Dutch State Treasury Agency
Ministry of Finance

State of the Netherlands
Green bond report

28 May 2020

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1. Introduction

The Dutch State Treasury Agency issued its inaugural green bond on 21 May 2019. By issuing the green bond, the Netherlands aims to further enhance and support the establishment of a robust green capital market. Following the successful issuance, I am now proud to present the first combined allocation and impact report of the Dutch Green Bond.

Firstly, the DSTA is accountable through this document for the allocation of the use of proceeds raised in 2019 towards eligible green expenditures as identified in the Green Bond Framework. The allocation has been verified by the independent auditor of the Dutch State (ADR) and Sustainalytics has verified conformity of the expenditures with the Climate Bonds Standard. The findings of both the ADR and Sustainalytics have been added as Annexes to this report.

Subsequently, the report focuses on the environmental impact of the relevant green expenditures. The avoided carbon emissions as a result of investments in railway infrastructure has been calculated on the basis of a methodology developed by an independent research agency with a focus on mobility and transportation. This study has also been added as an Annex to this report.

The final section of the report discusses the recent developments of the Dutch Climate Agreement, development of the green bond market in general and the performance of our green bond.

The DSTA hopes you enjoy this reading and is – as always – open to receive any feedback on the report.

Elvira Eurlings
Agent of the DSTA

2. Allocation report

The issuance of green bonds is followed by the evaluation and selection of eligible green expenditures. This falls under the responsibility of the interdepartmental Green Bond Working Group, in which the Dutch State Treasury Agency (DSTA) of the Ministry of Finance, other relevant departments within the Ministry of Finance, the Ministry of Economic Affairs and Climate and the Ministry of Infrastructure and Water Management are represented. The interdepartmental Green Bond Working Group bases its selection on eligible green expenditures proposed by the DSTA. This Working Group assesses whether the inclusion of expenditures are possible, it checks whether expenditures meet the criteria and definition of eligible green expenditures in the Green Bond Framework, and approves the final selection of eligible green expenditures.

The Green Bond Framework distinguishes four expenditure categories for which the green bond proceeds can be used: Renewable Energy, Energy Efficiency, Clean Transportation, and Climate Change Adaptation & Sustainable Water Management. The Green Bond Framework likewise contains a list of the main articles in the National Budget that comply with these four expenditure categories.

The eligible green expenditures may include expenditures of the financial year in which the green bond is issued, the financial year immediately preceding it and future financial years. Hence, the DSTA has committed itself to allocate at least 50% of the net green bond proceeds to expenditure in the financial year in which the green bond was issued or future financial years.

During the Dutch Direct Auction (DDA) of 21 May 2019, the Dutch State issued green bonds to the value of EUR 5,985 million. The expenditure recorded for 2018 and 2019 specified in the Green Bond Framework as main expenditure of the aforementioned categories, collectively amounts to EUR 6,885 million.

As proposed by the DSTA, the interdepartmental Green Bond Working Group has decided to allocate the 2019 green bond proceeds to the budget items explicitly mentioned in Table 1 of the Green Bond Framework, for expenditures that were realised in 2018 and 2019. It was also decided to allocate 50% of the proceeds for expenditures realised in 2018 and 50% for expenditure realised in 2019. The eligible expenditures thus determined are significantly higher than the issuances of green bonds in 2019 (EUR 6,885 million worth of eligible expenditures vs. EUR 5,985 million worth of issuances). This means that the unallocated amount for the green bond is 0 euro. For the eventual allocation, the interdepartmental Green Bond Working Group has decided to allocate all eligible expenditures for 100% to the green bond, with the exception of expenditures on railway infrastructure (Infrastructure Fund, Article 13). 73,7% of the eligible expenditures on railway infrastructure over 2018 was taken into account and 80,2% over 2019. Since railway expenditures are the biggest and the DSTA wants to have a diversified portfolio of allocations, the choice was made to apply this selection to the expenditure item for railways. The relevant receipts on the articles by which the selected expenditures on the articles have been financed besides using the green bond have been taken into account. The table below sets out clearly how the interdepartmental Green Bond Working Group allocated the funds to the relevant government expenditures. At the same time, the nature of the expenditures is explained in detail for each expenditure category.

The percentage of allocation is the percentage of the green bonds' proceeds allocated to a category of expenditures in relation to the total eligible green government expenditures (all eligible expenditures in 2018 and 2019 were selected with the exception of railway infrastructure).

Annual expenditures category (x € 1 mln)		Allocation table green bond									
		2018				2019					
Category	Description	Total expenses (in million €)	Expenses allocated to green bond (in million €)	Percentage of allocation	Type green expenditure	Total expenses (in million €)	Expenses allocated to green bond (in million €)	Percentage of allocation	Type green expenditure	Total	Percentage of total
Renewable Energy	Stimulation of Sustainable Energy Production (SDE)	528	528	100.0%	Subsidy	495	495	100.0%	Subsidy	1,023	17.1%
	Offshore wind energy	*364*	*364*	*100.0%*		*348*	*348*	*100.0%*		*712*	*11.9%*
	Onshore wind energy	*151*	*151*	*100.0%*		*134*	*134*	*100.0%*		*285*	*4.8%*
	Solar energy	*13*	*13*	*100.0%*		*13*	*13*	*100.0%*		*26*	*0.4%*
Energy Efficiency	Energy savings in the rental housing sector	106	106	100.0%	Subsidy	134	134	100.0%	Subsidy	240	4.0%
Clean Transportation	Maintenance and management of railway infrastructure, development of railway infrastructure for passenger rail	2,016	1,485	73.7%	73,8% operational expenditures* and 26,2% direct investment	1,870	1,500	80.2%	76,7% operational expenditures* and 23,3% direct investment	2,985	49.9%
	Management, maintenance and replacement	*1,514*	*1115*	*73.7%*		*1,458*	*1,170*	*80.2%*		*2,285*	*38.2%*
	Construction	*399*	*294*	*73.7%*		*302*	*242*	*80.2%*		*536*	*9.0%*
	Integrated contract forms/PPC	*142*	*104*	*73.7%*		*144*	*116*	*80.2%*		*220*	*3.7%*
	Interest and redemptions	*10*	*7*	*73.7%*		*10*	*8*	*80.2%*		*15*	*0.3%*
	Receipts	*-49*	*-36*	*73.7%*		*-44*	*-35*	*80.2%*		*-71*	*-1.2%*
Climate Change Adaptation & Sustainable Water Management	Delta Fund	873	873	100.0%	59,0% operational expenditures and 41,0% direct investment	863	863	100.0%	59,2% operational expenditures and 40,8% direct investment	1,737	29.0%
	Flood risk management Investments	*307*	*307*	*100.0%*		*304*	*304*	*100.0%*		*611*	*10.2%*
	Freshwater supply investments	*11*	*11*	*100.0%*		*0*	*0*	*100.0%*		*11*	*0.2%*
	Management, maintenance and replacement	*208*	*208*	*100.0%*		*195*	*195*	*100.0%*		*403*	*6.7%*
	Experimentation	*20*	*20*	*100.0%*		*21*	*21*	*100.0%*		*41*	*0.7%*
	Network related costs and other expenditures	*308*	*308*	*100.0%*		*316*	*316*	*100.0%*		*624*	*10.4%*
	Water quality investments	*20*	*20*	*100.0%*		*28*	*28*	*100.0%*		*48*	*0.8%*
Total expenditures		**3,523**	**2,992**	**84.9%**		**3,362**	**2,993**	**89.0%**		**5,985**	**100.0%**

** The expenses for maintenance, management and replacemant of railway infrastructure are distributed by the Ministry of Infrastrructure and Water Management as a subsidy to ProRail.*

*** Due to rounding in the table above it could occur that the sum of the categories is slightly different than the total.*

I. Renewable energy

To stimulate renewable energy generation, over the last few years the Dutch State has introduced several successive subsidy schemes: Environmental Quality of Electricity Production (MEP), Stimulation of Sustainable Energy Production (SDE), SDE+ and SDE++. These schemes provide long-term economic security for operators of renewable energy generation plants. This will stimulate the generation of renewable energy.

Of these subsidy schemes, the SDE scheme has been selected as an eligible expenditure. In 2018 and 2019, the Environmental Quality of Electricity Production (MEP) expenditure was very modest in size, while the Surcharge on Sustainable Energy (ODE) is a source of funding for the SDE+ and SDE++ schemes. This means the latter expenditures fall outside the definition of eligible expenditures.

SDE expenditures relate to a series of techniques for the generation of renewable energy. For allocation of the green bond proceeds to SDE expenditures, only expenditures relating to subsidies for onshore wind energy, offshore wind energy, and solar energy have been selected. The SDE scheme compensates additional costs incurred by a producer in the generation of renewable electricity for a period of 12 to 15 years. The SDE scheme is therefore an operating subsidy which will compensate the unprofitable part of renewable electricity generation in order to encourage these projects. The annual subsidy amount decreases as the electricity price increases (after all, it becomes more profitable to generate renewable electricity). These are renewable energy projects which are now operational, but for which an annual subsidy has been granted for a period of 12 to 15 years. As a result, project developers and investors have gained greater certainty about the profitability of a project, enabling them to operate their energy generation plant in a responsible manner.

When the SDE scheme was introduced, it was one of the most important instruments by which the State encouraged the energy transition. Many of the SDE features are still present in the SDE+ scheme and will be present in the SDE++ scheme.

II. Energy efficiency

For energy savings in the social rental sector an amount of EUR 400 million has been made available through the Energy Performance incentive scheme for the rental sector (STEP), which entered into force on 1 July 2014. Of this, EUR 5 million is earmarked for implementation costs and EUR 395 million for the programme. Through the STEP scheme, housing corporations and property owners receive subsidies for improving the energy efficiency of existing housing through floor or wall insulation, high-efficiency glazing, more efficient central heating systems and other measures.

The deadline for applying for this subsidy expired on 31 December 2018. The government entered into commitments for the entire subsidy budget and has granted over 4,000 applications, which will make improvement of sustainability possible for about 110,000 homes. The subsidies are paid out two years after they have been granted based on the achieved improvement in the energy performance of the relevant housing. In 2018, payout of the subsidies commenced and a total of EUR 105.8 million was spent, with which almost 30,000 housing units have been sustainably improved. In 2019, another EUR 134 million was spent on the improved sustainability of about 45,000 rental housing units.

III. Clean transportation

The Dutch railway system safely, sustainably, cost-effectively and space-effectively transports large flows of passengers between cities. In 2018, there were 21 billion passenger kilometres. The largest rail transportation operator in the Netherlands – NS – operates on 100% renewable energy, whereas 91% of the main track has been electrified. Furthermore, steps have been taken by ProRail, the network infrastructure manager, to reduce the carbon footprint while the tracks are being maintained and constructed. ProRail carries out its activities on behalf of the Ministry of Infrastructure and Water Management. For the management, maintenance and replacement of the railways, ProRail receives subsidy using the management concession from the Infrastructure Fund of the Ministry of Infrastructure and Water Management. ProRail also receives funds from the Infrastructure Fund for the construction of State infrastructure projects conducted by ProRail on the railways. Allocation of proceeds from the green bond for railway infrastructure expenditures, does not include expenditure specifically intended for goods transportation.

IV. Climate Change Adaptation & Sustainable Water Management

In 2018, the Netherlands faced extreme weather conditions: prolonged drought, heat and heavy showers. The national heat record dating back to 1944 was broken in the summer of 2019. Research simultaneously showed that future sea levels may rise faster than was assumed in the delta scenarios. The World Economic Forum (WEF) also found that climate change is the biggest threat to the global economy. It is therefore of vital importance that the Netherlands continues to prepare itself well for the consequences of climate change, with a good protection against high water, plenty of freshwater and a climate-resistant and water-robust design.

Since 2010, the Netherlands has been working on common goals in the Delta Programme in conjunction with various public authorities and organisations. Rather than waiting for new flood disasters to strike, the Netherlands is ensuring that we keep ahead of any disasters, major damage and problems. Expenditures in this category are expenditures from the Delta Fund to ensure that high-water protection, freshwater supply and spatial planning are climate-proof and that water safety is guaranteed. For example, the identified weak links in the high-water protection system are systemically addressed and improved to meet the threat level that is foreseen for 2050.

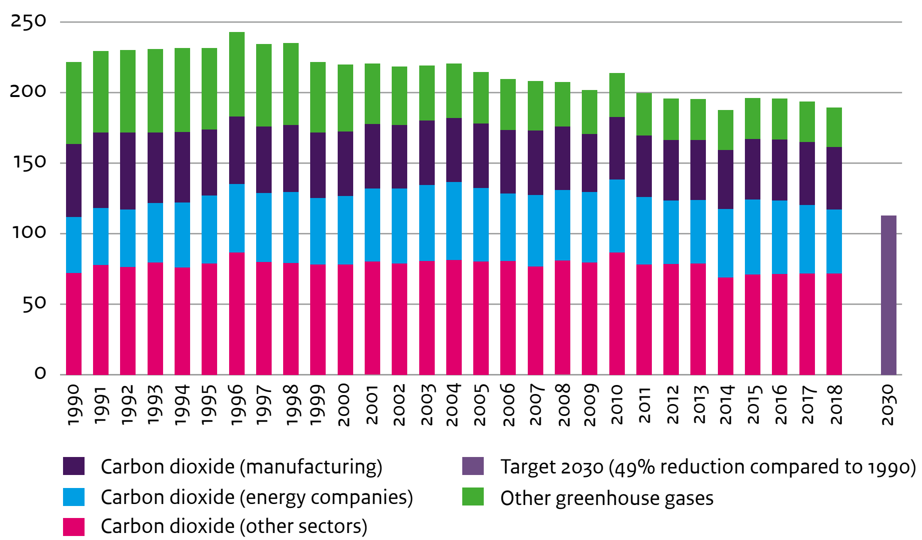
3. Impact report

The DSTA committed itself in the Green Bond Framework to publish the first impact report in the year after the first green bond was issued, explaining the positive environmental impact of the eligible expenditures. The DSTA's approach is that the reporting is based as far as possible on existing public reports on the results and impact of the eligible green expenditures.

