GREEN OLO
IMPACT REPORT 2018

Federal Public Service Health,
Food Chain Safety and Environment

In collaboration with the
Belgian Debt Agency

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1
INTRODUCTION

1.1 EXECUTIVE SUMMARY

In February 2018, the Kingdom of Belgium issued its first series of Green Bonds ("Green OLO") amounting to EUR 4.5 bn. The allocation report published in June 2019 by the Belgian Debt Agency, gives an overview of the expenditures funded by the Green OLO. Multiple socio-economic and environmental benefits accrue from this Green OLO.

This impact report covers six key expenditure categories or parts thereof, amounting to 39 % of the EUR 4.5 bn issuance. The impact assessment of the Green OLO focuses mainly on the global challenge of Climate Change, estimating GHG emissions savings.

To estimate GHG emissions savings, specific methodologies were developed. These were based on the principles of environmental evaluation and are aligned with the work of the EU Commission's Technical Expert Group on Sustainable Finance. Where applicable, the methodologies were based on market practices and are in line with other impact reports already published covering similar expenditures, such as the SNCF Réseau impact reporting.

For the sake of clarity and accessibility, the complexity of the assessment was reduced to what was strictly necessary to ensure rigorous results. Clear documentation and the use of publicly available data allow for the replication of the exercise, and the testing and comparison of different hypotheses.

Given the novelty of the exercise and the number of hypotheses and assumptions to be made, conservative estimates were produced, and the results should be considered to be prudent figures. Suggestions were made by the Steering Committee overseeing this impact report to develop, identify and measure further impacts for subsequent exercises.

The period covered by the assessment depends on the type of expenditure. For investments, an assessment over the lifetime of the investment was produced, as in the case of the new SNCB/NMBS rolling stock and the maintenance of the railway infrastructure. These two expenditures in the railway sector, totalling 262 and 768 M EUR of allocated funds, are estimated to avoid GHG emissions of 68 and 1512 kt of CO_2eq over the lifetime of M7 trains and the average life of the maintenance investments respectively.

The impact computed for the M7 trains stems from the higher energy efficiency of the new train, while in the case of maintenance, the impact of the deterioration of train services due to lack of maintenance was estimated.

The Federal support to windfarms was funded with 173 M EUR of the Green OLO. Its GHG savings are estimated at 637 kt of CO_2eq and they were calculated based on the amount of offshore electricity production the expenditure supported.

The tax exemption and deduction to promote clean transportation, funded with 404 M EUR of the Green OLO, amounts to 398 kt of avoided CO_2eq emissions. The impact stems from a modal shift from cars to cleaner transport modes as bus and train.

For Bio invest only the expenditures in specific investments, totalling 66 M EUR of allocated funds, were investigated. They were found to avoid emissions of 28 kt and 12 kt respectively for projects in operation and projects under development.

The reduced packaging charge, funded with 100 M EUR of the Green OLO, was found to avoid emissions of 299 kt of CO_2eq. In addition, this expenditure permits savings of natural resources (sand, soda and limestone) of almost 400 kt. The impact stems from a positive impact of the charge on the reuse of glass drink packaging.

These results confirm the significant contribution of the evaluated expenditures to the Belgian environmental objectives. Investment decisions are of course not solely based on their envisaged environmental impact but are also driven by larger societal objectives that are part of the overall evaluation of expenditures.

Expenditure	Allocated amounts 2017 and 2018 assessed (M EUR)	Period covered by the assessment	Impact Evaluated	Assessment (kt)
SNCB/NMBS Investment Programme - New Rolling Stock (M7)	222	Impact all over the lifetime of M7 trains (45 years)	Avoided GHG emissions	68
INFRABEL Investment Programme - Maintenance of Railway Infrastructure	768	Impact over the lifetime of maintenance investments (40 years)	Avoided GHG emissions	1512
Federal support for offshore windfarms	173	2017-2018	Avoided GHG emissions	637
Tax exemptions and deductions to promote clean transportation	404	2017-2018	Avoided GHG emissions	327
Reduced package charge for using individual reusable drink packages	100	2017-2018	Avoided GHG emissions	299
		2017-2018	Avoided extracted materials (soda, sand, lime)	398
Green investments by BIO INVEST	66	2017-2018 (projects in operation)	Avoided GHG emissions	28
		Yearly (project under construction)		12

1.2 BELGIAN ENVIRONMENTAL POLICIES

Belgium's environmental policies are geared towards addressing the most contemporary global environmental challenges. The efforts undertaken are rooted in the international community's efforts to produce a response to those challenges. Although interrelated, one can by and large distinct three challenges:

- Climate Change
- Biodiversity conservation
- Preservation of natural resources

1.2.1. CLIMATE CHANGE

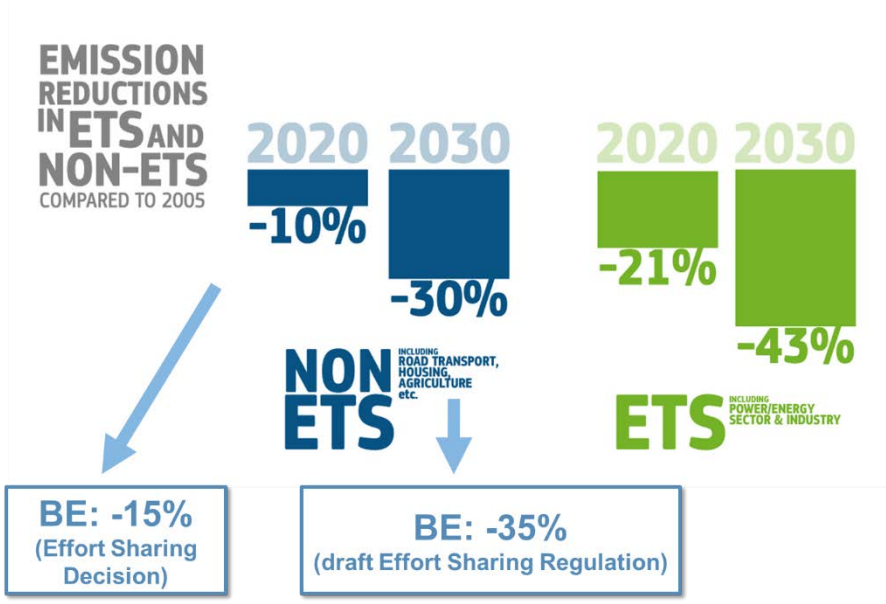
Total global GHG emissions have continuously risen since 1990 and reached around 55.3 GtCO2e in 2018[1].

In 2015, after years of negotiations, the Paris Agreement was adopted as the first uniform and legally binding response to this threat. The long-term objectives of this Agreement are to hold *"the increase in the global average temperature to well below 2 °C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels"*, as well as to foster climate resilience and make finance flows consistent with the previous two objectives. In Belgium, greenhouse gas emissions will need to be drastically reduced by 2050. Discussions on a target of climate neutrality by 2050 are ongoing at the European level and will form the basis of the 'European Green Deal' that was announced by the Commission Von der Leyen[2].

