

ChemClimCircle A Practical Guide Supplementary report

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ABBREVIATIONS

Abbreviation	Explanation
CHEMCLIMCIRCLE	ChemClimCircle procurement which integrates a toxic-free environment, climate neutrality and circularity objectives
EU	European Union
FCM	food contact material
GHG	greenhouse gas
GPP	green public procurement
ICT	information and communication technology
LCC	life cycle costing
PET	polyethylene terephthalate
POPs	persistent organic pollutants
PC	polycarbonate
PVC	polyvinyl chloride
M1	Emission standard in Finland
EC	European Commission
Project consortium	ChemClimCircle project partners and associated organisations

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1. Introduction

1.1 About this document

This document has been prepared to be used further in elaboration of a public procurement guide for municipalities and other public buyers who want to use and integrate chemical, circular, and climate-neutral aspects into their procurement processes. The material was prepared based on the previous work on circular procurement, chemical-smart procurement, the Scoping report of the project (link: <https://interreg-baltic.eu/project/ChemClimCircle/>) and the knowledge gained by working with partners in various workshops, meetings and by testing the methodology in the partner municipalities. This is a preparatory and supplementary report prepared for supporting the development of ChemClimCircle project's guidance and training materials.

1.2 About the project

The ChemClimCircle project is an EU Baltic Sea Region (BSR) Interreg project aiming to enhance and develop green public procurement focusing on integrating three topics: hazardous chemicals, circular economy and climate impacts at different levels in municipal organisations.

European municipalities procure goods and services at large scale for various public facilities in the fields of child and elderly care, construction, education, vehicles and traffic solutions. For this reason, they have great potential to use the procurement process to achieve environmental goals, by demanding more sustainable products and services.

Today, European municipalities and other public buyers are applying green public procurement criteria. However, many municipalities are still in the early stages of this process and face various challenges, ranging from a lack of management support to a lack of knowledge in the organisation – concerning everything from market dialogues and requirements in the municipal units to selection of criteria and follow up processes.

One of the greatest difficulties is the lack of a holistic approach: procurement managers often focus on individual goals such as climate neutrality while the topic of avoiding hazardous substances in the procured services and goods has received far too little attention so far. The hazardous substances issue is also critical for a circular economy to be possible – the more material that does not contain toxic substances, the more opportunities there are for reuse and recycling.

With the intention to help municipalities to further develop their procurement strategy, this project aims to combine the three aspects; tox-free, circular, and climate-neutral procurement processes.

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Project website

On Interreg web-page <https://interreg-baltic.eu/project/ChemClimCircle/> and <https://thinkbefore.eu/en/chemclimcircle/>

Project partners

- City of Stockholm,
- BEF Germany,
- Stockholm Environment Institute Tallinn Centre,
- Taurage Municipality,
- Ecodesign Competence Centre,
- Environmental Centre for Administration and Technology (ECAT),
- Turku University of Applied Sciences,
- Smiltene municipality,
- POMINNO Ltd.

2. ChemClimCircle approach to procurement

Green Public Procurement (GPP) is a practice used by public buyers to procure goods, services and works with a reduced environmental impact throughout their life cycle. Government expenditure on works, goods and services represents around 14% of EU GDP, accounting for roughly EUR 1,8 trillion annually.

The ChemClimCircle approach is a focus area of GPP, seeking integration of

- chemical,
- climate and
- circularity

criteria into public sector purchasing processes.

These three pillars are important procurement aspects on their own, however, when combined, it is a promising approach to simultaneously address effects on human health and environment by procuring tox-free products, at the same time reducing the CO₂ footprint as well as providing possibilities for circulating materials, thereby reducing the consumption of virgin resources.

Europe's public authorities are major consumers. For example, municipalities are large-scale purchasers of goods and services, responsible for various public entities, e.g. schools, pre-schools, care centres, traffic, construction, street and park management. Due to this, municipal organisations have a large potential to use the purchasing process, in which procurement is one part, as a means to reach environmental goals and contribute to sustainable consumption and production. The public sector is thus in a position where it can promote the protection of both human health and the environment. Many municipalities are committed to promoting sustainable development, and reducing the use of hazardous substances should be taken as part of their commitment (Kontturi, 2018).

GPP is a widespread practice among public buyers in Europe. The GPP share in the total public procurement value show the tendency to grow. The national statistics in the ChemClimCircle partner countries show that the GPP share in the public procurement ranges from around 7% to 40% (ProjectConsortium, 2023):

- In Denmark about 44% of all tenders contained a green element (2020);
- In Estonia, GPP accounted for 17% of the total cost of public procurement (2022);
- In Finland, 2/3 of tenders includes general environmental requirements, and about 40% of tenders include more specific environmental requirements (2017);
- In Germany, GPP amounted to 31,5% of the total economic value of contracts awarded (2021);
- In Latvia, the share of GPP in all public procurement was 29,1% in financial terms (2020);
- In Lithuania, the share of GPP is 60.90% of the total cost of contracts (2022);
- In Poland, the GPP 6,7% of the total value of public contracts awarded (2020).

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These numbers, however, do not tell us how many and what type of criteria were applied in which product groups– but they do demonstrate the value of the purchasing power that lies within the public procurement. The financial power within the public purchasing can be utilized more fully and will then help to achieve a tox-free, climate neutral and circular Europe.

GPP therefore, can support a variety of environmental and sustainability-related values, from reducing the impact of climate change and promoting a circular economy to supporting the achievement of a toxic-free environment. GPP may also provide financial savings for public authorities as well as stimulate a critical mass of demand for more sustainable goods and services that otherwise would be difficult to get onto the market.

One of the challenges not recognised on a wide scale is a lack of an integrated approach, i.e. the integration of different dimensions such as climate impact, circularity and chemical risks. Most often, the procurement priorities have focused on single issues and goals such as climate neutrality or circular aspects. The matter related to avoiding hazardous substances in procured products, articles and services has received much less attention. The risks of chemicals could cause conflicts in procurement objectives (e.g. circularity vs contaminated materials, reuse vs products that contain hazardous substances). Also, the integrated nature and synergies between climate, circularity and chemicals/non-toxic environment is not often recognised in the selection of criteria in the procurement process.

The ChemClimCircle approach recognizes the interconnections and potential conflicts between climate policies, circular economy policies, and chemical policies. It aims to address these objectives in a holistic manner, promoting sustainable practices and minimizing negative impacts. The approach contributes to:

- Achieving the EU policy objectives for tox free, climate-neutral and circular Europe;
- Protection of human health, biodiversity, and ecosystems;
- Implementation of safer and sustainable chemical alternatives;
- Potential for enhancement of circularity and climate objectives through reduced use of hazardous chemicals.

Currently, the ChemClimCircle approach is being used to a limited extent. The use of chemical, circularity and climate criteria in an integrated manner is more widespread in Nordic municipalities. Some common barriers for the ChemClimCircle approach in procurement are lack of strategic framework (clear objectives and targets), shortage of organisational resources (personnel and time) and insufficient understanding of the ChemClimCircle approach to procurement in municipalities. Often, the lack of knowledge and competence, especially on chemicals, is also an issue.

This document provides the background for our ChemClimCircle approach, taking into account tox-free, circular and climate objectives.

2.1 Policy objectives, trends and ChemClimCircle approach

The EU aims to achieve climate neutrality by 2050 through the Green Deal, which serves as a comprehensive strategy and framework for a sustainable, climate-neutral future. The Green Deal encompasses various policy instruments and provides a policy framework for the ChemClimCircle approach. Furthermore, the ChemClimCircle approach aligns with key EU policies and legal acts such as the Circular Economy Action Plan, European Climate Law, Chemicals Strategy for Sustainability, and Zero Pollution Action Plan.

Although Europe aims to ensure chemical safety by legislative means, some hazardous substances which are still in use can have severe adverse effects on both human health and the environment. It is not uncommon to have widely used chemicals withdrawn from the market later, as new research results reveal that the risks are higher than the advantages. There are plenty examples of this, such as freons, asbestos, phthalates and bisphenols. (Kontturi, 2018)

The chemical sector is regulated in the EU by some of the most advanced chemical regulations worldwide. The main legal regulations are REACH¹ and CLP². These regulations aim to protect human health and the environment. REACH ensures the registration and evaluation of chemical substances used in articles and material, and controls their application. It dictates which hazardous chemicals can be utilized for specific purposes, as well as how they should be transported, stored, and disposed of. CLP regulates direct risks during transport, sales, and use of chemical products specifically. CLP is also connected to the global harmonised system (GHS) for chemical labelling. For certain specific areas such as toys, food contact materials, electronics and cosmetic products there are specific pan-European legislations including more stringent chemical regulations. This regulatory framework places considerable responsibility on industries to manage risks effectively and provide accurate information about chemicals. Although Europe aims to ensure chemical safety by legislative means, some authorized substances have severe adverse effects on both human health and the environment.

The legal trend is moving towards more requirements on sustainable products: new proposals for Green Claims Directive and proposal for Eco-design for Sustainable Products Regulation will set new requirements for companies, especially regarding information on environmental performance of products. This trend will help public purchasers to make better informed decisions considering environmental performance on products.

With the expanding legal and policy requirements that come in various sectors and cross-sectoral policies, there will be more and more requirements for the public purchasers to integrate the aspects of chemicals, circularity and climate in the purchasing processes.

