



Rijkswaterstaat  
Ministry of Infrastructure  
and Water Management



**Rijkswaterstaat:  
proudly engineering  
sustainability in the  
Netherlands**

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# Rijkswaterstaat: proudly engineering sustainability in the Netherlands



Michèle Blom,  
Director-General Rijkswaterstaat

Viewing the Netherlands from the air, what you see is a country built by human hands. For generations, civil engineers have repeatedly transformed the country's landscape. As the inscription on the statue of Cornelis Lely on the Afsluitdijk puts it: 'A living nation builds for its future'.

Today, our country is in need of another facelift, a makeover that leaves it climate-proof so that we can leave behind a country fit for our children and our grandchildren.

Rijkswaterstaat has been building the country's physical environment for 220 years. Sustainable area development is naturally one aspect of what we do. Constructing roads, waterways and flood defences, while also enhancing the beauty, the ecology and the quality of life in our nation. Always in close collaboration with the stakeholders in the regions where we operate.

The Netherlands is currently formulating a climate agreement which will provide an additional incentive to discover new ways of making the Netherlands more sustainable. Our objective is to make all our infrastructure networks energy-neutral by 2030. Another target for that same year is to operate on the principles of the circular economy.

We cannot achieve this alone. We have to do it together with all our partners in the chain: the government, the business community and research institutes, but also the public and interest groups. All of them pursuing their own interests and contributing their own particular talents and expertise.

Rijkswaterstaat defines its responsibility for promoting sustainability broadly. We actively share our specialist knowledge for projects in the area of water, roads and the physical environment. And, wherever possible, we are happy to make available the large areas of land we manage in the country for the generation of energy and for experiments with promising innovations.

We are also eager to pioneer efforts to meet the national targets for sustainability by consolidating the strengths of our partners in the public and private sectors and the research community in innovative projects to promote sustainability. In addition, more and more of our work is devoted to projects designed to make our partners at every level of the national government more sustainable.

This inclusive, collaborative approach has already produced remarkable results. You can read about some of our successes in this brochure. Inspiring tales of what can be achieved by making full use of everyone's knowledge and experience, but also a fascinating description of how Rijkswaterstaat has evolved into a sustainable executive organisation for the entire national government.

I hope you enjoy reading it!

# Sustainability above all

The Netherlands faces major challenges in the domain of sustainability. Our ambition is to create a circular economy and ultimately eliminate emissions of CO<sub>2</sub> and other greenhouse gases altogether. What does that mean for Rijkswaterstaat? Our Strategic Sustainability Advisor, Maarten Neelis, discusses how Rijkswaterstaat is addressing the challenges of making the Netherlands more sustainable.

“Sustainability is a difficult concept,” says Neelis, “but in a nutshell it means meeting the needs of society today while ensuring that future generations are also able to meet their needs. The term ‘people, planet, profit’ encapsulates Rijkswaterstaat’s ambitions in that respect. One of the tools that Rijkswaterstaat uses in implementing that slogan is the Infrastructure Strategy Appraiser (Omgevingswijzer), an instrument for evaluating projects which encompasses all three aspects: people, planet and profit. Accessibility and water are two of the aspects covered in the Infrastructure Strategy Appraiser, but there are others such as energy and materials, spatial quality and the business climate. The task we face is to take account of all these aspects, in consultation with other stakeholders, in the projects that we are involved in. In the process, it is crucial that we avoid creating problems in the future.”

“This broad definition of our task reflects the fact that it relates to everything we do. Equally, however, it illustrates the fact that operating in a sustainable manner is not exceptional or unusual extra. It is not the icing on the cake, so to speak. Sustainability has to be an integral facet of everything we do and how we do it. It is the common thread connecting every aspect of spatial development.”

## Various needs and interests

Planning sustainable spatial development is a process in which Rijkswaterstaat works with a great many partners. “And all of those partners have their own particular needs and wishes. For citizens, health and the quality of life in the immediate vicinity of the infrastructure managed by Rijkswaterstaat, such as motorways,

is important. For our own ministry, mobility in the Netherlands is often a political priority. And for municipalities, spatial quality is very important. Each of these parties brings different social demands to the table. We then endeavour to find an integrated solution that reconciles all of the various interests.”

## Different roles

Rijkswaterstaat fulfils its mandate in a variety of capacities. How we address sustainability can differ depending on the specific role we are playing. “In the role of principal – with respect to the construction, management and maintenance of our motorways, waterways and the water system – much of the responsibility rests with the organisation itself,” says Neelis. “For example, the criteria for sustainability in tenders are becoming increasingly stringent and we reward contractors who demonstrably perform better in that regard. By replacing electric light bulbs with LED lighting or using cleaner vehicles for earthmoving, for example.”

But Rijkswaterstaat is not just a principal, but is also a manager and a licensing authority. “Anyone wishing to use the land we manage for a particular purpose requires a permit from us. That requirement covers everything from allowing sheep to graze on a dike to installing a wind turbine alongside a motorway. At the same time, we consciously search for opportunities to use our land for sustainable initiatives, naturally ensuring that such activities do not threaten the primary function of our land and that they fit in well with the local environment.”



### Partner in area development processes

Finally, Rijkswaterstaat is a partner in area development processes. The government, provinces and municipalities are currently drafting environmental strategies, as required by the Environment and Planning Act, which will include plans for the development of specific areas. Neelis: "Accessibility is an essential element of those plans and that calls for an integrated analysis of the various interests. For example, is a road the best solution for that area or are there better alternatives?"

### Operating as a government-wide executive agency

In light of the number of challenges facing us and the need to formulate an integrated strategy to address them, our parent ministry, the Ministry of Infrastructure and Water Management, is no longer our sole client. We have numerous clients. For example, in our capacity as the manager of a very large area of nature we are accountable to the Ministry of Agriculture, Nature and Food Quality. And for the Ministry of Economic Affairs and Climate Policy we are exploring the possibilities to use our land for the generation of renewable energy. In other words, our function as an executive agency extends to the entire government and we believe that role will only become more important in the future."

## Innovation, harmonisation and production

There are three elements to Rijkswaterstaat's approach to sustainability: "innovation", "harmonisation" and "production". "We have a really good track record in developing innovations in association with the private sector. How can we integrate solar panels in sound barriers? How do you install wind turbines alongside a motorway without endangering road safety? Naturally, we hope that the new technologies and working methods will be widely used and become the standard, and eventually be incorporated in the relevant guidelines. Take LED lighting, for example. We started by carrying out various tests with the technology and later started including the use of LED lighting as one of the requirements in tenders. In this way, LED lighting will eventually become the standard in every project."

*'How do you install wind turbines alongside a motorway without endangering road safety?'*



# Sustainability Report 2017

Overview of Rijkswaterstaat's results

Rijkswaterstaat writes an annual sustainability report (with the Ministry of Infrastructure and Water Management) describing the results it has achieved and illustrating them with inspiring practical examples. This section contains a selection of the highlights from the Sustainability Report for 2017. We achieved these results with innovative solutions and in association with an expanding network of partners with whom we are creating a cleaner, greener and more pleasant living environment. For the full report, see [www.duurzaamheidsverslagrws.nl](http://www.duurzaamheidsverslagrws.nl)

## Energy and climate

**AMBITION** Rijkswaterstaat aims to be energy-neutral (i.e., will generate as much energy as it consumes) by 2030.



Rise from level 3 to level 4 on the CO<sub>2</sub> Performance Ladder



Reduction of CO<sub>2</sub> emissions by 30% compared with 2009; the target for 2020 has already been met

**REVIEW OF 2017** We tightened control of our CO<sub>2</sub> emissions, primarily by reducing the fuel consumption of the vessels owned by Rijkssrederij (the Government Shipping Company) and electricity consumption, for example by installing LED lighting in the Benelux tunnel.



Reduction of 9% in CO<sub>2</sub> emissions from the Rijkssrederij's vessels and ordering of three semi-electric ships



Purchase of 100 electric cars

## Circular economy

**AMBITION** Rijkswaterstaat intends to operate according to the principles of the circular economy and to reduce the use of primary raw materials by 50% by 2030. Operating according to circular principles involves high-value recycling of raw materials and minimising waste. One example of high-value reuse is using old concrete to produce new concrete so that it retains its value.



Circular office furniture for 100,000 government workstations



Circular demolition of a district office in Terneuzen

**REVIEW OF 2017** We used the practical experience gained in association with partners to take the first steps towards a circular economy.



Circular use of materials for the Reeve sluice gate complex



Signing of Green Deal GWW 2.0 (a Green Deal for the civil and hydraulic engineering sector) with more than 60 partners

## Sustainable Area Development

### AMBITION IN EACH ROLE AND HIGHLIGHTS

We perform this function by drafting a strategy for an area with partners before the area is redeveloped.



As area partner, helping to formulate environmental strategies and agendas for an area, for example in the planning process for the Twente Canals




As executive agency, integrating sustainability in every contract in 2020, for example for the Reeve sluice gate complex



As manager, assessing sustainable initiatives more quickly and more clearly and helping to execute them, for example for the A37 (Solar Route)

**REVIEW OF 2017** We gradually learned to engage sooner and more proactively with our partners in the area.

A low-angle photograph of a solar panel array on a roof. The panels are blue with a grid of silver lines. The sun is in the upper right corner, creating a bright lens flare. The sky is clear blue. In the background, there are some trees and a house.

# Energy & Climate

# Facilitating the generation of renewable energy on public land

Rijkswaterstaat, the Central Government Real Estate Agency (RVB) and the Netherlands Enterprise Agency (RVO) have launched a pilot programme for renewable energy on behalf of the Ministry of Economic Affairs and Climate Policy. The three organisations are investigating the possibilities of making government-owned land available to the market for the generation of renewable energy.

