



## Low-carbon reconstruction of the A12 motorway section Veenendaal-Ede-Grijsoord

Rijkswaterstaat, The Netherlands

- A tendering method that aims to reduce CO<sub>2</sub>e emissions was applied. Tendering parties were encouraged to offer a lean design and to apply innovative materials and working methods.
- Remarkable savings equivalent to the average annual CO<sub>2</sub>e emissions of about 1,500 European households.



### Standard tender

- 36,589 t CO<sub>2</sub>e emissions
- 10,428 toe energy consumption

### GPP 2020 tender

- new procurement methodology & design optimisation
- 27,645 t CO<sub>2</sub>e emissions
- 7,879 toe energy consumption

### Results

- 8,944 t CO<sub>2</sub>e emissions reduction
- 2,549 toe energy savings

## Contract tendered

The contract is a Design, Build, Maintain and Finance contract (DBFM) and consisted of two parts.

### *First part:*

The reconstruction of the A12 motorway between the city of Ede and the Grijsoord Junction and a small section of the A50. The contractor was asked to design, realize, maintain and finance the project and will be held responsible for the availability of the infrastructure for a period of 16 years after realization.

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This first part of the contract includes:

- widening of the motorway from 2x2 lanes to 2x3 lanes over a length of about 11 kilometer including 2 emergency lanes
- Adaptation of road signaling
- Mitigating / compensating / and integration measures
- Adaptation or installation of noise reducing screens
- Maintenance and expansion of emergency services
- Adaptation of connecting roads to road site facilities
- Application of noise reducing road surface material with at least the acoustic quality of two-layered porous asphalt on the main carriageway of the A12 and over almost the whole section of the A50 that is included in the reconstruction.
- Widening of a viaduct
- Replacing of a railway viaduct
- Widening of four underpasses and construction of one new underpasses
- Several, but limited, adaptations of the Grijsoord junction

Public lighting is not required since this section of the motorway is situated in the natural wildlife reserve area 'the Veluwe'.

### *Second part:*

This includes the regular maintenance of the A12 motorway section between the cities Veenendaal and Ede. The contractor will be held responsible for the availability of the infrastructure and technical facilities for a period of 18 years after the signing of the contract.

This second part of the contract includes:

- The maintenance of:
  - 2x2 lanes with emergency lanes and traffic jam lanes of approximately 8 kilometers in length;
  - four viaducts;

- one underpass;
- the noise reducing screens;
- the realization of:
  - installations for operation of traffic jam lanes;
  - dimmable public lighting of part of the section;
  - three connections to crossing roads

The maximum price (“ceiling price”) the provider was willing to pay for this contract was set to € 83,700,000.

This contract is tendered sustainably according to the Dutch Governmental policy and contributes directly to the Dutch policy “20% Less CO<sub>2</sub> emission in 2020 compared to 2009”.

The map shows the project area of the A12 between Veenendaal and Grijsoord Junction. The distance between Veenendaal and Grijsoord is 19 km



## Procurement approach

The tendering followed the Competitive Dialogue procedure.

- The dialogues were started after the selection of five potential providers.
- It was planned to have two dialogues phases, which could consist of more than one rounds of conversations.
- After the first dialogue phase three providers remained.
- After the second dialogue phase these three providers were allowed to make bid for this DBFM-contract..
- The bid is based on the most economical advantageous tender (MEAT) approach. i.e. the final bid consists of a bidding price and a description of the offered quality.

- The bidding prices should not exceed the available budget of € 83,700,000 and Rijkswaterstaat use MEAT procurement as a tool to select the provider that offers the best quality to price ratio.
- The MEAT procedure was used in this tender to select an offer based on the bidding price and 4 quality criteria:
  - Organisation
  - Hindrance to road & railway traffic
  - Impact on nature
  - Sustainability

### Sustainability

This tender model focuses on the last criteria; other MEAT criteria are not discussed here. By applying this last criteria Rijkswaterstaat shows that it wants to select a provider with a) an energy efficient Working Processes who also offers b) a product with a high Product Quality (being a low environmental impact). Both aspects – process and product – contribute to CO<sub>2</sub> emissions. The MEAT approach implies a pricing of both these quality aspects.