Impact indicators for the Netherlands

The introduction of this chapter initially discusses impact indicators that apply to the Netherlands and are related to climate change. Then, where feasible and available, specific results are given in relation to the eligible green expenditures of the green bond allocations. The emphasis here is on the projections of avoided carbon emissions for each expenditure category. Finally, chapters 4 and 5 provide an in-depth examination of case studies of projects that have been implemented.

Greenhouse gas emissions in Netherlands in bn CO2 equivalents

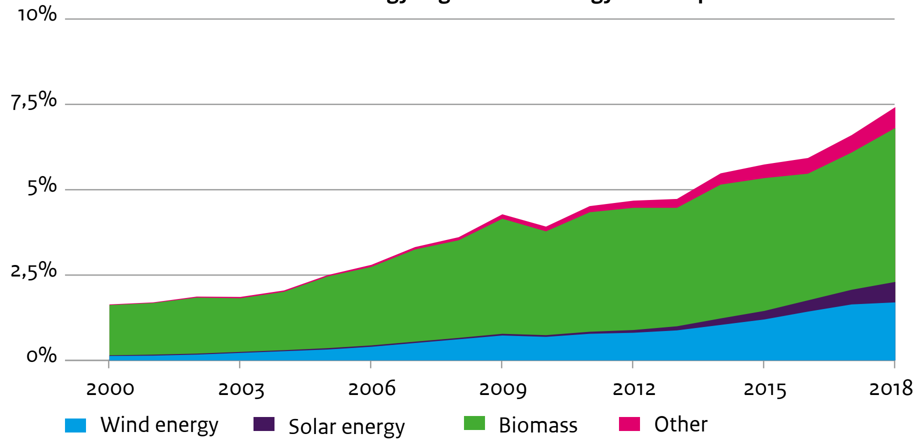


Source: Statistics Netherlands, National Institute for Public Health and Environmental Protection (RIVM)/Emissions Registration

The above graph shows that greenhouse gas emissions in the Netherlands were decreased by 5.1 Mton CO2 equivalents in 2018, 2.7% lower in 2018 than in 2017. Emissions in 2018 were 15.1% lower than in 1990. The objective in the coalition agreement is to reduce greenhouse gas emissions by 49% by 2030 in comparison to 1990. The objective for 2020 in comparison to 1990 amounts to 25% less greenhouse gas emissions. The decrease between 1990 and 2019 largely takes place for other greenhouse gases: emissions of methane (CH_4), nitrous oxide (N_2O) and fluorinated gases (F-gases) were 53% lower in 2019 than in 1990. In 2019, carbon dioxide emissions were 5% lower[1] than in 1990.

The following illustration shows that energy consumption from renewable sources in the Netherlands was 7.4% of the total energy consumption in 2018.[2] This figure was 6.6% in the previous year. The Netherlands Environmental Assessment Agency (PBL) expects that the proportion of renewable energy will increase to 11.4% by 2020 and 16.1% by 2023 as a result of acceleration in the rollout of renewable energy.[3]

Share of renewable energy in gross final energy consumption



Source: Statistics Netherlands

[1] Refer to https://www.clo.nl/indicatoren/nl0165-broeikasgasemissies-in-nederland

[2] Refer to https://www.cbs.nl/nl-nl/nieuws/2019/22/aandeel-hernieuwbare-energie-naar-7-4-procent

[3] Refer to https://zoek.officielebekendmakingen.nl/kst-32813-400.html

Impact of the Dutch State's green bond

The table below shows an overview of the impact of the green bond in relation to eligible expenditures in 2018 and 2019. The avoided carbon emissions continuously relate to the joint impact of all expenditures and investments of all actors for the benefit of the underlying projects with the exception of the category clean transportation for which the avoided carbon emissions are related to the part financed by the green bond.

Impact table green bond

		2018			2019		
Category	**Category description**	**Impact metric avoided CO_2**	**Result indicators**	**Impact metric other**	**Impact metric avoided CO_2**	**Result indicators**	**Impact metric other**
Renewable Energy	Stimulation of Sustainable Energy Production (SDE)	3.13 Mton	10,113 projects 1,734 MW subsidized production capacity	19.11 PJ production of renewable energy 5,308 mln kWh	3.22 Mton	10,088 projects 1,730 MW subsidised production capacity	19.63 PJ production of renewable energy 5,462 mln kWh
Energy Efficiency	Energy savings in the rental housing sector	0.05 Mton	29,463 rental housing units 117,853 label steps	Annual energy saving: 0.82 PJ 228 GWh	0.08 Mton	45,289 rental housing units 181,156 label steps	Annual energy saving: 1,268 PJ 352 GWh
Clean Transportation	Maintenance and management of railway infrastructure, development of railway infrastructure for passenger rail	0.18 Mton	2 realised railway projects 7,097 km railway track maintained investments in 47 projects	21 billion rail passenger km in 2018	0.18 Mton	3 realised railway projects 7,114 km railway track maintained investments in 47 projects	Number of rail passenger km in 2019 is not yet available and will be published in the next impact report.
Climate Change & Sustainable Water Management	Delta Fund: • Flood risk management investments • Freshwater supply investments • Management, maintenance, and replacement • Experimentation • Network related costs and other expenditures • Water quality investments		In 2018 107 kilometers dyke was safe in view of the new standards. This is 12 % of all dykes. The target is 100% safe dykes in 2050. In 2018 24 engineering structures meet the new standards. This is 5 % of all engineering structures. The target is 100 % safe engineering structures in 2050.	In 2050 the probability of individual mortality as a result of flooding should not exceed 1:100,000 per annum. This goal has been translated into new standards for dykes and engineering structures. The availablility of storm surge barriers was 40% in 2018. The target is 100% availability.		In 2019 129 kilometers dyke was safe in view of the new standards. This is 14 % of all dykes. The target is 100% safe dykes in 2050. In 2018 24 engineering structures meet the new standards. This is 5 % of all engineering structures. The target is 100 % safe engineering structures in 2050.	In 2050 the probability of individual mortality as a result of flooding should not exceed 1:100,000 per annum. This goal has been translated into new standards for dykes and engineering structures. The availability of storm surge barriers in 2019 was 83% in 2019. The target is 100% availability.

I. Renewable energy

In 2018, EUR 528 million worth of SDE subsidy was granted for selected categories within the SDE, for the categories solar energy, offshore wind energy and onshore wind energy. With this subsidy, 19.1 petajoules (5.3 million kilowatt hours) of renewable energy was generated. This is measured on the basis of actually measured meter readings and can therefore be determined with very high accuracy. This generated renewable energy is equal to 3.13 megatons (=3.13 billion kilo) of avoided carbon emissions.[4]

For 2019, EUR 495 million worth of SDE subsidy was granted for the categories solar energy, offshore wind energy and onshore wind energy. With this subsidy 19,6 petajoules (5,5 million kilowatt hours) of renewable energy was generated. This generated renewable energy is equal to 3.22 megatons (=3.22 billion kilo) of avoided carbon emissions.[5]

At the end of 2018, 10,113 projects received subsidy with a total capacity of 1,734 megawatts for the selected categories. Below is a summary table with a breakdown of the number of projects and their capacity per category.

2018	Number of projects	Subsidized installed capacity [in MW]	Actual annual energy production [in million kWh]
Offshore wind energy	3	719	2.898
Onshore wind energy	142	965	2.363
Solar energy	9,968	50	47
Total	**10,113**	**1,734**	**5.308**

At the end of 2019, 10,088 projects received subsidy with a total capacity of 1,730 megawatts for the selected categories. Below is a summary table with a breakdown of the number of projects and their capacity per category. The number of projects is slightly lower in 2019 than in 2018, because no new SDE subsidy decisions were issued. For new subsidy decisions, the SDE subsidy has been succeeded by SDE+. Furthermore, part of the current subsidy decisions were honoured in full in 2019.

2019	Number of projects	Subsidized installed capacity [in MW]	Actual annual energy production [in million kWh]
Offshore wind energy	3	719	2.931
Onshore wind energy	141	962	2.497
Solar energy	9,944	49	34
Total	**10,088**	**1,730**	**5.462**

As indicated in the chapter on Allocation, the SDE is an operating subsidy for the unprofitable part of renewable electricity generation. Aside from this subsidy, project developers and other financiers invest their capital to make renewable electricity generation possible. That part of the total financing of the underlying projects, is not available. However, the commitment of an operating subsidy for a period of 12 to 15 years was conditional to the underlying projects being implemented. It is for this reason that calculation of the avoided carbon emissions is based on the total renewable electricity generation of the underlying projects and the amount of carbon emissions that this has avoided.

II. Energy efficiency: STEP

For the STEP subsidy, the eventual amount of subsidy granted is based on the difference in energy performance prior to renovations and after improving sustainability of the rented housing. Energy performance is expressed in improvement in the energy label. To become eligible for the subsidy – depending on the initial situation – an improvement of at least 2 or 3 label steps is required. The average improvement per housing unit is 4 label steps. The support provided in 2018, has improved the energy performance of nearly 30,000 rented housing units. This means that the avoided carbon emissions for this group of housing units is 50 million kilotons per year. By 2019, energy performance had been improved in more than 45,000 rented housing units, resulting in about 80 million kilotons of avoided carbon emissions per year.

[4] Statistics Netherlands, *Rendementen en CO_2-emissie van elektriciteitsproductie in Nederland* [Yields and carbon emissions of electricity generation in the Netherlands], update 2017

[5] Statistics Netherlands, *Rendementen en CO_2-emissie van elektriciteitsproductie in Nederland* [Yields and carbon emissions of electricity generation in the Netherlands], update 2017

The avoided carbon emissions are based on an estimated energy saving per label step per housing unit[6]. This subsidy scheme is closed at the end of 2018. From 2019 onwards there are no new registrations. Because the subsidy is established and paid two years after granting this subsidy, there will be payments of subsidy the coming years.

The STEP scheme also requires that operators (housing corporations and property owners) must make investments that are supplementary to the subsidy, to achieve improvements in the energy performance of the rented housing concerned. The avoided carbon emissions shown, is the total amount of avoided carbon emissions achieved by means of improving efficiency.

STEP	2018	2019
Budget (in million €)	105.8	134.3
Number of houses	29,463	45,289
Number of label steps	117,853	181,156
Avoided CO_2 in Mton	0.05	0.08

III. Clean transportation

In respect of punctuality and reliability in 2018, ProRail's results rank as one of the world's top 3 railway countries, with Japan and Switzerland. By investing every year in the management, maintenance, renewal and expansion of the railways (for passenger transportation), passengers in the Netherlands are provided with a mode of transport which is relatively low in carbon emissions. In 2018 and 2019, the Ministry of Infrastructure and Water Management has realised respectively 2 and 3 railway projects. In both years in 47 existing railway projects and programs has been invested, ranging from the programme 'Accessibility to stations' to completion of the 'Utrecht Central Station' project. The network infrastructure manager ProRail has maintained in 2018 and 2019 respectively 7,097 kilometres and 7,114 kilometres of track.

The projection of the avoided carbon emissions as a result of investments and maintenance in railway infrastructure, required more effort than the categories of eligible expenditures mentioned above, since there was no existing data for railway infrastructure that was suitable for the Green Bond impact report. On commission for SNCF-Réseau in France, Carbone 4 developed a method whereby the avoided carbon emissions are calculated based on the expected change in passenger behaviour as a result of investments and maintenance in the railways. This method has also been used by the Spanish transport operator ADIF-Alta Velocidad. However, together with the Ministry of Infrastructure and Water Management and ProRail, the DSTA has concluded that this method cannot be applied to the situation in the Netherlands, because no 'degeneration curve' is available for the Netherlands that indicates how the infrastructure is deteriorating if, year after year, no investment would be done in management, maintenance and replacement of railway infrastructure.

The DSTA has therefore commissioned Significance, an independent research agency focused on mobility and transportation, to develop an alternative which assumes the change in passenger behaviour without the availability of railway infrastructure as the starting point. If no railway infrastructure would be available, the public would have to make other choices in terms of transport modality, the necessity to travel, and location for commuting from home to work and back, etc. These other choices can partially be estimated with the National Model System (LMS), although the LMS has not been developed for this purpose. The LMS is Rijkswaterstaat's forecasting model that predicts mobility in the Netherlands in the medium and long-term and is primarily used for capacity analysis, the balancing of various alternatives in projects and the consequences of other policy measures. Although the use of LMS for calculating avoided carbon emissions due to the situation with and without availability of railway infrastructure is a forecast, we believe that this gives the best estimate for the situation in the Netherlands for the avoided carbon emissions, as a result of investments and maintenance of railway infrastructure. For a more detailed explanation of the methodology chosen, refer to Annex III.

[6] The amount of energy savings is based on a commonly used model of TNO/ECM to estimate the effects of finance constructions and policy measures. In this model (the variation tool) for a representative sample of the Dutch housing stock the characteristics of houses and households and the possibilities for energy savings have been measured. From the houses in the sample the energy use, the presence of energy saving measures and the energy label is known. The avoided CO_2 per label step has been calculated by translating the average actual savings in energy use to the comparable avoided CO_2.