In the pilot programme, which will run for four to five years, ten potential energy projects will be investigated and prepared. The relevant locations could then be developed by private companies. The projects involve onshore and offshore generation of solar energy, but the programme could be expanded later to include wind energy and other electricity-generating technologies. Sten Heijnis, who is responsible for the pilot programme, explains its background: “This assignment is a perfect fit for Rijkswaterstaat because of the organisation’s wealth of experience in project and environmental management in the physical domain. The land under our management offers huge opportunities for multifunctional use of space. With these projects we can make a major contribution to the energy transition.”

## Opportunities for the market

Rijkswaterstaat will not build, operate and manage any solar parks itself. “That is up to the market,” says Rik Jonker, the contract manager for the pilot programme.

*“The knowledge and experience we gain with these ten pilot projects will be hugely important for us”*

*“This assignment is a perfect fit for Rijkswaterstaat because of the organisation’s wealth of experience in project and environmental management in the physical domain ”*

“Public land is interesting for market players, but is not an obvious choice because it is already zoned for a specific purpose, such as mobility or water management. Candidates would also need a lot of permits from public authorities and network companies to develop a site and that is a complex, time-consuming and expensive process.” If necessary, the participants in the pilot programme will assist the entrepreneur by handling at least part of the preliminary work. The point of departure is that the government-owned land will be issued at the market price in a public and transparent procedure. The parcels of land or water being issued are suitable for large-scale projects, ranging in size from several dozen to hundreds of hectares.

#### **New knowledge**

The aim of the pilot programme is to design smooth and cost-effective procedures for organising energy-related projects on government-owned land. “The knowledge and experience we gain with these ten pilot projects will be hugely important for us,” says Heijnis, “particularly in terms of learning the most effective way for the government to market public land. We know how to respond if a party asks to erect an advertising hoarding on our land, but a solar park is a totally different matter. That is relatively uncharted territory for us. By varying the conditions and the procedures in the various pilot projects, they will yield a tremendous amount of information for future projects.”

## An energy-neutral Ministry of Infrastructure and Water Management

The Ministry of Infrastructure and Water Management has instructed Rijkswaterstaat to transform the entire ministry into an energy-neutral organisation. Ernst Menten has been assigned the task of coordinating this operation for Rijkswaterstaat: “One element of the energy-neutral programme is the construction of a wind farm on the edge of the Second Maasvlakte. The wind farm will generate approximately 100 MWatt of energy, the equivalent of the energy consumption of roughly 100,000 households. We are now making the preparations for the wind farm and will be inviting tenders to build and operate it in the first half of 2019. Once the wind turbines are operating, the energy will be supplied to Rijkswaterstaat.”

Besides generating our own energy, energy saving is a crucial component of the ministry’s energy-neutral programme. Menten: “We are also going to make greater use of electricity as a substitute for fossil fuels. By using electric vehicles, for example. The volume of energy we will be generating on the Second Maasvlakte is one-and-a-half times the ministry’s current consumption, but our greatly increased use of electricity will also lead to growing demand for it.”

It will be a nice bonus if the Second Maasvlakte ultimately generates more electricity than the ministry consumes, says Menten. “The ideal scenario would be to make the entire government energy-neutral and we are keen to help in achieving that. At the request of the Ministry of Home Affairs and Kingdom Relations, we are currently exploring the possibility of making the entire national government energy-neutral in terms of electricity consumption by 2030. That will in any case require building more of these wind farms.”

# Energy from surface water: a promising alternative


In pursuit of the goal of eliminating the use of fossil fuels, the Netherlands is desperately searching for ways of generating energy from renewable sources, not only to power electronic devices but also to heat homes and buildings. “That is perhaps the biggest challenge of all”, according to Henk Looijen of Rijkswaterstaat and Reinier Romijn of Dutch Water Authorities. “We have to get off gas, so we are looking for alternatives. Aquifer Thermal Energy Storage (ATES) is one possible option.”

As water managers, Rijkswaterstaat and the water authorities are jointly exploring the possibilities of exploiting this source of energy. “ATES uses the seasonal differences in the temperature of the surface water,” Looijen explains. “In the summer, heat is extracted from the surface water and stored, in a heat and cold storage installation for example. The heat can then be used to warm buildings during cold periods. On the other hand, cold can be stored in the winter and used as a source of sustainable cooling in the summer.”

## Studies

Rijkswaterstaat and Dutch Water Authorities have already identified where in their respective networks there is the greatest potential for generating energy from surface water. Looijen: “We are also carrying out numerous studies, for example to determine the consequences for water quality and ecology of extracting enormous amounts of energy from surface water. Would it be

*“I expect ATES to play an important role  
in the energy transition.”*



*“We can extract an incredible amount of energy from the surface water that we manage”*

## Energy coalition

Rijkswaterstaat is a member of the Energy Coalition, in which it is working on the energy transition with the water authorities. Romijn: “The Energy Coalition was formed at the National Climate Summit in 2016. We found that we complemented each other in many respects and could together give the water management sector a voice in the energy transition. Dutch Water Authorities is intensively involved in the consultations on a strategy for the energy transition. For their part, Rijkswaterstaat’s managers have better access to the responsible officials in the ministries of Economic Affairs and Climate Policy and Home Affairs and Kingdom Relations. Accordingly, we can strengthen one another.”

“In 2016,” Looijen adds, “we agreed to join forces in exploring how we could not only make our own organisations energy-neutral, but also how we could use our assets and our networks to help the business community in the Netherlands with the energy transition. One of those assets is the water under our management. We can extract an incredible amount of energy from the surface water that we manage. One of the things our coalition is investigating is how best to exploit that potential.” ATES will occupy a prominent place in the Green Deal that Rijkswaterstaat and Dutch Water Authorities are currently drafting. Romijn: “It remains to be seen whether it will work, but the interest in this alternative is growing rapidly.”



acceptable, for example, if the temperature of the water in the Amsterdam-Rhine Canal fell by a few degrees due to the extraction of energy from the water to heat a few hundred thousand homes? That is a trade-off that has to be investigated further, but from the perspective of the water quality of a river system every application to use ATES could be granted at the moment. ATES has practically no impact on the quality of the water in the Rhine.”

### Energy for the whole of the Netherlands

The water authorities and Rijkswaterstaat need only a small fraction of the enormous volume of energy that could be extracted from the water under their management. “It’s the equivalent of a teaspoonful in a mammoth tanker”, says Looijen. Romijn: “Naturally, therefore, our main aim is to persuade other parties, such as energy suppliers or municipalities with plans to create a new district or to make an existing residential neighbourhood gas-free, to adopt the method so that the energy in our water can be used to advance the energy transition in the Netherlands. The primary objective of our strategy in the last two years has therefore been to promote the enormous potential of this technology and to encourage these organisations to incorporate this form of renewable energy in their plans.”

*“We have to get off gas, so we are looking for alternatives. Aquifer Thermal Energy Storage (ATES) is one possible option”*

### Heat networks

If ATES is to be successful as a sustainable form of energy, more heat networks will have to be created. Romijn: “Without networks to distribute the heat, the enormous amount of energy that can be generated with ATES is worthless. Fortunately, everything is working in favour of heat networks today, particularly the desire to get off gas in the Netherlands. The problem is that many municipalities are still exploring all the options and are not actually constructing heat networks, partly because of the substantial investment required. Nevertheless, I expect ATES to play an important role in the energy transition. We have no choice but to take advantage of every possible option.”

### Business case of Westraven

Although Rijkswaterstaat and the water authorities are in fact small energy users, they certainly intend to use ATES in their own operations. Romijn: “Dutch Water Authorities is currently exploring the possibility of making its own offices energy-neutral. One of the options it is exploring is ATES.” For Rijkswaterstaat, the most striking example of what it is doing is its Westraven office complex, where the Central Government Real Estate Agency is investigating the options. Looijen: “The key question is whether it is feasible to heat and cool Rijkswaterstaat’s property with water from the nearby Amsterdam-Rhine canal using the existing heat and cold storage system. It would be tremendous if we could use ATES ourselves, but it would also be a fantastic advertisement for the system.”

# CO<sub>2</sub> reduction by sailing on cooking fat

The Rijksrederij, which is part of Rijkswaterstaat, manages approximately 100 vessels for various ministries. The fleet accounts for roughly 30% of the total CO<sub>2</sub> emissions by the Ministry of Infrastructure and Water Management. “Not surprisingly, therefore, we are looking for ways of reducing those emissions,” says Dirk Schennink, Rijksrederij’s sustainability coordinator. The larger vessels already sail on a biofuel blend and hybrid solutions are available for the smaller vessels on the inland waterways.

“To make real advances in reducing the use of fossil fuel, we have focused on the twelve largest marine vessels that we manage,” explains Schennink. “They account for half of the emissions caused by the Rijksrederij. We are currently conducting tests with the use of biodiesel produced from used frying fat on a number of these ships. The research has shown that it is a very good solution. In 2016 we rolled out the use of that biodiesel to the rest of the large vessels and they are now all using it. Consequently, in 2016 we reduced CO<sub>2</sub> emissions – from fossil fuels – by just over 26% compared with 2011.”

## Minimising the environmental impact

“We specifically chose to use certified biodiesel produced from used frying fat,” Schennink continues. “Our vessels are in fact running on a waste product from restaurants and the hospitality industry. The fuel has an extremely low environmental impact. Unlike palm oil, for instance, the production of this fuel does not lead to the loss of tropical forest or of land for food production.”

The diesel fuel is a blend. “The vessels use a blend of 30% Hydrotreated Vegetable Oil (HVO) – as the biodiesel is known – and 70% regular gas oil. In time, the proportion of HVO could increase. We will eventually have to comply with the Paris climate agreement and are currently investigating whether the percentage of biofuel can be raised to 35% or 40%.

