlled by the organisation, for example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc.; emissions from chemical production in owned or controlled process equipment. Direct CO_2 emissions from the combustion of biomass shall not be included in scope 1 but reported separately. [14]

Scope 2: Electricity indirect GHG emissions: GHG emissions from the generation of purchased electricity consumed by the organisation. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organizational boundary of the organisation. Scope 2 emissions physically occur at the facility where electricity is generated. (Guidance for scope 2, see GHG Protocol Corporate Standard and Scope 2 Guidance Training Webinar.[15]

Scope 3: Other indirect GHG emissions: The category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the organisation but occur from sources not owned or controlled by the organisation. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services. (Guidance for scope 3[16] see Technical Guidance for Scope3 Emissions version1.0)

[1] IPCC_SYR_AR6, Annex 1, Glossary https://www.ipcc.ch/report/sixth-assessment-report-cycle/
[2] IPCC glossary: https://www.ipcc.ch/sr15/chapter/glossary/

[3] Klimaatverbond

[4] https://klimaatverbond.nl/publicatie/synthesis-2019-accounting-for-the-future-the-price-of-climate/

[5] https://www.umweltbundesamt.de/en/publikationen/methodological-convention-31-for-the-assessment-of

[6] Basic definition by Investopedia: https://www.investopedia.com/terms/p/procurement.asp#:~:text=Procurement%20is%20the%20process%20of,several%20areas%20of%20a%20company.

[7] https://en.wikipedia.org/wiki/Procurement

[8] https://single-market-economy.ec.europa.eu/single-market/public-procurement_en#:~:text=Public%20procurement%20refers%20to%20the,goods%20or%20services%20from%20companies.

[9] https://green-business.ec.europa.eu/green-public-procurement_en

[10] https://www.netsuite.com/portal/resource/articles/accounting/procurement.shtml#:~:text=Procurement%20involves%20every%20activity%20involved,the%20steps%20in%20the%20process.

[11] Based on the outcomes of the DeCarb-Pro WP Lead-PMT meeting 24.01.2024

[12] The WP2 Pilot Definition Version 2 was made available to all partners on the Basecamp server on 29 February 2024.

[13] (Wiedmann and Minx, 2008), IPCC, Jamie Goggins-NUIG

[14] Guidance for scope 1, see GHG Protocol Corporate Standard: https://ghgprotocol.org/corporate-standard

[15] Scope 2 Guidance Training Webinar | GHG Protocol

[16] Guidance for scope 2, see GHG Protocol Corporate Standard and Scope 2 Guidance Training Webinar: https://ghgprotocol.org/scope-3-calculation-guidance-2