- Working processes: Rijkswaterstaat favours companies that organize their working processes efficiently and thus reduce CO<sub>2</sub> emissions. This is done by deducting a fictional amount of money from the bidding price. The higher the efforts to reduce CO<sub>2</sub> emissions, the higher the deduction. The tool utilized for the monetizing of the benefit is called the CO<sub>2</sub> Performance Ladder, see [www.skao.nl](http://www.skao.nl).
- Product Quality: Rijkswaterstaat favours the bidder that offers a product with a low environmental impact due to materials and working methods. CO<sub>2</sub>e emissions are a part of the environmental impact. In order to monetize the product quality, Rijkswaterstaat developed the software instrument DuboCalc. DuboCalc is based on the life cycle assessment (LCA) of all materials that are used in the construction. The result of this monetization is presented as the “environmental costs indicator value” (ECI Value, see <http://www.youtube.com/watch?v=cAaL4FfBQnc>).

### Most Economic Advantageous Tender (MEAT)

The MEAT approach implies a pricing of both above mentioned quality aspects. The ECI Value and CO<sub>2</sub> Performance Ladder are used in the MEAT procedure as follows:

- the contracting authority provides organisations that expressed their interest in making a bid with all the functional requirements and technical framework conditions;
- these organisations make a design and calculate the price and the ECI Value;
- they also state how much effort they will put in the reduction of CO<sub>2</sub>e emissions caused by their internal operational processes, more effort will result in a higher rung on the CO<sub>2</sub> Performance Ladder;
- these three criteria (bidding price, CO<sub>2</sub> Performance Ladder rung and ECI Value) are presented in the bid to the contracting authority.
- the contracting authority calculates the benefits and deducts these from the bidding price;
- the bidder with the lowest combined – fictional – bidding price wins the tender.

## Criteria development

- The CO<sub>2</sub> Performance Ladder was applied to this tender. According to the green procurement policy of Rijkswaterstaat each rung of the ladder yielded an extra one percent fictional deduction of the bidding price. The highest rung (rung 5) yields 5% extra fictional deduction from the bidding price.
- The reference design was used to estimate the quantities of materials applied in this work. These quantities were used to calculate the ECI Value of the reference design using DuboCalc. The calculation was limited to the materials that contribute the most to the ECI Value.
- Using DuboCalc an ECI Value of 3,600,000 was calculated for a design life time of 50 years. However, according to their professional knowledge the project team expected that the most optimal design could reach an ECI Value of as low as 2,800,000.
- The project team decided that a maximum deduction of the bidding price of € 4,000,000 would be applied for the sustainability criterion in this tender. This meant that the bidder that could design the civil structures in such a way that, when the total ECI Value is as low as 2,800,000 - or lower, it would be awarded with a fictional deduction of the bidding price of € 4,000,000. A design that scored 3,600,000 would get no deduction from the bidding price. Other ECI Values would result in a deduction proportional to the ECI Value.

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## Results

	CO <sub>2</sub> e emissions	Energy consumption
Low Carbon Solution	552.9 t CO <sub>2</sub> e/year	157.8 toe/year
Last Tender/or „worst case“	731.8 t CO <sub>2</sub> e/year	208.6 toe/year
Annual savings	178.9 t CO <sub>2</sub> e/year	50.8 toe/year
Total savings (50 years)	8,944 t CO <sub>2</sub> e	2,549 toe

- The winner offered a bidding price of € 69,355,184.
- The winner offered to perform the work under the regime of the fifth rung of the CO<sub>2</sub> Performance Ladder, so he earned a fictional deduction of 5% \* € 69,355,184 = € 3,467,759
- The winner offered an ECI Value of 2,720,000. This was even better than the minimum of 2,800,000 that was hoped for. It assured him of the maximum fictional deduction of € 4,000,000.
- The bidding price corrected for the fictional deductions due to the CO<sub>2</sub> Performance Ladder and DuboCalc was: € 69,355,184 – € 3,467,759 - € 4,000,000 = € 61,887,425.