## No negative effect on the ship’s engine

Does the use of biofuel lead to higher maintenance costs? “Not at all,” says Schennink. “The use of biodiesel has no negative effects on the ship’s engines. We conducted research in advance with the engine manufacturers and carried out tests on a few vessels. The results were all positive. We have been using this fuel for some time now and there have been no complaints at all.”

### Hybrid propulsion for new multifunctional vessels

“The use of biofuel is certainly not the only way in which the Rijkswaterstaat has reduced CO<sub>2</sub> emissions,” says Schennink. “We also use hybrid solutions for the smaller vessels, for example.” The Rijkswaterstaat is replacing fifteen ships that are reaching the end of their useful economic life with seven multifunctional vessels. These so-called Multi-Purpose Vessels (MPVs) can perform a range of functions including placing waterway channel markers, carrying out patrols, performing measurements and conducting fisheries research. The fleet replacement programme will commence with the building of three MPV-30 vessels, which will be used on the large inland waterways, the estuaries, the Wadden Sea and the North Sea up to 30 miles from the Dutch coast. At a later stage, two mid-size MPVs and the smaller MPV-05 vessels will be delivered.

### Batteries

This is the first time that Rijkswaterstaat has commissioned multi-purpose and energy-efficient ships. Schennink: “The MPV-30 is fitted with batteries and the vessel is able to carry out most of its day-to-day work on a single battery pack. Because the engines are used less, the energy consumption is low. The ships will also have solar panels to supply energy to the crew’s quarters.”

### Energy-efficient design

The vessel’s hull is designed to minimise its resistance in the water, which further reduces the vessel’s use of energy. Furthermore, the residual heat from the engines is used to run the radiators, the boilers and the deck heating. Another special feature of the MPV-30 is that the rotating propulsion pods beneath the ship allow it to sail in two directions, which enables the ships to continue operating regardless of the height of the waves.

## Rijkswaterstaat

Rijkswaterstaat manages the ships operated by the customs, the coastguard, the Ministry of Economic Affairs and Rijkswaterstaat. The vessels’ area of operation encompasses almost 8,000 kilometres of waterways. Their main tasks are to mark channels in waterways, carry out patrols, conduct measurements and perform fisheries management and research. They also conduct Search and Rescue (SAR) operations and deal with oil slicks. The fleet consists of 100 ships with a total of 200 crew members. Rijkswaterstaat also provides advice on nautical matters and fleet management. Rijkswaterstaat has been an autonomous division of Rijkswaterstaat since 2009.

“Rijkswaterstaat’s biodiesel has minimal impact on the environment”



# Working together on sustainability

A selection of our partnerships

Rijkswaterstaat has a great many partners. With local stakeholders for infrastructure projects, but also with public authorities and the private sector through Green Deals and chain agreements, for example. Rijkswaterstaat's role in a partnership is often to provide its knowledge.



### Green Deal Duurzaam GWW 2.0

The objective of the Green Deal for a Sustainable Civil-Engineering Sector (Duurzaam GWW 2.0) is to ensure that by 2020 sustainability is incorporated as an integral element of all civil-engineering projects. The signatories of the Green Deal include the ministries of Infrastructure and Water Management and Economic Affairs, ProRail, provinces, Dutch Water Authorities, municipalities, construction companies, port companies, drinking water companies and their suppliers, consultancy firms and research institutions. There is enormous potential for CO<sub>2</sub> reduction and cost savings in the sector. The target of the signatories of the Green Deal is to reduce the use of primary raw materials by 50% and CO<sub>2</sub> emissions by 20% (compared with 1990) by 2030.



### Agreement on concrete

The agreement on concrete concluded on 10 July 2018 marked an important milestone in the process of making the concrete chain more sustainable. Building companies, recycling businesses and suppliers of raw materials and binding agents, the Central Government Real Estate Agency, Rijkswaterstaat, ProRail and numerous municipalities and provinces have signed the agreement, which focuses on four topics: CO<sub>2</sub> reduction, the circular economy, social capital and natural capital. Rijkswaterstaat immediately started implementing the agreements that had been made. Since the autumn of 2018 we have included maximum values for the Environmental Cost Indicator (MileuKostenIndicator, MKI) of concrete in contracts. The parties to the agreement have undertaken to reduce these values every year, so that CO<sub>2</sub> emissions caused by the concrete sector will decline further, but without any adverse effects on the useful life of the concrete.

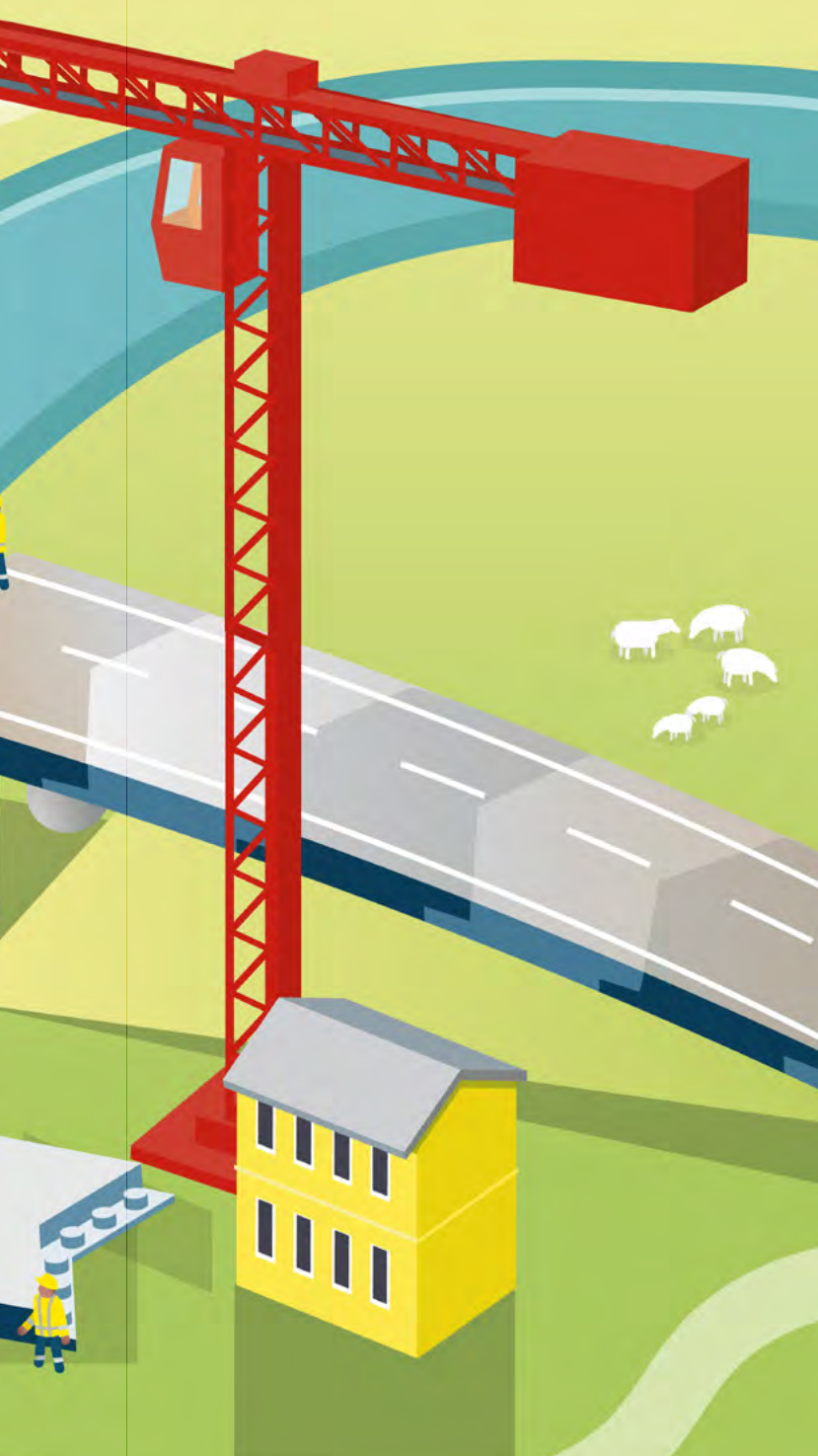


### CB'23

There have been a lot of experiments with circular building in recent years, but the parties involved are not yet sharing all of the lessons they have learned. Rijkswaterstaat and the Central Government Real Estate Agency have therefore taken the initiative to establish a platform for circular building known as Platform CB'23. The envisaged role of the platform is to act as a broker connecting the numerous existing initiatives, promoting knowledge exchange and providing a forum where the parties concerned can develop scenarios and make agreements on issues such as the procedures for inviting tenders, the standardisation of design principles, systems for documenting data about materials, ideas for new practical experiments and further research into circular building. The platform is managed by Bouwcampus and the Netherlands Standardisation Institute (NEN) in association with Rijkswaterstaat and the Central Government Real Estate Agency.

# Circular Economy





## Designing a circular viaduct in an “open experimental area”

A viaduct that can be dismantled after use and reassembled elsewhere. The open experimental area for the first circular viaduct is already being prepared. The challenge for Rijkswaterstaat and the market parties lies not only in the technical execution of the project, but also in the novelty of this form of collaboration.

In this, the first project of its type, the circular viaduct can be dismantled without damaging its parts so that they can be reused later in another project. “The viaduct consists of individual building blocks that can be easily transported,” says Rob Valk, Rijkswaterstaat’s advisor on the Circular Economy. “The structure can be repeatedly dismantled and reassembled at another location. Because the deck consists of individual modules both lengthwise and breadthwise, the viaduct can be lengthened and widened as required.”

