Greenhouse Gas Emissions of BNG Bank's Loan Portfolio

The GHG footprint of 2022

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Colophon

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www.hetpon-telos.nl

Management summary

In 2015, the Paris Climate Agreement established the goal of limiting global warming to less than two degrees Celsius above pre-industrial levels. The aim is to keep warming limited to one and a half degrees. Following that, the Netherlands outlined a specific target in the 2019 National Dutch Climate Agreement: to achieve a 55% reduction in greenhouse gas (GHG) emissions by 2030, compared to 1990 levels. There is even an more ambitious aim to further reduce GHG emissions to 60% by 2030. To make the transition to a low-carbon society, still a lot of effort is needed. While many companies are taking action, many others are still lagging behind.

Since the 2015 Paris Climate Conference, the banking sector has been actively involved in contributing to the realization of the ambitions of the Paris Agreement. Given the scale of the climate challenge and the crucial role of the banking industry, and the financial sector in general, in facilitating the net zero carbon transition, the Partnership for Carbon Accounting Financials (PCAF) was created.

BNG Bank committed itself to PCAF in 2019. Utilizing the PCAF methodology, the GHG emissions of the bank's loan portfolio have been calculated and disclosed in the BNG Annual Reports for the years 2019, 2020, 2021, and 2022.[1] The following sectors are part of the loan portfolio: social housing sector, municipalities, provinces, water authorities, healthcare institutions, educational institutions, drinking water utilities, and other organizations. Identifying opportunities for enhancing the methodology is part of the PCAF project for BNG Bank. This includes improving the methodology, for instance by changing the calculation methodology or using alternative data sources. These improvements can be viewed as an additional contribution made by BNG Bank to the further development of the PCAF methodology. In this report the overview tables contain the results of the years 2018, 2021, and 2022. The results for the year 2022 are the most recent, therefore the results are one year behind. By calculating and presenting the GHG emissions over a period of time enables the bank to monitor the development of the GHG emissions over time.

This report describes the results as well as the methodology of the GHG emissions assessment of BNG Bank's loan portfolio for the year 2022. The climate impact has been (re)calculated in line with the latest available harmonized approach for the financial sector in the Netherlands[2] and the global GHG accounting & reporting standard.[3]

As illustrated in Table S-1, 90.0% of the BNG Bank's loan portfolio is covered in this GHG emission report. The coverage rate has not increased in comparison to 2021.
In comparison to 2018, the coverage rate has increased. Although the coverage rate for 2022 is 90.0%, not all sectors in table S-1 include scope 1, 2, and 3 emissions (see Tabel 2-1). If scope 3 is included it is not always complete, such as for the healthcare sector.

[1] https://www.bngbank.com/Financials/Annual-report
[2] Accounting GHG emissions and taking action: harmonised approach for the financial sector in the Netherlands PCAF The Netherlands, report 2019
[3]https://carbonaccountingfinancials.com/standard
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

The absolute GHG emissions have decreased by 57 kiloton CO_2-eq (Table S-2) between 2021 and 2022 and by 338 kiloton CO_2-eq between 2018 and 2022. Overall this resulted in a decrease in the relative GHG emissions by 1.0 ton CO_2-eq per million Euro between 2021 and 2022 and a decrease by 9 ton CO_2-eq per million Euro over a period of five years.

The reduction of scope 1 and 2 GHG emissions is larger than the total reduction of 57 kiloton CO_2-eq between 2021 and 2022, namely 101 kiloton CO_2-eq (Table S-3). This was mainly due to a reduction of scope 1 and 2 GHG emissions for municipalities (-49 kiloton CO_2 equivalent), social housing sector (-22 kiloton CO_2 equivalent), and healthcare sector (-22 kiloton CO_2 equivalent).
For the social housing sector the largest reduction was seen for scope 2 electricity use. This reduction might be caused by an increase in solar panels on the homes of social housing associations. For the municipalities and healthcare sector the largest reduction was seen for scope 1 natural gas use. For municipalities this concerns buildings that are owned by municipalities and used for different public functions, such as education, sports, wellbeing, and culture. This is a divers set of buildings and the natural gas use depends on the building function. Therefore the measures taken to reduce natural gas use will vary per building and an explanation for the reduction of scope 1 cannot be given based on the results in this report. For the healthcare sector scope 1 mainly contains the use of natural gas for building heating and the use of warm tap water. From the results of this report it cannot be concluded why the reduction of scope 1 has occurred. Healthcare institutions might replace the use of natural gas by heat pump installations.

As can be seen in table S-3, scope 3 GHG emissions have increased by 44 kiloton CO_2-eq. Scope 3 GHG emissions increased for municipalities, provinces, and water authorities. Because data quality of scope 3 of municipalities and provinces is poor (score 4), the conclusions based on these data are to a certain extent uncertain.

Per million Euro, the water authorities and municipalities have the highest GHG emissions for reporting year 2022 (Table S-2). During the last four years, the water authorities have shown a large decrease in the relative emissions.

This report demonstrates a decreasing trend in the GHG emissions of BNG Bank's loan portfolio expressed in ton CO_2-eq per million Euro. The aim of BNG Bank is to accelerate this reduction in the coming years. In the climate action plan of BNG Bank, goals are being set to reduce GHG emissions for social housing associations, municipalities, healthcare institutions, and educational institutions. BNG Bank employs an engagement strategy to encourage their clients to reduce GHG emissions.

External factors will continuously impact GHG emissions. Over the past five years, events like the COVID-19 crisis and the conflict between Ukraine and Russia have influenced energy prices, energy consumption and travel patterns. Also changes in weather conditions and changes in energy usage due to climate change, particularly during winter, have impact on GHG emissions. By longitudinal monitoring of the GHG footprint of the bank's loan portfolio, the results will show whether the reduction is temporary, for example as a result of external factors, or whether it really is a long term positive development due to structural

behavior changes or investments in sustainable energy sources and/or investments in making real estate more sustainable.

Table S-1 Total outstanding loans of BNG Bank and part covered in the GHG assessment for the years 2018, 2021, and 2022[4]

Market segment	Sector	Loan portfolio (million EUR)			Loan portfolio Covered with GHG footprint (%)		
		2022	**2021^**	**2018**	**2022**	**2021**	**2018**
Social housing	Social housing associations*	44,815	43,336	38,739	95.3	95.1	94.5
	Others	33	67	9	0.0	0.0	0.0
Public sector	Municipalities*	27,061	27,272	26,033	100.0	99.9	99.8
	Provinces	421	337	137	100.0	100.0	100.0
	Water authorities	197	204	233	100.0	100.0	100.0
	Joint regulations	1,933	1,935	2,014	0.0	35.6	0.0
	Others	1,299	1,344	1,290	0.0	0.0	0.0
Healthcare	Healthcare*	6,708	6,860	6,973	95.9	92.9	88.4
Education	Educational institutions*	1,057	993	954	62.2	64.6	55.6
Networks	Drinking water utilities	548	677	811[#]	94.3	87.7	0.0
	Others	634	731	435	0.0	0.0	0.0
Mobility	Mobility	1,235	1,229	1,512	90.1	86.1	58.5
Energy	Energy	914	836	541	0.0	0.0	0.0
Environment	Environment	679	745	759	0.0	0.0	0.0
Financial institutions	Financial institutions	218	226	157	0.0	0.0	0.0
Others		206	320	120	28.2	19.0	0.0
Remaining				911			0.0
Total		**87,958**	**87,112**	**81,628**	**90.0**	**90.0**	**86.4**

*In the climate action plan, BNG Bank focuses on the GHG emissions of scope 1 and 2 of 4 sectors, namely social housing associations, municipalities, healthcare institutions, and educational institutions.
The coverage rate for these scopes (1 and 2) of these four sectors is 96.5% for 2022.
^In current report, data of the years 2019 and 2020 are not included. It is decided to calculate 3 years:
The reference year (2018) and the two most recent years, 2021 and 2022 current report.
#For drinking water utilities the reference year is not 2018, but 2020. Sector specific data is presented in chapter 9.

[4]Reference date for the year 2022 is 31-12-2022, reference date for the year 2021 is 31-12-2021, and reference date for the year 2018 is 31-12-2018.