1 Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)

2 Regulation on Classification, Labelling, Packaging (Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures

2.2 GPP requirements in legislation

There are mandatory and voluntary approaches to GPP. At the EU level, the application of the GPP criteria is voluntary, however, there are legal requirements in the EU legislation that are mandatory for all public buyers for certain goods and services, such as:

- **Office IT equipment** - energy requirements prescribed by the EU Energy Star Regulation (Regulation No 106/2008 on a Community energy-efficiency labelling programme for office equipment).
- **Road transport vehicles** – all contracting authorities must consider the operational energy use and environmental impacts of vehicles as part of the procurement process, and there are national targets for their public procurement (Directive 2009/33/EC on the promotion of clean and energy-efficient road transport vehicles).
- **Buildings** – Minimum energy performance standards apply to public buildings; these are set at national level based on a common EU methodology. The Energy Efficiency Directive⁹ also sets mandatory requirements regarding renovation of public buildings and purchase or new rental agreements meeting minimum energy-efficiency standards.³

Furthermore, following the adoption of the 2020 Circular Economy Action Plan, the European Commission is proposing minimum mandatory GPP criteria and targets in sectoral legislation and phase in compulsory reporting to monitor its uptake. Below is the list of the EU Commission's legislative proposals including GPP requirements that will soon require mandatory elements in the public sector's purchasing processes:

- [Batteries Regulation](#)
- [Energy efficiency directive \(Commission proposal for a directive \(recast\) adopted on 14.07.2021\)](#)
- [Energy performance of buildings directive – revision](#)
- [Proposal for a Regulation on Ecodesign for Sustainable Products](#)
- [Construction products regulation](#)
- [Packaging and packaging waste Regulation](#)

Every country has its own legislation, recommendations, support services and information for GPP. For national countries, links are provided in the Annex I for more information and support. The European Commission (EC) has been developing voluntary GPP criteria for several product groups:

- EU Green Public Procurement page: https://green-business.ec.europa.eu/green-public-procurement_en
- Voluntary EU GPP criteria can be accessed here https://circabc.europa.eu/ui/group/44278090-3fae-4515-bcc2-44fd57c1d0d1/library/f69e60f9-9dc6-4345-aa18-b9a4b6dfdbf0?p=1&n=10&sort=modified_DESC

³ For the building sector, see project NonHazCity 3 where ChemClimCircle approach is extended to the buildings and construction. Link: <https://thinkbefore.eu/en/>

3. Chemicals, climate and circularity interaction in public procurement

While providing some synergies between the three aspects, such as the plastic types which are most efficiently recycled at present are also the ones which are most tox-free, the ChemClimCircle approach also recognizes the potential conflicts that may arise. One of these might surface when pursuing circularity, such as the risk of presence of hazardous substances when scaling up the plastic recycling to include more plastic types. The ChemClimCircle approach provides guidance to manage these challenges effectively.

The next sections provide insights of on the climate neutral procurement, chemical smart procurement and circular procurement as stand alone subjects (Sections 3.1, 3.2 and 3.3.) and their interlinks, conflicts and synergies in the ChemClimCircle context (Section (3.4)).

3.1 Climate neutral procurement

Climate neutral procurement is the practice of considering and mitigating the climate impact of purchasing activities by aiming to offset or reduce the GHG emissions associated with the goods and services procured. Climate neutral procurements are often well established amongst public procurers. The procurements related to climate change mitigation most often include criteria for energy efficiency, electrified transport and reduction of GHG emissions. For the public buyers, there are mandatory requirements set in the EU legislation, such as [Clean Vehicles Directive](#), [Energy Efficient Directive](#) and [Energy Performance of Buildings Directive](#).

3.2 Circular procurement

In a circular economy, resources are used and managed in a way that promotes their continual use and regeneration. Circular procurement aligns with this concept by considering the entire life cycle of a product, from its design and production to its use, reuse, or recycling of the materials it contains.

The main objectives of circular procurement are:

- **Resource conservation:** By selecting products, materials and services that are designed for durability, repairability, and recyclability, circular procurement aims to reduce the consumption of new raw materials and minimize waste generation.
- **Extended product life:** Circular procurement encourages the procurement of products that have a longer lifespan.
- **Closed-loop systems:** Establishing closed-loop systems where products are recycled and materials remain in the same production cycle.

Thus, to implement circular procurement, municipalities may include specific criteria and strategies in their procurement processes such as choice of materials and products that can be re-used or recycled, which have increased longevity or special maintenance requirements that prolong the product's lifetime. Circular procurement can take a variety of forms (Morales, 2020):

- Circular products: Purchase of products (or services) that are superior in circular terms, such as recycled content, free of hazardous chemicals, designed to be repaired, etc.
- Circular business models: Use leasing or pay-per-use contracts to incentivize a more efficient material management from both buyers and suppliers.

3.3 Chemical smart public procurement

Hazardous substances can be found in a range of goods from construction materials, kitchen utensils, medical equipment, ICT equipment, toys and clothes to furniture. Due to this, in public spaces such as schools many different types of items that contain unwanted substances might exist. Use of cleaning agents, food contact materials and packaging are among many areas where high volumes of products and articles are purchased by municipalities, and there are potentials for reduction and recycling.

Municipalities and other parts of the public sector will benefit from recognizing their own potential and responsibility for limiting the spread of hazardous substances by requesting products and materials which do not contain harmful substances. Municipalities can set goals for procuring tox-free products and services and include criteria for harmful substances which are not allowed in the procured goods, extending from the legislation, this will:

- Set an example for companies (the market) and guide companies to prepare for more stringent legislation in the future. This can be done by setting the criteria which go further than legislation to be achieved during the contract period. See example from Stockholm presented under 3.4, below.
- Set an example for consumers; the municipality staff and inhabitants are consumers too. By showcasing the good cases and examples, like tox-free kinder gardens, this will increase the awareness and education of the inhabitants.

The Table 1 below shows an example from the City of Stockholm of the range of substances of concern and their presence in some commonly used products and materials. The presence of these substances should be minimized by procurement criteria according to the City's Chemical action plan 2020-2023.

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Table 1. Substances of concern and their presence in the materials and products.

Substance/ substance group	Example	Examples of presence in materials and products,
Alkylphenols or Alkylphenoletoxylates	Oktylphenols, nonylphenoletoxylate	Pharmaceutical and biotech industries, textile production
Antimicrobial substances	Silver, triclosan	Fridges and such appliances, sports clothing, and shoes
Halogenated flame retardants	Deca-BDE, TCPP	Textiles and electronics
Bisphenols	Bisphenol A, bisphenol S, bisphenol F	Receipt paper, food packaging, construction materials (epoxy resins in for example glues, relining products for waterpipes)
Phthalates	DEHP, DINP, BBP	Soft PVC (vinyl), for example, toys (especially bath toys), floors, vinyl wall papers, cables, roof materials, tarpaulins etc
Chlorinated paraffins	Short, medium, and long chain chlorinated paraffins (CP)	Soft PVC (vinyl) and foam plastic, for example in construction materials such as insulation, chemical products such as paint, sports equipment such as handles on gym equipment.
Highly fluorinated compounds (PFAS)	PFOA, PFBS, Fluorotelomers	Leather and textile coatings for water and dirt resistance, firefighting foam, kitchen utensils and appliances including single use paper materials, chemical products such as lubricant oils etc.
Metals	Cadmium, lead, copper, zinc	Cadmium as a pigment in artistic materials and contamination in food, lead in cheap jewellery, electronics, copper in roof materials, waterpipes and as an antifouling agent in boat bottom paints, zinc in tyres and galvanized materials.
Organotin compounds	Tributyltin (TBT), Dibutyltin (DBT)	Was used in boat bottom paints previously as an antifouling agent. Has also been used in PVC plastic as a stabilizing agent and biocide.

For more options for municipalities to gain knowledge and competence of chemicals and for building the case for tox-free procurements, see the following links

- Training toolkit on Chemical Smart Public Procurement <https://training.nonhazcity.eu/course/view.php?id=4>
- Guide to Chemical Smart Procurement <https://thinkbefore.eu/en/guide-for-chemical-smart-public-procurement/>

4. Interactions, conflicts and synergies within the ChemClimCircle approach

There are interlinkages between the ChemClimCircle aspects that create synergies in the choice of products and articles municipalities procure and consume while sometimes it results in conflicts of objectives. While we try to reduce GHG emissions, we may add to other aspects, for example, the need for more hazardous chemicals to ensure the GHG goals. Some of the products have reuse, recycling, or even safe disposal challenges at the end of their lifetime due to the presence of chemicals or no availability for recycling at the end of their useful lifetime. This section highlights the synergies and conflicts and brings illustrative examples.

As an example of synergies, the City of Stockholm procured single use food contact materials, starting with procurement criteria development in 2019. This was based on the EU Single-Use Plastics Directive (in force since 2021) for single use products, but the City of Stockholm went ahead of the implementation of the directive and refined the article specification to reduce the demand for new plastic materials.

The procurement criteria defined the assortment as follows:

- Cups made of bioplastic or paper;
- Cutlery made of wood;
- Food boxes made from “bagasse” (a type of natural fiber-based material).

