

Target Setting for Green Public Procurement Programmes

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Executive summary

Clear quantitative targets are needed for a successful green public procurement (GPP) programme. GPP targets can be applied to an overall programme and to specific goals such as reducing embodied carbon. In this brief, we examine the targets related to embodied carbon set by existing GPP policies, the methodologies used to quantify the targets and the target setting process. We focus on best practices in the European Union (EU) (particularly the Netherlands), Japan, Korea and the US state of California. This set of countries and regions exemplifies a range of approaches to GPP for embodied carbon and specific criteria for cement and steel products. Table 1 summarizes aspects of GPP criteria in these selected countries and regions.

Table 1. Summary of aspects of GPP target setting in these selected countries and regions.

	Scope	Method	Target Setting Process	Measurement & Verification
The EU	Split into two types: core criteria and more ambitious comprehensive criteria. Both sets include criteria in project-level LCA, percentage use of recycled content, reduction of CO2 emissions from transport and recycling of demolition waste.	Life cycle assessment (LCA)	Collaborative process with stakeholder consultation.	Contract performance clauses defined on a per-project basis.
The Netherlands	Project-level environmental impact.	LCA using DuboCalc tool, CO2 Performance Ladder	Based on EU processes.	Contractors must demonstrate proposed reduction is achieved. Monetary sanctions are imposed for not meeting the reductions targets proposed in bid.
Japan	Percentage use of recycled content by product category.	Percentage by weight	The Ministry of the Environment develops the basic policy with the help of review committees. Agencies set their own targets with reference to the basic policy. These targets are reviewed annually.	Reduced emissions are estimated based on reduced emissions from a chosen average green product. Ratio compared with baseline from 2000.
South Korea	Percentage use of recycled content by product category.	Korea eco-label which is maintained by the Korea Environmental Technology & Industry Institute (KEITI)	Agencies set their own GPP targets and report performance to KEITI annually.	Reduced emissions estimated based on comparison with conventional products using LCA data.
The US state of California	Maximum acceptable global warming potential (GWP) by product category.	Environmental Product Declarations (EPDs)	Industry average with tolerance for uncertainty. Reviewed every three years to lower limits.	Unknown. The first report on the impact of GPP will be published in January 2022.

1. Scope of greenhouse gas (GHG) emissions reduction targets for GPP

GPP targets in surveyed countries vary in their scope, intended effect, performance indicators and level of precision. We classify them into four categories with increasing specificity: 1) adoption targets, 2) industry-level targets, 3) project-level targets, and 4) product-level targets.

1.1 Adoption of green public procurement

The broadest target type is adoption of a GPP programme. These adoption targets are typically not product- or industry-specific. Rather, they provide a phase-in period to enable both procuring agencies and industry to transition to GPP smoothly. This allows government agencies to refine criteria and implementation methods. It also allows manufacturers to build capacity in regards to reporting and compliance, and obtain any required certifications.

The targets set during this phase-in period aim to establish two of the main components of GPP: reporting and criteria. Before the environmental impact of a product can be evaluated, it must first be quantified and reported. Thus, the first target many countries or regions set is to require bidders to submit environmental impact assessment data. The data submission could take the form of an EPD or a voluntary eco-label on a share of public projects. This first target does not imply that the data will be used in the bid evaluation. Environmental criteria must also be established before they can be used for rigorous evaluation. A target to address this is to require a share of public tenders to state environmental criteria.

As environmental criteria become more refined, the adoption targets may become binding. A target may require a share of all projects to meet green criteria. Examples include the Netherlands' target of 100% compliance with Dutch GPP policies (European Commission, 2021). Another possible indicator is the total value of all GPP compliant projects which weighs high-cost projects, such as roads and public infrastructure, more highly as they tend to have greater environmental impacts.

Target	Indicator
Increased reporting of environmental impact	Percentage of projects requiring EPD or other certification
Increased statement of environmental criteria in projects	Percentage of tenders with environmental criteria
Increased consideration of environmental impact	Percentage of projects that are compliant with criteria and the financial amount spent on these projects

1.2 Industry-level targets

Industry-level targets are designed to increase the adoption of certifications that have been voluntarily developed by industry. GPP policy may require public contracts to procure products and services that have these certifications.

There are two types of industry certifications: those developed through a consensus-based standard development process with industry and other stakeholders and those set by individual sectors or companies. These certifications provide valuable insights into industry-specific target design; elements of green certification criteria can be incorporated into future GPP programmes.