- Other MEAT criteria were valued and awarded much higher than sustainability (€ 22,130,000), so the total fictional bidding price that was compared with the other tenderers was € 61,887,425 - € 22,130,000 = € 39,757,425.

This was the lowest price compared to the corrected bidding prices of other tenderers.

- Emissions Reduction of CO<sub>2e</sub> in this project
  - On beforehand the contracting authority make a reference design and use this to calculate an ECI Value. CO<sub>2e</sub> emissions is one of the (in total 11) parameters of the DuboCalc calculation that contributes to the ECI Value. The CO<sub>2e</sub> emissions are the amount that is emitted as a result of the processing of all building materials involved (production, transport, demolishing, re-use, et cetera) and the realization processes.
  - The amount of CO<sub>2e</sub> emissions that is reduced can easily be calculated by subtracting the ECI Value of the offered design from the reference design.
  - The CO<sub>2e</sub> emissions are an integral, proportional part of the ECI Value. It follows from the DuboCalc calculation that in this project 50.8% of the ECI Value is caused by the emissions of CO<sub>2e</sub>. The amount of CO<sub>2e</sub> emissions can now be calculated since 1 t CO<sub>2e</sub> emissions equals an ECI Value of 50.
  - The calculated ECI Value for the reference design is 3,600,000 for a design life time of 50 years. These are CO<sub>2e</sub> emissions of 36.589 tons in 50 years and an energy consumption of 10,428 toe in 50 years.
  - The winner offered in the tender an ECI Value of 2,720,000, which is 27,645 tons of CO<sub>2e</sub> emissions in 50 years and an energy consumption of 7,879 toe in 50 years.
  - The design offered by the bidder yielded 8,944 tons less emissions of CO<sub>2e</sub> in 50 years and an energy saving of 2,549 toe in 50 years.
  - The reduction in CO<sub>2e</sub> emissions of the construction is due to the material to be used in the top layer; the contractor applies material with a longer life time then was predicted in the reference design

## Lessons learned

- The client must have a well-thought-out reference design and know where there is room for improvement in order to predict a maximum ECI Value.
- The bidders have the freedom to make their own choices since they are only be provided with functional requirements and technical framework conditions. The market appreciates this approach..
- Perhaps the results (and the amount of saved energy) would have been greater if the bar for sustainability had been placed higher and the criterion had been valued higher in terms of money, i.e. the minimum ECI Value could have been lower and the fictional prize deduction could have been higher. This assessment flows into the drafting of future tenders.

## Contact

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Sites: [www.rijkswaterstaat.nl/](http://www.rijkswaterstaat.nl/), <http://duurzaamgww.nl/>

## About GPP 2020

**GPP**  
**2020** | procurement  
for a low-carbon  
economy

GPP 2020 aims to mainstream low-carbon procurement across Europe in support of the EU's goals to achieve a 20% reduction in greenhouse gas emissions, a 20% increase in the share of renewable energy and a 20% increase in energy efficiency by 2020.



To this end, GPP 2020 will implement more than 100 low-carbon tenders, which will directly result in substantial CO<sub>2</sub> savings. Moreover, GPP 2020 is running a capacity building programme that includes trainings and exchange. – [www.gpp2020.eu](http://www.gpp2020.eu)

## About PRIMES

 **PRIMES**  
Green Public Procurement

Across six countries in Europe; Denmark, Sweden, Latvia, Croatia, France and Italy, PRIMES project seeks to help municipalities overcome barriers in GPP processes, many of which lack capacity and knowledge.

PRIMES aims to develop basic skills and provide hands-on support for public purchasing organisations in order to overcome barriers and implement Green Public Purchasing. This will consequently result in energy savings and CO<sub>2</sub> reductions. – [www.primes-eu.net](http://www.primes-eu.net)



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