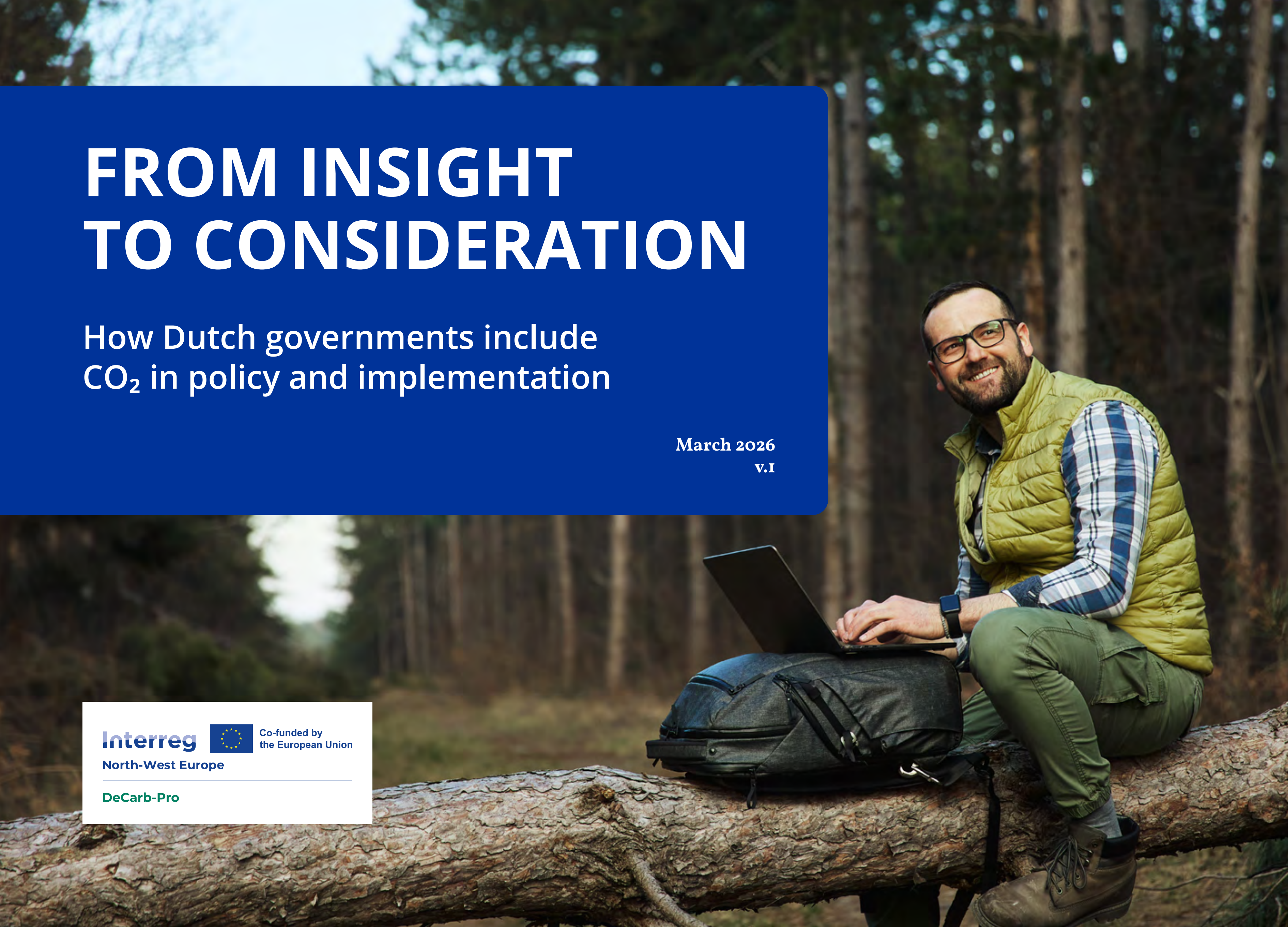

FROM INSIGHT TO CONSIDERATION

How Dutch governments include CO_2 in policy and implementation

March 2026
v.1

Interreg
North-West Europe
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COLOPHON

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This publication was produced as part of the project DeCarb-Pro: Decarbonise public procurement in NWE, funded by Interreg North-West Europe. DeCarb-Pro aims to reduce carbon emissions from procurement by local authorities in Northwest Europe.

The project is executed by 12 organisations: the cities of Amsterdam, Paris, Strasbourg and Essen and the network organisations Klimaatverbond Nederland, Green-Metropolitan Region Arnhem-Nijmegen, Climate Agency Strasbourg, Climate Agency Wiesbaden, Flux50, South-East Energy Agency (SEEA), SKAO (CO_2 performance ladder) and Climate Alliance Germany. In this 4-year project, the partners will be working on introducing CO_2 pricing in public procurement processes of local authorities in North-West Europe.

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SUMMARY – FROM INSIGHT TO CONSIDERATION

How governments give CO_2 a place in their work process
Governments have been focusing on money, risk, and planning for decades. For a long time, CO_2 played a minor role in this: it was measured and accounted for, usually afterwards.

CO_2 pricing changes that. By translating emissions into euros, it becomes clear that CO_2 is not an abstract environmental problem, but a social cost item related to health, infrastructure, water safety and quality of life.

This document shows how governments are taking that step: from calculating CO_2 to using CO_2 information in choices. Not as one fixed method, but as a coherent set of approaches that fit different moments in the work process.

From confusing image to coherence
If you look at CO_2 pricing without prior knowledge, you will see a fragmented picture. Organisations use different amounts per tonne of CO_2. Sometimes CO_2 is used in policy, sometimes in projects or tenders, and sometimes only as a conversation tool. That seems arbitrary.

The core message of this document is that this diversity is logical. CO_2 pricing does not have one function but answers several questions. As soon as it becomes clear which question is central, coherence is created.

Two questions, two approaches
In practice, governments ask two fundamentally different questions when they give CO_2 a value:

1. What does CO_2 emissions mean for society as a whole?
2. What does it cost to reduce those emissions within concrete choices?

These questions lead to two approaches that coexist and complement each other. The policy maker values CO_2 as social damage. By translating emissions into euros per tonne, it becomes clear what choices mean for society in the long term. This approach is used in policy, strategy and social cost-benefit analyses. The price is not a standard here, but a tool to take effects into account in decision-making.

CO_2 control in implementation uses CO_2 as management information for projects, investments and programmes. This is not about damage, but about action perspective: which measure will result in how much reduction and at what cost? The price per tonne of CO_2 avoided helps to compare choices and set priorities within limited resources.

The document shows that confusion arises when these two approaches are confused and one " correct" CO_2 price is sought. It doesn't exist. What does exist is a logical interplay between appreciation and implementation.

ARRO as a connecting frame of mind
To clarify this coherence, the document introduces ARRO (Avoid, Reduce, Replace, Offset) as a conceptual framework. ARRO is not an additional instrument but describes the order in which choices are logical: first prevent, then reduce or replace, and only compensate last.

Within this frame of mind, CO_2 pricing takes on meaning. Policy-based valuation helps with the question of whether something is desirable, while implementation-oriented CO_2 control helps with the question of how it can be implemented. Compensation remains emphatically the final piece.

From theory to practice

Using examples from provinces, municipalities, and water boards, the document shows how these approaches work in practice. Some organisations mainly use CO_2 at the front end of the process, in policy and strategy. Others do so in projects or programmatically over several years. None of these choices are better on their own; they depend on the context and organisation.

Overviews per project phase show where CO_2 actually influences choices and how policy, organisation and projects can reinforce each other. Projects provide data, organisations translate it into management, and policy uses those insights to give direction to new choices. This creates a learning system.

What this means for employees

An important insight is that CO_2 control is not a uniform task. Not everyone has to calculate or apply prices. However, everyone works from the same framework, in which CO_2 is a natural part of the consideration.

- Policy officers use CO_2 information to make long-term consequences explicit.
- Program and organisational staff ensure consistency and predictability.
- Project teams use carbon data as design information, in addition to costs and schedule.
- Buyers and contract managers use CO_2 as an incentive to the market.

This lowers the threshold for working with it and prevents CO_2 from remaining something for specialists alone.

Reflection and direction

The document shows that CO_2 pricing is not a pipe dream. Governments are already applying it, each in their own way. The strength is not in one instrument, but in coherence, learning ability and clear goals.

The most important message is therefore simple:

- CO_2 pricing is not an end in itself, but a means to make better choices. Not because we have to, but because it helps to take responsibility for the social consequences of today's decisions.

CO_2 pricing is not an end in itself, but a means to make better choices. Not because we have to, but because it helps to take responsibility for the social consequences of today's decisions.

DEFINITIONS

Green House Gases (GHG)[1] : GHGs are atmospheric gases that absorb and emit radiation within the thermal infrared range and that contribute to the green-house effect and global climate change. Many different GHGs are produced as a result of human activities, including: (In **bold** the GHG of the Kyoto Protocol and GHG that the **GHG Protocol** Corporate Standard is accounting for[2])

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.

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.[3]

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 tonne CO.

Synonym for emission in this document
In this Document we use CO_2 for the GWP emissions.

Abatement Costs: The Abatement costs are specific expense of taking measures to reduce emissions, which are the extra costs divided by the saved emission.

