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Moving towards Green Public Procurement in Belgium

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Abstract

Integrating sustainability in the road construction sector is omnipresent and is still gaining interest. This paper specifically addresses the topic of environment-friendly and sustainable procurement of road works (Green Public Procurement). The Belgian Road Research Centre has formed a national working group with members from road administrations, road contractors, and sustainability experts.
The main objectives of this working group are to help road authorities (at the national and regional levels) in the process of including sustainability indicators in their road tenders, with a view to achieving Green Public Procurement in their road projects, and to keep abreast of new developments: European guidelines, best practices in the sector, progress in other sectors such as the building industry, and certification in other sectors and in road construction.
The aim is to define the most important sustainability (environmental-social-financial) indicators in the life cycle of a road pavement, and use the evaluation of these to come to an overall assessment of the road's sustainability for use as a criterion in tendering. Pragmatic choices are made from the basket of sustainability indicators to keep the methodology easy and simple yet objective, without aspiring to a full life cycle analysis.
A pilot project has been set up with global warming potential, the depletion of materials, noise, responsible sourcing, road availability and annoyance to people, and direct construction costs as environmental, social and financial indicators. Each of these is split up into sub-indicators (such as road transport, recycled contents, tyre-road noise, or rolling resistance) that are all assessed by an easy procedure for both the contractor and the road administration, respectively, thereby delivering and checking the sustainability information in the tender.
The evaluation leads to a single value, i.e., a weighted sustainability score. This score affects the actual tender price in such way that direct costs as well as the sustainability score both determine which contractor wins the bid.
The paper describes the implementation of the methodology in the pilot project.

Keywords: Sustainability / Life Cycle Analysis (Modelling and Prediction), green public procurement, Decarbonization

1. Introduction

1.1. Context

Sustainability is no longer a topic for academics alone. In a society with limited resources and a well-informed public, authorities can no longer be satisfied with only technical compliant solutions without also considering durability and sustainability and the effects of these solutions on the environment and the (local) community.

Till recently, public authorities had only limited possibilities to incorporate sustainability considerations in their tendering processes. The awarding of contracts was mainly based on technical and financial considerations. The latest version of the European Public Procurement Directive, 2014/24/EU (1) however also allows to take environmental and societal implications of offered solutions into consideration. Besides the self-evident societal advantage, this also allows to move away from the lowest-price model and to stimulate innovation. Contractors can be rewarded for (more expensive) solutions with a lower impact and will hopefully be triggered to start developing innovative and sustainable solutions.

Several initiatives exist already. Besides the legal framework to allow 'Green Public Procurement', the EC/JRC published different guidelines as a source of inspiration for procurement entities that wish to introduce this new approach in their tendering process (2). CEN/TC350 (Sustainability of construction works) developed a framework to allow a sustainability evaluation of, until now, mainly building. Only recently, EN 15643-5 (3), a framework standard on the sustainability of civil engineering works was added to the existing collection.

Over the years, several sustainability evaluation tools and initiatives have been developed and are still developing in the building sector (such as BREEAM (4), LEED (5), ..), In the road construction sector however, these tools often focus on specific sustainability indicators (e.g. carbon footprint), consider only one or a limited number of life cycle stages and others concentrate mainly on environmental issues or are tailored for national or regional construction practices. These carbon-footprint oriented tools contribute to the ambition to reduce the emission of greenhouse gasses (6) but ignore other important issues (depletion of natural resources, recycling potential, societal impact, life cycle costing, …)

1.2. Problem statement & goals

Despite all this guidance and already existing initiatives, it remains a very challenging task to introduce an overall sustainability approach in the tendering process. Existing standards and guidelines give extensive lists of topics that should be considered in a sustainability evaluation but, at the same time, remain vague on the properties and evaluation methods that can be used to evaluate these topics. This gap allows for creativity but, at the same time, emphasizes the importance of concertation with all stakeholders to determine relevant and practical indicators and evaluation methods. The road construction sector, particularly in Belgium, is typically a sector which mainly consists of SME's. New tendering practices should not limit market access for these companies.

Of course, compliance with the technical tender specifications to allow the works to be used as intended, remains the main concern. Initiatives to introduce other criteria should always go together with a reflection to find the right balance between the 'primary' technical criteria and 'secondary' sustainability considerations. On the other hand, public resources remain limited. Deployment of new procurement techniques and (in some cases more expensive) sustainable solutions, should not deplete public means and impede other projects.