Upon the finalisation of the Paris Agreement, all parties to this Agreement submitted their Nationally Determined Contributions (NDCs). Full implementation of (un)conditional NDCs for 2030 and comparable action afterwards would still result in a temperature rise of about 3°C by 2100. As the number of unique and already threatened systems, and of risks of extreme weather events will be higher with additional warming, additional efforts are needed.

Belgium did not submit its own NDC but is bound by the objectives established for the European Union as a whole (-20% by 2020, at least -40% by 2030 compared to 1990).

These targets were then redistributed within the European Union among the industrial sectors, which are regulated through the European Emission Trading System (ETS) on the one hand and the other sectors (non-ETS) on the other, for which member states' national governments are responsible to implement emission reduction policies. The following targets in the non-ETS sectors apply to the Kingdom of Belgium:



[1] UNEP, Gap report, 2019.

[2] Ursula von der Leyen, A Union that strives for more. My agenda for Europe, 2019.

The following graph[1] shows that, although Belgium is on track to meet its 2020 target, significant additional measures are needed to achieve the 2030 target.

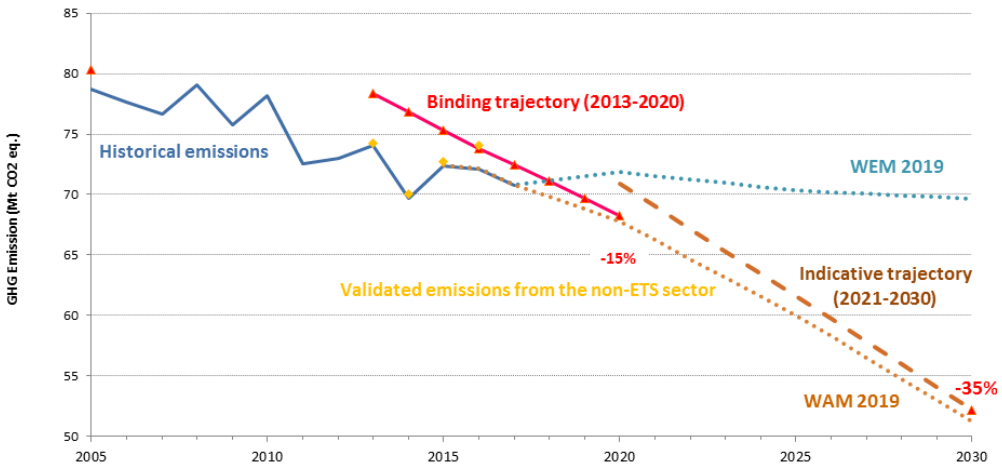


Figure 1: GHG emissions and trajectories towards 2020 and 2030 for Belgium, Mt

1.2.2. BIODIVERSITY CONSERVATION

In the course of the last 50 years, biodiversity losses occurred more rapidly than during all previous periods of human history. Without new policies, 1 in 10 animals and plants could be extinct by 2050.

Threats to biodiversity are manifold:

- land-use change (e.g. agriculture, forestry, infrastructure development)
- fragmentation of natural habitats
- invasion of alien species
- overexploitation and overconsumption (e.g. fishing)
- pollution (e.g. fertilizers, pesticide)
- climate change.

Belgium implements different conventions or legislations on biodiversity preservation through EU regulation and/or national legislation, such as the CBD strategic plan 2011-2020, the Nagoya Protocol on Access and benefit-Sharing (genetic resources), the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), EU Regulation on invasive alien species (IAS), Natura 2000 (Birds and habitats directives).

1.2.3. PRESERVATION OF NATURAL RESOURCES

The unsustainable use of resources has triggered critical scarcities and caused climate change and widespread environmental degradation. In the EU alone, around 600 million tonnes of materials are lost, which could be recycled or reused.
As regards air quality, around 3.7 million premature deaths are attributed annually to outdoor air pollution.

Belgian circular economy policies aim to preserve resources while creating opportunities to boost the economy, contribute to innovation, new business models, growth and jobs creation. To this end, efforts are made to maintain the value of products and materials as long as possible in the economic system (closing the loop) through: (1) a longer use of products, (2) reuse (of products and components); (3) higher and better recycling.

The objective of Belgium's Air Quality policies is to reduce the negative health impacts of air pollution by 50%, while complying with the EU directive on air pollution (NEC Directive (2016/2284) and the Directive on the limitation of emissions from medium combustion plants (2016/2284).

To achieve the abovementioned objectives and targets, expenditures are needed in the Green sectors of

- Clean Transportation
- Energy Efficiency
- Renewable Energy
- Circular economy (including waste and water management)
- Living Resources and Land Use

[1] FPS, Third Federal Environment Report, 2019, p. 10.

1.3 THE GREEN OLO FRAMEWORK

1 Use of Proceeds	• Eligible Green Expenditure related to a large number of assets, in line with the State's role, and targeting different beneficiaries: households, companies, local authorities and public agencies. • Five Green sectors have been defined: Clean Transportation; Energy Efficiency; Renewable Energy; Circular Economy; and Living Resources and Land Use. • Investment expenditure, operating expenditure and tax expenditure are eligible.
2 Process for Project Evaluation and Selection	• The selection of Eligible Green Expenditure is managed annually by an Inter-Ministerial Working Group. • Selection has been made in order to be representative of the Federal State's missions and in line with the Federal budget. • Each FPS (Federal Public Service) is responsible for identifying Eligible Green Expenditure. • An overlay in the selection process aimed at excluding expenditure mainly related to selected sectors (fossil fuels, armaments, nuclear, large scale hydroelectric developments). • Green Expenditure that other Belgian agencies may plan to use themselves for issuing their own Green Bonds is excluded.
3 Management of Proceeds	• Tracking the allocation of the bond proceeds will be done by the Belgian Debt Agency. • Eligible Green Expenditure from the previous year and the current year are included.
4 Reporting	• The Kingdom of Belgium is committed to providing two levels of reporting: o The management and allocation of bond proceeds. o The assessment of the environmental impact of Eligible Green Expenditure.
External review	• Second Party Opinion on the Green OLO Framework provided ex-ante by Sustainalytics. • The allocation table will be reviewed by an independent audit firm. • The impact report methodologies are reviewed by an Independent Committee.

1.4 METHODOLOGY

The impact assessment for the Green OLO is supervised by the Inter-Ministerial Working Group. An ad hoc Steering Committee coordinated by the Belgian Debt Agency and the FPS Environment with senior representatives from the different departments and institutions responsible for the assessed expenditure provided input and advice on the impact assessment methodologies. An Independent Committee composed of representatives of various Belgian stakeholders as well as policy evaluation experts gave an independent advice on these methodologies.

For this first report, the environmental impact assessment for the Green OLO allocated proceeds focused on several eligible expenditure items covering different Global Challenges and Green Sectors.