Marginal Abatement Costs (MAC): The Marginal Abatement Cost (MAC) estimates the cost of reducing emissions by tonne CO_2 and measures the cost of reducing one more unit of pollution (tonne CO_2.) and is used in carbon trading and reaching set targets. …. Marginal cost is an economic concept that measu-res the cost of an additional unit……[4]

Social Cost of Carbon (SCC): Social Cost of Carbon (SCC) count in the social and economic costs (societal) of damages and estimates the costs from emitting one additional tonne CO_2.

It represents the real damage resulted from climate change in monetary terms. These costs are not mandatory for public bodies in Ireland and therefore not considered for any investment decision making, yet. …..The social cost of carbon (SCC) is an estimate, typically expressed in dollars, of the economic damages associated with emitting one additional ton of *carbon dioxide* into the atmos-phere……[5]

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1 IPCC_SYR_AR6, Annex 1, Glossary *https://www.ipcc.ch/report/sixth-assessment-report-cycle/* Eurostat glossary: *Category:Glossary - Statistics Explained*

2 *https://ghgprotocol.org/corporate-standard#:~:text=The%20standard%20covers%20the%20accounting,and%20nitrogen%20trifluoride%20(NF3).*

3 ISO 14067, 2018: index, based on radiative properties of GHG, measuring the radiative forcing following a pulse emission of a unit mass of a given GHG in the present-day atmosphere integrated over a chosen time horizon, relative to that of carbon dioxide (CO_2).

4 *https://en.wikipedia.org/wiki/Marginal_abatement_cost*

5 *https://en.wikipedia.org/wiki/Social_cost_of_carbon*

1. INTRODUCTION

Governments have been focusing on money, risk, and planning for decades. CO_2 played a limited role in this for a long time. It was measured and reported, often afterwards. That has changed in recent years. More and more governments are using CO_2 information to substantiate choices in policy, investments, projects and procurement.

This movement shows a diverse picture. Organisations use different CO_2 prices, different methods, and apply CO_2 information at different points in the work process. Sometimes this is done in policy and strategy, sometimes in projects or programmes, and sometimes mainly as a conversation tool. That raises questions. Why do amounts vary so much? Why is CO_2 included here and not there? And how do these applications relate to each other?

This document is intended as a starting document to organise those questions. It does not provide a framework of standards, a step-by-step plan or a final picture, and does not indicate a “correct” CO_2 price or method. The aim is to provide insight into how pioneering governments give CO_2 a place in their work processes, what logic is behind this and where differences come from.

The document is therefore emphatically a working document. It forms the basis for a learning and exchange process between governments that work with CO_2 pricing or are considering doing so. The examples show what is already happening, where patterns become visible, and where questions remain unanswered. Based on these experiences, a follow-up process can be used to work towards more shared principles and practical tools. Updating this document is an obvious choice.

From calculating to steering

In many organisations, the first step has been taken: CO_2 is calculated. Materials are calculated, variants are compared, and emissions are made transparent. This provides valuable information but calculating alone does not lead to other choices.

CO_2 only becomes meaningful when the information is used in considerations:

- when comparing design variants;
- when making investment decisions;
- in programmes and budgeting;
- in tenders and cooperation with the market.

CO_2 pricing plays a key role in this. By translating emissions into euros, CO_2 information can be compared to other assessment criteria. Not as a separate sustainability criterion, but as part of the regular decision-making process.

By translating emissions into euros, CO_2 information can be compared to other assessment criteria. Not as a separate sustainability criterion, but as part of the regular decision-making process.

Two questions, multiple logics
In practice, it appears that governments answer various questions with CO_2 pricing. Sometimes it is about the *social significance* of emissions in the long term. Sometimes it is about the costs and *freedom of choice* within specific projects or measures. These questions are not interchangeable and require a different application of CO_2 information.

This paper shows that two dominant approaches emerge from these questions that are often used side by side in practice. These approaches bring order to the existing image, but do not explain everything. In addition to these logics, other factors also play a role, such as organisational culture, sector, political context and the phase in which an organisation finds itself.

Making these approaches explicit creates a better understanding of differences and makes it clearer where confusion comes from. Not to solve those differences now, but to make them negotiable and to learn from them.

Reading guide
The document first describes two interrelated perspectives on CO_2 pricing and then shows how they are applied in practice by provinces, municipalities and water boards. The examples are intended for illustration and comparison, not as a blueprint. Note: In this Document we use CO_2 as a synonym for GWP emissions.In later chapters, the relationship between policy, organisation and projects is made visible. Finally, the document reflects on what these experiences mean for employees and organisations, and what questions arise for a next step.

The key message is simple: *CO_2 pricing* is not an end in itself, but a *tool to better substantiate choices.* How that tool is used depends on the question that is asked and its place in the work process. *This document offers a common starting point for moving forward together.*

1.1 CO_2 pricing along two clear lines

Anyone who looks at how governments apply CO_2 pricing without prior knowledge will see a fragmented picture. Organisations use widely differing amounts per tonne of CO_2. One calculates with a few tens of euros, the other with amounts that go towards a thousand euros. Sometimes CO_2 is included in policy and strategy, sometimes in investment proposals or projects, and sometimes mainly as a discussion tool. There seems to be no fixed approach and no clear line.

This image is reinforced by the fact that applications coexist. CO_2 is reflected in policy documents, social cost-benefit analyses, project considerations, internal budget discussions and tenders. Without context, this looks incoherent. It seems as if every organisation chooses its own method and price.

This document shows that this diversity is not random but stems from various questions that governments are trying to answer with CO_2 pricing. These questions arise at different points in the work process and from different perspectives. As a result, the way in which CO_2 information is used also differs.

In practice, two questions keep recurring:
- *What does CO_2 emissions mean for society as a whole, in the long term?*
- *What does it cost to reduce those emissions within specific choices, projects and programs?*

These questions are related, but not interchangeable. The first is about appreciation and direction: what do we find socially acceptable or desirable? The second is about acting and prioritising: what can we do, and at what cost?

These questions give rise to two recognisable lines in the application of CO_2 pricing. These lines are not pre-selected routes or fixed methods, but a retrospective arrangement of how CO_2 is used in practice:

- *a policy line* in which CO_2 is valued as a social damage and is used in policymaking, strategy and long-term decisions. Here we look at the Social Costs of Carbon (SCC)
- *a prevention line*, in which CO_2 is used as steering information for projects, investments and programmes to compare and prioritise choices. Here we look at the Abatement Costs or Marginal Abatement costs (MAC)

This dichotomy brings coherence to the existing image but does not explain everything. In addition to these logics, other factors also play a role, such as the sector in which an organisation operates, the degree of organisational maturity, political choices, legal frameworks and the available data. These factors influence how far CO_2 pricing is implemented and at what times it is used.

The two strands mainly help to understand why amounts, instruments and applications diverge without necessarily indicating inconsistency or lack of ambition. As soon as it is clear which question is central, it also becomes clear why CO_2 plays a role as an assessment framework in one place and as a practical tool in another.

In the following paragraphs, these two lines are elaborated separately. Not to rank or merge them, but to make their own logic visible and to make it clear how they relate to each other within the work process of governments.

The way in which CO_2 pricing is applied does not follow from one fixed method or price, but from the question that is central to the consideration. The figure on the right shows how different perspectives and applications arise from this question, and how the policy line and prevention line can be derived from this.

From question to application of CO_2 pricing

1. What is the central question?

> What does this emission mean for society in the long term?

> What choice can I make within this project, program or budget?

2. What perspective fits that?

> Societal valuation and long-term effects

> Action space, feasibility and choices in implementation

3. How is CO_2 used?

> As an appraisal standard to make effects explicit

> As steering information to compare options and measures

4. What line emerges from that?

> **Policy line:** *CO_2 as societal damage*

> **Prevention line:** *CO_2 as aid in implementation and choices*

The **policy line** and **prevention line** are not pre-chosen routes, but an order emerging retrospectively from the central question.

2. THE POLICY AND PREVENTION LINE

CO_2 pricing is used by governments to answer various questions. These questions arise at different points in the work process and require a different way of dealing with the same information. As a result, the applications, amounts and instruments used in practice also differ.

In essence, two questions keep recurring:

- *What does CO_2 emissions mean for society as a whole, in the long term? Or more scientifically asked what are the Social Costs of Carbon (SCC)?*
- *What does it cost to reduce CO_2 emissions within concrete choices, projects and programmes? (MAC)*

These questions are related, but not interchangeable. The first is about valuation: making social consequences explicit in policy and strategic considerations. The second is about room for manoeuvre: comparing and prioritising measures within the implementation.

These questions give rise to two interrelated approaches to CO_2 pricing, which are referred to in this document as the policy line and the prevention line. These lines coexist and each fulfil its own role. They are not hierarchical, nor are they intended to be merged into one uniform approach.

The policy uses CO_2 pricing to make long-term effects visible in policy and decision-making. The prevention line uses CO_2 information to support choices in projects, investments and programmes. Both work with euros per tonne of CO_2, but do something different in terms of content.

Confusion arises when these differences are not made explicit and CO_2 pricing is approached as if there should be one price or method that can be applied everywhere. That is not the case. The meaning of a CO_2 price follows from the question it answers and the place in the work process where it is applied.

The following sections elaborate on these two lines separately and show how they are used in practice.