Introducing sustainability considerations in the public procurement process is new. Procuring authorities and contractors need time and guidance to get acquainted with this new approach. Making declarations for a whole new set of indicators will not always be very precise. For several reasons, deviations between declared and realized performance for sustainability indicators might occur. To discourage speculation and unfair competition, financial rewarding (or sanctioning) mechanisms must also integrate the finally realized performance for sustainability indicators.

The Belgian road construction sector already has a large experience with recycling and the use of recycled materials. To help the Belgian road construction sector to introduce Green Public Procurement (GPP) and a more holistic sustainability approach, BRRC took the initiative to gather road authorities, contractors and

sustainability experts and to launch a working group on this topic. The kickoff meeting of this group was organized just before the summer of 2016.

2. Project approach

Starting from a proposed list of indicators and through regular consultations a workable GPP approach is envisaged. Road authorities have committed themselves to apply this newly developed approach in a pilot project. The experiences with these pilot projects are expected to feed the working group and to continuously improve this new approach.

Fig. 1 sustainability pillars

Although the working group is aiming for a set of indicators which encompasses all aspects which are relevant for sustainability, completeness is considered as secondary to feasibility. Feasibility is a major concern of the working group. Contractors insist on relevant indicators, transparent and objective evaluation methods and procedures that are not an important additional burden for the companies that have to apply them.

The initial work of the working group focusses on asphalt pavements. However, the modular approach allows to add or to replace existing indicators for variants or new indicators which are more relevant for other types of pavement materials or works.

The results of the working group and experience that hopefully will be obtained with the pilot project, will allow a further improvement of the proposed indicators, evaluation methods and GPP procedures. More importantly, a positive experience could possibly help to decrease existing reluctance and encourage other procuring entities to adopt similar approaches.

3. Sustainability indicators for Green Public Procurement pilot project

3.1. Introduction

Different documents served as source of inspiration to propose a list of indicators:

- CWA 17089, Indicators for the sustainability assessment of roads (7)
- ISO/TS 21929-2, Sustainability in building construction : sustainability indicators. Part 2, framework for the development of indicators for civil engineering works (8)
- prEN 15643-5, Sustainability of construction works - Sustainability assessment of buildings and civil engineering works - Part 5: Framework on specific principles and requirement for civil engineering works (3)
- the deliverables of the CEDR EDGAR project (9)
- EN 15804, Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products (10)

Starting from this initial list, each indicator, the evaluation method and its relevancy for the pilot project were carefully discussed with all stakeholders. Acceptance by the road construction sector was a main concern during these discussions. Contractors particularly insisted on a limited additional administrative burden and relevant, transparent and objective criteria and evaluation procedures.

There have been long discussions about the inclusion of recyclability to the list of indicators. From the viewpoint of a circular economy, not only the use of recycled materials but also the use of recycled materials, avoiding downgrading, is crucial. Because however there was no agreement on the property nor evaluation methods to assess this (mainly because the current practice for road works in Belgium comprises only the construction stage of the pavement's life cycle), it was finally decided to abandon this indicator for the time being.

The initial approach for responsible sourcing was a rather voluntaristic one which mainly aimed at empowering companies to creativity and a tailored implementation of some responsible sourcing themes (social accountability, materials traceability, health & safety management, impact on local communities, employment &

skills development). For transparency reasons and to ensure an objective evaluation, the WG members finally decided to replace this by existing certification schemes

Originally, life cycle costing was also included as indicator in the financial category, additionally to direct costing. Because however no workable evaluation method was available, it was decided to abandon this indicator as well for the time being.

3.2. The indicators

The project started with an initial list of 17 indicators which could be grouped in 3 categories (environmental category, social category and financial category). After discussion a final proposed list of 11 indicators has been retained.

Environmental category – Global Warming Potential

Truck Transport
Truck transport is expressed in ton.km. The indicator takes into consideration transport of raw materials from its source to the asphalt plant and transport of asphalt from the plant to the work site. The transport distance for recycled aggregates is conventionally considered as equal to the plant-work site distance. To account for the lower impact of transport over water, this distance is compensated with a reduction factor. The total truck transport is compared with the average truck transport for all receivable offers. A lower score is awarded with a positive sustainability score for this indicator. In case a contractor declares a higher total transport, he receives a negative score.