As a result, at least 14 tonnes of plastic are reduced annually, reducing the environmental impact in all three ChemClimCircle categories:

(1) Climate: reducing the need for virgin plastic material and thus there are less GHG emissions compared to the situation if these items were produced from new materials;

(2) Circularity: reducing the plastic waste,

(3) Chemicals: removing materials that may contain plastic types which may pose potential hazards to health due to specific chemical content.

4.1 Climate aspects

To reach net-zero greenhouse gas (GHG) emissions, we need to change the way we produce and consume products/goods and materials, and we need to purchase and use less. In the climate focus area, we tend to focus mainly on the transition to renewable energy, complemented by energy efficiency measures. These measures can only address 55% of GHG emissions; the primary energy use of housing, transportation etc. The remaining 45% of the emissions come from producing the goods and products (such as cars, clothes, food, and other products) we use every day. (EllenMacArthurFoundation, 2019)

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The aim to increase the re-use of products, i.e., waste prevention by increased repairability and the prolongation of the lifetime of products (including via the use of maintenance chemicals), is an important cornerstone at the interface of circular economy and climate change. In addition, the circular economy can prevent GHG emissions because the production of materials from recycled sources often require less energy and resources than the production of primary materials.

In the climate focus area, much of the effort is on energy efficiency. There are materials that are good for insulation or energy efficiency, however they can emit hazardous substances over time, or there are difficulties with recycling them, indicating that there is important criteria to consider for construction materials – see Figure 1.

<p>Climate aspects - Energy production, efficiency, insulation and building materials with hazardous chemical content</p> 	<p>Indoor contamination by off-gassing - pipe insulation keeps the pipes from emitting heat, but the material which contains chlorinated paraffins has to be avoided, since these HS are emitted into indoor air.</p> <p>Outdoor runoff of hazardous chemicals through rainwater.</p> <p>Electrification of the whole society, electric cars are good for climate provided that the electricity is produced without fossil fuels, but worse in a circular view due to rare earth metals needed for batteries. Or, it must be secured that these metals are taken care of and used again at the end of life for electrical appliances and vehicles.</p> <p>More electricity is needed, there is not enough "clean" energy for this transition, electricity shortage can develop, or finite fossil sources are used to produce energy.</p>
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Figure 1. Climate aspects in energy production, efficiency, insulation and building materials conflicts with chemical content.

4.2 Circularity aspects

There are situations where the recycling of materials may consume more resources and energy than the production of primary materials: in that case, very high recycling targets could contribute to increased energy use and CO₂ footprint. This could be the case for very complex products, where the disintegration requires many specified steps or the separation of materials requires (energy-intensive) processes, such as in the separation of metals. The benefits of recycling also depend on other factors, related to collection and transportation of the secondary material, its cleanliness, necessity of pre-treatment and the number of life cycles a product or a material may have. Additionally, conflicts can occur between climate and circularity, such as the electrification of society requiring rare earth metals for batteries.

In a circular economy, we intend to keep material in the economy and create closed loops, often by recycling. However, looking from the chemical content, many materials contain hazardous chemical substances that leak into the outdoor and indoor environment and are absorbed by animals and the human body. Conflicts arise when recycling processes impact chemical content, such as in old tires used as infill for artificial turfs or PVC flooring and toys containing toxic phthalates, these materials cannot be used in a circular economy (see Figure 2). This shows the importance of tox-free products for circularity: less hazardous chemicals, more opportunities are there for re-use and recycling of products.

On the other hand, synergies exist when criteria for chemical content increase reuse and recyclability, like in electric and electronic devices, or when the use of recycled plastics in articles and packaging reduces plastic waste and by that decreases the climate footprint.

<p>Circularity/climate conflict with chemical content</p> 	<ul style="list-style-type: none">○ Old tires made into infill for artificial turfs.○ PVC flooring material or toys which contain phthalates that are toxic for reproduction cannot be recycled.○ Outdoor clothes made from recycled plastics, direct skin contact, potential precontamination and otherwise taken out from a functioning recycling loop of food contact material (FCM) grade material (bottle circulation system in Sweden, for example).○ Circulating old toys and furniture (chemical risks but circular and climate-neutral, providing that these toys and furniture are used instead of buying new).○ Asphalt made from ashes from the waste incineration energy plant.
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Figure 2. Circularity/climate conflict with chemical content

4.3 Chemical content aspects

The reduction of the use of hazardous chemicals may also benefit climate policies. Some widely used chemicals are resource and energy intensive to produce and could be replaced by chemicals that require less energy to be produced. In general, chemicals based on renewable plant-based resources tend to create lower GHG emissions than those produced by fossil fuels, as the plants absorb carbon dioxide during their growth. For example, the EIONET report on greenhouse gas emissions of plastics states that 30% of GHG emissions could be saved if fossil-based polymers were replaced (Vanderreydt, 2021).

Conflicts in chemicals and climate policy goals may arise where the replacement of chemicals would result in increased use of energy (i.e., generation of GHG emissions). This could be the case, for example, where solvents are replaced with water, resulting in the need for increased heat use to evaporate water. Another conflict may arise where toxic chemicals are needed to develop technologies that would save energy or generate energy (i.e., solar panels containing cadmium).

Chemical content can have both health and environmental issues, as well as issues during the production and in materials where they are used. Besides hazardous effects from many chemicals, many industrially produced chemicals originate in fossil raw materials. Chemicals and climate have a synergy when the chemical criteria steers towards more sustainable raw materials (not produced from fossil sources) and materials without hazardous chemicals as these can be reused, remain in use, and recycled without problems of exposure to substances which might be or become regulated due to their toxicity.

Some examples on connections with climate and circularity:

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- Kitchen utensils for multiple use made from polycarbonate (contains BPA) are not recycled at present and BPA is a hazardous substance. It is better to choose PET-plastics, for example, both for chemical aspects and recycling aspects.
- PVC plastic, often used for toys and flooring material: it cannot be recycled if the material has content of phthalates, which are reproductive toxicants.

For product group examples please refer to the ChemCimCircle Practical Guide (available on Project's website).

Use of plastics has become a global issue of concern due to its accumulation in the environment, health reasons and the use of fossil fuels for its manufacturing. In the chemical content focus area, there also are conflicts. Plastics is a material that we use in so many products, both household and industrial. However, plastics has become a global problem, largely due to single use plastic items, polluting our environment, seas and oceans and affecting human health, see Figure 3.

Conflicts involving reduced plastic use.	<ul style="list-style-type: none">○ Changing from plastics to paper consumables puts a larger footprint in the forestry sector, and good forest management needs to be secured. Growing new forests cannot fully replace the outtake of old forests, and a lot of biodiversity is lost. Examples of articles: coffee cups, paper plates, single-use cutlery, wash napkins etc.○ Changing to more natural materials in the kitchen utensil assortment, wooden cut boards and ladels, metal containers, measuring cups etc. instead of plastic. It has fewer chemical hazards but outtake of forest which might make the forest and metal raw materials into a CO₂ source instead of sink.○ Food contact materials: glass containers vs single-use plastics. Glass is very heavy and thus takes more energy to transport. In contrast, plastic is lighter and does not have the same risk of being crushed. Glass needs to be used very many times since the production process and recycling demand high temperatures and, thus high energy consumption (climate issue).
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Figure 3. Conflicts involving reduced plastic use.

There are also situations when these three focus areas create synergies, adding the benefit to the other focus area, see Table 2.

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Table 2. Synergies in the ChemClimCircle approach

Thematic area for synergy	Examples
Chemical content increase reuse and recyclability	<p>Electric and electronic (ICT) devices, criteria for less harmful chemicals in procurement yields an easier recycling process later and less harmful substance exposure in countries where this equipment is disassembled.</p> <p>Types of plastics which are better from a chemical perspective are also better from a circular view. Polyethylene (PE), polypropylene (PP) and polyethylene terephthalate (PET) are the better types concerning chemical content and the ones which are the easiest to recycle in the current systems.</p>
Less use of (new) plastic:	<p>Recycled plastic is preferable to new plastic from a climate protection point of view because it has a lower carbon footprint.</p> <p>Change from single-use to continuous-use items gives a synergy, less plastic and less climate footprint and a more circular approach. For example, textile wash napkins instead of plastic ones. These can be washed and used many times and then recycled into other textile items, although some energy is involved in the wash cycles.</p> <p>Material might be more resource intensive to produce so it is important that the multiple use materials are used many times.</p> <p>There is a need to steer towards less plastic use (more wood, glass, and metal multi-use items) but also a need to steer towards more circularity, reuse of items many times, and then make new items with recycled content.</p> <p>Use of natural fibres instead of synthetic textiles with flame retardant additives - better to choose natural fibres for use of less plastic and chemicals.</p>

5. Implementation of the ChemClimCircle approach in procurement

When public procurers are aware of the linkage and synergies between climate, circularity and chemical issues, conflicts between these three objectives can be avoided, and informed preference be given to one or two of the goals if no win-win-win situation exists.

The implementation of in an organisation`s procurement system has to be part of its overall GPP process that is integrated into strategic, managerial and practical activities. :

- Strategic and management level. For successful GPP and ChemClimCircle practice, a strategy and political commitment in the municipality is a must. Along with the strategic objectives, the management of the municipality shall set organisational structures and procedures for ChemClimCircle implementation.
- Practical application where procurement decisions are taken and criteria are set by procurement staff and experts in the organisation.