2.1 Conceptual framework for CO_2 pricing

In this document, CO_2 pricing is used as a collective term for assigning a value to CO_2 emissions in order to make choices explicit. The way in which that value is created and applied differs per context. To avoid confusion, the following terms are used consistently:

Social Cost of Carbon (SCC)
It is a valuation of CO_2 emissions based on the damage that emissions cause to society and future generations. This price is used as a policy-based valuation framework in strategic considerations and vision formation. The damage price is not a standard or limit for measures and says nothing about the costs of reduction.

Marginal Abatement Costs (MAC)
It is a CO_2 price based on the costs needed to prevent or reduce emissions in order to achieve climate goals. This approach is used, among other things, in national SCBA guidelines and in programmatic management. The prizc supports choices about feasibility and prioritisation.

(Specifc) Abatement Costs
This is the ratio between the additional or lower costs of a concrete measure and the amount of CO_2 that is saved as a result. This outcome arises within projects and programmes and is used to compare measures. It is not a fixed price, but a unit of account.

Internal CO_2 pricing
This is the application of a CO_2 value within an organisation to support choices. All applications in this document are covered by internal CO_2 pricing. There is no actual payment or external taxation.

External CO_2 pricing:
This is when parties outside of the own organisation (such as contractors in a tender process) are involved in the process.

This conceptual framework distinguishes between valuation, management and comparison, without using them interchangeably.

OVERVIEW OF APPLIED CO_2 PRICES AND CONTROL LOGIC

This appendix provides an overview of how various governments and instruments give CO_2 a value and apply it in their work processes. The overview shows that there is no single uniform CO_2 price, but different applications, each of which fulfils its own function.

The table does not order the examples by price, but by logic and application: what is the CO_2 value used for and at what level in the organisation?

Reading guide
The CO_2 values included are not intended as mutual standards and cannot be compared one-to-one. Differences are related to the purpose of the application, the place in the work process and the question that is answered with the CO_2 value.

Together with the main text, this appendix shows how CO_2 pricing functions as a coherent but differentiated instrument: policy-based appreciative, executive steering and project-based comparative.

Overview per organisation and application

Organisation / instrument	CO_2 value	Type of approach	Application	Core of the logic
Province of Utrecht	€ 875 / tonne	Social damage price	Policy considerations and strategy	Values long-term effects of emissions as a social impact.
Municipality of Utrecht (real estate)	€ 875 / tonne	Measure costs per tonne avoided (limit value)	Making real estate more sustainable	Determines to what extent unprofitable measures are socially defensible.
Municipality of Amsterdam	€ 448 / tonne (2025)	Prevention cost price (internal)	Investment decisions	Weighs CO_2 effects in business cases to compare variants.
Province of North Holland	No fixed price	Measure costs per tonne avoided	Programmes and projects	Compares measures on cost per tonne of CO_2 within programmatic control.
Municipality of Enschede	No fixed price	Measure costs per tonne avoided	Design and project phase	Makes CO_2 effects of design variants transparent in addition to costs.
Water boards	€ 100–150 / tonne	Prevention cost price (shadow price)	Policy, pilots and procurement	Supports trade-offs with a fictitious CO_2 value.
CO_2 Performance Ladder	No fixed price	Market mechanism	Tendering and implementation	Rewards demonstrable reduction through certification and award advantage.

2.2 The policy line: CO_2 as a social damage (SCC)

Within the policy guideline, CO_2 is used to make the social consequences of emissions explicit in policy-making and strategic considerations. Valuing emissions in euros per tonne creates a framework that reveals long-term effects alongside financial costs, risks and other public interests.

This application of CO_2 pricing is used in policy, vision formation and strategic decision-making. The value of CO_2 acts as an assessment instrument, not as a standard or limit value. The aim is not to optimise measures, but to provide insight into what choices mean for society in the long term.

In the case of social cost-benefit analyses (SCBAs), an important distinction applies in this respect. The national SCBA guidelines of the Netherlands Bureau for Economic Policy Analysis (CPB) and the Netherlands Environmental Assessment Agency (PBL) prescribe that CO_2 effects are valued on the basis of prevention costs. These prices are derived from the costs needed to achieve climate goals and are calculated within various Welvaart & Leefomgeving (WLO) scenarios; also mentioned Prosperity & Living Environment (PLE). The bandwidths used are considerably lower than values based on social damage costs.

Not all governments follow this guideline one-to-one. Some consciously choose to work alongside or outside the SCBA system with a higher valuation of CO_2, based on social damage. This choice is mainly meaningful at the policy level and says something about the way in which an organisation wants to make responsibility for long-term effects explicit. This application is separate from the SCBA Directive and should be read as such.

2.3 The prevention line: CO_2 as a management information in the implementation, (Abatement Costs/MAC)

The abatement costs are rooted in the practice of projects and programmes. The focus here is not on the damage of emissions, but on the question of how emissions can be reduced and at what cost. Designs, materials and implementation methods are compared with each other on the basis of their CO_2 effects and the associated additional costs.

In this line, the CO_2 price is not created in advance, but during the work. By dividing the cost of a measure by the amount of CO_2 it saves, a price per tonne avoided is created. This price helps to make choices within limited resources and to prioritise measures among themselves.

This approach makes CO_2 concrete in daily work. It supports designers, project leaders and administrators in making well-founded choices, without the need for a single fixed standard.

Two lines that reinforce each other

Although both lines work with euros per tonne of CO_2, they do something fundamentally different. The policy values emissions; the Prevention Line compares options for action. One provides direction and ambition, the other makes implementation possible.

Confusion arises when these lines are mixed up and one is looking for one correct CO_2 price. It doesn't exist. What does exist is a coherence in which policy-based valuation gives direction to what is desirable, and preventive pricing shows what is feasible.

When these lines are connected to each other, CO_2 control is created that goes beyond calculations alone. Policy becomes more concrete, projects become more consistent and choices become easier to explain.

2.4 ARRO as a connecting frame of mind within CO_2 pricing

ARRO is an internationally widely used classification for dealing with CO_2 emissions and stands for Avoid, Reduce, Replace and Offset. In this document, these terms are referred to respectively as avoid, reduce, replace and compensate. The classification is not used here as a step-by-step plan or decision model, but as a thinking aid to organise different options for action around CO_2.

The four elements of ARRO describe different ways in which emissions can be dealt with. They do not represent a fixed order and do not imply a normative arrangement. Which elements are relevant, and how much weight they carry, differs per context and depends on the central question and the perspective from which the view is made.

Within the policy line, ARRO helps to provide insight into where social gains can be achieved in the long term. It shows which types of measures are aimed at preventing future emissions and which choices mainly mitigate effects within existing systems. Within the prevention line, ARRO offers guidance to order and compare measures in projects and programmes, without qualifying them in advance as better or worse.

In this document, ARRO thus serves as an organising principle for the discussion about CO_2. The framework supports making assumptions explicit and helps prevent different perspectives from getting mixed up. In this way, ARRO contributes to more substantiated and more explainable choices, while maintaining the space for context, professional consideration and local circumstances.

3. POLICY LINE IN PRACTICE: SOCIAL DAMAGE AS AN ASSESSMENT FRAMEWORK

Policy is not about individual projects, but about direction. Which choices contribute to well-being in the long term, and which do not? The Social Costs of Carbon (SCC) makes it possible to explicitly include CO_2 emissions in such considerations, in addition to financial costs, risks and other public interests.

The SCC says nothing about the costs of measures. It is not a tool to optimise projects, but a valuation framework to make visible what emissions mean for society as a whole. It is precisely because of this that CO_2 is given a place in policy discussions where it would otherwise often remain abstract.

What this line yields

The policy line makes CO_2 visible at the level where direction is determined. It helps administrators and policymakers to make choices explicit and to explain them better, without committing themselves to concrete measures. In this way, it forms the frame of reference within which implementation and projects are given their place.

Example: Province of Utrecht – social damage price (€875 per tonne)

The province of Utrecht uses a fixed SCC of €875 per tonne of CO_2 in policy considerations and strategic decision-making. This value is based on international studies on the Social Cost of Carbon and is intended to make the long-term effects of climate change visible in euros.

The approach of the province of Utrecht deliberately deviates from the national SCBA guidelines. Whereas SCBAs work with CO_2 prices based on prevention costs, Utrecht chooses to calculate with a social damage price in policy considerations.

This choice does not mean that Utrecht will replace or correct the SCBA system. The social damage price is used as an additional valuation framework to make long-term effects more clearly visible in policy and administrative considerations. The application is therefore explicitly policy-related in nature and is not intended as a standard for project optimisation or implementation decisions.

The Utrecht example shows that governments can place different emphases within the policy line. While some organisations strictly adhere to the national prevention cost approach, others choose to value social damage more explicitly. Both choices answer a different question and are not interchangeable.

4. CO_2 CONTROL IN THE IMPLEMENTATION: FROM CHOICE TO APPLICATION

The implementation is not about the social damage of emissions, but about the question of what reduction costs and how resources are used in such a way that they have the greatest possible effect. CO_2 is used as management information, in addition to costs, planning and technical feasibility.

4.1 CO_2 as a tool for investments and projects

In projects and investment decisions, design variants, materials and measures are compared with each other. Every choice has financial consequences and an effect on emissions. By connecting the two, insight is gained into what reduction actually costs.

In practice, this happens, for example, in municipal investment proposals and design considerations, where CO_2 information is used to compare variants and substantiate choices (see appendices 1 and 4).

