Guidance on Public Investment into Sustainable Infrastructure Projects

Specific contract SI2.1046055 / 15bis implementing framework contract No. ENV.B.I/FRA/2018/0002 Lot1

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[September – 2022]

EUROPEAN COMMISSION

Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs
Directorate C — Investment
Unit [Directorate C.2 — Public Procurement

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PDF	ISBN [number]	ISSN [number]	doi:[number]	[Catalogue number]

Luxembourg: Publications Office of the European Union, 2022

Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs

Notice

This Guidance is intended to help public buyers and to encourage good practice.

It is a non-binding document which does not affect the rights and obligations set in the EU legislation. Moreover, the content of the Guidance is subject to the evolution of EU law, including the revision of the Procurement Directives and case-law of the Court of Justice. It represents the state of play as of August 2022.

The concepts, ideas and solutions proposed in this document are without prejudice to national legislation and may need to be adapted to consider the national legal framework.

Although the information in this Guidance have been carefully checked, the European Commission accepts no liability concerning the specific cases mentioned in it.

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Acknowledgments

This Guidance has been produced on behalf of the Directorate General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) by a consortium led by Technopolis Group, ICLEI, Arctik, COWI, and WAAT in the framework of a specific request for services.

The examples of good practice have been checked for compliance with the existing legislative framework by Abby Semple.

We thank all the stakeholders who have contributed through interviews, surveys, and workshops to the identification of the examples of good practice presented in Chapter 2, as well as to the finalisation of the overall structure and content of the guidance to make it responsive to their needs.

For the specific part on risk management, we acknowledge the contributions of the OECD gathered during the online workshop held on June 30, 2022.

1. Introduction

The European Union is committed to transforming sustainable public procurement into a policy instrument to support the achievement of public authorities' common societal goals. These include the goals to ensure environmental protection, social responsibility and inclusion, innovation, combating climate change, fair and inclusive employment, and public health.

Sustainable public procurement is a process by which public authorities seek to achieve the appropriate balance between the three pillars of sustainable development – economic, social, and environmental – when procuring goods services or works at all stages of the project.

This Guidance aims to promote the use of public procurement as a concrete tool to deliver major sustainable infrastructure[1] projects in line with the objectives of the European Green Deal, to make the EU's economy resource-efficient and competitive, with zero net emissions of greenhouse gases in 2050 within the framework of the Sustainable Europe Investment Plan[2].

Its target users are EU public buyers with an interest in attracting public investment for the green transition and crisis recovery (EU and national) and in leveraging private investments conditioned to sustainability objectives. It also helps suppliers and service providers to better understand the environmental requirements increasingly encountered in public tenders.

The Guidance provides operational support to make informed decisions regarding how sustainability principles should be embedded in each phase of the lifecycle of an infrastructure project. It follows a holistic approach that starts with the pre-procurement phase and continues through the other phases of tendering, procurement, construction, use, maintenance and operation, and end of life.

Existing guidance documents and handbooks for sustainable implementation of infrastructure projects, as well as a variety of relevant projects, methods, approaches, and tools have been analysed, organised, and referenced in the preparation of this document to offer practical, transferable examples of good practice and inspiring recommendations to enhance sustainability. The Guidance is also informed with the findings of an assessment of how the European Taxonomy on sustainable finance can be used as a basis for the formulation of selection criteria, technical specifications, award criteria or contract performance clauses in the procurement phase.

Following this introduction, Chapter 2 briefly describes the policy and legal background of the Guidance, including its relation to the EU Taxonomy for Sustainable Activities. Relevant key concepts, including what is to be understood by 'sustainability' in a public infrastructure project and how sustainability can be integrated into public infrastructure projects, are also explained. Chapter 3 provides practical suggestions, examples of good practice and recommendations to support public buyers across the main phases of the lifecycle of an infrastructure project, starting with preparation for tendering, continuing with tendering, construction, use, maintenance and operation, and culminating with end of life. A user-friendly sustainability checklist for public buyers is available in Chapter 4.

1 Infrastructure is a broad concept encompassing buildings, network infrastructure, and a range of built systems and assets. For instance, the InvestEU Regulation includes a comprehensive list of eligible investments under the sustainable infrastructure policy window. EUROPEAN COMMISSION, COMMISSION NOTICE, Technical guidance on the climate proofing of infrastructure in the period 2021-2027, (2021/C 373/01).

2 https://ec.europa.eu/commission/presscorner/detail/en/fs_20_48.

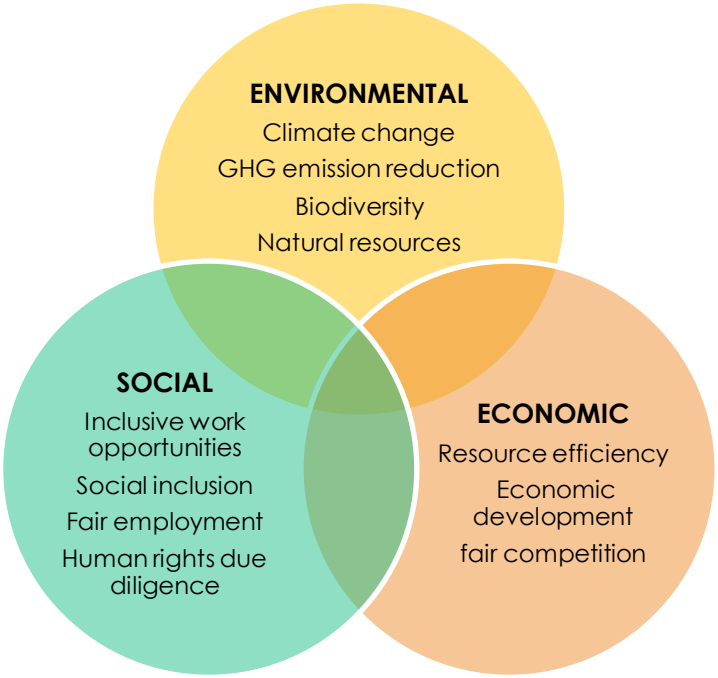
2. Principles of sustainable public procurement

In this chapter you will be able familiarise yourselves with some key concepts of sustainable public procurement and sustainable infrastructure, as well as with the legal framework underpinning the implementation of sustainable considerations in European public procurement processes and the main aspects of the EU Taxonomy for Sustainable Activities.

2.1. Sustainable public procurement (SPP)

Sustainable public procurement (SPP) facilitates for sustainable products and services to be attractive for investors and businesses, supporting sustainable development between the public and private sector in the market. Moreover, sustainable public procurement aims to influence the long-term value of the interaction, going beyond the sole focus on purchase costs and price. When applied correctly, SPP can encourage more efficiency and competitiveness in markets and further the economic, environmental, and social development of countries and regions.

Figure 1 Three pillars of sustainable procurement



The European Commission defines sustainable public procurement as "a process by which public authorities seek to achieve the appropriate balance between the three pillars of sustainable development – economic, social, and environmental – when procuring goods, services, or works at all stages of the project".[3] As illustrated in Figure 1 on the right, SPP can thus be understood as interlinked aspects of sustainability defined as follows:

- **Economic sustainability** is about resource efficiency, economic development, and fair competition with the aim to improve the quality of products and services while optimising cost.
- **Environmental sustainability** focuses on reducing climate change with actions such as the reduction of greenhouse gas emissions through waste emission and air pollutants reduction, preservation of biodiversity and proper management of natural resources.

3 The European Commission: Green and Sustainable Public Procurement: https://ec.europa.eu/environment/gpp/versus_en.htm.

- **Social sustainability** means making socially responsible choices by creating more inclusive job opportunities, fair working conditions, social inclusion, and improving human rights due diligence and compliance.[4]

When the above-mentioned three interlinked aspects of sustainability are partly or fully included in the implementation of an infrastructure project, **life cycle thinking** is implemented**.** Life cycle thinking aims to identify possible improvements to infrastructure projects in the form of lower environmental impacts and reduced use of resources across its whole life cycle.[5] This means that all parties involved in the lifecycle of an infrastructure, from its design until its end, have an important role to play to ensure it is sustainable. For public authorities, life cycle thinking in practice could be, for instance, to carry out an analysis of the main goods and services required for the development of an infrastructure project to better understand which environmental criteria could be relevant for the design of a tender. Life cycle thinking can encourage contractors to reduce their resource consumption and improve the performance of the products they use in the execution of a project.

EU level environmental criteria

To support procurers in the inclusion of sustainable requirements in public tender documents, the European Commission has developed provided an overview of EU level environmental criteria on their website.

In the area of sustainable infrastructure, the following criteria are currently relevant:

- Office building design, construction, and management (from 2016)
- Road design, construction, and maintenance (from 2016)
- Road lighting and traffic signals (from 2018)

Examples on how these criteria and other criteria have been implemented can be found below under each life cycle phase.

While the use of the criteria is voluntary, they can support public authorities to include green requirements in the tendering process. The criteria must be used in compliance with the requirement of EU public procurement legislation and similar provisions.

More information on the use of the criteria can be found in the European Commission's handbook on green public procurement, "Buying green".

Relevant links

- https://ec.europa.eu/environment/gpp/pdf/swd_2016_180.pdf
- https://ec.europa.eu/environment/gpp/pdf/GPP%20criteria%20Roads%20(2016)%20203.pdf
- https://ec.europa.eu/environment/gpp/pdf/toolkit/181210_EU_GPP_criteria_road_lighting.pdf
- https://ec.europa.eu/environment/gpp/buying_handbook_en.htm

2.2. Procurement of sustainable infrastructure projects

In the context of major infrastructure projects, it is useful to first understand how infrastructure can be sustainable and how the three pillars mentioned above are integrated. According to the Inter-American Development Bank, sustainable infrastructure can be understood to refer

4 *Buying for a Better World* (2019): A guide on Sustainable Procurement for the UN system, UNEP, UNOPS, ILO, ITC-ILO, https://www.oneplanetnetwork.org/sites/default/files/from-crm/bfabw_final_web_1.pdf.

5 Life cycle Initiative: https://www.lifecycleinitiative.org/starting-life-cycle-thinking/what-is-life-cycle-thinking/

to “infrastructure projects that are planned, designed, constructed, operated, and decommissioned in a manner to ensure economic and financial, social, environmental (including climate resilience), and institutional sustainability over the entire life cycle of the project”.[6] This understanding of sustainable infrastructure goes hand-in-hand with the definition of sustainable public procurement as well as life cycle thinking. **Public procurers can ensure that economic, social, and environmental sustainability is considered**, e.g. by for example requiring contractors to use building materials that can easily be recycled or recovered for reuse or make certain that workers’ rights and conditions are protected as part of the procurement documents.

Years of continued use of large and smaller infrastructure, requires periodic maintenance and replacement. A sole focus on aspects of economic sustainability and cost effectiveness in the implementation of infrastructure runs the risk of excluding environmental and social impacts that can cause ageing infrastructure maintenance processes to be more costly than initially foreseen, for example when the infrastructure turns out to have detrimental long-term effects to the surrounding biodiversity or negative impact on infrastructure is caused by using unskilled workers in adequate planning or use of materials. When large infrastructure development goes wrong as a result of poor consideration, planning, design, development or maintenance, it can endanger our surroundings like nature and wildlife, even human health. In sum, a focus on short-term costs can make a building less expensive to build but be more expensive when considering the full lifespan.

In line with life cycle thinking, to maximise the value of the infrastructure, each material used should be accounted for from the day it is purchased until the day it is disposed of. **By including the life cycle approach in sustainable infrastructure projects, risk such as inefficiency, lack of quality, overrunning costs, economic and financial uncertainty and integrity breaches can be prevented.**

To facilitate the process, **Life Cycle Costing**[7] **(LCC)** is a costing tool more frequently applied among procurers in the EU and across sectors to cover the costs not reflected in the purchase price and to better understand how it impacts sustainability[8]. In the procurement process, the analysis **can be used as both a needs analysis to estimate the total cost but is also useful in tender processes to evaluate the most economic advantageous offer**. Moreover, in the design of tenders, these specific lifecycle costs can be emphasised as aspects for bidders to include to show in a transparent manner, how the environmental criteria will be safeguarded.

In a nutshell, LCC is a methodology for calculating the entire cost of infrastructure implementation from beginning to the end- of -its life, including the financial cost and the environmental and social costs. More specifically, the technique can establish the total cost of ownership[9] by considering purchase price and all associated costs (e.g. delivery, installation, insurance), operating costs (e.g. energy, fuel and water use, maintenance), end-of-life costs (e.g. decommissioning or disposal), and externalities (e.g. GHG emissions).

In practice, LCC encourages the assessment of the cost of the infrastructure over time, including the material and equipment used throughout the lifecycle, focusing on acquisition

6 *What is Sustainable infrastructure? A Framework to Guide Sustainability Across the Project Cycle* (2018): Inter American Development Bank, https://publications.iadb.org/en/what-sustainable-infrastructure-framework-guide-sustainability-across-project-cycle

7 Life Cycle Costing, European Commission: https://ec.europa.eu/environment/gpp/lcc.htm.

8 Life-cycle costing, European Commission: https://ec.europa.eu/environment/gpp/lcc.htm.

9 Total Cost of Ownership refers to the sum of all costs incurred throughout the lifetime of owning or using an asset; they typically go beyond the original purchase price. Total Cost of Ownership enables decision makers to look at asset procurement in a more strategic way (beyond the lowest bidder) and to level the playing field when choosing among competitive bids where the lowest priced bid may or may not be the least costly asset to procure.

and construction costs, as well as operation and maintenance costs until the cost of disposal, as illustrated in Figure 2 below. The outcome will allow for optimizing the value of the project to better determine the best options long- and short term. The 2014 public procurement directives[10] clearly lay out rules for Life Cycle Costing on how the cost during tender evaluation should be carried out.

Figure 2 Elements of Total Life Cycle Costing

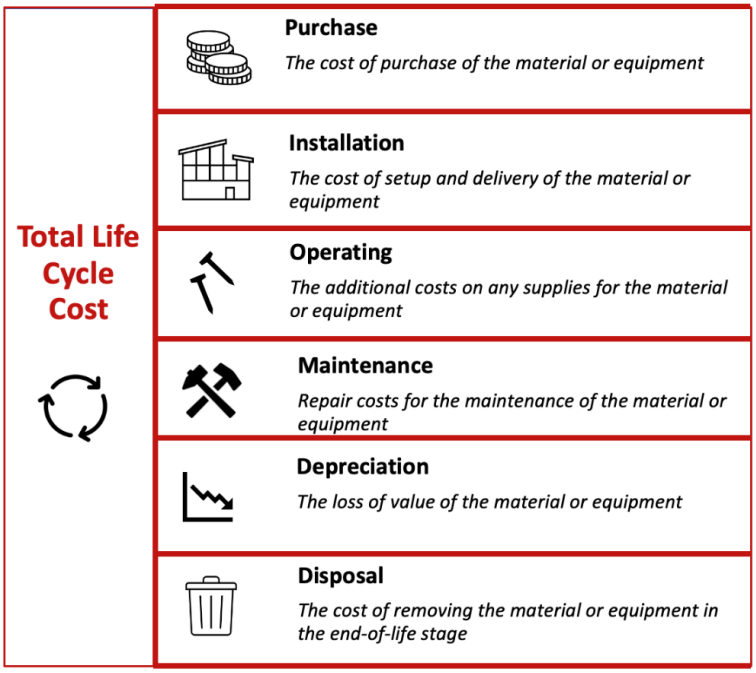


Table 1 shows a fictitious example of how LCC calculations could be carried out. While the cost of the initial investment mirrored in the purchase cost is 15 000 euros, the lifecycle costing is higher amounting to a total cost of 23 000 euros, when integrating in the calculation other aspects such as installation, operation, maintenance costs and the depreciation and disposal value.

Table 1 Example of LCC calculation

Particulars	Estimated value as part of the lifecycle costing assessment (in euros)
Purchase cost	15 000
Installation cost	1 000
Operating cost	3 500
Maintenance cost	2 000
Depreciation value	500
Disposal value	1 000
Life cycle costing	**23 000**

10 EU Public procurement Directives (2014): https://ec.europa.eu/environment/gpp/eu_public_directives_en.htm.

However, to help reduce harmful environmental impact and to improve the competitiveness of company products, companies and business associations are becoming more accustomed to using **Life Cycle Assessment (LCA).** LCA is an internationally standardised methodology (ISO 14040 ff), which helps to quantify the environmental pressures (e.g. emissions to e.g. air and water, waste generation and resource consumption) related to goods and services (products), the environmental benefits, the trade-offs and areas for achieving improvements from the extraction of raw materials through production and use to final disposal, including recycling, reuse, and energy recovery[11]. Moreover, it can indicate the impacts on natural resources and human health. The assessment requires a more specialist expertise and is used to assess the potential environmental impacts of available products, process, or service. The assessment calculates the emissions to the environment based on an analysis of the energy and materials used across the value chain. For companies and business associations, LCA is used to help reduce harmful environmental impact and to improve the competitiveness of company products. Furthermore, for public authorities, LCA can support the improvement of product design by choosing specific materials, technologies, and design criteria as part of their decision-making processes. **Life cycle considerations are also included in eco-labels and can support procurers in defining requirements regarding bio-based products in public tenders**[12].

LCC and LCA are often used interchangeably but are different in their focus.

- **LCC** focuses on the social, environmental, and economic cost of a product used in construction, operation, and maintenance,
- **LCA** evaluates the environmental impact of production, use and disposal.

Both methods present the fundamental shift towards a long-term thinking in the EU's green agenda, where information used for making business decisions includes a full cycle mindset.

2.3. Legal framework

Directive 2014/23/EU on concessions, Directive 2014/24/EU on public procurement, and Directive 2014/25/EU on procurement by entities operating in the water, energy, transport and postal services sectors allow for great flexibility for the implementation of sustainable procurement and the use of sustainable criteria[13]. The directives have been transposed into national law in all EU member states with the aim to ensure equal treatment and transparency and remove legal and administrative barriers to cross-border participation in tenders[14].

The 2014 Directives were also adopted "to increase the efficiency of public spending, facilitating in particular the participation of small and medium-sized enterprises (SMEs) in public procurement, and to enable procurers to make better use of public procurement in support of common societal goals"[15]. They allow public buyers to pursue a sustainable, innovative and socially responsible approach to procurement, in line with the current objectives

11 European Platform of Life Cycle Assessment: https://eplca.jrc.ec.europa.eu.

12 Factsheet No.5 – Life Cycle Assessment (LCA) and Life Cycle Costing (LCC), Forum for bio-based innovation in public procurement: https://www.biobasedconsultancy.com/uploads/files/InnProBio_Factsheet_n5.pdf.

13 The Procura+ Manual – A guide to implementing sustainable procurement (2016), European sustainable procurement network: https://procuraplus.org/fileadmin/user_upload/Manual/Procuraplus_Manual_Third_Edition.pdf.

14 Public procurement guidance for practitioners – on avoiding the most common errors in projects funded by the European Structural and Investment Funds (2018), European Commission.

15 Recital 2 of directive 2014/24.

of the European Commission's European Green Deal and with the UN's Sustainable Development Goals 9[16] with the aim to support industry, innovation, and infrastructure.

In the Circular Economy Action Plan (2020), the European Commission also stressed the importance of strengthening environmental requirements in public procurement processes, especially by "improving sustainability principles and regulating product durability, reusability, upgradability and reparability"[17], in line with instruments such as the EU Ecolabel and the EU green public procurement (GPP) criteria. The Action Plan emphasises that the European Commission is dedicated to support public buyers with capacity building, guidance, training and dissemination of good practices to further boost the use of the GPP criteria and its implementation and to ensure public buyers' participation in procurement initiatives.

Furthermore, several tools and guidance documents have been made available to support the public sector in their transition to implement a more sustainable public procurement. For example, the guidance documents on green criteria - 'Buying Green' (2016)[18], on social criteria - 'Buying Social'[19], and 'Public procurement for circular economy'[20] raise awareness on the support to the public sector by focusing on awareness raising through a collection of good practices, inspiring public and private procurers to choose green products and services[21]. Moreover, the GPP training toolkit for public purchasers and trainers offers six modules on the introduction on GPP as well on GPP and strategic aspects; legal aspects; needs assessment; circular economy; and market engagement[22].

This Guidance builds on the background above and aims at inspiring primarily public authorities but also private economic operators to successfully take up and promote sustainable public procurement approaches in relation to the phases of the lifecycle of an infrastructure project. The phases are linked to selected good practices that display a high degree of transferability and replicability.

2.4. EU Taxonomy for Sustainable Activities[23]

The **EU Taxonomy for Sustainable Activities** provides a classification system with the aim to clarify about sustainable and environmental investments in the context of the European Green Deal. The main purpose of the EU Taxonomy is to support greener choices and prevent greenwashing.

The activities included in the EU Taxonomy activities must comply with four criteria to be regarded as sustainable. Moreover, any activities that are not listed by the EU taxonomy are

16 UN's Sustainable Development Goals: https://sdgs.un.org/goals

17A New Circular Economy Action Plan (2020): https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN

18 Buying green – a handbook on green public procurement, European Commission: https://ec.europa.eu/environment/gpp/buying_handbook_en.htm

19 Buying social – a guide to taking account of social considerations in public procurement: https://op.europa.eu/en/publication-detail/-/publication/cb70c481-0e29-4040-9be2-c408cddf081f

20 Public procurement for a circular economy – good practice and Guidance, European Commission: https://ec.europa.eu/environment/gpp/pdf/cp_european_commission_brochure_en.pdf

21Green public procurement (GPP) – A collection of good practices (2012): https://ec.europa.eu/environment/gpp/pdf/GPP_Good_Practices_Brochure.pdf

22 GPP training toolkit (2022): https://ec.europa.eu/environment/gpp/toolkit_en.htm

23 EU Taxonomy for Sustainable Activities, European Commission: https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

not considered to be sustainable. The EU Recovery Plan requires e.g. that public investments comply with the "do-no-significant-harm principle" (DNSH) of the Taxonomy, which in the case of infrastructure investments funded by the Recovery Plan incorporates sustainability requirements into infrastructure procurement activities.

The **four Taxonomy compliance criteria** are the following:

1. The activity contributes substantially to one or more of the following six environmental objectives:
    a. Climate change mitigation
    b. Climate change adaptation
    c. Sustainable use and protection of water and marine resources
    d. Transition to a circular economy
    e. Pollution prevention and control
    f. Protection and restoration of biodiversity and ecosystems.
2. The activity does not do harm the other five environmental objectives, also referred to as the Do-No-Significant-Harm (DNSH) principle.
3. The activity complies with social safeguards.
4. The activity complies with technical screening criteria. (TSC).

The Technical Screening Criteria to identify which economic activities are considered sustainable are adopted through delegated acts. A delegated act for climate mitigation and adaptation criteria was adopted in 2021.[24] Annex I of the first delegated act defines the technical screening criteria TSC for economic activities that seek to make a substantial contribution to climate mitigation or climate adaptation. These are further summarised in the EU Taxonomy Compass.[25]

In February 2022, the European Commission published a Complementary Climate Delegated Act which adds nuclear and fossil gas power production as transitional activities. This Complementary Act will take effect from 2023.[26] As of August 2022, these activities have not yet been added to the EU Taxonomy Compass. The legislative text is however separately available.[27]

A third delegated act is planned for the remaining four environmental objectives and is foreseen to be adopted in the course of 2022. A final draft version of the relevant economic activities as well as the TSC was published in March 2021.[28] The Annex of the document entails the TSC. These may be subject to changes upon adoption. Similarly, a delegated act is foreseen to introduce more concrete minimum social safeguards. A first draft of these safeguards was published in summer 2022, with a final proposal for the European Commission expected by the end of 2022.[29]

24 COMMISSION DELEGATED REGULATION (EU) …/... supplementing Regulation (EU) 2020/852, C/2021/2800 final

25 https://ec.europa.eu/sustainable-finance-taxonomy/

26 https://ec.europa.eu/info/publications/220202-sustainable-finance-taxonomy-complementary-climate-delegated-act_en

27Commission Delegated Regulation (EU) 2022/1214, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32022R1214

28 https://ec.europa.eu/info/publications/210803-sustainable-finance-platform-technical-screening-criteria-taxonomy-report_en.

29https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/overview-sustainable-finance/platform-sustainable-finance_en.

In the case of infrastructure projects, **the EU taxonomy and its delegated acts on climate change mitigation and climate change adaptation are a useful tool to incorporate sustainability into infrastructure projects**. The technical screening criteria for projects seeking to contribute substantially to climate change mitigation are summarised in the EU Taxonomy Compass. [30].

The review of literature on incorporating sustainability into procurement has shown that **there are still important barriers among procurement professionals in incorporating taxonomy elements into procurement**. Nevertheless, the EU Taxonomy's primary potential lies in supporting procurement professionals in the early procurement phases, such as strategy, feasibility, and design, as many criteria should already be considered in the project design. Moreover, the taxonomy is also relevant for the tendering and all subsequent phases, as it can help specify e.g. relevant thresholds for selection or exclusion criteria, contract performance requirements, and auditing schemes. **The EU Taxonomy can therefore provide important guidance for procurement professionals on the specific attention points during project and tender design**.