Six categories of eligible expenditure, or parts of thereof, out of nine were assessed. The categories were chosen with the view to cover a balanced set of green sectors, on the basis of the availability of established assessment methodologies. In total, the assessed expenditure represents 39% of the total allocated amount for 2017 and 2018. For all but one of the assessments, climate change was the focus of the quantitative analyses.

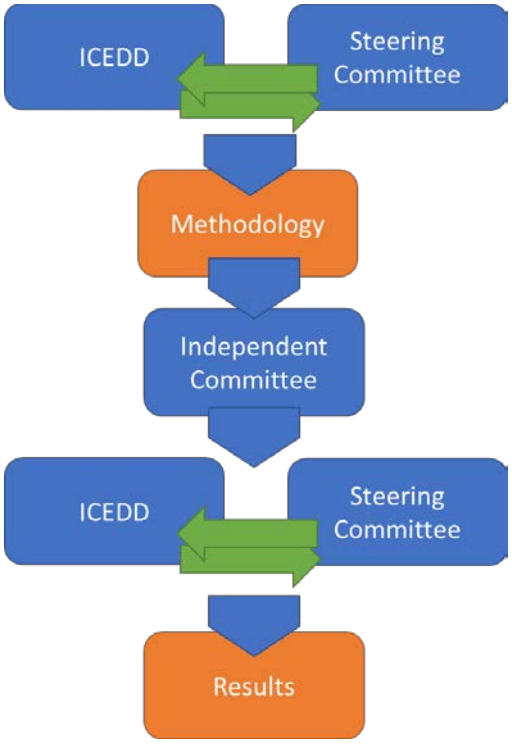
Expenditures	Impact evaluated	% of total (2017 and 2018) allocated amount
SUBSIDIES TO SNCB		**31.0**
Infrastructure Fee	-	27.3
Rolling Stock	-	3.7
SUBSIDIES TO SNCB (INVESTMENT PROGRAMME)		**15.5**
Rolling stock		7.9
M7	√	4.9
Reception of clients	-	3.9
Maintenance	-	3.6
SUBSIDIES TO INFRABEL (INVESTMENT PROGRAMME)		**32.1**
Railway Infrastructure		19.1
Maintenance	√	17.0
Capacity expansion	-	2.1
ETCS Investments	-	12.9
FEDERAL SUPPORT FOR OFFSHORE WINDFARMS	√	**3.8**
TAX EXEMPTIONS AND DEDUCTIONS TO PROMOTE CLEAN TRANSPORTATION		**9.0**
Commute by public communal transport	√	7.6
Bicycle allowance	√	1.4
Electrically powered vehicles	-	0.0
INCREASED TAX DEDUCTIONS FOR GREEN INVESTMENTS	-	**1.6**
REDUCED PACKAGE CHARGE	√	**2.2**
GREEN INVESTMENTS BY THE SFPI-FPIM	-	**0.8**
GREEN INVESTMENTS BY BIO INVEST		**1.8**
Funds	-	0.3
Projects	√	1.5
CONTRIBUTIONS TO DEVELOPMENT COOPERATION	-	**2.2**

Specific methodologies for the assessment of each category of expenditure (or part thereof) were developed based on the following guiding principles:

- **Environmental impact assessment best practices**. The principles set out so far by the EU Commission's Technical Expert Group on Sustainable Finance for the evaluation of green bonds were used as a starting point for the development of the methodologies. Although a standard evaluation procedure has yet to be set up for the evaluation of Green Bonds, the expenditure financed by the Green OLO falls into categories (investments in railways transport system, investments in renewable energy capacity, etc.) for which a large number of environmental impact exercises have already been carried out. The methodologies developed for the environmental impact assessment of the Green OLO are based on the main internationally agreed principles underpinning these exercises. Whenever similar expenditures were evaluated by other issuers (as in the case of the work done by SNCF Réseau), their methodologies were used as a benchmark for methodologies used in this report.
- **Robustness and workability**. To avoid over-complexity methodologies were kept as simple as possible to ensure their transparency and readability while guaranteeing their robustness.
- **Clear documentation and use of publicly available data (whenever possible)**. The methodologies for the estimation of environmental impacts are well documented with regards to data sources, assumptions, hypotheses and calculation methods. The data used is mostly publicly available. These two characteristics allow for the replication of the exercise and the testing and comparison of different hypotheses.
- **Prudent estimation**. Given the novelty of the exercise and the number of hypotheses and assumptions to be made, the results should be considered to be prudent (conservative) estimates, situated at the lower end of the range. The Steering Committee has always opted for prudent and conservative estimates to avoid potential double counting of benefits or overestimation of impacts.

The impact assessment process consisted of several steps and involved a group of experts in order to ensure the quality and reliability of estimations:

- The impact assessment methodologies were developed by **ICEDD**'s experts and supervised by the **FPS Health, Food Chain Safety & Environment**, which is responsible, among other things, for the environmental impact assessment reporting of the major Belgian policies to the EU and other international fora.
- A **Steering Committee** with senior representatives from the different departments and institutions responsible for the evaluated expenditure provided input and advice on the impact assessment methodologies.
- An **Independent Committee** composed of representatives of the Belgian socio-economic bodies as well as policy evaluation experts was set up to provide independent advice on the impact assessment methodologies.
- Based on the methodology discussed with the Independent Committee of experts, data was collected, and the assessment was performed by the ICEDD's experts.
- The Steering Committee validated the results included in this report.



2
IMPACT REPORTING

2.1 FEDERAL BUDGET EXPENDITURE

2.1.1. EXPENDITURE RELATED TO RAILWAY TRANSPORT

Mobility is a critical issue in Belgium. Road traffic has a negative impact on the environment in terms of GHG emissions and air quality. Road transport accounted for 22% of all Belgian GHG emissions in 2017 and no decreasing trend has yet emerged. Traffic congestion is increasing year after year, which further reduces the environmental performance of road transport.

In this context, the Belgian railway system plays an important role in the Belgian strategy to promote cleaner transportation. Enhanced rail services lead to the reduced use of cars thus reducing the GHG emissions, improving air quality (in particular in high density populated areas) and contributing to several other beneficial environmental, social and economic impacts.

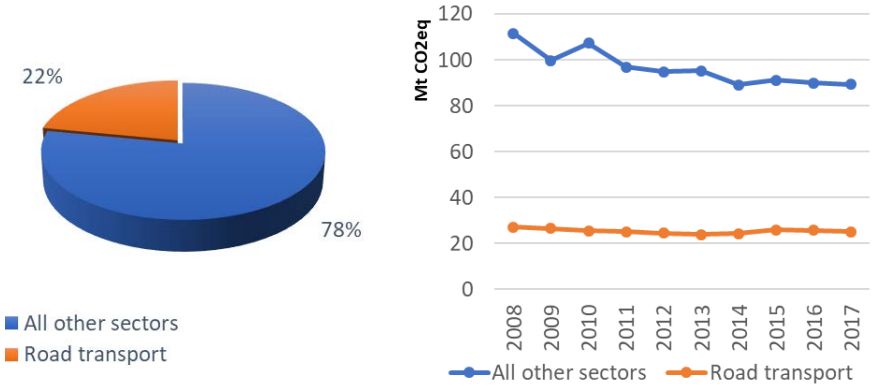


Figure 2: GHG emissions from road transport and all other sectors in Belgium, in 2017, as % of total GHG emissions (left) and evolution between 2008 and 2017 in ktCO2eq (right)

According to the work of the Technical Expert Group on Sustainable Finance in relation to the development of an EU classification system for environmentally sustainable economic activities (hereinafter 'Taxonomy')[1], while 'modal shift' is not included as a distinct economic activity with associated criteria in the proposed Taxonomy, the potential carbon savings from a modal shift towards rail are acknowledged. Therefore, a greater proportion of transport in lower carbon modes such as railway transport are Taxonomy eligible.