Table S-2 Absolute and relative GHG emissions for the years 2018, 2021, and 2022

Market segment	Sector ^	Scopes included#	Part covered with GHG footprint (million EUR)			GHG emissions (ton CO_2-eq)			Relative GHG emissions (ton CO_2-eq/million EUR)			Data quality**
			2022	**2021^**	**2018**	**2022**	**2021**	**2018**	**2022**	**2021**	**2018**	
Social housing	Social housing associations	1-2	42,688	41,221	36,617	492,425	514,444	635,242	11.5	12.5	17.3	2.0
Public sector	Municipalities	1-2-3	27,061	27,230	25,973	1,884,274	1,886,854	2,009,935	69.7	69.3	77.4	3.9
	Provinces	1-2-3	421	337	137	12,969	10,559	5,449	30.8	31.4	39.8	3.9
	Water authorities	1-2-3	197	204	233	19,152	19,117	39,419	97.0	93.8	169.0	2.7
	Joint Regulations	1-2	0	689	0	-	17	-	-	0.03	-	2.0
Healthcare	Healthcare	1-2-3	6,432	6,376	6,167	207,947	234,047	285,245	32.3	36.7	46.3	3.3
Education	Educational institutions	1-2	657	641	531	12,919	15,570	15,922	19.6	24.3	30.0	3.0
Networks	Drinking water utilities	1-2-3	517	593	0	20,356	26,299	-	39.4	44.3	-	2.2
Mobility	Mobility		1,113	1,058	885	16,805	16,894	14,017	15.1	16.0	15.8	4.0
Others	Others		58	61	0	214	206	-	3.7	3.4	-	4.0
Total	**All sectors**	**1-2-3**	**79,144**	**78,410**	**70,543**	**2,667,061**	**2,724,007**	**3,005,229**	**33.7**	**34.7**	**42.6**	
Total	**Social housing Municipalities Healthcare Education***	**1-2***	**76,838**	**75,466**	**69,254**	**914,185**	**1,010,336**	**1,173,618**	**11.9**	**13.4**	**16.9**	

^In current report, data of the years 2019 and 2020 are not included. It is decided to calculate 3 years: The reference year (2018) and the two most recent years, 2021 and 2022 current report.

#This column presents which sectors contain only scope 1 and 2 and which sectors contain (parts of) scope 3. For mobility and others the scopes cannot be specified.

*In the climate action plan, BNG Bank focuses on the GHG emissions of scope 1 and 2 of 4 sectors, namely social housing associations, municipalities, healthcare institutions, and educational institutions.

**Weighted average data quality score. More details about the data quality score can be find in section 2.3.

Tabel S-3 Absolute GHG emissions divided in the different scopes for the years 2018, 2021, and 2022

Market segment	Sector	GHG emissions (ton CO_2-eq)			Relative GHG emissions (ton CO_2-eq/million EUR)		
		2022	**2021**	**2018**	**2022**	**2021**	**2018**
		Scopes 1 and 2					
Social housing	Social housing associations	492,425	514,444	635,242	11.5	12.5	17.3
Public sector	Municipalities	228,681	277,945	290,267	8.4	10.2	11.2
	Provinces	783	740	451	1.9	2.2	3.3
	Water authorities	17,414	17,534	36,096	88.4	86.0	154.9
	Joint Regulations	-	17	-	-	0.02	-
Healthcare	Healthcare	180,160	202,377	232,187	28.0	31.7	37.6
Education	Educational institutions	12,919	15,570	15,922	19.6	24.3	30.0
Networks	Drinking water utilities	15,950	20,475	-	30.9	34.5	-
Mobility	Mobility*	16,805	16,894	14,017	15.1	16.0	15.8
Others	Others*	214	206	-	3.7	3.4	-
Total scopes 1 and 2		**965,351**	**1,066,202**	**1,224,182**	**12.2**	**13.6**	**17.4**
		Scope 3					
Public sector	Municipalities	1,655,593	1,608,909	1,719,668	61.2	59.1	66.2
	Provinces	12,185	9,820	4,998	28.9	29.1	36.5
	Water authorities	1,739	1,583	3,323	8.8	7.8	14.3
Healthcare	Healthcare	27,787	31,670	53,058	4.3	5.0	8.6
Networks	Drinking water utilities	4,406	5,824	-	8.5	9.8	-
Total scope 3		**1,701,710**	**1,657,806**	**1,781,047**	**21.5**	**21.1**	**25.2**

*For mobility and others the scopes cannot be specified in scope 1 and 2 and scope 3.

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1 Introduction

The Paris Climate Agreement in 2015 agreed that global warming should be limited to less than two degrees Celsius compared to the pre-industrial period. The aim is to keep warming limited to one and a half degrees. The Dutch climate agreement has a clear goal: 55% reduction in greenhouse gas (GHG) emissions in 2030 compared to 1990 and there is even a more ambitious aim to reduce the GHG emissions to 60% in 2030. An energy transition is needed to achieve these goals. Already more and more electricity comes from renewable sources. Renewable energy will not only come from wind and sun, but also from geothermal heat, hydrogen and biogas. Besides the transition to renewable energy it also remains important to save electricity. This is also addressed in the climate agreement. Energy saving remains important because the expectation is that the demand for electricity will increase in the (near) future because more cars will become electric, industry will replace more oil and gas to clean energy and in buildings more electricity or district heating will be used for heating. To make the transition to a low-carbon society, still a lot of effort is needed. While many companies are taking action, many others are still lagging behind.

Since the 2015 Paris Climate Conference, the Dutch financial sector has been involved in contributing to the realization of the ambitions of the Paris Agreement. Banks play a crucial role in the realization of these ambitions. Not only because they represent most of the worldwide available capital, but also because the largest banks have still invested heavily in the fossil fuel sector, specifically, nearly $4.6 trillion since the Paris Climate Agreement. This is equivalent to $1.8 billion for every day since the end of 2015, not showing a downward trend and lacking assessment of the carbon impact of that finance.[5]
In 2019, 54 financial institutions signed the Climate Commitment. Banks, insurers, pension funds and asset managers agreed on how they, as the financial sector, actively contribute to the Paris Climate Agreement and the Dutch Climate Agreement.[6] The involved institutions agreed on four actions: participate in the financing of the energy transition, measure the GHG emissions of their relevant financing and investments, prepare action plans including GHG emission reduction targets, and organize consultations with involved stakeholders about the progress of the GHG emissions reductions.

1.1 A Partnership for Carbon Accounting Financials: PCAF

The Partnership for Carbon Accounting Financials (PCAF): PCAF is a global partnership of financial institutions that work together to develop and implement a harmonized approach to assess and disclose the GHG emissions associated with their loans and investments.[7]

In 2015, the Dutch Carbon Pledge started with eleven institutions under the leadership of ASN bank. These financial institutions wanted to take responsibility and come with new and meaningful steps to keep global warming under safe levels. Since then, more financial institutions from the Netherlands have joined forces under PCAF to develop and implement open-source methodologies to measure the GHG emissions of all asset classes within their

[5] https://carbonaccountingfinancials.com/about
[6] Commitment van de financiële sector | Publicatie | Klimaatakkoord
[7] https://carbonaccountingfinancials.com/about

loan and investment portfolios.[8] At the beginning of 2019, BNG Bank formally committed themselves to the PCAF initiative.

Building on the GHG accounting activities in the Netherlands and North America, ABN AMRO, Amalgamated Bank, ASN Bank, Global Alliance for Banking on Values (GABV), and Triodos Bank decided to launch a global initiative to develop a global GHG accounting standard and increase the number of financial institutions applying this standard to over 250 institutions worldwide, and ultimately to make GHG accounting common practice within the financial industry and facilitate the transition in line with the Paris Climate Agreement.[9]

In October 2023, 443 financial institutions have committed to measure and disclose the GHG emissions associated with their portfolio of loans and investments with total financial assets of $ 94.7 trillion.[10]

All financial institutions have experienced great value in assessing and disclosing their GHG emissions of their loans and investments, as this triggers an institution-wide discussion on climate change and the role of the financial institution to facilitate the transition to reach net zero emissions by 2050.

1.2 BNG Bank and PCAF

In 2018, preparing itself for joining the PCAF initiative, BNG Bank asked Telos[11] to measure the GHG emissions associated with the bank's public loan portfolio, using the PCAF methodology. The first report of the GHG emissions was for the year 2018. Since then the GHG emissions have been reported yearly and disclosed in the BNG Bank Annual Report.[12] Every year BNG Bank reports about the reference year, which is 2018, the most recent year and one year earlier.

Finding opportunities to improve the methodology, for instance by changing the calculation methodology or using higher quality data sources, is an ongoing process. These improvements in quality of the PCAF methodology can also be seen as a further contribution from BNG Bank to the development of the PCAF methodology. For the year 2022, again some amendments to the methodology have been implemented by Het PON & Telos. The reasoning behind and justification for these changes are discussed in detail in this report.

[8] https://carbonaccountingfinancials.com/about
[9] https://carbonaccountingfinancials.com/about#our-mission
[10] https://carbonaccountingfinancials.com/financial-institutions-taking-action#overview-of-financial-institutions
[11] At that time Telos was an independent research institute, based at Tilburg University. In January 2020 Het PON and Telos have merged into one organization called Het PON & Telos. At the same moment this new institute , Het PON & Telos, became official partner of Tilburg University.
[12] Annual report 2022 (bngbank.com)

1.3 From GHG footprint to action

Measuring and disclosing the GHG emissions associated with the lending and investment activities of financial institutions are necessary for transparency and accountability. But PCAF is not only about measuring and disclosing the GHG emissions of a financial institutions portfolio. The aim is also to identify and set carbon footprint reduction targets, and take actions (Figure 1).