In 2018, there were 21 billion rail passenger kilometres, which would be completely eliminated[7] if there were no investments in railway infrastructure. Every year, about EUR 6 billion is spent on the railway system, to cover the costs of railway infrastructure (State/ProRail) and the costs of rolling stock (NS/regional transport operator). Based on the aforementioned method, Significance calculated that the total volume of avoided carbon emissions in 2018 was about 776,000 tons. For expenditures allocated in terms of the green bond in relation to clean transportation, this amounts to 0.18 Mton of avoided carbon emissions per year for the years 2018 and 2019.

IV. Climate Change Adaptation & Sustainable Water Management

Some important concrete results were achieved in the field of water management in 2018 and 2019. For example, the new water safety standards for flood defences were legally established; preparations are already underway for the first dyke reinforcements based on these standards. In 2018, a new water-level decision was adopted for the IJsselmeer area, enabling flexible water-level management. This means that the freshwater supply is considerably more robust in a large part of the Netherlands. In addition, the Ministry of Infrastructure and Water Management has invested in seven projects, including strengthening the Lek dyke along the Lek River. In 2018, a total of 107 of the 927 kilometres of dykes were safe (12%). This means that they meet the water safety standard set for 2050.

It is expected that 12 flood defences of the 468 engineering structures will be reinforced to a safe level. In total, 24 flood defences[8] (5%) have been reinforced since the introduction of the new High Water Protection Programme in 2016. The drought in 2018 made it clear that the measures taken in the Delta Plan on Freshwater Supply are effective.

In 2019, preparations for reinforcement of the Markermeer dykes started, the plan elaboration of Wolferen-Sprok was initiated and the innovative dyke improvement of Ringdijk Watergraafsmeer was completed. In total, 129 kilometres (14%) of the dykes were safe in 2019.[9]
In 2019 there was no increase in the number of safe engineering structures in comparison to 2018. However, in January 2019, the new standards for stress testing were published for waterlogging, heat stress, drought and the consequences of urban flooding. As part of the Delta Plan on Spatial Adaptation, the stress test mapped out the vulnerability to extreme weather for almost all municipalities.

[7] There are several malfunctions (small and large) that need to be solved every day. If this does not happen, the entire country will soon be shut down, partly due to the 'interconnected' network in the Netherlands.

[8] Refer to page 35 of Delta Programme 2020: https://www.rijksoverheid.nl/onderwerpen/ruimtelijke-ordening-en-gebiedsontwikkeling/documenten/rapporten/2019/09/17/bijlage-2-deltaprogramma-2020

[9] Delta Programme 2020, section 3.2.1 figures 1 and 2: refer to https://deltaprogramma2020.deltacommissaris.nl/3.html

4. Case study: project Utrecht Central Station

A significant eligible expenditure under the Green Bond included investments in our railway infrastructure. A relevant project was the improvement of the railway infrastructure in Utrecht and its surroundings. The Dutch railway system's capacity was raised due to the introduction of high-frequency rail transportation on the busiest sections in the Randstad conurbation, and a good coherence with the transportation modes before and after rail transportation. Utrecht Central is the busiest railway station in the Netherlands. Where some 285,000 passengers now use Utrecht Central on a daily basis, this is expected to grow to 360,000 passengers per day in ten years' time.

Challenge

In Utrecht, railway infrastructure forms a barrier that divides the city into two. The area has a lot of unused and cluttered terrain. The railway station and the city and regional bus terminus are too small and too cluttered to accommodate the expected doubling in the number of passengers. The government has therefore designated this project as a New Key Project *(Nieuw Sleutelproject, NSP)*.

Solution

The municipality has developed a new station area to improve the atmosphere and to change the spatial structure in such a way, to make the area a connecting link in the city. Hoog Catharijne Shopping Centre, Vredenburg Music Centre, the Jaarbeurs (Exhibition Centre) and the pattern of streets and city canals have been extensively improved. A new public transport terminal for trains, RandstadRail (rapid transit network), trams and buses was designed to double the number of passengers. In doing so, the regional projects for high quality public transport (HOV) from Utrecht Central Station to Leidsche Rijn and the eastern side of Utrecht, were taken into account.

Contribution to policy objective solution:

This investment contributes to improving travel convenience, allowing for sustainable growth in passenger transport and reducing door-to-door travel time.

(source: 2018 and 2019 overview of Multiannual programme for Infrastructure, Space and Transportation (MIRT))

5. Case study: Wonen Limburg

Improving sustainability of 4,000 rented housing units

In 2017, *Wonen Limburg* (housing corporation in Limburg) started improving the sustainability of 4,000 rented housing units over a period of four years. In this way, Wonen Limburg will achieve its goal of having an average B energy label for its entire property ownership of 26,000 housing units in 2020. By making use of the available subsidy – STEP – work can be carried out without any additional rental increase for the tenant. The savings in energy bills is therefore entirely for the benefit of the residents.

This enables *Wonen Limburg* not only to reduce the housing costs of 4,000 tenants, but it has also taken an enormous step in achieving its sustainability-related ambition.

(Source: https://www.wonenlimburg.nl/Home/Nieuws_Archief/Archief/2017:N8GwABEtTs-MnD_tolt-QPA/2017_april_juni/Verduurzaming_van_4_000_huurwoningen)

6. Green Bond other topics

I. Strong demand

The launch of the inaugural Green Bond, via a Dutch Direct Auction (DDA) on 21 May 2019, was widely regarded as successful. The book was closed with a total bid volume of more than EUR 21 billion. Due to the strong investor demand, DSTA ultimately issued EUR 5.98 billion, the upper end of the range of EUR 4 to 6 billion indicated prior to the auction.

The efforts of the DSTA to encourage green investors were also rewarded. In the weeks prior to the auction, the DSTA brought the green bond to the attention of investors, inter alia through an extended roadshow in Europe and the US. The DSTA committed itself to give priority in the allocation of green bonds to so-called green investors. Investors who were able to demonstrate sustainability credentials could indicate this through signing an investor letter. This would subsequently allow them to be registered as a green investor. Prior to the auction, 32 investors were registered as a green investor by the DSTA. At the cut-off spread, the green investors received a priory allocation and were allocated ten percentage points more vis à vis normal 'real money' investors. This resulted in an ultimate allocation of 82,5% of the bids from 'green real money accounts', 72.5% of the bids from 'real money accounts' and 18.5% of the bids from 'other accounts'. Of the total amount allocated 28.5% went to 'green real money accounts', 47.0% to 'real money accounts' and 24.5% to 'other' accounts.

II. Liquidity of the Green Bond

For the DSTA, sustaining liquidity in its bonds is one of its core values. Liquidity of the Green Bond, being the ease by which investors can buy and sell bonds without a notable price concession, has been very satisfactory. Initially there had been concerns that after the issuance the bond would mostly be bought and held by investors and, as a result, potentially impact the free float and hence its liquidity. Nonetheless, the DSTA is very pleased that market participants have confirmed that liquidity of the Green Bond is at least as good as other bonds in that part of the curve. As the DSTA is committed to sustain its liquidity, the green bond will be actively tapped by the DSTA (on the run), bringing its outstanding volume up to EUR 10 billion. This is subject to change in the overall funding need of the government. In the meantime, the DSTA will closely monitor – as with all other bonds – its liquidity while the green bond matures.

III. Development of the Green Bond Market

The Green Bond market has shown a strong growth in 2019. The Climate Bonds Initiative (CBI) calculates that the total global issuance has come to USD 257 billion in 2019, marking a 51% increase from its 2018 levels of around USD 167 billion. This means that the year-on-year growth has picked up again in 2019, where this was pretty moderate in 2018 (y-o-y growth of around 7%). In the Netherlands specifically, green bond issuance was around USD 15 billion according to the CBI. Aside from the Dutch State Treasury Agency, sixteen Dutch issuers were active in the green bond market.

The Dutch Authority for the Financial Markets (AFM) published a report on sustainable bonds[10] in the Netherlands. AFM expects that the sustainable bond market will grow rapidly and indicates that issuers transition into more sustainable business models. An increasing number of companies might turn to financing investments through sustainable bonds.

IV. Reopening of the Green Bond

In the Outlook 2020 it was communicated that the DSTA will reopen the green bond for about € 2 bn. In light of the recent developments in the financing requirement it is possible that this amount of issuance will become higher. The DSTA will reopen the green bond at least once more. The first reopening took place at 14 January 2020. The DSTA has issued € 1.37 bn. in this reopening. The total outstanding amount of the green bond is currently € 7.36 bn.

Climate Bond Certified

[10] https://www.afm.nl/nl-nl/professionals/nieuws/2020/april/groei-obligatiemarkt

V. Status of the Climate Agreement

In June 2019, the Dutch Climate Agreement was presented[11] by the Dutch government. This agreement, signed by relevant stakeholders in Dutch civil society, businesses and the government, outlines plans to reduce greenhouse gas emissions by 50% (base measure 1990) in 2030. The priority for the Dutch government is to achieve the reduction target in a way that is feasible and affordable for everyone. This means ensuring the lowest possible impact on the household budget and a fair distribution of burden between households and businesses, while maintaining a level playing field for the business sector. The climate agreement includes plans for the built environment (e.g. homes will gradually become more sustainable through a so-called neighbourhood approach), mobility (e.g. new cars emission free in 2030), industry (e.g. a reasonable and objective carbon levy in 2021), electricity (e.g. a switch from coal- and gas-based electricity to 70% electricity from renewable sources in 2030) and agriculture (e.g. measures for an integrated feed- and animal-specific approach to methane and ammonia for the dairy sector). Furthermore actions in cross-sectoral themes have been agreed upon, such as developing agreements regarding the labour market and training as a means to ensure a fair climate transition.

Moreover, a strong commitment from the financial sector is evidenced by their commitment to report on the climate impact of their investments and financing from 2020 onwards. In addition, action plans by financial institutions will be presented in 2022 that will contribute to the reduction of greenhouse gas emissions.

[11] https://www.klimaatakkoord.nl/documenten/kamerstukken/2019/06/28/letter-house-of-representatives

VI. Consequences of the European taxonomy for sustainable activities for the Green Bond of the Netherlands

In June 2019 the EU Technical Expert Group on Sustainable Finance (TEG) proposed an EU Green Bond Standard (EU-GBS) as well as the EU taxonomy. The EU-GBS can be regarded as a stricter version of the, now frequently used, ICMA Green Bond Principles (GBP). The main differences are that the EU-GBS require a use of proceeds format, disclosure of the proportion of proceeds used for refinancing, impact monitoring and reporting, external verification, and publication of the external verification, whereas the GBP only recommends these. In addition, the EU-GBS uses the EU taxonomy as a guideline to define which projects are green and requires verifiers to be accredited by the European Securities and Market Authority (ESMA). The EU taxonomy was agreed between the European Parliament and the Council in December 2019. The final report was released in March 2020. Subsequently, this agreement will have to be approved by the committee on environmental affairs and the economic affairs committee.

Based on the latest available information, we believe that the Green Bond of the Netherlands would be eligible in due time as a Green Bond under the EU taxonomy. The following text draws heavily on the information provided by the European Union in the Proposal for a regulation of the European Parliament and of the Council on the establishment of a framework to facilitate sustainable investments.[12]

[12] https://data.consilium.europa.eu/doc/document/ST-5830-2020-ADD-1/en/pdf

The Proposal for a regulation of the European Parliament and the Council[13] reads as follows: "an economic activity shall be environmentally sustainable where that activity complies with all of the following criteria:

a. the economic activity contributes substantially to one or more of the environmental objectives set out in Article 5 in accordance with Articles 6 to 11;
b. the economic activity does not significantly harm any of the environmental objectives set out in Article 5 in accordance with Article 12;
c. the economic activity is carried out in compliance with the minimum safeguards laid down in Article 13.

The text then continues to list the environmental objectives in Article 5, namely:

1. climate change mitigation;
2. climate change adaptation;
3. sustainable use and protection of water and marine resources;
4. transition to a circular economy;
5. pollution prevention and control;
6. protection and restoration of biodiversity and ecosystems.

The list of environmental objectives is also to be found in the TEG report on the EU taxonomy.[14] It is our view that the Dutch Green Bond would contribute to objective (1) and (2) listed in Article 5. We are also of the opinion that the activities funded by the Dutch Green Bond cause no noteworthy harm to any of the objectives listed in Article 5.[15]
Renewable energy and clean transportation fit quite neatly in the EU taxonomy, but for expenditures on flood risk management the definitions in the EU taxonomy are yet to be defined. We also consider energy efficiency to fit in the EU taxonomy. For all categories, the DSTA will continue to monitor developments in the EU taxonomy and will report on specific categories should this become available.

In addition, Article 4 of the regulation stipulates that "Financial market participants offering financial products as environmentally sustainable investments, or as investments having similar characteristics, shall disclose information on how and to what extent the criteria for environmentally sustainable economic activities set out in Article 3 are used to determine the environmental sustainability of the investment." In our view, the impact report that has been drafted by the DSTA in cooperation with the other relevant ministries, ensures compliance with Article 4 and shows investors how their investment in Dutch Green Bonds contributes to the objectives as set out in Article 5 in a meaningful an transparent way.

[13] 2018/0178 (COD)

[14] https://ec.europa.eu/info/sites/info/files/business_economy_euro/banking_and_finance/documents/200309-sustainable-finance-teg-final-report-taxonomy_en.pdf

[15] https://data.consilium.europa.eu/doc/document/ST-5830-2020-ADD-1/en/pdf

Appendix I

Independent auditor's report

To: The Agent of the Dutch State Treasury Agency

Our opinion

We have audited the Allocation report (chapter 2 of the Green bond report 2019 of the Dutch State Treasury Agency based in The Hague).

In our opinion the allocation report is prepared, in all material respects, in accordance with the principles as described in the Green Bond Framework of the Dutch State (version march 15th 2019), chapters 2.1, 2.2, 2.3 and 2.4.

Basis for our opinion

We conducted our audit in accordance with Dutch law, including the Dutch Standards on Auditing. Our responsibilities under those standards are further described in the 'Our responsibilities for the audit of the allocation report' section of our report.