The abatement costs are not a fixed price, but a ratio: euros per tonne of CO_2 avoided. This ratio helps to make choices explicitly and to compare them with each other. What is appropriate differs per context. The information supports the conversation but does not prescribe a decision.

Example:
Municipality of Amsterdam – Include CO_2 in investment decisions

The municipality of Amsterdam structurally takes CO_2 into account when making investment decisions above a certain size. In this assessment, CO_2 is used as internal management information to compare project variants, in addition to financial costs and other policy goals.

In investment proposals, design and implementation variants are calculated on the basis of their CO_2 emissions. These emissions are multiplied by an internal CO_2 value, based on the prevention costs required to achieve climate goals. This creates an overall picture that shows how variants relate to each other.

A design with higher investment costs can therefore still be more attractive when CO_2 emissions are lower. The CO_2 value does not act as a standard or limit, but as a tool to make differences explicit and to support administrative considerations.

The application is explicitly aimed at investment decisions and has no impact on tenders or project optimisation at a detailed level. The chosen CO_2 value can be adjusted over time based on new insights and policy choices.

4.2 Programmatically steering towards CO_2 reduction

When choices are repeated across multiple projects, the focus shifts from individual decisions to coherence. At the programme level, CO_2 reduction is guaranteed by structurally creating space in budgets and planning.

Instead of taxing each project separately, we work with average surcharges or reduction budgets. This creates peace of mind in the implementation and predictability for project teams.

Example:
Province of North Holland – mitigation awards and programmes

The province of North Holland works with a library of measures in which the costs and expected CO_2 reduction are recorded for each measure. By using this information, project teams can choose measures that fit within the programme.

The province does not use a hard standard but uses bandwidths to give direction. Programmatic management provides insight into what reduction at scale costs and which choices structurally contribute to the goals.

A programmatic approach, in which reduction, costs and learning experiences over several projects are linked, has been developed in provincial management programmes and water boards (see appendices 2 and 6).

4.3 Application at different levels

CO_2 control in the implementation is reflected in several places in the organisation. The form differs per level, but the underlying logic is always the same: making choices transparent within existing preconditions.

- **Organisation level**
  Internal pricing or shadow pricing supports policy and investment considerations and helps to build experience.
- **Programme Level**
  Structural budget space makes it possible to apply sustainable choices consistently across multiple projects.
- **Project level**
  Cost per tonne of CO_2 avoided supports design and material choices.
- **Market Level**
  Incentives such as award benefits and the CO_2 Performance Ladder encourage market parties to reduce emissions.

These applications complement and reinforce each other when used in conjunction.

5. THE COHERENCE BETWEEN POLICY, ORGANISATION AND PROJECTS

The previous chapters describe various ways in which governments include CO_2 in policy and implementation. These approaches differ in purpose, application and moment in the work process. This makes comparison difficult, especially when examples from different organisations are compared to each other.

The examples in the appendices show that this coherence is interpreted in different ways in practice, depending on the organisation, scale and phase in the work process.

This chapter brings these approaches together in one overview. The table below shows which methods are used, which question they answer and where in the organisation they have their place. The overview is intended as a tool to recognise and better understand differences, not to designate one approach as the best.

The table should therefore not be read as a ranking or step-by-step plan. The approaches complement each other and can coexist. Which method is appropriate depends on the question that is asked: is it about giving direction to policy, about choices within projects, or about steering towards market parties?

By comparing this information, it becomes clear how the different forms of CO_2 pricing relate to each other and why they are applied so differently in practice.

5.1 CO_2 control visible per project phase

CO_2 pricing is given a role at various points in the work process. Sometimes this is done in policy, sometimes in organisation-wide agreements and sometimes in concrete projects. These applications differ in form, purpose and intensity. As a result, they are not one-to-one comparable.

The tables in this chapter bring these applications together in one overview. They show where in the project process CO_2 influences choices, and for what purpose. The tables are emphatically not a ranking and not a step-by-step plan. They show how different organisations use CO_2 at different times, appropriate to their context and working method.

The colour coding indicates the extent to which CO_2 is actually guiding in a certain phase. This is not about the level of a CO_2 value, but about the role that CO_2 information plays in the assessment.

Table 1. Insight into the application of CO_2 pricing in the project process

Project phase	Municipality of Enschede	Province of North Holland	Province of Utrecht	Municipality of Utrecht (real estate)	Municipality of Amsterdam	Water boards	CO_2 Performance Ladder
1. Exploration and policy frameworks	CO_2 as a point of attention in ambitions and frameworks △	CO_2 targets at programme level; guiding choices ■	CO_2 as a valuation framework in policy and strategy ■	Framework for real estate choices and ambition ■	Sustainable Investment Framework; CO_2 included in consideration ■	Internal CO_2 value as part of policy considerations ■	Non-policy (instrument for procurement) ●
2. Initiative and project start	Include CO_2 questions in assignment / scope △	CO_2 as a criterion for the choice of measures within the programme ■	CO_2 framework in starting decisions and prioritisation ■	Selection of buildings and approach; CO_2 explicit component ■	Investment proposals above threshold; CO_2 equation ■	CO_2 as a factor-in-life, factor in project start and choices △	Only relevant when tendering starts ●
3. Design (VO–DO)	Compare variants on CO_2 and costs ■	Measures library / reduction measures as a basis for design choices ■	Not primarily focused on project design ●	Calculation of measures per building; choice driven by CO_2 and costs ■	Variant comparison where calculations are made △	Supports design choices in pilots/ projects △	Not applicable (no design tool) ●
4. Procurement and contracting	CO_2 requirements and/or award space in contract ■	Assurance through agreements, standardisation and programmatic preconditions ■	Not a standard part of the tendering approach ●	Impact through requirements/ agreements within real estate projects △	Limited impact on tendering △	Sometimes applied in award or contract terms △	Direct management through award and contracting ■
5. Realisation and implementation	Monitoring or post-calculation where possible △	Recording reduction results at programme level ■	Not primarily designed for implementation ●	Implementation within the chosen package of measures; monitoring ■	Not primarily designed for implementation ●	Monitoring of pilots and compliance with agreements △	Execution in accordance with requirements and audit cycle ■
6. Management, maintenance and evaluation	Feedback to working methods and new projects △	Evaluating and recalibrating the approach within the programme ■	Evaluation of policy frameworks and application △	Monitoring reduction and adjusting roadmap ■	Recalibration of working method based on experience △	Evaluation and further development of approach ■	Continuous improvement cycle through audits ■

■ Guiding (CO_2 makes a demonstrable difference in the choice) △ Supportive (CO_2 helps, but is not decisive) ● Not/Hardly (No Visible Application)

5.2 Coherence between project, organisation and policy

The tables show that CO_2 control can take place at different points in the work process. These moments are not separate from each other but together, form a coherent whole.

Projects are often the starting point. Here, CO_2 is made visible in designs, variants and measures. The insights are concrete: which choices work, what do they cost and where is the most reduction. Without this project data, management remains abstract.

When these insights are collected structurally, they take on meaning at the organisational level. They form the basis for internal pricing, budget agreements, and programmatic choices. Repetition creates consistency and experience.

That experience then feeds policy. Policymakers gain insight into what is feasible, what costs are realistic and where bottlenecks arise. Policy is thus based on practice, rather than on assumptions.

Policy then works back to projects. Strategic frameworks and social damage prices give direction to new choices not as a mandatory standard, but as a reference point within which project teams make their considerations.

When these levels are aligned, a learning system is created. Projects provide data, organisations translate it into management and policy uses that guidance to give direction. This direction is reflected in new projects.

The maturity of CO_2 pricing is therefore not in one fixed price or method, but in the relationship between policy, organisation and implementation.

6. WHAT THIS STRUCTURE MEANS FOR EMPLOYEES

CO_2 pricing not only changes how calculations are made, but also how people do their work. The dichotomy between policy-based valuation and CO_2 management in projects and programmes makes it clear that not everyone has to do the same thing, but that they do work from the same framework. That gives you something to hold on to.

Working in policy
For employees who work in policy, this structure means that CO_2 is no longer an abstract goal, but an explicit consideration factor. The Social Costs of Carbon offer a way to make long-term effects visible in euros, in addition to other public interests.

The work thus shifts from formulating ambitions to making consequences explicit.

The work thus shifts from formulating ambitions to making consequences explicit. Policy choices are made more in-depth because it becomes clear what emissions mean for future costs, quality of life and broad prosperity. CO_2 pricing helps to make choices easier to explain, not to record them.

Working in organisation and preparation
For employees working on programs, investments or preparation, CO_2 control becomes part of the conversation about priorities, budgets and feasibility. Internal prices, shadow prices or structural budget space ensure that sustainable choices do not have to be fought for over and over again.

The emphasis here is on consistency. Not every project has to reinvent the wheel. By securing CO_2 control at the organisational level, peace and predictability are created. This helps to make plans better and keep expectations clear.

Working in projects
For project teams, CO_2 becomes concrete. Design variants are calculated, material choices are compared and measures are substantiated. CO_2 management in practice supports this work by providing insight into what reduction costs and yields.

It is important that CO_2 pricing does not form an extra layer of control here. It is a tool in the design process, similar to costs and planning. Project employees retain their professional space but receive better information to make choices.

It is important that CO_2 pricing does not form an extra layer of control here. It is a tool in the design process, similar to costs and planning.

Working with market and purchasing
For employees who work with the market, this structure provides clarity about the role of incentives. CO_2 control is not used to settle suppliers, but to stimulate desired behaviour.