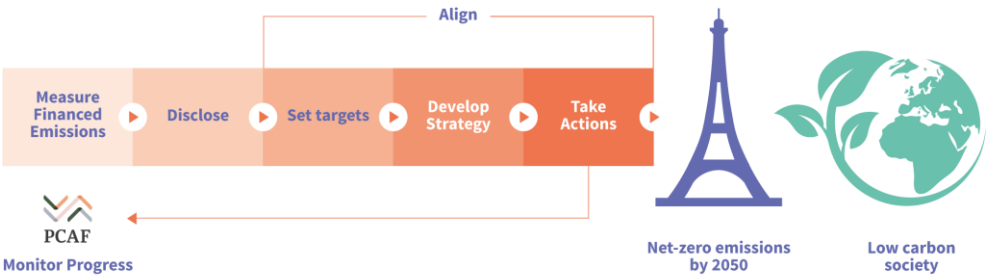

Figure 1. Visualization from GHG footprint to action

As part of her strategy 'Road to impact', BNG Bank measures and reports not only the GHG footprint associated with the bank's public loan portfolio but the bank also reports on her social impact[13], with the aim to continuously work on improving this impact. For the impact measurements, she uses the Sustainable Development Goals (SDGs) as guiding principles. BNG Bank targets at five SDGs on which she can maximize her impact by stimulating her clients with good health and well-being (SDG 3), quality education (SDG 4), affordable and clean energy (SDG 7), sustainable cities and communities (SDG 11), and climate action (SDG 13).[14] BNG Bank has published her climate action plan in 2022. This plan sets out the BNG Bank strategy to reduce GHG emissions in the sectors social housing, municipalities, healthcare, and education.

1.4 Reading guide

This report describes the methodology and the outcome of the GHG emissions assessment of BNG Bank's loan portfolio.

Chapter 2 describes the PCAF methodology in general. In chapter 3, the loan portfolio of BNG Bank is presented. Chapter 4 up to 12 describe the results of the coverage rate and the absolute and relative GHG emissions and a description of the methodology for the sectors mentioned below. Chapter 13 summarizes the results of all sectors.
The following sectors are included in this report:

- Social housing sector;
- Public sector: Municipalities, Provinces and Water authorities;
- Healthcare sector;
- Drinking water utilities;

[13] More information about social impact: Driven by social impact (bngbank.com)
[14] https://sdgs.un.org/goals

- Educational institutions;
- Joint regulations;
- Other organizations.

The details about the reasoning behind and the justification for the improvements in methodology of the above mentioned sectors are discussed in the individual chapters.

In comparison to last year, the methodology of the following sectors has been further improved:

- Social housing sector;
- Public sector: Scope 1 and 2 for Municipalities;
- Educational institutions.

The following sectors are not included this year:

- Avoided emissions of windfarms and solarparks

This report contains the GHG emissions of the years 2018 (reference year), 2021, and 2022. In the management summary and in chapter 13, the loan portfolio, coverage rate, and GHG emissions are shown for the years 2018, 2021, and 2022. That enables the bank to monitor the development of the GHG emissions over time. For each of the years, the reference date for the loan portfolio was ultimo of the year. For the calculation of the GHG emissions the latest data that have been available were used. For the year 2022 these data are either from 2021 or 2022.

In the previous reports the term 'reporting year' was used. For example, in the report of last year, the term reporting year 2022 was used for reporting the GHG emissions of the most recent year. To calculate the GHG emissions of reporting year 2022 the loan portfolio of 31-12-2021 was used and the most recent energy data or data required for the calculation of energy data were either from 2021 or 2020.
In current report the term 'reporting year' is not used anymore. The year corresponds with the year of the used loan portfolio. For current report the most recent used loan portfolio is 31-12-2022 and the most recent energy data or data required for the calculation of energy data were either from 2022 or 2021. In current report this is called 2022 instead of 'reporting year 2023'.
In previous reports the reference year was called: 'reporting year 2019', while in current report this is called 2018.

2 PCAF methodology

The methodology that has been used in current study, is based on The Greenhouse Gas Protocol, A corporate accounting and reporting standard, revised edition[15], The harmonized approach for the financial sector in the Netherlands[16] and The global GHG accounting & reporting standard.[17] The overall reporting requirements and recommendations are:

- Principles: GHG accounting and reporting of financial institutions shall be based on the following principles: relevance, completeness, consistency, transparency, and accuracy;
- Purpose: A financial institution's reporting should align with its specific business goals; for instance, for identifying and managing climate-related transition risks or for steering toward a specific emissions reduction target;
- Frequency: Financial institutions shall disclose at least annually and at a fixed point in time in line with the financial accounting cycle. Financial institutions shall ensure that the chosen point in time provides a representative view on the emissions for that reporting year and shall transparently disclose if large changes close to (before/after) the reporting date affected the results;
- Recalculation and significance thresholds: Financial institutions shall, in line with the GHG Protocol Corporate Value Chain (Scope 3) Accounting and Reporting Standard requirement, establish a baseline recalculation policy to define under which circumstances a recalculating of (reference year) financed emissions is necessary to ensure the consistency, comparability, and relevance of the reported GHG emissions data over time. As part of this reference year emissions recalculation policy, financial institutions shall establish and disclose the significance threshold that triggers reference year emissions recalculations;
- Form of reporting: Financial institutions shall disclose in publicly available reports such as (semi) annual reports, website articles, or other publicly available sources as deemed appropriate by the financial institution;
- Past performance: Where appropriate and relevant for their business goals, financial institutions should disclose their financed emissions for multiple comparable time periods, e.g., years.

2.1 Scopes

The GHG Protocol is the most widely used greenhouse gas accounting standard. The GHG protocol defines three different scopes all entities may report about separately (see Figure 2). As can be seen in Figure 2, GHG emissions contain CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6. In the current report these scopes are defined from the perspective of the reporting financial institution like BNG Bank and focusses on all the direct and indirect GHG emissions BNG Bank is responsible for by financing different types of organizations. The emissions

[15] ghg-protocol-revised.pdf (ghgprotocol.org)
[16] https://carbonaccountingfinancials.com/standard
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.
[17] https://carbonaccountingfinancials.com/standard
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

resulting from a reporting company's loans and investments fall under Scope 3 downstream emissions (see the blue circle in Figure 2). In the PCAF methodology scope 1, 2, and 3 refer to the scopes from the viewpoint of the investee, project, company or government.

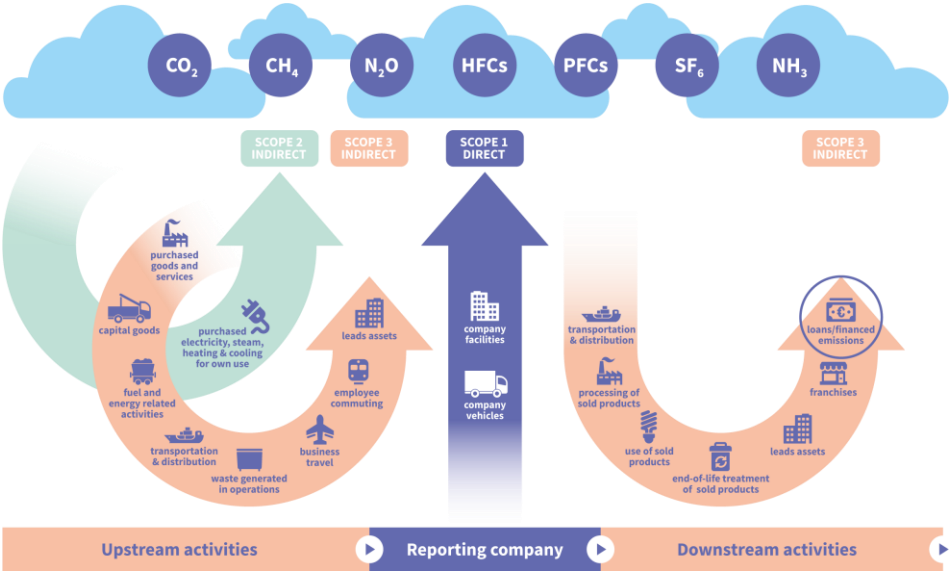

Figure 2. The scope definitions from the GHG Protocol (Image created from GHG Protocol).

According to the GHG Protocol Corporate Value Chain Accounting and Reporting Standard, the carbon footprint of any financial institution should include:

- Scope 1: All direct GHG emissions that occur from sources owned or controlled by the reporting company, such as natural gas use, and fuel for company cars of the investee, project, company or government.
- Scope 2: Indirect emissions from the generation of purchased or acquired electricity, steam, heating, or cooling consumed by the investee, project, company or government. Scope 2 emissions physically occur at the facility where the electricity, steam, heating, or cooling is generated.
- Scope 3 covers all other indirect emissions (not included in Scope 2) that occur in the value chain of the investee, project, company or government. Scope 3 can be broken down into upstream emissions that occur in the supply chain (for example, from production or extraction of purchased materials) and downstream emissions that occur as a consequence of using organization's products or services.

Disclosure of total generated emissions data is mandatory for scope 1 and 2. Disclosure of emissions intensity data (ton CO_2 eq per million EUR) for scope 1 and 2 is voluntary. For scope 3 emissions, disclosure of total generated data is mandatory when relevant and available (i.e., recommended by the methodology). Disclosure of scope 3 emissions intensity data (ton CO_2 eq per million EUR) is voluntary. When not provided, institutions should explain why they are not able to provide this.

2.2 Attribution

The GHG footprint of BNG Bank loan portfolio has been calculated based on the attribution approach. The attributed GHG emissions are calculated by using the following formula:

$$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan\ volume}}{\boldsymbol{Total\ balance\ sheet\ (equity + debt)}}$$

The GHG emissions of all individual organization are added at sector level to calculate the total emissions in CO_2 equivalent per sector. All the sectors together amount for the total emissions in CO_2 equivalent of the BNG Bank's loan portfolio.