All the levels must work together. Sustainable procurement strategy development can only work in a long-term, sustainable manner if a strategy with goals and objectives is in place. Feedback with measurement of impact should be established and continual development need to be ensured.

5.1 Management decisions, processes and structures

All procurement processes start with strategic decisions, made at the higher level and having necessary political, or top management commitment.

Strategic level means that the decision or commitment is taken at the political and organizational top management level, and further expressed by development of documented policies, planning documents and visions that the municipal organization adopts to formulate the policy for a special topic.

Strategic level also needs political backing. Without political backing it can be difficult for those committed to implementation to get effective co-operation from colleagues, particularly from those in other departments.

The strategic decision then needs to be developed into an appropriate procurement strategy that supports the use of the ChemClimCircle integrated procurement criteria. The strategic documents can take various forms, a municipal development plan, for example, may include descriptions on how the GPP processes should be performed, as well as providing links to the

goals and objectives in other action plans and documents relating to climate, circularity, and chemicals. Strategic documents shall provide:

- clear objectives and targets.
- responsibilities.
- monitoring and reporting.
- continuous improvement.

It is important that the monitoring and impact assessment is considered at the strategic level, where information on impact achieved, information on performance of procured goods and services and other aspects are fed back to management, ensuring continued improvement in the procurement practice within the field of GPP (including aspects).

5.2 Organizational structures and procedures

Implementing the ChemClimCircle approach will require certain organisational management. At the organizational level, it is necessary to establish the management structure and appropriate procurement organization to align with and implement the strategy and reach the overall objectives and goals.

Organisational level means that there is organization, internal guidance, procedures, different tools and instruments, as well as the necessary knowledge and competence for the implementation of the strategy in order to reach the objectives and targets of the organization.

There are various tools and approaches to aid in the organization of GPP. In essence, the ChemClimCircle approach does not differ that much, but certain elements are most appropriate for successful ChemClimCircle cases:

- Internal organisation and connections within the organisation, among procurement staff, environmental experts, contract controllers etc.
- Establishing an internal guidance system for ChemClimCircle integrated procurements.
- Communicating with end-users and building understanding among recipients on the assortment of procured products and their ChemClimCircle aspects, building demand for these products internally and clarify different methods needed when using new alternatives.
- Communicating with suppliers via market dialogues.

Most municipalities have procurement divisions established, and some also have sustainability/environmental departments or specialists in the organisation. The ChemClimCircle approach will not require any new organisation, but there will be a need to bring more competence, for efficient integration of tox-free, circular, and climate-neutral procurements, as well as coordinating and educating internally on this subject, within the established organisational structure. In smaller municipalities, there will be more limits to the availability of specific ChemClimCircle competence. These municipalities can get support from national organisations who have the competence of GPP.

In the City of Stockholm, as an example, there is a Chemical centre and a Centre for Circularity, which are both part of the Environment and Health Department. These have the competence to

give support on choice of relevant criteria for chemical content in different materials and products as well as for criteria on climate and circularity suitable for different specific procurement areas. The Environment and Health Department coordinates the support for criteria for different sustainability areas and cooperates with other units in the city (see Figure 4).

Collaborations for sustainable purchasing processes within the city



Figure 4. Example from the City of Stockholm on contacts within the municipal organization in order to facilitate the ChemClimCircle approach in procurement processes.

Gentofte municipality in Denmark provides another example; in the department of *Tenders, Contracts & Climate Economics* there are three teams including: 5 procurement officers, 3 contracts controllers, one e-trade officer; one environmental economist, one climate economist, one data analyst and one project coordinator. All 13 employees have roles within the purchasing processes in the municipality and are communicating horizontally.

5.3 Communication with end-users and recipients within the municipality

The ChemClimCircle approach to procurement must be more customer oriented than traditional procurement. I.e. the end-users/recipients of the procured assortments must be more deeply involved in the procurement process. A transparent and open communication of the procurement goals and their importance is a central part of the ChemClimCircle approach to procurement. This is because the foundations for successful sustainable procurement must be laid at the very beginning of the process, i.e., when describing demand. This means that the demand side (end users and recipients) must understand the goals and targets of the GPP. To this end not only the procurers must be trained in what and how to procure, but also the end-users must be trained to understand why there is a shift towards more sustainable products and how these are to be used. At the same time, sustainable alternatives to current, possibly unsustainable order habits must be demonstrated in the organisation through active

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communication. Also, the procurement decisions, i.e. the possibility of award criteria, must be communicated and discussed with the demand side. The latter is important to make sure that the sustainability goals of procurement do not bypass the demands.

A successful ChemClimCircle procurement thus entails active communication with the end-users and recipients. When approaching the end-users, clear and simple messages should be used to increase awareness for both the importance of ChemClimCircle smart consumption patterns and the significance of making ChemClimCircle smart decisions in every order. Central statements of the communication with the end users could be for example: “Hazardous substances are a risk to human health and environment” or “The chemical load to our environment (both indoors and outdoors) can be reduced by procuring and purchasing better choices of products and services.”

Many municipalities that aim for sustainable procurement have already established support structures in the form of competence centres or similar. In Hamburg, for instance, there is a Competence Centre for sustainable procurement since 2019 (**Kompetenzstelle für Nachhaltigkeit** im Einkauf). The defined tasks of the Competence Centre also include the facilitation of communication between the procuring entity and the contracting authority. It is noteworthy, that a lack of communication in the procurement process is often perceived as an existing barrier to implementing sustainable procurement even in the municipalities with existing support structures. The support centres (both on national and municipal level) should have appropriate communication expertise at their disposal.

The communication strategy can be a very targeted case-by-case communication in which procurement and sustainability experts inform the end-user about the topic. This kind of consultancy should be part of every procurement case. The strategy can, on the other hand, be a widespread untargeted end-user communication. Publishing informative articles or running informative campaigns via municipal communication channels is a method that has successfully been used before.

The communication portfolio can also include events, that brings together representatives of a certain end-user target groups. A basis for this approach to demand-side communication could be procurement summits, which take place regularly in cities and countries. Public purchasers, procurement lawyers and consultants as well as representatives from business, science, politics, and associations can meet here regularly. Hamburg, for example, has hosted the Hamburg Procurement Day once a year since 2016. So far, the goal of these events has been a market dialogue, but that could be extended to the end users.

A mandatory and standardised communication process could be inserted into the organisational setup for sustainable procurement. The procurement office of the Federal Ministry of the Interior of Germany, for example, provides a checklist for the description of the demand by the end-user. In this checklist, reference is also made to the legal framework for sustainable procurement and some specific questions are asked regarding energy efficiency, life cycle costs, recyclability, etc. of the requested products. With this tool, the end user is already made aware of sustainability criteria in procurement at an early stage. The stronger the targets for reducing hazardous substances are embedded in a municipal strategy, the easier it becomes to raise awareness and discuss this topic also with end-users.

Useful links

- Information for demand side actors from the Procurement Office of the Ministry of the Interior (site only available in German):
https://www.bescha.bund.de/DE/FuerBedarfstraeger/InfosFuerBedarfstraeger/infosfuerbedarfstraeger_node.html
- Guide to chemical smart procurement: <https://thinkbefore.eu/wp-content/uploads/2020/07/TC-chemical-smart-procurement.pdf>

5.4 Communication with suppliers and market dialogue

In order to know more about what is available from potential suppliers, a market consultation can be arranged. The aims of the consultation are (EC, GPP Training Kit, 2019):

- **Identify** potential bidders and available articles, products and other solutions within the specific procurement area;
- **Build capacity** in the market to meet the requirement(s);
- **Inform** about the design of the procurement and contract.
- **Help suppliers** to submit strong bids.

The need for market engagement is because it is impossible for an end user or procurement officer to know all the latest market developments. Similarly, no company can have a complete understanding of municipal purchasing requirements, such as the strategy to reduce hazardous substances (Kontturi, 2018)). Companies tend to develop their products according to demand, and municipalities can affect the direction of development through their demand power. Moreover, the municipalities cannot demand just anything in the search for cost-effective solutions. This is why the procurement unit should prepare the procurement and its possible content after dialogue with companies.

Market dialogue is beneficial for both the market actors and the municipalities. In fact, cooperation is supported by the EU Procurement Directive (Kontturi, 2018). What is important is that every potential supplier receives the same information.

Consulting the markets is one tool that can be used when a city wants to reduce the load of hazardous substances by public procurement. By consulting the markets, the municipality creates a win-win situation and gets up-to-date information about the safer choices companies can offer and which demands are still out of their reach. At the same time, the market gains awareness of the municipal purchasing needs. (Chemical smart procurement, page 24).

When municipalities make enquiries, they send a message: “We are interested in more sustainable choices both today and in future; we want to build relationships with those suppliers whose products fit our values.” (Kontturi, 2018). This is a clear message that there is a market for products that consider sustainability, including ChemClimCircle factors and that there are good business opportunities in meeting this demand.

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Even if the procurement unit has carried out a similar procurement before, the market may have changed and evolved, which is why a market consultation guarantees an informed and successful procurement process.

There could be various ways for market engagement. Procurers should select the best set-up for the interaction, including determining the necessary information to be shared with potential suppliers beforehand. For example, they may be:

- Independent market analysis.
- Request for information.
- Information event.
- One-on-one meetings with many potential suppliers.
- Other models of cooperation (See 3-in-1 model from City of Gentofte below).