In Belgium, passenger mobility demand was about 140 billion passenger kilometres/year (pkm) in 2016, with more than 80% of this demand met by road transport. Freight mobility was more than 70 billion tonne-kilometres/year (tkm) in 2016, with trucks accounting for the largest share of 73% of the total. Rail and inland navigation accounted for 12.4% and 14.6% of the total demand for passenger and freight transport respectively[2].

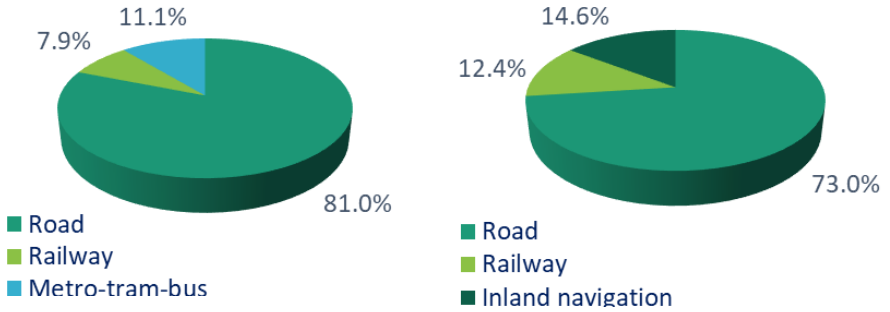


Figure 3: Passengers (left) and freight (right) transport per mode in Belgium, in 2016 (% of total pkm - for passengers - and tkm - for freight - transported)

[1] The available Group documents are published at https://ec.europa.eu/info/publications/sustainable-finance-technical-expert-group_en

[2] SPF Mobilité et transport, Chiffres clés de la mobilité en Belgique, 2018.

Green OLOs proceeds have been allocated to several budget expenditure items related to the Belgian railway transport system. This expenditure finances both the operating and capital expenditure of the SNCB/NMBS (the railway operator) and the capital expenditure of Infrabel (the network operator).

The federal budget covers a number of operating costs. Green OLO proceeds were allocated to two major categories:

- the infrastructure fee paid annually by SNCB/NMBS to Infrabel for the use of the rail network when providing its transport services;
- the costs of the maintenance, repair and remediation of the company's own rolling stock.

In addition, major SNCB/NMBS investment programmes are also financed with federal government subsidies. A subset of the above-mentioned budget programmes were selected as eligible green expenditure and more specifically, investments in the following three categories:

- rolling stock such as the purchase of M7 double-deck trains to increase the capacity of the busiest lines;
- the reception of customers (in particular station buildings, parking and safety) such as major works on several railway stations (such as Mons, Brussels-North, Mechelen, Aalst) and investments aimed at improving the information to railway travelers;
- the maintenance of these facilities and, in particular, the investments in the SNCB's own workshops (CW Mechelen, TW Ostend, PW Melle, CW Salzinnes).

The federal government also contributes annually to the Infrabel's investment programme. Under the Green OLO framework, two categories of investments were selected:

- investments addressing rail traffic safety such as the roll-out of European Traffic Control System (ETCS) across the whole infrastructure and the abolition of certain level crossings;
- investments in railway infrastructure, both for railway network maintenance (i.e. tracks, overhead lines and signage) and for capacity expansion, (such as a new bypass in Mechelen, construction of the third and fourth rail lines between Ghent and Bruges and the Regional Express Network around Brussels).

Allocated amounts in M EUR	2017	2018	Impact evaluated
SUBSIDIES TO SNCB			
Infrastructure Fee	627	602	
Rolling Stock	86	82	
SUBSIDIES TO SNCB (INVESTMENT PROGRAMME)			
Rolling stock	212	144	√ (partially)
Reception of clients	94	84	
Maintenance	88	75	
SUBSIDIES TO INFRABEL (INVESTMENT PROGRAMME)			
Railway infrastructure	461	400	√ (partially)
Maintenance	*413*	*355*	√
Capacity expansion	*48*	*45*	
ETCS	302	279	

For this impact report, it was decided to focus on investments expenditure and the portion of investment (SNCB/NMBS) in the rolling stock for the purchase of new M7 trains and the investment (Infrabel) in railway network maintenance were assessed.

PURCHASE OF M7 DOUBLE-DECK TRAINS

With regard to the rolling stock investment programme of the SNCB/NMBS, based on discussions with the company, it was decided to consider only the investment in M7 vehicles. Indeed, this investment accounts for a large share of the total eligible investment in “rolling stock”.

SNCB/NMBS's new M7 rolling stock is modern, high-performance equipment with superior speed, capacity and comfort. M7 trains are not intended to be used to establish new rail links or to increase the frequency of trains. The commissioning of the M7s will contribute to increasing the energy efficiency of rolling stock and thus to reducing its carbon footprint. In fact, a 20 to 30% energy consumption reduction can be achieved thanks to the higher efficiency of the M7s. On the other hand, the use of M7 trains on the network’s busiest lines, and especially in Brussels, could increase the capacity on these lines.

However, the main purpose of the M7 trains is to maintain railway capacity. The first 445 M7 trains that were purchased will replace old trains. This offsets the loss of seat capacity due to the decommissioning of old equipment. For this reason, no increase in capacity due to expenditure financed by 2017/2018 Green OLO on M7 vehicles was included in the assessment and only the energy efficiency gains were taken into account.

By 2023, all non-ETCS-adaptable equipment will be decommissioned. This amounts to 22% of the current passenger transport capacity. M7s will replace vehicles that cannot be adapted to ensure compatibility with ETCS. The impact assessment was carried out by comparing emission factors per seat for old trains and new M7 vehicles in order to calculate avoided GHG emissions over the whole lifetime of the M7s (45 years).

As only part of the investment in M7s was made in 2017/2018, a coefficient for the 2017 and 2018 share of investment in M7s of the total investment in M7s was calculated.

Overall 67.5 ktCO_2 will be avoided during the whole lifetime of the M7 trains financed by the Green OLO in 2017 and 2018.

An underlying assumption of the calculations is a stable emission factor for electricity production during the lifetime of the M7 trains. Although the share of renewable energy in total electricity production is expected to increase over the coming years and decades in Europe, the Belgian electricity production infrastructure will most likely have higher CO_2 emissions due to the nuclear phase-out between 2022 and 2030.