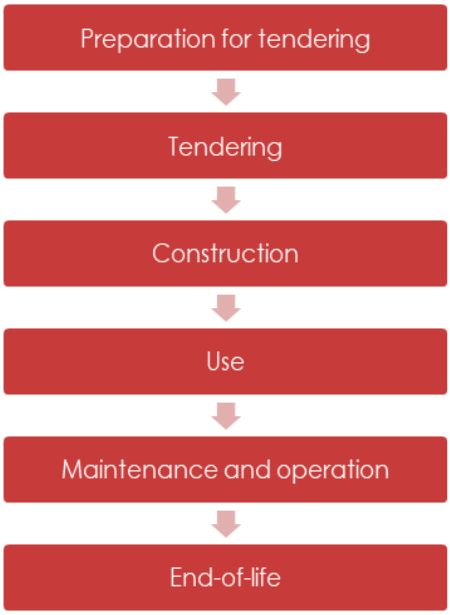
This guidance provides practical examples across the different procurement phases, of how the EU Taxonomy can be used to secure alignment of projects with the Taxonomy, or even go beyond the minimum requirements.

30 https://ec.europa.eu/sustainable-finance-taxonomy/.

3. The Guidance on Sustainable infrastructure projects

This chapter provides the relevant guidance per each of the six phases of the life cycle of an infrastructure project.

Figure 1 The six phases of activity to procure sustainable infrastructure



The six different phases are presented in the sections below.

3.1. Preparation for tendering

The pre-procurement stage is very important to embed sustainability into an infrastructure project. Procurement's public needs for infrastructure may be routinary or occasional but are most likely to be one-off. In each case having a thorough understanding of what is needed and of how it will be used is essential. Equally important is an understanding of the market from which it will be procured. For example, if the procurement is intended to award a contract for road construction, as a public buyer you will need to know what user expectations are for the service and what type of organisations are operating in the sector. This allows you to determine which sustainable solutions there are for road building, what products, methods and equipment may be appropriate and the potential impact the works may have on workers in the sector.

Box 1 Replicable tools, circular construction indicators, instruments for the dialogue with developers and other inspiring material produced by the CIRCuIT project

Description:

The Circular Construction in Regenerative Cities (CIRCuIT) project focuses on the sustainable and green transition at the city and regional level. It is a Horizon 2020 collaborative project running from 2019-2023 and involves 31 ambitious partners across the built environment chain in Copenhagen, Hamburg, the Helsinki Region and Greater London.

CIRCuIT aims to bridge the gap between theory, practice and policy by delivering a series of demonstrations, case studies, events and other dissemination activities that showcase how circular construction approaches can be scaled and replicated across Europe to enable cities to build more sustainably and transition to a circular built environment. These practical tools and resources will increase local and regional authorities' knowledge and offer urban planning instruments, public procurement criteria and roadmaps.

Tools developed for public procurers:

The participating cities have carried out activities to demonstrate how materials reuse, knowledge-sharing and data collection can be carried out. The following outputs can be applied to sustainable infrastructure procurement:

- Mapping options for including circular construction requirements into urban planning and building permits by analysing European, national, and local regulations. By running hackathons for designers, architects and students, the project has enabled knowledge sharing, capacity building and collaboration. For example, Helsinki region partners with the Finnish Ministry of the Environment, HYPPY project and Hämeenlinnan asunnot organised an event focussed on *The New Life of a Precast Concrete Building*.
- Recommendations on circularity indicators at the levels of materials, buildings and cities for a circularity dashboard, allowing actors to measure the circularity of their activities, target opportunities for improvement, and communicate their circular economy actions in a consistent and comparable way (https://www.circuit-project.eu/post/report-recommendations-on-circularity-indicators-for-a-circularity-dashboard)
- Recommendations for improving the capture of material flow data in the built environment, which provides recommendations for how data could be improved or applied more effectively by practitioners, researchers, policymakers and other key stakeholders in support of a circular economy of built environment materials within cities (https://www.circuit-project.eu/post/report-recommendations-for-improving-the-capture-of-material-flow-data-in-the-built-environment)
- Recommendations - Instruments for dialogues with developers, investigating what aspects of the dialogue between city officials and private developers can be improved to increase the chance of circular initiatives making its way into the final building project. The recommendations are developed both as a standalone instrument and checklist to be used in all new private building projects, as well as points of attention to be integrated into existing instruments. Clear examples based on the application of the recommendations to existing planning tools are provided via the examination of two dialogue-focused planning tools being the Copenhagen Sustainability Tool and the London Circular Economy Statement Guidance (https://www.circuit-project.eu/post/report-recommendations-instruments-for-the-dialogues-with-developers).
- Developing a business case template for cities to assess the environmental and economic impact of projects. This business case template can be found here: https://www.circuit-project.eu/post/circuit-publishes-template-business-case-for-built-environment.

Transferability:

This work showed that circular approaches in the planning requirements, building regulations, and codes at the local level was sometimes limited by national frameworks. Nevertheless, options to improve the process were identified through several opportunities, e.g. requiring pre-demolition audits, making pre-demolition audit data publicly available, and setting requirements either around reuse and recycling of waste or the incorporation of recycled or reclaimed components into new constructions.

The main lessons learnt by the project concern the following aspects:

- include circularity from early on by including aspects such reuse and recycling of materials and accessibility requirements
- consider the full lifecycle of the project from pre-tender preparation to end-of-life
- enhance capacity for involved stakeholders through training programs
- encourage key actors to choose sustainable solutions through incentives and early and inclusive dialogue in the first phases of the procurement process.

Relevant links

- https://www.circuit-project.eu/
- https://cordis.europa.eu/project/id/821201

- Presentations of the project can also be found on the project's YouTube profile: https://www.youtube.com/channel/UCbUmQ7L5PkQbetk6yIdRcAA.
- The project is coordinated by Copenhagen Municipality which can be reached by phone: +45 33 66 33 66. The project partner, the Helsinki Region Environmental services (HSY), can also be contacted using the contact details available here: https://www.hsy.fi/en/environmental-information/projektit-ja-hankkeet/circuit-project/.

3.1.1. Identifying functional needs

As a public buyer, **your starting point should always be to assess your real needs** when dealing with sustainable procurement and public procurement of innovative solutions[31], including for construction and infrastructure projects.

Sometimes the most sustainable option will be to avoid launching a procurement process altogether. Thinking in terms of what outcome you wish to achieve (e.g. office space for an organisation), rather than of a specific infrastructure solution to achieve that outcome (a new building with 300 desk spaces), can result in innovative, sustainable solutions. As the responsibility for determining requirements will not typically be with procurers, you will need to collaborate closely with and maybe even challenge technical/user departments to develop functional outcomes which can be correctly translated into an effective procurement exercise.

Identifying functional needs is vital at this pre-procurement stage to ensure that the project is necessary, i.e. procurement is needed at all, and that the needs of all current stakeholders and future users are met. The purpose of this phase is also to ensure that there is the necessary buy-in from politicians, civil society and all stakeholders to make the project a success.

To assess your needs, there is a range of methods that you can use. For example, you can rely upon the advice and processes outlined in both the Procura+ Manual[32], and in the Needs Assessment Guidance Document produced by Public Procurement Analysis[33], included in the GPP Training Toolkit (2022)[34].

Needs Assessment Guidance Document

The *Needs Assessment Guidance Document* developed for the European Commission by ICLEI gives you a list of options that can be used to assess needs prior to procurement, all with the aim of avoiding unnecessary or inappropriate purchases:

- A questionnaire or online survey to determine user needs and preferences
- Observation and analysis of existing use patterns
- A review and planning meeting to which all relevant stakeholders are invited
- Inviting users to attend supplier demonstrations held as part of preliminary market consultation

Which option you choose in any given scenario will depend upon the infrastructure project being proposed. For example, a review and planning meeting with all stakeholders may be the most appropriate needs assessment methodology for a substantial and public facing project such as a new motorway or train line.

In seeking to identify more sustainable solutions to one's procurement needs within the context of deep cuts to public budgets, one needs to embrace and encourage innovation on the market.

31 Public procurement of innovative solutions happens when the public sector uses its purchasing power to act as early adopter of innovative solutions which are not yet available on large scale commercial basis PPI.

32 https://procuraplus.org/manual/.

33 https://ec.europa.eu/environment/gpp/pdf/toolkit/presentations/4_Needs_Assessment_Handout.docx.

34 https://ec.europa.eu/environment/gpp/toolkit_en.htm.

If technical specifications, selection, or award criteria suggest to bidders that they are not expected to propose new, more sustainable ways of doing things, they are unlikely to do so. At the same time, innovation must be placed within the context of sustainability, and an assessment of environmental and social impacts should remain a key part of any development process.

As regards innovation, **smart city applications** can contribute to making infrastructures more sustainable, reducing the CO2 footprint, improving energy efficiency and storage, waste and water management, traffic conditions. Such ICT applications concern the following main areas:

- Intelligent Monitoring systems, e.g. IoT sensors and system infrastructure for collection and analysis of data, systems for synchronization of electrical supply and demand with connected objects to help manage buildings' energy consumption.
- Solutions for Energy Efficiency, e.g. sustainable grid solutions to monitor the consumption and efficiency of industrial areas.
- Smart Utility Management, e.g. Smart water distribution and sanitization networks monitoring and advanced management system.
- Transport and street network, e.g. Public and active transport infrastructure, space allocated to car parking, and last-mile infrastructure, walking and cycling infrastructure, increasing access to urban services and amenities.
- Urban planning, e.g. Installation of street furniture, smart lighting, mobile tree planters, gazebos, pergolas, grilles, toilets, maintenance spaces, and Landscaping (deforestation, gardening, perennial planting / surface lawning, including planting trees and shrubs).

3.1.2. Assessing costs, sustainability impacts and defining ambitions

Clarity regarding your sustainability goals at the beginning of the procurement process is vital. In some cases it will be helpful to define these quantitatively (e.g. by 2024, ensure 80% of office buildings meet high energy performance standards), but this cannot so easily be done for all sustainability goals. Again, this will likely need to be a **collaborative process** involving several departments within your organisation, and in some cases potential providers.

Having a clear picture of your real needs together with your sustainability goals will provide you with a solid basis on which to build the procurement process to communicate both internally and externally to potential suppliers and helps in determining the most appropriate procurement approach. This process sets a baseline expectation for the project in terms of its impacts (environmental, social, financial, legal) that can be both support getting the political buy-in for the project (See next Section 3.1.1) and enable analyses to take place as to the overall impacts of the project.

To meaningfully incorporate sustainability into the procurement of infrastructure, you must first define and quantify to the extent that it is possible the scope of the impacts and of the expected benefits. This sets the groundwork for the rest of the procurement lifecycle and for the following use / operation / maintenance / decommissioning phases. There are **several examples of cost indicators** that you can use. Box 7 further below presents the example of the Environmental Cost Indicator developed in the Netherlands.

As public buyers you have expectations that common quality standards for both suppliers and procurers are available and usable. Common standards communicate your quality expectations to the market. You can also use them to align your ambitions at the pre-procurement stage with what the market has to offer, making it easier for all stakeholders to

deliver on your desired sustainability outcomes. While a challenge regarding standards is the need for them to be clearer, ISO 15392:2008, for example, defines the sustainable development of buildings and other construction works as bringing about the required performance and functionality with minimum adverse environmental impact, while encouraging improvements in economic and socio-cultural aspects at local, regional, and global levels.

Similarly, digital solutions can be applied to increase transparency in the processes themselves and improve competitiveness and efficiency. Notably, cost/benefit analysis of Building Information Modelling (BIM) for individual public projects throughout the EU, for all phases of the lifecycle can be useful to digitise the sector. The European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs and the EU Building Information Modelling Task Group (EU BIM Task Group) have developed a methodology, handbook and calculation tool that provide practical support for public procurers can help verify the costs and benefits of using BIM and justify potentially higher planning costs at the beginning of the project by calculating the benefits during construction and operation[35].

An example of the benefits that can be yielded through BIM is in Box 2 below, which presents Sweden's most digitised construction project.

Box 2 Project Celsius

Description

Celsius[36] is a new advanced laboratory building built by the leading property owner, 'Vasakronan', in Sweden. The building will mainly house the Swedish Food Agency, which is doing heavy research and testing in laboratory. The building is an entirely new construction and consists of 12 000 square meters divided on seven floors. Construction started in 2018 and finished on the 1st November 2020. This approx. 450 MSEK-worth project is a 2020 building smart international (bSi) award winner, which was developed completely without paper drawings. All work is digital and model-based - from planning, procurement and purchasing to production and management.

Collaboration on the project has been strengthened by all consultants working in the same model. The fact that Celsius is completely drawingless also means that the Virtual Reality glasses have taken their place at review meetings and the construction workers have navigated the model on a pad instead of reading on paper. Everyone had access to the same information and changes in the model were immediately visible to the fitters on site. Getting the right information to the right person in real time increased the efficiency and productivity of the project. It allowed it to be completed on schedule despite the complexity of the content.

Results

- Managed to bridge the gap between office and the field by empowering all workers with an openBIM-platform.
- BIM in the field for all workers, no traditional drawings produced.
- openBIM-model as the legal construction documents.
- Used openBIM-models for procurement.
- Enriched model with as-built data and data for facility management.
- Project is finished two months ahead of schedule, under budget.
- 80% fewer rework orders that originated from design errors.
- Reduced transports to site by 80% thanks to better material order from BIM.
- Zero accidents.

35 The package of methodology, handbook and calculation tool provides the first practical assistance for procurers to help digitise the construction sector, as described in the 'Renovation Wave for Europe'. http://www.eubim.eu/cost-benefits/.

36 https://app.box.com/s/7b0srp9l0ficxtw26cynq1iw6rgposhl.

- Highly ranked satisfaction by site workers, owner and tenant.

Relevant links

- Project & Construction Management: Byggstyrning, Johannes Ris Johannes.ris@byggstyrning.se
- Building owner: Vasakronan, Anders Boström Anders.Bostrom@vasakronan.se

The Report "Green Public Procurement Criteria for Office Building Design, Construction and Management"[37] details a list of criteria related to various environmental impacts of a building. These vary from topic such as energy to resource efficiency and include:

- Commissioning of building energy systems
- Lighting Control Systems
- Life-Cycle Performance of the building
- Supply chain due diligence such as legal sourcing of materials including wood.

The specific standard and approach to controlling sustainability for different categories of building materials and construction will vary from project to project and should be tailored accordingly. Contained within the same report are details as to what Green Public Procurement criteria can be included and guidance for doing so. The *Toolbox of Sustainable Procurement* published by the German *Kreditanstalt für Wiederaufbau - KfW*[38] also contains examples of required certifications that are appropriate for construction projects.

The **EU taxonomy is another tool that can help scoping and assessing the feasibility of the ambitions of infrastructures**. The taxonomy defines which activities can be considered sustainable. Infrastructures (or activities in general) that do not correspond to any of the listed and described activities cannot be considered sustainable in the context of the EU taxonomy. For example, the energy recovery of waste through incineration is not an activity that is listed in the EU taxonomy and is accordingly not eligible to be considered a sustainable activity under the taxonomy.

Next to identifying principally sustainable activities, the EU taxonomy defines criteria for its six environmental objectives under which the associated activities can be considered sustainable. Whereas waste-to-energy is not eligible, the material recovery of non-hazardous waste is considered a sustainable activity. This activity is however only eligible, if, among others, at least 50% of the waste is processed into secondary raw materials, which helps frame whether the sustainability ambitions match the functional needs of the project.

The taxonomy thus defines minimum sustainability ambitions for infrastructures. Accordingly, the taxonomy's description of activities and associated environmental objectives can be used to evaluate from the outset, whether the necessary minimum ambitions appear feasible within the scope and functional needs of the foreseen project.

37 https://ec.europa.eu/environment/gpp/pdf/report_gpp_office_buildings.pdf.

38https://www.kfw-entwicklungsbank.de/PDF/Download-Center/PDF-Dokumente-Richtlinien/Toolbox-zur-Nachhaltigen-Auftragsvergabe-EN.pdf.

3.1.3. Getting political buy-in

Once you pass the needs assessment stage and the level of ambition of your infrastructure project is clear, **achieving the necessary political buy-in is the next step**. Without political backing it is difficult to introduce sustainable procurement within your organisation's practice.

The *Toolbox of Sustainable Procurement* published by Kreditanstalt für Wiederaufbau (KfW), the German state-owned investment and development bank, provides some advice on how to secure the necessary political backing[39]. A written resolution by politicians on sustainable procurement is one way to provide a solid foundation for standardised and coordinated implementation. Elected policy makers should be responsible for ensuring that the resolutions on sustainable procurement are also implemented. Without a written resolution, efforts tend to be fragmented and based on the personal efforts of individuals.

Furthermore, it can be difficult to encourage procurement officers to include environmental and social criteria in procurement processes.

3.1.4. Engaging the market

Market engagement is a process which takes place throughout the procurement cycle. In the pre-procurement phase it can help public buyers identify potential bidders, develop capacity in the market to meet the requirements, and inform the design of the procurement and contract. Well implemented, market engagement should also help suppliers to best meet the procurers' needs. **The benefits of undertaking a robust and meaningful market engagement exercises cut across the entire value chain, from procurers to contractors, including opening the opportunity to suppliers of all sizes**.

The EU Public Procurement Directives specifically authorise preliminary market consultations (Article 40 of Directive 2014/24/EU), enabling public buyers to engage with potential bidders, consultants, NGOs, expert bodies etc. Care must be taken to ensure that no unfair advantage or disadvantage is conferred on any operator as a result of pre-tender activities – for example any information shared during the pre-tender stage should also be made available as part of the tender documents (Art. 41 of Directive 2014/24/EU).

In the preparation for the tendering phase, it is essential that solutions to the procurers' challenges are available. This is particularly true in the case of infrastructure where the requirements and needs may be wide ranging and have long timescales. Given the recent emergence of the procurement of sustainable infrastructure, the market may need closer engagement to ensure that these particular needs are met. There may be a gap between aspiration and deliverability that can only be addressed through market engagement, or in some cases, expectations may need to be revised based on what is technically and commercially possible.

Therefore, the success of any procurement exercise will ultimately be determined by how the market responds to your requests as a public buyer. Effective engagement with potential suppliers prior to tendering has several purposes:

- Identify potential bidders and/or solutions
- Build capacity in the market to meet the requirement(s)
- Inform the design of the procurement and contract.

39 https://www.kfw-entwicklungsbank.de/PDF/Download-Center/PDF-Dokumente-Richtlinien/Toolbox-zur-Nachhaltigen-Auftragsvergabe-EN.pdf.

This stage involves the consultation of all relevant stakeholders, encourages procurers to ensure that the infrastructure need is fully defined, and that the piece of infrastructure under discussion is the best way to address those needs. It may be that the outcome of this stakeholder engagement and the needs assessment is that there is no requirement for new infrastructure. However, going through the process would still be valuable in this situation to document this decision and to identify any suitable alternative to procurement.

The Procura+ Manual[40] provides advice to public procurers on ensuring that the scope and scale of tender opportunities are open to as many operators as possible.

Providing greater opportunities for small and medium sized enterprises (SMEs) to bid can be important in terms of innovation, competitiveness, environmental impact and local economies. Although it is not permitted to make direct reference to a preference for SMEs in procurement, there are approaches which help encourage SMEs to apply for public procurement. For example:

- hold widely advertised open days or meet the buyer events to inform potential suppliers about where opportunities are advertised, how the procurement process is structured, and what tender documentation is required;
- minimise the complexity of tender documentation, as submitting tenders can often be an unnecessarily cumbersome and bureaucratic process;
- divide contracts into smaller lots to make contract requirements more achievable to SMEs (and less attractive to bigger companies)
- limit the number of lots which will be awarded to any one bidder, based on objective and non-discriminatory criteria which must be established in advance;
- allow for a longer period of time for the submission of expressions of interest and tenders; and
- commit to paying SME invoices on time, or even early to help with cash flow.

The “Market Engagement SPP Regions Best Practice report”[41] details the approach that procurers should adopt for market engagement at each step of the procurement cycle. While a lot of the market engagement that you will carry out will be in pre-procurement phase, such as by providing a pre-tender briefing to suppliers who are interested in a contract opportunity, holding industry workshops, attending trade shows, and issuing Requests for Information, your interaction with the market will not end there. A key element of successful procurement is the application of market engagement throughout the process, including during tender (briefing suppliers and responding to clarification questions), and post tender (debriefing suppliers, issuing contract award notices and the ongoing maintenance of market awareness).

In Box 3 below a step-by-step guide is presented, including **multiple voluntary methods to drive market engagement and dialogue**. Other topics and phases of this process that are explained are: understanding the underlying objectives, collaboration, suitable methods before the event, during the event, and follow up after the event. The guide has successfully been used by several public authorities in multiple countries, like Sweden, Spain, the Netherlands, Norway, and the UK. For example, when used by the Region Stockholm, Sweden, the result was the opening of a dialogue with market stakeholders which lead the city to get a better understanding of what the market could offer in future procurements.

40 https://procuraplus.org/manual/.

41 https://sppregions.eu/fileadmin/user_upload/Resources/Market_Engagement_Best_Practice_Report.pdf.

Box 3 A guide for public buyers on how to engage the market

Description

This is an initiative from Make ICT Fair, which is a project supporting mainly buyers procuring ICT, though the principles detailed in this guide can also be applied to procurement in infrastructure projects. The guide is published by ICLEI with support from Procura+, and Electronics Watch, and was funded by the European Union. The guide consists of the following six steps to engage the market before, during and after tendering processes:

- Assess your needs
- Collaborate, and put together a team
- Choose suitable methods for the before, during, and after phases.

In the step discussing how to choose suitable methods, multiple tools to drive market-dialogue are presented, as well as why, how and when one might want to use them. Methods that are named are, for example, site visits, supplier driven meetings, roundtables, market surveys, and panel discussions.

Objectives

Supporting public buyers in understanding how they can engage the market, by developing a dialogue-based relationship. This way, higher social and environmental standards can be achieved within supply chains. The guide suggests using market engagement events to achieve the following:

- Discuss with potential contractors the social and environmental criteria included in tenders in more depth, as well as how to implement these in practice during the management of contract.
- Communication of public buyers' (long term) strategies.
- Open a discussion on alignment, development and planning with bidders or stakeholders in the existing supply chain.
- Discuss potential queries from the industry about criteria in future tenders.
- Improve knowledge about products or services available on the market.

Results and Environmental Impacts

In general, via market-dialogue higher social and environmental standards can be achieved within supply chains. A case study showed that, by providing more understanding and engagement in the contract management phase, contract clauses were better understood and designed from the beginning by all the relevant parties. Linking this to environmental impacts, it can be expected that environmental clauses will be clarified initially, and therefore be adhered to more easily and effectively.
By gaining insight on the status of the market and its products and services, it becomes clearer where in the supply chain higher environmental criteria can be pushed, and which parts of the chain still need more innovation.

Key takeaways

A key takeaway from a case study in Spain, where Barcelona City Council used the guide, was that support and cooperation between stakeholders is essential for effectively setting new criteria in a tender. For example, politicians, legal services and suppliers must be involved.
Another outcome that was found, is that to ensure that all clauses and criteria in the contract are fully understood by stakeholders, market dialogue is essential. This outcome was found for example In the UK when the Greater London Authority used the guide in a procurement project.
Lastly, a key message of this good practice is that market dialogues can bring unexpected input and findings to the surface, and therefore broaden the perspective on a project. This was for example found by the Municipality of Haarlem in the Netherlands.

Relevant links

- https://sustainable-procurement.org/fileadmin/templates/sp_platform/lib/sp_platform_resources/tools/push_resource_file.php?uid=acd816f1
- The project is coordinated by ICLEI: procurement@iclei.org.

3.1.5. Identifying a suitable procurement route and format

For all projects the pros and cons of the different procurement routes should be assessed for, among other things, suitability, and appropriateness and to ensure that the procurement can deliver on all organisational objectives. These organisational objectives increasingly include sustainability as a central pillar.

Once you have gathered sufficient information and identified the scope for sustainable procurement or innovation to be targeted in a contract, the procurement approach can be defined i.e. which type of procurement procedure to use, how it should be carried out, and what kind of contract is needed. As a rule, procurement will involve a competitive process. It is highly likely that construction contracts are valued above the EU threshold, meaning that EU Procurement rules will apply to the tendering procedure. An advertisement (notice) will need to be placed in the Official Journal and the rules for each stage of the chosen procedure followed. The approach selected depends on many factors including the time available, market size and organisational preferences. However, it is worth keeping in mind that certain procedures – those with greater flexibility – may be better suited to including new sustainability or innovation objectives but may also require additional time and skills. Flexible procedures such as the competitive dialogue, will involve meeting with bidders which can be a good opportunity to discuss sustainability and innovation aspects, understand their approach and communicate your priorities. The following four procedures offer enhanced flexibility:

- If you are procuring research and development (R&D) services, you may be able to make use of an exemption to the Directives and apply pre-commercial procurement (PCP).[42,43]
- The innovation partnership procedure is specifically designed to cover the full innovation cycle from R&D through to piloting and purchase on a commercial scale of new products or services. The 2014 Directives require to explain why a contract has not been divided into lots. National governments may also choose to make the division of contracts into lots mandatory for certain types of contracts. (Article 31 of Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement[44]).
- The competitive dialogue procedure allows you to meet with bidders to progressively refine your requirements, especially where it is not possible to write a specification in advance. (Article 30 of Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement[45]).
- The competitive procedure with negotiation gives the public sector more freedom to negotiate with bidders where contracts involve elements of design or innovation, or in other defined circumstances. (Article 29 of Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement[46]).