Best practices and case studies can help as inspiration for market dialogues. While a ChemClimCircle project can be innovative for a specific municipality, there might be examples of similar products and services being supplied to other municipalities. Municipalities should prioritize finding examples from similar context since it can facilitate obtaining organizational support.

It is important that the market dialogues are set well in advance of actual procurement advertising. For example, the procurement specialists in the City of Gentofte have experience that it is for about a year before the actual advertising for tender starts.

An example of stakeholder engagement in the City of Gentofte, Denmark, is presented below. It is not a specific approach for ChemClimCircle but a long-term, building partnership approach that involves commercial and social partners. This is a trend for the future on how to take into account the stakeholders' interest and knowledge, and balance them to achieve the best environmental, social and economic value.

5.5 Internal guidance and procedures/programmes for the ChemClimCircle approach in procurement

Setting up a documented guidance system for the ChemClimCircle approach in procurement can be helpful. This can take various forms, for example:

- An action plan or programme;
- An internal guidance document;
- Procedures for the ChemClimCircle approach.

These internal guidance documents can contain recommendations for the ChemClimCircle approach in procurement, prohibitions (items that are not allowed to be procured), and other elements. There are also supportive tools used by municipalities, such as CO₂ footprint calculators, life cycle cost calculations and others.

5.6 Examples of management documents and organisation

5.6.1 Example from the City of Stockholm (Sweden): Environment programme, programme for purchasing, and the Chemical Action Plan

- The City of Stockholm has planning documents with corresponding commitments for integrating environmental issues into purchasing: **Programme for purchasing** and **Environmental programme** (see Figure 5)
- For the City of Stockholm, there are 7 sustainability priorities in the Environmental programme: (1) fossil free city, (2) fossil free organisation, (3) climate-adapted city; (4) resource smart city; (5) biodiversity; (6) fresh air and low noise environment; (7) tox free city.
- These are further elaborated into the guidance and action plans, including **Chemical action plan** (see described below), Climate action plan, and others.

Political decisions guide the work through strategic documents



Figure 5. Strategic documents in the City of Stockholm.

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There are many action plans under the City's Environment program, described in Figure 5 above, stating how the goals in the program can be fulfilled; the Chemicals action plan is one of them. Other plans are the Climate action plan, the Action plan for sustainable use of plastics, the Action plan for circular construction processes and the Action plan on biodiversity. These plans all refer to procurement as a strategic tool which should be used to reach the goals set within the Environment program and the specific action plan.

Chemical action plan

In chapter two of the Chemicals action plan for 2020-2023, the principles for chemical smart procurement processes are laid out. Criteria for avoidance of hazardous substances in articles, products, and materials, focusing on items in the indoor environment, are to be included in both market analyses, procurement tender documents, follow up procedures during the contract period and in dialogue with the operative units and the staff which handles the purchases from the procured assortments. Experts from the Environment and Health department are involved in all these processes for the prioritized areas of purchase, of which there is a list in this chapter of the plan.

The work with the Chemicals action plan has shown that a success factor is a well-thought-out launch of plans so that managers and management teams become aware of them and understand their role. This is something that, for example, environmental coordinators at the city districts testify to. Most of the actions have at least started, but how far the work has come varies between areas, action types and units involved. Within the city districts, for example, they have come a long way in, above all, chemical-smart preschool actions and utilization of the central chemicals management system.

Figure 6 shows the Chemicals action plan priority areas for criteria on chemical content in procurement processes in the City of Stockholm. These areas are prioritized due to the high content of chemicals in the related assortments as well as a large potential to set criteria to avoid hazardous chemicals in the same assortment. Another criteria for prioritization is if the assortment is going to be used by children or in the units where children spend their days, such as pre-schools and schools. Another way to reduce chemical exposure is making choices in the assortment, but ideally, the assortment should be as free as possible from articles and products containing hazardous substances. This can be done in various ways, i.e. specifying which plastic types that are allowed, specifying the products/articles with less risk of HS content, specifying natural materials instead of plastics etc.



Figure 6. Priority contract areas for chemical criteria in Stockholm's chemical action plan.

5.6.2 Example from Gentofte municipality (Denmark): The municipality's environment and procurement policies

Gentofte intend to meet national and local targets for Green Transition using a "Tripple Bottom Line" (economic, social, climate and environment). This includes reduced impact on the climate and environment as well as mitigation and adaption to climate change. The procurement strategy is linked to clear objectives and targets, see Figure 7.



Figure 7. Gentofte Procurement policy

5.6.3 Gentofte model: a 3-in-1 cooperation model for more sustainable procurements

The City of Gentofte has developed and is using a model called 3-in-1 for their procurements. The model is used for better implementation of the city's Procurement strategy and to reach the triple bottom line; economic social, climate and environmental targets.

The 3-in-1-Model is based on interdisciplinary cooperation between the Labor Market representatives. The purpose is to define and set up balanced contract requirements, which facilitate cooperation during the contract period. The model involves cooperation between Gentofte municipality, employers' associations (Danish Chamber of Commerce and Confederation of Danish Industry) and trade unions (FOA, 3F). The aim of the 3-in-1 dialogue is to

- To understand the interests at stake.
- Utilize the parties' combined extensive knowledge.
- Align expectations for the tender and the subsequent task solution.

There is an extensive knowledge in the industry and amongst employees (trade union representation), which can be used in preparing the tenders. By involving representatives from both the employee and employer side, a suitable level is found between requirements for the services provided, working conditions, remuneration and attractive pricing.

An open transparent dialogue is carried out between the parties, where the parties' expectations for quality, price, working conditions and other relevant contractual requirements are agreed upon prior to the tender. These expectations are reflected in the price structure of the subsequent tender.

The aim of the dialogue is to achieve:

- That the services provided are consistent with the municipality's wishes and expected requirements.
- That the interpretation of the agreement becomes easier - and the conflicts fewer - because the Labor Market Representatives have already agreed on the expectations for the services provided before the conclusion of the contract, e.g., in relation to education level, environmental requirements, standardization levels etc.
- Clearer requirements and thus less uncertainty for tenderers in connection with submitting tenders.
- A competitive pricing, and an actual price that corresponds to the expected performance.
- To prevent social dumping, including ensuring that there is a correlation between pay and working conditions for employees and the prices offered, for example by checking compliance with Danish laws and regulations, tax payment, working environment and social security.

In the 3-in-1 process, the municipality is the initiator and project coordinator and must ensure consistency between (tender) legislation and the commercial goals.

Prior to the implementation of the tender, the municipality must ensure the cooperation of the other two labour market parties in establishing balanced requirements within the quality of the services, pricing and working conditions. The municipality must therefore, prior to carrying out a 3-in-1-Tender determine a process and a timetable for the involvement of the two parties.

The model is mostly used for large volume contracts. The attractiveness to the ChemClimCircle procurements of this model lies within the benefits for all parties, such as gained joint knowledge, clear expectations from all parties, and ability to negotiate and find the best solutions, as well as opportunity to educate everybody on a particular subject, for example, providing and disseminating knowledge on hazardous substances and the ways to prevent exposure to them for three target groups at once: industry, municipality and employees.

5.6.4 Example from KEINO (Finland): a support structure for municipalities

KEINO⁴ is a network-based Competence centre for Sustainable and Innovative public procurement in Finland. Being operative since 2018, KEINO supports and helps public procurers with sustainable and innovative public procurement. KEINO plays a key role in the implementation of a Green Deal contract in cooperation with the government.

KEINO was established to provide a support and knowledge base for public procurers in Finland. The decision to make a support organization was made at the governmental level. The founding members responsible for the operation and co-development are Motiva Ltd, VTT Technical Research Centre of Finland Ltd, The Finnish Funding Agency for Innovation – Business Finland, the Finnish Environment Institute SYKE and Hansel Ltd. KEINO Change Agents (*KEINO-muutosagentti* in Finnish) act as the local contact point for the Competence Centre, bringing KEINO's activities and support closer to public procurers locally.

In this case we look into KEINO's task of coordinating green deals, which are voluntary agreements between the state and the contracting entity. A green deal typically covers one or more themes or procurement categories in which the parties commit to improve sustainability in procurement. At the same time, a green deal creates new kind of procurement cooperation and competence structure, where the procurement process can be monitored, and impacts assessed.

A green deal helps procuring authorities to reach their strategic objectives, for instance emission targets. A procedure with high ambition and common criteria has significant impact on the market and on societal objectives. KEINO provides help in assessing the impacts of the procurement and support co-operation during the contract period. The procuring authority receives expert help for the preparation of the procurement, defining the criteria and development of tools for evaluating impact. As a frontrunner the procuring authority gets visibility both nationally and internationally.

KEINO has helped to implement several "green deals". Here we present the green deal 'reducing hazardous substances in kindergartens and pre-school environment':

⁴ <https://www.hankintakeino.fi/en/about-keino>

The goal of the green deal agreement for reducing hazardous substances in the early childhood environment is to reduce the exposure of children to chemicals.

