

City of Rotterdam

CONSTRUCTION MATERIAL PROCUREMENT: ZERO EMISSION TRANSPORTATION

LF Dijk, City of Rotterdam

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Introduction - Construction materials

It is no secret that a large share of public expenditure goes on new construction and maintenance of structures, renovations and extensions of water, sanitation and road infrastructure. An important part of it covers the supply of construction materials. The municipality of Rotterdam purchases these construction materials through framework contracts with industrial suppliers. It consists of a variety of materials, including pavement tiles, sewerage piping and lightpoles. In fact almost all materials that can be found in the public space of Rotterdam are obtained directly from industry to ensure an optimal ratio of quality and sustainability against price. The materials are manufactured on request, made available to contractors who have been selected in tenders for civil works and delivered directly to several construction sites. A shared service department of the municipality dedicated to materials supplies coordinates the logistics in order to optimize load factors, e.g. through combining material requests from different projects in the city.

The vast majority of construction materials are delivered on-site in trailers of 30-40 tonnes. From our CO₂ transportation footprint analysis¹ it appeared that over 95% of total emissions caused by the transportation of purchased goods could be allocated to construction materials. With an estimated of 350,000 tonnes and allocated distance of approximately 300,000 kilometres a year, sand has a dominant contribution to the overall transportation footprint of construction materials. Freight vessels are used to carry sand to a hub, from where it is delivered by a heavy duty truck to several construction sites within the city.

The supply of construction materials is primarily carried out by heavy duty vehicles, which presents a major challenge for zero emission transportation, as ZEVs in this category remain in their early stages of development. Therefore it was decided to take a more open, and promotional approach to this procurement category – aimed at encouraging innovative ideas, rather than setting strict (and unrealistic) requirements.

Procurement approach

Since 2015 Rotterdam endorses the use of environmental product declarations (EPD's) as the sustainable procurement approach for construction materials. We believe that adopting EPD's in procurement lead to eco-efficiency and environmental priority strategies in product development. Individual suppliers are required to calculate the external costs of their product through an environmental life cycle assessment (LCA), which quantifies the overall environmental impact from production to waste disposal, including transportation. The outcomes are however aggregated in a single score to make evaluation of tenders easy.

¹ www.buyzet.eu/wp-content/uploads/2017/11/Rotterdam-BuyZET-Transportation-Mapping-Report.pdf

It is obvious that ZE transportation from the industrial facility to the project sites will lead to a reduction of total environmental impact. Whether the LCA outcomes as award criterion incentivises the uptake of ZE transportation depends on the relative contribution of transport emissions to the overall life cycle. Looking at the production of construction materials, this is not automatically the case.

To promote ZE last mile delivery, we therefore add other award criteria and minimum emission requirements specifically for vehicles that are used to deliver the construction materials from the industrial facility to the construction site. The minimum requirements relate to all transportation within the contract. It imposes the emission thresholds of the Rotterdam Low Emission Zone (LEZ) to the vehicles that are used for the contract. It is expected the LEZ will be transformed to a Zero Emission Zone by 2025. Currently, the requirement allows heavy duty vehicles with EURO IV and above. The award criteria requires the supplier to provide a vision for how zero emission transportation may be achieved for this contract. This is designed to elicit interesting, innovative ideas from the market for a highly challenging procurement category.

This new approach was piloted in a tender for the supply of bricks, published on 1 June 2018

Tender documentation

Contract clauses

All vehicles that are being used during the framework agreement should meet the specifications of the Rotterdam Low Emission Zone (LEZ). Access by some polluting vehicles is restricted with the aim of improving local air quality. More details of the vehicle specifications that meet the LEZ standards in Rotterdam can be found at www.gezonderelucht.nl. In addition to the LEZ, heavy duty vehicles are banned from certain areas of the city, such as the 's-Gravendijkwal. Only for special cases, you may be exempted.

Award criteria

1. Environmental costs indicator

Prospective contractors are required to publish an Environmental Product Declaration (EPD) based on an environmental life cycle analysis (LCA). The rules of thumb for this LCA are according to ISO 15804 and can be found at www.milieudatabase.nl. The outcomes will be awarded as a fictitious deduction to the bid price. The LCA results of the product should be declared as a single score, the so-called environmental costs indicator, which reflects the total environmental load of a product in monetary terms (€). The LCA should cover extraction of resources and production of raw materials, transportation to the production location, production of finished product, transportation of final product to the construction site, disposal and waste treatment. All sorts of environmental impacts are quantified for a certain reference unit. In case of the bricks tender, this is 1 ton of bricks for pavement purposes as being further technically specified in the tender document.