There are many resources available to public procurers at the start of a project to determine the most appropriate route for procurement, and most crucially, how to embed sustainability throughout. The One Planet Network's *Guidance Document on Procuring Sustainable*

42 COM(2007) 799 final.

43 https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0799:FIN:EN:PDF

44 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32014L0024

45 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32014L0024

46 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32014L0024

Buildings and Construction[47] presents in detail the process of procurement planning including the procurement strategy development which it defines as "the planned approach to purchasing that takes into account the project timeline, funding and budget, the projected risks and opportunities, and other factors." It highlights the need for public procurers to consider, among other things, the project timeline, funding and budget available, and the perceived risks.

A real and inspiring example of how market parties can be explicitly involved by public buyers in their exploration for the best method to purchase circular viaducts is presented in Box 4.

Box 4 Stimulating the Market to Offer Sustainable Solutions by Collaboratively Exploring the Best Methods for Tendering Circular Viaducts

Description

The Circular Viaducts Buyer Group explores, together with public clients, the best ways to tender circular viaducts. In the Circular Viaducts Buyer Group, market parties are involved in this exploration to work on a good match between supply and demand, and to find the best way of tendering. After defining a tendering strategy, the participating parties implement the explored methods into their projects. This way, the Buyer Group stimulates market parties to offer circular solutions that adhere to the shared needs of the partaking parties.

Objectives

The market vision and tendering strategy aim to clarify the sustainability ambitions of the partaking parties, and how these ambitions can be implemented in tenders.
In terms of market dialogue and stakeholder consultation within the building process, this project explicitly involves market parties in their exploration for the best method to purchase circular viaducts. Therefore, the compatibility between supply and demand as well as the best tendering method are optimised.
The Circular Viaducts Buyer Group aims to build further on a previous initiative named the Strategic Business Innovation Research (SBIR) Circular Viaducts, by optimally making use of the earlier gained knowledge from that project. A part of this effort is inviting all parties that participated in the SBIR Circular Viaducts to partake in the Circular Viaducts Buyer Group.

Results and Environmental Impacts

As part of this initiative, a 100% circular bridge was built. The construction of the bridge was executed by the Dutch Ministry of Infrastructure and Water Management (Rijkswaterstaat) with contractors. The concept underpinning the procurement was developed in close cooperation with 60 representatives of procurers and suppliers. Together, they established a forum under the name 'Open Learning Environment' where all participants could share their expertise and experience on this topic (https://debouwcampus.nl/trajecten/open-leeromgeving-circulaire-viaducten-en-bruggen/) .

The procurement process was based on the signature of a cooperation agreement, stipulating that all activities by the parties involved were carried out independently, such as the use of communication and the project management. An exception to this were the costs associated with deal with the design, transport, monitoring, assembly, and production of the building elements. It was agreed in advance that these costs would be borne and reimbursed by RWS.

The main arguments for the single private tender based on the criteria from the Proportionality Guide, were:
It concerns the realization of a design made by one specific party.

The significant savings in transaction costs.

The number of potential tenderers; through the design process in the previous two years there could hardly be an equal playing field.

The building elements come into the possession of RWS after dismantling.

All knowledge gained is shared openly with the industry.

The procedure then consisted of making the offer by VHB and signing the cooperation agreement.

47https://www.oneplanetnetwork.org/sites/default/files/from-crm/guidance_document_on_procuring_sustainable_buildings_and_construction_final.pdf

The expected environmental impacts of the project are:

- To reduce harmful emissions such as CO_2 within the tendering process of viaducts.
- To reduce raw material consumption within the tendering process of viaducts.
- For the circular bridge, it is 100% circular; all resources and raw materials can be reused. Zero fossil fuels were used for the construction of the bridge.

Key takeaways

- Combining forces and knowledge from public buyers and relevant market suppliers and other stakeholder allows to set up a collaborative tendering strategy and market vision. This stimulates the market to offer sustainable solutions for viaducts, as in the case presented here. In addition, the circular bridge project shows that working together with builders and suppliers from the beginning until the end of the entire supply chain is essential to achieve the highest levels of circularity within a construction project.
- Explicitly involving the relevant market players in setting up tendering strategies for circular viaducts creates a better balance between supply and demand. Also, it allows for procurement processes that are pragmatic for the market parties.
- The approach of the Buyer Group does not only apply to future tendering processes, but also for replacement and renovation of existing infrastructure.
- For the circular bridge, Rijkswaterstaat experienced that having the room to experiment with circular innovations allows for new pragmatic insights to bring circularity to a higher level.

Relevant links

- https://www.rijkswaterstaat.nl/nieuws/archief/2021/07/start-buyer-group-circulaire-viaducten
- https://www.pianoo.nl/nl/themas/maatschappelijk-verantwoord-inkopen/buyer-groups/buyer-group-circulaire-viaducten-en-bruggen
- https://www.otar.nl/rijkswaterstaat-begint-buyer-group-circulaire-viaducten/
- The project is coordinated by Rijkswaterstaat and Pianoo, who can be contacted via the following email address: maurice.vanrooijen@pianoo.nl.
- More information about SBIR can be found here: https://www.rijkswaterstaat.nl/zakelijk/duurzame-leefomgeving/circulaire-economie/strategic-business-innovation-research-circulaire-viaducten
- https://www.rijkswaterstaat.nl/en/environment/circular-economy/construction-of-circular-bridge
- https://debouwcampus.nl/trajecten/open-leeromgeving-circulaire-viaducten-en-bruggen/
- The Open Learning Environment was set up together with De Bouwcampus. For questions about the forum, De Bouwcampus can be reached via maurice.vanrooijen@debouwcampus.nl.

Other valuable resources on this topic to support choosing the optimum procurement route include:

- OECD Recommendation of the Council on Public Procurement[48], which highlights why a competitive procedure might be best.
- Guidance for public authorities on Public Procurement of Innovation , 1st Edition - Abby Semple, Public Procurement Analysis, Public Procurement of Innovation: Guidance for Public Authorities[49], which focuses on considering your knowledge of the market, your

48 https://www.oecd.org/gov/public-procurement/OECD-Recommendation-on-Public-Procurement.pdf

49 https://s3platform.jrc.ec.europa.eu/en/w/guidance-for-public-authorities-on-public-procurement-of-innovation

organisation's appetite to risk, and ability to generate competition as factors in selecting the most appropriate procurement route.

- The eafip Toolkit[50], including three module toolkit that can be used to support policy makers in designing PCP and PPI strategies, and procurers and their legal departments in implementing such procurements. Module 2 is particularly relevant operationally by clarifying the pre-requisites and key steps to design and implement an innovation procurement process.
- The Toolbox of Sustainable Procurement, A guide on how to include aspects of sustainability in public procurement procedures for Financial Cooperation projects published by KfW[51], which provides advice for procurers on applying core public procurement principles of transparency, non-discrimination, cost-effectiveness, competitiveness and proportionality.

3.1.6. Setting up a project team

It is important to understand whether you, as the procuring authority, have the technical competences and capacity in house to oversee the procurement process. If it is determined that you do not have this expertise or do not have the resources to deliver, external support must be sought. In doing so, an advisor with sustainability and/or procurement expertise may be appointed.

To prioritise sustainability, the brief for this external expertise should be well defined and clearly have its own focus on sustainability. As with all procurement, following the pre-procurement tasks and activities described in this section will also be relevant for the procurement of consultancy support to aid the procurement of the infrastructure in question.

Detailed guidance to support you, as a public procurer, in ensuring the project team is well set up is provided in the following toolkits. Additionally, following the advice given in the other sections above (Sections from 3.1.1 to 3.1.5) will set your organisation in good stead.

- The *Guidance Document on procurement Sustainable Buildings and Construction* by the One Planet Network[52] gives detail and best practice on the topic of setting up the right project team.
- Similarly, The Report *"Green Public Procurement Criteria for Office Building Design, Construction and Management*[53]" also explains how Green Public Procurement criteria can be used in relation to set up a project team, including the project manager, designers and main contractors.

An element to consider in the setting up of a project team, and more accurately in developing the necessary expertise in-house, is the availability of tools, manuals and case studies. You would benefit from more official knowledge-exchange opportunities among other procurers at EU level to ensure network knowledge dissemination and cross-border exchange of information. Facilitating early stage collaboration between the client and contractors, as

50 https://eafip.eu/toolkit/

51https://www.kfw-entwicklungsbank.de/PDF/Download-Center/PDF-Dokumente-Richtlinien/Toolbox-zur-Nachhaltigen-Auftragsvergabe-EN.pdf

52https://www.oneplanetnetwork.org/sites/default/files/from-crm/guidance_document_on_procuring_sustainable_buildings_and_construction_final.pdf.

53 https://ec.europa.eu/environment/gpp/pdf/report_gpp_office_buildings.pdf.

described in the market engagement guidance, can be useful to obtain input for the preparation of the final contract.

3.1.7. Setting up a risk management strategy

Risk management is an integral part of the procurement process for sustainable major infrastructures. It entails the assessment and mitigation of risks. In this context, this encompasses an assessment of the nature, causes and possible consequences of the risks. It not only relates to the contracting authority, but also to the contractor. As it is essential to ensure integrity and efficiency during the whole process of public procurement. which should be embedded in every phase of the infrastructure's lifecycle. As part of their public procurement toolbox, the OECD published several useful tools for implementing and enhancing risk management in (public) procurement which are introduced in the box below.

Box 5 OECD toolbox for risk management in public procurement

Description

The OECD recommends developing risk assessment tools and to publish strategies for risk management. Therefore, they published multiple risk management tools within the OECD public procurement toolbox.
The procurement toolbox can be successfully applied in procurement projects world-wide, as has been shown for projects in for example the UK, Australia, and the USA. While the OECD toolbox is applicable across jurisdictions, contracting authorities in EU Member States need to be aware of the additional requirements highlighted above in relation to non-competitive tendering and conflicts of interest.

Objective

Developing instruments with which all sorts of relevant risks can be identified and mitigated.
Publicise strategies for risk management. For example, this could be whistle-blower programmes, raising awareness or expertise of the stakeholder arena of public procurement.
Manage the following types of risks:

- Waste or inefficiency risks throughout the procurement cycle
- Financial risks
- Risks of fraud, misuse of public funds or corruption
- Reputational risks.

The risks of waste and inefficiency apply for all stages of the procurement cycle and link to the principle of circularity, since they encompass a risk of unnecessary amounts of waste or energy use throughout the procurement process. This risk can arise due to a lack of awareness of stakeholders, or due to the complexity of a procurement project.

Composition of the toolbox

A checklist for implementing the Risk Management Principle has been published as part of the OECD procurement toolbox (https://www.oecd.org/governance/procurement/toolbox/search/Checklist%2010%20Risk%20management.pdf) This tool guides stakeholders to review, develop and update their procurement framework using principles of the Recommendation of the Council on Public Procurement. It also drives self-assessment of the stakeholders. This tool is mainly relevant for procuring entities, policy makers, the private sector and civil society.

For the pre-tendering phase, a template as well as a checklist for enhancing integrity in non-competitive tender methods was published (https://www.oecd.org/governance/procurement/toolbox/search/template-checklist-enhancing-integrity-non-competitive-tender-methods.pdf). This instrument aims to support procurement parties in for example, increasing value for money and documenting and justifying decisions. This tool is mainly relevant for procuring entities and policy makers. It should be noted that under EU law the use of non-competitive

tendering is strictly limited and, in some cases, requires additional transparency measures such as the publication of a notice or individual tender report.[54]

For the post-award phase, a checklist was published for post-award risk assessments of the contractor's financial vulnerability (https://www.oecd.org/governance/procurement/toolbox/search/checklist-post-award-risk-assessments-contractor-financial-vulnerability.pdf). This instrument aims to simplify financial evaluations of contractors. This tool is mainly relevant for procuring entities.

A list with indicators of procurement risk was published. This list is applicable for the entire procurement cycle (https://www.oecd.org/governance/procurement/toolbox/search/indicators-procurement-risk.pdf). This instrument functions as a guide to identify corruption. It also has the purpose to provide understanding of the different possible risks throughout the cycle. This tool is mainly relevant for procuring entities.

A template for registration of private interests was published. This template is also applicable for all phases (https://www.oecd.org/governance/procurement/toolbox/search/template-registration-private-interests.pdf). The purpose of the instrument is to enhance transparency in the procurement cycle, drive ethical conduct, and simplify preparing procedures for risk management. This tool is mainly relevant for procuring entities. Note that under EU law specific rules relating to conflicts of interest in tender procedures apply, including a duty for contracting authorities to take appropriate measures to effectively prevent, identify and remedy conflicts of interest[55].

Relevant links

- https://www.oecd.org/governance/procurement/toolbox/principlestools/riskmanagement/.
- The specific instruments mentioned in this documents can be found here: https://www.oecd.org/governance/procurement/toolbox/search/Checklist%2010%20Risk%20management.pdf; https://www.oecd.org/governance/procurement/toolbox/search/template-checklist-enhancing-integrity-non-competitive-tender-methods.pdf; https://www.oecd.org/governance/procurement/toolbox/search/checklist-post-award-risk-assessments-contractor-financial-vulnerability.pdf; https://www.oecd.org/governance/procurement/toolbox/search/indicators-procurement-risk.pdf; https://www.oecd.org/governance/procurement/toolbox/search/template-registration-private-interests.pdf.
- The project is coordinated by the OECD, who can be contacted via the following mail public.procurement@oecd.org.

3.2. Tendering

The tendering process involves two main phases:

1. A planning phase, where the specifications are developed
2. An award phase, based on:
   a. Exclusion criteria,
   b. Selection criteria,
   c. Award criteria and evaluation of the bids
   d. Contractual provisions.

54 The limited grounds justifying the use of the negotiated procedure without prior publication are set out in Art. 32 of Directive 2014/24/EU. Article 72(1) specifies the requirement to publish a notice where modifications to contracts are made in certain circumstances, and Article 84(1)(f) sets out the need to justify non-competitive procedures in an individual tender report.

55 Article 24 of Directive 2014/24/EU.

3.2.1. Scope and rationale

During the first phase of preparing a tender, technical specifications will define the needs to be satisfied by the successful tenderer. Their purpose is to provide the clearest possible description of the needs of the contracting authorities, to allow economic operators to propose solutions to address these needs. They are a key element of the contract and of the overall tendering procedure, and need to be carefully prepared, reviewed and validated. As opposed to the selection and exclusion criteria, the technical specifications must cover performance aspects, rather than the general competences or qualities of economic operators.

The selection phase is of crucial significance in achieving sustainable procurement of an infrastructure project, as it involves evaluating and screening contractors and suppliers against sustainability criteria: those suppliers that cannot meet the minimum sustainability requirements are disqualified, avoiding a significant sustainability risk, whilst the bidders who have scored the highest points in relation to the sustainability criteria a high-quality and cost-competitive proposal and exceed the minimum environmental and social requirements are selected.

3.2.2. Critical considerations in a sustainability context

3.2.2.1. Planning phase (specification development)

You may consider, as a public buyer, a number of considerations when developing technical specifications. To ensure the sustainability of infrastructure projects, it is essential that **minimum requirements** for the project have first been identified as well as the standards to which they relate. For example, in the case of construction tenders, you can achieve this by referring to, for example, the International Construction Measurement Standards' (ICMS) minimum performance requirements for construction, which are briefly illustrated in Box 6.

Box 6 Referring to International Construction Measurement Standards (ICMS) for classifying and reporting construction costs and the environmental impact associated with construction

Description

The International Cost Management Standard (ICMS), first published in 2017, has since provided a single methodology for classifying, defining, measuring, recording, analysing, presenting and comparing the acquisition, construction, use, operation, maintenance, and end-of-life costs of construction projects at regional, state, national or international level. The guidance was last updated in 2021 to go much further in developing a framework for both construction costs and carbon emissions reduction.
As regards carbon emissions, whereas ICMS provides the reporting framework, it is intended that appropriate existing standards are used for their actual measurement and management, for instance: ISO 21931-1:2010 Sustainability in building construction – Framework for methods of assessment of the environmental performance of construction works – Part 1: Buildings; ISO 21931-2:2019 Sustainability in buildings and civil engineering works – Framework for methods of assessment of the environmental, social and economic performance of construction works as a basis for sustainability assessment – Part 2: Civil engineering works; etc.

Presently, the ICMS' scope does not cover the process industries (although factories and their production equipment can be reported as buildings). It covers the life cycle costs and carbon emissions arising throughout

the life of a construction project, from inception to end of life, but not Whole Life Costs[56] and Whole Life Carbon Emissions[57].

Objective

The ICMS was created to address the fact that the construction profession currently lacks a common language and framework for classifying and reporting construction costs and the environmental impact associated with construction.

Results

Since its introduction, the ICMS has already been adopted by several high-profile bodies seeking to benchmark project costs internationally, including large public sector project sponsors, global cost consultancies, constructors, and other construction sector stakeholders (for a list of business support partners see https://icms-coalition.org).

Using the ICMS is expected to bring the following benefits:

- construction costs can be consistently and transparently benchmarked
- the causes of differences in costs between projects can be identified
- more informed decision-making about the design and location of construction projects
- data can be used with confidence for construction financing and investment, decision-making, and related purposes.

Key takeaways

The aim of the ICMS is not to replace existing local standards, but to provide an internationally accepted reporting framework into which data generated locally can be mapped and analysed for comparison. Widespread adoption and use of the ICMS has the potential to support procurers in the evaluation of competing tenders. If built successfully into procurement documentation, it could form the basis of environmental evaluation criteria and provide a common framework upon which to compare the costs and environmental impacts of proposals.

Under EU public procurement law, where references are made to a particular standard, equivalent standards must also be accepted. Life-cycle costing can be used to compare the cost of tenders, including monetisation of environmental impacts (Article 67 of Directive 2014/24/EU). Key considerations are the transparency and accessibility of the methodology, and whether the data required can be provided with reasonable effort by normally diligent tenderers. The ICMS is generally compatible with other established or emerging standards, while remaining flexible to accommodate detailed cost classification systems that exist across the world.

Relevant links

- https://icms-coalition.org/.
- https://icmscblog.files.wordpress.com/2021/11/icms_3rd_edition_final.pdf.
- https://icmscblog.files.wordpress.com/2022/01/icms3_basis-for-conclusions_dec-2021.pdf.

The technical specifications should ensure that the minimum requirements set should meet environmental and social regulatory requirements (including the DNSH principle introduced by the EU taxonomy), but also **incentivise bidders to meet the highest standards** for all sustainability aspects, whether environmental, social, or economic.

The technical screening criteria of the EU taxonomy can provide a useful reference to identify sufficiently high standards. For example, the taxonomy requires that the construction, extension, and operation of water collection, treatment and supply systems must, among others, have a) an Infrastructure Leakage Index (ILI) rating below 1.5, and b) a net average energy consumption for abstraction and treatment below 0.5 kWh/m^3.[58] This includes

56 All significant and relevant initial and future costs and benefits of an asset, throughout its life cycle, while fulfilling the performance requirements.

57 All significant and relevant initial and future carbon emissions and benefits of an asset, throughout its life cycle, while fulfilling the performance requirements.

58 https://ec.europa.eu/sustainable-finance-taxonomy/activities/activity_en.htm?reference=5.1.

sustainable public procurement requirements in terms of design performance, material specifications, accessibility for all users and execution of the contract through all the stages (including waste management).

To facilitate the assessment of a bidder's approach in terms of sustainability, where relevant, you should include in tender specifications a request for bidders to provide details of their approach to sustainability, including any specific steps taken in the design and manufacture of products to reduce any detrimental environmental impacts, and the provision of a lifecycle costing (LCC) analysis or to provide information that allows the procurer to make its own LCC calculation.

For public buyers, in the Netherlands, the Environmental Cost Indicator presented below in Box 7 is an example that can show how a single score for the total environmental footprint of a product can be calculated in environmental terms (e.g. EUR/m^2).

Box 7 Environmental Cost Indicator

Description

The Environmental Cost Indicator (ECI) is an indicator developed by Dutch company Ecochain that unites all relevant environmental impacts into one measure of environmental costs. This way, the total footprint of a project or product can be calculated in Euros. This single-score indicator accounts for all environmental impacts along the supply chain and can be compared across industries. The ECI draws on different indicators, which are all measured in different units. These are then multiplied by their environmental costs to add all indicators into one single value.

Key takeaways

Use the tool to estimate the different environmental impacts made along the supply chain. This is done by uniting all environmental data points into one monetary indicator.
Enables a shadow price of a product, project, or proposal. A shadow price is the price of something, in this case a piece of infrastructure, that is not usually available on the market. It reflects the real economic price of a project that doesn't otherwise have a tangible cost.
Enables procurers to make objective comparisons of proposals in terms of environmental impact.
Stimulates circularity in building projects. Within the impact categories incorporated in the ECI, material reduction, energy use and emissions are measured, which are lower if projects are circular.

Ways the tool can be used to reduce environmental impacts

The ECI is an effective indicator to objectively compare different proposals for projects, as for example shown in the life cycle assessment of different bridge designs by Beco. Enabling the most environmentally beneficial proposal to be identified.
Reducing the environmental impact throughout the whole life cycle of a project or product in a wide range of industries.
Increasing the circularity of projects and products in a wide range of industries, for example by accounting for material use.

The ECI can be used for projects in a wide range of sectors and allows for comparison across construction products.
Unifying all environmental impacts along the entire supply chain into one indicator triggers multiple stakeholders within the entire chain to include a ECI calculation for their services, projects, or products. For example, since increasingly more clients value sustainability, suppliers are driven to include an ECI calculation for their products as well.

Relevant links

- https://ecochain.com/knowledge/environmental-cost-indicator-eci/
- https://www.duurzaaminstaal.nl/upload/File/Eindrapport_LCA_studie_bruggen_September_2013.pdf

Public authorities can also refer to national or international tools and methods, such as the **CO2 Performance Ladder** or the **Environmental Footprint Methods Recommendation**. The European Commission's Environmental Footprint Methods Recommendation[59] can also help companies calculate their environmental performance based on reliable data. Such tools are key to help public authorities assess the environmental performance of competing tenderers. The Dutch national rail company, ProRail, experience with the CO2 Performance Ladder accreditation scheme is detailed below in Box 8.

Box 8 ProRail's experience using the CO2 Performance Ladder accreditation scheme

Description

During this project's tendering phase, ProRail incorporated a voluntary accreditation scheme called the CO2 Performance Ladder into its evaluation framework for bidders. The CO2 Performance Ladder enables individual projects to be assigned a level based on that project's CO2 savings. ProRail chose to apply a discount (award advantage) to the evaluation price for bidders depending on which level of carbon ambition they had achieved, with a maximum of 10% being deducted for the highest level (Level 5).
The project was valued about €3m, meaning that for Level 5 contractors, roughly a €300,000 saving in the financial evaluation was applied.

Objective

ProRail sought a contractor to not only deliver on its requirements to renovate the necessary infrastructure, but also to collaborate with it to develop potentially innovative and ambitious solutions to the climate crisis through further CO_2 reduction.
As the client, ProRail acknowledged that while it can set the specifications and requirements for the works it is contracting, the tenderers and ultimately the selected contractor may be able to contribute further innovation. Therefore, ProRail took the step of involving the contractor through a two- stage process:
Engineering: each tenderer was invited to submit a project specific action plan with two emissions inventories: one showing the CO_2 emissions of the project if all the measures were applied, and one showing the CO_2 emissions without applying all the measures. Having selected the preferred bidder, ProRail sat down at the table to go through all their proposed plans and agree which of the proposed measures they were going to apply, and which not. At the end of this first phase, ProRail had the measures in focus. Then the phase ended with setting up a contract.
Realisation: Once the above has been agreed, the plan was executed.

Results

Through the collaboration with its contractor, ProRail was able to implement the following:
Changed how the organisation thinks about reuse and its potential to reuse materials
Enabled itself to apply varying standards depending on the use case, for example using rails no longer suitable to high-speed lines for track in the yard.
Used digital passports and infrastructure mining to facilitate material reuse.

Environmental impacts

According to the CO2 Performance Ladder's website, the University of Utrecht has carried out scientific research on several companies to assess the environmental impacts connected to the use of the Performance Ladder. In the businesses surveyed, the CO_2 reduction from 2010 to 2013 was 3.2 percent per year. The average energy saving rate in the Netherlands is 1.5 percent per year.

Key takeaways

The procurement of this project demonstrated the use of the CO2 Performance Ladder as a complement towards evaluation and award in the procurement cycle. If successfully incorporated into procurement documentation, achieving a level on the ladder, or equivalent, gives procurers the ability to compare the environmental performance of competing tenders.
The CO2 Performance Ladder has been used in 10% of European tenders in the Netherlands by more than 150 clients. As its use has increased, so has the number of certificate holders, rising from 12 in 2010 to 1,140 in 2021.