We are independent of the Dutch State Treasury Agency in accordance with the Verordening inzake de onafhankelijkheid van accountants bij assurance-opdrachten (ViO, Code of Ethics for Professional Accountants, a regulation with respect to independence) and other relevant independence regulations in the Netherlands. Furthermore we have complied with the Verordening gedrags- en beroepsregels accountants (VGBA, Dutch Code of Ethics).

We believe the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Emphasis of the basis of accounting and restriction on use and distribution

We draw attention to note paragraphs 1 up to and including 3 of chapter 2 of the Green bond report 2019 of the Dutch State Treasury Agency based in The Hague, which describes the basis of accounting. The Green bond report 2019 of the Dutch State Treasury Agency based in The Hague is intended for the investors in de green bonds issued by the Dutch State Treasury Agency and is prepared to assist the Dutch State Treasury Agency to comply with the principles as described in the Green Bond Framework of the Dutch State (version march 15th 2019), chapters 2.1, 2.2, 2.3 and 2.4. As a result, the Allocation report may not be suitable for another purpose. Therefore, our auditor's report is intended solely for the Dutch State Treasury Agency and the investors in de green bonds issued by the Dutch State Treasury Agency and should not be distributed to or used by other parties than the Dutch State Treasury Agency and the investors in the green bonds issued by the Dutch State Treasury Agency. Our opinion is not modified in respect of this matter.

Other information

To the Allocation report other information has been added that consists of:

- Introduction
- Impact report
- Case study: Project Utrecht Central Station
- Case study: Wonen Limburg
- Green Bond other topics

Based on the following procedures performed, we conclude that the other information is consistent with the allocation report and does not contain material misstatements.

We have read the other information. Based on our knowledge and understanding obtained through our audit or otherwise, we have considered whether the other information contains material misstatements.

By performing these procedures, we comply with the requirements of the Dutch Standard 720. The scope of the procedures performed is substantially less than the scope of those performed in our audit of the Allocation report.

The Agent of the Dutch State Treasury Agency is responsible for the preparation of the other information in accordance with the principles as described in the Green Bond Framework of the Dutch State (version march 15th 2019), chapters 2.1, 2.2, 2.3 and 2.4.

Responsibilities of the Agent of the Dutch State Treasury Agency for the allocation report

The Agent of the Dutch State Treasury Agency is responsible for the preparation of the allocation report in accordance with the Green Bond Framework of the Dutch State (version march 15th 2019), chapter2.1, 2.2, 2.3 and 2.4. Furthermore, the Agent of the Dutch State Treasury Agency is responsible for such internal control as she determines is necessary to enable the preparation of the allocation report that is free from material misstatement, whether due to fraud or error.

Our responsibilities for the audit of the allocation report

Our objective is to plan and perform the audit engagement in a manner that allows us to obtain sufficient and appropriate audit evidence for our opinion.

Our audit has been performed with a high, but not absolute, level of assurance, which means we may not detect all material errors and fraud during our audit.

Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the allocation report. The materiality affects the nature, timing and extent of our audit procedures and the evaluation of the effect of identified misstatements on our opinion.

For a more detailed description of our responsibilities, we refer to https://www.nba.nl/ENG_algemeen_01

The Hague, May 28th 2020

Auditdienst Rijk

[redacted]

This brochure is published by:

Dutch State Treasury Agency
Ministry of Finance
PO Box 20201 | 2500 EE The Hague
The Netherlands

www.dsta.nl

The State of the Netherlands

POST-ISSUANCE VERIFICATION LETTER

MARINE RENEWABLE ENERGY, WIND ENERGY, SOLAR ENERGY, LOW CARBON BUILDINGS, LOW CARBON LAND TRANSPORTATION, AND WATER INFRASTRUCTURE CRITERIA OF THE CLIMATE BONDS STANDARD

Type of engagement: Assurance Engagement
Period engagement was carried out: April-May 2020
Approved verifier: Sustainalytics
Contact address for engagement: De Entrée 35-37 – 1101 BH, P.O. Box 22703 – 1100 DE, Amsterdam, The Netherlands
Post-Issuance Engagement Leader: Larysa Metanchuk, larysa.metanchuk@sustainalytics.com, (+40) 21 529 2233

Scope and Objectives

In May 2019, The State of the Netherlands (the Dutch State) issued a green bond aimed at financing existing and future government expenditures that promote the Netherlands' realization of policy objectives aimed at decarbonizing the country's energy, housing and transportation sector, while building resilience to climate change in the following use of proceeds categories: renewable energy, energy efficiency, clean transportation, and climate change adaptation & sustainable water management. In April-May 2020, the Dutch State engaged Sustainalytics to review the projects funded through the issued green bond, and provide an assessment as to whether the projects met the Post-Issuance Requirements (Part A, Part B and Part C) of the Climate Bonds Standard.

Green bond projects include those related to:

- Marine renewable energy
  - Offshore wind energy
- Wind energy
  - Onshore wind energy
- Solar energy
  - Onshore solar electricity generation facilities
- Low carbon buildings
  - Residential property energy efficiency upgrades
- Low carbon land transportation
  - Public passenger transport infrastructure
- Water infrastructure
  - Engineered water infrastructure
    - Flood defence
    - Water distribution
  - Nature-based water infrastructure
    - Flood defence

Schedule 1 provides details of the green bond project portfolio and disbursement of proceeds per eligibility criteria.

Compliance Evaluation Criteria

Post-issuance requirements under Climate Bonds Standards Version 2.1:

- Part A: General Requirements - All the requirements in Part A shall be met to be eligible for post-issuance certification.
- Part B: Eligible Projects & Assets - Part B requirements shall be met based on the projects & assets associated with the bond and the specified eligibility criteria.
- Part C: Requirements for Specific Bond Types - Part C requirements shall be met to be eligible for post-issuance certification and are used selectively, depending on the type of bond in question.

Issuing Entity's Responsibility

The Dutch State is responsible for providing accurate information and documentation relating to the details of the projects that have been funded, including description of projects, total development cost of each project, and disbursed amounts.

Independence and Quality Control

Sustainalytics, a leading provider of ESG and corporate governance research and ratings to investors, conducted the verification of the Dutch State's green bond, issued to finance marine renewable, wind and solar energy projects, residential property energy efficiency upgrades, public passenger transport infrastructure projects, and water infrastructure projects, and provided an independent opinion informing the Dutch State as to the conformance of the green bond with the Post-Issuance requirements and Marine Renewable Energy, Wind Energy, Solar Energy, Low Carbon Buildings, Low Carbon Transportation and Water Infrastructure criteria of the Climate Bonds Standard.

Sustainalytics has relied on the information and the facts presented by the Dutch State with respect to the Nominated Projects. Sustainalytics is not responsible nor shall it be held liable if any of the opinions, findings, or conclusions it has set forth herein are not correct due to incorrect or incomplete data provided by the Dutch State.

Sustainalytics makes all efforts to ensure the highest quality and rigor during its assessment process and enlisted its Sustainability Bonds Review Committee to provide oversight over the assessment of the bond.

Verifier's Responsibility

Sustainalytics conducted the verification in accordance with the Climate Bonds Standard Version 2.1 and with International Standard on Assurance Engagements 3000 (ISAE 3000) – Assurance Engagements other than Audits or Reviews of Historical Information.

The work undertaken as part of this engagement included conversations with relevant Dutch State employees and review of relevant documentation to confirm the conformance of the Dutch State's green bond with the Post-Issuance Requirements (Part A, Part B and Part C) of the Climate Bonds Standard Version 2.1.

Exceptions

No Exception were identified. All projects aligned with the Post-Issuance requirements of the Climate Bonds Standard and were in conformance with the Marine Renewable Energy, Wind Energy, Solar Energy, Low Carbon Buildings, Low Carbon Transportation and Water Infrastructure criteria.

Conclusion

Based on the limited assurance procedures conducted, nothing has come to Sustainalytics' attention that causes us to believe that, in all material respects, the allocation of EUR 5,985 million from the Dutch State green bond, issued to fund eligible green projects, is not in conformance with the Post-Issuance requirements of the Climate Bonds Standard.

Detailed Findings

Eligibility Criteria	Procedure Performed	Factual Findings	Error or Exceptions Identified
Compliance to Part A: General Requirements	Verification of project portfolio funded by the green bond in 2019 to determine if Part A: General Requirements were met (See Schedule 2A and 2B).	Project portfolio reviewed complied with the General Requirements.	None
Compliance to Part B: Eligible Projects & Assets	Verification of project portfolio funded by the green bond in 2019 to determine if projects fall into (i) one of the investment areas of the Climate Bonds Taxonomy (ii) meet the Marine Renewable Energy, Wind Energy, Solar Energy, Low Carbon Buildings, Low Carbon Transportation and Water Infrastructure technical criteria.	Project portfolio falls under the Marine Renewable Energy, Wind Energy, Solar Energy, Low Carbon Buildings, Low Carbon Transportation and Water Infrastructure criteria and meet the related technical requirements.	None
Compliance to Part C: Requirements for Specific Bond Types	Bond Type Applicable: Use of Proceeds Bond.	The requirements of Project Holding, Settlement Period and Earmarking have been met.	None

Schedule 1: Detailed Overview of Nominated Projects and Assets

Details of the Nominated Projects are provided below:

1) Marine renewable energy: Subsidies for the following wind offshore parks

Name	Capacity, MW	Number of windmills	Location	Allocation 2018 (EUR mn)	Allocation 2019 (EUR mn)
Gemini Offshore Wind Park	600	150	Dutch North Sea	364	348
Luchterduinen Offshore Wind Park	129	43	Dutch North Sea		

2) Wind and Solar Energy:

	Number of projects 2018	Allocation 2018 (EUR mn)	Number of projects 2019	Allocation 2019 (EUR mn)
Onshore wind projects	142	151	141	134
Solar projects	9,968	13	9,944	13

3) Low carbon buildings: Residential property energy efficiency upgrades

Incentive Scheme for Energy Performance in the Rental Sector (STEP). STEP awards subsidies for refurbishments of rental housing, require a minimum improvement of two Energy Index steps, but only grant subsidy when this also results in an improvement of a minimum of two or three EPC energy label steps.[1] This minimum improvement is in line with the 30% threshold required by the CBI Low Carbon Buildings Standard.[2] As part of the programme homes must be visited by a registered Energy Performance Advisor (EPA) in order to verify compliance with the energy efficiency improvements required by the programme. In 2018 and 2019, the average improvement per housing unit was 4 label steps.

Subsidies for energy savings upgrades in the rental housing sector:

Number of houses upgraded 2018	Allocation 2018 (EUR mn)	Number of houses upgraded 2019	Allocation 2019 (EUR mn)
29,463	106	45,289	134

4) Low Carbon Transportation:

Expenditures related to upgrading trajectories for higher-frequency passenger rail travel, railway capacity management, bicycle parking space at rail stations, and linkages to other modes of public transportation.
To be eligible for Climate Bond Initiative Certification scheme, railway infrastructure must fulfill Criterion 3: Emissions threshold for public passenger transport, which is 75gCO2/passenger/km for 2020 and 56gCO2/passenger/km for 2030.

[1] STEP requirements available at: https://www.rvo.nl/subsidies-regelingen/stimuleringsregeling-energieprestatie-huursector-step/voorwaarden-step/particulieren
[2] As the State of the Netherlands is providing subsidies rather that investments, the CBI Standards Board confirmed, in February 2019, that the relative performance improvement is not required to scale based on the bond tenor.

In 2017, the average emissions for Dutch passenger trains were 6g CO2/passenger/km. This performance is derived from data on the Dutch rail use,[3] indicating 75% of Dutch passenger km transport via intercity electric trains, 20% local electric trains, and 5% local diesel trains. Given the average 6g CO2/passenger/km, the State of the Netherlands' green bond fulfills the Climate Bond Initiative Criteria.