New binder
As recycled binder content is difficult to evaluate, the members of the WG agreed to replace this indicator with new binder content, expressed as %. A lower new binder percentage is supposed to require a higher amount of recycled binder. The declared new binder content is, as with the previous indicator, compared to the average for all offers that were introduced. A lower declared content is rewarded with a positive score, a higher declared content receives a negative score.

Energy consumption
Instead of directly measuring the energy used for the production of asphalt, the WG focussed on measures that can reduce energy consumption directly or its resulting GHG emissions. The sustainability score for energy consumption is based on 3 components

1. the share of low temperature asphalt in the offer,
2. the share of covered storage of raw materials and
3. the primary energy carrier.

A higher share of low temperature asphalt or a higher percentage of covered storage results in a higher score (more 'sustainability points'). In the other case, the contractor is sanctioned with a negative score. The third component evaluates the primary energy carrier. If mainly gas is used as asphalt production energy, the contractor is rewarded with a positive score.

Texture
Texture has an important influence on the GWP during the use phase of a road. ROSANNE (11) indicates a good correlation between texture and MPD wich allows the latter to be used as a parameter that gives an indication about expected fuel consumption A lower MPD (ISO 13473-1) has a positive influence on fuel consumption (12) Texture is a road surface property which is not only determined by the mixture but also through the execution. On the other hand, for skid resistance minimum requirements apply and texture needs to be sufficiently high to meet this requirement. The texture indicator tries to create an incentive for contractors to reconcile two apparently opposing requirements. Therefore it was agreed not to ask a contractor to declare a value for this property but to limit to a post execution evaluation only. A contractor that succeeds to create a pavement with a MPD which is lower than a limiting value (mentioned in the tender specifications) is rewarded with a positive sustainability score which immediately results in a bonus fee. In all cases the skid resistance requirements apply and should be met.

Environmental category – Depletion of materials

Renewable energy
Contractors are asked to declare the share of 'green' electricity (produced and purchased) in the total amount of consumed electricity. A share which is higher than the average is rewarded with a positive sustainability score. Contractors with a lower share receive a negative score.

Recycled aggregates content
This indicator promotes the use of recycled aggregates in bituminous mixtures. A contractor has to declare the content of recycled aggregates for each mixture. When this declared content is higher than the average overall receivable offers, this is rewarded with a positive score, a lower declared content ends in a negative score.

Social category – Noise

Tyre-road noise
Traffic noise is considered as an important source of health problems. Different measures are possible to reduce exposure of people living close to the road to unacceptable noise levels. The emission of rolling noise can be reduced through optimizing the road surface or by applying specially developped pavements. A CPX-measurement is a generally accepted means to measure tyre-road noise emission of a road section. As it is the case with texture, tyre-road noise is only evaluated after execution. A short period after the road has been taken into service, the results of a CPX measurement are compared with a treshold value that will be mentionned in the tender specifications. This treshold value will be based on historical measurements on similar pavement types. Contractors that succeed in realizing a pavement with a low CPX value will receive a positive sustainability score and bonus. If the CPX measurement results in a higher value this will have no consequences.

Truck transport
All transport contributes to the GWP but unavoidably also causes noise pollution for people living in the vicinity of the transport routes and storage areas. The evaluation of this indicator is identical to the truck transport indicator in the GWP category (meaning that for the time being no distinction is made for hindrance during night and day hours). Transport over water is not counted in this indicator.

Social category – Responsible sourcing

Environmental impact
Although other evaluation methods were considered, transparency reasons finally resulted in choosing a certified ISO14001 environmental management system as the primary criterion to award a contractor with a positive score for this indicator. Companies that take the initiative to obtain an additional EMAS (EU Eco-Management and Audit Scheme) registration are rewarded with extra points. Companies without ISO14001 management system end up with a negative score

Health & Safety
VCA ("Veiligheidschecklist aannemers"- Safety Checklist Contractors) is a certification scheme originally developed in the Netherlands but also wide-spread in Belgium. Compliance with a list of topics, mainly targeted on health and safety, allows a company to obtain a certificate. Additionally, a certified company is also required to register incidents and to take demonstrable measures to avoid similar incidents and to decrease the overall number of incidents. Companies with such a VCA-certificate can claim extra sustainability points. Without such certification, the sustainability score is reduced.