The circular viaduct was designed in 2016 by Van Hattum and Blankevoort, with input from other companies. The first joint sessions, with Van Hattum and Blankevoort / VolkerInfra, Spanbeton / VBI, SBRCURnet, SGS Intron and Rijkswaterstaat, was devoted to exploring precisely what “circular” means and what that implies in

terms of design principles. In the spring of 2017, a larger meeting was organised to discuss the details of the individual parts of the viaduct. How should the pillars and connections look? What properties must the bridge deck have? The partners formed small interdisciplinary groups to flesh out the details of those elements and eventually produced a circular design.

### Open experimental area

“The viaduct is being further designed in an open experimental area,” says Valk. “Sharing knowledge is increasingly important for making the transition to a circular economy and that is a form of collaboration that is new to the sector. It is also new to Rijkswaterstaat, whose strict client-contractor relationship with building companies is being replaced by a more equal collaborative approach.”

## *“This project would never have progressed as far as it has with a traditional client-contractor relationship”*

“Rijkswaterstaat is a partner in the project and the launching customer for this circular innovation. It was the only option, because our traditional working method is inappropriate in this case. We are not yet able to draft a good invitation to tender for a circular viaduct because we don’t really know what is required. At the same time, there are a great many private companies that want to operate according to circular principles but don’t know how to build a viaduct of this type.”

Preparations are now underway to test the first viaduct in an open experimental area. “We would like to test the working viaduct for a few months to monitor how the bridge deck behaves under the weight of road traffic,” says Valk. “But also to gain experience with dismantling the deck. We hope to find that the building blocks can be dismantled without being damaged and then reused while retaining the same quality and properties as before they were used.”

### **Circular principles**

The development of the viaduct will continue during the pilot project, says Valk. “Not just the technical aspects, but also in terms of the principles of the circular economy. The basic principles at the moment are that the modules must be recoverable without being damaged and that the use of toxic materials should be avoided. But there are other criteria you could adopt which would produce different outcomes. The important thing is to share the knowledge we acquire with market actors so that we can also challenge them to assist in the further development of the project. This desire to motivate and inspire other parties to develop and produce circular infrastructure is an important aspect of the pilot project.”

The importance of collaboration is in fact one of the crucial lessons from the project up to now, says Valk. “This project would never have progressed as far as it has with a traditional client-contractor relationship.”

## **“Learning by doing”**

Rijkswaterstaat is a major client of the civil-engineering sector in the Netherlands and is responsible for the use of a lot of materials, including earth, concrete and asphalt. There is an ample supply of these materials and they will not quickly become exhausted, but enormous quantities of them are required. Their extraction, production and transport impose an enormous burden on the climate and the environment. That impact can be reduced by using the materials efficiently and by reusing them. Reducing the volume of materials that has to be extracted and transported also reduces CO<sub>2</sub> emissions and the harm caused to nature. Rijkswaterstaat’s target for 2030 is to work according to circular principles and reduce the use of primary raw materials by 50%. To promote efforts to create a circular economy, Rijkswaterstaat has launched a Circular Economy Programme. The programme is based on the principle of “learning by doing” in association with the market, research institutes and other clients of civil-engineering projects.



# The battle against litter is mainly a question of changing behaviour

Litter is a public nuisance and a threat to the environment. Plastic litter can also end up in the plastic soup in the oceans. Furthermore, valuable raw materials disappear from the chain as litter. Together with municipalities, public waste management companies and the private sector, Rijkswaterstaat is formulating a national strategy to reduce the volume of litter. As the manager of a large area of land, it is also playing its own part in that process.

Litter comes in all shapes and sizes. There are small items of litter such as cigarette butts and chewing gum. Larger items of litter consist mainly of packaging such as bottles, cans, sweet wrappers and takeaway food containers. This form of waste is to be found everywhere. Many municipalities have introduced underground storage of the household waste that is collected, but that does not solve the problem because of the mess created by people leaving their bags of rubbish around the underground container rather than in it. Pests and wind then carry it off and transform it into litter. Other well-known litter hot spots are city-centre areas and public transport terminals.

## Changing behaviour

“Municipalities don’t want to spend all their time keeping a place clean,” says Wilma Middel, an advisor on Rijkswaterstaat’s From Waste to Resources programme and on the National Waste Management Plan. “In addition to proper management, it is also important to change people’s behaviour.” Rijkswaterstaat supports municipalities in that task. Middel: “Our specific role is that of knowledge partner. We hold meetings to provide information, arrange programmes to apply what has been learned and organise intervention sessions. We also develop useful materials such as step-by-step plans and handbooks that people can use to take their own measures.” Middel refers to a project in the region of Hoogeveen, where Rijkswaterstaat, the municipality and other stakeholders have launched a programme to tackle litter along roads, including motorway access roads



## *“Rijkswaterstaat is dedicated to preventing litter and forms a last line of defence in ensuring that plastic does not end up in the ocean.”*

and carpool pick-up points. The McDonalds restaurant and a number of petrol stations in the area are also involved. “The first step in formulating a strategy is to ensure that the foundations are sound,” says Middel. “The area must be tidy, have the necessary amenities and be well-maintained. The rubbish bins must not be full. That may seem obvious, but those basics, effective management and good amenities, are often not properly arranged. Even in areas under our management, there is still room for improvement in that regard.”

### **Next step**

The next step is to explore how we can influence people’s behaviour, says Middel. “That could be with publicity campaigns, by installing rubbish bins or by making changes in the design of an area.” And those changes do not necessarily have to be major, as experiments with the colour of rubbish bins in Amsterdam and Rotterdam have shown. “Rubbish bins often have an unobtrusive colour because otherwise they would spoil the look of the street. Amsterdam and Rotterdam have now chosen to install apple-green containers. The result is that the bins are more visible and pedestrians make greater use of them: the bins are fuller and there is less litter, purely because the bins are more recognisable.”

Rijkswaterstaat is also studying the possibilities of reducing the volume of litter in the areas it manages. As the manager of a large number of roads, bridges, waterways, beaches, dikes and dams, Rijkswaterstaat can make a major contribution to reducing litter in the Netherlands. “We know a lot about how to prevent litter,” says Middel. “We could use that knowledge far more in the areas we manage. We are currently investigating what improvements can be made in our existing anti-litter programme with a view to developing an integrated approach. And to prevent the loss of raw materials, we are also considering the feasibility of waste separation, either at the source or through post-separation.”

### **Plastic soup**

Estimates of the volume of litter in the Netherlands vary greatly. According to MilieuCentraal, a government body that provides independent information and advice about energy and the environment, it comes to 50 million kilos a year. Some of that waste enters the environment and finds its way along waterways and rivers to the sea. There is an enormous quantity of plastic floating around in the seas and oceans: the so-called plastic soup. Rijkswaterstaat employs various tactics in its efforts to prevent waste from entering the sea. For example, Rijkswaterstaat’s Sea and Delta unit collaborates with the sea’s users and NGOs in projects designed to prevent new waste from entering the sea and, with the “Fishing for litter” programme, to reduce the quantity of waste in the sea. Rijkswaterstaat has also launched a scheme whereby waste collected along the banks of the large rivers by companies, members of the public and public authorities is removed and processed free of charge by Rijkswaterstaat. Municipalities can organise a clean-up action with volunteers at low tide, for example. The scheme is an efficient and effective way of preventing litter ending up in the sea. Middel: “Rijkswaterstaat is dedicated to preventing litter and forms a last line of defence in ensuring that plastic does not end up in the ocean.”





Various national organisations are engaged in reducing the litter problem as part of the National Waste Management Plan. Rijkswaterstaat concentrates mainly on assisting public bodies by bringing parties together and collaborating with them and by creating and sharing knowledge. It adopts an integrated approach, encompassing everything from the design of public space to cleaning up litter. Rijkswaterstaat's strategy is to bring together various organisations and interested parties – local residents, businesses, local authorities, civil-society organisations and area managers – in a joint effort. A clean, litter-free country can only be created through the combined efforts of everyone concerned.

This approach is supported by the National Centre of Expertise on Waste and the Circular Economy, which is also part of Rijkswaterstaat's Circular Waste department. Together with its partners, Rijkswaterstaat has gained considerable expertise in the sustainable management of waste and secondary raw materials. By sharing this knowledge and experience with others, Rijkswaterstaat promotes the recycling of waste as a raw material by public authorities, households and businesses. Rijkswaterstaat involves the entire product and material chain in that process.

# Turning roadside grass cuttings into a valuable raw material

Grass cuttings along the verges of roads have always been regarded as waste and an expense. But that is changing. The partners in the “From verge to page” project are investigating the possibility of using roadside grass cuttings as a high-value raw material for the paper industry. Rijkswaterstaat is a supplier and an equal partner in this chain, which will have to be built from the ground up.

The entire chain is involved in the project, says Mireille Götz, manager of Rijkswaterstaat’s Natural Capital business unit. “From the land managers that supply the raw material – the grass cuttings – including water authorities, the provinces and Rijkswaterstaat, to the enterprises that extract the useful fibres from the grass and on to the paper manufacturer that was looking for an alternative raw material. If everything goes according to plan, we and the other suppliers will gradually scale up the experiment and start supplying large quantities of grass cuttings as a raw material for the cardboard industry or as an additive for products such as insulating material.”

## Unique process

Various tests have already shown that it is perfectly feasible to mix fibres from the grass cuttings in the manufacturing process

for cardboard. The fibres are extracted by a young company called New Foss. “We got involved from the outset and discussed it with Rijkswaterstaat,” says the company’s director, Geert van Boekel. New Foss’s process is unique. “Using micro-organisms we open up the plants’ cell structure so that we can separate the proteins, sugars, minerals and fibres. We then process the fibres into a new raw material for paper production.”