Expenditures and investments in the maintenance and management of railway infrastructure, development of railway infrastructure for passenger rail:

Number of realised projects 2018	Allocation 2018 (EUR mn)	Number of realised projects 2019	Allocation 2019 (EUR mn)
2	1,485	3	1,500

5) Water infrastructure expenditures include a variety of projects. In the following table examples of projects financed are included in the description:

Expenditure name	Description	Allocation 2018 (EUR mn)	Allocation 2019 (EUR mn)
Flood risk management investments	Second Flood Protection Program (HWBP-2): Investments to get flood defences up to legal standard. Space for the River: Investments to bring safety along the Rhine branches and the downstream part of the dike Maas (from Hedikhuizen) into line with the legally required standard and contribute to improving the spatial quality of the river area, thereby strengthening the river area economically, ecologically and regarding landscape. Grensmaas and Zandmaas, nature development: primarily contributing to flood risk management and in addition, these projects realize nature that benefits the National Ecological Network (EHS).	307	304
Freshwater supply investments	The Delta Plan on Freshwater Supply 2015-2021: Large number of initiatives and measures to make the freshwater supply in the Netherlands more robust for the future effects of climate change and to tackle the bottlenecks that are already there. 'Haringvliet Locks Management Decision' project: improves the situation for migratory fish, such as salmon, sea trout and glass eel and improves the fresh water to agricultural areas. The Water Authorities strive for a 30% improvement in energy efficiency in the period	11	0

[3] Data on the use of and emissions of the Dutch train systems can be found under "Personenvervoer" at: https://www.co2emissiefactoren.nl/lijst-emissiefactoren/

	2005-2020, including improvements in equipment.[4,5]		
Management, maintenance, and repl acement	Monitoring water levels, water quality and information provision. Crisis management and prevention. Regulation of use through licensing and enforcement. Complying with administrative agreements on water distribution and use (including in water agreements). Regulation of water distribution (updating and applying operational models, operation (storm surge) barriers, weirs, pumping stations and drains).	208	195
Experimentation	Measures and provisions in other policy areas such as nature, the environment or economic development, subject to the condition that these measures are related to measures for water safety or freshwater supplies.	20	21
Network-related costs and other expenditures	Equipment costs of Rijkswaterstaat (RWS) and the Delta Commissioner Staff. Other network-related expenses of RWS and program expenses of the Delta Commissioner that cannot be directly allocated to the individual projects from this Delta Fund.	308	316
Water quality investments	Water safety and water quality improvements, with particular attention paid to development possibilities and safety of shipping and to nature compensation, recreation and the improvement of the habitat of flora and fauna.	20	28

[4] https://www.uvw.nl/waterschappen-kunnen-energie-besparen-op-poldergemalen/
[5] Example application of energy efficient equipment being applied at the Afluitdijk: https://www.vanoord.com/news/2018-improvement-work-afsluitdijk

Schedule 2A: Post-Issuance General Requirements of the Climate Bonds Standard

Nominated Projects & Assets	***4.1*** Statement on the environmental objectives of the bond ***4.2*** Nominated Projects meet the Climate Bonds criteria ***4.3*** Confirmation that Nominated Projects and Assets will not be nominated to other Climate Bonds
Use of Proceeds	***5.1*** Net Proceeds of the bond allocated to the Nominated Projects ***5.2*** Funds allocated to Nominated Projects within 24 months of issuance of the bond ***5.3*** Estimate of the share of the Net Proceeds used for financing and re-financing ***5.4*** Net Proceeds of the bond shall be tracked by the Issuer following a formal internal process ***5.5*** Net Proceeds of the bond shall be no greater than the total investment or the total Fair Market Value of the Nominated Projects & Assets at the time of issuance
Non-Contamination of Proceeds	***6.1*** Tracking of proceeds ***6.2*** Managing of unallocated proceeds ***6.3*** In the case of a Force Majeure, the Issuer may apply to the Climate Bonds Standard Board for an extension to the asset allocation period
Confidentiality	***7.1*** Information about the Nominated Projects & Assets provided to the Verifier and to the Climate Bonds Standard Board ***7.2*** Issuer should disclose information about the bond and the Nominated Projects & Assets to the market
Reporting Post-Issuance	***8.1*** Report containing the list of Nominated Projects & Assets to which proceeds of the bond have been allocated

Schedule 2B: Conformance to the Post-Issuance Requirements of the Climate Bonds Standard

Procedure Performed	Factual Findings	Error or Exceptions Identified
Verification of Nominated Projects & Assets	***4.1*** The objective of the bond is to primarily use proceeds to finance projects in the areas of renewable energy, energy efficiency, clean transportation, and climate change adaptation and sustainable water and wastewater management (Nominated Projects). ***4.2*** The State of the Netherlands confirms that the Nominated Projects meet the Eligibility Criteria. ***4.3*** The State of the Netherlands confirms that the projects shall not be nominated to other Climate Bonds.	None
Verification of requirements specified under Use of Proceeds	***5.1*** Net Proceeds of the bond have been allocated to the Nominated Projects. ***5.2*** The State of the Netherlands has confirmed that funds have been allocated to Nominated Projects within eight months of the issuance. ***5.3*** The State of the Netherlands allocated 50% of the proceeds for expenditures realised in 2018 and 50% for expenditure realised in 2019. Sustainalytics notes that The State of the Netherlands might have used green bond proceeds for refinancing.[6] ***5.4*** The State of the Netherlands has confirmed that Net Proceeds of the bond shall be tracked by the Issuer following a formal internal process. ***5.5*** The State of the Netherlands has confirmed that the Net Proceeds of the bond shall be no greater than the total investment in the Nominated Projects or the Total Development Cost of the Nominated Projects.	None
Verification of requirements specified under Non-Contamination of Proceeds	***6.1*** The State of the Netherlands confirms that the proceeds have been segregated and tracked in a systematic manner and were exclusively used to finance Nominated Projects. ***6.2*** The State of the Netherlands confirms that, as of December 2019, the proceeds of the green bond are fully allocated. ***6.3*** N/A	None
Verification of requirements specified under Confidentiality	***7.1*** The State of the Netherlands confirms that all relevant information about the Nominated Projects has been provided to the Verifier and to the Climate Bonds Standard Board to support the assessment of conformance with the Climate Bonds Standard. ***7.2*** The State of the Netherlands confirms that all relevant information about the bond and the Nominated Projects has been disclosed to the market.	None

[6] The State of the Netherlands has used green bond proceeds for subsidies, operating expense, and direct investment. While the breakdown of the date that these expenditures were incurred has been provided, the issuer has not disclosed specifically the share of proceeds are related to financing vs. refinancing. Sustainalytics notes that projects financed are in conformance with the CBI sector criteria.

Verification of requirements specified under Reporting Post-Issuance	***8.1*** The State of the Netherlands has provided a report containing the list of Nominated Projects to which proceeds of the bond have been allocated (See Schedule 1).	None

Disclaimer

Sustainalytics

Sustainalytics is a leading independent ESG and corporate governance research, ratings and analytics firm that supports investors around the world with the development and implementation of responsible investment strategies. For over 25 years, the firm has been at the forefront of developing high-quality, innovative solutions to meet the evolving needs of global investors. Today, Sustainalytics works with hundreds of the world's leading asset managers and pension funds who incorporate ESG and corporate governance information and assessments into their investment processes. Sustainalytics also works with hundreds of companies and their financial intermediaries to help them consider sustainability in the policies, practices and capital projects. With 16 offices globally, Sustainalytics has more than 600 staff members, including over 200 analysts with varied multidisciplinary expertise across more than 40 industry groups. For more information, visit www.sustainalytics.com.

Green bonds in passenger transport

Final report for the Ministry of Finance

SIGNIFICANCE

January 2020

significance
quantitative research

Information page

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HOOFDSTUK 1 Background and aim of the study

1.1 Background

The first year that the Ministry of Finance started issuing green bonds was in 2019. A major part of this is intended to finance investments in the development, management and maintenance of rail infrastructure (as is done by ProRail). Specific expenditure by ProRail for freight transportation is not included here.

Investors in green bonds receive a report on the effects of green bonds. On the one hand, it reports where the incoming funds are allocated to (indicators for rail are: completed projects and the number of kilometres of railway infrastructure maintained). On the other hand, an assessment of the environmental impact of these investments is calculated and reported. The environmental impact on railways must, in any case, be expressed in terms of annual rail passenger kilometres, but where possible, also in terms of avoided carbon emissions.

1.2 Aim

The aim of this study, which was carried out by Significance for the Ministry of Finance, is:

To determine the annual impact of ProRail's expenditure on passenger transport on the number of rail passenger kilometres and on carbon emissions.

These effects are determined making use of Rijkswaterstaat's forecasting model for transport and traffic *LMS* (national model system) and published emission factors. The study monitoring group includes representatives from the Ministry of Finance, the Ministry of Infrastructure and Water Management and ProRail (see Annex 1).

1.3 Contents of this report

Chapter 2 provides a description of the methodology followed. Chapter 3 presents the outcomes of the *LMS* application. Based on this, the annual rail passenger kilometres and the avoided carbon emissions are determined. These calculations and outcomes are described in Chapter 4. Chapter 5 summarizes the study and conclusions are drawn.

HOOFDSTUK 2

The methodology followed

2.1 Possible behavioural reactions in the absence of the train

The environmental impact of green bonds in rail passenger transport has already been calculated by SNCF Réseau and Carbone 4 (2017) in France and by ADIF-alta velocidad (2019) in Spain for high-speed trains. The methods used in France and Spain cannot be applied in the Netherlands, because there is no ‘deterioration curve’ function for the Netherlands to indicate how the infrastructure deteriorates if, year after year, no investments are made in its management, maintenance and replacement. However, ProRail has indicated that without expenditures on railway management, maintenance and replacements, it is no longer justified to have trains running from the very first year. We have assumed this (absence of transportation by rail) as the starting point in the methodology described below. We have calculated the carbon emissions that are avoided due to the existence of the railway system, by comparing the situation including the train and the situation excluding the train.

If there were no trains, people (and businesses and public authorities) would react to that in different ways:

- Changing modes of transport (from train to car, bus, bicycle, etc.), while car ownership remains the same;
- Changing travel destinations (where to work, where to go shopping, and where to go to school?): choices of locations that can be reached without going by train, usually to places close by;
- Changing the number of trips made, so in this case staying at home more often;
- Buying or renting more cars, in combination with more car use;
- Change in place of residence;
- Businesses can adapt their locations, which will affect commuting in particular;
- Project developers and public authorities could choose other locations for residential construction;
- Developing alternative forms of public transport (e.g. more long-distance bus lines).

In this report we make use of the *LMS* (national model system) to quantitatively gauge the effects of an absence of the rail system. The *LMS* contains some of the summarized effects. Firstly, the following describes the *LMS* and the assumptions used, and then we discuss which effects are absent in the model and what this is expected to mean for the outcomes.

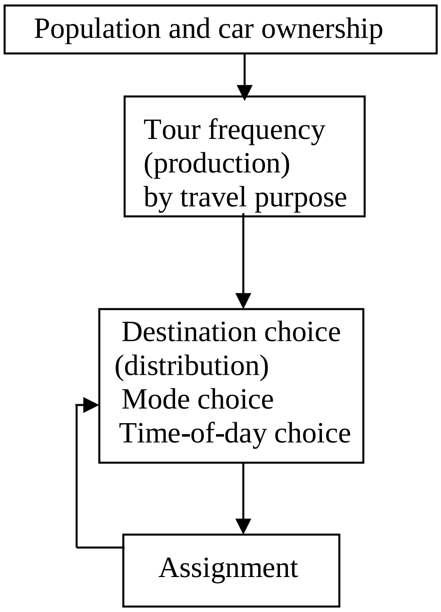
2.2 Passenger and transportation runs using the *LMS*

The *LMS* is a medium- and long-term forecasting model developed for *RWS WVL* (Public Works Department and Water Management - Water, Traffic and Environment). It predicts mobility in the Netherlands on an average working day in 2030, for example, based on a base year (in the current version: 2014). These calculations are carried out separately for various travel purposes, such as commuting, shopping and going to school. The latest version of the *LMS*, which we have used here, was developed on commission for *RWS WVL* in close cooperation with ProRail. It describes various passenger options, such as travel frequency, choice of transportation (between car driver, car passenger, train, bus/tram/metro, cycling and on foot), choice of destination, and choice of travel time (see Figure 1). For train trips, the mode of transport before and after is also included in the model (e.g. the choice for car driver, car passenger, on foot, cycling, bus/tram/metro). If the train trip falls away, then the mode of transport before and after falls away too. The passenger choices mentioned are also subject to changes in the travel times and travel costs of the various modes of transport. After a change in one of these variables, the model calculates the new equilibrium: the new pattern of movements after all changes have been worked out. So, the *LMS* does not provide short-term forecasts, such as one or two years ahead.

The *LMS* model is estimated on data of individual movements (micromodel) from the Mobility Survey of the Netherlands (MON; conducted by Statistics Netherlands) and the CLIMATE V survey by Dutch Railways (NS). It has been operational since 1985, and has been updated regularly and reviewed and used for all kinds of official documents of the Ministry of Infrastructure and Water Management, such as the National Market and Capacity Analysis (NMCA) and the *WLO2* studies (welfare and living environment scenario studies) by the *CPB* (Netherlands Bureau for Economic Policy Analysis) and the *PBL* (Netherlands Environmental Assessment Agency).

The *LMS* has not been developed to investigate what would happen in a situation where the rail system cannot be used. However, we think that the *LMS* is the most suitable instrument currently available in the Netherlands for the research question posed. The study should explicitly be seen as a survey (see also 2.4).

Figure 1. Structure of the *LMS*



2.3 Assumptions for the effect on passengers of not investing in the management, maintenance and further developments of rail infrastructure

An important part of the environmental impact calculation of ProRail's expenditure covered by the green bond is determining the 'counterfactual', the reference situation without these expenditures. This particularly concerns expenditures that are incurred by ProRail in reality. Then the reference situation is the imaginary situation that for years there is no investment in the development, management, maintenance and replacement of infrastructure for rail passenger transport. In the consultation with ProRail, a starting point was formulated that if nothing were to be spent on the railways in future, there would be absolutely no justified rail transport anymore, starting in the first year.

The *LMS* does not have a button to switch the train 'off'. That is why we simulate the effect of an absence of trains in the *LMS* by making travel by train take so long (1000 times longer) that the train is no longer chosen in the model.[1]

Without the annual expenditure by ProRail including management, maintenance and replacement, a change in the chosen mode of transport takes place because the train is not available at all in the relevant years. Aside from another mode of transport, the *LMS* also calculates the effects of changes in the choice of the trip's

[1] The sub-models in the *LMS* are probability models that determine the possibility of choosing a particular alternative (e.g. the train as a mode of transport). Even if the train would become very unattractive, there is still a very small chance for every passenger to go by train. Across the entire Dutch population, it still adds up to 9 km by train on an average working day in 2014. This is 0.00002% of the number of rail passenger kilometres on an average working day in 2014 if trains are running.

destination and the frequency for every purpose of travel. So, if there are no trains, then the *LMS* will determine the effects of another choice in the mode of transport, destination and frequency of travel.

This is contrasted by the situation of expenditures on management, maintenance and replacements, as well as expenditures on new lines and improving existing lines. The current *LMS* uses 2014 as the base year. For the year 2030, forecasts have already been made for the input for the *LMS* and within the *LMS* itself: particularly the Low and High *WLO2* scenarios by *CPB/PBL*. We also use these in this study. This already includes, for example that due to both the level of income and population growth, the number of passenger kilometres in the Netherlands increases further between 2014 and 2030 (in the High scenario this growth is stronger). These scenarios also include improvements already planned in rail infrastructure (new lines and improving existing lines).