The agreement's goals are:

- Reduce content of antimicrobial substances, fragrances, and dyes as well as substances of very high concern (SVHC) in environments.
- Apply stricter chemical restrictions than was required by the EU Toy Safety Directive and Finnish law on the procurement of all toys (kids under 14 years old).
- Encourage municipalities and other contracting public authorities to require information on substances of very high concern on call for tenders.
- Create shared procurement criteria and contract terms for the reduction of harmful substances.

The criteria for detergents and cleaning services were published in 09/2021, outdoor playground equipment and furniture in 02/2020, indoor toys in 10/2020, and indoor furniture in 3/2023. Criteria for textiles will be published in 2023 and new building construction and renovation in 2023-2024.

5.6.5 Example from Ii municipality (Finland): an ambition from a small municipality

Another example is from the municipality of Ii in Finland. It is a small municipality of 9,849 inhabitants in northern Finland. They have developed a strategic development document entitled “*Roadmap for Resource-wise Ii*”. All the decision-makers, officials and subsidiary companies were able to influence the document in a working group. A decision was also made that the resource-wise Ii management team includes the chairs of the boards as political decision-makers, leading civil servants and CEOs of the group's subsidiaries. The document is updated annually.

Roadmap Resource-wise Ii goals to be achieved before 2050:

- 1) No climate emissions – The municipality operates carbon-neutrally and does not produce greenhouse emissions that affect climate change.
- 2) No waste – The municipality operates in a circular economy, where materials circulate, and no waste is generated.
- 3) No overconsumption – The municipality consumes natural resources within the planetary boundaries.

In 2022, the focus was in the sectors of waste management and improvement of energy efficiency in street lighting. There are more specific objectives for the five main sectors in the document, including energy production and consumption, transportation and built environment, food production and consumption, as well as water consumption and natural waters. The specific focus areas are decided annually.

Results achieved are:

- A Nordic Swan eco-labelled school was built in the municipality in 2020 (Alaranta). The central kitchen runs on geothermal heating and part of the energy comes from solar power.
- Another example is commuting, which can be done with a leased electric car, which is part of the sharing economy, i.e., can be rented by municipal residents. Vehicles used in property maintenance are electric cars.
- Circular economy purchases also include solar cells and power plants among other things.
- System for circulating goods and furniture within the municipal organisation. This is also considered for expansion to be used by municipal residents. A lending facility might be set up in connection with the library e.g., for tools. In addition, the kierto.net service is used, among other things, for borrowing seldomly used machines and equipment.

This example shows that the political commitment can initiate changes independent of the size of the municipality. However, here it is necessary to ensure that support structures will be available. The municipality officials have noted the significance of sharing competence in networks that are related to circularity and procurement. This small municipality of Ii finds the expert support offered by the national networks extremely useful when implementing the above-mentioned actions.

5.6.6 Example from the City of Hamburg (Germany): GPP guidelines

The City of Hamburg has established GPP guidelines since 2016, which were updated (2019). They have not been made with an integrated ChemClimCircle approach; however, they are a good in demonstrate the ways it can be done in municipalities. In Hamburg, there are environmental criteria developed for 19 product groups (see Figure 8), and there is a negative list of the items public procurers shall not include in the assortment (see Figure 9). The negative list includes single-use cutlery, capsule coffee machines, one-way packaging, air refresheners etc.

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Figure 8. Product groups with GPP criteria in the city of hamburg gpp guidelines

The Green Procurement Guidelines designate specific environmental criteria for 19 product groups:

 All kinds of office supplies (e. g. paper, paper clips)	 Postal services (e.g. mailing campaigns)
 Furniture (e.g. shelves, cabinets)	 Medical consumables and devices, including maintenance and repairs (e.g. examination gloves)
 Electronics, consumables (e.g. projectors, television sets)	 All kinds of motor vehicles (purchase, leasing and rental) and car tyres
 Recovery and disposal services (e.g. waste furniture, wood waste)	 Wooden and derived timber products (e.g. slatted frames)
 Sanitary products (e.g. tissue-paper products, towel dispensers)	 Cleaning services (e.g. floors, window sills)
 IT (e.g. desktop computers, screens)	 Everything related to greenery (e.g. cut flowers, ornamental plants)
 Interior lighting (e.g. lamps)	 Clothing, textiles, linen, footwear, laundry and repairs
 Varnishes and paint (e.g. wall paint)	 White goods and kitchen appliances (e.g. washing machines, kettles)
 Food (e.g. dairy products, vegetables)	 Tools and material, craftsmen's needs, floor coverings, wall paint and other materials for interior construction
 Printed matter (e.g. brochures, flyers)	

6 Negative list

The Green Procurement Guidelines list seven products and product components that should not be procured as a matter of principle in Hamburg. This negative list is designed to prevent the occurrence of certain negative environmental impacts.

➤ So far, the negative list contains the following products and product components:

- Appliances for making hot drinks involving the use of portion packs, such as capsule coffee machines
- Mineral water, beer and soft drinks sold in one-way packaging. This also applies to one-way packaging for which a compulsory deposit is charged. Exceptions to this are carton packaging, tubular bag packaging and stand-up foil pouches
- Disposable crockery and cutlery in canteens and cafeterias
- Products with transport packaging made of cardboard containing less than 80% recycled material (mass)
- Chlorinated cleaning agents as well as drop-in tank toilet fresheners and air fresheners
- Equipment for heating and cooling air outside enclosed spaces, e.g. gas mushroom heaters, similar electric radiating systems and air conditioning units. Heating devices required for winter construction work are an exception
- Heavy metal based colourants.



Figure 9. Example of negative list from the city of Hamburg GPP guidelines

Source: <https://www.hamburg.de/contentblob/6789344/b75ca35ac5a3431b375ac5f4cd3e531d/data/d-umweltsleitfaden-kurz-englisch.pdf>

5.6.7 Example from City of Västerås (Sweden): Action plan for sustainable use of plastics

City of Västerås has developed an “Action plan for a sustainable use of plastics in Västerås 2022-2025” (adopted by the Municipal Council 2023-02-02). Sustainable plastic use means that plastic is used in the right place in resource- and climate-efficient, non-toxic, and circular flows with negligible leakage. Part of the action plan focuses on “Conscious purchasing and smarter use of plastics” as its focus direction. Within this focus area, City of Västerås strive to ensure that no harmful or unnecessary plastics are present in their operations. Activities include setting criteria in the city's procurements, improving purchasing practices and raising awareness among those working with procurement and purchasing, and raising awareness of the contents, properties and function of the products used.

There is related guidance for sustainable procurement and purchasing of plastics in the city. Sustainable plastics procurement means reducing, reusing, and making informed choices concerning plastics in procurement and purchasing. By working strategically with procurement and purchasing, we can reduce the climate impact of plastics, reduce the amount of waste, and contribute to a functioning market for recycled plastics and bring more sustainable solutions to the market.

There is a checklist for **use, purchase, and procurement of plastic-containing products**:

- 1) *Replace plastics with another materials: Choose materials other than plastic, such as wood, metal, and porcelain. Choose products that can be used several times instead of disposable products, where possible.*
- 2) *Choose recycled plastic: If you must choose a plastic product, choose one made from recycled plastic in the first place. As the material is already in circulation, it does not add any carbon dioxide to the atmosphere and can circulate about five to seven times before it wears out. PE (polyethylene) is the plastic most in demand by recycling market.*
- 3) *Choose renewable or bio-based plastics: Secondly, choose plastic products made from bio-based materials, such as Bio-PE, which is made from renewable raw materials. It has the same structure and function as fossil PE. If fossil plastics must be purchased, ensure that the product contains as few composite plastics as possible to simplify recycling.*
- 4) *Avoid certain products: Most products made from so-called biodegradable or compostable plastics do not break down in nature or in the household compost, only in industrial processes, so avoid these where possible since industrial composts are not widely available.*
- 5) *Remove certain products completely: PVC (polyvinyl chloride) and PS (polystyrene) products should never be chosen. Both PVC and PS may contain endocrine disruptors and should therefore not be used in contact with food.*

6. Practical implementation

6.1 Needs assessment and market check

Preparing a procurement starts with needs assessment. The procurer identifies organizational needs and the challenges to be solved. When the needs are identified, alternative means to fulfil them can be analysed. How can the goals of circular, climate neutral and tox-free procurement be achieved while still fulfilling the needs in the organisation? Procurers can also benchmark suppliers' different business models and think beyond traditional ways of procuring, what can the market provide? What are we buying? Can we rent instead of buying? Do we need to buy, or do we already have what is needed in stock or as a part in another contract?

6.2 Circularity into consideration

In a circular economy, resources and materials circulate in the economy for as long as possible while maintaining their value. In procurement, this draws attention to such ideas as long life and make-use-return systems.

Alternative models to traditional procurement of goods are, for example:

- renting (buying an item for a short fixed period and then returning it)
- leasing (renting an item for a longer fixed period and it is sometimes possible to agree on the redemption of the product)
- pay-per-use (the customer pays for using the item at each instant, rather than having to buy it), or
- product-as-a-service (buying services and solutions, not the item itself).

Other factors to consider for circularity in a procurement are such as the supply of maintenance services and spare parts, design, modifiability as well as disassembly and other policies at the end of the use period. Procuring services instead of an ownership is often advisable and confirms that the supplier too is committed to circular economy practises.