Including CO_2 performance in tenders creates room for better proposals. The focus shifts from compliance to performance. This requires careful formulation but also provides a more level playing field.

One framework, different roles
What this structure makes especially clear is that CO_2 control is not a uniform task. Not everyone has to calculate or apply prices. However, everyone works from the same framework, in which CO_2 is a natural part of the consideration.

This lowers the threshold for working with it and prevents CO_2 from remaining something for specialists alone.

7. REFLECTION AND RECOMMENDATIONS

Differences in application and meaning
The application of CO_2 pricing within governments shows a diverse picture. Differences in amounts, instruments and times of application are large. At first glance, this may give the impression that there is fragmentation or lack of coherence. This document shows that these differences arise to a large extent from the questions that governments try to answer with CO_2 pricing and the place that CO_2 information is given in the work process.

In that light, the level of the CO_2 price used is often a visible and sensitive subject. An amount per tonne of CO_2 is concrete and immediately raises questions about ambition, feasibility and political choices. It is understandable that there is a lot of attention for this in policy and implementation.

The role of the level of the CO_2 price
At the same time, practice shows that the meaning of a CO_2 price cannot be seen separately from the context in which it is applied. The same value can be indicative in one situation and mainly serve as comparative information in another situation. The role that the CO_2 price plays in the consideration – appreciative, guiding or supporting – is therefore at least as decisive as the amount itself.

However, this does not mean that the level of the CO_2 price is unimportant. It is precisely when CO_2 pricing is used in investment decisions, programmes or policy considerations that the chosen price level influences the results of analyses and the sensitivity of choices. Both directors and executive teams attach value to the question of what amount is used and on the basis of what substantiation.

Follow-up and learning agenda
The examples in this document show that governments make different choices in this regard. Some are closely aligned with national prevention cost approaches; others consciously opt for a higher valuation of social damage at the policy level. These differences are not necessarily problematic, but they do require explicitness. As long as it is clear which question is answered by the CO_2 price, its level can also be better understood and discussed.

This document is therefore emphatically not an end point. It provides an initial order of existing practices and makes visible where similarities and differences lie. The next step lies in deepening these experiences together. Think of:

- how different forms of CO_2 pricing affect decision-making;
- how the board and organisation deal with the results in practice;
- and which bandwidths are experienced as workable and explainable in different contexts.

A learning and exchange process between governments can help to explore these questions. Not with the aim of setting one uniform CO_2 price, but to arrive at shared insights, sharper concepts and more explainable choices. Based on these experiences, this document can be refined in a subsequent phase and developed into a guide for governments.

APPENDIX 1: PROVINCE OF UTRECHT – CO_2 PRICING IN POLICY AND DECISION-MAKING

The province of Utrecht has made a clear choice: climate change will have an economic value in its policy and decision-making. Not as a theoretical model, but as a fixed part of the way in which the province makes social considerations.

Utrecht uses an internal CO_2 price of 875 euros per tonne of emissions, based on the social damage caused by each tonne of CO_2, the social costs of carbon (SCC) This price is not intended to pay for measures, but to make visible what emissions really cost society. So, it's about the damage price of CO_2, not the cost of reduction. In doing so, the province is making the consequences of climate change concrete in euros, so that administrators can better consider what their choices mean for the future.

Why the province of Utrecht prices CO_2

Behind this method lies a fundamental idea: climate change is the result of a market failure. The price of products does not reflect the damage they cause to the climate, the living environment and health. These so-called externalities have not been taken into account for years. The province wants to break through this by reducing CO_2 in economic analyses as a real effect – not something "external", but something that counts in every policy choice.

The province sees that climate change is becoming increasingly tangible: longer droughts, flooding, damage to agriculture and infrastructure, and health risks in heat. Globally, this translates into crop failures, migration and natural disasters. These social consequences come at a price, even if it is not included in the budget. By pricing CO_2 emissions, Utrecht brings these hidden costs into focus.

How the price came about

The price of 875 euros per tonne of CO_2 has been carefully determined. Klimaatverbond Nederland was commissioned by the province to investigate which value is appropriate to represent the social damage of emissions. This is in line with international studies, especially those of the German Umweltbundesamt, which calculates the so-called Social Social Cost of Carbon (SCC): the total damage that a tonne of CO_2 causes in the atmosphere during its lifetime.

This calculation takes into account:

- Intergenerational justice: future generations count as much as the current ones;
- Tipping points in the climate system: irreversible processes such as the melting of permafrost or the death of rainforests;
- Global justice: the unequal distribution of damage between rich and poor countries.

In the German calculations, the social damage is between €700 and €870 per tonne. The province of Utrecht has opted for €875 per tonne as the guideline value, including a risk premium of 25% for irreversible effects. This amount is the lower limit, which is reviewed every two years on the basis of new scientific insights.

The place of CO_2 prices in decision-making

The province applies the internal CO_2 price in social cost-benefit analyses (SCBAs) and policy explorations. In practice, the province compares different policy or investment scenarios on their total social value. For each scenario, the expected CO_2 emissions are estimated on the basis of key figures from, among others, the National Environmental Database (NMD), the Netherlands Environmental Assessment Agency (PBL) and DuboCalc-like references.

APPENDIX 1

Think of choices between expanding infrastructure or stimulating public transport, constructing heat networks or maintaining the gas network, or inner-city versus out-of-town housing. The calculated emissions per scenario (in tonnes of CO_2) are multiplied by the fixed social damage price of €875 per tonne. This yields a sum of money that reflects the social damage of the emissions.

By comparing these damage amounts with the financial costs of the scenarios, it becomes clear which variant is the most advantageous for society. For example, a more sustainable scenario with higher construction costs may turn out to score better on balance, because it causes considerably less climate damage in the long term.

The fixed value of €875 per tonne does not function as a subsidy ceiling or measure limit, but as a valuation criterion within policy and investment considerations. It makes it possible to include the social consequences of emissions in decision-making, in a similar way to taking into account costs, benefits and risks.

Application in practice

The internal CO_2 price is used in policy proposals, investment analyses and explorations of infrastructure projects. Think of the choice between expanding a road or improving public transport or comparing different energy or housing scenarios.

A concrete example can be found in the infrastructural investment projects of the province itself. In large projects – for example, the construction or replacement of a bridge – the CO_2 emissions of different variants are calculated. Suppose one variant of a bridge project causes 10,000 tonnes of CO_2 over its lifespan (due to material production, transport and maintenance). These emissions are multiplied by the internal CO_2 price of €875 per tonne: a social damage of €8.75 million.

A more sustainable alternative, for example with circular concrete or a lighter design, can reduce emissions to 7,500 tonnes. In that case, the social damage amounts to €6.56 million. The difference of €2.19 million shows what society “saves” through the sustainable choice. This loss is in addition to the financial costs in the SCBA, which makes the effect of CO_2 emissions visible in money.

If the sustainable variant then turns out to be more expensive, the overall picture is reconsidered: the additional cost of the investment is set against the social benefit of fewer emissions. When that gain is greater or comparable, the province usually opts for the sustainable variant. If the additional cost is much higher, a broader administrative consideration will follow in which other benefits are also taken into account, such as health, quality of life or nature.

In this way, the choice is not limited to a calculation, but the conversation is held about the real value of sustainability. The internal CO_2 price makes that conversation concrete: not to decide automatically, but to make conscious choices.

Two approaches: prevention costs and damage costs

The approach of the province of Utrecht differs from that of many other governments, which calculate with the so-called Abatement Costs – the costs of achieving reduction targets. This results in CO_2 prices between €15 and €160 per tonne.

Utrecht consciously opts for the Social Costs of Carbon. That price reflects the actual damage of emissions and forces us to take a sharper moral and administrative perspective: what will it cost us if we don’t act?

By calculating with this higher social price, the province is setting the bar higher than the current market prices. In doing so, it encourages policies that accelerate the transition to a low-carbon economy, without directly disrupting the budget.

APPENDIX 1

From analysis to policy
The province uses the internal CO_2 price not only in individual projects, but also as an assessment framework for new policy. Policy proposals that lead to structurally higher emissions are set against these social costs, making it easier to see whether policy contributes to or detracts from the climate goals.

This method reinforces the principle of broad prosperity: policy is assessed not only on economic growth, but also on well-being, living environment and future value. In doing so, the province of Utrecht is in line with the new guidelines of the Netherlands Environmental Assessment Agency (PBL) and the Netherlands Bureau for Economic Policy Analysis (CPB) from 2022, in which broad prosperity is the standard for government considerations.

More than a calculation
The Utrecht method is not only economic, but also moral. The province makes it visible that every tonne of emissions has a price – even if it is not paid immediately. This approach is in line with the social responsibility of governments: making choices that do justice to future generations.

The internal CO_2 price is not intended to collect money, but to embed moral awareness in policy. It helps administrators and policy advisors to ask themselves: what is the real price of our choices?

Towards a coherent climate policy
In the coming years, the province wants to link the CO_2 price to other policy areas, such as circular economy, sustainable procurement and area development. This creates a coherent set of instruments in which CO_2 pricing, CO_2 calculations and policy management reinforce each other.

By including social costs as standard in policy, planning and decision-making, the province of Utrecht is developing a new economic awareness: not everything that pays off financially is socially beneficial. This approach makes policy more transparent, fairer and more future proof.