Since no clear scenario for electricity production following the nuclear phase out exists, for reasons of simplicity and to avoid double counting (e.g. with the support mechanism for offshore wind production), the evolution of the emission factor was not taken into account in the calculations for the impact assessment.

PURCHASE OF M7 DOUBLE-DECK TRAINS	
Allocated amounts of Green OLO to M7 2017 /2018 [Meuros]	222.00
Improvement in energy efficiency of M7 trains (per seat)	25%
Avoided CO_2 emissions related to Green OLO over the lifetime of M7 trains [kt]	**67.50**

MAINTENANCE OF RAILWAY INFRASTRUCTURE

To make train traffic possible safely, reliably and with comfort, Infrabel has to maintain its network regularly. Without maintenance, every year, network reliability and safety will decrease causing a progressive increase in travel time on different sections of the network. This situation will encourage passengers or freight operators to choose alternative transport modes, which are often more polluting than trains.

The core of this methodology, inspired by a similar assessment made by SNCF Réseau[1], is that a lack of investment in the maintenance of a section of the railway network will affect the mean speed of trains on that section and, consequently, a reduction in the mean speed will decrease the attractiveness of rail transport along that part of the network. Therefore, passengers and freight operators will move to other transportation means such as cars or buses for passengers and trucks or inland navigation for freight.

The different sections of the railway network are supposed to be completely renovated according to an annual renovation programme. Therefore, it is assumed that a lack of renovation investment in a given section of the network in a given year will not be offset in subsequent years but only once all the rest of the network has been renovated. In other words, the unrenovated section of the railway network will 'miss its maintenance turn'. Hence, its reliability will be affected until the next 'maintenance turn' occurring after a period equal to the technical lifetime of the equipment (tracks, catenaries, signage), which has been established at 40 years.

To translate this reasoning into figures, the assumptions below were made. The total Belgian railway traffic is homogenously distributed over the whole Belgian network. The annual maintenance investment budget of Infrabel, which is assumed to cover 1/40 of Belgian railway infrastructure, impacts 1/40 of the demand. In the first two years following the period without maintenance there are no impacts. Conditions of the line will only deteriorate from the third year onwards, hence impacting the service conditions of the line. The deterioration of the line implies that the traffic on that section will gradually (linearly) disappear in 20 years' time. Much of the traffic on the lines will be diverted to cars (for passengers) or trucks (for freight), based on a diversion factor of 87% and 100% for passengers and freight respectively.

According to the latest projected railway traffic figures from the Federal Planning Bureau up to 2040[2], passengers and freight transported by the Belgian railway system will increase by 10% and 60% respectively compared to 2015. These figures allow the calculation of the total amount of passenger traffic (in terms of pkm) and freight traffic (in terms of tkm) which is diverted from trains to cars and trucks due to the lack of maintenance investment. By multiplying this amount of pkm and tkm by the difference between the emission factor of the railway system and that of cars and trucks, the total amount of avoided emissions in the period 2017-2040 was calculated. The share of these emissions related to the Green Bond allocated amount of investment in maintenance amounts to 1512 ktCO_2.

MAINTENANCE OF RAILWAY INFRASTRUCTURE	
Allocated amounts of green OLO 2017 and 2018 [Meuros]	767.95
Emission factors :	
• railways, passengers [g CO_2 / pkm]	16.30
• passenger road transport [g CO_2 / pkm]	130.94
• railways, freight [g CO_2 / tkm]	7.00
• freight road transport [g CO_2 / tkm]	70.00
Avoided CO_2 emissions related to Green OLO over the lifetime of maintenance investments [kt]	**1512.00**

[1] SNCF Réseau and Carbone 4, Carbon Impact of rail infrastructure investments, 2017.

[2] Bureau Fédéral du Plan, Perspectives de la demande de transport en Belgique à l'horizon 2040, 2019.

2.1.2. FEDERAL SUPPORT FOR OFFSHORE WINDFARMS

Belgian power generation capacity is dominated by nuclear power plants which produced 39% of the electricity generated in Belgium in 2018. Fossil fuel power plants (mainly gas-fired power plants) came in second place and produced 35% of electricity in 2018. Wind energy is the third largest source of electricity, with 10% of electricity produced in 2018[1].

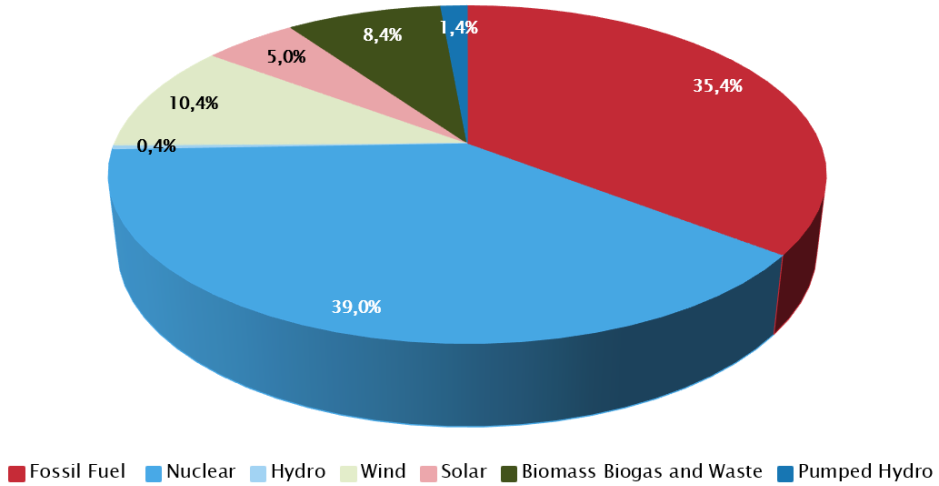


Figure 4: Total net electricity production in Belgium by source in 2018 (TWh)

In 2003, Belgium decided to phase out nuclear power plants. According to the current nuclear phase-out timetable all seven Belgian nuclear reactors will be shut down between 2022 and 2025.

To avoid a large increase in GHG emissions from the power generation sector, it is necessary to develop as much renewable energy capacity as possible. Since 2010, renewable electricity generation has increased significantly reaching 15 TWh in 2018, which represents more than 15% of Belgian electricity consumption (see graph below). The offshore share of renewable electricity generation has been constantly increasing in recent years and will most probably continue to increase as offshore power is seen as a major source of renewable electricity for Belgium in the coming years.