When interpreting the results in this report, it is important to realize that due to the methodology used (especially in smaller sectors) changes in the ratio outstanding loan volume / total balance sheet between years have an effect on the change in GHG emissions attributable to the bank.
An increase or decrease in the absolute GHG emissions between years can be the result of a change in the ratio outstanding loan volume/ total balance sheet rather than for example structural changes in energy consumption at sector level. The total balance sheet has an influence on the absolute and relative GHG emissions. When the ratio outstanding loan volume/ total balance sheet influences the attributed GHG emissions this is indicated in the result paragraph.

2.3 Data quality

An important element of carbon accounting is the quality of data on emissions attributed to loans and investments. Different asset classes present unique challenges and opportunities with respect to emissions data. This section provides some overarching principles about the quality and preferred hierarchy of emissions data.

High quality emissions data is defined as follows:

- Emissions data is consistent, both across entities and across time;
- Emissions data reflects the underlying emissions generating activities of the entity and are not impacted by unrelated factors;
- Emissions data is accompanied by a relevant level of assurance.

It is possible that emissions data do not meet all the criteria listed above. This depends on the specific properties of the loan or investment and the sector or market best practice. To comply with PCAF's reporting guidance, participating institutions are asked to publish the existing PCAF hierarchy of the data quality according to Table 2-1. The table is a guide to disclose data quality scores in total and per asset class. In addition, in the report PCAF (2022) a more detailed table is presented per asset class that can be used to determine the data quality per sector.[18] These asset class specific tables are used as a reference for this report.

[18] https://carbonaccountingfinancials.com/standard.

The data quality presented in each chapter concerns all calculated years. In Table 2-2 data quality scores are rounded to a whole number. In Table S-2 and Table 13-2 data quality scores are presented with one digit after the decimal point and is calculated according to the percentage of emissions per sector per scope. Because the data source and calculation method can differ between scopes and items within a scope, several data quality scores are given to different scopes of a sector. In the general factsheets, the underlying reasoning for the data quality scores is explained. In paragraph 2.3.1, the data quality scores per sector are explained and summarized.

Table 2-1 Generic data quality table

Data quality (highest to lowest)	Description
1	Audited GHG emissions data or actual primary energy data
2	Non-audited GHG emissions data, or other primary data
3	Averaged data that is peer/(sub)-sectorspecific
4	Proxy data on the basis of region or country
5	Estimated data with very limited support

2.3.1 Data quality per sector

As mentioned before, an important element of carbon accounting is the quality of data on emissions attributed to loans and investments. The data quality score gives insight into how accurate the calculated GHG emissions are. Different asset classes present unique challenges and opportunities with respect to emission data.

Because the data source and calculation method can differ between scopes and items within a scope, several data quality scores are given to the different scopes of a sector. In the factsheets per sector, the choice for the data quality score has been explained. This paragraph provides an overview of the data quality (see Table 2-2).
For the sectors social housing, municipalities, and educational institutions the source for energy data has changed. For the social housing sector this did not improve the data quality score, but the available data was more recent (2022 instead of 2021). For municipalities and educational institutions the data quality score has improved. For both municipalities and educational institutions the data quality score has improved from 4 to 3.

Table 2-2 Data quality scores per sector per scope

Sector	Scope	Data quality score	Explanation
Social housing sector	1: natural gas use 2: electricity use	2	Primary data on actual building energy consumption (corrected for a warmer or colder year, energy in one m^3, and gaspressure) is available. According to option 1b in Table 5-14 on page 92 of the report PCAF (2022)[19] the data quality is 2. Part of the data is based on energy consumption data delivered by the three largest energy operators in the Netherlands for clusters

PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

[19] https://carbonaccountingfinancials.com/standard
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

			of buildings. Due to privacy regulations it is not possible to collect this data for individual houses. The data is therefore collected for small clusters (10 to 15 buildings) of similar houses, which is subsector-specific. The data has been aggregated to the level of a housing association. However, because energy consumption data is more specific than sector specific the data score is 2.
Municipalities	1: natural gas use 2: electricity use	3	The indicators are based on actual energy consumption from 2018 and 2020. For the 2021 and 2022 data, estimates have been made based on the developments in energy consumption based on trends within the sector published by CBS.
Municipalities	1: company cars	5	The GHG emissions are calculated based on average car information. Brand, model, and type are unknown and distance traveled is based on local or regional statistical data. Therefore, data quality score is 5.
Municipalities	3	4	The GHG emissions are calculated based on economic activity. The expenses made in the categories 3.1, 3.2, 3.5, and 3.8 were multiplied by a value for kg CO_2-eq / Euro. The value for kg CO_2-eq / Euro has been calculated based on proxy data on the basis of country. Therefore, the data quality is score 4. See for more details paragraph 5.2.2.
Provinces	1: natural gas use 2: electricity use	4	The GHG emissions are calculated based on energy supply to the public administration and government services sector at the aggregation level of a whole province. This is not only energy supply to the province organization, but also other governmental authorities. Therefore, data is used on the basis of region and data quality score is 4.
Provinces	1: company cars	5	The GHG emissions are calculated based on average car information. Brand, model, and type are unknown and distance traveled is based on local or regional statistical data. Therefore, data quality score is 5.
Provinces	3	4	The GHG emissions are calculated based on economic activity. The expenses made in the categories 3.1, 3.2, 3.5, and 3.8 were multiplied by a value for kg CO_2-eq / Euro. The value for kg CO_2-eq / Euro has been calculated based on proxy data on the basis of country. Therefore, data quality score is 4. See for more details paragraph 5.2.2.
Water authorities	1: **without** GHG emissions from the sewage treatment plant 2 & 3	2	The GHG emissions are calculated based on data received from the water authorities themselves, but the data is not audited. Therefore, data quality score is 2.
Water authorities	1: for GHG emissions from the sewage treatment plant	3	The GHG emissions of methane and nitrous oxide from sewage treatment plants have been determined based on an IPCC model. This does not take into account the individual situations of the sewage treatment plants. But, data is sectorspecific. Therefore, data quality score is 3.
Healthcare	1 & 2	3	Part of the data is based on energy consumption data delivered by the three largest energy operators in the Netherlands for clusters of buildings. Due to privacy reasons it is not allowed to provide energy consumption data for individual buildings. It is allowed to provide these for cluster of buildings (10 to 15 buildings). Where possible, clusters consisted only of buildings of the same owner. If this was not possible, buildings of different owners have been clustered. For the buildings with missing consumption data an estimation for gas and electricity has been assigned on the basis of the building period and surface class. Because the actual building energy consumption had to be clustered and in some cases for the buildings with missing data an estimation has been made the data quality score is 3.

Healthcare	3	5	The GHG emissions are calculated based on average vehicle information. Vehicle brand, model, and type are unknown and distance traveled is based on local or regional statistical data. Therefore, data quality score is 5.
Drinking water utilities	1 & 2	2	The GHG emissions are calculated based on data received from the drinking water utilities themselves, but the data is not audited. Therefore, data quality score is 2.
Drinking water utilities	3	3	The GHG emissions for scope 3 are less certain than scope 1 and 2, because traveled distances are known, but details on means of transport are sometimes missing. Therefore, data quality score is 3.
Education	1 & 2	3	Part of the data is based on energy consumption data delivered by the three largest energy operators in the Netherlands for clusters of buildings, but when these data has not been available estimated values have been used based on sector specific data, therefore data quality score is 3.
Joint regulations	1 & 2	2	The GHG emissions are calculated based on data received from the joint regulations themselves, but the data is not audited. Therefore, data quality score is 2.
Other organizations	1, 2 & 3	4	The GHG emissions for 20% of the other organizations are based on GHG emissions published in their annual reports which are audited. For 80% of the other organizations, the GHG emissions are based on emission factors for the sector per unit of revenue. Therefore, data quality score is 4.

2.4 Emission factors

For the calculation of the carbon footprint of the BNG Bank's loan portfolio, emission factors have been used to calculate emissions to ton GHG emissions. The selection of the correct emission factors is crucial. For this publication the emission factors from CO2emissiefactoren.nl have been used. This list of emission factors is developed by the Dutch National Government, SKAO, Stimular, Connekt, and Milieu Centraal.[20] This list is frequently updated and contains information about the applied system boundaries and gives a list of widely accepted and uniform emission factors.

PCAF has chosen to use the grid emission factors related to direct emissions, expressed under column 'Tank to Wheel' (TTW) value on CO2emissiefactoren.nl. This emission factor only includes the emission from the use of the energy carrier and not the production of the energy carrier. Where the term emission factor has been used, the CO_2-equivalents are meant.