We then compare the *LMS* forecasts of the number of passenger kilometres per mode of transport with the expenditures by ProRail in a year with a reference situation for that year (both for Low and High *WLO2* for 2030) without the ProRail expenditures. In the latter situation, rail passenger transport is no longer possible, so, in the LMS people will choose other modes of transport and also other destinations and they will travel less often. The avoided carbon emissions are calculated using emission factors for each passenger kilometre per mode of transport, which is available from publicly accessible literature.

Six calculations using the *LMS* are of importance in this project:

- 2014 with ProRail expenditures;
- 2030 with ProRail expenditures for Low *WLO2* scenario;
- 2030 with ProRail expenditures for High *WLO2* scenario;
- 2014 without ProRail expenditures;
- 2030 without ProRail expenditures for Low *WLO2* scenario;
- 2030 without ProRail expenditures for High *WLO2* scenario.

According to the current infrastructure fund programming, the two scenarios for 2030 with planned ProRail expenditures include expenditures for both management, maintenance and replacement and expenditures for new rail lines and improving existing lines. These model runs therefore include growth in the number of rail passenger kilometres due to exogenous factors (such as population and level of income growth) and the effects of investment projects and service improvements in rail transport.

In both scenarios without ProRail's expenditures, investment projects and their effects on the growth of rail passenger kilometres cease to exist. Additionally, 'existing' rail passenger kilometres also cease to exist, because justified rail transport is no longer possible due to the lack of maintenance and management.

2.4 Cautionary remark when using the *LMS* in this study

An important cautionary remark is that the *LMS* has been designed to carry out future-scenario surveys and to calculate the effects of investment projects in roads and railways and other transport policies. Calculating a future situation without rail passenger transport was not considered during the design of the *LMS* and is far removed from reality and data on the current situation on which the model is estimated. That can already be seen by the fact that there is no button in the *LMS* to make the train unavailable.

It can be expected that if no trains are running, people would not only change modes of transport, destinations and the number of trips made, but would also possibly buy or rent more cars and/or would go and live somewhere else. Furthermore, businesses might adapt their locations, or other locations for residential construction could be chosen. It is also conceivable that other forms of public transport would be adapted or extended (e.g. the Flixbus). These effects, which are discussed below, are not in the *LMS* and are therefore not in the outcomes in this report.

In the absence of the train, it is expected that there will be an increase in car ownership and associated car use. The amount of avoided carbon emissions due to investments in the rail system therefore increase as a consequence. Our forecasts lack this effect of changing car ownership and in this respect are a conservative estimate (rather an underestimation than an overestimation) of the avoided carbon emissions due to green bonds.

In the situation without the train, if people would live closer to their work, school and other travel destinations, the avoided carbon emissions would drop. In this respect, this report overestimates the amount of avoided carbon emissions. The same applies for business migrations that aim to be closer to the residential locations.

We expect that the above-mentioned effects will not be of decisive importance. Research into the influence factors on car ownership, home locations and business locations, show that other factors (such as income, family situation, car costs, housing prices, land and business premises) are significantly more important here than the influence of the rail system (Anowar et al., 2014; De Jong et al., 2004; De Jong and Van de Riet, 2008; Zondag and De Jong, 2010). On the other hand, an absence of the rail system in the Netherlands is a hypothetical situation, for which we do not have any information on what would happen with car ownership. In regions in the United States, for example, where public transport is virtually absent (so too in urban regions), car ownership is more pronounced than in the Netherlands. Alternative forms of public transport might also arise in the absence of trains (e.g. more long-distance bus lines), but these alternatives are not modelled here: we consider what is taken care of by existing modes of transport (in addition to travelling less often and less far). The above is summarized in Table 1.

Table 1. Developments that are and are not included in the *LMS*, as used in this report

Development	Whether or not included in the *LMS*
Shift from train to car, bus, tram, metro, by bicycle and on foot	Included
Shift from train to other modes of transport (air travel, motor bike, new modes of transport to be developed)	Not included
Travel less far (e.g. location of work, school, shopping centre is closer)	Included
Travel less often	Included
Moving (closer to work, school, etc.)	Not included
Buy or rent more cars	Not included (car availability in a year in the model does not change if no trains are running)
Spatial developments	Not included (other residential and industrial site locations)
Adaptations to transport system	Not included (new or improved supply of other public transport services)
Bus/tram/metro transport capacity	Not included (the model does not take capacity limitations of public transport into account)

In order to ensure the integrity of this exercise, several meetings have been held with a research advisory group composed of representatives from the Ministry of Finance, the Ministry of Infrastructure and Water Management (explicitly including Rijkswaterstaat, the model owner and manager) and ProRail.

2.5 Effects of the green bond on ProRail expenditures per year

The question now is which part of the rail passenger transport that ceases to exist (and its associated avoided carbon emissions), can be attributed to the reduced expenditure for rail passenger transport by ProRail. The Dutch government's expenditure on rail infrastructure for passenger transport currently amounts to about EUR 2.0 billion per annum. The Dutch Railways (NS) spend about EUR 3.0 billion annually for transporting passengers by rail, and the other operators of rail passenger transport an additional EUR 0.5 billion. The total rail expenditure is therefore EUR 5.5 billion per annum. The avoided carbon emissions, which can be attributed to the funds yielded in one year for green bonds and which are related to ProRail expenditure, can then be calculated by dividing the total avoided carbon emissions in 2018 by the aforesaid EUR 5.5 billion, and applying the resulting figure to expenditure on green bonds for rail passenger transport in one year.

ProRail has indicated that without expenditure for passenger transport, trains will no longer be able to operate in the first year already. For every year that we examine, we use the *LMS* to compare two balanced long-term situations: including and excluding trains. These outcomes concern a new situation which will only be reached after several years of behavioural adaptations (a stylized reality; a ‘what if’ simulation). Some behavioural adaptations need more time than others. Particularly changes in the choice of destination (location of work, school/university, shopping centre) are likely to take considerably longer than a year. Nevertheless, for expenditures on rail over one year (e.g. 2018), we look at the total long-term effect of such expenditures. We do not make any assumptions on which of these effects already occur in the first year and which would take longer, but restrict ourselves to a total effect, because that is ultimately the issue.

HOOFDSTUK 3

Outcomes when using the *LMS* for an average working day

3.1 The number of trips on an average working day if no trains are running

The *LMS* outcomes relating to the number of trips on an average working day for 2014, 2030 Low and 2030 High, are shown in Tables 2, 3 and 4 respectively. A trip ('tour') is a series of consecutive movements that start and finish in the same place (e.g. commuting from home to work and back).

Table 2. Number of trips (x 1,000) in 2014 on an average working day if no trains are running (index figures with blue shading in respect of 2014 by train = 100)

	Car driver	Car passenger	B T M	By bicycle	On foot	Total
Home - School	125	74	265	995	76	**1,535**
	114.7	109.7	132.2	107.7	107.0	**99.8**
Home - Work	3,325	262	332	1,797	174	**5,889**
	103.9	106.1	110.0	107.4	107.1	**99.8**
Home - Business	346	24	6	45	8	**428**
	102.1	103.3	109.9	103.5	103.7	**99.0**
Home - Shops	1,501	450	119	1,590	964	**4,625**
	100.7	100.5	100.1	100.3	100.3	**99.9**
Home - Other	2,654	823	193	2,159	1,135	**6,964**
	100.9	100.8	101.5	100.8	100.7	**99.8**
Work - Business	135	55	3	53	28	**275**
	102.9	100.0	99.2	103.9	98.6	**100.0**
Work - Other	39	14	2	26	66	**147**
	103.0	97.8	97.5	103.0	97.1	**99.7**
Child - School	0	192	37	883	597	**1,709**
		100.1	99.6	100.0	100.0	**100.0**
Business air travel	19	10	2	0	0	**31**
	153.2	153.3	155.2			**121.8**
Other air travel	30	28	5	0	0	**64**
	155.6	155.4	172.5			**117.7**
Total	**8,175**	**1,932**	**964**	**7,548**	**3,047**	**21,667**
	102.5	**102.3**	**111.7**	**103.0**	**100.8**	**99.9**

Table 3. Number of trips (x 1,000) in 2030 Low on an average working day if no trains are running (index figures with blue shading for 2030 in respect of 2030 Low by train = 100)

	Car driver	Car passenger	B T M	By bicycle	On foot	Total
Home - School	125	64	243	887	68	**1,387**
	115.3	110.8	136.4	108.4	107.5	**99.7**
Home - Work	3,301	256	369	1,846	166	**5,938**
	103.8	107.7	113.5	109.6	109.1	**99.7**
Home - Business	360	25	6	48	8	**446**
	101.7	103.7	111.2	103.9	104.1	**98.4**
Home - Shops	1,648	469	133	1,632	988	**4,871**
	100.2	100.4	101.3	100.7	100.8	**99.9**
Home - Other	2,870	882	208	2,113	1098	**7,171**
	100.3	100.9	103.0	101.1	101.1	**99.8**
Work - Business	137	50	3	54	25	**270**
	103.1	100.4	99.5	105.4	98.7	**99.7**
Work - Other	41	14	2	27	65	**150**
	102.9	97.3	97.0	104.0	96.6	**99.6**
Child - School	0	195	44	809	554	**1,603**
		99.8	100.0	100.0	100.0	**100.0**
Business air travel	40	21	4	0	0	**66**
	162.8	163.0	167.5			**125.3**
Other air travel	46	43	9	0	0	**98**
	170.5	170.3	196.5			**121.3**
Total	**8,568**	**2,021**	**1,021**	**7,417**	**2,972**	**22,001**
	102.4	**103.1**	**113.7**	**103.8**	**101.2**	**99.9**

The rows show the *LMS*s purposes of travel[2] and the columns show the modes of transport (B T M stands for: bus/tram/metro). All three tables relate to the situation excluding the train, so a column for the train has been omitted here. The rows with a coloured shading in Table 2 are index figures for comparison with the situation by train for 2014. The number of trips for each purpose and mode of transport including the train has been set to 100 and the index in the table shows how the number of trips excluding the train compare to those including the train (in 2014). For example, the 102.5 at the bottom for car driver in the 2014 table, indicates that excluding a train there are 2.5% more trips for a car driver than in the situation including the train. In the three tables, this increase is 2.2-2.5%. The number of trips transported as car passengers increases by 2.3-3.3%, by bicycle by 3.0-3.9% and on foot by 0.8-1.3%. The largest relative movement compared to the train takes place by bus/tram/metro as the main mode of transport: a 12-14% increase. It may seem somewhat strange that on foot

[2] The runs using the *LMS* for 2014 (base year), 2030 High scenario (in *WLO2*) and 2030 Low scenario (also in *WLO2*) for a situation excluding trains were successful for all travel reasons, except for two: child – shopping and child – other (child-school did work well). We simulated absence of the train in the model by giving it an extremely long trip time (1000 times more). The model jammed for the two travel purposes mentioned. The two purposes, together, have 2.4% of all passenger kilometres. In consultation with the advisory group, we decided only to look at the changes for the remaining 97.6%.

and especially by bicyle would act as a substitute for the train, because the emphasis by train lies on longer distances. However, it is not the case that the average distance of the trip by bicycle (i.e. return trip) in the situation excluding the train is very long: either including or excluding the train it is 5-7 km by bicycle (and 2-3 km on foot) as the main mode of transport. So, it seems that these modes of transport are mainly used for relatively short trips even excluding the train. In addition, the mode of transport by bicycle in the *LMS* also contains the electric bike, which allows for longer distances.

Table 4. Number of trips (x 1,000) in 2030 High on an average working day if no trains are running (index figures with blue shading for 2030 in respect of 2030 High by train = 100)

	Car driver	Car passenger	B T M	By bicycle	On foot	Total
Home - School	135	68	264	986	74	**1,527**
	114.4	110.1	134.8	108.0	107.3	**99.7**
Home - Work	3,610	234	403	1,801	158	**6,206**
	103.5	107.9	114.4	110.3	109.8	**99.7**
Home - Business	411	25	7	51	8	**503**
	101.5	103.6	111.5	104.0	104.2	**98.4**
Home - Shops	1,974	451	153	1,607	997	**5,182**
	100.1	100.4	101.5	100.8	100.9	**99.9**
Home - Other	3,313	875	230	2,160	1,126	**7,704**
	100.3	100.9	103.1	101.1	101.1	**99.8**
Work - Business	154	48	3	54	25	**284**
	103.0	100.6	99.8	106.1	99.0	**99.7**
Work - Other	49	14	3	27	65	**158**
	102.6	97.1	96.9	104.2	96.4	**99.6**
Child - School	0	279	63	867	595	**1,805**
		99.8	100.0	100.0	100.0	**100.0**
Business air travel	46	24	5	0	0	**75**
	161.3	161.4	166.0			**124.9**
Other air travel	65	61	12	0	0	**139**
	167.4	167.2	192.3			**120.7**
Total	**9,758**	**2,080**	**1,143**	**7,553**	**3,049**	**23,583**
	102.2	**103.3**	**113.5**	**103.9**	**101.3**	**99.9**

The outcomes for an average working day are as follows: making it impossible to go by train (compared to going by train) in 2014, 2030 High and 2030 Low hardly leads to fewer trips (all modes of transport and purposes combined): the index is 99.9 each time, so there is a drop of 0.1%. This means that the effect of absence of trains in the choice of travel frequency is very limited; this does not lead to or hardly leads to fewer trips (thus staying home more often). We see the same per travel purpose. Yet, for 'business air travel' and 'other air travel' purposes, we see an increase in the number of trips if the train is not available. This concerns passengers who cannot travel to or from Schiphol by train. Some of them are taken and fetched by car, which would be two trips instead of one.