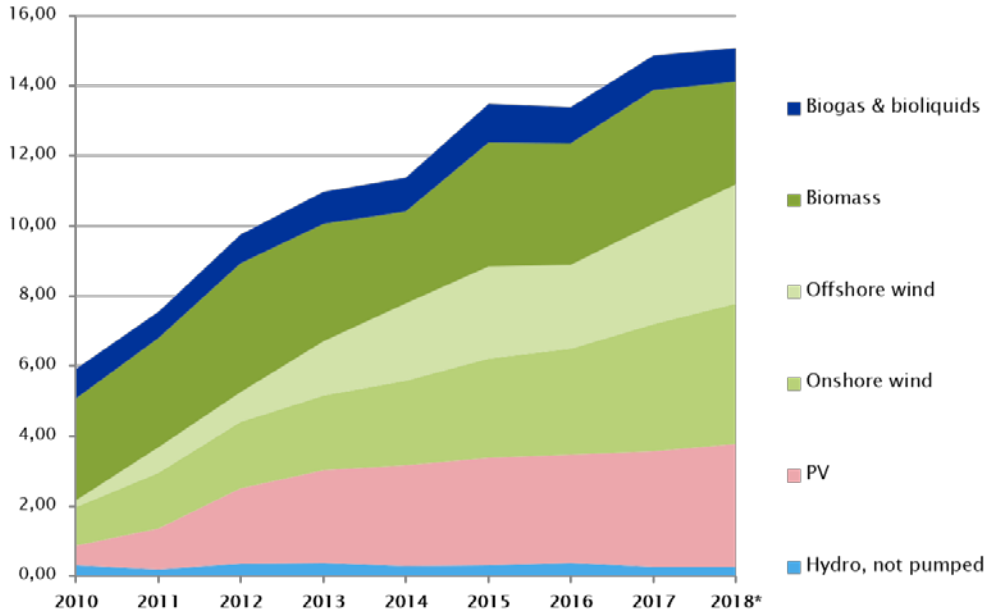


Figure 5: Gross electricity generation by renewables in Belgium by source in 2018 (TWh)

The cost of developing offshore wind farms off the North Sea coast is supported by a surcharge paid by the power users. However, so as to prevent those surcharges becoming uneconomically high, the federal government intervenes through a system whereby this surcharge is on a sliding scale and capped.

[1] FEBEG, Statistiques électricité, 2019.

Offshore (as well as onshore) wind production support schemes are based on green certificate mechanisms. It means that wind generation is supported by final consumers. To prevent companies from supporting too much of the offshore green certificate mechanism, their contribution is reduced and capped. Therefore, the Federal authorities must finance these reductions. This intervention is settled (see Figure 6 below) through payments by the Federal State to the CREG (the Commission for Electricity and Gas Regulation).

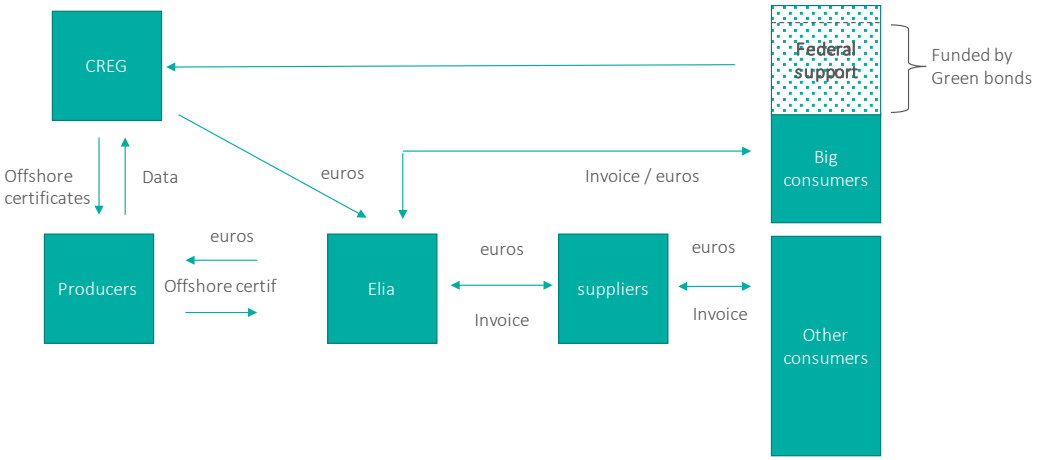


Figure 6 : Financing of the offshore wind support scheme in Belgium

The Federal contribution to the offshore support scheme was 82.6 million euros in 2017 and 106.2 million euros in 2018 while the whole (green certificate) support mechanism paid to offshore producers amounted to 295 million euros in 2017 and 350 million euros and 2018[1].

Allocated amounts in EUR	2017	2018	Impact evaluated
Offshore windfarms	71	102	√

Federal support for offshore windfarms funded by the Green OLO amounted to 71 million euros in 2017 and 102 million euros in 2018, that is 24% and 29% of the whole green certificate mechanisms in 2017 and 2018 respectively.

Offshore electricity production amounted to 2864 and 3391 GWh in 2017 and 2018 respectively. We assume that only a share of this production equal to the share of the Green OLO (allocated) to the whole offshore green certificate mechanism can be attributed to the Green OLO. This amounts to 687 GWh of offshore wind electricity production in 2017 and 989 GWh in 2018. This production avoided the equivalent electricity production of a gas-fired power plant. Considering a Combined Cycle Gas Turbine (CCGT) power plant with an emission factor of 380 t of CO_2 per GWh, the impact of the Green OLO can be estimated at saving the emission of 636.7 kt of CO_2, of which 261 kt of CO_2 in 2017 and 376 kt in 2018 (see table below).

FEDERAL SUPPORT FOR OFFSHORE WINDFARMS	2017	2018
Offshore production [GWh]	2.864	3.391
Total support (Green Certificates) amount [Meuros]	295	350
Part of offshore production supported by green OLO [GWh]	687	989
Emission factor of CCGT [t CO_2 / GWh]	380	380
Avoided CO_2 emissions related to Green OLO [kt]	**261**	**376**

[1] CREG, Annual report, 2017 and 2018.

2.2 FISCAL EXPENDITURE

2.2.1. TAX EXEMPTIONS AND DEDUCTIONS TO PROMOTE CLEAN TRANSPORTATION

The Belgian personal income tax code provides for a series of exemptions and tax deductions that promote the use of clean transportation. Those fiscal expenditures include the following three elements:

- the total exemption (for taxpayers who declare their professional costs on a lump sum basis) of a reimbursement paid by the employer for the costs of commuting, provided that this transfer is made by public transport[1];
- the total exemption (up to a maximum amount per kilometre) of a bicycle allowance paid by the employer for an employee's commuting by bicycle[2];
- a tax deduction for the purchase of a fully electric vehicle[3].

Allocated Expenditures in EUR	2017	2018	Impact evaluated
Commute by public communal transport	178.5	164.0	√
Bicycle allowance	30.9	30.8	√
Electrically powered vehicles	0.5	0.4	

EXEMPTION FOR REIMBURSEMENT OF COMMUTING BY PUBLIC TRANSPORT

According to FPS Mobility figures[4], in 2017 the large majority (65%) of commuting between home and work was done by car.

This expenditure covers the total exemption (for taxpayers who declare their professional costs on a lump sum basis) of a reimbursement paid by the employer for the costs of commuting, provided that this transfer is made by public transport.