59 https://ec.europa.eu/environment/publications/recommendation-use-environmental-footprint-methods_en.

In recognition of the CO2 Performance Ladder's ability to quantify environmental impacts, it has been incorporated as one of the instruments to ensure that the Green Deal is able to integrate sustainability into rail, ground, water and road constructions.

Relevant links

- https://www.co2-prestatieladder.nl/en/project/project-prorail.
- https://www.co2-prestatieladder.nl/nl/deelnemers/ProRail_B_V.

Another inspiring model developed by the Austrian Federal Railways in cooperation with the Technical University of Graz to calculate offer-specific environmental impacts in production, construction and operation is described in Box 9. The model is based on the Total Cost of Ownership approach, while also integrating the costs caused by the environmental impacts, such as greenhouse gas emissions.

Box 9 Embedding Product-Specific calculations of environmental impacts in public procurement

Description

The Austrian Federal Railways (ÖBB) has developed a model in cooperation with the Technical University of Graz to calculate offer-specific environmental impacts in production, construction and operation. The model is based on the Total Cost of Ownership approach, while also integrating the costs caused by the environmental impacts, such as greenhouse gas emissions. This way, greenhouse gas emissions of production, construction and end of life emissions are considered in the procurement process. During the project a focus was also to raise awareness and enable broad acceptance of the tool among ÖBB staff and bidding companies.

Results and Environmental Impacts

- The Total Costs of Ownership Model that was previously used in the ÖBB's procurement process was adapted to include the greenhouse gas emissions of production, construction and use phase of products and services. This way tenderers are chosen that offer the lowest cost for a product or service, considering the total duration of use, including the monetized emissions costs over the whole life cycle.
- The developed model is now used in all new procurement processes of the ÖBB, e.g., when buying tracks, trains or buildings and maintaining train infrastructure elements.
- In its procurement process, the model is combined with ÖBB's supplier management system which rates suppliers according to CSR-questionnaires to be completed by suppliers.
- To reduce CO_2 emissions of the production, construction and use phase of infrastructure
- To reduce the overall environmental footprint of the infrastructure, by preferably choosing durable products
- To reduce waste by preferably choosing durable products.

Key takeaways

- The publicly available tool (see links to relevant articles further below) that has been developed in cooperation with the Technical University of Graz could serve as an example for other public procurement entities to embed similar approaches.
- Actively striving to create acceptance of industry stakeholders through training activities can pave the way to more targeted green tendering of infrastructure.
- The developed calculation approach can potentially serve as an inspiration to include further environmental or social considerations and adapt the tool according to the latest regulatory developments.
- ÖBB's involvement in the international sustainability initiative "Railsponsible" can lead to spin-off effects of their procurement approach.
- The use of life-cycle costing, which includes the possibility to assign a cost to environmental externalities such as greenhouse gas emissions, is authorised under Art. 68 of Directive 2014/24/EU (Art. 83 of Directive 2014/25/EU). Key considerations are the transparency and objectivity of the method applied to compare life-cycle costs, and the possibility for normally diligent tenderers to produce the required data with reasonable

effort. Provided these safeguards are respected, life-cycle costing tools can make an important contribution to sustainability in public tenders.

Relevant links

- https://konzern.oebb.at/en/
- https://www.tugraz.at/en/home/
- https://www.globalrailwayreview.com/article/117212/implementation-environmental-impacts-obb/
- ÖBB's 2021 sustainability report (in German) also touching up the TCO-CO_2 tool can be read here: https://presse.oebb.at/de/dam/jcr:6f2f5318-1b7e-4e19-9be8-338f3e5f04f2/OEBB_CSR2020_Web.pdf
- The procurement department of ÖBB infrastructure can be reached here: https://infrastruktur.oebb.at/en/partners/for-suppliers/contact-purchasing.

Other elements which may be relevant to include within the technical specifications are requests for the need for key performance indicators, already defined or not, and monitoring and enforcement provisions to ensure that the agreed environmental and social performance of the infrastructure is achieved over its lifetime.

3.2.2.2. Exclusion criteria

The exclusion criteria included in the tender should firstly require the verification of whether the bidders are in a situation which should necessarily lead to their exclusion, such as serious breaches of environmental law, violation of conventions (e.g. the Basel Convention on hazardous waste) or presence on a sanctions list. The Procurement Directives contain a comprehensive list of cases where the personal situation of a bidder may lead to its exclusion from the procurement procedure[60].

The tender should as a priority include the verification of whether the bidder is compliant with applicable environmental, social and labour law obligations (e.g. on emissions, work condition rules applicable to the staff involved, health and safety rules etc…), as well as requiring that the bidder seeks relevant guarantees from subcontractors that they will also comply with the environmental and socially relevant obligations and have the required management capacities to do so.

You may require, as a public buyer, that companies demonstrate their technical capacity to respect the exclusion criteria. Environmental management systems such as EMAS or ISOS 14001 can serve as a (non-exclusive) means of proof for that technical capacity[61].

The most relevant exclusion criteria from a green public procurement perspective are[62]:

- Non-compliance with applicable national, EU or international environmental laws
- Grave professional misconduct which renders integrity questionable
- Failure to pay social contributions

60 Article 45 of Directive 2004/18/EC and Articles 53(3) and 54(4) of Directive 2008/17/EC.

61European Commission, Buying Green! A handbook on green public procurement. Available at: https://ec.europa.eu/environment/gpp/pdf/Buying-Green-Handbook-3rd-Edition.pdf

62 European Commission, Buying Green! A handbook on green public procurement. Available at: https://ec.europa.eu/environment/gpp/pdf/Buying-Green-Handbook-3rd-Edition.pdf

- Significant/persistent deficiencies in performance of substantive requirement under prior contract which led to termination or comparable sanctions
- Misrepresentation of any of the above or inability to submit supporting documents.

3.2.2.3. Selection criteria

The selection criteria included in the tender should ensure that bidders have the best arrangements in place to **comply with the environmental, social, and economic requirements of the contract**. This includes criteria linked to the bidder's personnel and management capacities (to ensure that they have the required educational and professional qualifications and experience to conduct the environmental tasks of the contract), their technical equipment, and internal arrangements to comply with social and work integration requirements (e.g. in favour of persons with disabilities or disadvantaged persons or gender equality). For instance, selection criteria sometimes include a requirement for bidders to designate an engineer or technical-grade architect responsible for coordinating the maintenance services. In one case in Spain, the person put forward for this role had to prove they had the appropriate training, knowledge and experience in environmental matters associated with the maintenance services, including energy efficiency and waste management[63].

Similarly, requiring bidders to provide an environmental management system in construction, like the EMAS - European Union's Eco-Management and Audit Scheme could serve to demonstrate their capacity of being able to implement environmental management measures. Such a requirement could also be extended to demonstrate the use of certain technical equipment or capabilities/ training of staff.

63 European Commission, Buying Green! A handbook on green public procurement. Available at: https://ec.europa.eu/environment/gpp/pdf/Buying-Green-Handbook-3rd-Edition.pdf

European Union's Eco-Management and Audit Scheme (EMAS)

A common EMS relevant to the construction phase is the European Union's Eco-Management and Audit Scheme (EMAS)[64] embedding several environmental management requirements, including those defined by the well-known management system EN/ ISO 14001. EMAS additionally verifies the compliance with environmental legislation, commitment to continual improvement of environmental performance, employee involvement and mandatory public communications of annual performance.

The requirements to obtain EMAS registration for an organisation comprises:

- conducting an environmental review to identify the environmental impacts
- implement an action plan to decrease the impact
- implement an EMS to assess and control the environmental performance
- conduct regular assessments if the procedures respond to the objectives
- prepare a public statement on the environmental performance
- obtain an independent verification by an EMAS verifier
- register with the competent authority in the Member State.

In case of non-compliance penalties can be imposed by the competent Member State authorities, leading to the deletion from the EMAS register.

It is also advisable for specifications to require bidders to provide **records of orders** already carried out with similar sustainability elements (references) to demonstrate their technical capability and to corroborate information provided by a bidder in their response to a tender.

This requirement may be extended to subcontractors in the case where they implement significant parts of the tasks of a project. Overall, specifications can also request bidders to provide a copy of their environmental policy and certifications, highlighting how these relate to the services which are the subject of the tender. Furthermore, if the project has the potential to be delivered by one or more SMEs, the financial selection criteria should be proportionate to allow them to bid.

Box 10 Prequalification for infrastructure projects in Calgary, Canada

Description

The City of Calgary uses prequalification as a method to develop and maintain a list of Prime Contractors who meet the minimum standards to be considered for construction work in the city. In procurement procedures for infrastructural projects, bidders must show in a prequalification phase that in addition to mandatory financial and safety criteria, they also satisfy environmental criteria.

Objective

Most of the City of Calgary's solicitations are made through the prequalification list of companies who are deemed to have met the minimum commercial, safety, environmental and technical criteria of large infrastructure projects. To make the prequalification list, a company must present an environmental certification equivalent to ISO 14001, identify measures in the company regarding environmental management systems, as well as the company's experience with similar measures in environmental protection, before they are even admitted to technical screening. Each bidder that is not able to provide verification of these fundamental principles is considered to be non-compliant and is not considered in the continued selection process.

Relevant links

- https://www.calgary.ca/buy-sell/supply-to-city/prime-contractors.html
- More information about the project can be obtained by contacting prequalification@calgary.ca.

64 https://ec.europa.eu/environment/emas/index_en.htm

The EU taxonomy also seeks to incorporate social safeguards. Whereas exact criteria are still in development as of 2022, the EU taxonomy already requires an overall alignment with, among others, the OECD Guidelines for Multinational Enterprises and the UN Guiding Principles on Business and Human Rights[65]. Minimum social safeguards could be incorporated using selection criteria by requiring demonstrated experience in executing infrastructure-related projects in alignment with for example the above safeguards.

As is the case with criteria more generally, the application of the criteria of the EU taxonomy as selection criteria should however be done with caution: too strict, ambitious, or novel selection criteria may non-intentionally exclude too many otherwise suitable tenderers, whilst if too loosely applied, the right staff and expertise may not be found. For constructions of new buildings that seek to make a substantial contribution to the circular economy for example, the draft final criteria propose that minimum 90% (by weight) of non-hazardous construction waste prepared onsite is prepared for re-use or recycling[66]. An exact replication of this criteria may automatically exclude many potential tenderers. A more generic formulation, such as "demonstrated experience with the re-use or recycling of construction waste" could in turn provide a more balanced deselection of potentially non-suitable tenderers.

3.2.2.4. Award criteria and evaluation of the bids

The award criteria included in the tender should give a sufficient weighting to **reward sustainability aspects such that it can concretely influence the award of the contract**, when compared to price-related criteria. This includes an appropriate bonus attributed to services or products with characteristics which exceed the minimum environmental and social requirements, including accessibility for all characteristics of the infrastructure. Doing so will provide further incentives for bidders to make a more advantageous offer on the sustainability requirements included in the technical specifications and the contract clauses.

Reward criteria can in some cases rely on specific sustainability tools and methods. An inspiring example is the calculator presented in Box 11. It relies on a software allowing for quickly and easily quantifying and comparing the relative sustainability and procurement costs of various designs of ground, road and water works.

Box 11 DuboCalc, a sustainable construction calculator

Description

To support its decision making, Rijkswaterstaat has created a Sustainable Construction Calculator called "DuboCalc". This software has proven very useful for contractors as it allows for quickly and easily calculating and comparing the relative sustainability and procurement costs of various designs of ground, road and water works.

DuboCalc calculates lifecycle impacts of a project considering elements such as materials and energy including the impacts of extraction, demolition and recycling and produces an estimated cost in Euros. The use of the tool is straightforward: a project is created and standard items to be used for the infrastructure in question are added as inputs from a library. Each standard item is linked to an environmental impact. When the items intended for use in the project are combined, the sum of all the standard items gives the project's overall impact and therefore a score. This score can be used to compare multiple competing projects.

65 https://ec.europa.eu/info/publications/220711-sustainable-finance-platform-report-minimum-safeguards_en.

66 Activity 5.1, Construction of new buildings, p. 358. https://ec.europa.eu/info/sites/default/files/business_economy_euro/banking_and_finance/documents/220330-sustainable-finance-platform-finance-report-remaining-environmental-objectives-taxonomy-annex_en.pdf.

A ten-year commitment to DuboCalc has been indicated by Rijkswaterstaat through its recent tender to host, manage and maintain the software until 2032.[67] The confidence this gives for its continued use may support procurers to use it as a tool to quantify environmental impacts of infrastructure projects.

Key takeaways

- DuboCalc provides robust measurements whereby procurers can calculate the whole life cost of a bidder's proposal and compare between different tenders. The tool is particularly interesting for the assessment of tenders based on Most Economically Advantageous Tender (MEAT) criteria, when a procurer wishes to compare the environmental costs depending on the different design and configuration options linked to the proposals under assessment.
- DuboCalc enables procurers and bidders to consider life cycle impacts of infrastructure projects in a consistent way. It gives confidence that the same metrics are being used to compare competing projects and adds robustness to this comparison. The calculation of impacts at the bidding stage also gives contract managers an agreed baseline against which they can compare the actual impacts of a project and understand if the performance is as expected.
- DuboCalc is based on the methodology of Life Cycle Assessment (LCA) according to ISO:14040 standard and the Environmental Assessment Method Buildings and Construction.
- The use of the DuboCalc tool as part of the procurement process not only makes it easier for a public buyer to transparently compare alternative bids for sustainable infrastructure, but it can also encourage potential contractors to consider environmental impacts as part of the design and tendering phase to be more competitive

Relevant links

- https://www.dubocalc.nl/en/

A way for a supplier to prove the carbon performance of a specific project in a tender is the *CO2 Performance Ladder*, which is a non-binding certificate which can be indicated by public buyers as a means to compare competing tenders based on their commitment to CO2 emissions reductions demonstrated through the certificate or other equivalent proof. This certificate has been used by both the Delfland Water Board, ProRail and other public procurers in the Netherlands as an incentive to foster innovation and embed sustainability into the contracts they are responsible for. It has been developed and used in compliance with the European Union Procurement Directive, making it immediately applicable in other EU countries.

Similarly, as previously detailed in Box 8 ProRail in the Netherlands provided an award advantage for tenderers that could demonstrate a commitment to an environmental performance corresponding to Level 5 of the Dutch CO2 Performance Ladder (or equivalent). The award commonly corresponds to a 10% price reduction of the tender. The CO2 Performance Ladder ensures that contractors themselves are committed to GHG reductions, leading to GHG-friendly performance of the project.

The city of Oslo has also experimented with award criteria favouring the use of emission-free construction machinery and vehicles. Overall, the environmental aspects weighed 20% of the final score, as detailed in the Box 12 below.

67https://ted-europa-eu.translate.goog/udl?uri=TED:NOTICE:038279-2022:TEXT:NL:HTML&_x_tr_sl=nl&_x_tr_tl=fr&_x_tr_hl=fr&_x_tr_pto=sc

Box 12 Oslo's experience in developing sustainable minimum requirements and award criteria for heavy equipment and construction sites

Description

The urban construction pilot project in Oslo city centre aimed at reducing the city's CO_2 emissions by focusing on heavy equipment and construction sites. Through the pilot project, Oslo municipality wanted to achieve an emission-free construction site using only electrical machinery. The machinery was supplied through separate low-value agreements with smaller companies, which the successful contractor was obliged to use in delivery of the main contract.

Objective

In terms of procurement, the pilot project aimed to:
Be the first construction site in Norway to carry out an emission-free construction project
Contribute to the target in the Oslo Climate and Energy strategy of reducing Oslo's CO_2 emissions by 95% by 2030, compared to 1990 levels, by implementing objectives such as emission-free construction sites by 2025 and fossil-free solutions (or the use biofuel, if fossil-free is not achievable) in transport of materials to construction sites by 2025
Address the reduction of these emissions in the heavy machinery and construction sectors
Establish a closer dialogue with the market of producers and sellers of electrical construction machines, and local grid companies to better understand opportunities and needs.

Results

The project was unfortunately not able to fully implement an emission-free construction site due to the lack of available electrical wheel loaders to carry out the most complex part of the heavy lifting and loading for delivery on site. Nevertheless, the pilot project had a series of positive lessons learned that Oslo municipality is implementing in their current tendering processes, such as:
adopting minimum requirements, award criteria and contract requirements to oblige the use of emission-free construction machinery and vehicles. Whenever this is not achievable, construction machinery is required to use fossil-free fuel.
implementing award criteria in building and construction procurement whereby environmental aspects must be weighted at least 20% of the final score
enforce that at least half the environmental criteria be earmarked for emissions related to the building and construction site
award additional points to suppliers for using emission-free machines and vehicles.

Environmental impacts

The pilot project achieved the following:
saved emissions of 35 000 litres of diesel equivalent, and 92 500 kilos of CO2 equivalents (CO2e) compared to the use of regular diesel, corresponding to an annual emission reduction comparable to that of 50 fossil fuel-driven cars.
reduced noise pollution reported by machine operators which made them feel less fatigued at the end of the day. Similar results were reported by the local shops and offices in the street of the construction site.

Key takeaways

Under the EU Procurement Directives, it is possible to include environmental considerations in technical specifications (minimum requirements), award criteria and contract performance clauses provided these are linked to the subject-matter of the contract and included in the tender documents (Articles, 42, 67 and 70 of Directive 2014/24/EU). It is also possible to conduct preliminary market consultation which addresses environmental aspects of the tendering procedure, provided that this does not result in any operator having an unfair advantage or disadvantage (Article 41 of Directive 2014/24/EU). The approach followed by Oslo could therefore be applied in other EU or non-EU countries.

Relevant links

- https://www.klimaoslo.no/2021/02/09/new-pedestrian-street-brings-new-life-to-oslo-city-centre/
- https://www.klimaoslo.no/wp-content/uploads/sites/88/2020/12/BYM_Utslippsfri-anleggsplass.pdf
- More information about the project can be obtained by contacting Project Manager Karin Dalberg, Oslo Municipality (Bymiljøetaten) at postmottak@bym.oslo.kommune.no.

Indeed, purchasers can indicate how tenderers can score in relation to the award criteria (preferences) with **weighing ratios.** These weighing ratios are only applicable when the tendering process is based on the principle of the Most Economically Advantageous Offer. Sufficient weighing should be allocated to the sustainability criteria to ensure that the sustainability component will impact the award. Practice has shown that, in many cases, **at least 20%** must be allocated to the sustainability component in relation to the procurement for it to have an effect on the award[68].

The EU taxonomy is also relevant for the development of award criteria and the evaluation of the bids. This is particularly relevant to maximizing the sustainability performance of an infrastructure. For example, alignment with the EU taxonomy requires, among others, that electricity, co-generation, heat, or cool produced from bioenergy leads to lifecycle GHG savings of 80%.[69] Bioenergy has however potential lifecycle GHG savings far above 100%. The award criteria can therefore be used to further maximise the potential GHG savings, by evaluating the bids, among others, based on their expected lifecycle GHG savings.

3.2.2.5. Contractual provisions

The contract should include **clauses and conditions on the guaranteed performance parameters** to be delivered by the contractor in relation to environmental and social aspects, including instructions for remedy and resolution within specific deadlines and possibly contractual penalties in case performance deviations are identified during the execution of the contract. It should also include further conditions for implementation considering environmental (e.g. eco-friendly packaging and logistics minimization of waste during the contract, reduction of CO2 emissions generated by transport, environmental due diligence in the supply chain) and social conditions (workers' rights, health and safety, human rights due diligence in the supply chain, prevention of forced labour, professional integration of disadvantaged persons and groups, and ensuring equal opportunities).

Concretely, at the handover of a construction work after a works contract for instance, the public authority can require the implementation of specific contractual provisions for the sustainable management and maintenance of certain materials and installations. The provisions should describe the key maintenance measures required to keep the construction work in good order. These can include:

- The description of the management measures to be considered with inspection intervals for a defined period, with associated instructions (describing for instance inspection points, methods, estimated number of person-hours);
- The description of the maintenance intervals to be considered for a defined period, with associated instructions (describing for instance maintenance activities and necessary materials, an estimate number of person-hours, etc)[70].

You can use the EU taxonomy as a source of information to identify whether contractual provisions may be required to ensure alignment with the EU taxonomy in the long term. For some of the activities related to infrastructure, the taxonomy entails criteria to ensure

68 RVO, Criteria for the sustainable procurement of Heavy-duty motor vehicles and mobile equipment including maintenance services, 2011. Available at: https://english.rvo.nl/sites/default/files/2013/12/Criteriadocument%20Heavy%20duty%20motor%20vehicles%20and%20mobile%20equipment.pdf

69 E.g. Activity 4.8, Electricity generation from bioenergy, https://ec.europa.eu/sustainable-finance-taxonomy/activities/activity_en.htm?reference=4.8.

70 Dutch Government/RVO, Criteria for the sustainable procurement of Construction Works (2011). Available at: https://english.rvo.nl/sites/default/files/2013/12/Criteriadocument%20Construction%20Works.pdf.

sustainability in the long term. For example, for the restoration of wetlands, the criteria foresee, among others, an audit within two years after the beginning of the restoration and every ten years thereafter to ensure permeance of its contribution to climate change mitigation.[71] In this context, relevant contractual provisions could entail performance clauses that the contractor must ensure the restored wetland lives up to the specific criteria in the EU taxonomy up until the first 10-year audit.

3.3. Construction

Guidelines for contract monitoring after sustainable infrastructure projects have been awarded and interaction with suppliers of sustainable infrastructure projects related to construction will be presented in this section.

3.3.1. Scope and rationale

The construction phase requires a diligent implementation of the contractual conditions set forth in the tendering phase. Furthermore, the possibilities to make amendments to the contractual conditions defined in the tendering phase are very limited, as substantial amendments to the contractual conditions can be legally challenged by the contractor. The main attention point in the construction phase is therefore setting up a monitoring system that adequately incorporates the environmental and social conditions defined in the tendering phase. An adequate monitoring system thus ensures that the sustainability benefits expected from the construction are truly delivered.

During the construction process, it is key to consider the three following phases for good contract management:

- Preparing the contract management
- Setting up the monitoring system
- Monitoring the construction.

It is important to note that the “early works” in the construction phase (e.g. land clearing, excavation, or the preparation of construction infrastructures) often have the highest sustainability impacts during the construction phase.[72] The management of the environmental and social considerations by the contractor should therefore be approved prior to the commencement of any construction activities. Notably, the criteria to be used will have to be somehow taken into account in the tendering phase – either in the technical specifications or the contract clauses, as mentioned under Section 3.2 above.

Possible environmental criteria[73]:

- Promoting and enhancing biodiversity and the natural environment
- Contributing to climate change mitigation

71 Activity 2.1 – Restoration of wetlands, https://ec.europa.eu/sustainable-finance-taxonomy/activities/activity_en.htm?reference=2.1

72 https://www.ifc.org/wps/wcm/connect/87197a95-1b7f-4f57-ac1e-ee961730ce4d/p_GPN_ESContractorManagement.pdf?MOD=AJPERES&CVID=mR5DVaJ

73 FAST-Infra-SI-Framework-Draft_For-Consultation-June-2021-2.pdf (climatepolicyinitiative.org)

- Promoting waste reduction and circularity
- Embedding pollution prevention and control

Possible social criteria:

- Promoting health and safety
- Protecting and enhancing human- and labour rights
- Prevention of resettlement & land acquisition
- Promoting stakeholder engagement
- Promoting inclusivity in terms of gender and ability.

When using social indicators, it should be considered to which extent the disaggregation into population groups is warranted.

A positive example for the considerations of environmental and social criteria in the construction phase is the *Grand Paris Express* project, further described in Box 13 example further below. When land clearing including forest clearing had to be conducted for the construction of lines, offsetting targets were defined to compensate for the environmental impact. For the construction of each line a dedicated environmental manager oversees the environmental requirements associated with the construction, e.g. the prevention and management of environmental pollution.

3.3.1.1. Preparing the contract management

Modifications to the contract

The EU rules on procurement foresee that contract performance clauses must in principle be announced at the tendering stage and that these must be relevant for the subject-matter of the procurement procedure.[74] Accordingly, environmental, and social criteria should equally be incorporated in the tendering phase.

Modifications to a contract can entail considerable legal- material and project management related consequences, wherefore the reasons for a modification should be balanced and well-reasoned (see conditions for contract modifications[75]). If the nature of the project points to the need of adaptations later on, the inclusion of a review clause should be considered.[76] These clauses should state the scope and nature of possible modifications or options as well as the conditions under which they may be used, though without altering the overall nature of the contract. Including a review clause might e.g. be necessary for a project in which a dynamic environmental condition might require the modification of aspects of a contract, e.g. increased water protection/saving measures in drought periods for long-term projects.

Prior to the tendering procedure, it should therefore be ensured that if not all environmental and social criteria have been established in the preparation for tendering, a review clause should be added to provide scope of adding further criteria.