3.2 The number of passenger kilometres on an average working day if no trains are running

The number of passenger kilometres in the absence of the train on an average working day in 2014, 2030 Low and 2030 High are shown consecutively in Tables 5, 6 and 7.

Table 5. Number of passenger kilometres (x 1,000) in 2014 on an average working day if no trains are running (index figures with blue shading in respect of 2014 by train = 100)

	Car driver	Car passenger	B T M	By bicycle	On foot	Total
Home - School	5,718	2,040	7,903	8,623	176	**24,461**
	112.3	109.2	133.2	107.1	106.7	**69.2**
Home - Work	156,889	12,361	7,387	13,040	498	**190,174**
	103.3	106.4	110.8	107.4	106.5	**91.2**
Home - Business	25,204	2,649	134	250	26	**28,262**
	101.7	103.0	110.2	103.5	103.6	**93.9**
Home - Shops	19,554	8,760	1,422	6,363	2,314	**38,412**
	100.3	100.1	100.7	100.3	100.3	**94.3**
Home - Other	57,855	26,370	3,132	10,138	2,915	**100,410**
	100.5	100.5	102.5	100.7	100.6	**93.6**
Work - Business	2,846	3,196	37	296	71	**6,445**
	103.2	100.2	99.8	104.3	99.5	**97.6**
Work - Other	479	697	14	117	145	**1,453**
	103.0	98.1	97.9	103.0	98.2	**100.1**
Child - School	0	1,466	595	3,148	1,594	**6,803**
		99.3	99.6	100.0	100.0	
Business air travel	1,769	901	77	0	0	**2,747**
	151.3	151.4	153.6			**116.0**
Other air travel	3,536	3,342	364	0	0	**7,241**
	148.8	148.6	153.6			**118.0**
Total	**273,850**	**61,782**	**21,064**	**41,975**	**7,738**	**406,409**
	103.1	**104.3**	**116.2**	**103.9**	**100.8**	**91.2**

The absence of the train will reduce the total passenger kilometres on an average working day by 8-9%. This relates to a decrease in the distance travelled per trip. There are two reasons for this:

- In the medium to long-term, there is a change in the destination choice if the train becomes a particularly unattractive option: people decide to go elsewhere to work, to shop or to go to school, etc. These are mainly destinations that are closer to the point of departure (usually the home). In this way too, the distances excluding the train are shorter.
- When travelling by train, the total distance travelled is often longer than by car, bicycle or bus as the main mode of transport, because the train has a less dense network with a limited number of stops to embark and disembark. Replacement journeys with other modes of transport usually have fewer detours and are therefore shorter.

Table 6. Number of passenger kilometres (x 1,000) in 2030 Low on an average working day if no trains are running (index figures with blue shading for 2030 in respect of 2030 Low by train = 100)

	Car driver	Car passenger	B T M	By bicycle	On foot	Total
Home - School	5,998	1,806	7,213	7,818	154	22,989
	113.1	110.4	137.9	107.7	107.2	67.4
Home - Work	166,580	12,444	8,207	14,475	460	202,176
	103.4	108.2	114.3	109.6	108.5	89.8
Home - Business	27,173	2,729	145	289	26	30,362
	101.3	103.5	111.5	103.8	104.0	93.3
Home - Shops	24,478	9,363	1,646	6,926	2,376	44,789
	99.8	100.1	101.8	100.7	100.8	94.1
Home - Other	72,428	28,852	3,435	10,481	2,803	118,000
	100.0	100.6	103.7	101.1	101.0	93.7
Work - Business	3,234	2,956	38	322	64	6,615
	103.4	100.7	100.2	105.9	99.6	96.6
Work - Other	618	686	15	130	139	1,589
	103.0	97.6	97.3	104.1	97.7	100.2
Child - School	0	1,583	736	2,867	1,460	6,646
		99.0	100.0	100.0	100.0	99.8
Business air travel	3,815	1,948	166	0	0	5,929
	158.8	158.9	163.8			116.2
Other air travel	5,145	4,849	522	0	0	10,516
	159.5	159.3	171.5			119.9
Total	**309,470**	**67,216**	**22,125**	**43,308**	**7,492**	**449,610**
	103.3	**106.2**	**118.5**	**104.9**	**101.2**	**91.0**

For some purposes (e.g. home-school and home-work), the effect on the total number of passenger kilometres is relatively big. This will partly be due to the spatial concentration of destinations which vary between the purposes, but here it mainly seems to be due to a major change in the choice of destination. For these purposes, this effect seems to be overrated, even if we take into account that this is not a short-term effect. Possibly the absence of the option to change the home location may be partly due to this, because in the model, one cannot live anywhere else so one sooner opts for other destinations. Due to this rather large reduction in distances in the absence of the train, the forecasts of the amount of avoided carbon emissions are specifically reduced. A more conservative assessment is also justifiable as such.

Furthermore, there is also a shift in the mode of transport for passenger kilometres. The number of passenger kilometres as a car driver increases from 2.7 to 3.3% due to the absence of the train. There are also increases for car passengers (4.3-7.2%), by bicycle (3.9-5.1%) and on foot (0.8-1.3%).

Table 7. Number of passenger kilometres travelled in 2030 High on an average working day if no trains are running (index figures with blue shading for 2030 in respect of 2030 High by train = 100)

	Car driver	Car passenger	B T M	By bicycle	On foot	Total
Home - School	6,312	1,871	7,770	8,816	169	**24,938**
	111.8	109.4	136.1	107.4	107.0	**68.0**
Home - Work	183,628	10,895	9,022	14,495	447	**218,487**
	102.7	108.2	115.1	110.3	109.1	**89.8**
Home - Business	32,069	2,730	158	317	27	**35,301**
	101.0	103.2	111.7	104.0	104.1	**93.4**
Home - Shops	34,243	8,798	1,931	6,933	2,383	**54,288**
	99.5	99.9	101.8	100.8	100.9	**94.3**
Home - Other	100,172	28,215	3,913	10,925	2,872	**146,097**
	99.8	100.5	103.8	101.1	101.0	**94.0**
Work - Business	4,108	2,754	42	329	63	**7,294**
	103.1	100.7	100.6	106.7	99.9	**96.4**
Work - Other	990	672	17	132	138	**1,949**
	102.5	97.3	97.1	104.3	97.6	**100.4**
Child - School	0	2,301	1,123	3,063	1,566	**8,052**
		99.8	100.0	100.0	100.0	**99.6**
Business air travel	4,378	2,236	189	0	0	**6,802**
	157.2	157.3	162.3			**116.0**
Other air travel	7,420	6,995	743	0	0	**15,159**
	156.7	156.6	167.9			**119.2**
Total	**373,320**	**67,467**	**24,907**	**45,009**	**7,665**	**518,367**
	102.7	**107.2**	**118.1**	**105.1**	**101.3**	**91.4**

The effect on the number of bus/tram/metro passenger kilometres is the balance of two effects:

- Substituting the train by a bus/tram/metro. Tables 2, 3 and 4 show that this mode of transport shift is considerable. Tables 5, 6 and 7 show that this is even a bit more for passenger kilometres (16.2-18.5%). This is using a bus/tram/metro as the main mode of transport.
- No use of bus/tram/metro as transport before and after the train (not shown separately in the tables). This also has a considerable effect, which means that the resultant effect, after weighing up the two effects, is small. On balance, the total passenger kilometres by bus/tram/metro increases by 0.1-1.6% in the absence of the train.

Taking the 2030 Low scenario (as an example), 60.9 million passenger kilometres cease to exist for an average working day in the absence of the train. In the case of car drivers, there are 10,0 million more (i.e. about 1/6 part of what ceases to exist by train), in the case of car passengers 3,9 million and by bicycle 2,0 million. Increases in the number of passenger kilometres for bus/tram/metro and on foot are minimal: 0.3 and 0.4 million respectively. In total, other modes of transport account for 16.6 million passenger kilometres and the overall reduction in distances provides the remaining 44.3 million (balance is then the aforesaid 60.9 million).

HOOFDSTUK 4 **Annual outcomes and avoided carbon emissions**

4.1 Annual outcomes

The *LMS* outcomes concern an average working day. For the train, ProRail has provided annual totals for each purpose for the year 2010[3], which allows the rail passenger kilometres to be calculated for a whole year. We have converted these to the *LMS* base year (2014) by making use of the growth of passenger kilometres 2010-2014 according to Statistics Netherlands (+13.7%; Statistics Netherlands, 2019). By dividing the annual totals for 2014 by the passenger kilometres for the average working day in the *LMS* for 2014, interpolation factors were obtained for each purpose. These interpolation factors are used to determine annual totals for both 2014, 2030 Low and 2030 High.

Table 8 shows the rail passenger kilometres (based on the train's availability) for the whole year (on an annual basis). From 2014 to 2030, the rail passenger kilometres increase from 19.6 billion to 23.6-26.4 billion per year. This increase is due both to developments in the demand (income, inhabitants, jobs, train usage costs and alternative transport costs), and to investments in the rail system.

[3] These are annual totals per trip purpose for the year 2010 in millions of passenger kilometres: home-work 3,933, education 2,931, shopping 1,045, business 1,935 and other private 7,408. A growth of 13.7% is applied to these figures to interpolate from 2010 to 2014. Subsequently, multiplication factors were applied to the *LMS* outcomes of 2014 (including train) in such a way that for the train it would result in the annual totals for every purpose of travel for 2014. This interpolation also applies to the behavioural reactions as a result of absence of the train. For 2030, we use the same interpolation factors as for 2014.

Table 8. Rail passenger kilometres (x 1 billion), for each purpose of travel, on an annual basis

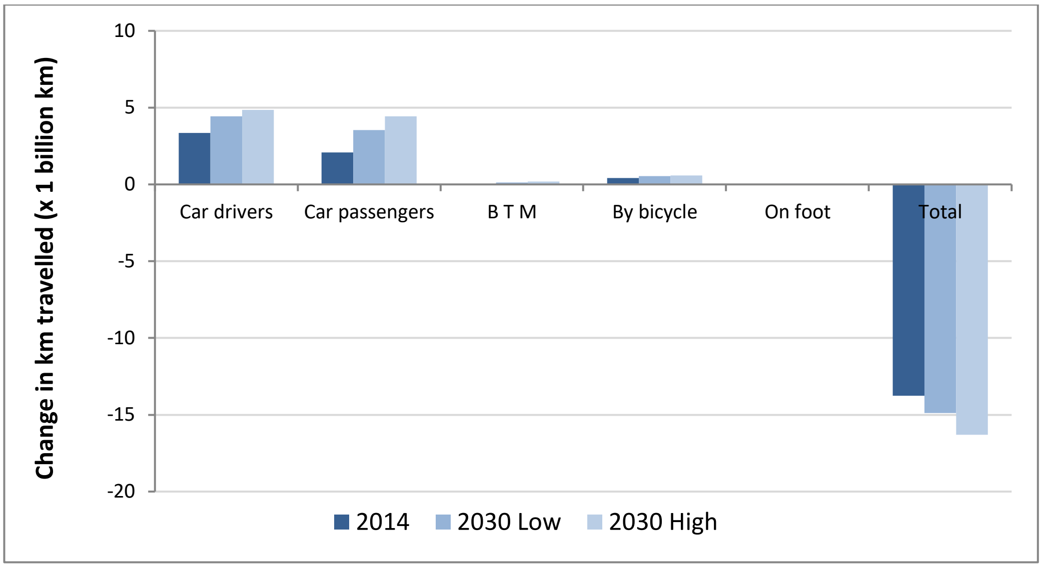
	2014	2030 Low	2030 High
Home - School	3.3	3.4	3.6
Home - Work	4.5	5.5	5.7
Home - Business	1.6	1.8	2.0
Home - Shops	1.2	1.4	1.5
Home - Other	7.2	8.0	9.1
Work - Business	0.2	0.3	0.3
Business air travel	0.4	1.0	1.1
Other air travel	1.3	2.2	3.1
Total	19.6	23.6	26.4

Changes in the passenger kilometres on an annual basis, for each mode of transport, if no train is available, are shown in Table 9 and Figure 2. For the car driver, the biggest increases are for all modes of transport; for car passengers the increases are also considerable in absolute terms. For the bus/tram/metro, there is a very small increase (for 2014 there is even a decrease excluding the train), because the number of kilometres for transport before and after the train also cease to exist. By bicycle and especially on foot, there are also small increases in absolute terms. The total number of kilometres (across all modes of transport) reduces considerably in the absence of a train due to opting for closer destinations and shorter routes (see previous chapter).

Table 9. Change in the passenger kilometres (x 1 billion) on an annual basis due to the absence of the train

Mode of transport	2014	2030 Low	2030 High
Car driver	3.4	4.4	4.97
Car passenger	2.1	3.5	4.4
B T M	-0.03	0.1	0.2
By bicycle	0.4	0.5	0.6
On foot	0.03	0.04	0.05
Train	-19.6	-23.6	-26.4
Total (overall distance reduction)	-13.8	-14.9	-16.2

Figure 2. Effect of absence of the train on the passenger kilometres on an annual basis (absolute change x 1 billion km)



4.2 Avoided carbon emissions due to existence of rail system

We multiply the calculated changes in the number of passenger kilometres (on an annual basis) for each mode of transport by emission factors for the volume of carbon emissions per passenger kilometre per mode of transport. The emission factors used for the year 2018 are shown in Table 10. The emission factors in the table relate both to 'well-to-tank' emissions (emissions in fuel extraction and production and electricity generation), and to 'tank-to-wheel' emissions (emissions on combustion and due to wear and tear). Together, these are the 'well-to-wheel' emissions (also called 'scope I and II emissions'). The factors are based on the factors in CE Delft (2015). Scope III emissions (such as those for extraction of necessary raw materials) are not included in this, nor are they included in our report. The emission factors for cars shown in the table apply both to car drivers and car passengers (because the CE Delft factors assumed an average car occupancy. The calculations show that the average occupancy increases by less than 1% due to the absence of the train, so this assumption is justified).