ENERGY STAR programme in the US

ENERGY STAR is a programme developed by the United States Environmental Protection Agency to identify products, buildings and plants with superior energy efficiency. The programme has developed industry-specific energy performance measurement tools for a range of industrial plants, including cement and integrated steel plants. It is an internal standard as it compares performance to similar plants in the US. Plants in the lowest 25th percentile of energy use per ton of production, or the top 25% in terms of energy efficiency, are eligible for an ENERGY STAR certification (Energy Star, 2021).

To compute the Energy Performance Indicator (EPI), plants must supply total energy consumption by fuel type and total production for a reference year. For cement plants, the maximum daily kiln throughput and number of kilns is also considered in the calculation. For steel, the levels of oxygen used in the blast furnace, if applicable, are also considered in the calculation (Energy Star, 2021).

While this programme focuses on energy use rather than embodied emissions, the correlation between energy production and GHG emissions makes it a good proxy in the absence of a more complete product-specific life cycle analysis.

Target	Indicator
Increased energy efficiency in industrial plants	ENERGY STAR EPI

The Concrete Sustainability Council (CSC)

The CSC certifies concrete, cement and aggregate companies. It examines the social and environmental impact of a given plant and grants one of four levels: Bronze, Silver, Gold or Platinum. The CSC eco-label is considered best practice for concrete products in the Belgian GPP programme (Belgium FIDO, 2021).

The CSC criteria requires the implementation of an LCA, release of one or more EPDs, contributing to the creation of an industry-wide EPD (i.e. an industry standard), public reporting of GHG emissions, and a public emissions reduction target. Other criteria include emissions levels of NO_x, SO_x and dust; use of next generation trucks for transportation; and responsible processing of returned concrete. Some of these factors are not currently considered in GPP criteria and could be incorporated into future policy.

Target	Indicator
Cement and concrete sustainability	CSC certification level (composite indicator)

1.3 Project-level targets

Project-level targets evaluate the environmental impact of the entire project instead of individual components. Project-level analyses can be more impactful than product-level requirements as they allow for greater flexibility in the use of low-carbon alternative materials and substitutes. Furthermore, they encourage emissions reductions in other aspects of the project such as waste management. This can be difficult to implement as it requires conducting an environmental impact assessment for each new project bid, whereas a product-level analysis can be performed once per product and reused for all bids involving that specific product.

Project-level targets are typically used for award criteria rather than requirements. Award criteria do not set a minimum standard. Instead, green products are given an advantage through most economically advantageous tender (MEAT) evaluations. One implementation of this is to allot weights to environmental dimensions such as material use and GWP and compute a score for each bid. The score is then considered as one of multiple attributes in the evaluation stage. Another implementation of project-level analysis is to monetize environmental attributes and discount project prices for environmentally friendly products (Chiappinelli and Zipperer, 2017). Real-world examples of these implementation options are found in the EU for the former and the Netherlands for the latter.

The EU

The EU's GPP criteria recommends the use of project-level analysis through a point system. Points are awarded based on the improvement of LCA performance compared to business as usual or competing designs. In the absence of a whole-project life cycle analysis, points can be calculated from proxy data such as the reduction of CO₂ equivalent emissions from the transportation of materials (European Commission, 2021).

The Netherlands

The Netherlands incorporates project-level environmental assessment into bid evaluation through adjusted bidding prices. The Dutch Public Infrastructure Authority (Rijkswaterstaat) has developed two instruments to assess sustainability attributes: the CO2 Performance Ladder and DuboCalc. These tools address CO2 emissions reduction and environmental impact, respectively.

The CO2 Performance Ladder is a five-level certification system which a tenderer can use to show the measures to be taken to limit CO2 emissions within the company, in projects, and in the supply chain. A tenderer can submit a CO2 Performance Ladder certificate with their bid, which obliges the tenderer to comply with a specified CO2 reduction target. The more ambitious the CO2 reduction, the higher the certification level. The submitted project price is adjusted based on the CO2 Performance Ladder level with a deduction of 1% off the submitted price per level. The highest level is rung 5, so the maximum deduction is 5% (OECD, 2015).