The project forced the participants to change the way they think, says Götz. “Partners in a chain have traditionally focused on their own interests. In this project, we have had to learn to pursue the common interest – what is best for the chain as a whole. That mindset produces the best result, and hence the best business model for the individual parties. It requires mutual trust. We appointed an





## *“The entire chain is involved in the project”*

independent project manager to guarantee impartiality throughout the chain and to ensure that all the partners in the chain were on the same page.”

### **Chain manager**

Rijkswaterstaat’s role in the project is that of supplier, but it is also the chain manager. “This is a first for us,” says Götz. “We have a dual mandate: to develop a chain and to create value from the raw materials on the land we manage. Our investments have to generate a return, not only in financial terms, but also in the broader sense of using renewable raw materials and reducing waste. Our aim is to produce the best possible outcome in terms of ‘people, planet and profit’.”

### **Adjustments**

There are also technical challenges. The partners in the project spent a long time discussing the necessary quality of the grass fibres, says Götz: “There is lush grass and there is woody grass. The grass can be harvested in the spring and in the autumn. The grass can be stored in a silo or baled. These are all factors that can be adjusted; variables that can be programmed to optimise the production process. The entire chain is always needed to achieve

that. It is also essential that the year-round availability of raw materials is guaranteed. We are gradually expanding our knowledge and getting closer to finding the best solution.”

Van Boekel sees other possibilities for processing the grass cuttings. “Current legislation does not permit us to process other components of the grass into raw materials because it is formally regarded as waste. Special rules were adopted for the fibres. We are now holding talks with the government to have the same ‘end-of-waste status’ assigned to the proteins, minerals and sugars as well.”

### **Buyer**

If the pilot project is a success, it will be an important advance in the high-value use of biomass and the development of Rijkswaterstaat and its partners as an innovative, sustainable and effective management organisation. According to Götz, it should work both ways. “Like other managers of land, we supply raw materials such as grass cuttings, wood and river sediment. At the other end of the spectrum, we also buy the sustainable products produced from biomass.”

# Sustainable business operations and procurement

Examples of how Rijkswaterstaat is improving its own sustainability

Rijkswaterstaat spends a huge amount every year on procurement for its projects, services and operations: the total amount is between € 3 and € 4 billion. The organisation uses its buying power to promote sustainability as far as possible, not only in civil engineering but also in the domains of information provision, knowledge and business operations. For example, we are converting our fleet to electric vehicles and use our role as Category manager for office furniture to buy circular office furniture for the entire central government.



### **Circular office furniture for 100,000 workplaces**

Rijkswaterstaat is responsible for buying office equipment for the entire central government. This includes tables, chairs and cabinets for roughly 100,000 workplaces in government offices. The contract with the supplier specifies that the furniture must be made from existing materials as far as possible. Rijkswaterstaat buys the furniture for the ministries, the Custodial Institutions Agency and the Public Prosecution Service. Other government agencies will also soon be using the new contract, including the Netherlands Food and Consumer Products Safety Authority, the Education Council, the Netherlands Forensic Institute and the Child Protection Board.



### **Circular procurement**

Rijkswaterstaat's ambition is that by 2030 it will be operating entirely according to the principles of the circular economy. Not only through its networks, but in its own business operations and the implementation of its policies. Our basic principle will be learning by doing, making the necessary adjustments as we go along. Rijkswaterstaat will learn not only from what it does itself, but also through the advice it provides to other organisations. In this way, buyers in the public and private sectors will together discover how the circular procurement process works in practice. This learning process will be enhanced by Rijkswaterstaat's participation in programmes such as the Green Deal on Circular Procurement (in which Rijkswaterstaat is a partner) and the EU's Renovation for Energy Efficient BuildingS (REBus) project (for which Rijkswaterstaat is the executive organisation in the Netherlands).



### **Electrification of the vehicle fleet**

Rijkswaterstaat is the first government body to commence the large-scale electrification of its fleet of vehicles. With the purchase of the first 100 electric cars (Renault ZOE), 7% of Rijkswaterstaat's cars are now electric. Work vehicles, such as the yellow pick-up trucks used by the road inspectors, will follow later because there is no suitable electric model of these vehicles on the market yet. The Ministry of Infrastructure and Water Management's ambition is for the entire car fleet to be fully electric by 2030. The electric cars will be purchased as part of a government-wide tender procedure.







### Sustainable communication

Rijkswaterstaat's ambitions in terms of sustainability also extend to communication. For example, the organisation produces digital maps with data about the land it manages so that interested parties have easy access to the information they need. We have also developed a so-called materials passport, a document that contains a range of data regarding our assets and represents a mine of the raw materials of the future. Our use of "sensing" also provides us with more accurate information for the purposes of maintenance and recycling. We also apply circular principles to our processes, working methods and contracts and are investigating the possibilities for sharing IT infrastructure with partners. Applications like Skype improve communication and enable us to reduce the amount of travelling our staff members are required to do.



### Sustainable catering

The organisation outsources its catering. With its responsibility for procurement in the product category catering for the government, Rijkswaterstaat's choices are also relevant for other government organisations. The slogan for the procurement procedure is "Healthy, enjoyable and circular". Our restaurant must offer an affordable, appetising and healthy range of products. The switch to circular catering will lead to a significant reduction of CO<sub>2</sub> emissions as waste will be reduced and the menu will include a higher proportion of vegetable protein. The criteria for the tender will also include social aspects such as "fair trade" and "opportunities for the hard-to-employ".



### Management of waste and raw materials

The government-wide target is to reduce the volume of residual waste to a maximum of 35% of the total quantity of waste by the end of 2020. This is a major challenge for Rijkswaterstaat, where residual waste currently accounts for around 60% of the total volume. Meeting the target will require measures such as effective separation of a larger volume of the streams of plastic, beakers and organic waste. In that context, Rijkswaterstaat has introduced new waste containers in its canteen in Westraven to improve the routing and separation of waste. However, the target can only be met if staff members also change their behaviour and therefore, at the end of 2018, Rijkswaterstaat launched an internal campaign specifically designed to persuade them to change their ways.

# Sustainable Area Development



# The Blankenburg Link improves the quality of the area

From 2024, the Blankenburg Link, a tunnel under 't Scheur (the Nieuwe Waterweg), will connect the A20 at Vlaardingen with the A15 at Rozenburg. The project will not only improve mobility in the Rotterdam region but also enhance the quality of the area around the new route. Public authorities in the region have joined forces to enhance the ecological quality of the area and create new recreational facilities in the area.

“The construction of a motorway always imposes a burden on the environment and is therefore, by definition, not sustainable,” says Rijkswaterstaat’s advisor on spatial quality, Laurens van Tiel. “But with all the parties working together, you can plan the entire process of surveying, planning and realisation on the basis of a sustainable concept.”

## Choosing a route in consultation with local residents

“We have learned that with major projects it is essential to look beyond the road’s immediate surroundings,” Van Tiel continues. “You can use major developments of this type as a catalyst to develop the area in such a way that is capable of absorbing the impact of the intervention. You achieve that by improving the quality of the area.”

Rijkswaterstaat learned from other projects, such as the A4 from Delft to Schiedam, that you can only produce good plans with the participation of local residents, public authorities and the business community, says Van Tiel. “But that requires a very intensive consultation process. For the Blankenburg Link, we formulated the priorities together with our partners in the region. The decision that the connecting road was needed was a joint one. We also jointly explained why it was needed. We did not hide the fact that the construction work would have a major impact on the environment and invited local residents to suggest ideas on how the link should look. Finally, we also jointly determined what other investments were needed in the area. What you find is that if the process is entirely open and transparent, people have the feeling of being in control. Sometimes it can even generate enthusiasm for the project.”

*“The entire chain has to consider how to add value in a sustainable manner”*

### Unexpected results

Public participation sometimes produces unexpected results. For example, the construction of the tunnel (the Holland Tunnel) was a political decision, but its integration into the surrounding landscape was fleshed out in close consultation with the local community. This resulted in the tunnel, which had been planned as a dike through the area, was moved underground to preserve the open landscape. “The solution was genuinely the result of the consultative process,” says Van Tiel. “The tunnel was shorter where possible and deeper where the landscape required it. We were therefore able to preserve a piece of characteristic Dutch landscape – an open landscape with a ribbon development of traditional farms.”

### Enhancing the quality of the area

In conjunction with the construction of the Blankenburg Link, the regional authorities, led by the Rotterdam and The Hague Metropolitan Region, drew up a programme to improve the quality of the area. The programme entitled Nieuw Waterland encompassed a range of measures to enhance the natural beauty of the area, improve the water quality, expand recreational facilities and reduce noise pollution. The national government and the regional authorities are sharing the costs of implementing these measures. “We analysed the qualities of the region and identified aspects in which improvements were required,” says Van Tiel. “The area around the Blankenburg Link will be upgraded to fit in better with the landscape and to make it more accessible for the neighbouring cities and for visitors.”

A spin-off project from the quality programme is the so-called water harmonica, a mechanism to improve the quality of the freshwater in the area. The idea originated with the waste water purification plant in Delfland, which treats 130 billion litres of waste water from households and businesses every year.

The plan is to convert the purification plant into a ‘freshwater factory’. “The intention is to use a new treatment process based on ozone and sand to remove the final micro contaminants and residues of medicines from the water,” says Werner Krijger of the Delfland Water Authority. “The water can then be released back into the area.”

### Water harmonica

A water harmonica is a natural system for enhancing the ecology of reed marshes, for example. “The water from the freshwater factory is actually too clean,” says Krijger. “It contains too little oxygen and minerals. The water harmonica converts that water into healthy and natural freshwater that is suitable for swimming, for example.”