CE Delft (2015), shows emission factors for each passenger kilometre for the year 2011 and a look-ahead is offered for 2020. The year for which we need the emission factors is 2018. We calculated them using figures in the CE report through linear interpolation between the emission factors for 2011 and 2020. Here we made one exception, being the train. Since 2017, all electric trains in the Netherlands run on green electricity (*Milieu Centraal* [Focus on Environment], 2019), i.e. zero carbon emissions for energy usage such as electric (well-to-tank and tank-to-wheel). Only diesel trains (and replacement bus transport) still have carbon emissions. The CE 2015 publication had not assumed this as yet, but we included this for 2018 (in which we assumed 5% diesel trains, see CE Delft, 2015). The fact that more road congestion would be caused without the rail system, would increase the emission factors slightly for cars, but this has not been taken into account (so here too, there is a conservative estimate of the avoided carbon emissions).

Table 10. Emission factors used for 2018 (grams of carbon emissions/passenger kilometre)

	Tank-to-wheel	Well-to-tank	Well-to-wheel
Car	113	29	142
Train	4	1	5
Bus	107	31	138
Tram	0	61	61
Metro	0	67	67
B T M	19	58	77

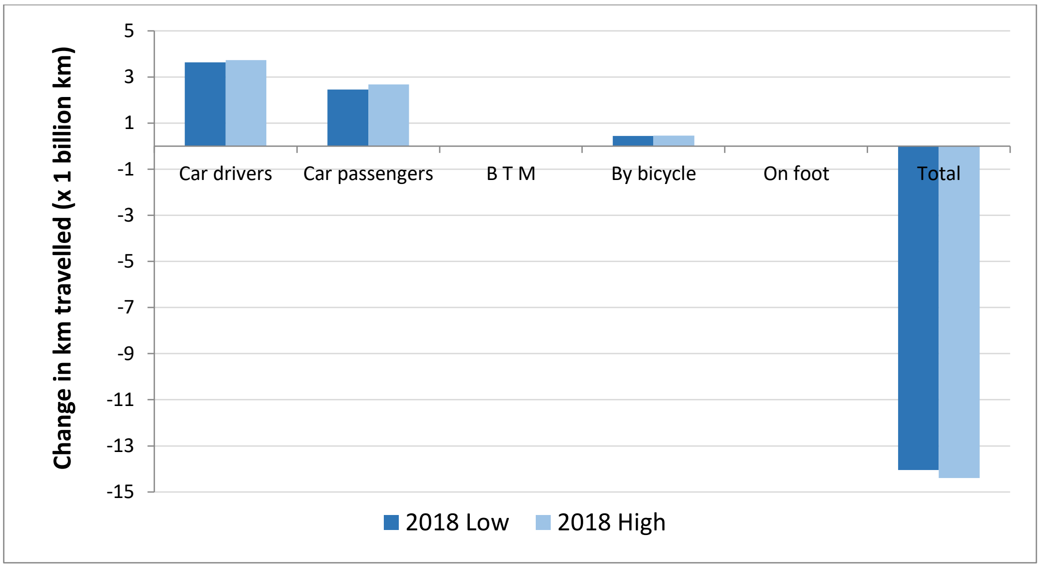
4.3 Avoided carbon emissions due to green bonds in passenger transport

For 2014 and 2030 Low and High, we have calculated the passenger kilometres per mode of transport using the *LMS* (chapter 3) on an average working day including and excluding the train. Paragraph 4.1 of this report already shows this on an annual basis. The changes in the number of passenger kilometres per mode of transport for 2018 has been calculated by linear interpolation for both the pathway from 2014 to 2030 Low and for the pathway from 2014 to 2030 High. For the year 2018 we notice 20.6 billion rail passenger kilometres for the pathway to 2030 Low and 21.3 billion for the pathway to 2030 High (see Table 11 and Figure 3). The unweighted average of this is 21.0 billion. Without a functioning rail system in 2018, these rail passenger kilometres would have ceased to exist and been absorbed by all sorts of changes in the behaviour of passengers, including switching to other modes of transport.

Table 11. Change in the passenger kilometres (x 1 billion) in 2018 due to the absence of the train

Mode of transport	Pathway from 2014 to 2030 Low	Pathway from 2014 to 2030 High
Car driver	3.6	3.7
Car passenger	2.5	2.7
B T M	0	0.02
By bicycle	0.4	0.5
On foot	0.03	0.03
Train	-20.6	-21.3
Total (overall distance reduction)	-14.0	-14.4

Figure 3. Effect of absence of the train on passenger kilometres in 2018 (absolute changes x 1 billion km)

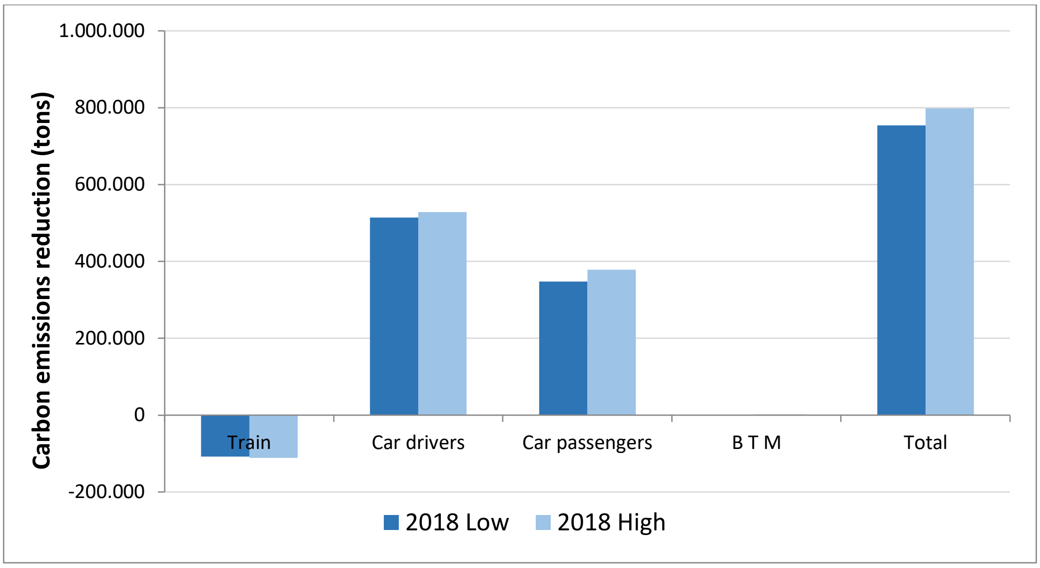


We then apply the emission factors for 2018 and the avoided passenger kilometres per mode of transport per year for 2018, and thus reach the total carbon emissions including and excluding the train in 2018 (long-term effects). Finally, we deduct the carbon emissions by train in 2018 from the carbon emissions by train in 2018 excluding the train. The balance is then the carbon emissions that have been avoided due to the availability of the rail system for passenger transport. The outcomes of these calculations are shown in Table 12 and Figure 4. Here we see that the emissions of the train itself (the remaining diesel trains) provide a negative contribution to the avoided carbon emissions. For car passengers, we use the same emission factor as for car drivers, because it concerns emissions per passenger kilometre (and when interpreting it, account is kept of the average occupancy of a passenger vehicle).

Table 12. Avoided carbon emissions due to the existence of the rail system in 2018 (tons x 1,000)

Mode of transport	Pathway from 2014 to 2030 Low scenario	Pathway from 2014 to 2030 High scenario
Train	-108	-111
Car driver	514	529
Car passenger	347	379
B T M	0.5	2
By bicycle	0	0
On foot	0	0
Total	754	798

Figure 4. Effect of rail system present in terms of avoided carbon emissions (in tons)



For linear interpolation between 2014 and 2030, we reach 754,000 tons of avoided carbon emissions in 2018 for the pathway to 2030 Low and 798,000 for the pathway to 2030 High. The (unweighted) average of both scenarios for 2030 is 776,000 tons of avoided carbon emissions in 2018. Because the rail system is available, there will be a long-term saving of 2.5% of carbon emissions from cars, trains and other public transport. In terms of size, this effect is comparable to that of the intended maximum speed limit reduction on highways to 100 km/h, which concerned an effect on carbon emissions of between 500,000 and 1,000,000 tons (*Volkskrant*, 2019).

The next question is, what part of the avoided carbon emissions can be attributed to green bonds in rail passenger transport? In 2018, the Dutch government, Dutch Railways and other rail passenger transport operators spent about EUR 5.5 billion per annum. In 2018, about EUR 6 billion was raised for green bonds, of which EUR 1.3 billion was allocated to rail passenger transport (ProRail expenditure for management, maintenance, replacement and renewal).

The avoided carbon emissions which can be attributed to the funds raised in 2018 for green bonds and which are related to ProRail expenditure, can then be calculated based on the effect of total rail expenditure in 2018. To this end, we divide the estimated carbon emission reduction of 776,000 tons in 2018 by the total rail expenditure of EUR 5.5 billion. This will result in approximately 141 tons of avoided carbon emissions per million euro of rail expenditure. The effect of EUR Y million in 2018 of green bonds on avoided carbon emissions is then calculated as follows: 141 * Y tons avoided carbon emissions in 2018.

We expect that the assumptions made in the next few years will not change significantly. Consequently, the same 141 tons of avoided carbon emissions per million euro spent on green bonds in rail passenger transport, can also be used for the coming years.

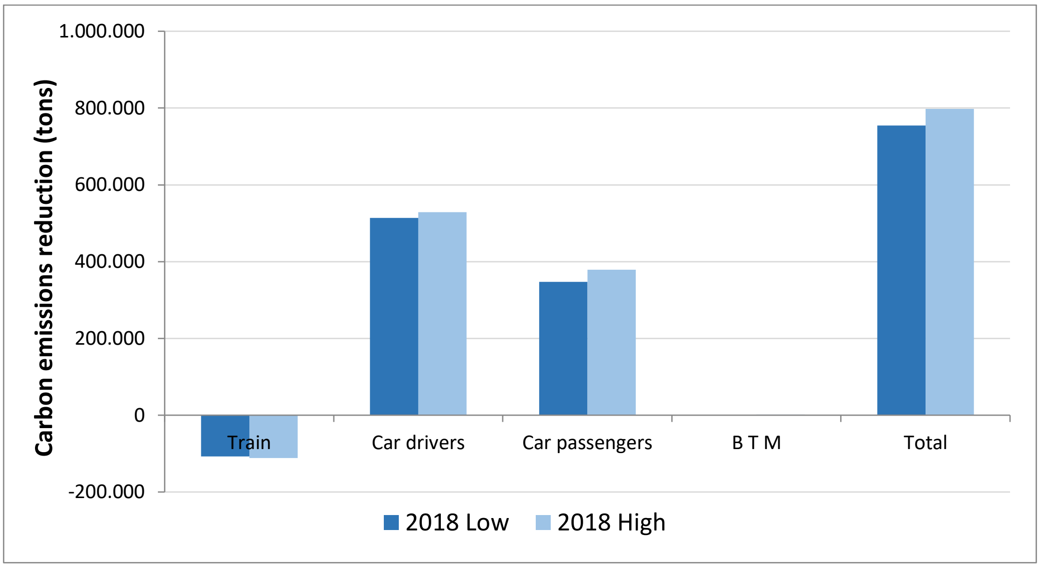
This amount relates to the long-term effect of investments in 2018 and is encumbered with various uncertainties as outlined in this report; this study using the *LMS* can therefore be no more than a survey of the effect of green bonds in passenger transport. Effects missing from the model used would almost all lead to a higher estimate of the avoided carbon emissions; our estimate is probably on a bit on the conservative side.

HOOFDSTUK 5 Summary and conclusions

By investing every year in the management, maintenance, renewal and expansion of the railways (for passenger transport), passengers in the Netherlands are provided with a mode of transport which is relatively low in carbon emissions. If the train were not available, passengers would have to adapt their behaviour (e.g. to change modes of transport or changing destinations). The National Model System (*LMS*) for traffic and transport is a forecasting model of Rijkswaterstaat for the medium and long-term that predicts the changes in the mode of transport, destination and number of trips made for changes in travel times and travel costs using various modes of transport. In this report, this model system has been used outside the model's 'comfort zone', for a comparison of the situation including and excluding the rail system for travellers in the Netherlands. This means that the study is merely a survey of the effects of the green bond in passenger transport. Various possible effects are missing in the model used. As these are mainly effects that would lead to a higher outcome for avoided carbon emissions, this report provides a conservative estimate of the avoided carbon emissions.

In 2018, the rail system was good for 21 billion rail passenger kilometres, which would cease to exist if trains could not run. This comparison provides an approximation for calculating the amount of avoided carbon emissions as a result of all expenditure incurred in the rail system for passenger transport in one year (a total of EUR 5.5 billion in 2018). The total volume of avoided carbon emissions in 2018 is approximately 776,000 tons (see also Figure 5).

Figure 5. Effect of rail system present in terms of avoided carbon emissions (in tons)



If, in 2018, EUR Y million worth of green bonds were allocated to rail passenger transport, then a proportion of the avoided carbon emissions is attributable to green bonds: 141* Y. This volume of approximately 141 tons of avoided carbon emissions per million euro of rail expenditure can also be used to calculate carbon emissions from the issuance of green bonds in rail passenger transport in the first few years after 2018.

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Annex 1: Composition of the advisory group

Advisory Group:

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