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Sustainable reconstruction of the A6 motorway in the Netherlands

Rijkswaterstaat (Netherlands)

Background

The Netherlands aims to achieve a 49% reduction in CO_2 emissions by 2030, compared to 1990 levels, and have a target of 16% renewable energy production by 2023, compared to 2% in 2010.

To support achieving these targets, a political commitment was made in 2005 to procure only sustainably by 2010 for central government entities. Moreover, the current Action plan for Responsible and Sustainable Procurement by governments runs from 2015 to 2020.


Image: RWS

Rijkswaterstaat (RWS) is the Department of Public Works within the Dutch Ministry of Infrastructure and Water Management. It has an annual budget of €3.5 billion and is the biggest investor in infrastructure in the country. It employs around 8,500 people and manages the main waterways, coastal water systems and motorways in the Netherlands. RWS' yearly emissions of CO_2 total 818 kilo tonnes. In 2030, RWS aspires to work in a completely circular way via the intensive re-use of raw materials, and by producing as little waste as possible.

Procurement objectives

In 2015, RWS published a Design, Build, Maintain and Finance (DBMF) contract to widen a 13 kilometre stretch of road between Almere Havendreef - Almere Buiten Oost (A6 motorway) and maintain this during a 20-year operation phase. This project was part of wider improvements to the Schipol-Amsterdam-Almere (SAA) corridor, which aims to improve traffic flow and road capacity.

The tender was prepared and executed under the leadership of RWS.

RWS uses the 'Most Economically Advantageous Tender (MEAT) procedure to select tenders on the basis of price and quality, which in this project was assessed on a risk management plan, a traffic congestion restriction plan, and sustainability.

RWS assigns monetary values to quality aspects. These values are then subtracted from the actual offered price to provide a 'corrected total price' in which environmental impacts are also accounted for. The bidder with the lowest 'corrected total price' then wins the contract.

Procurement approach for infrastructure projects - in general

RWS have developed a methodology for infrastructure projects, whereby the functional specifications of the tender together with the quality input from the client ensure an innovative and high-quality final solution. This methodology contributes to the reduction of CO_2e emissions and other environmental impacts caused by materials used in infrastructure projects.

Tendering based on functional specifications

RWS strives to commission procurement projects as far as possible based on functional, performance-based specifications of the required infrastructure, so that the market has the optimum freedom to arrive at effective, alternative and innovative solutions. Functional specifications provide a description of the solution within the margins that apply to that system, product or service.

The MEAT approach for the 'award' phase

Using the MEAT procedure means that RWS selects tenders on the basis of a combination of price and quality.

Two instruments are used by RWS to assess and monetise sustainability in the award phase of a public procurement process:

1. The CO_2e Performance Ladder. This certification system allows bidders to show measures taken (or to be taken) to limit CO_2e emissions within the company, all its projects, including the one tendered, and the concerned supply chain. It is used to adjust total price by evaluating the estimated emissions from the proposal against a series of levels, or 'rungs' (in ascending order as the efforts are greater), with each successive performance rung providing an additional 1% deduction to the final offer price. A maximum of 5% can be deducted to from the total price.

2. DuboCalc. This Life Cycle Analysis (LCA) tool calculates the Environmental Cost Indicator (ECI) or the sustainability of the materials required in a particular design (based on standardised values from the National Environment Database), allowing bidders to test different design options and maximise the sustainability of their offer. The lower ECI value, the lower the environmental cost. How this works in practice is that RWS assigns a price to specific quality aspects. This value is then subtracted from the actual offer price to yield a corrected 'total price'. The more effort the bidder makes to improve the quality of the bid, the higher the monetised value that will be deducted from his actual offer price. The tenderer with the lowest 'total price' wins the tender.

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The DuboCalc tool was developed by RWS. An introduction to DuboCalc, in English, is available at this YouTube link and further instructions are available here.

Award criteria used in the A6 motorway tender

Quality criteria included for this project:
- Risk management plan
- Traffic congestion restriction plan
- Sustainability: Through the use of the CO_2e Performance Ladder and DuboCalc (explained above).