Social category – Road availability

Road availability & accessibility
Road works unavoidably cause hindrance. People living in the neighourhood will be faced with noise and dust during the works and will have difficulties to access their properties. Other road users will face delays or might be forced to change their route resulting in additional travelling time. To evaluate this nuisance a calculation scheme was developed which takes into account:

- nuisance (noise, dust) caused by the works and mainly an issue for people near the worksite and
- reduced accessibility of the road which is an issue for neighbours and other road users.

The calculation scheme allows road authorities to add extra weight for periods during the day for which it can be considered that there is more embarrassement (e.g. evening and night for noise and dust, peak hours for accessibility); eventually different for both above mentioned types of nuisance. Within eventual legal or other constraints, contractors are allowed to organize their work to reduce the result of the calculation scheme. The total score is simply the sum of both types of nuisance (if this nuisance exists according to the contractors declared planning), eventually multiplied by the weight given by the contracting road authority. This is compared to the average score. For lower scores (a lower calculated nuisance), a contractor will receive extra sustainability points, with a higher nuisance score, he receives negative sustainability points.

Hindrance (hindrance neighbourhood*works + hindrance road users*availability)								
	0:00-05:00	05:00-07:00	07:00-09:00	09:00-16:00	16:00-18:00	19:00-22:00	22:00-24:00	total
Monday	0	2	5	2	5	2	0	16
Tuesday	0	2	5	2	5	2	0	16
Wednesday	0	2	5	2	5	5	0	19
Thursday	0	2	5	2	3	2	0	14
Friday	0	2	5	2	3	0	0	12
Saturday	0	0	0	0	0	0	0	0
Sunday	0	0	0	0	0	0	0	0
								77

Fig. 2: road availability & accessibility evaluation

The hindrance score for the different periods of the day is determined as follows:

hindrance category	hindrance appreciation	hindrance = hindrance appreciation x activity
hindrance neighbourhood caused by works	appreciation given by road authority, varies from 0 (low hindrance) to 3 (high hindrance)	Usually appreciated hindrance for the neighbourhood caused by activity in the work zone will be most important during the night and lower during the day. Depending on the periods the contractor declares he will work, the total hindrance for the neighbourhood varies between 0 and 3
hindrance road users caused by road unavailability	appreciation given by road authority, varies from 0 (low hindrance) to 3 (high hindrance)	Hindrance caused by the unavailability of the road will be most important during peak hours (morning and evening) and lower throughout the day and night. Depending on the road availability declared by the contractor, the total hindrance for road users varies between 0 and 3
activity (declared by contractor)	0 = no activity, road available 1 = no activity, road not available 2 = activity, road not available	total hindrance varies between 0 (no hindrance) and 6 (max. hindrance for both categories)

Table 1: determination of hindrance score

4. Calculating sustainability score

Except for the tyre-noise and texture indicator, a contractor has to include a value in his offer. For each indicator, this value is compared with the average (of all offers) or thresholds or classes specified in the tender specifications. According to the result of this comparison, each indicator is rewarded with (positive or negative) sustainability points. For each category, a contractor starts with 50 sustainability points. The scores for each indicator within a category (sometimes negative) are simply added to this start value. Weighting for individual indicators is indirectly taken into account by the rewarded sustainability points per indicator.

Evironmental category – GWP	sustainability points
Truck transport	a
New binder	b
Energy consumption • low temperature asphalt • covered storage • energy carrier	 c1 c2 c3
Texture	-- (post execution evaluation only)
Sustainability score - GWP category	50+a+b+c1+c2+c3

Table 2: calculation of sustainability score for the GWP category

Weighting factors for the different categories allow a procuring entity to increase or decrease the relative importance of categories and finally to calculate a single sustainability score for each offer. The final choice of these weighting factors are the responsibility of the procuring authority and might be changing in time or be work dependent. A sensitivity analysis is also applied on the weights to test for the robustness of the rankings.

environmental score = score GWP category x 50% + score material depletion category x 50%
social score = score noise category x 20% + score responsible sourcing category x 15% + score road availability x 65%
single sustainability score = environmental score x 60% + social score x 40%

Equation 1: calculation environmental score, social score and final sustainability score, weigth factors can be different

With this single sustainability score a virtual tender price offer can be calculated.

virtual price = price offer x (1-[(single sustainability score-50)/100])