2. Vision and action plan towards ZE transportation



The municipality of Rotterdam promotes zero emission city logistics. As urbanization increases, air quality is under pressure. At the same time technical developments in manufacturing of zero emission vehicles take wings. To push this development forward, the city's objective is to have all logistics within the city run without any vehicle exhaust by 2025. We liaise together with private companies in a so called green deal to design policies and action plans towards this goal, More on these activities can be found at <http://www.logistiek010.nl/nl/>. The city sets a good example by implementing a sustainable procurement strategy that focuses also on zero emission deliveries. In due time, the city will require all transportation of purchased goods and services to be zero emission. Given these ambitions, describe your view on the transportation that is needed do deliver the bricks on the project locations in Rotterdam. Highlight the opportunities for zero emission deliveries considering operational risks and preconditions that may occur during the contract.

Evaluation

Minimum requirements

You should submit vehicle documentation for approval. This information is stored in an unrestricted national database (www.rdw.nl) and should be checked after receiving the bidding documents.

EPD/LCA

The supplier bases the environmental cost indicator of the product on an LCA that is being approved by a third party official. In addition the municipality will have the inventory data being monitored from time to time by an independent auditor. The environmental cost indicator multiplied with a weighing factor is then added to the bid price.

Vision and action plan

The document is being reviewed by the municipality and evaluated according its expected contribution to the ZE activities in Rotterdam as well as its practicability and realism. The vision and action plan (pdf, maximum 2 pages A4, Arial 10) will be awarded by a fictitious deduction to the bid price of 5% maximum.

Score	Evaluation	Fictitious deduction
5	Outstanding	5%
3	Good	3%
1	Sufficient	1%
0	Insufficient	0 %

Calculation example tender document brick

Firm A declares to have an environmental cost score of 16 €/ton. Bid price is € 2.000.000,- by purchase of a 13,200 tons of bricks. The weighting factor for the environmental cost indicator to be added to

the bid price is 9,5. The vision and action plan for zero emission transportation is awarded as 'good'. Final offer will then result in:

- Bid price including external costs: $\text{€ } 16,- * 13.200 * 9.5 = \text{€ } 2.006.400,- + \text{€ } 2.000.000,- = \text{€ } 4.006.400,-$
- Fictitious deduction initial price: 3% of $\text{€ } 2.000.000,- = \text{€ } 60.000,-$.
- Final offer: $\text{€ } 4.006.400,- - \text{€ } 60.000,- = \text{€ } 3.946.400,-$.

Firm B achieves a 10% reduction of total environmental load by means of an eco-efficient freight vessel that transports the bricks to a hub in Rotterdam. There Bid price is $\text{€ } 2.200.000,-$. The transportation plan is being evaluated as outstanding. Final offer will then result in:

- Bid price including external costs: $\text{€ } 14,40 * 13.200 * 9.5 = \text{€ } 1.805.760,- + \text{€ } 2.200.000,- = \text{€ } 4.005.760,-$.
- Fictitious deduction initial price: 5% of $\text{€ } 2.200.000,- = \text{€ } 110.000,-$.
- Final offer: $\text{€ } 4.005.760,- - \text{€ } 110.000,- = \text{€ } 3.895.760,-$.

Firm C has significantly improved its environmental performance by energy saving measures in its production facility, leading to an environmental cost indicator of 8 €/ton. The bid price is $\text{€ } 3.100.000$. The transportation plan is viewed as sufficient.

- Bid price including external costs $\text{€ } 8,- * 13.200 * 9.5 = \text{€ } 1.003.200,- + \text{€ } 3.100.000,- = \text{€ } 4.103.200,-$.
- Fictitious deduction initial price: 1% van $\text{€ } 3.100.000,- = \text{€ } 31.000,-$.
- Final offer $\text{€ } 4.103.200,- - \text{€ } 31.000,- = \text{€ } 4.072.200,-$.

As a result the contract will be awarded to firm B.

Complementary measures

The city of Rotterdam is considering the development of material hubs at the corridors. Construction materials may then be transported to the hubs and distributed to the project locations by means of ZE vehicles. When the hubs are situated along the waterfronts some materials such as bricks may be transported by freight vessels.