DuboCalc is a life cycle analysis-based software tool which calculates the environmental impact of a specific design based on the materials used. It calculates 11 environmental impact parameters and combines them into a single value: the environmental cost indicator (ECI). The ECI is then translated into a monetary value which is applied as a discount to the submitted price. The procuring agency then selects the tenderer with the lowest price (OECD, 2015).

Target	Indicator
Project-level life cycle assessment	LCA indicators: GWP formation potential of tropospheric ozone photochemical oxidants (POCP); depletion potential of the stratospheric ozone layer (ODP); acidification potential of soil and water (AP); eutrophication potential (EP); abiotic resource depletion potential for elements (ADP_elements) and abiotic resource depletion potential of fossil fuels (ADP_fossil fuels)
Decreased CO2 emissions	The CO2 Performance Ladder (the Netherlands)
Project-level environmental impact assessment	DuboCalc environmental cost indicator (the Netherlands)

1.4 Product-level targets

Product-level targets are the most specific type of targets currently in use in GPP programmes around the world. They are still relatively rare as target setting requires investigations of industry standards and technical consultation. The narrow scope of the target allows them to be precise and they are often expressed as quantitative values. Current product-level targets focus on circular economy and emissions reduction.

Emissions reduction

A product-specific target that focuses on GHG emissions reduction requires an LCA to be performed on the product. The result is presented in an EPD that contains the GWP of the product. GWP is a measure that incorporates heat absorbing gases collectively referred to as greenhouse gases (US EPA, 2021).

Target	Indicator
Greenhouse gas emissions reduction	GWP

Recycled content

When no EPD is available for a product, the percentage composition of recycled or waste content can be a proxy for reduction of embodied emissions in concrete products. This reduces emissions in two ways. First, replacing traditional clinker with industrial waste such as blast furnace slag diverts the waste from landfills which extends the lifespan of materials. Second, recycled content can replace part or all of natural sand, gravel or stone, thereby reducing emissions from resource extraction. EPDs are preferred to recycled content targets, where available, as they provide a less prescriptive way to evaluate embodied emissions in cement and concrete products. Further, EPDs take the use of waste materials into account when computing embodied emissions, meaning that GWP is already a function of recycled content.

These types of targets are in use in the EU, South Korea, the Netherlands and Japan. The EU GPP Core Criteria awards points to tenderers that incorporate 15% by weight of recycled content or by-products in concrete slabs, structural frames, walls, etc. (European Commission, 2021). Japan's recycled content specifications defines eco-cement as cement that contains ashes from incineration of city waste at a rate of no less than 50% of dry weight (Japan Ministry of the Environment, 2019).

Target	Indicator
Use of recycled content in concrete	Percentage by weight of slag aggregate that comes from waste or recycled materials

1.5 Comparison of target categories

Currently, there is no literature that includes a comparative analysis of the types of GPP targets and their relative success in achieving environmental, social and innovation goals. Here we discuss some of the differences between GPP criteria in international best practice and the effects of these decisions on implementation and emissions reduction outcomes.

The first difference is whether targets are voluntary preferences or strict requirements. In adoption targets, some countries and regions aim for GPP criteria to be used in a given percentage of public procurement without specifying if, and to what degree, environmental impact should be weighed against other competing factors like cost or job creation. Consideration of GPP criteria does not guarantee that a project will be awarded based on these benchmarks.

Criteria can be requirements (i.e. minimum standards) or preference-based. In the Netherlands, these are called quality and performance criteria, respectively. Quality criteria state a minimum requirement, where tenders that do not meet the criteria are disqualified from consideration. Performance criteria, on the other hand, do not disqualify bids. Instead, they give preference to green materials using MEAT evaluation. Performance criteria can only be effective if the environmental effect of a tender has a large impact on the final decision; the percentage of evaluation criteria reserved for environmental impact must be significant compared to other criteria including price. In current GPP programmes, preference-based targets tend to be project-level while requirement-based targets tend to be product-specific.

Another major difference in GPP targets is whether targets are project- or product-level. Product-scale policies are less complex and therefore easier to implement. A product-specific EPD can be created once and reused for multiple tenders. Project-level targets are more complex as they require environmental impact analysis for each project bid. One of the benefits of project-level targets is that they evaluate performance without prescribing technical details. This allows for greater flexibility in material efficiency and a circular use of low-carbon alternative materials, which product-specific targets do not incentivize. Whole project analysis ensures that substitute materials are not given an unfair advantage. For example, if GPP only covers cement products, then wood substitutes would get an unfair advantage, even though they may be less durable. Project-level targets allow for a cross-industry comparison of products and delegate the job of making trade-offs between cost, embodied emissions and durability of materials to the designer.