With the process, the water authority is killing two birds with one stone. In addition to improving the water supply in the area, the purified and revitalised water can also be used to make the water in the nearby Krabbeplas more suitable for swimming. The lake often suffers from blue algae and swimming in it was in fact banned for the entire summer of 2018. “By channelling the water from the water harmonica through the Krabbeplas we can reduce the risk of a deterioration in the quality of the water because the blue algae are averse to currents.”

“It is important to realise that constructing a motorway is not sustainable,” says Van Tiel. “But you can do it in a sustainable manner. Not only at the planning stage, but also in the tender procedures. The entire chain has to consider how to add value in terms of sustainability.”

## Better accessibility

The New Waterland Quality Programme contains a range of measures with a total cost of € 53 million, in addition to the measures that are required by law during the construction of the new Blankenburg Link. The project covers a substantially larger area than the immediate vicinity of the new road. One of the aims is to enhance the ecological quality of the area and expand the range of recreational activities. Additional measures will also be taken to contain the noise pollution." The road has to be carefully designed and properly integrated into the surrounding landscape to fully exploit the quality of the area," says Van Tiel. "A quality team made up of architects and landscape architects was therefore appointed at the very beginning of the project. The members of the team, known as the Q Team, are very familiar with the area and enjoy the trust of the local authorities. This was important during the planning phase, but even more so when the construction work actually got underway."

*"Area development is not a solo project, but something you do together."*



# Room for the River: unique dual project with potential benefits for the community

The Room for the River programme, which is coming to an end, has made river basins safer and created a more attractive environment for the local residents. A large majority of the 34 measures that were taken in the programme have achieved their objectives. The final element of the programme is the IJsseldelta project, a unique dual project designed to create a safe and beautiful river basin, which also provides plenty of opportunities for initiatives by communities in the region.

For the Room for the River programme, Rijkswaterstaat consciously chose to follow a totally different course than simply strengthening dikes to prevent flooding in the river basin. Although the programme was launched with flood protection in mind, Room for the River is more than a response to a threat. The objective of the programme is not only to make the area around the rivers safer, but also to improve the local landscape, ecology and economy. This unique dual mandate also gives the local authorities tremendous opportunities to improve the quality of the living environment.

## Ownership of the project

The focus on spatial quality not only produces more attractive solutions, but also creates opportunities to benefit local communities and helps to generate public

support for the projects. In one of the long reads published by the Room for the River programme in the last few years, the former mayor of Deventer, Andries Heidema, remarked that “the possibility that the dual objective created for local government to improve spatial quality naturally made the entire programme very inspiring. It allowed local authorities to ‘own’ the project. In Deventer, for example, we brought history to life by incorporating one of the bridgeheads of a historic shipping bridge over the IJssel into one of the projects. We also created

*“For an integrated design, knowledge from every discipline must be incorporated and in balance”*

*“The focus on spatial quality not only produces more attractive solutions, but also creates opportunities to benefit local communities and helps to generate public support for the projects”*

channels to widen the river for water sports and recreation. It therefore became a project of Deventer and the city’s inhabitants rather than a ‘burdensome’ project imposed by the national government. The Room for the River approach really caught on and is certainly worth replicating.”

#### **Dialogue between public authorities, stakeholders and experts**

Is the success of the approach adopted in Deventer typical of the strategy in the Room for the River programme? The researchers at Berenschot gave the following answer to that question in one of its interim evaluations. “Explicitly mentioning spatial quality as a second objective has led to an efficient process, whereby the quality of the designs has been assured in a dialogue between public authorities, stakeholders and experts. The local approach, where spatial measures are initiated by a municipality, a province or a water authority, is effective and yields good results.”

Almost all of the projects undertaken in the Room for the River

programme have clearly illustrated the importance of early collaboration between all the relevant stakeholders. The projects were carried out within budget and on time and the vast majority of the stakeholders were pleased with how the flood-protection measures had been incorporated into plans that also enhanced the quality of the region. However, producing the correct plans requires cooperation between the right people with the right mix of expertise.

#### **Balanced integration of all available knowledge**

“For an integrated design, knowledge from every discipline must be incorporated and in balance,” says Regina Havinga of the mix of expertise that is needed. As an expert in spatial quality, she was a member of the Room for the River programme office from a very early stage. “You need to think in terms of experts with specialist knowledge of rivers, soil, engineering, archaeology, landscape architecture and legal affairs. In complex projects of this type, you need to be able to call on that knowledge when and where it is required.”

That is one of the reasons why the involvement of the quality team (Q Team) was so important, says Havinga. The team, which was chaired by the National Adviser on Landscape and Water, provided solicited and unsolicited advice on aspects of spatial quality to both the management of the Room for the River programme and for the individual projects. “There is no way of measuring spatial quality and there are no standards laid down for it in legislation. It is an aspect that can sometimes be overshadowed by the pressure of other issues in major projects. The involvement of the Q Team ensured that this was avoided and that sufficient attention was given to developing an integrated, area-specific approach.”



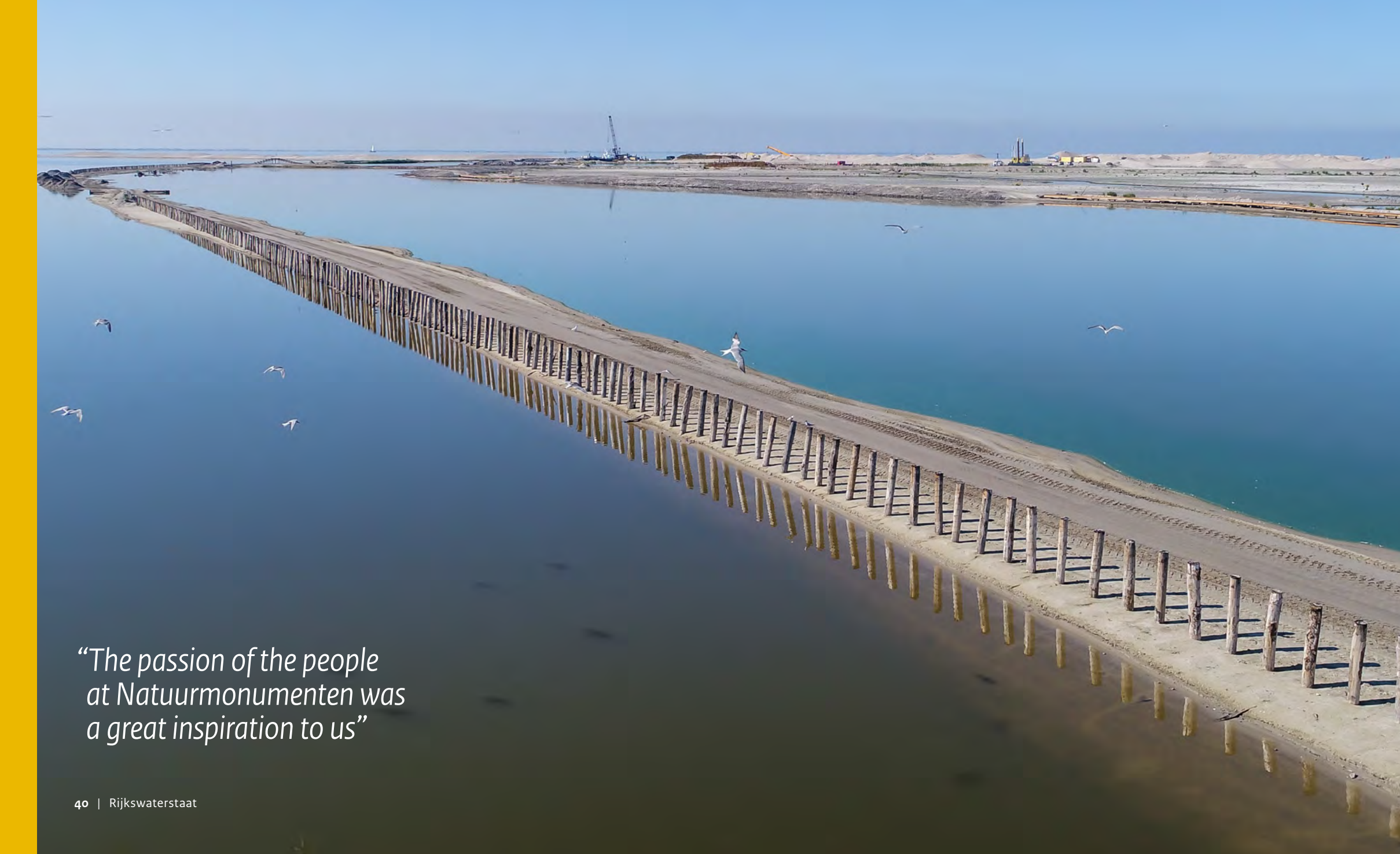




Measures are being taken at more than thirty locations to improve the drainage capacity of rivers in order to improve flood protection and to enhance the quality of the surrounding region.

Achieving these dual objectives (improving safety and spatial quality) is a task of the government. The programme is being implemented under the auspices of the Ministry of Infrastructure and Water Management and the Ministry of Economic Affairs and Climate Policy. However, seven provinces, eight water authorities and thirty municipalities have been granted a great deal of discretion in working out the details of specific measures, subject to predetermined frameworks and preconditions. Regional and local authorities are drawing up their own plans in consultation with local residents and businesses, but wherever possible they are also carrying them out themselves.

The independent Q Team plays an important role in ensuring the quality of the spatial measures that are taken. The multidisciplinary team, chaired by the Government Advisor on Landscape and Water, provides advice on aspects of the proposed plans from the perspective of landscape architecture, river science, ecology, physical geography and urban planning for all the projects in the Room for the River programme.