An emission factor can change over time. The factors can change due to changes in methodology based on scientific insights or due to changes in the context of the emission factor (gradual changes over time). For example, for the emission factor for electricity from

[20] In March 2014, the Green Deal CO_2 equivalent emission factors was signed by the Dutch national government, SKAO, Stimular, Connekt and Milieu Centraal. Due to an increase in attention for CO_2 emission factors, more and more tools are created to calculate a footprint. However, confusion arises when companies and organizations use different figures. Creating an uniform list is a solution to this and that is why the Green Deal CO_2 equivalent emission factors was developed.
The aim of the Green Deal is to arrive at a single, widely supported and scientifically substantiated list of CO_2 emission factors, based on generally accepted principles. The list concerns CO_2 data of energy carriers, passenger transport, goods transport and refrigerants. The primary target group consists of companies and organizations that use CO_2 equivalent emission data or calculation tools in their communications or reports. This shifts the discussion about the accuracy of the figures to what really matters: reducing GHG emissions.

an unknown source. This emission factor is calculated on the basis of the national energy production mix (e.g. the mutual relationship between coal, nuclear, and renewable energy sources). This factor changes every year due to changes in the national energy mix.

Changes in CO_2 emission factors can be of influence on the development in GHG emissions. Therefore, when calculating GHG emissions, for a correct comparison, the footprint of previous years may need to be recalculated. At CO2emissiefactoren.nl an advise is given whether the revised emission factor should be used retroactively and also from which date onwards. For example it is recommended to use the emission factor for electricity from an unknown source (which is revised in 2020) retroactively from January 2018.

In this report, when emission data is longitudinally presented, the following three basic principles have been used to determine the emission factor:

1. Changes in emission factors over time due to changes in the national energy mix: use the emission factor in accordance to the data year. E.g. data from 2022 means using the emission factor of 2022.
2. Changes in emission factors over time due to technological development: use the emission factor in accordance to the data year. E.g. data from 2022 means using the emission factor of 2022.
3. Changes in emission factors over time due to new methodology or scientific insights: use the most recent emission factor. E.g. data from 2021 means using the emission factor of 2022.

An overview of the emission factors used per year is presented in Table 2-3. In general, for every calculation and approach, emission factors were chosen in accordance to the data year.

One exception was made for district heating for the social housing sector. For calculating the GHG emissions for district heating the emission factor of the year 2022 has been used for all years. CO2emissionfactor.nl doesn't give an advice about whether the emission factor from the year 2022 should be used retroactively[21]. Because end users have no influence on which heating network they are using, CO2emissiefactor.nl published an average emission factor for heat from large heating networks since 2022. The difference with the emission factor in previous years is large (23.4 for 2022 vs. 32.53 in previous years). To prevent that the GHG emissions change (decrease) only due to the fact that the used emission factor for the year 2018 and 2021 is higher than for the year 2022, the emission factor of the year 2022 is also used for previous years. The sustainable performance of large heating network improve over time. By using the same emission factor for all the years in current report, this improvement in performance is not taken into account, but the increase in the use of district heating is becoming visible.

Table 2-3 Emission factors used per data year

Source	Unit	Emission factor (kg CO_2 eq/unit) (TTW)						If emission factor has changed over the years, which one should be used?
		2017	**2018**	**2019**	**2020**	**2021**	**2022**	
Petrol (E10) (NL)	Liter	2.233	2.233	2.233	2.141	2.141	2.141	Advised by CO2emissiefactoren to use these values (see CO2emissiefactoren 2022, comments at Benzine)
Diesel (B7) (NL)	Liter	2.514	2.514	2.514	2.474	2.474	2.474	Advised by CO2emissiefactoren to use these values (see CO2emissiefactoren 2022, comments at Diesel)
LPG (NL)	Liter	1.61	1.61	1.61	1.61	1.631	1.631	Use of the emission factor in accordance to the data year
Bio-diesel (HVO)	Liter					0.038	0.038	Values before 2021 were indicative. Advised by CO2emissiefactoren.nl to use values of the year 2022
CNG	Liter	2.234	2.234	2.234	2.234	2.284	2.284	Use of the emission factor in accordance to the data year
Bio-CNG	Liter					0.137	0.137	Values before 2021 were indicative. Advised by CO2emissiefactoren.nl to use values of the year 2022
Gas-to-liquid	Liter					2.471	2.471	Use of the emission factor in accordance to the data year
Propane	Liter					1.53	1.53	Use of the emission factor in accordance to the data year
Fuel oil	Liter	3.185 (WTW)	3.185 (WTW)	3.185 (WTW)	3.185 (WTW)	3.185 (WTW)	3.185 (WTW)	Use of the emission factor in accordance to the data year
Natural gas	Nm^3	1.791	1.791	1.791	1.785	1.785	1.788	Use of the emission factor in accordance to the data year
Grey energy	kWh	0.464	0.572	0.572	0.476	0.476	0.454	Use of the emission factor in accordance to the data year
Electricity from unknown sources (kWh)	kWh	~~0.301~~	~~0.361~~	~~0.361~~	0.405	0.405	0.369	Advised by CO2emissiefactoren.nl to use values of the year 2020 and 2021 also for the previous years
Passenger transport by car, unknown fuel & weight (vehicle km)	Vehicle km	0.181	0.181	0.181	0.163	0.163	0.145	Use of the emission factor in accordance to the data year
Electric Car (grey energy)	Vehicle km	0	0	0	0	0	0	
Public transport in general (traveled kms; type of transport unknown)	Traveler km	0.025	0.025	0.025	0.025	0.011	0.011	Use of the emission factor in accordance to the data year
Public transport in general (traveled kms; Bus, Tram, Metro average)	Traveler km	-	-	-	-	0.052	0.052	Use of the emission factor in accordance to the data year. For year 2018 the emission factor of 2021 and 2022 have been used
Public transport by train (traveled kms; unknown train type)	Traveler km	0.005	0.005	0.005	0.005	0.002	0.002	Use of the emission factor in accordance to the data year
Public transport by bus (traveled kms; type unknown)	Traveler km	0.113 TTW	0.113 TTW	0.113 TTW	0.113 TTW	0.103 WTW	0.103 WTW	Use of the emission factor in accordance to the data year CO2emissiefactoren.nl reports that for the year 2021 and 2022 TTW is not available
Public transport by tram (traveled kms)	Traveler km	0	0	0	0	0	0	

Public transport by metro (traveled kms)	Traveler km	0	0	0	0	0	0	
Air travel <700 km	Traveler km	0.278	0.278	0.278	0.278	0.278	0.202	
Air travel 700-2500 km	Traveler km	0.187	0.187	0.187	0.187	0.187	0.152	
Air travel >2500 km	Traveler km	0.137	0.137	0.137	0.137	0.137	0.140	
Air travel, average km	Traveler km						0.160	Use of the emission factor in accordance to the data year
Bulk goods, Truck, unit with semi-trailer heavy	Tonne km	0.064	0.064	0.064	0.064	0.067	0.067	Use of the emission factor in accordance to the data year
Average heating networks	GJ	32.53	32.53	32.53	32.53	32.53	23.4	The value for 2022 is the average emission factor for heat from large heating networks. For current report, the emission factor of 2022 has been used for all years due to the large differences between the emission factors of 2022 and previous years.
Methane	Kg					28 WTW	28 WTW	Value for methane only published by CO2emissiefactoren.nl for the years 2021 and 2022, this value is also applicable for earlier years
Source		LINK[22]	LINK[23]	LINK[24]	*LINK*[25]	*LINK*[26]	*LINK*[27]	

2.5 Methodology development is an ongoing process

Comparability and transparency of carbon accounting requires uniform disclosure, following the same guidelines and methods and ideally using the same metrics.[28] However, the methodology for carbon accounting is not yet a set and fixed method. Due to continuous improvement in data availability and/or methodological advancements more accurate calculations will be possible in the future.
Therefore the total GHG footprint that is presented in chapter 13 of this report is not conclusive. Each time the methodology and data used improve, the results of the earlier years will be recalculated so comparison in time will be possible.

[22] https://www.co2emissiefactoren.nl/wijzigingen-overzicht/ 2017 Lijst CO2-emissefactoren
[23] https://www.co2emissiefactoren.nl/wijzigingen-overzicht/ 2018 Lijst CO2-emissefactoren
[24] https://www.co2emissiefactoren.nl/wijzingingen-overzicht/ 2019 Lijst CO2-emissiefactoren
[25] https://www.co2emissiefactoren.nl/wijzingingen-overzicht/ 2020 Lijst CO2-emissiefactoren
[26] https://www.co2emissiefactoren.nl/wijzingingen-overzicht/ 2021 lijst CO2-emissiefactoren
[27] https://www.co2emissiefactoren.nl/wijzigingen-overzicht/ 2022 lijst CO2-emissiefactoren
[28] https://carbonaccountingfinancials.com/standard.
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

3 BNG Bank loan portfolio

BNG Bank's loan portfolio encompasses several market segments. These segments cover multiple sectors or sub-sectors. An overview of these sectors is given in Table 3-1.