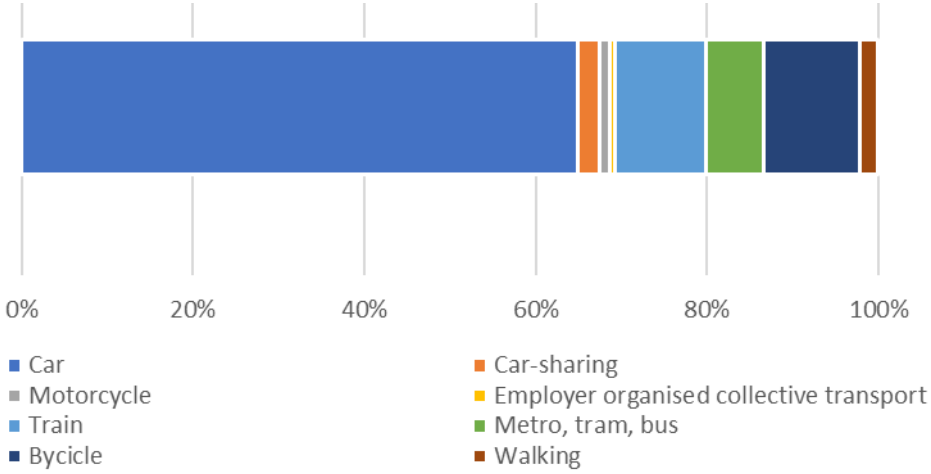


Figure 7 : Modal distribution of home to work commuting, Belgium, 2017 (% of total home to work commuting)

[1] Art. 38, §1, section 1, 9° a) of the direct tax code (CIR/WIB92),
[2] Art. 38, §1, section 1, 14° a) of the direct tax code (CIR/WIB92)
[3] Art. 145/28 of the direct tax code (CIR/WIB92)

[4] SPF Mobilité et Transport, Diagnostic Fédéral sur les déplacements domicile-travail 2017-2018, 2019.

According to the FPS Mobility and Transport figures, this expenditure causes a 14% increase in public transport (train, metro, bus, tram) users.

As a first step for the impact assessment, the number of commuters that would not have used public transport without the reimbursement was estimated based on the price elasticities from a FPB study[1]. Then, based on the average distances travelled by commuters and the transport mode used before switching to public transport, an estimate of the emission reduction was calculated using the differences in emission factors.

Overall, the CO_2 emissions avoided in the period 2017-2018 were estimated at 287kt.

EXEMPTION FOR REIMBURSEMENT OF COMMUTING BY PUBLIC TRANSPORT	2017	2018
Mpkm travelled by train due to policy	8249.88	8458.71
Mpkm travelled by bus, tram, metro due to policy	1517.89	1556.31
pkm travelled by train, bus, tram, metro due to policy from ex-car users [%]	67%	67%
Avoided CO_2 emissions related to Green OLO [kt]	149	138

BICYCLE ALLOWANCE

The impact assessment for this expenditure was carried out in three steps. First, we obtained the bicycle pkm since 2016. Second, we calculated what share of those km are due to the policy and travelled by previous car drivers (rather than public transport users). Finally, we applied the difference in emission factors between cars and bicycles. We do not measure any emission reduction for the switch by public transport users to bicycles. We assume it would not lead to a reduction in the public transport vehicles running and thus to a change in emissions.

Cyclists are former car users in only 26% of cases. They are most often former public transport users (60%) or pedestrians[2].

Only a share of the people switching from cars to bicycles do so because of the allowance they get. In most companies paying an allowance, other measures to promote cycling are also applied. The FPS Mobility and Transport figures show that the allowance results in a 36% increase in cyclists.

Overall for 2017 and 2018 the measure is found to have avoided 40 kt of CO_2.

BICYCLE ALLOWANCE	2017	2018
Mpkm travelled by bycicle due to policy	280.71	305.12
pkm travelled by bycicle due to policy from ex-car users [%]	67%	67%
Avoided CO_2 emissions related to Green OLO [kt]	20.23	19.85

2.2.2. REDUCED PACKAGING CHARGE FOR USING INDIVIDUAL REUSABLE BEVERAGE CONTAINERS

Belgium introduced a Packaging Charge on beverage containers in 1993 alongside other environmental taxes. The packaging charge is a tax equivalent to excise duty that is levied on individual packaging containing beverages (except for milk and flavoured milk-based drinks)[3]. It was designed to encourage consumer behaviour change to promote re-use through deposit refund systems and recycling by changing the relative prices of products.

[1] Coraline Daubresse et al. Description et utilisation du modèle PLANET, 2018.
[2] B. Van Zeebroeck et al., Impact et potentiel de l'usage du vélo sur l'économie et l'emploi en Région de Bruxelles-Capitale, 2014.

[3] Established in Art. 371 of the Law of 16th July 1993 aimed at completing the state structure, as modified last by law of 28th March 2007

Reusable packaging is subject to a reduced packaging tax, provided that the natural or legal person who distributes beverages in such packaging has applied for and received the necessary approval.

For packaging to be considered reusable, it must be refillable at least seven times, collected via a deposit system, and actually reused. In practice, the reduced package charge affects glass packaging.

Allocated Expenditures (in EUR)	2017	2018	Impact evaluated
Reduced Package Charge	59	42	√

The reduced package charge prevents waste generation, pollution and GHG emissions and contributes to the circular economy. On the one hand, re-use is far less polluting than producing new packaging (even from recycled materials), on the other hand, re-use allows a reduction of the input of extracted materials, with all the environmental benefits that carries.

The assessment of the reduced package charge was done in terms of avoided CO_2 emissions and avoided extracted materials. Based on the charges for re-usable containers and non-reused containers an estimation of the reused containers (1000l) was carried out.

As a first step, a reference scenario was established where reuse is at zero: all beverage packaging is used only once. This implies that all the beverage containers are produced with primary and/or recycled materials according to the actual recycling rate for this kind of glass. Then a reuse scenario was established, where we take into account that glass packaging is all used 7 times. But the first time it is used, it needs to be produced. So 1/7 of the beverage containers are assumed be produced with primary or recycled material (according to the actual recycling rate for this kind of glass).

For each scenario, we calculated the materials needed and emissions related to the production and re-use of glass. The impact on GHG emissions is assessed based on emission factors ($kgCO_2eq/1000l$) linked to the type of production (new or recycling) and to the kind of collection (deposit system or collection point)[1]. For reused bottles, emissions are only linked to the collection (we assume a deposit system) and to the washing of the bottles. The inputs in terms of materials and energy used took into account recycling rates in Belgium as well as the limit for the use of recycled materials when producing new glass bottles.

With regard to the total results, only the share that is due to the allocated amount of the tax expenditure to Green OLO was taken into account.

The reduced packaging charge is estimated to have avoided 299 kt of CO_2 in 2017 and 2018, as well as 231kt of sand, 92kt of lime and 75kt of soda.