Contract management

The delegated contract manager (or a delegated assistant manager) should ideally be familiar with the relevant sustainability considerations during the construction phase. The level of

74 Article 70 of Directive 2014/24/EU; Article 87 of Directive 2014/25/EU

75 Article 72 of Directive 2014/24/EU; Article 89 of Directive 2014/25/EU

76 Article 72 of Directive 2014/24/EU; Article 89 of Directive 2014/25/EU

familiarity may already be sufficient based on previous experiences with environmental and social management systems, but additional support from a sufficiently qualified (external) expert should be considered if there is a risk that criteria cannot be adequately reviewed. In the case of the Grand Paris Express project (see Box 13) this was e.g., done by assigning a dedicated environmental manager to each worksite, ensuring the compliance with all environmental requirements. Furthermore an environmental protection plan for the work site has been developed based on the environmental protection blueprint to be handed in with the tender of the project.

The review of an environmental and social plan may for example require sufficient expertise within defining the system boundaries of the construction, the protection of the surrounding biodiversity, or the adequacy of workers accommodations. The adequate management of these considerations need to be ensured prior to the commencement of the construction.

3.3.1.2. Setting up the monitoring system

Setting up an effective monitoring system is crucial to follow the compliance with the social and environmental performance criteria and the set timeline. Whichever system is chosen, its indicators and mechanisms will need to be adapted to the actual contractual commitments and environmental standards that have to be monitored in the specific contract.

Environmental management systems

Environmental management systems have become an indispensable part of all sorts of economic operations. In construction they can contribute to monitor social and environmental aspects as foreseen by the contract. Environmental management systems are especially effective if they comprehensively detect and mitigate risks, therefore allowing the construction process to proceed smoothly in compliance with social and environmental standards.

Indicator framework

The development of an effective monitoring system requires balancing a set of indicators that are relevant, quantified, and comprehensive (in terms of environmental and social considerations), but not too complex or numerous. A guiding principle in defining appropriate indicators is that these should be SMART: Specific, Measurable, Achievable, Relevant, Time phased.

Every indicator requires time and resources for the data collection, processing, reporting, and enforcement. The development of the indicator framework should therefore keep this consideration in mind. It can be advantageous to choose fewer indicators that are comparably easy to monitor and enforce, over a longer list of indicators that require intensive resources on monitoring and enforcement.

Equally, a disproportionate list of indicators can lead to overly complex contracts, where the performance against the indicators becomes ambiguous, or put tension on the relationship with the contractor. It is therefore also a good practice to develop the indicators in cooperation with the contractor, as a way of achieving consensus on which set of indicators can be regarded as feasible within the scope of the project. It is important to keep in mind that indicators and mechanisms need to be adapted to the actual contractual commitments and environmental standards to be monitored in each contract.

For the construction sector the European Commission's Sectoral Reference Documents contain best environmental practices, environmental performance indicators and benchmarks of excellence[77]. Environmental indicators named in the reference document comprise amongst

77 ConstructionSector.pdf (europa.eu)

others, volume of waste, percentage of reused and recycled waste, number of emergencies with environmental impact, waste management costs, etc.

To ensure that the construction phase respects the Do-No-Significant-Harm (DNSH) principle of the EU taxonomy, the taxonomy should be considered as guiding principles in identifying those indicators relevant to monitoring DNSH compliance with the six environmental objectives. The criteria as per the EU taxonomy can be found in the EU taxonomy Compass tool.[78]

To ensure a truly sustainable performance, the defined indicators should accordingly correspond to a level of ambition that respects the DNSH principle. For example, to ensure no significant harm to the circular economy in the construction of buildings, the DNSH criteria prescribe that at least 70 % (by weight) of the non-hazardous construction and demolition waste generated on the construction site is prepared for reuse, recycling and other material recovery.

Next to ensuring the definition of representative indicators, it should be considered to which extent indicators should perform according to a timeline, such as milestones. Setting milestones can secure are a consistent performance and mitigate the risk that the final target value will not be met.

Monitoring setup

The monitoring is only as effective as its enforcement. Therefore, a close monitoring is advised to provide a disincentive for non-compliant performance. There are a variety of methods by which compliance can be monitored, for instance:

- Contractors can be required to submit evidence for compliance,
- Contractors can be subjected to spot checks, and
- Third parties can monitor the contractor's compliance. [79]

As also stated on the preparation of the contract management, the procurer should ensure that the modalities of the monitoring system are defined in the initial contract or agreed during the contract negotiations, as the gathering of the relevant monitoring data can entail a significant administrative burden for contractors.

A second factor to consider is that the monitoring system agreed in the contract should entail proportionate penalties in the case of poor performance or bonuses in the case of good performance. As much as it is already common practice to connect general performance indicators to the payment terms, environmental and social performance indicators can be equally connected to the payment terms.

Subcontractors

It is important to enforce sustainability throughout the supply chain, as unsustainable impacts can for example already be associated with the extraction of raw materials on workers' conditions or the environmental quality. The EU rules on public procurement allow contracting authorities to (i) require joint liability of both the contractor and subcontractors on complying with environmental obligations provided by national law, and (ii) require the replacement of subcontractors that cannot verify their compliance with environmental obligations. [80]

78 https://ec.europa.eu/sustainable-finance-taxonomy/tool/index_en.htm

79 https://ec.europa.eu/environment/gpp/pdf/Buying-Green-Handbook-3rd-Edition.pdf

80 Article 71(6)(a) of Directive 2014/24/EU; Article 87(6)(a) of Directive 2014/25/EU

Post-occupancy evaluation

Particularly in the context of constructing buildings, or any other infrastructure that will be occupied for their use, a post-occupancy evaluation (POE) can provide a valuable exercise of identifying those things that work(ed) well and those that did/do not. A POE should be conducted after sufficient experience could be gathered, such as minimum one year.[81]

A POE focuses commonly on the management process, and the functional and technical performance of the infrastructure. The POE overall consists of:

- Data collection to evaluate the actual performance against the intended design,
- Interviews to gather views on the user experience of the infrastructure, and
- Interviews with the detailed designers to evaluate the performance of the infrastructure.

A POE can help to improve the sustainability of the existing infrastructure, by improving the performance of the building against the environmental and social criteria defined for the infrastructure in question. A POE can however also be a useful learning exercise for project stakeholders (particularly project owners and procurement professionals), through which future procurements processes as well as future project designs and specifications can be improved. In the context of this guidance, a POE can thus serve as a valuable tool to increasing the institutional capacity of incorporating sustainability into infrastructure procurement.

3.3.1.3. Monitoring the construction

Induction on environmental and social criteria

To ensure that all workers on a construction site are aware of the environmental and social ambitions for the construction, it can be considered to conduct an induction for all workers. The induction can be used to train workers on the applicable environmental and social provisions, as well as raise workers' awareness on for example security management, community engagement, complaint or whistle-blower mechanisms, or grievance mechanisms.[82]

Execution of the monitoring

Throughout the construction the contractor is obliged to monitor the environmental performance of the construction in accordance with the monitoring framework. In some cases performance parameters have to be tested continuously for complying with environmental requirements to be claimed after the construction. To enable proper monitoring throughout the construction, the steps indicated in the framework such as reporting, and audits need to be planned and executed. A clear understanding on the performance requirements as well as the transparency of contractors and subcontractors throughout the entire supply chain are prerequisites to make the monitoring of social and environmental performance possible

Operationalised on a construction site this can be done by monitoring the following factors as proposed in the JRC's best environmental management practice for the building and construction sector[83]: (1) Proper site preparation to take account for e.g. water management and drainage; (2) monitoring the impacts of earth work; (3) ensure proper disposal and recycling of construction and demolition waste (as done in the case of the Grand Paris express with 99% of the waste concrete to be recycled); (4) take account for the environmental impact of pre-fabricated elements; (5) take account for the high CO_2 emissions of cement and enable

81 https://ec.europa.eu/environment/gpp/pdf/Guidance_Buildings%20final.pdf

82https://www.ifc.org/wps/wcm/connect/87197a95-1b7f-4f57-ac1e-ee961730ce4d/p_GPN_ESContractorManagement.pdf?MOD=AJPERES&CVID=mR5DVaJ

83 https://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/inline-files/ConstructionSector.pdf

replacing cement with recycled materials (as done in the case of the Grand Paris express, by using 70% low-carbon concrete) (6) monitor the use of machinery and equipment in terms of emissions and noise; (7) Monitor health and safety for workers in e.g. handling hazardous substances and monitor health risk to people close to the construction.

Box 13 Sustainability in the construction of one of Europe's largest transport infrastructure projects

Description

Between 2020 and 2030 large scale transformations to public transport infrastructure are taking place in the Capital Region of France. The ambition, expected to be realised by the construction of the Grand Paris Express, is to curb urban sprawl, promote mixed use of space, and encourage sustainable travel in the region.

A Public Agency was created for the sole purpose of delivering the vision of the Grand Paris Express. The Société du Grand Paris advertises procurement opportunities relevant for both SMEs and multinational corporations.

The total budget amounts to just over €35 billion (at 2012 prices). To date, €3 billion have been invested to start the work in the form of loans granted by the French *Caisse des Dépôts* and the European Investment Bank.
As a reflection of its robustness and long-term vision, Moody's Agency assigned the Aa2/Prime-1 rating to the Société du Grand Paris, on a par with France's sovereign rating, thereby highlighting the strong operational, strategic, and financial bonds between the two.

Objective

The Grand Paris Express is ostensibly a transport infrastructure project but is foreseen to have wider positive impacts on the region. The main ones are as follows:

- Environmental – support citizens to transition away from private vehicles towards the use of public transport.
- Employment – 115,000 direct jobs in addition to those created by regional growth supported by the Grand Paris Express.
- Economy – It is expected that this project will contribute €100 billion to the regional economy.
- Land Development – this project will advance the mixed use of land in the region, both developing transport and housing – including social housing.

Environmental impacts

As this is an ongoing project, the impacts are defined either as modelled outcomes, or the impacts of work carried out so far. These fall into categories ranging from societal (access to public transport), to environmental (noise and odour pollution reduction).

- Sustainable Mobility – to make transport equally accessible for all and increase provision in previously isolated areas.
- Prevention/Management of Environmental Pollution – employ a dedicated environmental manager, ensure compliance with legislation and adopt a precautionary approach to sensitive areas.
- Longevity – design and build infrastructure to last.
- Circular Economy – with a focus on spoil and C&D waste arising from the project, introducing projects to encourage reuse, recycling and the reduction of waste.

Key takeaways

This project is a clear example of how environmental and social outcomes can be brought to prominence in any type of infrastructure project. The way that improving transport infrastructure will lead to the creation of new sustainable communities in the greater Paris area where people can congregate for commuting, working, shopping and enjoying the urban environment can be used as a template for all infrastructure projects.

Beyond the way works are carried out, this project is a good example of efforts being undertaken to reduce embodied carbon in construction materials, for instance for the following aspects:

- All contractors are required to produce an ISO 14001 or equivalent compliant environmental protection blueprint to submit a tender. This blueprint becomes a contractual environmental protection plan once works begin.
- Each line has a dedicated environmental manager, and each worksite has environmental requirements associated with it.
- Where appropriate, certain lines have forestry offsetting targets to compensate for the planned land clearing of some working sites.
- Significant effort is made to recycle Spoil into aggregate and reduce the overall amount of Spoil waste produced by reusing it across the project. Three current Spoil projects have the potential to recycle 530,000m^3 of spoil.
- There is capacity for 99% of waste concrete to be recycled. This is of a total of 10,000T of concrete waste.
- 70% of the project will be constructed with low-carbon concrete. Concrete currently accounts for 50% of the 4.5m T of CO_2 produced by this project.
- There is a 70% target for bio-based or geo-based building construction materials to be used.
- For some tenders there were requirements for the use of wood and other bio-materials.
- Social and Environmental criteria have been incorporated into the choice of internal service providers.
- There has been Zero Waste to Landfill to date, with 53% of waste being recycled and the remaining being sent for Energy from Waste.

Relevant links

- https://www.societedugrandparis.fr/
- https://media-mediatheque.societedugrandparis.fr/medias/domain1/media623/94153-vbawky8jj1.pdf?_gl=1*o6tdyi*_ga*MTM0MjQxODU3Ny4xNjUzODk2MTg5*_ga_6541VBRHTX*MTY1NDAxNzIyNS40LjEuMTY1NDAxOTg2OC4w.

Reviewing the monitoring reports

The contractor should be required to produce regular implementation reports that give a status on the agreed environmental and social indicators. The project owner (or a delegated third party) should immediately review these reports to identify any potential non-compliance with the performance requirements and ensure timely follow up by the contractor.

If the review of the implementation reports gives rise to concerns about repeated non-compliance or a significant risk of environmental or social impacts, the project owner should consider an immediate halt of the construction operations and ensure that any such concerns are sufficiently mitigated prior to presuming the construction.

Construction site visits

The frequency of site visits should be proportionate to the to the environmental and social risks associated with the activities of the construction phase. The frequency of site visits can thus also alternate by type of activity. If the construction could however lead to severe adverse environmental impacts, a permanent presence of a project owner representative should be considered.

Payment schedule

As also presented on the set up of the monitoring system, the payment schedule should be connected to environmental and social key performance indicators. When the contractor issues invoices, the delegated manager for the environmental and social considerations should be part of the sign off process. The delegated manager should critically review whether the activities associated with the payment can be considered fully compliant with the associated KPIs, or whether there is a justification to withhold (part of) the payment. If concerns are

identified, the dialogue should be sought with the contractor on how timely action can be ensured to achieve compliance with the key performance indicators in question.

3.3.2. Available guides, frameworks, tools, references, and standards for support in the construction phase

The following table provides additional examples of tools and methods which may be useful to support the construction phase.

Table 2 Available guides, frameworks, tools, references, and standards for support in the construction phase

Tool and methods	Owner	Description	Link
EU Taxonomy Compass	European Commission	The EU taxonomy Compass provides guidance to identifying, which economic activities can be considered to be sustainable, by making a substantia contribution to one of six environmental objectives, while simultaneously ensuring no significant harm on the other five environmental objectives. Only infrastructures that are “taxonomy aligned” can be considered as sustainable. The taxonomy compass can serve as reference for the development of performance indicators.	Here
Green Public Procurement Criteria for Office Building Design, Construction and Management	JRC	The development of GPP criteria for Office Building design, construction and management aims at helping public authorities to ensure that projects are procured and implemented with higher environmental standards. The aim of this document is to provide simplified guidance to procurers, estate managers and project teams on how to procure an environmentally improved office building. The guidance has been structured to reflect the distinct phases of activity that may be involved, as well as the most common forms of contracts that are used.	Here
EU Eco-Management and Audit Scheme (EMAS)	European Commission	The EU EMAS is a management instrument to evaluate, report, and improve the environmental performance of companies. The instrument is a well-established and “standard” tool that secures effective and recognised environmental management.	Here
Best environmental management practice for the building and construction sector	JRC	As part of the JRC's sectoral reference documents (SRD) the following guidance provides best environmental management practices and sector-specific performance indicators.	Here

3.4. Use

Guidelines for contract monitoring after sustainable infrastructure projects have been awarded and interaction with suppliers of sustainable infrastructure projects related to the use of the infrastructures will be presented in this section.

3.4.1. Scope and rationale

As for the construction phase, the use of infrastructure is bound to the contractual conditions defined during the tendering phase, if the use phase is encompassed by e.g. a design, building

and operate contract[84]. If the use phase is not included in the contractual conditions, the elements of this section do not apply to procurements procedures. Nevertheless, this section can provide inspiration for relevant attention points when the use of an infrastructure is in the hands of a public authority. Similarly, a strong monitoring and evaluation system is therefore the main attention point. Use should in this context be understood as using the provided infrastructure by a party without possessing ownership of the asset. This could for example comprise tenants of a building, and the way they use the building passively without technically operating or maintaining it. In the procurement phase certain conditions and prerequisites to the use of infrastructure can be included (in an operating contract). This responds to the need of ensuring that not only the construction, maintenance/operation and end of life aspect are considered, but also all the aspects influencing the overall sustainability by those benefitting from the infrastructure are adequately addressed.

In the abovementioned specific case example of tenants of a rental home, this can for instance include the following considerations:

- Use of highly energy efficient electric appliances in the apartment
- Use of water saving appliances in the apartment
- Use of furniture manufactured according to circularity aspects or sustainability labels (e.g. FSC certified wood) in the apartment
- Use of noise reduced appliances in the apartment
- Actively monitoring efficient heating/cooling practices in the apartment
- Social considerations applied to the mentioned case example can e.g. comprise:
- Safe use of the apartment in terms of health & safety considerations. This could for instance pertain to the inbuilt equipment of the apartment and building and safe installation of electrical appliances like lights and ovens.
- Stakeholder engagement of the tenants to support each other in EMS schemes and sustainability aspects
- For the use of infrastructure, three main aspects are relevant to consider:
- Setting up the monitoring system,
- Monitoring the use of infrastructure, and
- Evaluating the use of infrastructure.

3.4.2. Critical considerations in a sustainability context

3.4.2.1. Setting up the monitoring system

To be able to comply with the social and environmental performance criteria defined in the contract for the use phase, it is important to define the right set of monitorable indicators. As mentioned before are environmental management systems an integral part of monitoring the sustainability of economic operations. Environmental management and auditing schemes such as EMAS can proof useful to monitor aspects such as energy consumption, water consumption

84 Guidance_Buildings final.pdf (europa.eu)

and use of appliance incorporating sustainability prerequisites. The Eco-design directive and eco-design criteria e.g. rating the energy efficiency of electric appliances can be used to define indicators for users. Likewise, The JRC's sectoral reference documents (SRD) include guidance on best environmental management practices and sector-specific performance indicators.

Also, the European Framework for the Buildings Sector "Level's"[85] as further down described in Box 14 can prove useful in setting up a monitoring system. Level's approach addresses the complete lifecycle of buildings, including parameters such as the energy and water consumption or health and comfort in the use phase of the building. The framework can therefore help to both define prerequisites for the use of infrastructure already in the procurement phase, as well as defining monitoring indicators.

Box 14 Level(s) is a European framework for the building sector

Description

Level(s) is a European framework for the building sector. It is an instrument to assess and report the sustainability performance of buildings in the context of circularity. Level(s) is a simple entry point for stakeholders to apply sustainable practices in the built environment.
There are different ways to assess the sustainability performance of buildings. Level(s) therefore supplies a common language for building processes, which corresponds to all other sustainable initiatives of the European Union. By considering and uniting the output from different initiatives, Level(s) simplifies the assessment of sustainability performance of buildings and building transformation processes. Level(s) provides this common language by incorporating six macro-objectives. These objectives are tracked by sixteen indicators in total. The indicators ensure that the building process is aligned with the objectives of EU policies.

Objectives

- By developing a common language for better sustainable building performance, Level(s) aims to unite the entire value chain.
- Level(s) aims to maximally reduce emissions in the building sector by addressing the complete lifecycle of buildings.
- Level(s) aims to increase efficiency and circularity of resource flows by addressing the complete lifecycle of building.
- Level(s) aims to support all stakeholders involved in the building process of sustainable buildings, like built environment and sustainability professionals, policy makers, procurers, and public authorities, as well as investors, property owners and landlords.
- Levels(s) aims to simplify cooperation between actors within the building sector.
- Level(s) has been developed in collaboration with public authorities, planners, developers, architects, designers, investors, clients, construction firms and product manufacturers, in order to develop a holistic instrument.

Tools based on the framework

The project has produced the following tools:

- The project developed an eLearning course, which provides a detailed overview of the framework. The eLearning supports anyone to prepare for using Level(s) in their own working environment. The course explains the concepts used within Level(s) and provides practical advice on how to implement these principles. The target audience for this course is Built environment and sustainability professionals; Policy makers, procurers, and public authorities; and Investors, property owners, and landlords.
- Level(s) developed a Calculation and Assessment Tool (CAT). This tool helps users to complete their sustainability performance assessments and is thus relevant for anyone applying Level(s) in the building process.

85 https://ec.europa.eu/environment/topics/circular-economy/levels_en

- Three manuals where developed, which contain all information needed to apply Level(s):
  - Manual 1 introduces Level(s). The manual explains for which stakeholders it is useful and summarises how to use Level(s).
  - Manual 2 provides an explanation on how to apply the Level(s) methodology to a project.
  - Manual 3 offers more detailed instructions and advice in terms of the different performance indicators within Level(s).
- Lastly, documentation on the benefits of Level(s) for each different stakeholder type was developed.

Environmental impacts

The expected environmental impacts of Level(s) are:
Reduce and minimise the whole life carbon output of building processes. This not only includes embodied energy within the building, but also energy consumption during the use phase of the building.
Increase the efficiently of water use. This applies especially to areas where long-term or expected water stress has been identified.

Key takeaways

By providing a common sustainability language for the built environment, Level(s) supports users in their alignment with already existing assessment and certification schemes.
The framework can help authorities in their choice of monitoring indicators, e.g. resource use and health also with regards to the use phase.
Level(s) supports a wide range of stakeholders within the building process, like public authorities, policymakers, and procurers, in monitoring the environmental and economic impact of building processes in terms of resource use and environmental performance, health and comfort, and cost, value and risk.

Relevant links

- Learn about the Level(s) project on the website here: https://ec.europa.eu/environment/topics/circular-economy/levels_en.
- The project is coordinated by the Directorate-General for Environment of the European Commission. For questions or advice on how to use Level(s), it is possible to reach out to the initiative's helpdesk (https://environment.ec.europa.eu/topics/circular-economy/levels/helpdesk_en).

3.4.2.2. Indicator framework/ Certification and labelling schemes

The development of an effective monitoring system requires balancing a set of indicators that are relevant, quantified, and comprehensive (in terms of environmental and social considerations), but not too complex or numerous. A guiding principle in defining appropriate indicators is that these should be SMART: Specific, Measurable, Achievable, Relevant, Time phased.

Developing indicators for the use phase and monitoring them can prove more challenging due to the involvement of private stakeholders having to comply with requirements. It is therefore advisable to limit the number of indicators and chose those that are easy to monitor. In the case of an apartment building this could e.g. comprise the electricity and water consumption per tenant, compared to the average consumption stated in the contractual terms. Other indicators could comprise the compliance with labelling schemes, such as the EU Ecolabe[86] or the Ecodesign and Energy Labelling[87]. The EU energy labelling requirements encompass a

86 http://ec.europa.eu/ecat/.

87https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/rules-and-requirements_en.

broad range of product groups[88] that could be relevant to monitor throughout the use phase. An indicator set could thereby e.g. require the use of electrical appliances with A/B rating only, ensuring that only energy efficient appliances are used. Apart from energy consumption the EU energy label also provides information on parameters such as water consumption or noise emissions, which could facilitate monitoring the indicators. Ecolabel-derived indicators could require the use of labelled furniture only, providing for a use of sustainable raw materials. The JRC best environmental management practice for the building and construction sector[89] recommends the inclusion of ecolabel products in the selection procedure for construction materials. Equally, requirements relevant to the use phase can be included in the selection procedure including relevant indicators for monitoring the compliance.

Energy Labels and Ecodesign are also relevant for some activities to be EU taxonomy aligned. For example, the DNSH criteria on environmental pollution for transmission and distribution networks for renewable and low carbon gases, such as hydrogen, require that fans, compressors, pumps and other equipment covered by the Ecodesign Directive[90] comply with the top-class requirements of the energy label and implementing best available technology.[91]

As also exemplified for the construction phase, the criteria of the EU taxonomy can inform target values for related indicators. For newly constructed buildings for example, the DNSH criteria for water resource provide technical specifications to the maximum water flow and water flush volumes for sanitary installations.[92] These technical specifications can feed into the indicator framework to secure alignment of buildings with the taxonomy throughout the use phase.

3.4.2.3. Monitoring the use of infrastructure

As with the construction phase, monitoring only proves effective if it is enforced and if disincentives for non-compliance are in place. Monitoring can be conducted in the following way:

- Contractors can be required to submit evidence for compliance, which in the case example of tenants could comprise the electricity bill, evidence for the eco-design rating of electrical appliances.
- Contractors can be subjected to spot checks, and
- Third parties can monitor the contractor's compliance.[93]

3.4.2.4. Evaluating the use of infrastructure

Similar to the POE presented under the construction phase, it can be relevant to evaluate the overall sustainability impact that has materialised during the use of the infrastructure. In contrast to a POE, such an evaluation should be conducted well into the use phase (e.g. half-

88 Such as: Lighting; Heaters; Refrigeration; Vacuum cleaners; Washing machines and driers; Air conditioners and fans; Electronic displays and TV boxes; Kitchen appliances; Pumps; Transformers and converters; computers and servers; Imaging equipment; Game consoles, Electric motors; Off mode standby and networked standby; Welding equipment.

89 ConstructionSector.pdf (europa.eu).

90 Directive 2009/125/EC.

91 Activity 4.14 - Transmission and distribution networks for renewable and low-carbon gases, https://ec.europa.eu/sustainable-finance-taxonomy/activities/activity_en.htm?reference=4.14.

92 Activity 7.1 – Construction of new buildings, https://ec.europa.eu/sustainable-finance-taxonomy/activities/activity_en.htm?reference=7.1.