Table 3-1 Overview of BNG Bank loan portfolio for the years 2018, 2021, and 2022[29]

Market segment	Sector	Loan portfolio (million EUR)			Percentage of all loans		
		2022	**2021**	**2018**	**2022**	**2021**	**2018**
Social housing	Social housing associations	44,815	43,336	38,739	50.9	49.7	47.5
	Others	33	67	9	0.0	0.1	0.0
Public sector	Municipalities	27,061	27,272	26,033	30.8	31.3	31.9
	Provinces	421	337	137	0.5	0.4	0.2
	Water authorities	197	204	233	0.2	0.2	0.3
	Joint Regulations	1,933	1,935	2,014	2.2	2.2	2.5
	Others	1,299	1,344	1,290	1.5	1.5	1.6
Healthcare	Healthcare	6,708	6,860	6,973	7.6	7.9	8.5
Education	Total	1,057	993	954	0.1	0.1	1.2
Networks	Drinking water utilities	548	677	811	0.6	0.8	1.0
	Others	634	731	435	0.7	0.8	0.5
Mobility	Mobility	1,235	1,229	1,512	1.4	1.4	1.9
Energy	Energy	914	836	541	1.0	1.0	0.7
Environment	Environment	679	745	759	0.8	0.9	0.9
Financial institutions	Financial institutions	218	226	157	0.2	0.3	0.2
Others		206	320	120	0.2	0.4	0.1
Remaining				911			1.1
Total		**87.958**	**87,112**	**81,628**	**100.0***	**100.0***	**100.0***

*The sum in these columns it not always exactly 100% due to rounding per sector

As can be seen in Table 3-1, the social housing associations and municipalities are the largest sectors in BNG Bank's loan portfolio. The total loan portfolio increased by 846 million Euro between the years 2021 and 2022.

The final overview of all the calculations of the years 2018, 2021, and 2022 can be found in the datafiles mentioned in the factsheet below.

List of the calculation sheets	Location
240227 Bankcijfers BNG 2022.xlsx	4_Data_AVG\4.1_Startdata_met ID\Bankcijfers\BNG
231210 Bankcijfers BNG 2021.xlsx	4_Data_AVG\4.1_Startdata_met ID\Bankcijfers\BNG
231210 Bankcijfers BNG 2018.xlsx	4_Data_AVG\4.1_Startdata_met ID\Bankcijfers\BNG
240227 berekening scope 1 en 2 voor Tabel S-2 en Tabel S-3.xlsx	4_Data_AVG\4.1_Startdata_met ID\Bankcijfers\BNG
231212 m2 data gemeenten zorg en onderwijs BNG Bank.xlsx	4_Data_AVG\4.1_Startdata_met ID

[29] Reference dates for the years 2018, 2021, and 2022 are 31-12-2018, 31-12-2021, and 31-12-2022, respectively.

4 Social housing sector

4.1 Results Social housing sector

The social housing sector is the largest sector within the loan portfolio of BNG Bank. The sector has a share of 50.9% within the bank's loan portfolio.

4.1.1 Coverage

The GHG footprint has been calculated for 95.3% of the loan portfolio within the social housing sector in 2022. Between 2021 and 2022, the outstanding loan volume has increased by 1,479 million Euro. For 2018, 2021 and 2022, the loan portfolio and coverage rate are shown in Table 4-1.

Table 4-1 Loan portfolio and coverage rate for the social housing sector in 2018, 2021, and 2022

Social housing sector	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)[30]
2022	44,815	100%	50.9%	95.3%
2021	43,336	100%	49.7%	95.1%
2018	38,739	100%	47.5%	94.5%

4.1.2 GHG emissions

Table 4-2 shows the GHG footprint results for the social housing sector in 2018, 2021, and 2022.

Table 4-2 Absolute and relative GHG emissions for the social housing sector in 2018, 2021, and 2022

Source of emissions	Scope	GHG emissions (ton/year)			GHG emissions (%)			Relative GHG emissions (ton CO_2/million EUR)		
		2022	**2021**	**2018**	**2022**	**2021**	**2018**	**2022**	**2021**	**2018**
Natural gas use	Scope 1	312,985	322,337	401,874	63.6	62.7	63.3	7.3	7.8	11.0
Electricity use	Scope 2	168,085	184,108	221,620	34.1	35.8	34.9	3.9	4.5	6.1
District heating	Scope 2	11,355	7,999	11,748	2.3	1.6	1.8	0.3	0.2	0.3
Total		**492,425**	**514,444**	**635,242**	**100.0***	**100.0***	**100.0***	**11.5**	**12.5**	**17.3**

*The sum in these columns it not always exactly 100% due to rounding per sector

Between 2021 and 2022 the absolute GHG emissions have decreased for both scope 1 natural gas use and scope 2 electricity use. The total absolute GHG emissions have decreased by 22,019 ton. This decrease is mainly caused by a decrease in scope 2 electricity use, which has decreased by 16,023 ton. The absolute GHG emissions for scope 2 district

[30] In order to make sure that the coverage rate for all three years is comparable, the loans and total balance sheet of social housing associations that have merged in the past few years have been summed for 2021 and 2018 and it is assumed that the energy consumption of the (new) social housing association applies to the merged social housing associations.

heating has increased by 3,356 ton between 2021 and 2022. For the social housing associations that have houses with district heating the used warmth has increased. This increase may be due to the increase in houses with district heating. Between 2017 and 2021, the number of houses owned by social housings associations with district heating has increased by more than 33,000 houses for all social housing associations. Between 2020 and 2021 this number increased with more than 4,000 houses.
The loans covered with a GHG footprint has increased from 41,221 to 42,688 million Euro. The percentage of outstanding loan volume / total balance sheet has slightly increased in comparison to 2021 (from 9.8% to 10.1%). Due to an increase in the loans covered with a GHG footprint and a decrease of the absolute GHG emissions, the relative GHG emissions have decreased by 1.0 ton / million Euro. In conclusion, the absolute and relative GHG emissions for the social housing sector have decreased between 2021 and 2022.

The GHG emissions per m^2 due to natural gas- (scope 1) and electricity use (scope 2) have decreased over the years from 3.5 kg CO_2-eq per m^2 to 2.7 kg CO_2-eq per m^2 (see Table 4-3).

Table 4-3 GHG emissions per m^2 due to natural gas- and electricity use for the social housing sector in 2018, 2021, and 2022

	GHG emissions / m^2 (kg CO_2-eq)		
	2022	**2021**	**2018**
GHG emissions per m^2 due to natural gas- (scope 1) and electricity use (scope 2)	2.7	2.9	3.5

By 2050, all properties owned by social housing associations must achieve carbon neutrality. With a view to achieving that goal, social housing associations work hard to insulate homes to save energy. This effort can be seen in de reduction of at least scope 1 natural gas. On the other hand, social housing associations invest in solar panels on their homes. The number of social rental homes with solar panels is increasing faster than before.[31] Except for energy conservation, social housing associations must also strive to increase the number of homes without gas. To make that possible, alternative heat sources are needed, such as district heating. Between the years 2021 and 2022, the GHG emissions for district heating have increased, however from current data it is not possible to determine whether the increase in district heating causes a decrease in natural gas use.

4.2 Social housing sector approach

4.2.1 Scope 1 and 2

Adjustments in methodology

The methodology for the social housing sector to calculate the GHG emissions due to natural gas use and electricity use has changed in comparison to previous years. Previously, per municipality, the energy consumption (natural gas use and electricity use of houses in the social housing sector was known (CBS) and this data was proportionally distributed across the various social housing corporations. This year, we used data based on

[31] Solar Magazine - De harde cijfers | 1 op 5 sociale huurwoningen heeft zonnepanelen

consumption records (corrected for a warmer or colder year, energy in one m^3, and gaspressure) from the largest energy suppliers in the Netherlands. The energy consumption was calculated based on the ownership (number of houses and surface area) of social housing corporations. The corrected consumption records can be higher or lower than actual consumption records.
For the previous method, CBS data has been used and most recent available data would be 2021. However, with the new method most recent available data is 2022.

The calculations for Scope 2 district heating are unchanged compared to last year. Unfortunately for district heating the most recent available data is 2021 and not 2022. This data is therefore one year behind in comparison to the other energy data.

Because the methodology for the social housing sector has been changed, also the previous years had to be recalculated. During the years some social housing associations have merged. In order to make sure that the coverage rate for all three years is comparable, the loans and total balance sheet of social housing associations that have merged in the past few years have been summed and it is assumed that the energy consumption of the (new) social housing association applies to the merged social housing associations.

When the results of the previous and new method are compared, not only the change in method is seen but also a difference in data year. It must be taken into account that with the old method the energy data for 2021 was actually from 2020. With the new method the energy data of 2021 is from 2021. Therefore, when comparing these two methods, not the same year is compared. The new 2021 data is compared to 2020 data (previous 2021) and the new data from 2018 is compared to 2017 data (previous 2018). The differences between the results of the new and previous method are presented in Table 4-4.

Table 4-4 Effect of the change in methodology on the GHG emissions

Scopes	New 2021	Previous 2021	Difference * (%)	New 2018	Previous 2018	Difference * (%)
Scope 1 Natural gas	322,337	350,232	-8.0	401,874	427,086	-5.9
Scope 2 Electricity	184,108	200,925	-8.4	221,620	220,563	0.5
Coverage rate	95.1%	98.5%		94.5%	98.8%	

*The difference is calculated with the following formula: (New - Previous)/Previous*100

General factsheet

Topic	Description
Scopes covered	For the social housing sector scope 1 and 2 have been covered. Scope 1 covers natural gas use and scope 2 covers electricity use and district heating.
Portfolio covered	The coverage rate of the social housing sector for 2022 is 95.3%.
Data	Data on the electricity use and natural gas use is based on connection registers of energy network companies. Due to privacy regulations it is not possible to collect this data for individual houses. The data is therefore collected for small clusters of similar houses. The data is aggregated to the level of a housing association. Data on the number of houses and total surface per social housing association come from 'Kadaster'[32].