*“The passion of the people  
at Natuurmonumenten was  
a great inspiration to us”*

## Marker Wadden: Freedom to innovate

The Netherlands is an unfinished project. The first part of the latest land reclamation effort was officially completed in September. The Marker Wadden are not being created for housing or to build business parks, but for nature. The construction of the archipelago is a joint initiative of the Dutch Society for Nature Conservation (Natuurmonumenten) and Rijkswaterstaat. The result? The enhancement of the ecological quality of the Markermeer, one of the largest freshwater lakes in Western Europe.

The natural banks of the islands provide more opportunities for fish to spawn and forage. As a result, larger numbers of birds are also expected to visit the area. The construction of the islands with silt from the Markermeer also greatly improves the quality of the water. “The silt cannot escape and clouds the water in the Markermeer,” says Ben Viveen, the project manager for Rijkswaterstaat. “Aerial photos show the Markermeer to be brown, while the IJsselmeer is green.”

### Exceptional collaboration

The first island, with a surface area of roughly 300 hectares, was officially opened on 8 September. The other islands in the archipelago are due to be completed by 2020. The Marker Wadden will then have a total surface area of 800 hectares. At the opening of the island, Minister of Infrastructure and Water Management

Cora van Nieuwenhuizen spoke of the outstanding cooperation behind the development of the Marker Wadden. Natuurmonumenten and Rijkswaterstaat formed an alliance to carry out the project and established a joint team to manage it. Rijkswaterstaat was mainly responsible for contract management and overseeing the project, while Natuurmonumenten devoted itself to raising funds for the project and contributing its knowledge of nature, but is also responsible for environmental management and media relations.

### Space to innovate

The two organisations are not obvious partners but the collaboration has generally worked well, says Roel Posthoorn, Natuurmonumenten’s project manager for the Marker Wadden. “Our basic position was always that the

requirements of the project should determine its structure. In other words, not the working methods employed by Natuurmonumenten or RWS, but the ambitions for the Marker Wadden. Natuurmonumenten has never organised a construction project on this scale before, while Rijkswaterstaat has little experience with projects unconnected with infrastructure. We took full advantage of the opportunity the project offered to innovate.” Particularly at the start a lot of energy was devoted to overcoming the cultural differences between the organisations, says Viveen. “That process taught us a lot. The passion of the people at Natuurmonumenten was a great inspiration to us. On the other hand, they initially regarded us as very bureaucratic but gradually came to appreciate the value of our experience and our approach, for example when it came to drafting a procurement plan or dealing with setbacks during the construction process.”

### Traversable by geese

To build the islands, the contractor Boskalis first laid a contour of sand and clay and then filled the contour with materials from the Markermeer itself. Silt is mushy, so this was no easy task. Consequently, a first, experimental island sank to the bottom of the Markermeer. Viveen: “Most of the islands will ultimately be “traversable by geese”. The ground has to be strong enough to bear the weight of birds walking on it. It doesn’t have to support humans.”

### A helping hand from nature

Creating new land out of water is the work of man, but nature can give a helping hand. Posthoorn: “Our aim is to find a smart way of collecting the sediment from the bottom of the lake. We plan to do this by digging a number of deep channels. After a storm, the sediment swirls down to the deepest point, so those channels will form a reservoir for building materials repeatedly created by nature itself. All we then have to do is pump those materials from

the channels to the island. That will save money. We will spend the coming years investigating whether this method works.” The construction of the Marker Wadden is not only a project based on the principle of building with nature, it also represents an excellent opportunity for Rijkswaterstaat to learn more about building with silt. Viveen: “The reactions to the project at various international conferences have shown that there is a lot of interest in this method in the world of hydraulic engineering in the Netherlands and abroad. This could be the birth of a new Dutch export product.”

## Growing in a new role

The Marker Wadden knowledge and innovation project is part of the programme of the Water top sector. The project is being carried out by Rijkswaterstaat, Natuurmonumenten, Deltares and Boskalis, and they are still looking for other partners. The knowledge generated by the project will provide an impetus for further innovation.

The government, business community, NGOs and research institutions are formulating a joint strategy for the further development of the project for the benefit of everyone.

“This nature restoration project is also valuable for Rijkswaterstaat because it enables us to grow in a public role that is new to us,” says Rijkswaterstaat’s project manager Ben Viveen. “It allows us to demonstrate that we are capable of more than just widening roads and building locks. In this project we are gaining experience in building with nature and demonstrating our ability to collaborate with partners.”



# Digital System Environment and Planning Act: a common database for everyone

The new Environment and Planning Act consolidates the existing laws and regulations in the areas of spatial planning, housing, infrastructure, the environment, nature and water. The law promises to accelerate decision-making, simplify procedures, promote greater public participation and create more scope for individual initiatives and projects tailored to local needs. The Digital System Environment and Planning Act (DSO) is a tool for helping to deliver on the promise of the new legislation. Rijkswaterstaat is one of the organisations helping to develop the DSO.

The implementation of the Environment and Planning Act rests on two pillars: the introduction of a new digital system and of new procedures for municipalities, provinces and water authorities. After taking office, the government transferred responsibility for the system from the Ministry of Infrastructure and Water Management to the Ministry of the Interior and Kingdom Relations, whose Directorate-General for the Environment and Planning Act Programme now coordinates the system's management.

## Development partner

Digitalisation is crucial to the success of the Environment and Planning Act, says Martin Bal, the head of InfoMil, the division of Rijkswaterstaat that is assisting in

the implementation of the Environment and Planning Act. The Digital System Environment and Planning Act contains all the relevant laws and regulations and other information relating to the living environment. Its purpose is to accelerate decision-making processes and to improve the service to end users – including members of the public and businesses. Rijkswaterstaat is a partner in the

*“The DSO will provide everyone with the same reliable information”*



## “Members of the public will no longer have to trawl through all the rules and regulations or go knocking on doors.”

development of this information system, which is designed to ensure that the Environment and Planning Act works properly in practice. Bal: “The word partner says it all. We are not developing the DSO alone, but together with other organisations including the Land Registry, the Knowledge and Exploitation Centre Official Government Publications (KOOP), Geonovum and the municipalities, provinces and water authorities.”

### Integration

Bal explains why the DSO is needed: “The changes we are making in the legislation – the integration of various laws and processes in the area of the physical environment – cannot be made without integrating the supply of information. The existing facilities are still tailored to the former legislation and only cover certain aspects of the Environment and Planning Act. For example, you can now make an environmental report with the Activities Decree Internet Module. But the Environment and Planning Act encompasses far more than “the environment” alone. It is therefore necessary to change the way we provide information.”

### A one-stop shop for insight and oversight

The DSO will soon constitute a common source of information that provides reliable data about the physical environment in a user-friendly manner. Not only for public authorities, but also for citizens and businesses. Bal: “In a nutshell, any individual or business that wishes to start an activity will be able to click on a map and discover what rules apply for that particular location. This will include rules laid

down by the national government, the province, the municipality and the water authority. Because the application will ask specific questions about the activity you are planning to start, the answers will actually constitute an initial permit application. The information will also be forwarded immediately to the authority that has to make a decision on the application. In other words, members of the public will no longer have to trawl through all the rules and regulations or go knocking on doors.”

### Putting the end user first

The DSO will also immediately show the current status of the water, soil, air and noise level at the relevant location, says Bal. “A user will also be presented with a list of the activities that are permitted at that particular location. This has the important advantage that anyone planning an activity will save the expense of carrying out numerous studies at that location.”

“With the DSO, the end user comes first,” says Bal, encapsulating the unique character of the system. “Whether it is a public authority, a citizen or an entrepreneur who wants to do something in the physical environment, the DSO will provide everyone with the same reliable information they need to do their job, to interpret the rules correctly, to inform themselves properly or to exert influence.”

### Beta version

Bal: “The new Environment and Planning Act is due to enter into force on 1 January 2021. But that deadline cannot be met if the DSO is not ready, so we are working flat out to ensure that it is. We are currently exploring the possibilities of publishing a beta version of the DSO, perhaps as early as next year, so that interested parties will be able to experiment with the system and learn how to use it.”



## Cooperation on environmental planning strategies

The new Environment and Planning Act will enter into force in 2021. It will be accompanied by a single national strategy for the physical environment: the National Environmental Planning Strategy. It is essential to be aware of the challenges the Netherlands faces so that the country remains a healthy and attractive place to live with a flourishing economy in the future. Together with other government bodies, Rijkswaterstaat is drafting a National Environmental Planning Strategy. Moreover, every province and every municipality is preparing its own environmental planning strategy. Rijkswaterstaat actively assists the local authorities in the planning process, preferably from the earliest possible stage because these environmental strategies will provide the framework for Rijkswaterstaat's future efforts to ensure that the Netherlands remains a safe, liveable and accessible country.

A high-angle photograph of a construction worker wearing a white hard hat with a red dot and a green jacket with an orange reflective stripe. The worker is looking down at a concrete structure. The structure has a textured surface with several circular openings. In the background, there is a metal railing and a person's hand in a grey glove holding a metal rod. The scene is outdoors near water.

# Towards sustainable construction and maintenance

Two showcase projects highlighted

A lot of progress has been made in making construction projects more sustainable through programmes like the Multi-year Programme for Infrastructure, Spatial Planning and Transport (MIRT). But when it comes to management and maintenance, there is still a lot of ground to be made up. To promote sustainability in that domain, seven showcase projects have been launched to demonstrate how management and maintenance can also be made more sustainable. This section highlights two of those showcase projects: sustainable saltwater dredging and what are known as performance-based contracts for dry infrastructure.