93 https://ec.europa.eu/environment/gpp/pdf/Buying-Green-Handbook-3rd-Edition.pdf.

way or close to the end of the expected lifetime). Such a process can prove beneficial to evaluate (i) whether the use phase led to the sustainability impacts that were anticipated, and (ii) how the infrastructure performed against the expected lifetime. The gathered insights can be then used as lessons learnt for subsequent projects.

The evaluation should thus focus on the sustainability performance of the infrastructure and the technical performance of the infrastructure against its lifetime. Accordingly, the evaluation should consist of:

- Data collection to evaluate the actual performance against the intended design and any defined indicators,
- Interviews to gather views on the user experience of the infrastructure, and
- Interviews with the detailed designers to evaluate the performance of the infrastructure.

If the infrastructure was not specifically designed with a sustainability objective in mind, the sustainability criteria as defined by the EU taxonomy can be used as a point of reference to evaluate against. Using this reference can provide the basis for a gap analysis and identify which marginal improvements are required for a subsequent upgrade to qualify as environmentally and socially sustainable.

Finally, the evaluation should also consider whether there are any unintended spillover effects on the environmental and social aspects of the context, such as impacts on greening and inclusivity of mobility and transport networks.

3.4.3. Available guides, frameworks, tools, references and standards for support for the use phase

Table 3 Available guides, frameworks, tools, references and standards for support for the use phase

Tool and methods	Owner	Description
EU taxonomy Compass	European Commission	The EU taxonomy Compass provides guidance to identifying, which economic activities can be considered to be sustainable, by making a substantia contribution to one of six environmental objectives, while simultaneously ensuring no significant harm on the other five environmental objectives. Only infrastructures that are “taxonomy aligned” can be considered as sustainable. https://ec.europa.eu/sustainable-finance-taxonomy/tool/index_en.htm
EU Energy Label and Ecodesign	European Commission	Ecodesign sets common EU wide minimum standards to eliminate the least performing products from the market. The energy labels provide a clear and simple indication of the energy efficiency and other key features of products at the point of purchase. This makes it easier for consumers to save money on their household energy bills and contribute to reducing greenhouse gas emissions across the EU. https://ec.europa.eu/info/energy-climate-change-environment/standards-tools-and-labels/products-labelling-rules-and-requirements/energy-label-and-ecodesign/about_en
EU Eco-Management and Audit Scheme (EMAS)	European Commission	The EU EMAS is a management instrument to evaluate, report, and improve the environmental performance of companies. The instrument is a well-established and “standard” tool that secures effective and recognised

		environmental management. https://ec.europa.eu/environment/emas/index_en.htm
EU Ecolabel Product Catalogue	European Commission	The EU Ecolabel covers a wide range of product groups, from major areas of manufacturing to tourist accommodation services: http://ec.europa.eu/ecat/
Level(s) European framework for the building sector	European Commission	It is an instrument to assess and report the sustainability performance of buildings in the context of circularity: https://ec.europa.eu/environment/topics/circular-economy/levels_en .
Best environmental management practice for the building and construction sector	JRC	As part of the JRC's sectoral reference documents (SRD) the following guidance provides best environmental management practices and sector-specific performance indicators: https://susproc.jrc.ec.europa.eu/product-bureau/sites/default/files/inline-files/ConstructionSector.pdf .

3.5. Maintenance and operation

3.5.1. Anticipating Impact

During the maintenance and operation of infrastructure there will invariably be both impacts on the environment and society. Something that is frequently referenced in relation to this guidance is how for public procurers, measurement and data can be two key elements to the successful embodiment of sustainability by new infrastructure projects. In that sense, anticipating impact or, in other words, quantifying the expected results, can be a vital tool for procurers, project managers and contract managers as well as contractors. Impacts will range from employment opportunities, gender equality, contribution to climate change mitigation, contribution to the transition to the circular economy and contribution to the protection and restoration of biodiversity and ecosystems.

Here, data and the ability to quantify aspects of the project's environmental and social impacts are key to being able to anticipate the impact. Tools and standards provide a common basis for comparison both between competing projects, but also between a single project's anticipated and actual impacts. These can include:

- The CO2 Performance Ladder[94]
- DuboCalc[95]
- The International Cost Management Standard[96, 97].

It may be beneficial to use tools like these for the award criteria. The use of such a tool will calculate an expected impact of a project. This theoretical calculation can then be compared to the actual impacts when measured after construction during the use maintenance and operation, and use phases.

94 https://www.co2-prestatieladder.nl/en.

95 https://www.dubocalc.nl/en/.

96 https://icms-coalition.org/.

97 https://icmscblog.files.wordpress.com/2021/11/icms_3rd_edition_final.pdf.

Appropriately developed contract documents can give project and contract managers mechanisms to remedy deviations from the project plan related to impacts. This can only be done if the correct data is collected and evaluated. A theme from this project's interview stage was the desire of Procurers and suppliers alike need to be able to have access to meaningful quantitative data related to infrastructure projects. This is just as crucial in the context of anticipating impact as in any other stage.

3.5.2. Accounting for maintenance and operational impacts at tendering stage

The preparation for tendering phase is the main opportunity that you as procurers have to set your own expectations of how the project will deliver on the functional needs of the organisations, and its wider sustainability, social, environmental objectives. Included within this stage should be due consideration to how the piece of infrastructure will deliver through its lifetime. For construction and infrastructure projects, given the likely lifecycle of a structure, the lifetime impacts are likely to contribute a substantial amount to the overall project impacts because the operational life is so much longer than the time over which the building is constructed.

The outcomes of this project's interviews indicated that this stage of the cycle is where the lowest number of stakeholders have encountered barriers, and correspondingly perhaps, there is the least amount of guidance to support procurers through it. However, taking the maintenance and operational impacts into account at the tender stage sets the scene for good social and environmental outcomes.

As with other stages of procurement covered in this guidance, the importance of setting up an opportunity to deliver environmental and social targets cannot be understated. In defining functional needs and assessing sustainability impacts, the use phase should also be considered.

3.5.3. Creating accountability

Sustainability is too important a topic to be allowed to fall by the wayside. As such, commitments made by the successful bidder, its consortium, or its subcontractors in the successful bid must be monitored, reviewed, approved, and, if failing, rectified.

As with many elements of procurement, the contractual mechanisms that will support the contracting authority to enforce its sustainability objectives will be defined in the pre-procurement and procurement phases. With a negotiated procedure, these dialogue stages with bidders are prime opportunities to present proposed payment and performance mechanisms, discuss how they relate to wider objectives, and adapt them if necessary. Once the contract has been awarded it is already too late to consider the key measurements for success.

In this sense, Key Performance Indicators (KPIs) should be developed in conjunction with the project specification and the other criteria by which a successful project will be measured.

In the same way that identifying the functional needs of a project is unlikely to be carried out by the procurement department, the responsibility for determining measures for success and who is accountable to deliver that success will not typically be with procurers of infrastructure projects. They Procurers will need to collaborate closely with and maybe even challenge

technical/user departments to develop a set of KPIs and other metrics which are appropriate to the project.

Many of the impacts which sustainable procurement aims to address will only arise during the delivery of a contract – particularly for services and works. The gains from sustainable and innovative procurement can often only be realised if they are reflected in the way a contract is performed and managed. Often this may fall outside of the immediate role of those who have awarded the contract, so it is important that two elements are considered in advance:

- The first is the use of robust terms and conditions which address the specific sustainable procurement/PPI aspects of a contract and provide for effective remedies if they are not delivered. For example, in a construction contract you may wish to include conditions relating to the employment of apprentices, management of resources and waste on site, transport and noise. Such terms should be highlighted in your tender documents, to ensure that bidders have provided for any associated costs or planning requirements. The 2014 Directives' rules on contract performance clauses are not as prescriptive as those which apply during the procurement process itself, however they must be linked to the subject matter of the contract and cannot be subject to substantial changes during the term of the contract.
- The second is a realistic appraisal and allocation of the time and resources which will be available to monitor performance. Specific individuals should be given the responsibility of making sure each requirement is met. For bigger purchasing bodies this function may sometimes be contracted out to a specialist external organisation. Social, environmental and innovation aspects of contracts can be complex and require an ongoing dialogue with the appointed contractor, to ensure you are realising your objectives.

A carefully drafted contract and, where appropriate, service level agreement, will help to allocate responsibility and any risk associated with non-performance. Many public authorities have standard terms and conditions which allocate most of the risk associated with contracts to the supplier, but you should consider whether these are appropriate if you really want to encourage innovation or better environmental, economic, and social performance. For example, if you want a contractor to actively contribute to your organisation's target for CO_2 reductions, you need to have clear contractual provisions and define how outcomes will be measured. The incentives or penalties which will apply under the contract should also reflect your sustainability and innovation goals.

3.6. End of life

Guidelines for contract monitoring after sustainable infrastructure projects have been awarded and interaction with suppliers of sustainable infrastructure projects involved in the end of life of the infrastructures are presented in this section.

3.6.1. Scope and rationale

The end-of-life stage of the procurement process is often overlooked, yet it is fundamental when considering sustainable procurement in its totality. Particularly in the construction sector, the end-of-life opportunities for maximising the potential of used materials is huge.

Until now, the end-of-life management of most worksites is characterized by open-loop material systems. Closed-loop systems with full materials recovery do not exist at present, due

to a lack of technology, poor product design, thermodynamic reasons, and a lack of adequate economic incentives.

The end-of-life stage overlaps with all other stages of procurement, notably the tendering phase. From the outset, public authorities can choose to include specific selection or award criteria as well as contractual provisions related to a sustainable end of life management. This can range from requiring bidders to work with recycled materials (selection or award criteria) or to introduce rigorous maintenance requirements (contractual provisions) to ensure the longevity of the building in the construction sector. Public authorities should require bidders to present credible life-cycle assessments, waste audits or end-of-life management plans.

The end-of-life stage involves three main processes:

- End-of-life strategy and assessment of reuse, disassembly, and recycling opportunities
- Consideration of disposal and site clearance costs
- Life-cycle assessments taking into account the end-of-life.

When considering end-of-life strategies, bidders should favour activities that can make a substantial contribution to climate mitigation, circularity and environmental pollution based on the latest version of the Taxonomy. Notably, the assessment of end-of-life should be based on established practice and infrastructure rather than 'speculative or under development'. Also, there must be a stronger relation between design phase and end-of-life, as the former is largely defining the possibilities during the latter.

3.6.2. Critical considerations in a sustainability context

3.6.2.1. End-of-life strategy and assessment of reuse, disassembly, and recycling opportunities

Tenderers should ensure that a sufficient weighing is attributed to the presentation of the end-of-life strategy and reuse, disassembly and recycling opportunities for the contract. At the outset, bidders should present convincing **pre- deconstruction/demolition waste audits and or waste management plans** to clearly determine what can be reused, recovered or recycled. To the extent possible, it should be possible to determine whether the choice of materials and techniques allow for easy end-of-life management. Several public organisations have experimented with different tools, guidelines and certificates to correctly assess the demolition and waste audits presented by bidders. The recommended content and process for preparing waste audits is further detailed in the European Commission's Guidelines for the waste audits before demolition and renovation works of buildings (2018).

The Austrian standard ÖNORM B3151 developed a list of C&D materials that need to be removed from the building before demolition, and which are used by various Austrian public authorities for building work. Likewise, the Dutch authorities issued an official certification scheme for qualitative demolition processes (BRL SVMS-007, See also Box 21 and Table 5). It follows four key steps[98]:

98 European Commission, Guidelines for the waste audits before demolition and renovation works of buildings (2018). Available at: https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwinjMLLrKX5AhUGgRoKHZolBiIQFnoECDoQAQ&url=https%3A%2F%2Fec.europa.eu%2Fdocsroom%2Fdocuments%2F31521%2Fattachments%2F1%2Ftranslations%2Fen%2Frenditions%2Fnative&usg=AOvVaw2tvcn_NTCNiJ8kmSadDd6k

- Step 1 Pre-demolition audit: The demolition contractor carries out an advanced inspection of the demolition project and an inventory of the materials (hazardous and non-hazardous) to get insight into the nature, quantity and any contamination of the extracted demolition materials. An inventory is made of the risks to occupational safety and safety risks to the surroundings.
- Step 2 Waste management plan: A waste management plan is drawn up that includes a description of the method of selective demolition and environmentally-friendly demolition, processing and removal of released material flows, safety measures that have to be taken and implementation requirements of the customer.
- Step 3 Execution: The execution of the demolition occurs in accordance with the waste management plan. Experts in the area of safety and environmentally-friendly demolition are involved and certified demolition contractors work with approved equipment. The demolition contractor must ensure that the demolition location is safe and well organised and that the released material flows do not contaminate the soil and the surroundings.
- Step 4 Final report: The delivery of the project takes place in consultation with the involved parties. A final report of the released demolition materials is drawn up by the demolition contractor, and it is supplied to the customer upon request.

As concerns demolition activities, the bidder might include references to the **EU Demolition and Construction Waste Protocol** or a national equivalent and specify the percentage of waste (by weight) that might be prepared for reuse of recycling. However, before considering end-of-life, bidders should always indicate their preference for eco-design processes and explicitly recognise that most of the environmental impacts occur at the initial design stage.

The EU Demolition and Construction Waste Protocol is also relevant in the EU taxonomy context, as the DNSH criteria on circular economy for, among others, some transport infrastructures require the reuse, recovery, and recycling of demolition waste in line with the above protocol.[99] Accordingly, to ensure taxonomy alignment of projects, it is important to review whether the EU taxonomy prescribes specific end-of-life requirements that should be added to the project specification. Any end-of-life requirements are, if applicable, specified under the environmental objective of circular economy of each activity.[100]

- Bidders should be able to specify what the available take-back options are, and, if there are none, how the product can be safely disposed of anyway. Some of these might cover (but are not limited to) activities listed in the Taxonomy:
- Treatment of hazardous waste as a means for material recovery
- Recovery of bio-waste by anaerobic digestion and/or composting
- Depollution and dismantling of end-of-life products for material recovery
- Demolition of wrecking of buildings and other structures
- Sorting and material recovery of non-hazardous waste

As concerns demolition activities, the bidder might include reference to the EU Demolition and Construction Waste Protocol or a national equivalent and specify the percentage of waste (by weight) that might be prepared for reuse of recycling. However, before considering end-of-life,

99 E.g. Activity 6.14 – Infrastructure for rail transport, https://ec.europa.eu/sustainable-finance-taxonomy/activities/activity_en.htm?reference=6.14

100 https://ec.europa.eu/sustainable-finance-taxonomy/tool/index_en.htm

bidders should always indicate their preference for eco-design processes and explicitly recognise that most of the environmental impacts occur at the initial design stage.

3.6.2.2. Consideration of disposal and site clearance costs

The **disposal and site clearance costs** are an integral part of the end-of-life stage of procurement and should also therefore be accounted for. Tenderers should also assess the bidders' presentation of specific disposal and site clearance costs based on the materials used being taken into consideration. Cost calculations should be based on waste and recycling structures and markets, and bidders should specify that they will consider the latest regulatory evolutions, such as for instance landfill bans.

3.6.2.3. Life cycle assessments and End-of-Life

Bidders presenting convincing **life cycle assessments for the materials they have selected and end-of-life strategies** (or experience using such models) when presenting their overall end-of-life strategies should be rewarded in the weighing procedure. Life-cycle assessments can take into consideration the emissions arising from decommissioning, stripping out, disassembly, deconstruction and demolition operations, as well as from transport processing, preparation for reuse, recycling and disposal of materials.

End-of-Life strategies can also be important in the context of the EU taxonomy, as some activities require the existence of a waste management plan that ensures maximal reuse, remanufacturing or recycling at the end of life. This is for example the case for the DNSH criteria on circular economy for electricity, thermal energy, and hydrogen storage facilities.[101]

Public authorities, such as the Austrian Federal Railway, have developed tools that help them assess the bidder offering the lowest cost for a product or service, considering the total duration of use, including the monetized emissions costs over the whole life cycle. This tool pays specific attention to the durability (and longevity) of products so as to avoid generating replacements and unnecessary waste. It is presented in more detail in Box 15 below.

Box 15 The Austrian Federal Railways' approach to calculating environmental impacts at every step of the cycle, including end-of-life

Description

The Austrian Federal Railways (ÖBB) has developed a model in cooperation with the Technical University of Graz to calculate offer-specific environmental impacts in production, construction, operation as well as end-of-life.

Objective

The project has the following procurement objectives:

- the developed tool is used in all new ÖBB procurement projects and helps the company to fulfil regulatory requirements and further green their procurement process
- by conducting surveys with the industry, the project identified willingness of the stakeholders to pay CO_2 charges and/or to include environmental costs in public procurement
- to further raise acceptance for the approach in procurement among stakeholders, training programmes were conducted by the project.

Result

Currently, the project has produced the following results:

101 Respectively activities 4.10 – 4.12, https://ec.europa.eu/sustainable-finance-taxonomy/activities/sector_en.htm?reference=4

- The Total Costs of Ownership Model (TCO) that was previously used in the ÖBB's procurement process was adapted to include the greenhouse gas emissions of production, construction and use phase of products and services. This way tenderers are chosen that offer the lowest cost for a product or service, considering the total duration of use, including the monetized emissions costs over the whole life cycle.
- The developed model is now used in all new procurement processes of the ÖBB, e.g., when buying tracks, trains or buildings and maintaining train infrastructure elements.
- In its procurement process, the model is combined with ÖBB's supplier management system which rates suppliers according to CSR-questionnaires to be completed by suppliers.

Environmental impacts

The expected environmental impacts of the project are:
- to reduce CO_2 emissions of the production, construction and use phase of infrastructure
- to reduce the overall environmental footprint of the infrastructure, by preferably choosing durable products
- to reduce waste by preferably choosing durable products

Key takeaways

The publicly available tool (see links to relevant articles further below) that has been developed in cooperation with the Technical University of Graz could serve as an example for other public procurement entities to embed similar approaches.
Actively striving to create acceptance of industry stakeholders through training activities can pave the way to more targeted green tendering of infrastructure.
The developed calculation approach can potentially serve as an inspiration to include further environmental or social considerations and adapt the tool according to the latest regulatory developments.
ÖBB's involvement in the international sustainability initiative "Railsponsible" can lead to spin-off effects of their procurement approach.
The use of life-cycle costing, which includes the possibility to assign a cost to environmental externalities such as greenhouse gas emissions, is authorised under Art. 68 of Directive 2014/24/EU (Art. 83 of Directive 2014/25/EU). Key considerations are the transparency and objectivity of the method applied to compare life-cycle costs, and the possibility for normally diligent tenderers to produce the required data with reasonable effort. Provided these safeguards are respected, life-cycle costing tools can make an important contribution to sustainability in public tenders.

Relevant links

- The relevant article written by the developers Matthias Landgraf (University of Graz) and Sven Schirmer (ÖBB) including the description of the tool can be read here: https://www.globalrailwayreview.com/article/117212/implementation-environmental-impacts-obb/.
- An article by Sven Schirmer and Matthias Landgraf published in the railway magazine ZEV can be read https://www.zevrail.de/artikel/integration-von-umweltwirkungen-im-oeffentlichen-beschaffungsprozess-am-beispiel-der.
- ÖBB's 2021 sustainability report (in German) also touching up the TCO-CO_2 tool can be read here: https://presse.oebb.at/de/dam/jcr:6f2f5318-1b7e-4e19-9be8-338f3e5f04f2/OEBB_CSR2020_Web.pdf
- The procurement department of ÖBB infrastructure can be reached here: https://infrastruktur.oebb.at/en/partners/for-suppliers/contact-purchasing.

3.6.3. Available guides, frameworks, tools, references, and standards for support in the end-of-life phase

The following table provides examples of tools and methods which may be useful to support the end-of-life phase.

Table 4 Available guides, frameworks, tools, references, and standards for support in the end-of-life phase

Tool and methods	Owner	Description
EU Construction and Demolition Waste Management Protocol	European Commission (2016, to be updated from 2023).	This guidance document was produced by the European Commission together with industry and Member State representatives. As well as providing guidance it includes good practices from across the EU, a glossary of definitions and a checklist for practitioners. https://ec.europa.eu/growth/news/eu-construction-and-demolition-waste-protocol-2018-09-18_en
Guidelines for the waste audits before demolition and renovation works of buildings	European Commission, 2018	This document provides guidance on best practices for the assessment of construction and demolition waste streams prior to demolition or renovation of buildings and infrastructures, called "waste audit". The aim of the guidance is to facilitate and maximize recovery of materials and components from demolition or renovation of buildings and infrastructures for beneficial reuse and recycling, without compromising the safety measures and practices outlined in the European Demolition Protocol. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwinjMLLrKX5AhUGgRoKHZolBiIQFnoECDoQAQ&url=https%3A%2F%2Fec.europa.eu%2Fdocsroom%2Fdocuments%2F31521%2Fattachments%2F1%2Ftranslations%2Fen%2Frenditions%2Fnative&usg=AOvVaw2tvcn_NTCNiJ8kmSadDd6k
Whole life costing tool for construction work projects	Zero Waste Scotland (2015)	A whole life costing spreadsheet tool that assists users in evaluating a construction project from inception to demolition using an appraisal and comparison of alternative solutions. The tool can be used for new builds, major refurbishments, or to consider discrete elements such as roofing or glazing. https://www.zerowastescotland.org.uk/construction/whole-life-costing
Guidance document on public procurement of circular construction materials	Big Buyers Initiative, 2016	A project in which eight working group members have conducted pilot projects on circular construction or demolition of infrastructure or buildings, addressing different challenges to circularity of construction materials across the value chain. This document presents some of the best practices learned. https://bigbuyers.eu/fileadmin/user_upload/Materials/BBI-CCM-lessons-learned.pdf
A guide on how to include aspects of sustainability in public procurement procedures for financial cooperation projects	ICLEI and KfW (2016)	This toolbox gives a comprehensive overview of the methods, instruments and aids which can be used to include sustainability criteria when placing orders, as well as strategies for their implementation. Due to the large number of partner countries, sectors and types of projects involved in FC, the concepts and methods presented should be viewed as a list of possibilities that need to be further refined and adapted to the relevant sector and country. The concepts and methods for the implementation of sustainable procurement contained within the toolbox are described for the various phases of a tender procedure and are supplemented with practical examples. These phases include the planning phase, the pre-qualification or pre-selection of bidder's phase, the evaluation phase, and the contractual provisions (incl. contract management) phase. Although the toolbox focuses on the water, wastewater/waste management, (renewable) energy sectors, as well as transport and communications, the methods and concepts presented can equally be applied to other sectors. https://ec.europa.eu/environment/gpp/pdf/Buying-Green-Handbook-3rd-Edition.pdf

3.6.4. Relevant examples of good practices for end-of-life management

The following table provides examples of best practices which may be useful to support the end-of-life phase.