[32] Kadaster registers who has what rights of all real estate (land and buildings) in the Netherlands.

	The data on district heating is based on connection registers of energy network companies, collected by the Dutch Central Bureau of Statistics (CBS). It is based on actual energy consumption, and therefore reliable. The use of district heating is available on municipality level. Per municipality the use of district heating by houses owned by the social housing associations are known. Data on the number of houses per social housing association per municipality comes from the 'Inspectie van de leefomgeving en transport'[33]. This data is audited and therefore reliable.
Grid emission factors	Paragraph 2.4 contains more information on emission factors. The following emission factors from Table 2-3 have been used: - Natural gas; - Electricity (unknown source); - Average heating networks.
Calculation steps	**Scope 1 natural gas use & scope 2 electricity use** The following steps have been performed by Republiq: 1. Inventory of houses owned by housing associations 2. Joining consumption data 1. Inventory of houses owned by housing associations Republiq acquired housing association property data from 'Kadaster'. For each housing association Republiq knows the number of houses they own, what the surface of each house is and to which energy class it belongs. Republiq has calculated the number of houses owned by each housing association and the total surface of these houses. From BNG Bank, Republiq obtained an overview of which housing associations are customers according to the loan portfolio of 31-12-2022. Republiq combined this list from BNG Bank with data from 'Kadaster' in order to add the number of houses and surface owned by each housing association, where possible. 2. Joining consumption data Energy consumption data was requested from the three major network operators (Enexis, Liander, and Stedin) in the Netherlands. Due to privacy reasons the network operators are not allowed to provide consumption data for individual buildings. However, data for clusters of buildings (10 to 15 buildings) can be provided: per cluster the standard annual consumption (in Dutch 'standaard jaarverbruik' (SJV)[34]) has been provided. Republiq has divided the annual consumption data by the average surface of buildings from a cluster to obtain consumption data per m^2. The consumption data per m^2 have been assigned to the individual houses belonging to a cluster. Following that, Republiq conducted an outlier check, ensuring that only reliable data remained. The average consumption data per m^2 per housing association is multiplied by the total surface that is owned by the housing association in order to get an estimate of the total usage of electricity and gas. Republiq has provided Het PON & Telos with the following data per social housing association to calculate GHG emissions: - Total electricity consumption (in kWh) - Total gas consumption (in Nm^3) - Surface area (m^2) The following step has been performed by Het PON & Telos: Het PON & Telos used these data in order to make the final calculations for both Scope 1 natural gas use and Scope 2 electricity use. The total electricity and natural gas use have been multiplied by the emission factor, from the same year as the data. For Scope 1 Natural gas use the emission factor Natural gas (Nm^3) has been used. For Scope 2 Electricity use the emission factor Electricity from unknown sources (kWh) has been used.

[33] Inspectie van de leefomgeving en transport is the supervisor for the living environment, transport, and housing.
[34] 'Standaard jaarverbruik' is the actual energy consumption recalculated to the expected energy consumption in a standard year. The actual energy consumption is corrected for a warmer or colder year, energy in one m^3, and the gaspressure.

	Surface area The source for the surface area data is the Basic Registration of Addresses and Buildings (BAG). The reference data for the total surface area per housing association is 1-1-2023. This surface area is used for all three years. To calculate the GHG emissions per m^2 the total attributed GHG emissions in kg CO_2-eq for the social housing sector is divided by the total surface area (m^2) of the social housing association included in the GHG footprint. **Scope 2: District heating** The use of district heating per social housing association is unknown. Hence, it was necessary to make an estimation. Several calculations had to be performed. The CBS Microdata contains information on the use of district heating of all Dutch houses. Within the CBS Microdata database, this dataset has been combined with another dataset containing information about homeowners. Only houses owned by social housing associations have been incorporated in the calculation. CBS defines house as: the smallest unit of use located within one or more buildings and suitable for residential purposes, and accessible through a private entrance from the public road, a yard or a shared traffic area. Examples include detached houses, single-family houses, apartment or porch houses, student houses. All residential objects in the Basic Registration of Addresses and Buildings (BAG) with at least a residential function and possibly one or more other use functions are considered as a house. So both self-contained and non-self-contained homes are included in this data. Per municipality, the use of district heating for all houses owned by social housing associations has been calculated. Outside the CBS Microdata database, the use of district heating per social housing association has been calculated. The 'Inspectie van de leefomgeving en transport' has data on the number of independent and non-independent houses per social housing association per municipality. According to this data the percentage of houses owned by the social housing associations has been calculated per municipality. The use of district heating per municipality for all houses owned by social housing associations has been multiplied by the ratio of the number of houses of one particular social housing association versus total number of houses of all social housing associations in one municipality. For each social housing association the use of district heating per municipality has been added up to result in the total district heating use for that particular social housing association. The use of district heating in GJ has been multiplied by the emission factor for average heating networks to result in kg GHG emissions. These emissions have been divided by 1000 to result in ton GHG emissions. Unfortunately, the total balance sheet data of 2022 was not available at the moment of these calculations. Therefore, for 2022, the GHG emissions attributed to the bank have been calculated based on the total balance sheet of 2021. In summary, for 2018, total balance sheet data of 2018 have been used. For 2021 and 2022, total balance sheet data of 2021 has been used because for 2022 the total balance sheet data of 2022 was not available in time. The absolute GHG emissions and relative emissions are reported per scope. To calculate the relative emissions, the absolute GHG emissions have been divided by the loans covered with a GHG footprint to calculate the relative emissions in ton CO_2-eq per million EUR.
Avoided emissions	The avoided emissions for the housing associations are not known and therefore not reported in this report. When an housing association invests in renewable energy, the electricity consumption from the energy network will reduce. Indirectly, therefore, investments in renewable energy should be reflected in a decrease of scope 2 electricity in this report.
Asset class specific considerations	For the social housing sector the methodology of asset class 'Mortgages' is followed. Energy use of financed buildings (scope 1 and 2) are covered.
Attribution	To calculate the GHG footprint following the PCAF principles, a general approach has been developed. First, GHG emissions of the different entities in the sector are

	calculated. Subsequently the Bank loan ratio of the total balance sheet is used to determine which part of the emissions BNG Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan\ volume}}{\boldsymbol{Total\ balance\ sheet\ (equity + debt)}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations have been aggregated.
Absolute vs. relative emissions	For the social housing sector the total absolute GHG emissions have been calculated in ton. The relative emissions have been calculated by dividing the absolute GHG emissions by the outstanding loan volume for which a carbon footprint has been calculated in this report. This results in ton CO_2-eq / mln Euro.
Limitations	**Scope 1 natural gas use & scope 2 electricity use** Some of the housing associations from the customers list from BNG Bank were not present in the data set of Republiq because these housing associations are not members of the Aedes trade association. For these housing associations there is no data available on the number of houses and surface area owned, and therefore no consumption data is available. This applies to the housing associations that are not affiliated with Aedes. Consumption data has only been collected from the three largest network operators. For housing associations solely operating outside the regions where these operators are active, there is no data available. Due to privacy regulations it is not possible to collect energy data for individual houses. The data has been gathered for small clusters of comparable houses. These data has been aggregated to the level of housing association. For energy consumption the standard annual consumption (in Dutch 'standaard jaarverbruik'(SJV)[35]) has been used. 'Standaard jaarverbruik' is the actual energy consumption recalculated to the expected energy consumption in a standard year. The actual energy consumption is corrected for a warmer or colder year, energy in one m^3, and the gaspressure. For electricity the emission factor Electricity (unknown source) has been used. It is unknown whether a home purchases green energy from the Netherlands. For that reason this emission factor is used. Due to more awareness about the importance of sustainable energy, the purchase of green energy from the Netherlands might increase. In that case the GHG emissions due to electricity use is overestimated by using the emission factor Electricity (unknown source). The reference data for the total surface area per housing association is 1-1-2023. This surface area is used for all three years. It is possible that for the years 2021 and 2018 the total surface area of the housing associations was different than in 2022, but this has not been taken into account. The expected renewal rate is less than 1%. An effect by change in surface area will be limited. **Scope 2 District heating** Unfortunately, Het PON & Telos has no data available regarding the allocation of houses to specific social housing associations. Therefore, the district heating per social housing association had to be estimated based on the ratio of the number of houses per social housing association versus the total number of houses of all social housing associations in one municipality. Enhancing the accuracy of the data is possible by identifying which houses are owned by specific social housing associations. This will have no effect on the GHG emissions of the sector in total but influences the GHG emissions at sector level attributed to the bank.

[35] 'Standaard jaarverbruik' is the actual energy consumption recalculated to the expected energy consumption in a standard year. The actual energy consumption is corrected for a warmer or colder year, energy in one m^3, and the gaspressure.

	The most recent data on heat used from a heating network of social housing associations available from CBS is from the year 2021. Therefore, the data on heat used from a heating network used for this report is from the year 2021 instead of 2022. The GHG emissions of the social housing corporations itself (scope 1, 2, and 3) are not included in this report.
Data quality estimate	2 Primary data on actual building energy consumption is available. According to option 1b in Table 5-14 on page 92 of the report PCAF (2022)[36] the data quality is 2. Due to privacy regulations it is not possible to collect this data for individual houses. The data is therefore collected for small clusters (10 to 15 buildings) of comparable houses, which is subsector-specific. This data has been aggregated to the level of a housing association. However, due to the specificity of energy consumption data compared to sector-specific data, the data score is 2.