APPENDIX 2: PROVINCE OF NORTH HOLLAND – INSIGHT INTO THE COSTS OF CO_2 EMISSION REDUCTION

The province of North Holland has mapped out the additional costs needed to achieve the CO_2 reduction targets for the management and maintenance of the provincial infrastructure. The approach shows how much CO_2 is emitted annually, which measures affect this and what financial space is needed for this. In this way, sustainability does not become a separate task, but a permanent part of the way of working.

The baseline measurement: knowing where you stand
The first step was to determine the annual emissions of the provincial area. This involves the management and maintenance of own assets such as roads, bridges, cycle paths, banks, greenery and road furniture.

The province collected area data and linked emission factors from the National Environmental Database to this, supplemented with practical figures from contractors and suppliers. This created a reliable picture of the emissions per type of work, such as asphalt production, earthmoving and equipment use. The baseline measurement comes to about 19,000 tonnes of CO_2 per year, of which sixty percent comes from asphalt, twenty percent from earthmoving and transport and about five percent from equipment.

This baseline measurement is updated annually so that the province keeps track of the effects of new technologies, cleaner fuels and changing maintenance volumes.

The Measures Library: what can you do?
Based on the baseline measurement, Noord-Holland has drawn up a library of measures with about thirty-five measures that can reduce emissions.

Examples are:

- asphalt with a lower production temperature,
- the use of recycled granules,
- electric or HVO-powered equipment,
- bio-based materials,
- and extending the lifespan of works of art.

For each measure, the expected CO_2 reduction is recorded, what the additional or lower costs are and under what conditions the measure is applicable. The library is updated annually, so that new insights are immediately included and outdated options disappear.

From measure to mitigation price
Each measure is translated into a price per tonne of CO_2 avoided: the mitigation price. This is created by dividing the additional costs of a measure by the expected reduction. The mitigation price makes measures comparable and helps project teams choose a suitable package.

The province does not use this price as a hard standard, but as a tool within a broader consideration that also includes safety, nitrogen, circularity and spatial quality.

To provide direction, North Holland uses a bandwidth:

- < €400/tonne CO_2: apply as standard
- €400–800/tonne CO_2: well defensible
- €800–1,250/tonne CO_2: apply for additional benefits
- €1,250/tonne CO_2: only in exceptional cases

APPENDIX 2

An integrated real-life example
Suppose a project processes 10,000 tonnes of asphalt. A more sustainable mixture costs an additional €8 per tonne. The additional costs are: 10,000 × €8 = €80,000

The Measures Library shows that this mixture saves 30 kg of CO_2 per tonne of asphalt. The total reduction is: 10,000 × 0.03 tonnes = 300 tonnes of CO_2

The abatement costs will then be: €80,000 / 300 = €267 per tonne of CO_2

With this outcome, the measure falls into the category of standard application. Project teams can therefore include the measure, as long as it is technically feasible. The choice is recorded in the project decision, together with the expected reduction and costs. After implementation, the actual reduction is measured.

By performing these kinds of calculations in the same way in all maintenance projects, programmatic insight is created: how much reduction is achieved annually, how many sustainable options have actually been applied and how much extra budget is involved. This makes CO_2 transparent at project level and at programme level.

From calculation to budget
Noord-Holland links the results of all projects to the total CO_2 of the acreage. This not only shows what one measure yields, but also what the total maintenance programme contributes to the provincial climate goals.

Each year, the following are analysed:

- what percentage of the asphalt was durable,
- which part of the rolling stock was electrically operational,
- how the total reduction relates to the reference footprint,
- And what realistic growth towards 2030 is.

This provides insight into the progress towards the target of a 55 percent reduction by 2030, as well as the structural additional costs involved.
Because measures cost money, the province works with an average surcharge of 3.5 percent for sustainable and nature-inclusive tendering, of which 0.5 percent for nature measures. This does not mean that each project individually receives an additional 3.5 percent budget, but that the total maintenance programme contains sufficient room to make sustainable choices possible. The principle is therefore programmatic, not project-based.

Application in projects
In projects, the process is always the same:

- Selecting relevant measures from the library.
- Calculating mitigation prices with current quantities.
- Putting together a realistic package within the available space.
- Recording reduction and costs in decision-making.
- Measuring afterwards what has actually been achieved.

A well-known example is the SOK Banks Programme, in which North Holland renews kilometres of banks every year within a long-term collaboration with contractors. The emphasis is on reuse, material reduction and the use of emission-free equipment. The programme aims for eighty percent lower environmental costs and at least fifty percent reuse. This shows how the system works out programmatically.

APPENDIX 2

Learning and adjusting
Noord-Holland works with an annual PDCA cycle:
- Planning: updating library and bandwidth.
- Implement: applying measures in projects.
- Control: measuring reductions and costs.
- Improve: adjust scale and budget based on market developments.

By collecting practical data year after year, the method becomes more and more accurate. Mitigation prices will become more competitive and measures will be more in line with the technical possibilities.

Responsibilities and organisation
- The programme manager steers the total reduction and monitors the use of the budget.
- Asset and management teams determine where measures are technically possible.
- Procurement secures the space in contracts.
- Sustainability advisors calculate measures and keep the library up to date.

To this end, the province uses simple, standardised calculation tools in which quantities, prices and CO_2 values come together. The results are collected annually in a dashboard that provides insight into reductions, costs per tonne and use of the available budget.

A learning system
The strength of this method lies in its simplicity: the baseline measurement provides the overall picture, the library translates knowledge into choices, the mitigation price makes CO_2 concrete in euros and the budget space ensures that measures remain feasible. By learning from practice every year, Noord-Holland is developing a system that works better and better. CO_2 thus becomes a permanent part of project-based work instead of a separate sustainability ambition.

APPENDIX 3: MUNICIPALITY OF ENSCHEDE – CALCULATING CO_2 AS A FIXED PART OF THE DESIGN PROCESS

The municipality of Enschede works with its own CO_2 estimation methodology that makes the emissions of projects visible from the very first planning stage. Even before a final design is on the table, it is possible to calculate the impact of choices in materials, transport, equipment and implementation on total CO_2 emissions. This approach is not a technical extra step, but a fixed part of the project process – just as obvious as the cost estimate.

From initiation to evaluation

The CO_2 calculation starts in the planning phase, where an initial estimate is made with the help of key figures. As the design takes shape, the data becomes more precise. During the Preliminary Design (PD), the first variants are compared with each other, and in the Final Design (FD) the calculation follows on the basis of the actual quantities and materials.

During the tender, tenderers can submit their own product data or alternative proposals, where the CO_2 performance can be added directly to the estimate. After completion, the calculations are adjusted where necessary on the basis of the material or working method used – which in turn provides valuable information for comparable future projects.

One estimate, one process

In Enschede, the CO_2 estimate is integrated into the same file in which the cost estimate is also made. The cost expert carries out the estimate in the usual software (Bakker & Spees), where the costs and CO_2 effects are visible side by side. Designers, project managers and managers look at the effects of design variants on both euros and emissions and can use this to decide on the most suitable choices.

This approach makes the difference: there is no separate software, no other format and no extra calculation moment. For the project team, CO_2 is just as visible and concrete as the cost items in an estimate.

Three types of data for the estimate

The CO_2 calculation in Enschede is based on three types of data, which work together to form a transparent whole:

- **Generic values from the NMD (category 3):** basic data for common products and processes.
- **Sector- or chain-related data (category 2):** emission values derived from sector studies or collaborations.
- **Product-specific data (category 1):** validated data from suppliers or contractors, for example for innovative materials or special mixtures.

For solutions or products that do not yet have a permanent place in the NMD, controlled assumptions or recalculated reference values from previous projects are temporarily used. It is important that assumptions are always made transparent.

How CO_2 is included in the existing estimate

In the estimation tool, every product, process or material that already has a price per unit (e.g. per tonne, per m^2, per meter or per hour) is now also expanded with a CO_2 value. These values are taken from the NMD or are supplier specific. Because of this link, every calculation of costs automatically leads to a calculation of emissions.

APPENDIX 3

When calculating quantities and variants – a different type of concrete, a different implementation method or different source material – the financial and CO_2 impact become visible at a glance. The same applies to contractors' alternatives during the tender: as soon as product data is available, the CO_2 calculation is immediately refreshed.

Examples from our own practice
Practical experience shows that involving CO_2 insights at an early stage can lead to different types of choices. For example, the reuse of clinkers mainly yields CO_2 gains by avoiding the production of new bricks, and not so much by reducing transport. A thicker layer of asphalt is rarely the solution; It is precisely the use of low-temperature asphalt or recycled material that leads to visible gains, without loss of quality.

During a maintenance project, 5,000 m^2 of paving will be replaced. The project team compares two options: new pavers or reuse of vacant pavers. Costs and CO_2 are in one estimate. The unit prices are all-in amounts for material, laying, recording and cleaning.

Variant A – new vowels
Price: € 30 per m^2 (material + labour)
Total costs: 5,000 m^2 × € 30 = € 150,000
CO_2: 5,000 m^2 × 25 kg = 125 tonnes of CO_2

Variant B – reused pavers
Price: € 24 per m^2 (pick-up, cleaning, sorting, re-laying)
Total costs: 5,000 m^2 × € 24 = € 120,000
CO_2: 5,000 m^2 × 6 kg = 30 tonnes of CO_2

Difference
Cost: reuse is €30,000 cheaper
CO_2 reduction: 95 tonnes less CO_2

As with North Holland, you can also determine the price per tonne avoided:
€ - 30,000 / 95 tonnes of ≈ – €316 per tonne of CO_2

APPENDIX 3

Embedding in the organisation

- **Cost experts** carry out the estimate and apply the CO_2 values.
- **Designers** test material variants against CO_2 estimates and costs.
- **Project leaders** discuss estimation and CO_2 insights in the design or construction team meeting.
- **Administrators and policymakers** use the final data to substantiate choices or adjust policy.