Circular procurement also combats climate impact as it reduces the need to use new resources and production of completely new products. In order to focus on climate neutral procurement, purchase categories that are hot spots, impacting for example, the CO₂ footprint the most, should be identified.

6.3 Check for chemicals

When procuring tox-free, it is important to know which substances of concern that can be present in which materials and products, when procuring goods or services in which consumables play a significant role. The EU chemical legislation aims to ensure chemical safety; however some hazardous substances which are not yet included in the legislation can have severe adverse effects on both human health and the environment. Banning of a substance is a long process and even though there might be a consensus about the harmfulness of a specific chemical, restriction actions are lagging. Furthermore, since there is a

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lack of awareness of the chemical content of everyday products due to a lack of labels of contents for articles, we need to be proactive and set strict criteria in our public procurements. This specifically concerns products that will be used by stakeholders having greater risk for harmful effects from chemicals, like children and adolescents.

In terms of a circular economy, pay attention to chemicals in materials so that they do not prevent the reuse and recycling of the material and choose accordingly. In addition, prefer materials with less chemical risks, e.g., avoid plastics. The combined effects of chemicals are more harmful than exposure to single substances.

Non-toxic procurements take risks from chemicals in products and materials into account. Firstly, the user group of the product should be considered, products and materials with risks of hazardous chemical content can be listed (e.g., plastic, textiles, panels and flooring). Procurement criteria that are targeted to a specific item or material should then be considered since specific hazardous substances are relevant for specific materials.

For example, if the product will be used by children, extra care should be taken. The Finnish KEINO competence centre has listed toy categories that should be paid attention to. The list includes moulding waxes, finger dyes and slime, metallic products that stain fingers or from which fingers smell, play mats and soft toys and soft dolls to name a few. (Keino-osaamiskeskus, Haitallisten aineiden vähentäminen varhaiskasvatuksen hankinnoissa – kestävien hankintojen green deal., 2022), see Table 4.

KEINO has also developed a green deal for indoor play equipment, which includes following requirements (Keino-osaamiskeskus(a), 2022) , see Table 3.

Table 3. Green deal requirements for indoor play equipment in Finland

The requirements apply to products for children under the age of 14 and that are partly or fully intended for play	
Antimicrobials	Antimicrobials must not be added to the products offered. Exception: Preservatives not classified as sensitizers may be added to water-based crafting materials (i.e., for which the following entry is required: 'Contains [name of sensitiser]. May cause allergic reaction' (EUH208)).
Perfumes	Fragrances must not be added to the products offered. This requirement does not specifically apply to games or materials based on smells and tastes, including doughs. These products must comply with EN 71-13:2021.
Nitrosamines and nitrosatable substances	Nitrosamines more than 0.05 mg/kg and nitrosatable substances in excess of 1 mg/kg must not be released from the products offered.
Formaldehyde content	In the products offered, the concentration of formaldehyde (CAS: 50-00-0) must not exceed a limit of 30 mg/kg. The limit applies to individual parts of the product, not to the total content of the product.
Substances of Very High Concern (SVHCs)	The product offered must not contain substances of very high concern, i.e., SVHCs greater than 0,1 % by weight. Substances identified as SVHCs can be found on the EU Candidate List.

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If new substances are added to the Candidate List during the contract period, the new products to be supplied may not contain these substances. This does not apply to products that have already been purchased but can still be used for the same purpose.

For some candidate list substances, like bisphenol, there are also requirements for low migration.

Dyeing agents

Products intended to leave colour (e.g., face paints), processed liquids (e.g. mucus), plasticine and similar products shall not contain more than 10 mg/kg of colouring agents.

Table 4. Hazardous substances in common product groups

Hazardous substances	Product groups
Flame retardants such as polybrominated diphenyl ethers (PBDE) and organophosphates.	In furniture upholstery and textiles as well as electronic equipment.
Plasticizers such as phthalates in chemical products, such as filling foams, and vinyl plastics (PVC),	Flooring materials, gardening hoses, cling film and toys (toys containing over 0,1% of phthalates are illegal to sell in the EU, but it still happens).
Monomers such as bisphenols and vinyl chloride.	Bisphenols can be found in polycarbonate plastic used in kitchen utensils and epoxy products. Vinyl chloride is used to make PVC plastic (vinyl) for use in flooring and other construction materials, gardening hoses and equipment, cling film and toys.
Antimicrobial agents such as organotin.	Can be found in paints and some plastic articles.
UV-stabilizers such as benzophenones and benzotriazolones.	Used in plastics in general to avoid rapid degradation when exposed to sunlight.
Toxic metals like cadmium and certain variants of chromium.	Chromium can be found in leather products.

7. The process of selecting criteria

Criteria can be selected in the following steps (Figure 10) ((Kontturi, 2018) p. 38)):

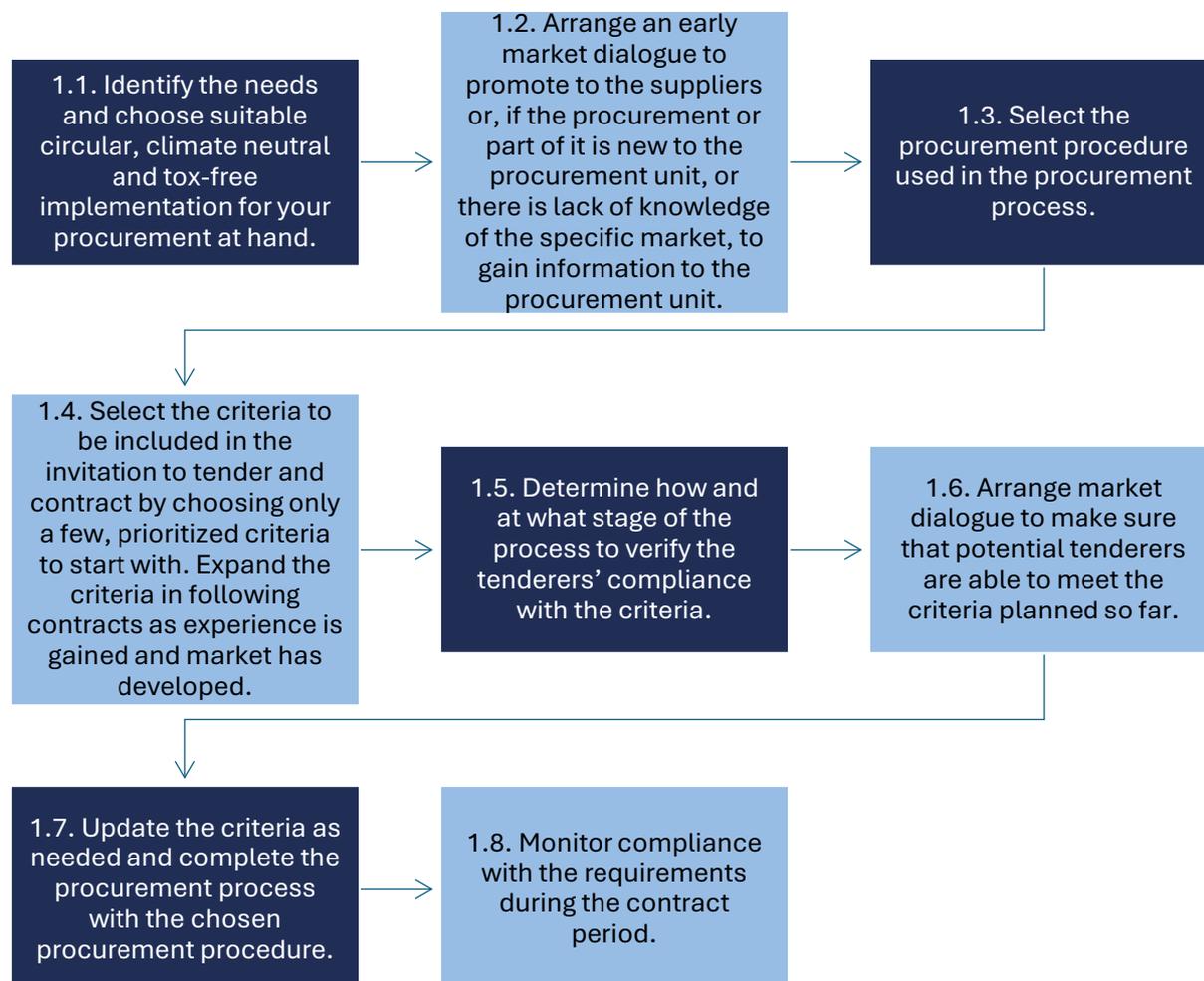


Figure 10. Steps of the ChemClimCircle criteria implementation in public procurement

7.1 How to approach a new way of implementation

For a procurer with no prior experience of the ChemClimCircle approach in procurement, it is advisable to start with selection of a relatively simple product group, e.g. cleaning agents. Larger the volume of the procurement is, the bigger the impact (Keino-osaamiskeskus, 2021); (Van Oppen, 2018).

Examples of procurements implementing circularity, climate-neutrality, and tox-free considerations: (Lankiniemi, 2023):

- Electric city bikes as a leasing service.