Other buyers

The use of EPD as an award criterion is getting more attention by other buyers. It is expected that this will be the main procurement model when it comes to construction of infrastructure including materialisation in the Netherlands. The use of EPDs for material supplies in framework contracts is

quite unique however, as most regional buyers outsource material deliveries and its transportation to their contractors. Similar criteria and requirements including may be included in these tenders as long as the contractors that purchase the materials from the industrial suppliers are monitoring the environmental performances and deliveries on the construction sites. Rotterdam is collaborating with local/regional buyers to create common procurement models, including the delivery from hubs.

Application

The minimum requirements as well as the EPD approach have already been applied in many tenders, including concrete tiles, pavement blocks, concrete piping and lighting poles. The tender for bricks was the first that awarded a vision and action plan on ZE transportation. We intend to apply this approach to more framework agreements for material supply. In addition, Rotterdam is preparing a pilot for zero emission transportation of materials, such as soil, sand and waste flows as a part of a tender for public space maintenance.

Next steps

Our preference would be to award zero emission transportation for deliveries of construction materials by means of a prospective use of zero emission vehicles during the contract. As the duration of framework contracts is normally restricted to 4 years maximum according to European procurement rules and because of the limited availability of ZE heavy duty vehicles it is currently not feasible to implement this approach to our framework agreements. ZE transportation of bulk materials is to be piloted in an upcoming tender for public maintenance (in progress).

However, the award criterion that challenges suppliers on their vision on ZE transportation has resulted in a promising response in case of the brick tender:

- The supplier declares transportation processes contribute relatively small to overall CO₂ emissions across the life cycle, in particular compared to production.
- Nevertheless the supplier understands the need for ZE emission transportation within the city boundaries as a logical response to local air pollution. Therefore, the supplier mentions both the possibilities of hybrid and hydrogen freight vessels of Blue Line Logistics that are able to navigate without emissions within the city water bodies.
- Apart from this, the supplier has also considered rail transport and collaborates with companies in Rotterdam to exploit a hub from where the bricks can be distributed with (small) zero emission trucks.

The development of material hubs deserves further work and is currently under development. Other buyers, including private companies, will be approached for collaboration in this matter.

Regarding the tender, the following aspects need additional attention:

- The current tender requires a unit price including transportation, handling fees and all other costs related to the delivery. A price differentiation that makes the transportation costs

explicit would provide useful insights in the additional cost needed to get the materials being delivered without emissions.

- Just in time deliveries may lead to suboptimal load factors. This has to be sorted by the planning and purchasing process on the construction site.
- Whether the batches needed at the construction site correspond with maximum loadings of smaller ZE heavy duty vehicles that are currently available needs further work. In the case of other bulk materials (sand), we found that only large trucks are used. These trucks are not commercially attractive.
- The use of EPDs is a powerful and widely accepted strategy to promote cleaner production and supply chains. As this combines all sorts of processes along the life cycle, we may also put additional weight on the last mile transportation without compromising the LCA model. This needs further investigation and study.

Internal promotion

The procurement approaches that have been developed within BuyZET, including the one for construction materials will be disseminated through an internal capacity building programme about Sustainable Public Procurement in 2019. We are also developing a decision support diagram which helps procurement officers and contract managers to decide which strategy is most suitable for a tender. During the first quarter of 2019, the City of Rotterdam participated in a national capacity building together with Connekt and PIANOo. We aim to disseminate this diagram to an even wider audience as a follow up on this training about procurement of ZE transportation.

A wider uptake of this approach is further guaranteed by the fact that there are only a limited number of contract managers who are responsible for all framework agreements for the supply of construction materials. The budget holder is already part of a project team that will organise a follow up on the brick tender. Additional internal stakeholders such as the engineering department responsible for construction will then be included as well.

Purchasing and handling of construction materials are under control of the materials department which act as the contract owner of all framework agreements. Additional internal stakeholders will be the contracting department of works, that actually need these materials and may need to adjust their planning process and incorporate operational risks related to ZE delivery and storage.

Replicability

All criteria and minimum requirements correspond with European standards and can therefore be applied in all contracts across Europe. Success is dependent on contract management reliability of vehicle documentation.



About BuyZET

BuyZET stands for BuyZET 'Procurement of innovative solutions for zero emission urban delivery of goods and services'.

The BuyZET project will develop innovative procurement plans to help the participating cities achieve their goals of zero emission urban delivery of goods and services.

Partners Logos



Contact details

Reach us:

Visit the project website: <http://www.buyzet.eu>

Join the discussion at the BuyZET Procurement Forum Group:
<https://procurement-forum.eu/>

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