Equation 2: calculation of the virtual price

The tender is finally rewarded to the contractor with the lowest virtual price offer. For the execution, the real price offer is used. This allows contractors with more innovative and sustainable solutions, with a more sustainable organization (and possibly with a higher price) to remain competitive against lowest price solutions.

	price offer	score	virtual price
contractor 1	520.000	70	416.000
contractor 2	470.000	62	413.600
contractor 3	400.000	45	420.000

Table 3: example – influence of sustainability score on virtual price

5. Execution

During the tendering phase, a contractor is supposed to introduce also, besides all regular tender documents, a sustainability file. This file should contain a declared performance for all indicators (except texture and CPX value) and all elements to motivate this performance and that allow a road authority to verify these statements.

During execution however, several reasons can cause the sustainability indicator to be different from what was declared during the tendering phase. Limited experience with this new indicators, increased environmental and social awareness, innovation, speculation, … will result in both positive and negative deviations. To motivate contractors to declare the performance for all these indicators as precise as possible, to reward a better performance during execution (or penalize a worse performance) and to discourage speculation a bonus/sanction fee scheme was developed. A significantly better or a significantly worse performance is rewarded or penalized with a bonus or a penalty which relates to the deviation from the originally declared performance for that indicator. To discourage incorrect positive declarations (which could lead to unfair competition) during the tendering phase, large negative differences between the declared performance for an indicator and the actually realized performance are being penalized with an additional factor (>100%). The allowed deviations and applicable bonus and penalty percentages are supposed to be chosen by the tendering authority and should be added in the tender specifications.

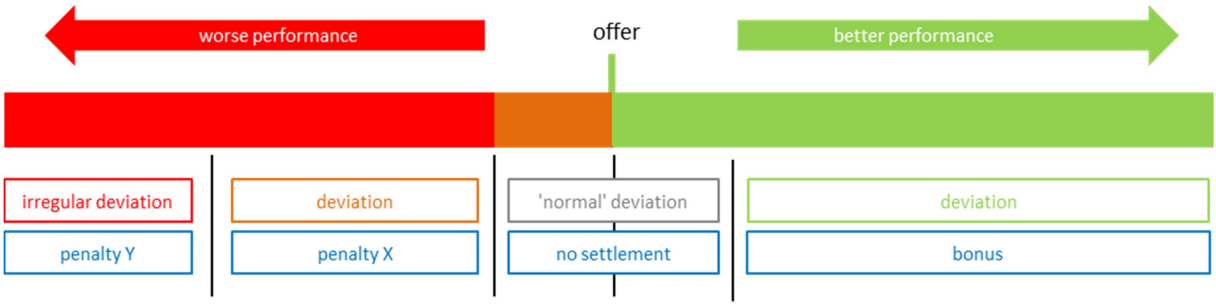

Fig. 3: deviations from declared performance – bonus & penalties scheme

6. Pilot study

The two major Belgian road authorities ('Administratie Wegen en Verkeer' for the Flanders Region and 'Service Public de Wallonie' for the Walloon Region) see this approach as a method to introduce more innovation and quality in their tenders and as a contribution to accomplish their societal duties. Both road authorities agreed to develop a pilot project in the near future.

This pilot projects will allow to evaluate the chosen indicators and their evaluation methods, the settlement mechanisms and, undoubtly, identify improvements.

7. General conclusions and perspectives

Sustainability and Green Public Procurement are more than buzz-words. The wording may appear misleading because more than environmental issues only are considered. The GPP approach allows road authorities and contractors to move away from the lowest-price model and to introduce more quality, innovation and respect for environmental and social considerations in the tendering process and during execution. Existing guidance is extensive but also challenges stakeholders to be creative to imagine relevant indicators and solutions. It is important that the procedures that introduce this approach in the tendering process don't disturb competition in the sector and allow all to benefit from better and more sustainable solutions. Workable procedures need to be developed in close cooperation with all stakeholders and should be introduced at a slow pace to allow all companies to absorb this approach and to take full advantage of the possibilities it offers.

However, the introduction of GPP will also be a continuous process. Indicators or evaluation methods relevant today might need to be replaced tomorrow. The actual work in the BRRC working group is mainly focussed on the execution of bituminous pavements in a first stage, but GPP for other types of pavement might require a different set of indicators for which all stakeholders must be able to give input. Care must be taken that everybody is allowed to participate to this new tendering approach.

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