Table 5 Relevant examples of good practices for end-of-life management

Good practice	Description
Gothenburg, Sweden – Procurement requirements for circular flows in the construction and demolition process	The city led a study on how the city could reduce the amount of destruction and demolition waste it produces. It developed a gap analysis between the current situation and the scenario for the year 2030. Based on the gap analysis, the city drew up concrete requirements to be included in the procurement process for future construction projects. These included: • Setting requirements for how a product should be dismantled in the future, targeting manufacturers and contractors. • Developing material inventories for rebuilding and demolition projects: this should occur in the feasibility study of a project and the materials should be classified according to their recycling potential. • Setting requirements for circular waste management https://goteborg.se/wps/wcm/connect/43e6c096-61d3-43d4-ad62-83d820a21012/Förutsättningar+och+rekommendationer+för+praktiskt+genomförande+Forsen%2C+Kjellgren+Kaminsky%2C+DGE+2019.pdf?MOD=AJPERES
Construction of a new gymnasium and deconstruction of a building including the old gymnasium and a disused swimming pool at Le Dantec high school, in Lannion (Brittany) (2020)	In its contract preparing the deconstruction of an old gymnasium, the Region had three main objectives: • Recycle the concrete by tiling the deconstruction materials for other public construction • Identify the needs of the material storage platform to promote the reuse of concrete • To work on the structuring of the sector as well as on a mapping of the actors who can take charge of construction operations in Brittany. In particular, the deconstruction program was drafted within the framework of the obligation to carry out a preliminary waste diagnosis, which was based on the work of a specialized project management firm. This diagnosis consisted of "a precise estimate of the types and quantities of materials present in the structure, the potential for reuse as well as the follow-up of the deconstruction work/recovery of materials". https://www.achatpublic.info/sites/default/files/document/documents/_commande_publique_et_economie_circulaire_dans_le_secteur_du_batiment_reseco_-_decembre_2020.pdf
Tracimat – Belgian Construction & Demolition (C&D) waste tracking	Tracimat is a non-profit, independent demolition management organization recognized by the Belgian public authorities that issue “certificate of selective demolition” for a specific C&D material that has been collected selectively at the demolition site and subsequently gone through a tracing system. The demolition certificate shows the processor whether the C&D material can be accepted as "low environmental risk material" which means that the purchaser (recycling plant) can be quite sure that the C&D material meets the quality standards for processing at the recycling plant. Tracimat does not issue a certificate of selective demolition until the waste has gone through the traceability system. The tracing process starts with the preparation of a demolition inventory and waste management plan prepared by an expert prior to the selective demolition and dismantling work. To guarantee the quality of the demolition inventory and waste management plan, they must be prepared according to a specific procedure. Tracimat will check the quality of the demolition inventory and waste management plan and issue a declaration on its conformity. Tracimat checks whether both the hazardous waste and the non- hazardous waste that complicates the recycling of the specific demolition C&D material, have been

Good practice	Description
	selectively and properly disposed of. Tracimat initially focused on the stony fraction, which in terms of weight by far represents the greatest portion of the construction and demolition waste and will deal with other C&D materials at a later stage. https://ec.europa.eu/docsroom/documents/31521/
Dutch certification scheme for demolition processes	The BRL SVMS-007 is a voluntary (not legally binding) instrument to encourage a quality demolition process. Customers who prescribe to this certification scheme of procurement and tendering are assured of environmental and safe demolition on site. The scheme is controlled by third parties and the Council of Accreditation. The certified demolition process follows four steps: • Step 1 Pre-demolition audit: The demolition contractor carries out an advanced inspection of the demolition project and an inventory of the materials (hazardous and non-hazardous) to get insight into the nature, quantity, and any contamination of the extracted demolition materials. An inventory is made of the risks to occupational safety and safety risks to the surroundings. • Step 2 Waste management plan: A waste management plan is drawn up that includes a description of the method of selective demolition and environmentally-friendly demolition, processing and removal of released material flows, safety measures that have to be taken and implementation requirements of the customer. • Step 3 Execution: The execution of the demolition occurs in accordance with the waste management plan. Experts in the area of safety and environmentally-friendly demolition are involved and certified demolition contractors work with approved equipment. The demolition contractor must ensure that the demolition location is safe and well organised and that the released material flows do not contaminate the soil and the surroundings. • Step 4 Final report: The delivery of the project takes place in consultation with the involved parties. A final report of the released demolition materials is drawn up by the demolition contractor, and it is supplied to the customer upon request. • https://ec.europa.eu/docsroom/documents/31521
Vallis Habita, Portugal	This project involved the rehabilitation of municipal housing in Valongo. It started its activity in October 1998 and since its creation it has adopted a management concept of great proximity in the relationship with the tenants of the social housing developments under its management. Over this time it has evolved in its object and procedures, and its activity has been certified since 2009. http://www.vallishabita.net/

4. Sustainability Checklist

4.1. Introduction

Public procurement of infrastructures is an extensive process, that will incur impacts over an extended period. By supporting buyers in assessing their practices throughout the life cycle of the infrastructures, this checklist constitutes a concrete toolbox to enhance sustainability in all its components (economic, social, and environmental) and reduce potentially negative impacts. It aims at improving procurement to a process as sustainable as possible, with the lowest environmental impact and highest positive social results. It is to be noted that the process is changing and developing continuously, with the permanent development of new solutions with potential lower ecological and social footprints. The checklist applies to a wide range of infrastructures.

Given the extended lifetime of infrastructure projects, it aims at supporting an analysis of the procured infrastructure across its whole life cycle, and not only at the initial procurement stage. It is related to the latest regulatory developments and state of the art practices.

While the early stages, preparation for tendering and tendering, are very important to enhance sustainability, the checklist also demonstrates that it is possible to also influence it during other stages. It may however imply considerations at an earlier stage to encompass the impact over the whole life cycles, through for instance a life-cycle costing approach. Throughout the document, various examples are provided to illustrate how some factors can influence sustainability in the various stages. These examples show clearly how economic, environmental, and social criteria can be used effectively to enhance infrastructure sustainability.

The Sustainability Checklist is intended to be an early support tool for public buyers to support procurement practices for infrastructure projects. Given the extended lifetime of infrastructure projects, it aims at supporting an analysis of the procured infrastructure across its whole life cycle, and not only at the initial procurement stage. It is related to the latest regulatory developments and state of the art practices.

Besides this introduction, the checklist is structured around four sections:

- Essential reading and support resources. The checklist aims at supporting the procurement process in an agile way, and does not intend to duplicate existing tools, both at international and national levels. This section refers to instrumental documents for the procurement of sustainable infrastructure
- A section on the drivers for enhanced sustainability for infrastructures
- The Sustainability Checklist to public buyers, divided across the six different phases of activity
- A conclusion section.

4.2. Essential reading and support resources

Over recent years, the European Commission has published several papers and established a range of support resources to facilitate and enable Member States to effectively implement procurement, including on sustainability aspects. The scope of these resources is often far

wider than infrastructure or sustainability, and this document constitutes the first to address jointly both aspects specifically.

Further, it considers the latest regulatory developments, including the 'do no significant harm' (DNSH) principle. Readers should however be aware that there is a constant evolution of the regulatory documents, and it is thus key to refer to the latest versions of the documents while using this checklist.

Key references in that regard include the following documents:

- The EU taxonomy[102], a classification system, establishing a list and a definition of economic activities that can be considered environmentally sustainable
- The National Recovery and Resilience Facillity[103], a facility established to mitigate the economic and social impact of the coronavirus pandemic and support the green and digital transitions of the European economies. To access the loans and grants of the facility, Member States are requested to submit recovery and resilience plans
- National and local procurement regulation.

Other useful materials and references are available at:

- DG GROW 2021, Guidance on Innovation Procurement[104]
- DG ENV 2021, Green Public Procurement[105]
- World Bank 2019, Sustainable Procurement: An introduction for practitioners to sustainable procurement in World Bank IPF projects
- DG REGIO 2018, Public Procurement - Guidance for practitioners[106]
- DG ENV 2017, Public Procurement for a Circular Economy: Good practice and guidance[107]
- KFW 2014, Toolbox Sustainable Procurement - A guide on how to include aspects of sustainability in public procurement procedures for Financial Cooperation projects[108].

In addition, national and local authorities can elaborate useful procurement support guidance and tools considering the local context, and readers are invited to consult them.

4.3. Drivers for enhanced sustainability

A document review on incorporating sustainability into infrastructures through procurement has shown that the available guidance focus to the greatest extent on climate change mitigation

102 https://ec.europa.eu/info/business-economy-euro/banking-and-finance/sustainable-finance/eu-taxonomy-sustainable-activities_en

103 https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

104 https://ec.europa.eu/docsroom/documents/45975

105 https://ec.europa.eu/environment/gpp/index_en.htm

106https://ec.europa.eu/regional_policy/sources/docgener/guides/public_procurement/2018/guidance_public_procurement_2018_en.pdf

107 https://ec.europa.eu/environment/gpp/pdf/Public_procurement_circular_economy_brochure.pdf

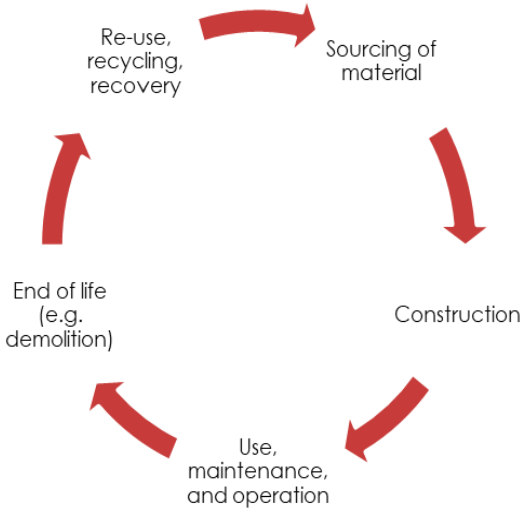
108 https://www.kfw-entwicklungsbank.de/PDF/Download-Center/PDF-Dokumente-Richtlinien/Toolbox-zur-Nachhaltigen-Auftragsvergabe-EN.pdf

and a transition to a circular economy. Other environmental areas like climate change adaptation, pollution prevention and control, water and marine resources, and protection of biodiversity & ecosystems, or social considerations, are less pronounced.

True sustainability entails however sustainability on all relevant economic, environmental, and social dimensions. Whereas climate change mitigation is a major environmental priority, an infrastructure investment is therefore also only accurately sustainable, if it at least does no significant harm on all environmental and social dimensions.

Sustainability is furthermore defined throughout the entire life cycle of an activity. Accurately sustainable infrastructures consider therefore sustainability throughout the entire life cycle, as presented in the figure below.

Figure 3 Typical life-cycle stages of an infrastructure



The EU Taxonomy builds on the two considerations above, by accounting for all relevant environmental areas and minimum social safeguards, and by accounting for the life cycle of activities. [109] Based on these principles, the EU taxonomy establishes four compliance criteria for an activity (or infrastructure project) to be considered sustainable, namely:

- the activity makes a substantial contribution to one or more of the six EU environmental objectives:
  - climate mitigation,
  - climate adaptation,
  - sustainable use and protection of water and marine resources,
  - transition to a circular economy,
  - pollution prevention and control,
  - protection and restoration of biodiversity and ecosystems
- the activity does not significantly harm any of the other five EU environmental objectives (i.e. DNSH principle);

109 Regulation (EU) 2020/852 of the European Parliament and of the Council of 18 June 2020 on the establishment of a framework to facilitate sustainable investment, and amending Regulation (EU) 2019/2088, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R0852&from=EN

- the activity complies with minimum social safeguards; and
- the activity complies with technical screening criteria.

The EU taxonomy therewith provides a comprehensive framework to incorporating sustainability considerations into infrastructure projects. The technical screening criteria to identify, which and how an activity is considered sustainable are specified in delegated acts. A delegated act for climate mitigation and adaptation criteria was adopted in 2021.[110] Annex I of the first delegated act defines the technical screening criteria for activities that seek to make a substantial contribution to climate mitigation or climate adaptation. These are further summarised in the EU taxonomy compass.[111]

A second delegated act is planned for the remaining four environmental objectives and is foreseen to be adopted in the course of 2022. A draft version of the relevant activities as well as technical screening criteria were published for consultation in summer 2021.[112] The Annex of the document entails the technical screening criteria. These may however be subject to changes upon adoption.

The EU taxonomy provides an important framework to incorporating sustainability into infrastructure projects. A review of literature on incorporating sustainability into procurement has however shown that there are still important barriers among procurement professionals.

According to the review, the environmental legislation to determine eligibility of infrastructure projects for EU funding alone (e.g. compliance with environmental legislation) cannot be regarded as sufficiently ambitious to fully incorporate sustainability considerations into public procurement.[113] Public procurement should therefore seek to define conditions that encourage applicants to go beyond the minimum of environmental legislation, for example by attaching a greater weight to environmental criteria in the assessment of offers.

The governing legislations on the assessment of sustainability impacts are further insufficiently clear, leading to a wide variability of the interpretations and quality of such assessments. The EN 15978 standard on the sustainability of construction works has for example been subject to diverging interpretations, leading to an inconsistent implementation and discrepancy of results.[114] From a regulatory perspective thus, additional guidance towards a better and more harmonious incorporation of sustainability considerations is relevant.

From a financial perspective, budget constraints across EU public authorities limit their ability to invest in new and maintain existing infrastructure. Even though sustainability can be incorporated in an ever more cost-effective way, through new innovative construction materials, technologies and processes, public authorities may still perceive these as a risky testing of new approaches.[115]

It is however not only financial aspects that drive a need for enhanced sustainability. The review has also shown that procurement professionals are confronted with knowledge barriers in defining the relevant characteristics of environmentally and/or socially preferable infrastructures and designing procurement processes that are effective in incorporating environmental and/or social sustainability considerations throughout the life cycle of the

110 COMMISSION DELEGATED REGULATION (EU) …/... supplementing Regulation (EU) 2020/852, C/2021/2800 final

111 https://ec.europa.eu/sustainable-finance-taxonomy/

112 https://ec.europa.eu/info/publications/210803-sustainable-finance-platform-technical-screening-criteria-taxonomy-report_en

113 E.g. COWI & Milieu, 2020, Integration of environmental considerations in the selection of projects supported by the European structural and investment funds

114 RICS, 2017, Whole life carbon assessment standard for the built environment

115 SCi Network, 2013, Guide – Procuring innovative and sustainable construction

project. Life-cycle performance is for example still a novel topic for many procurement professionals.[116] This may feed into the risk aversive behaviour of public buyers, who have difficulties sourcing and using verified and simple valuation methodologies and tools, or perceive these as difficult to apply. There is thus also a need of guiding procurement professionals towards the relevant attention points and the availability of simple tools in the procurement process.

The EU Commission's Recovery Plan, which has, among others, the European Green Deal at its heart and requires that public investments will respect the 'do no significant harm' (DNSH) principle, provides an important opportunity to mainstream sustainability into infrastructure and mitigating the perceived financial risk by public authorities. As also elaborated upon above however, further support to procurement professionals is needed to enable an effective incorporation of for example the DNSH principle into infrastructure investments during the procurement phase.

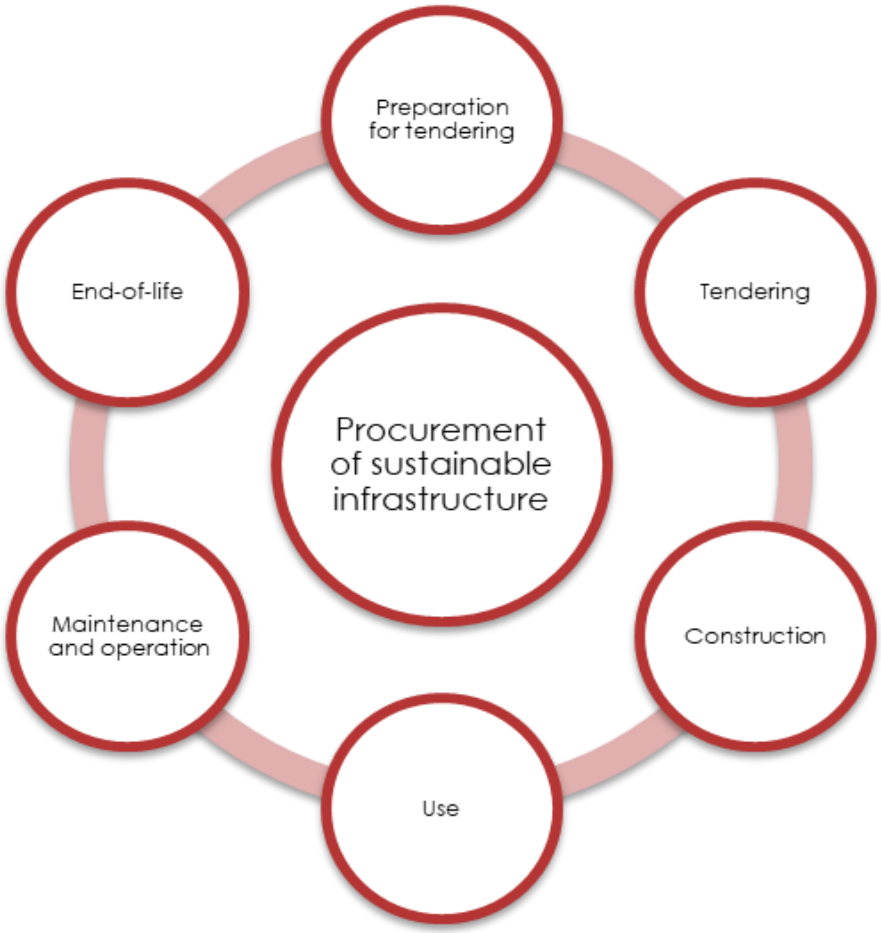
4.3.1. The Sustainability Checklist to public buyers

The objective of the checklist is to provide a comprehensive self-assessment tool, that could be used during the various phases of activity to ensure the sustainability of the procured infrastructures. It aims at being as exhaustive as possible and illustrates state of the art approaches through real examples.

When procuring such infrastructures, public buyers are invited to review their work to answer the various questions. If sustainability is appropriately taken into consideration, most or all answers should be 'Yes' or 'N/A', if irrelevant. A 'No' answer should be accompanied by a justification or a comment and should lead to an improvement.

The checklist is organised around six different phases of activity for the infrastructure, that interact between one another. The different phases are presented below:

116 ISD, 2018, Low-carbon innovation for sustainable infrastructure



When using the checklist, readers are invited to check all the elements of the different steps, as some of the elements of the checklist concerning later life-stages (e.g. use, end of life) might include considerations for earlier stages (e.g. tendering).

4.3.2. Preparation for tendering

The procurement of sustainable infrastructure requires thorough planning. Adequately preparing for tendering will significantly increase the chances of success of a project, helping the contracting authority to anticipate and reduce risks and ensure that the sustainability aspirations attached to the project can be met.

Whilst preparing for tendering, public authorities should consider the following aspects:

- Identifying needs
- Assessing and anticipating sustainability impacts
- Defining sustainability goals
- Engaging the market
- Identifying a suitable procurement route and format (e.g. lotting)
- Setting up a project team

The below checklist is designed to help procurers ensure that they consider all essential steps when preparing for the procurement of sustainable infrastructure.

Table 6 Checklist for the 'preparation for tendering' phase

Questions	Yes / No / N/A	Comment
Identifying functional needs		
Have you clearly identified the needs that the infrastructure solution which you want to procure should address?		
Have you consulted local stakeholders to confirm your needs assessment?		
Have you consulted (potential) users of the infrastructure in order to identify their needs? Have you considered in particular their accessibility needs?		
Are you sure that procuring this infrastructure solution is necessary to address these needs?		
Have you got political, institutional and community buy-in to tie social and environmental goals to the project? Have you identified your organization's social and environmental goals so as to incorporate them in the project to increase the chances of political, institutional and community buy-in for those?		
Assessing sustainability impacts and defining ambitions		
Have the likely direct environmental impacts of the project over its lifecycle been identified and estimated? In terms of environmental pollution In terms of GHG emissions In terms of biodiversity		
Have the likely direct social impacts of the project over its lifecycle been identified and estimated? In terms of employment opportunities/skills/ income In terms of public health In terms of local living costs In terms of equality/ distributional impacts (e.g. gender equality, social integration of disadvantaged groups, spillover effects on the improvement of conditions for disadvantaged persons) In terms of fostering due diligence and responsible business conduct		
Have the likely direct lifecycle economic impacts of the project over its lifecycle been identified and estimated? In terms of business and job creation In terms of GVA In terms of land and property prices		
Have you reviewed local, national and European policy and legislation to identify the minimum environmental, social and economic sustainability ambitions that the project should meet or may contribute to?		
Have you clearly identified the sustainability objectives that the procurement exercise should address? Environmental sustainability Social sustainability Economic sustainability		
Have those objectives been quantified?		
Engaging with the market		
Have you performed research about the sustainable solutions that the market can currently offer to meet your infrastructure needs?		
Have you discussed your needs and sustainability objectives with the market?		
Have you discussed the possibility of developing new solutions with your potential suppliers to better address your sustainability needs or strengthen the green and social impact of the project?		
Have you checked whether a variety of different operators (e.g. start-ups, SMEs, social businesses) have the potential to contribute to the project?		
Identifying a suitable procurement route and format		
Have you reviewed the pros and cons of different procurement routes for the project?		
Have you checked what legislation and policies may impact your chosen procurement route?		
Have you assessed different lotting options to improve chances for smaller and more diverse suppliers to bid for the tender?		
Have you considered designing the tender with the goal to avoid a disproportionate		

Questions	Yes / No / N/A	Comment
risk exposure for SMEs which possibly provide more innovative and sustainable solutions?		
Setting up a project team		
Have you got technical skills in house to analyse, understand and communicate the environmental, social and economic impacts of potential solutions proposed by the market? If not, have you considered cooperating with support structures in other organisations?		
Have you got sufficient skills in house to manage the procurement process?		
Have you considered getting external technical, management and legal support to guide you through the procurement process, including from other administrations or public organizations?		

Box 16 Example(s) of 'preparation for tendering' activities for procuring sustainable infrastructures

Market engagement to prepare for the procurement of zero-emission construction sites in Copenhagen, Denmark

In line with its ambitious climate targets, the city of Copenhagen was looking to minimise carbon emissions linked to the construction sector. Construction sites are notoriously disruptive in urban centres because of noise, dust and gas emissions linked to the heavy machinery on site, so that the city decided to explore solutions to encourage the construction market to develop innovative solutions for reducing emissions from construction sites.
The city held exploratory dialogues to test the market's readiness for fossil-free and zero- emission machines and understand what solutions might be available. It also formed a collaborative forum on zero-emission construction sites with stakeholders from the whole value chain. Feedback from those market engagement activities was used to shape the city's strategic procurement plans for transitioning to more sustainable construction machinery and inform the specifications to be included in construction and infrastructure tenders. For example, the discussions inspired Copenhagen to pilot the use of minimum tender requirements to encourage the use of electric vehicles on construction sites.
This collaborative approach allowed the city to establish long-term trust and partnerships with suppliers, and the perspective of future work with the city is giving the market a strong incentive to invest durably in innovative zero-emissions machinery solutions.[117]

Setting and communicating high environmental standards for urban regeneration in Turin, Italy

The City of Turin developed an ambitious and detailed set of environmental guidelines for the regeneration of the Barriera di Milano district. This Integrated program for Urban Development (PISU) covered 15 construction projects with a total investment cost of €35 million. To prepare itself and the market for procurement, the City developed a clear list of environmental goals the projects were expected to achieve. Those included:

- Environmental goals for the improvement of local environment. These goals significantly influenced the design and imply a different concept at the planning stage. They were designed to reduce local pollution and improve the usability of the final space, affecting overall environmental comfort and improving the habitability of the area. They covered aspects such as aesthetic/architectural quality, the management of surface stormwater, use of local trees, green roofs and facades, noise, and the durability of the materials used for surface coating.
- Environmental goals related to the life cycle impacts of construction elements (technology, product or material), covering for example, the use of recycled materials, or the energy requirements of heating and lighting systems.

117 European Commission 2021, Guidance on Innovation Procurement, https://ec.europa.eu/docsroom/documents/45975

Having those goals clearly set out in advance of the design and procurement process helped Turin clearly its environmental ambitions to suppliers[118]. This helped ensure that the market was adequately prepared to answer its requirements when the tender was published.

4.3.3. Tendering

The tendering process involves two main phases:

1. Planning phase, where the specifications are developed
2. Selection phase, including:

- Selection criteria,
- Exclusion criteria,
- Award criteria and evaluation of the bids
- Contractual provisions.

During the first phase of preparing a tender, specifications will define the needs to be satisfied by the successful tenderer. Their purpose is to provide the clearest possible description of the needs of the contracting authorities, to allow economic operators to propose solutions to address these needs. They are a key element of the contract and of the overall tendering procedure, and need to be carefully prepared, reviewed and validated. As opposed to the selection and exclusion criteria, the technical specifications must cover performance aspects, rather than the general competences or qualities of economic operators.

The selection phase is of crucial significance in achieving sustainable procurement, as it involves evaluating and screening contractors and suppliers against sustainability criteria: those suppliers that cannot meet the minimum sustainability requirements are disqualified, avoiding a significant sustainability risk.

The following checklist is meant to support the self-assessment of the tendering procedure for procuring sustainable infrastructure.

Table 1 Checklist for the 'tendering' phase

Questions	**Yes / No / N/A**	**Comment**
Technical specifications development		
Have the 'minimum requirements' for the project been specified as well as the standards they relate to?		
Do the specifications ensure that bidders will meet environmental and social regulatory requirements (including the DNSH principle introduced by the EU taxonomy)?		
Do the specifications ensure that bidders are incentivised to meet the highest standards for all sustainability aspects (environmental, social, and economic)?		
Does the tender include sustainable public procurement requirements, including in terms of: • Design performance? • Material specifications?		