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- Wood-structured school: The school's CO₂ footprint is about 44% lower than that of a school made mainly from concrete of the same size that uses district heating. The building is heated by geothermal heat and solar panels are installed on the building.
- Promoting the reduction of harmful chemicals in, for example, daycare-related purchases, such as toys.
- Extra points awarded for food transports if a biogas or electric vehicle is used.
- Goods as a service and leasing: computers, cars, entrance carpets, maintenance of workwear and extending the use of things, continued use of repaired clothing for work tasks where the appearance of the garment does not matter.
- Electricity produced from renewable sources.
- Cleaning services required to use products with the EU Ecolabel or the Swan label. The proportion of eco-labelled cleaning products should be at least 50%.
- In the tendering of indoor construction supplies and paints, the volume product list included environmental requirements set for the products. The indoor paints and floor coverings offered were to have emission of certain substances below a certain limit value.
- In food services, adding vegetarian food where possible, monitoring and addressing wastage.

Example: the City of Helsinki has combined the three aspects in the procurement of Self-owned and rental work clothes with laundry services, in which the goal was to study the differences in life cycle impacts depending on whether the clothes were procured as product or as service.

7.2 Setting criteria

Technically procurement criteria, in which the ChemClimCircle approach is implemented, can be set as:

- Tenderer requirements;
- Minimum requirements;
- Award criteria, and
- Contractual terms that identify the criteria that most affect the chosen aspects.

The criteria should be feasible in a cost-effective manner. It is not advisable to narrow the market by using such procurement criteria that can be applied by very few or only one supplier.

Circular criteria can be targeted, for example, to extend the service life, recycling potential or using recycled materials, or the contents of materials or products. This has to be implemented differently in different sectors, and in many cases, the possible integration of, for example, transport, catering, cleaning or maintenance services to the main object of the procurement at hand has to be taken into account. (Alhola, 2022)

Climate-neutral criteria can focus on, for example, CO₂-neutrality and energy-efficiency. It is advisable to use standards which are widely accepted, such as Worldwide Harmonised Light Vehicle Test Procedure (WLTP) measurement of vehicle fuel consumption in the case of procurement that includes transit [3b]. Regarding CO₂-footprint and energy-efficiency calculations, there are many different calculation methods. Use of these calculations in

tendering process should be considered case by case because the method has to be reliable and comparable. To ensure equal treatment of suppliers, it is vital that the information used is supplier-independent, meaning that all suppliers need to use the same calculation system that is provided by the tenderer, and which is based on objective and scientific methods.

7.3 Using pre-made criteria

The European Commission publishes and updates Green Public Procurement criteria, which are sustainable minimum requirements and award criteria, for multiple product and service groups. The criteria and other GPP material are available on the EU GPP website, see more below in 'Useful links'.

There are criteria concerning, for example, life-cycle costs/assessment, recycling, chemical content, energy-efficiency and CO₂-neutrality for multiple product and service groups. The criteria are set on the levels of core criteria and comprehensive criteria. The core criteria are for procurement units that look for GPP with low-effort. The comprehensive criteria are for procurement units that aim for procuring the market's best environmentally friendly solution (this requires more resources).

As a case example, the City of Tampere in Finland introduced circular economy procurement to road construction by utilizing EU GPP criteria amongst other criteria. In the procurement, the objective was to promote sustainability and circular economy goals of the city, and it implemented a Build & Design (B&D) operating model for the chosen tender. There were multiple criteria utilized in the request for tender as requirements: firstly, the EU Green GPP Criteria for Road Design, Construction and Maintenance (2016), and secondly, criteria for waste production during excavation, excluding construction and demolition waste. Additionally, an Excavation Materials and Soil Management Plan was required. See more information in 'Useful links' below.

Useful links:

- Green Public Procurement: Criteria and requirements https://green-business.ec.europa.eu/green-public-procurement/gpp-criteria-and-requirements_en.
- Case: Introducing circular economy procurement to road construction in the City of Tampere https://green-business.ec.europa.eu/green-public-procurement/good-practice-library/introducing-circular-economy-procurement-road-construction-city-tampere_en).

7.4 Using ecolabels as criteria

There are also ecolabels for product groups or areas on national, international and global level that are useful in procurement. The benefit of ecolabels is that the procurer does not have to evaluate whether the criteria is fulfilled other than by verifying that the label is awarded. However, it is important to be aware of choosing a trustful ecolabel.

Reliable ecolabels have such characteristics as (Kontturi, 2018):

- Certified by independent parties, who cannot be influenced by the ecolabel seeker;

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- Covering issues relevant to the procurement;
- Criteria are validated after an open process where they are revised by authorities, consumers, labour market representatives, manufacturers, trade representatives, NGOs and other interested parties;
- Criteria are objectively verifiable and non-discriminatory;
- All interested parties can have the ecolabel in question if the article or service abides to the criteria.

Ecolabels can be used as minimum requirements, award criteria or tenderer requirements (see **Table 5**). The EU Ecolabel, Nordic Swan Ecolabel, Blue Angel, Good Environmental Choice (Bra Miljöval), Global Organic Textile Standard and OEKO-TEX are all reliable ecolabels. [(Kontturi, 2018)] For more information, see links below.

Table 5. Criteria setting with use of ecolabels and environmental management systems

Technical criteria setting in a request for tender and a contract	Implementation
Tenderer requirement	E.g., tenderer having an environmental management system, which covers environmental matters in certain stages of operations, or demonstrating compliance with the procurer's requirements by a certified environmental management system.
Minimum requirement	Ecolabel to a single product or service, or a specific part of the ecolabel requirement.
As an award criteria	Ecolabel or part of it is not required, but it is encouraged to offer ecolabel by awarding points for quality in the comparison of tenders.

Useful links:

- Guide for Chemical Smart Public Procurement, pages 40-43
<https://www.turkuamk.fi/fi/tutkimus-kehitys-ja-innovaatiot/julkaisuhaku/20/>.
- Ecolabel links:
 - EU Ecolabel https://environment.ec.europa.eu/topics/circular-economy/eu-ecolabel-home_en
 - Nordic Swan Ecolabel <https://www.nordic-swan-ecolabel.org/>
 - Blue Angel <https://www.blauer-engel.de/en>
 - Good Environmental Choice <https://www.bramiljoval.se/artiklar/about-good-environmental-choice/>
 - OEKO-TEX <https://www.oeko-tex.com/en/>
 - Global Organic Textile Standard <https://global-standard.org/>

7.5 Remember to include criteria in the contract

In the case of requiring or awarding for GPP criteria or ecolabels in the request for tender, the procurer should include it similarly in the contract. When integrating any criteria as award criteria that consider future actions and promises, it is advisable to include incentives or sanctions in the contract. This is, for example, setting a bonus or penalty, or a prerequisite for the extension of the contract.

7.6 Impact assessment

Impact assessment is assessing or measuring the effects a planned action will likely result in. Measuring is an objective quantitative information and assessing is a partly subjective qualitative information. When assessing impact, compare the state of the procured goods or services after the change with the state before the change.

What is the current state of the goods and services in the municipality? What is the potential state?

It is recognized that circular procurement has a large impact, for example on natural resources, healthy living environment and social justice, market development and clean solutions, employment and regional economy, public services, and cost-efficiency of public procurement. However, there are not yet many calculations or measures for assessing impact of circular procurement. Circular procurement can be assessed by rating, utilizing yes or no classifications, or assessing qualitatively; how circularity is realized. (Alhola, 2022)

Questions considering impact of circular procurement can be such as (see (Alhola, 2022)):

- Cost-efficiency
 - Are life-cycle costs reduced?
- Environmental impact
 - Are natural resources used more efficiently?
 - Are renewable materials being utilized?
 - Are recyclable and recycled materials considered?
 - Is it possible to reduce waste?
 - Has the energy-efficiency improved?
 - Are renewable energy sources being used?
 - Is there hazardous chemical content?

Remember to include the aspect of chemicals. The chemicals aspect can be estimated by using data from purchasing statistics and then making some simple calculations to show the impact of the procurement with added chemical criteria. The following steps can be used for establishing the impact assessment:

- 1) Identify a material which has been changed from one containing HS to one without.

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- 2) Find statistics on purchases from own e-commerce system or from suppliers.
- 3) Systematize the calculation of chemical content reduction (find the content per kg of material).
- 4) Make a larger scale calculation.
- 5) Use the results as an indicator for change and goal achievement to show to decision makers.

For example, the City of Stockholm executed a procurement for office materials including erasers. For the needs of Education Department, 25 tonnes of erasers were purchased annually. The assortment contained erasers made from PVC-plastic. The City of Stockholm Chemical centre worked with the article specification and set requirement for a PVC-free assortment. The PVC erasers weigh 25 g each, and the annual purchase amounts to 1 000 000 erasers. Hence, when applying the new requirements, the impact was an annual phase out of 25 tonnes of PVC-plastic.

A good practice is to keep account of the experiences in the procurement unit by putting down the main points of each tendering process in a table. This way the procurer has systematic information, can analyse the development needs, and has a record of the development path. The information may be qualitative as well as quantitative. Such table can include the following columns:

- Type of market dialogue used, and number of tenderers participated
- Evaluated and realized value of procurement
- The criteria used
- The number of tenders received
- Evaluation of the results of the procurement (e.g., consumption of single-use items reduced, use of recycled items increased, life-cycle extended by requiring items that can be repaired when broken)
- Experience of compliance with the criteria from the contract period

This record supports both impact assessment as well as needs assessment when the procurement becomes tendered again over time.

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