### Saltwater dredging contract

Together with market actors, Rijkswaterstaat is currently exploring what standard requirements in terms of sustainability could realistically be included in contracts for saltwater dredging. There are no such criteria at the moment. For example, it is unclear what cost-effective options there are to reduce CO<sub>2</sub> emissions from the dredgers that maintain the “saltwater” channels. This showcase project therefore focuses on the question of what criteria Rijkswaterstaat should include in contracts with respect to that issue. It is also investigating the best possible use of the dredged sludge. Are there other high-value applications – besides depositing it in the coastal foundations – that could be permitted in contracts, such as using it to reinforce dikes?



### Performance-based contracts for dry infrastructure

The showcase project for performance-based contracts for dry infrastructure organised by Rijkswaterstaat’s regional organisation Sea and Delta is a step further than the dredging contract: the requirements are already known. For the first time, a Best Value Procurement contract has included the requirement to specify proposals for improvements in terms of sustainability. The contract also contains a number of specific requirements relating to sustainability. For example, the project must achieve a reduction of at least 10% in CO<sub>2</sub> emissions. Another obligation is to use circular – bio-based – road furniture. The contractor can only avoid that obligation for compelling reasons, for example because the necessary functionality of the road furniture does not allow it. However, in that case the burden of proof is on the contractor to demonstrate that the use of bio-based applications is actually impossible.

# Knowledge-based support

Examples of Rijkswaterstaat's role as knowledge partner

Rijkswaterstaat possesses a great deal of knowledge about the physical environment in general, which it uses to bridge the gap between policy and implementation for the policymakers in the ministries.

Rijkswaterstaat has an advisory function in relation to local authorities and the business community, for example in explaining the legislation governing the physical domain, but also carries out projects for municipalities and provinces. We also work with other organisations in national and international consortia.





### Support in the domain of planning

InfoMil has been the centre of expertise for information about legislation in the domain of planning and the environment since 1995. One of Rijkswaterstaat’s core tasks is to assist in the formulation of policy in this domain. Rijkswaterstaat also advises on programmes to implement new policies and regulations. For example, it is currently deeply involved in the implementation of the Environment and Planning Act and the first National Environmental Planning Strategy. A great deal of that support is provided to the departments in the provinces, municipalities, water boards and environmental services responsible for implementing policies. Rijkswaterstaat performs similar tasks in relation to the programmes of other bodies, including other ministries and the European Union.



### Knowledge partner for sustainable soil management

Rijkswaterstaat provides public authorities with knowledge and expertise regarding the sustainable use of soil and groundwater and the subsurface. We assist in the programmes to implement the Covenant on Soil Policy and the Spatial Planning Strategy for the Subsurface and promote the creation and exchange of knowledge through the Soil and Subsurface Expertise Network. Rijkswaterstaat’s Bodem+ division performs a number of statutory duties that promote sustainable soil management, and also coordinates the management of the national soil information system. Rijkswaterstaat forms the link between the formulation of policy by the ministries and its implementation by the provinces, municipalities and water authorities, for example by publishing practical guides on how to implement policies, providing instruments for doing so and performing a helpdesk function.



### Establishing a circular plastics chain

The Plastic Packaging Waste as Raw Material programme encourages the use of household plastic packaging waste in products. This calls for improvements in the plastics chain. At present, the recycling of plastic is mainly supply-driven. At the same time, there is little demand for secondary plastics from industry. The use of primary raw materials could be reduced by improving the match between supply and demand for recycled plastics, which would be another step towards creating a circular economy. The programme, which is being carried out by Rijkswaterstaat and the Netherlands Institute for Sustainable Packaging, focuses on two aspects: procurement and innovation..





Diederik Samsom's vision for the future

“It would be a foolish person who tried to stand in Rijkswaterstaat's way!”

Since leaving parliament, Diederik Samsom has devoted himself almost full-time to the issue of sustainability in this country. He recently gave a talk for managers of Rijkswaterstaat. His message: “Sustainability is advancing far more quickly than many people think. Join the revolution. It's fun!”

*In speeches on the subject you often refer to a family living in a modest home in a disadvantaged area in 2030 and go on to mention the many changes that will have occurred in and around that house by that time in the field of energy. That is twelve years from now. Where will Rijkswaterstaat stand then?*

“Twelve years is practically tomorrow for an organisation like Rijkswaterstaat. Many of the plans Rijkswaterstaat is currently working on date from the last century. Look at the extension of the A4 motorway. It took 33 years to complete. By comparison with that, the current energy revolution is occurring at the speed of light.

Certainly a lot faster than Rijkswaterstaat is accustomed to. That is one of the challenges that Rijkswaterstaat faces and where a breakthrough is needed. But if it succeeds there are numerous areas in which there is clearly a task for Rijkswaterstaat. Take electric driving. This is a country that is perfectly suited to electric driving. Distances are short, the country is flat, and there are underground electric cables almost everywhere. The problem is that most homes do not have their own driveway so most cars will have to be charged on the street. That will demand a charging infrastructure that is revolutionary compared with what we have now. There lies a task for Rijkswaterstaat, because otherwise there will soon be a crush around the few existing charging stations.”

*“It starts with realising just how much more quickly things are moving nowadays. That is the first thing that Rijkswaterstaat needs to understand. It should also be clear that the organisation needs to change”*

“Another example is solar panels. Property developers are combing the country in search of suitable locations. Most of those locations are on farmland. That supply is going to run out within a year because we want to preserve the farmland in this country and because the image of large fields of glass does not really appeal to us. Another 500 km<sup>2</sup> of land is still needed and there is only one organisation that manages so much land - three times as much in fact. That is Rijkswaterstaat. Moreover, it is land where the infrastructure is already in place. That is the perfect opportunity for Rijkswaterstaat to come up with the solution, because that land still has to be made ready and market parties have to be given the chance to use that land in an orderly fashion. I would say: start doing that yesterday, because it is already needed today.”

*Where is that revolution coming from?  
What is the difference with the past?*

“For a long time we were used to repeated setbacks in “the world of sustainability”. You then grow accustomed to the postponements, setbacks and disappointments which were the order of the day a few years ago. The environmentally-friendly paint that did not cover the wall. The environmentally-friendly glue that didn’t stick.

And the electric car that was no more than a pimped-up disabled vehicle with an action radius to the end of the garden. The situation has now changed totally. Look at Tesla’s success, which has prompted all the major car makers to produce mid-range electric cars. I predict that in 2021 the electric car will be cheaper than its petrol-driven equivalent. And when that happens, I know how the Dutch will react. And that 500 km<sup>2</sup> of solar panels that we have to install over the next thirty years? It seems impossible, but in China they are currently installing 150 km<sup>2</sup> a month! And they will do the same again next month. In other words, they will accomplish in three months what we believe will take thirty years. And the Chinese city of Zhenzhen – a city that nobody has heard of but which has a population of sixteen million – has decided to convert all 18,000 city buses to electricity within three months. That is more buses than there are in the whole of the Netherlands. These examples show that events are moving at an incredible pace at the moment. Things are changing before our eyes.”

*How can a large and relatively traditional executive organisation like Rijkswaterstaat keep pace with that?*

“It starts with realising just how much more quickly things are moving nowadays. That is the first thing that Rijkswaterstaat needs to understand. It should also be clear that the organisation needs to change.”. I am happy to leave the question of how best to make that change to the experts. I am not a change manager. But I believe strongly in the effect of a shared realisation that there is a revolution underway and that Rijkswaterstaat will really enjoy being part of it. It is mainly up to the managers in Rijkswaterstaat to decide how to do that. And I am hopeful in that respect. That afternoon when I spoke to Rijkswaterstaat’s middle management, in other words not just the board of management, I was looking at 150 people who are enthusiastic, aware, positive and forward-looking. That seems like a good start to me. Look, there is a

no-frills, down-to-earth culture within Rijkswaterstaat. Everything has to work properly and be safe. It must not break down. Everything is focused on that. But the staff are committed to the community, to the public interest, to the future. So yes, I see plenty of positive signs. More than in many businesses.”

*Isn't the key question regarding sustainability in the Netherlands: how do we create volume and speed? After all, there are already plenty of technologies, ideas and plans.*

“Certainly. And the good thing is that Rijkswaterstaat already has the volume. There is only one government organisation that manages as much land as Rijkswaterstaat. That also partly explains the inflexibility and sluggishness with which Rijkswaterstaat operates – the comparison with a super-tanker is an apt one. Try turning it around quickly. It depends on people within Rijkswaterstaat showing spirit and conveying it to others. A great deal can then happen. It is not that complicated. Take the issuing of land for solar panels: I would say, Rijkswaterstaat is sitting on it. You can do it. Rijkswaterstaat has been keeping the verges of roads clean and safe for hundreds of years and now there is another use for them. Integrate it and you will be making a genuine contribution to the energy revolution.”

*It naturally also takes courage to grasp the room you are given to do the unorthodox, to stick your necks out. Will Rijkswaterstaat be given that opportunity?*

“You're right, that is a classic problem. But Rijkswaterstaat will certainly be given the room to do things differently. If that doesn't happen now, it never will. In the 25 years I have been engaged with this subject, there have often been times when a number of factors were favourable. Sometimes because



of a technological breakthrough; sometimes – around the time of Al Gore's film, for example – because of public awareness. And at other times there was a political tailwind. But never all at the same time. And now, for the first time, that is the case. It makes me very optimistic. It still all has to happen, but Rijkswaterstaat has no reason for concern about its mandate. “I would almost say: “You already have the mandate, so use it!” I believe that Rijkswaterstaat could then play a crucial role in the energy revolution. A far greater role than it could have dreamed of a few years ago! And it would be a foolish person who tried to stand in Rijkswaterstaat's way.”







This is a publication of

**Rijkswaterstaat**

0800 - 8002

[www.rijkswaterstaat.nl](http://www.rijkswaterstaat.nl)

May 2019 | WVL0519MC41