118 SCI-Network, Sustainable Construction and Innovation through Procurement, Urban regeneration in Turin with high environmental standards, Italy https://sci-network.eu/snapshots/urban-regeneration-in-turin-with-high-environmental-standards-italy/

Questions	Yes / No / N/A	Comment
• Accessibility for all users • Execution of the contract, including waste management?		
Have questions been included regarding the bidder's approach to environmental sustainability, requesting they provide details of any specific steps taken in the design and manufacture of products to reduce any detrimental environmental impacts?		
Do the specifications require the bidder to adhere to functional accessibility requirements?		
Do the specifications include a request for the bidder to provide a copy of their environmental policy, highlighting how it relates to the services which are the subject of the tender?		
Does the tender require the bidder to carry out a LCC analysis or to provide information that allows the procurer to make its LCC calculation?		
Does the tender specify the need for KPIs and enforcement provisions to ensure that the agreed environmental and social performance of the infrastructure is achieved over its lifetime?		
Does the tender specify that an end-of life strategy and assessment of reuse, disassembly and recycling opportunities should be included as part of the technical offer?[119]		
Does the tender specify that disposal and site clearance costs should be accounted for?[120]		
Selection criteria		
Does the tender require the relevant specialist abilities and facilities to ensure that the minimum environmental outcomes required for the project as outlined in the brief can be achieved?		
Does the tender require that the bidder have personnel with the required educational and professional qualifications and experience to conduct the environmental tasks of the contract? Are the delegated contract manager or its supporting staff appropriately qualified to incorporate and monitor environmental and social considerations during the whole life stages of the infrastructure?		
Does the tender require that the bidder have access to the required technical equipment for environmental protection?		
Does the tender require that the bidder have the necessary arrangements in place to comply with the social and work integration requirements of the contract (e.g. in favour of persons with disabilities or disadvantaged persons or gender equality), and provide mentoring and support for trainees, work placements, a supply chain tracking system and other social considerations to ensure maximum retention and achievement of industry accreditation?		
Does the tender require the suitability of the subcontractors to be verified (as long as they implement significant parts of the tasks?)		
Does the tender require that the bidder use recognised standardised approaches for sustainability purpose?		
Does the tender require that the bidder provide records of orders already carried out with similar sustainability elements (references) to demonstrate their technical capability?		
If the project has the potential to be delivered by one or more SMEs, are the financial selection criteria proportionate so as to allow them to bid?		
Are the supplier's efforts in measuring circularity performance proportional?		
Exclusion criteria		
Does the tender require the verification of whether the bidder is in a situation which necessarily leads to their exclusion (e.g. serious breaches of law or presence on a sanctions list)?		
Does the tender require the verification of whether the bidder is compliant with applicable environmental, social and labour law obligations (e.g. on emissions,		

119 More specifications related to the end-of-life stages of procurement are detailed in section 4.3.7.

120 Ibid.

Questions	Yes / No / N/A	Comment
work conditions rules applicable to the staff involved, health and safety rules etc…)?		
Does the tender require the verification of whether the bidder complies with their obligations to pay social insurance contributions?		
Does the tender require the verification of whether the main bidder sought the relevant guarantees from subcontractors that they will also comply with the environmental and socially relevant obligations?		
Award criteria and evaluation of the bids		
Is the weight of the award criteria rewarding sustainability aspects such that it can concretely influence the award of the contract, when compared to the price-related criteria?		
Does the tender require that costs and sustainability over the whole life cycle be considered in the analysis of the bid?		
Do the award criteria given an appropriate bonus on evaluation to services or products with characteristics which exceed the minimum environmental and social requirements, including accessibility for all characteristics of the infrastructure?		
Does the tender include award criteria which provide further incentives for bidders to make a more advantageous offer on the sustainability requirements included in the technical specifications and the contract clauses?		
Contractual provisions		
Does the contract include clauses and conditions on the guaranteed performance parameters to be delivered by the contractor in relation to environmental and social aspects, including instructions for remedy and resolution within specific deadlines and possibly contractual penalties in case performance deviations are identified during the execution of the contract?		
Does the contract include conditions on environmental aspects of implementation (e.g. eco-friendly packaging, minimization of waste during the contract, reduction of CO2 emissions generated by transport, environmental due diligence in the supply chain etc.)?		
Does the contract include conditions on social aspects of the implementation, including inter alia worker's rights, working hours, salary, health and safety, human rights due diligence in the supply chain, prevention of forced labour, professional integration of disadvantaged persons and groups, and ensuring equal opportunities?		

Box 17 Example(s) of 'tendering' activities for procuring sustainable infrastructures

Pre-qualification for infrastructure projects in Calgary, Canada

In a procurement procedure for infrastructural measures in the city of Calgary, Canada, the bidders had to show in the pre-qualification phase that in addition to the mandatory financial and safety criteria they also satisfied environmental criteria (including presentation of environmental certification equivalent to ISO 14001; before they were even admitted to the technical screening. This included measures in the company regarding environmental management systems, as well as the company's experience with similar measures in environmental protection. Each bidder that is not able to provide verification of these fundamental principles is considered to be non-compliant and is not considered in the continued selection process.

Separate design and build in Austria

For the renovation of the 1964-built offices of Weiz District Authority in Austria, an ambitious energy target was set – to obtain the A+ Austrian energy certificate. A planning and design team of architects and specialist consultants was responsible for preparing detailed technical specifications for the procurement of construction work (materials, u-values, specifications for an innovative facade solution, etc.) and the building services (e.g. output power and performance of the HVAC system). They were also then responsible for assessing the compliance of the bids received. Construction was completed in 2011 and is estimated to have achieved an 80% reduction in heating energy requirements.

Sustainable Reconstruction of the Motorway A6, in the Netherlands

The Dutch Rijkswaterstaat procured the sustainable reconstruction of motorway A6. Tenders were assessed by a 'corrected total price', which corrects the economic price based on adverse environmental impacts. Bidders were required to assess the life cycle performance of the project, enabling them to test design options and maximise sustainability of their offers. During the construction of the motorway, the proposed commitments in the bid were introduced in the contract as contractual requirements and the environmental performance of the final product is checked one year after contract close.

Toolbox Sustainable Procurement, a guide on how to include aspects of sustainability in public procurement procedures for Financial Cooperation projects, BMZ; Procuring Innovative and Sustainable Construction: A guide for European Public Authorities, SCI-Network.

4.3.4. Construction

The construction phase requires a diligent implementation of the contractual conditions set forth in the tendering phase. Furthermore, the possibilities to make amendments to the contractual conditions defined in the tendering phase are very limited, as substantial amendments to the contractual conditions can be legally challenged by the contractor. The main attention point in the construction phase is therefore setting up a monitoring system that adequately incorporates the environmental and social conditions defined in the tendering phase. During the construction process, four main phases are identified:

- Preparing the contract management,
- Setting up the monitoring system, and
- Monitoring the construction.

Table 7 Checklist for the 'construction' phase

Questions	Yes / No / N/A	Comment
Preparing the contract management		
If any modifications of the environmental and social criteria have been made after the tendering phase: are all modifications compliant with the applicable rules for public procurement?		
Are the delegated contract manager or its supporting staff appropriately qualified or otherwise supported to incorporate and monitor environmental and social considerations during construction?		
If the above does not apply, have other forms of external support been considered, such as cooperation with other public authorities or organizations, or external experts helping with the management of sustainability aspects or technical expertise?		
Setting up the monitoring system		
Have all contractual provisions pertaining to guaranteed performance parameters, environmental aspects of implementation, and social aspects of implementation been clearly identified?		
Have indicators and a timeline relating to the performance of environmental and social targets or parameters of the project and contract been established?		
Has an appropriate environmental management system been identified to manage the environmental sustainability of the construction? [121] Does it sufficiently monitor the relevant environmental and social aspects of the contract? Have similar systems to manage the social and health and safety aspects of the contract and the execution been put in place?		

121 For example ISO 14001:2015. ISO - ISO 14001:2015 - Environmental management systems — Requirements with guidance for use, https://www.iso.org/standard/60857.html.

Questions	Yes / No / N/A	Comment
Does the setup of the environmental management system and the measures to manage social aspects and health and safety issues sufficiently mitigate potential risks regarding the environmental and social sustainability of the construction process?		
Are there any environmental and social aspects of the contract and the execution that are not captured by the above monitoring system monitored during construction?		
Is a post-occupancy evaluation (POE) foreseen to provide the contractor with an incentive to ensure that construction performs as planned and to get useful feedback from users of the infrastructure?		
Monitoring the construction		
Are the monitoring activities (e.g. construction site audits, reporting by contractors/subcontractors) appropriately planned to identify non-compliance with the environmental and social criteria of the contract?		
Do the monitoring activities ensure sufficient transparency in the supply chain to monitor the performance of environmental commitments by the contractor and the subcontractors?		
Do the monitoring activities ensure sufficient transparency in the supply chain to monitor the social performance of the contractor and subcontractors in the execution of the contract (e.g. the employment of workers with disadvantaged backgrounds, gender equality, mentoring and support for trainees, work placements, and other social and labour considerations and/or obligations)?		
Are payments subject to receiving full documentation and confirmation that the contractor is compliant with all environmental and social criteria of the contract?		
Creating accountability		
Have you included KPIs and enforcement provisions in the contract to ensure that the agreed environmental and social performance of the infrastructure is achieved during the construction phase?		

Box 18 Examples of 'construction' activities for procuring sustainable infrastructures

Ensuring compliance with social conventions during construction, Sweden

The Swedish National Road Administration uses a standard clause in its construction contracts that obliges contractors to comply with the core ILO conventions during contract performance.

- Contractors must further comply with certain reporting requirements to verify that goods and products used during performance of the contract have been produced in a safe environment in accordance with the rules of the core ILO conventions.
- If a good is identified to conflict with this provision, the contractor must replace that good at its own expense.
- The contractor is responsible to ensure that also its subcontractors comply with the same obligations.
- Any breach of these social obligations leads to a penalty.

Procuring the first Nordic Swan eco-labelled pre-school, Hyvinkää, Finland

Hyvinkää municipality in Finland procured an eco-labelled pre-school. To qualify for the ecolabel, buildings are assessed using a lifecycle perspective, and must achieve low energy consumption, fulfil high environmental and health requirements on building products, materials and chemical products, ensure a good indoor environment and low emissions, and use a quality-assured construction process. To ensure that the quality standards were met during the construction process, a contract performance clause was used in which bidders had to demonstrate:

- Plans for quality management in the construction process and management of the construction process, including work safety and environmental policies of the bidder; and
- A project plan that included planning, management and quality assurance of the construction work.

Buying Social, A Guide to Taking Account of Social Considerations in Public Procurement; Procura+ Case Studies

4.3.5. Use (excl. maintenance and operation)

As for the construction phase, the use of infrastructure is largely bound to the contractual conditions defined during the tendering phase. Similarly, a strong monitoring and evaluation system is therefore the main attention point.

For the use of infrastructure, three main aspects are relevant to consider:

- Setting up the monitoring system,
- Monitoring the use of infrastructure, and
- Evaluating the use of infrastructure.

Table 8 Checklist for the 'use (excl. maintenance and operation)' phase

Questions	**Yes / No / N/A**	**Comment**
Setting up a monitoring system		
Have all contractual provisions pertaining to sustainability performance parameters of the infrastructure as established in the bid and the contract terms (including accessibility for all characteristics) been clearly identified when setting up a system monitoring its use?		
Are all certification and/or labelling schemes (e.g. building performance standards) that have been either required in the contractual conditions or been proposed by the contractor been identified when setting up a system monitoring the use of the infrastructure?		
Have appropriate monitoring systems been set up to monitor compliance with i) sustainability performance parameters of the infrastructure as established in the bid and the contract terms, and/or ii) certifications and/or labelling schemes?		
Monitoring the use of infrastructure		
Have audits been set up during the use phase to properly monitor compliance with relevant environmental and social performance as established in the bid and the contract terms, as well as with certification and/or labelling schemes?		
Evaluating the use of infrastructure		
Has an evaluation been planned to evaluate the use of the infrastructure throughout the use phase, its actual sustainability impact both in terms of environmental and social aspects, and its possible spillover effects on the environmental and social aspects of the context (e.g. impact on greening and inclusivity of mobility and transport networks)?		
Creating accountability		
Have you included KPIs and enforcement provisions in the contract to ensure that the agreed environmental and social performance of the infrastructure is achieved during the use phase (excl. maintenance and operation)?		

Box 19 Examples of 'use (excl. maintenance and operation)' activities for procuring sustainable infrastructures

Monitoring compliance with CO2 reductions, Latvia

The Latvian Ministry for the Environment awards EUR 50 million per year under the Climate Change Financial Instrument (CCFI) for sustainable construction projects. Grants are awarded through project calls, in which applicants can choose GPP criteria from a checklist to obtain extra points in the evaluation phase of the project application. These criteria become legally binding upon reward and are a condition for the funding. All financed projects are subject to a monitoring period of five years following completion. If the monitoring of the project during the first and second year of the use phase shows non-conformity of CO2 emission reductions, the beneficiary must submit a plan to correct this and finances the correction from its own resources. If the non-conformity of the project continues, the resources disbursed from the CCFI for the project can be considered ineligible and recovered.

Building a Passive House School, Frankfurt, Germany

The German city of Frankfurt procured a school building that corresponds to passive house quality standards. Passive houses have the characteristic of being well-insulated and consuming only passive heat sources (e.g. solar heat). The city operates with guidelines for economic buildings which outline environmental requirements for all new public buildings in the city. The guidelines were used to determine tender specifications regarding the building's performance on energy efficiency, interior climate, and construction materials, as well as the performance of the construction site. The contract was monitored using checklists provided in the guidelines for economic buildings. If the performance of the building deviated more than 10% above the specified requirements, the contractor was required to justify the exceedances. If the origin of the exceedance could be traced back to a fault by the supplier, the contractor could be penalised financially.

Source: Buying Green Guide, 3rd edition; GPP in practice, Issue no. 49.

4.3.6. Maintenance and operation

Most infrastructure solutions will have strong social and environmental impacts throughout their operational phase. Owing to their long-expected lifespans, many infrastructure projects also call for significant maintenance needs.

Three key elements can help procurers maximise the sustainability of infrastructure projects throughout their maintenance and operational phase:

- Anticipating impacts
- Accounting for maintenance and operational impacts at the tendering stage
- Creating accountability.

Table 2 Checklist for the 'maintenance and operation' phase

Questions	Yes / No / N/A	Comment
Anticipating impacts		
Have you assessed the environmental impacts likely to be generated by the maintenance and operation of the infrastructure? • Contribution to climate change mitigation • Contribution to climate change adaptation • Contribution to the sustainable use and protection of water and marine resources		

Questions	Yes / No / N/A	Comment
• Contribution to the transition to a circular economy • Contribution to pollution prevention and control • Contribution to the protection and restoration of biodiversity and ecosystems		
Have you assessed the social impacts likely to be generated by the maintenance and operation of the infrastructure? • Employment opportunities for youth and older workers; • Gender equality (e.g. facilitating work/life balance, reducing sectoral and occupational segregation, ensuring equal treatment in the workplace). • Employment opportunities for people experiencing social exclusion due to long-term unemployment, homelessness, discrimination or other vulnerabilities; • Societal participation and employment opportunities for persons with disabilities, including through inclusive and accessible work environments; • Improved diversity policies, social inclusion and employment opportunities for persons from disadvantaged groups (e.g. migrant workers, people with a minority racial or ethnic background, religious minorities, people with low educational attainment and those at risk of poverty and social exclusion); and • Up and reskilling opportunities for all workers		
Accounting for maintenance and operational impacts at the tendering stage		
Have you asked bidders to consider solutions for maximising environmental and social benefits during maintenance and operation?		
Have you encouraged bidders to explicitly account for maintenance and operation costs in their offer e.g. through a life-cycle costing approach?		
Have you considered including “best available technology” or “technology refresh clauses” in the maintenance contract?[122]		
Have you encouraged bidders to consider design solutions and a choice of materials which will facilitate long-term maintenance and increase the lifespan of the infrastructure?		
Creating accountability		
Have you included KPIs and enforcement provisions in the contract to ensure that the agreed environmental and social performance of the infrastructure is achieved and measured during the maintenance and operation phase?		

Box 20 Examples of ‘maintenance and operation’ activities for procuring sustainable infrastructures

Using binding KPIs to ensure operational performance in Worcester, UK Communicating ambition for "The Hive", Worcestershire, the United Kingdom

The Hive building was a new build collaboration between the University of Worcester and Worcestershire County Council. From the onset, the ambition was to achieve a high environmental performance of the building in operation.
In order to ensure that the contractor would deliver on the agreed environmental KPIs, the University and the Council included legally binding performance criteria in the operating contract for the building. Those included for example a maximum CO_2 emissions threshold to be generated by the building in operation. A financial penalty was foreseen if those targets were not met, providing the contractor with a strong incentive to perform.

122 https://sci-network.eu/fileadmin/templates/sci-network/files/SCI-Network_Guide_contracting__1_.pdf

Developing a tool to help procurers include maintenance and operation costs of in their infrastructure procurement decisions, The Netherlands

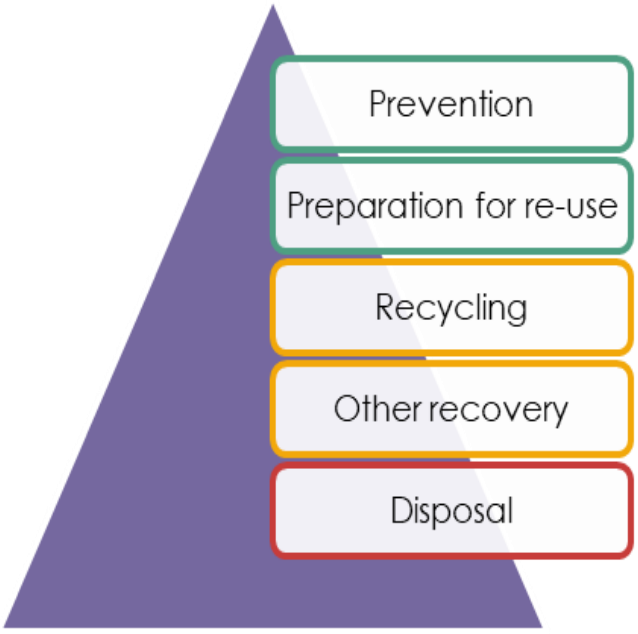
The Rijkswaterstaat (RWS) is part of the Dutch Ministry of Infrastructure and Water Management and responsible for the design, construction, management and maintenance of the main infrastructure facilities in the Netherlands.
RWS is a frontrunner in mainstreaming sustainable and circular procurement. Its ambition is to plan and execute their work completely circularly by 2010. The goal is reaching a fully circular operation by 2050[123].
It is RWS's goal to assess bids by the total cost of construction and maintenance, using life cycle costing and total cost of ownership concepts. To calculate life cycle costs, RWS has developed the DuboCalc software, which allows to calculate the environmental effects of a material, building or method. The software calculates life cycle environmental impacts in 11 areas using a life cycle assessment (LCA) database, converting these impacts into an environmental cost indicator (ECI) value for the proposed design. The materials proposed by the successful bidder become contract requirements and the ECI value of the final product is checked upon completion of the work.

4.3.7. End of life

Definitions for end of life will vary according to the sector, but the term usually refers to the final stages of a product or material's phase of use. In the construction sector, the treatment and disposal of construction materials, once they have reached their end of life, is an increasingly important issue to minimise waste, carbon emissions and the use of landfill sites. Increasingly, contractors are developing specific strategies for the design, specification and site management to minimise construction and demolition waste.

In the decision-making process concerning the end-of-life stages of procurement, it is recommended to apply the waste hierarchy principles. It is the legally binding principle behind any waste management decision or system, although life-cycle-assessments can help identify where the hierarchy does not hold as well.

Figure 4 The waste hierarchy, as defined by the Waste Framework Directive (2008/98/EC)



123 https://procuraplus.org/public-authorities/rijkswaterstaat/

The end-of-life stage of the procurement process is often overlooked, yet it is fundamental when considering sustainable procurement in its totality. Particularly in the construction sector, the end-of-life opportunities for maximising the potential of used materials is huge.

Up till now, the end-of-life management of most worksites is characterized by open-loop material systems. Closed-loop systems with full materials recovery do not exist at present, due to a lack of technology, poor product design, thermodynamic reasons, and a lack of adequate economic incentives.

The following checklist support the self-assessment of the end-of-life procedure for procuring sustainable infrastructure.

Table 9 Checklist for the 'end of life' phase

Questions	Yes / No / N/A	Comment
End-of-life strategy and assessment of reuse, disassembly and recycling opportunities		
Has a pre-deconstruction/demolition waste audit/waste management plan been carried/planned to be carried out to identify the key construction materials and to determine what can be re-used, recycled or recovered? For instance: Does the original contract include requirements on the choice of material and techniques that allow easy end-of life / recycling, if the regulation allows? Are there available manufacturer take-back options? If there is no waste strategy, can the product be safely disposed of?		
Consideration of disposal and site clearance costs		
Have disposal and site clearance costs based on the materials used been taken into consideration? These cost calculations (and their likely evolvement) should be based on waste and recycling structures and markets.		
Life cycle assessments and End-of-Life		
Are the emissions arising from decommissioning, stripping out, disassembly, deconstruction, and demolition operations as well as from transport processing and disposal of materials accounted for?		
Have end of life scenarios been developed? Are they explained with the LCA and whole life carbon assessment report?		

Box 21 Examples of 'end of life' activities for procuring sustainable infrastructures

Procurement requirements for circular flows in the construction and demolition process, Gothenburg, Sweden[124]

The city of Gothenburg is dedicated to reducing the amount of waste it produces and shifting from a linear to a circular economy. The city led a study on how the city could reduce the amount of destruction and demolition waste it produces. It developed a gap analysis between the current situation and the scenario for the year 2030. Based on the gap analysis, the city drew up concrete requirements to be included in the procurement process for future construction projects. These included:

- Setting requirements for how a product should be dismantled in the future, targeting manufacturers and contractors.
  - Suppliers shall provide disassembly instructions for the specified product. In cases where the supplier is unable to provide such instructions, the contractor must undertake to establish a plan for how the product can be dismantled. In cases where it is not possible to establish a dismantling instruction, this must be justified. Disassembly information should also be included in the digital data bases associated with the building models.

124 City of Gothenburg - https://goteborg.se/wps/wcm/connect/43e6c096-61d3-43d4-ad62-83d820a21012/Förutsättningar+och+rekommendationer+för+praktiskt+genomförande+Forsen%2C+Kjellgren+Kaminsky%2C+DGE+2019.pdf?MOD=AJPERES (2019)

- Developing material inventories for rebuilding and demolition projects: this should occur in the feasibility study of a project and the materials should be classified according to their recycling potential.
- Setting requirements for circular waste management
  - The contractor should undertake, during demolition and conversion, to dismantle building materials and products in one condition that allows them to be reused again;
  - New or supplemented existing material should be based on the material inventory;
  - The contractor should report how products for recycling are planned to be taken care of;
  - The weight and description of the spillage and disassembled materials that cannot be reused or recycled must be reported by the contractor to the customer.

Re-use of construction materials in a temporary construction site, London 2012 Olympic Park, The United Kingdom[125]

The Olympic Delivery Authority (ODA) set demanding sustainability targets for the Olympic Park demolition, including an overall target of at least 90% by weight of demolition material to be re-used or recycled. The ODA's overall target was exceeded by 8.5%, with less than 7,000 tonnes landfilled. The key lessons learned from this project include:

- Undertake a pre-demolition audit and include a reclamation survey.
- Use this data, and consultations with reclamation specialists, to set headline targets for re-use and reclamation for key materials before issuing tenders, ideally linked to carbon targets.
- Include clear reclamation and re-use targets as separate and additional to the overall recycling target and state them clearly in the tendering process and in contracts. Make explicit the responsibility for demolition.
- Incentivise use of specialist contractors and achieving of re-use targets.
- Require the project to measure the total carbon impact of the demolition process and the new construction on the site.
- Require re-use to be entered into a materials database and included in Site Waste Management Plans.
- Design team workshops and communication with other local regeneration projects are recommended; regular site visits are vital.
- Include use of site-won re-used materials in the design and construction contracts for the new build.
- Sufficient storage space is vital to enable re-use of construction products.

Certification scheme for demolition processes, The Netherlands[126]

The BRL SVMS-007 is a voluntary (not legally binding) instrument to encourage a quality demolition process. Customers who prescribe to this certification scheme of procurement and tendering are assured of environmental and safe demolition on site. The scheme is controlled by third parties and the Council of Accreditation. The certified demolition process follows four steps:

- Step 1 Pre-demolition audit: The demolition contractor carries out an advanced inspection of the demolition project and an inventory of the materials (hazardous and non-hazardous) to get insight into the nature, quantity, and any contamination of the extracted demolition materials. An inventory is made of the risks to occupational safety and safety risks to the surroundings.
- Step 2 Waste management plan: A waste management plan is drawn up that includes a description of the method of selective demolition and environmentally-friendly demolition, processing and removal of released material flows, safety measures that have to be taken and implementation requirements of the customer.
- Step 3 Execution: The execution of the demolition occurs in accordance with the waste management plan. Experts in the area of safety and environmentally-friendly demolition are involved and certified demolition contractors work with approved equipment. The demolition contractor must ensure that the demolition location is safe and well organised and that the released material flows do not contaminate the soil and the surroundings.

125 European Commission, Guidelines for the waste audits before demolition and renovation works of buildings (2018)

126 European Commission, Guidelines for the waste audits before demolition and renovation works of buildings (2018)

- Step 4 Final report: The delivery of the project takes place in consultation with the involved parties. A final report of the released demolition materials is drawn up by the demolition contractor, and it is supplied to the customer upon request.

4.4. Conclusions

Public procurement of infrastructures is an extensive process, that will incur impacts over an extended period. By supporting buyers in assessing their practices throughout the life cycle of the infrastructures, this checklist constitutes a concrete toolbox to enhance sustainability in all its components (economic, social, and environmental) and reduce potentially negative impacts. It aims at improving procurement to a process as sustainable as possible, with the lowest environmental impact and highest positive social results. It is to be noted that the process is changing and developing continuously, with the permanent development of new solutions with potential lower ecological and social footprints. The checklist applies to a wide range of infrastructures.

While the early stages, preparation for tendering and tendering, are very important to enhance sustainability, the checklist also demonstrates that it is possible to also influence it during other stages. It may however imply considerations at an earlier stage to encompass the impact over the whole life cycles, through for instance a life cycle costing approach. Throughout the document, various examples are provided to illustrate how some factors can influence sustainability in the various stages. These examples show clearly how economic, environmental, and social criteria can be used effectively to enhance infrastructure sustainability.

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[Catalogue number]

Publications Office
of the European Union

ISBN [number]