In this way, the quality of the calculations grows with the organisation. Every new experience or computational value from completed projects strengthens the dataset for future projects.

Continuous learning instead of just accountability

The CO_2 calculation method has been developed as a learning tool. By calculating and evaluating each project, insight into the impact of our choices – and into the effectiveness of alternatives – grows. Increasingly, the results of the CO_2 estimate are also included as a substantiated criterion in tenders. This leads to more confidence in reuse materials, new applications or other raw material management.

A practical approach for a more sustainable future

Enschede's working method shows that it is possible to connect design, costs, implementation and climate impact in one systematic chain – without complicated tools or long-term projects. By allowing CO_2 estimates to grow along with the design process, not only more transparency is created, but also control and room for choice.

Down-to-earth, practical, in line with the realities of project execution and at a pace that works. That is the Twente way of working.

APPENDIX 4: MUNICIPALITY OF AMSTERDAM – SUSTAINABLE INVESTMENT AND CO_2 PRICING

The City of Amsterdam applies CO_2 pricing as part of its approach to sustainable investment. The method is intended to make climate impact visible in investment decisions and thus contribute to broader considerations within the organisation.

Sustainable investment as a starting point
Amsterdam applies the principle of 'sustainable, unless'. In principle, investments are carried out sustainably. If this is deviated from, this requires an explicit administrative consideration. This principle is laid down in the Sustainable Investments Application Rule and applies to investments above a predetermined threshold.

Various sustainability aspects are included within this scheme. Climate adaptation and biodiversity are assessed qualitatively. For energy use, energy generation and material use, the CO_2 emissions are calculated and translated into a monetary value.

CO_2 value as a comparison tool
The municipality uses an internal CO_2 value that is based on Marginal Abatement Costs (MAC) costs: the costs needed to achieve the climate goals. In 2025, this value will be €448 per tonne of CO_2. The value is reviewed periodically and may be adjusted in the future.

The calculated CO_2 costs are presented to the board and organisation together with the investment costs. This provides insight into the total impact of different project variants. The method does not prescribe an outcome but supports the conversation about which variant is the most socially defensible.

Practical example
Two variants are compared with an investment proposal:

Variant A – standard design
CO_2 emissions: 5,000 tonnes
CO_2 value: 5,000 × €448 = €2.24 million
Investment costs: € 5.0 million
Total value: €7.24 million
Variant B – more durable design
CO_2 emissions: 2,500 tonnes
CO_2 value: 2,500 × €448 = €1.12 million
Investment costs: € 5.5 million
Total value: €6.62 million

Although the investment costs are higher, the total value is lower due to the lower CO_2 emissions. This makes it clear why a more sustainable design can be more socially attractive.

Tools and further development
To support this method, Amsterdam uses a calculation tool for sustainable investments. This tool helps to provide insight into additional costs, CO_2 effects and energy savings. The tool is being further developed on the basis of practical experience and is intended as a tool, not as a mandatory calculation tool.

Amsterdam emphatically considers CO_2 pricing as a learning method. Application in investment proposals provides insight into the effects of the method and it can be tightened or adjusted over time.

APPENDIX 5: MUNICIPALITY OF UTRECHT – CO_2 AS A MEASURE OF SOCIAL RESPONSIBILITY

Since 2023, the municipality of Utrecht has been using a fixed social cost of carbon (SCC) value of €875 per tonne of CO_2 to determine how far it will go with unprofitable sustainability measures in municipal real estate. This so-called CO_2 reduction method helps to carry out investments that do not fully pay for themselves, but that do demonstrably deliver climate benefits and are therefore socially responsible.

The method arose from a practical problem. The previous Acceleration Task for Energy-Neutral Core Real Estate scheme came to a standstill, because buildings only received a subsidy if they became completely energy-neutral. In practice, this turned out to be technically or financially unfeasible for many buildings. As a result, the implementation stalled. Utrecht decided to do things differently: no longer the energy label or the theoretical standard is leading, but the actual CO_2 emissions.

From energy label to emissions

Instead of focusing on energy labels, Utrecht is now looking at the climate impact of each measure. Each building is calculated on the basis of what it actually emits in terms of CO_2 and how many tonnes can be saved with various measures. Cost-effective measures – which pay for themselves through lower energy costs or subsidies – are implemented as standard. The CO_2 reduction method helps with the choices above that: measures that seem financially unprofitable, but whose social benefits are great.

The limit is €875 per tonne of CO_2 saved. If the cost per tonne avoided remains below that, the measure is socially responsible. That amount is based on research by the German Umweltbundesamt, supplemented by an additional 25 percent to also take into account additional climate damage. Utrecht uses that limit as a benchmark to determine how much the city is willing to invest to prevent future climate damage.

How the method works

The municipality applies the method to both new construction and renovation. In the case of new construction, the legal requirements are first followed. Measures that go beyond what is mandatory – for example, extra insulation or a heat pump with low-temperature heating – are calculated using the CO_2 method. If the additional costs per tonne of CO_2 avoided remain below 875 euros, the measure can be implemented.

In the case of existing buildings, the measures that can be covered financially are first examined. In addition, additional interventions are being considered as long as they remain within the social boundary. These can be, for example, HR++ glass, roof insulation or hybrid heat pumps. This creates a step-by-step approach in which not everything has to be done at once, but every investment demonstrably contributes to the climate goal.

The pilot in four buildings

To test the method, Utrecht carried out a pilot at four municipal buildings: Sterrenzicht, the Volksbuurtmuseum, the Musketon and the Vlampijpateliers. In three buildings, additional measures turned out to fall within the limit and are now being implemented. Together, they save about 49 tonnes of CO_2 annually. At the Vlampijpateliers, which was already connected to district heating, the extra measures turned out to be too expensive per tonne of savings and were therefore not implemented.

The example shows how the method helps to substantiate choices. The decision is no longer a matter of feeling, but of calculation. A measure that saves 300 tonnes of CO_2 for €200,000 has a cost of €667 per tonne and is therefore socially responsible. An intervention that saves 100 tonnes for the same amount comes to € 2,000 per tonne and falls outside the limit. In this way, the budget is used where the greatest climate gains can be made.

APPENDIX 5

Smart prioritisation within limited resources
Utrecht has about 450 municipal buildings, almost half of which still have a low energy label. Because not everything can be done at once, the municipality works with a roadmap that determines where the most profit can be made for each building. First, buildings that are required to be improved or where the CO_2 reduction is greatest are tackled. In this way, the available budget of approximately € 7.5 million is used in a targeted way for maximum results.

The approach makes it possible to become more sustainable step by step without waiting until there is enough money for complete renovation. In this way, projects remain feasible and controllable, while the total emissions are steadily decreasing.

What the municipality learns from the method
The pilot confirms that the CO_2 reduction method works as a practical decision-making tool. It provides direction in limited resources and makes visible where each euro has the most effect. The method also makes the discussion about unprofitable measures concrete: no longer a question of "too expensive", but of a substantiated cost per tonne of emissions.

The municipality sees the approach as a learning method. In the coming years, experience will be gained with more buildings. It is also looking at how the method can be extended to other themes such as circularity, nature-inclusive construction and user behaviour. Because a sustainable building is only truly sustainable if it is also used sustainably.

A moral and practical consideration
For Utrecht, the CO_2 reduction method is more than a calculation tool. It expresses a conviction: every tonne of emissions saved now prevents future damage.

"We do this because we feel morally obliged to limit climate damage," says task manager Erik Leisink. "Every tonne we save counts – even when money is scarce."

With this approach, Utrecht brings together moral responsibility and practical policy. By translating climate impact into euros, sustainability is given a permanent place in the budget and in thinking.

APPENDIX 6: UNION OF WATER BOARDS – FROM ENVIRONMENTAL COSTS TO SOCIAL VALUE

Water boards are among the first governments to take internal CO_2 pricing seriously. From their responsibility for water safety, purification and climate adaptation, they are directly affected by the consequences of climate change. CE Delft was commissioned by the Union of Water Authorities to develop a guide that describes how CO_2 pricing can be applied in policymaking, investments and tenders.

A unified approach
The Union of Water Boards wants to work towards a harmonised working method. The guide assumes an internal price of €100 to €140 per tonne of CO_2 until 2030, rising to €140 to €290 per tonne after 2030. That price reflects the social damage of CO_2 emissions: what it costs to repair or prevent the effects of climate change. The goal is not to actually pay, but to use this fictitious value in decision-making.

Internal price as an assessment framework
The CO_2 price is used as a so-called shadow price. This means that the calculated costs are not settled in money, but are included in the assessment of policy choices, designs and tenders. For example, sustainable variants, which seem more expensive financially, can still prove more attractive to society.

In practice, water boards apply CO_2 pricing in:
- Policy and investment decisions, by including the social costs of emissions in the business case.
- Procurement and tendering, where CO_2 costs are used as an award criterion.
- Fund formation, in which water boards consider converting fictitious CO_2 costs into an internal sustainability fund for future climate projects.