REDUCED PACKAGING CHARGE FOR USING INDIVIDUAL REUSABLE BEVERAGE CONTAINERS	2017	2018
Allocated amounts of Green OLO [% of total tax expenditure]	95	69
Avoided CO_2 emissions related to Green OLO [kt]	175	124
Avoided use of materials related to Green OLO [kt] :		
• sand	134	96
• lime	54	38
• soda	44	32

[1] Simon, B., et al., Life cycle impact assessment of beverage packaging systems: focus on the collection of postconsumer bottles, Journal of Cleaner Production (2015), http://dx.doi.org/10.1016/j.jclepro.2015.06.008

2.3 INVESTMENTS BY GOVERNMENT AGENCIES

2.3.1. GREEN INVESTMENTS BY BIO INVEST

The Belgian Investment Company for Developing countries (BIO) is a private company the capital of which is held by the Belgian State (FPS Development Cooperation). Its mission is to support a strong private sector in developing and/or emerging countries, to enable them to gain access to growth and sustainable development within the framework of the Sustainable Development Goals.

To this end, BIO invests directly in private sector projects and. as such, makes a structural contribution to the socio-economic growth of those host countries. Its mandate requires strict criteria in terms of geographical targets, financing tools and, above all, impact on development. One of the major challenges for Development Finance Institutions (DFIs) is to help financed companies to become aware that good governance and environmental and social performance are essential components for their success and sustainability, and that they must be permanently integrated into their strategy. BIO takes the environmental and social implications into account throughout the lifecycle of the project, and incorporates good practice principles at all levels, from the commercial strategy model through to daily decision-making.

The central focus of BIO's mission to invest in private sector projects is to contribute in a structural and positive way to the socio-economic growth of the host countries and their population, aligned with the UN's Social Development Goals. 35% of BIO's commitments in 2017 were renewable energy and energy efficiency projects.

As green eligible expenditures, disbursements during 2016-2017 and 2018 were considered, either in the form of loans to projects in renewable energy, solar and hydro projects (< 25 MW) or in the form of contributions to renewable energy funds.

Allocated Expenditures (in EUR)	2017 and 2018	Impact evaluated
Investments by Bio-Invest	80	
Funds	14	-
Projects	66	√

The impact assessment covers only renewable energy, solar and hydro projects (< 25 MW), which are either already in operation or under development. The sums invested in funds finance several projects for which information is not readily available, hence it was not possible to assess their impacts.

For projects in operation, avoided CO_2 emissions, for 2017 and 2018, are calculated by multiplying the electricity production by local margin emission factors. These figures depend on the local power generation fleet and are provided by the AFD carbon tool[1]. For projects under development, ex ante evaluation of avoided CO_2 emissions per year carried out for the project approval is used.

In total, for projects in operation, avoided CO_2 emissions attributable to Green OLOs for the years 2017 and 2018 are evaluated at 28kt. For projects still under development, the estimated annual avoided CO_2 emissions, attributable to Green OLOs, are estimated at 12kt. The table below details the emission reductions per project.

[1] Source: BIOINVEST

Projects directly financed by BIO	Country	Technology (capacity, MW)	Project status	Avoided CO_2 (tons)*
Senergy	Senegal	Solar (25)	In operation	9,318
Ten Merina Ndakhar	Senegal	Solar (20)	In operation	6,051
Rwimi	Uganda	Hydro (5.6)	In operation	8,935
IHC S.A.	Nicaragua	Hydro (20)	Under development	2,698
Bosforo	Salvador	Solar (>25)	Under development	3,412
Montecristi	Dominican Republic	Solar (>25)	In operation (from 2018)	2,020
Achwa	Uganda	Hydro run of river (>25)	Under development	5,369

* For projects in operation avoided emissions refers to the sum of 2017 and 2018 avoided emissions attributable to Green OLO.
For projects under development figures refer to annual avoided emissions once the project is in operation.

2.4 FURTHER DEVELOPMENTS

Assessing the impact for the expenditures financed by the Green OLO 2017 and 2018 proceeds posed several challenges, in terms of methodologies to be developed for each of the expenditures as well as in terms of data to be collected from several sources. Several reflections on future work for refining the assessment presented in this report and assessing other expenditures were made during the work on this study as well as in the context of the Steering Committee. These can be found in the table below.

Expenditures	Impact evaluated	Further developments discussed / planned
SUBSIDIES TO SNCB		
Infrastructure fee		
Rolling Stock		Assessment of the decrease in the attractiveness of rail transport due to the impact of the augmentation of rolling stock failures due to lack of maintenance. Therefore, passengers and freight operators will move to other transportation means such as cars or buses for passengers and trucks or inland navigation for freight.
SUBSIDIES TO SNCB (INVESTMENT PROGRAMME)		
Rolling stock : M7	√	Assessment of the impact of the new capacity that will be available due to the new M7
Rolling stock : other		Research on energy consumption reduction of the new rolling stock (other than M7)
Reception of clients		Research on energy consumption of railway stations
Maintenance		Assessment of energy savings of the maintenance ateliers of SNCB/NMBS based on energy consumption figures
SUBSIDIES TO INFRABEL (INVESTMENT PROGRAMME)		
Railway Infrastructure : Maintenance	√	Refine the hypothesis of the current assessment based on more precise figures on maintenance investment programme of Infrabel
Railway Infrastructure : Capacity expansion		Evaluation based on the ex-ante assessments of the 3 projects financed by the Green OLOs (RER, Mechelen, Bruges-Gand)
ETCS Investments	√	Evaluation of the modal shift related to railway infrastructure capacity expansion due to ECTS
FEDERAL SUPPORT FOR OFFSHORE WINDFARMS	√	

Expenditures	Impact evaluated	Further developments discussed / planned
TAX EXEMPTIONS AND DEDUCTIONS TO PROMOTE CLEAN TRANSPORTATION		
Commute by public communal transport	√	
Bicycle allowance	√	
Electrically powered vehicles		
INCREASED TAX DEDUCTIONS FOR GREEN INVESTMENTS		Evaluation based on the assessment of energy savings directly related to the renovation works funded
REDUCED PACKAGE CHARGE FOR USING INDIVIDUAL REUSABLE DRINK PACKAGES	√	
GREEN INVESTMENTS BY THE SFPI-FPIM		
GREEN INVESTMENTS BY BIO INVEST		
Funds		
Projects	√	
CONTRIBUTIONS TO DEVELOPMENT COOPERATION		

3
CONTACT

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CONTACT

Federal Public Service (FPS) Health, Food Chain Safety and Environment
DG Environment

Place Victor Horta, 40/10 | 1060 Brussels
Tel. : +32 (0)2 524 95 69
Email : bert.vanloon@health.fgov.be
Website : www.climatechange.be

Belgian Debt Agency

Avenue des Arts, 30 | B-1040 Brussels
Tel.: + 32 257 470 80
Email: public.debt@minfin.fed.be
Website: www.debtagency.be

RESPONSIBLE EDITOR

Tom Auwers - President
Belgian Federal Public Service (FPS) Health, Food Chain Safety and Environment
Place Victor Horta, 40/10 | 1060 Brussels