Targets can be internal or external to industry. For example, US GPP could require public contracts to use products with the ENERGY STAR® certification, which represents the top 25% of plants in terms of energy efficiency. Internal standards may disqualify the worst polluters from bidding, but they are more likely to promote the adoption of existing best practices than champion innovation. In industries with high

heterogeneity, such as cement, internal standards may not be enough to incentivize industry leaders to further reduce emissions as there is a long tail end of high-emitting competitors. An external target is independent of industry performance. Examples include the EU's maximum site waste management limit of 11 tonnes per 100m² internal area for buildings (European Commission, 2021). External targets are difficult to set as they must promote industrial efficiency without barring too many companies from bidding.

The initial values of internal and external targets may have similar effects. Where these two strategies begin to diverge is in how targets change over time. If an internal target is adjusted annually based on industry average, the target will continuously reflect best practice within the industry. In contrast, an external target could be adjusted annually to reach a long-term goal. For example, the maximum GWP limit could be reduced regularly to achieve net-zero by 2050. This type of ambitious target setting requires industrial transformation and could induce breakthrough innovations. However, it could also place undue pressure on companies and lead to resistance from industry stakeholders.

2. The green public procurement target setting process

The technical nature of reduction analysis requires consultation with industry experts when setting GPP targets. Most countries surveyed follow a similar process of drafting a proposal and iterating through several rounds of stakeholder consultation.

The European Commission is particularly influential in target setting as the criteria it produces form the basis of GPP criteria in all EU member states. The Commission's Joint Research Centre's Institute for Prospective Technological Studies (JRC-IPTS) leads the criteria development process. It drafts a preliminary report that broadly surveys public procurement within a sector and a technical report with quantitative criteria. Three rounds of stakeholder feedback are incorporated. The criteria then go through an inter-service consultation within the Commissions before it is published on the EU GPP website (European Commission, 2021).

In California, targets are set based on industry average. The Department of General Services sets the maximum GWP at the industry average by consulting databases of EPDs. Some tolerance is added to account for uncertainty. The department reviews the maximum threshold for each material every three years and may adjust the number to a more stringent threshold to reflect industry improvements (California Department of General Services, 2021).

A similar model is recommended by the Carbon Leadership Forum (CLF) for developing GPP policy. For product-level standards, CLF advises setting an initial value at the 80th percentile or at the industry average based on GWP data collected from EPDs. For project-level standards, an initial value could be a flat value normalized by project size (e.g. 500 kg CO₂ eq/m²), multiple normalized values that vary by project type (e.g. a value for roads, another for buildings), or a unique value calculated based on project features (e.g. a function of the number of floors). CLF also advises lowering the maximum GWP standards at two- or three-year intervals, with two potential rates of change. The first option is a percentage reduction using the initial value as a baseline in order to reach a 50% reduction by 2030 and zero carbon by 2050. The second is to re-evaluate the industry average so that the maximum GWP continuously reflects the 80th percentile or industry average (Carbon Leadership Forum, 2020).

3. Recommendations

Based on the surveyed international best practices, we make the following recommendations for GPP target setting to reduce embodied emissions in cement, concrete and steel products.

- Use a collaborative target setting process that involves stakeholder consultation. Industry experts should be involved in choosing quantitative targets to ensure that the standards are feasible for industry to meet. Industry associations should be given ample opportunity to comment on proposed policies before they are ratified.
- Apply a two-pronged approach to setting targets. Minimum standards must be met for a tender to be considered, thereby encouraging the adoption of existing green practices. Performance criteria reward bidders with best-in-class materials efficiency, thereby inducing innovation.
 1. Minimum standards should be product-level. Maximum acceptable GWP limits are recommended for the indicator. A cradle-to-grave analysis should be used in the LCA to include the environmental impact of end-of-life disposal.
 2. Performance criteria should be project-level. Performance targets can be used in bid evaluation to give preference to tenderers that exceed the minimum standards. The weight of this criteria must be significant relative to other criteria, including price, for this to have an impact on the final decision.
- Review GPP targets on a two- to three-year basis to lower the maximum acceptable GWP limits over time. With the initial value as a baseline, adjust to increase the stringency of the threshold to reach net-zero by the country or region's zero carbon commitment.

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