Application in projects
The guide describes two practical examples:
- Dike reinforcement Lauwersmeerdijk (Wetterskip Fryslân)
  Afterwards, the difference in climate impact between the traditional design and a sustainable alternative was calculated for this improvement. By reusing materials and biofuels, 3,700 tonnes of CO_2 were saved. With a price of €100 per tonne, that means a social gain of €370,000.
- Covering sludge buffer (Amstel, Gooi and Vecht Water Board)
  By covering an open sludge buffer, methane emissions are prevented. With a reduction of 2,869 tonnes of CO_2 per year, this represents a social value of €286,900. Without CO_2 pricing, this project would not have been financially implemented; Thanks to the fictitious price, the added value has been made visible.

Pricing in tendering
Water boards use the same system in tenders. A provider that emits less CO_2 gets a better score in the MEAT calculation. For example, the “cheapest” provider can still be more expensive if its CO_2 impact is large. In practice, this happens, for example, in the purchase of chemicals or civil engineering works, where the CO_2 footprint of products is converted into euros using DuboCalc or ECI values.

APPENDIX 6

Water boards as an example
The guide shows that CO_2 pricing is not only an instrument for climate policy, but also for more conscious financial management. Giving CO_2 a place in investment considerations creates a fairer comparison between costs now and climate damage later.

The water boards consciously opt for an internal price – not to tax, but to learn. This increases knowledge about the CO_2 impact of choices, and creates support for embedding sustainability in all parts of the organisation.

APPENDIX 7: THE CO_2 PERFORMANCE LADDER AS AN EXTERNAL STEERING MECHANISM

The CO_2 Performance Ladder is an instrument that helps organisations reduce their greenhouse gas emissions in a systematic way and allows contracting authorities to take emission reduction into account when awarding contracts. In this document, the Ladder is therefore not treated as an example of the policy-based valuation of societal harm, internal CO_2 pricing, or a project-specific calculation of abatement costs. It works differently: as a certification system and procurement instrument that encourages organisations to reduce their emissions and gives contracting authorities a market incentive to reward that behaviour.

The Ladder was developed by the Foundation for Climate-Friendly Procurement and Business (SKAO) and is widely used by both companies and public authorities. It has become a well-established instrument, particularly in construction, infrastructure and public procurement.

Why the Ladder is used

The Ladder was developed to make emission reduction less voluntary and more structured. Organisations that use it must understand their emissions, set reduction targets, implement measures and report transparently on their progress. The core idea is that reduction should not remain an ambition on paper, but should become a demonstrable part of the way an organisation operates and, at higher levels, of the way it works with partners in the supply chain.

In that sense, the Ladder is both a tool for emissions management within organisations and an external steering mechanism in procurement. For organisations, it provides structure for reducing emissions. For contracting authorities, it offers a way to make reduction efforts visible and comparable.

The transition to version 4.0

Since January 2025, the CO_2 Performance Ladder has been operating under version 4.0. In this version, the earlier structure of five levels has been replaced by three tiers. A transition period of two years applies, during which organisations can move to the new handbook and contracting authorities can adapt their procurement practices accordingly.

The new structure is more straightforward and places greater emphasis on supply-chain cooperation, longer time horizons and a broader approach to emissions. As a result, the focus shifts from the organisation alone to a wider climate challenge in which partners, suppliers and other influenceable emissions also play a role.

The three tiers

Under version 4.0, the Ladder works with three tiers. At the first tier, the main focus is on reducing emissions within the organisation itself. This concerns insight into energy use and emissions, setting reduction targets, and implementing measures within the organisation’s direct sphere of influence.

At the second tier, the perspective broadens to include the value chain. The organisation then also takes account of emissions outside its direct operations and works with a climate transition plan for the medium term. Cooperation with supply-chain partners becomes a structural part of the approach.

At the third tier, the emphasis is on the long term, with the aim of reducing emissions towards net zero by 2050. At this stage, the organisation works with a quantitatively substantiated climate transition plan and takes an active role in broader cooperation and supply-chain influence.

APPENDIX 7

This structure makes clear that the Ladder is not only about measuring and reporting, but also about increasingly ambitious reduction efforts, collaboration and strategic embedding.

What version 4.0 changes in substance

With version 4.0, the scope of the Ladder has been broadened. The focus is no longer limited to CO_2 alone, but extends more broadly to greenhouse gas emissions. There is also greater attention to other influenceable emissions, such as biogenic emissions, emissions removal and avoided emissions, insofar as these are relevant within the methodology.

In addition, climate transition plans now play a stronger role. From the higher tiers onwards, organisations must show not only what they are doing now, but also how they intend to contribute to structural emission reduction over the longer term. Results and implementation weigh more heavily than intentions or standalone plans.

How the Ladder works in procurement

For contracting authorities, the Ladder is primarily relevant as a procurement instrument. It allows authorities to give an advantage in the award process to tenderers that can demonstrate stronger performance in reducing greenhouse gas emissions. This may take the form of a fictitious discount or a comparable tender advantage in the evaluation of bids.

In this way, the Ladder functions as an external steering mechanism. It does not work by assigning a fixed monetary value to emissions themselves, but by rewarding reduction performance in competition for contracts. The Ladder therefore does not place an internal or societal CO_2 price on emissions. Instead, it creates a market signal: organisations that demonstrably perform better on emission reduction can strengthen their position in procurement procedures.

This is precisely what distinguishes the Ladder from the other examples in this document. Whereas internal CO_2 pricing uses a fixed value in internal decision-making, and specific abatement costs emerge from comparing costs and avoided emissions, the Ladder works through certification, transparency and procurement advantage.

What this means for contractors

For contractors, the Ladder means that emission reduction is not only an internal improvement process but also a factor that affects their market position. An organisation at a higher tier can demonstrate that it has insight into its emissions, sets reduction targets and implements measures that have been externally verified.

That can provide an advantage in procurement. The actual tender price does not change, but the assessment of the bid may become more favourable. In this way, the Ladder creates a direct incentive to work on structural emission reduction.

The reverse is also true. Companies that do not work with the Ladder miss out on this advantage and must compete without that additional distinguishing factor. The Ladder therefore stimulates not only reduction within organisations, but also movement in the market as a whole.

What this means for contracting authorities

For contracting authorities, the Ladder provides a practical way to incorporate emission reduction into procurement without having to create an entirely new assessment system each time. A certificate or project declaration shows that a tenderer works according to a recognisable method and has been externally assessed against it.

APPENDIX 7

This helps make sustainability a more structured part of the award process. At the same time, it requires careful formulation in procurement documents. It must be clear what ambition level is required, how the procurement advantage is calculated and how, after award, it will be verified that the tenderer actually delivers what was offered.

Example of application in procurement
Suppose a municipality tenders a road construction project and combines price and sustainability in the evaluation. The procurement documents state that tenderers at a higher ambition level on the CO_2 Performance Ladder receive a greater procurement advantage.

In that case, a contractor with a higher tender price may still rank first in the evaluation because its reduction performance carries more weight in the assessment method. The contracting authority is therefore not automatically selecting the lowest price, but the bid that performs best within the chosen framework for price and emission reduction.

It is important to note that this is not a direct valuation of societal harm caused by emissions. It is a procurement method that rewards reduction effort, not a calculation of climate damage or a project-specific reduction price.

Sanctions and assurance
If a tenderer offers a certain ambition level, that level must also be achieved after contract award. For that reason, some form of assurance or sanction is often included when the promised level is not delivered. This prevents organisations from gaining procurement advantage without actually translating that into reduction effort during implementation.

This underlines that the Ladder is not merely an administrative instrument. Its purpose is to ensure that reduction is reflected in actual behaviour, implementation and cooperation.

How the Ladder leads to reduction
The strength of the CO_2 Performance Ladder lies in the combination of measuring, improving, making transparent and rewarding. Organisations must know their emissions, take action and report on progress. Those that go further are rewarded for that in the market.

In this way, the Ladder changes behaviour differently from a fixed CO_2 price. It does not assign a direct value to emissions, but makes reduction effort more attractive for organisations that want to win and retain contracts.

Significance of this case
The CO_2 Performance Ladder shows that CO_2 steering does not always have to operate through a price per tonne. Certification, procurement and external incentives can also help governments and market parties incorporate emission reduction structurally into their work.

Within the structure of this document, the Ladder is therefore above all an example of an external steering mechanism. It does not directly value societal harm, it does not apply an internal price, and it does not calculate specific abatement costs. Instead, it rewards demonstrable reduction effort and makes emission reduction part of competition, cooperation and implementation.

In that sense, this case shows that CO_2 steering can also be embedded in practice without direct carbon pricing.

MORE INFORMATION

Would you like to learn more about CO_2 pricing? Or exchange ideas on how to get started with CO_2 pricing in procurement or other processes? Feel free to get in touch with one of us.

Klimaatverbond Nederland

Klimaatverbond Nederland
Klimaatverbond Nederland is an association of decentralised governments, founded in 1992. The association currently has 150 members, including municipalities, provinces and water authorities. Together, we work at local, regional, national and international levels towards active and impactful climate policy. In doing so, we act as a pioneer, connector and independent partner.

Klimaatverbond is the lead partner of the European cooperation project DeCarb-Pro, supported by the Interreg North-West Europe programme.

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