Using DuboCalc, RWS could also assess the impact of proposed materials, including groundwork, pavement, under layers, inter-layers and coatings. The project team set a maximum ECI value of 12,000,000, but based on professional experience, it expected that the most optimal design could only reach a 50% ECI value (that is, an ECI value as low as 6,000,000). This meant that the bidder that could carry out the work with an ECI value of as low as 6,000,000 would be awarded with a - fictional - deduction of the bidding price of €10,000,000. A design that scored 12,000,000 would have no deduction from the bidding price. Other ECI Values would result in a deduction proportional to the ECI Value.

By monetising efforts to reduce environmental externalities, RWS was able to assess and select a provider on the basis of more holistic information on cost and quality.

Contract performance requirements

The materials proposed by the successful bidder became contract requirements, and the ECI value of the final product was checked one year after the contract close. The results of this assessment re-informed the LCA data on which DuboCalc was based.

The measures included in the CO_2e Performance Ladder also become part of the performance requirements of the contract, which must be assessed one year after the start of the contract by certified authorities.

Results

In terms of the results of the tendering process for the A6 motorway, the winning tender proposed the work at a price under €200,000,000, at a quality which reached the fifth rung of the CO_2e Performance Ladder and met the optimal ECI score. It achieved this quality via:

- Smart construction transportation solutions which reduced the need to transport materials by road;
- Smart use of asphalt, which lowered the required quantity; and,
- Use of recycled materials, which reduced the need for primary raw materials.

Environmental impacts

There are a wide range of environmental impacts associated with road construction and other infrastructure projects, such as building tunnels and bridges. The extraction and processing of raw materials using mining operations and refining ores can cause the physical disturbance of land and water courses and the pollution of land, water and air. The manufacturing and processing of materials such as concrete, cement, asphalt and bitumen have high energy requirements, especially as they are required in such high volumes. The transport of materials to and from sites causes local air pollution and greenhouse gas emissions and the construction phase itself can cause habitat destruction and a loss of biodiversity at the site.

After a road has been completed, impacts include environmentally damaging rainwater run-off arising from tyre abrasion, fuels, lubricants and road surface treatments. When road surfaces need maintaining or replacing, waste materials from the surface layer are generated.

For these reasons, RWS have found ways to look at contractors' approaches to controlling overall emissions through the CO_2e Performance Ladder, as well as the wide range of environmental impacts associated with the materials included in the design through DuboCalc. CO_2e emissions are one of the 11 parameters that contribute to the ECI Value, and in this project, comprised 44% of the total ECI Value (as calculated against a reference design).

The winning design for reconstructing the A6 motorway met the optimum ECI score of 6,000,000, which equates to savings of 52,800 tonnes of CO_2e emissions, or 15,048 tonnes of oil equivalent (toe) over the life time of the project (or annual savings of 1,056 CO_2e/year and 301 toe/year) compared to the maximum ECI allowed value.

Lessons learned

- Due to the success of the approach used for reconstructing the A6 motorway, RWS is continuing to use this approach for procurements related to large infrastructure projects. However, due to the relative complexity of the tool, a focus on larger and more important projects leads to achieving more significant results.
- Bidders should have the flexibility to experiment to find optimal sustainability. As such, they should only be provided with functional requirements and technical framework conditions. Specifying particular materials, etc. should be avoided if the maturity of the market allows this.
- In order to set a maximum ECI Value, and judge the tenders accordingly, it is necessary for the client to have a good reference design for comparison. As such, applying DuboCalc requires expertise - particularly in environment, materials and civil engineering.
- The gains (that is, reduction of carbon emissions) should outweigh the increased cost of tendering. However, a sensitivity analysis may be necessary to assess this.

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The tender documents are available here on Tenderned. The availability of information is limited to the procurement selection phase. Following the selection phase, two further dialogue processes were undertaken.

For further details about this good practice case, please see the case study published through the EU-funded GPP 2020 project.

For related information, please see European GPP criteria for Road Design, Construction and Maintenance and the Technical Background Report.