Factsheet per data source used

Topic	Description
Data	Corporatiebezit Kadaster
Data files	20230125 - Corporatiebezit kadaster.csv
Data Source	Republiq
Year	2023
Last update	Not applicable
Date of download	Not applicable
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	Score 1 Data per social housing association specific.
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	A few housing associations that are customer at BNG are missing in this dataset.
Print screens	Not applicable

Topic	Description
Data	Consumption data per housing association
Data files	20230717 - Energieverbruik en energielabels woningcorporaties
Data Source	Republiq
Year	2018, 2020, 2021, and 2022
Last update	Not applicable
Date of download	Not applicable
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	Score 2 Consumption data is based on the average consumption of a cluster with similar houses

[36] https://carbonaccountingfinancials.com/standard.
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

Unit of measurement	kWh for electricity and Nm^3 for natural gas
Selections	Not applicable
Data transformation	Not applicable
Data missing	Consumption data is only available for houses located in the areas of the three largest network operators (Enexis, Stedin and Liander).
Print screens	Not applicable

Topic	Description
Data	Supply of energy to social housing corporations
Data file	Original files (datafiles received from Republiq): 20231103 - BNG_energieverbruik_woningcorporaties.xlsx
Data Source	Not applicable
Year	2018, 2020, 2021, and 2022
Last update	Not applicable
Date of download	Not applicable
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Original files: \5_Data-analyse\Woningcorporaties\Ruwe data
Data quality	Score 2 Primary data on actual building energy consumption is available. According to option 1b in Table 5-14 on page 92 of the report PCAF (2022)[37] the data quality is 2. Due to privacy regulations it is not possible to collect this data for individual houses. The data is therefore collected for small clusters (10 to 15 buildings) of comparable houses, which is subsector-specific. This data has been aggregated to the level of a housing association. However, due to the specificity of energy consumption data compared to sector-specific data, the data score is 2.
Unit of measurement	Natural gas: Nm^3 Electricity: kWh
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

Topic	Description
Data	Total balance sheet
Data files	Original files: dVi2018 H3.xlsx dVi2021 H3.xlsx Edited file: Balanstotaal 2018 en 2020.xlsx
Data Source	Inspectie Leefomgeving en Transport (ilent); Autoriteit woningcorporaties
Year	2018 and 2021. For 2018, 2018 data have been used. For 2021 and 2022, the total balance sheet of 2021 has been used. The total balance sheet of 2022 was not available yet. It is preferable to use the same year for the outstanding loan and the total balance sheet. Unfortunately this was not possible for 2022, therefore the total balance sheet of the previous year has been used.
Last update	Not applicable

[37] https://carbonaccountingfinancials.com/standard.
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

Date of download	2018: 7-10-2022 2021: 17-7-2023
Link to webpage	https://data.overheid.nl/dataset/verantwoordingsinformatie-woningcorporaties
Filters used to obtain the datafile	Sheet: data 3.1 Column B (Soort_instelling) selected on TE Column C (DAEB_Indicatie) selected on O Column D (Jaar) selected on 2018 or 2020 Column E (Balanskant) selected on PASSIVA Column F (Balanstype) selected on PASSIVA
Internal location	Original files: \5_Data-analyse\Woningcorporaties\Ruwe data Edited file: \5_Data-analyse\Woningcorporaties\Voorbewerking data For some housing associations, the annual report has been used as a source for the total balance sheet. The annual reports are located in the following folder: \5_Data-analyse\Woningcorporaties\Ruwe data\Jaarverslagen
Data quality	Score 1 Audited data per social housing association specific.
Unit of measurement	Euro
Selections	Not applicable
Data transformation	Not applicable
Data missing	For a few social housing associations total balance sheet data was missing in the used data file. For these social housing associations the total balance sheet data have been taken from the annual reports. When data of the needed year was missing, data of the previous year has been used.
Print screens	\5_Data-analyse\Woningcorporaties\Printscreens 20221007 dvi 2018 H3.png 20230717 dvi 2021 H3.png

Topic	Description
Data	Number of houses owned by housing associations per municipality
Data file	Original files: dvi2017 H2.xlsx dvi2020 H2.xlsx dvi2021 H2.xlsx Edited files: 20221021 aantal woningen 2017 aangepast 11-1-2023.xlsx 20221021 aantal woningen 2020.xlsx 20230717 aantal woningen 2021.xlsx
Data Source	Inspectie Leefomgeving en Transport (ilent); Autoriteit Woningcorporaties
Year	2017, 2020, and 2021
Last update	Not applicable
Date of download	07-17-2023
Link to webpage	https://data.overheid.nl/dataset/verantwoordingsinformatie-woningcorporaties-dvi2021-hfd2
Filters used to obtain the datafile	Filters obtained for 2017: DEAB_Indicatie: J & N; Woongelegenheid: J; Soort verhuureenheid: Huurwoning, Onzelfstandige wooneenheid; Prijsklasse: Onder huurtoeslaggrens, Boven huurtoeslaggrens, Geen prijsklasse, Betaalbaar, Goedkoop; Omschrijving: Aantal einde jaar; Zelfstandig: J & N. Filters obtained for 2020 and 2021: DEAB_Indicatie_Ultimo: J & N; Soort_Instelling_Ultimo: TI; EenheidSoort: WoonZelfst & WoonOnzelfst.
Internal location	Original files: W \5_Data-analyse\Woningcorporaties\Ruwe data

	Edited files: \5_Data-analyse\Woningcorporaties\Voorbewerking data
Data quality	Score 1 Audited data per social housing association specific.
Unit of measurement	Number of dwellings
Selections	Not applicable
Data transformation	To perform the calculations the following transformations have been done: Data of the year 2017 was transformed to the 2018 municipality division; Data of the year 2020 was transformed to the 2021 municipality division.
Data missing	Not applicable
Print screens	\5_Data-analyse\Woningcorporaties\Printscreens 20221018 dvi 2017 H2.png 20221018 dvi 2020 H2.png 20221022 dvi 2017 H1.png 20230717 dvi 2021 H2.png

List of the calculation sheets	Location
Aardgas en elektra BNG.csv Leningen woco BNG.csv Stadsverwarming woco 2017 2019 2020 2021.csv Woco passiva 2018 2020 2021.csv Woningen woningcorporaties per gemeente 2017 2019 2020 en 2021.csv Emissiefactoren.csv	\5_Data-analyse\Woningcorporaties\Tabellen voor SQL \5_Data-analyse\Emissiefactoren
20230913 script woco BNG 2022.ipynb 20230914 script woco BNG 2021.ipynb 20230914 script woco BNG 2018.ipynb	\5_Data-analyse\Woningcorporaties\Scripts
231208_pBNG.vWOCO_2018_CO2voetafdruk_Absoluut_Totaal.xlsx 231208_pBNG.vWOCO_2021_CO2voetafdruk_Absoluut_Totaal.xlsx 231212_pBNG.vWOCO_2022_CO2voetafdruk_Absoluut_Totaal.xlsx 231208_pBNG.vWOCO_2018_CO2voetafdruk_Relatief_Totaal.xslx 231208_pBNG.vWOCO_2021_CO2voetafdruk_Relatief_Totaal.xslx 231212_pBNG.vWOCO_2022_CO2voetafdruk_Relatief_Totaal.xslx 231208_pBNG.vWOCO_2018_Ratio_Lening_Passiva.xslx 20231110_pBNG.vWOCO_2021_Ratio_Lening_Passiva.xslx 231212_pBNG.vWOCO_2022_Ratio_Lening_Passiva.xslx 20231208_Emissies per m2_WOCO_BNG.xlsx	\5_Data-analyse\Woningcorporaties\Tabellen uit SQL - BNG

5 Public sector: municipalities

5.1 Results public sector: municipalities

Municipalities represent 30.8% of BNG Bank's total loan portfolio, making them the second-largest sector within the bank's loan portfolio.

5.1.1 Coverage

It has been possible to provide all municipalities with a GHG footprint. Between 2021 and 2022, the outstanding loan volume has decreased by 169 million Euro. For 2018, 2021, and 2022 the loan portfolio and coverage rate are shown in Table 5-1.

Table 5-1 Loan portfolio and coverage rate for the municipalities in 2018, 2021, and 2022.

Municipalities	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)
2022	27,061	100%	30.8%	100%
2021	27,272	100%	31.3%	99.9%
2018	26,033	100%	31.9%	99.8%

5.1.2 GHG emissions

Table 5-2 shows the GHG footprint results for the Dutch municipalities in 2018, 2021, and 2022.

Table 5-2 Absolute and relative GHG emissions for municipalities in 2018, 2021, and 2022

Source of emissions	Scope	GHG emissions (ton/year)			GHG emissions (%)			Relative GHG emissions (ton CO_2/million EUR)		
		2022	**2021**	**2018**	**2022**	**2021**	**2018**	**2022**	**2021**	**2018**
Natural gas use	Scope 1	135,032	166,203	161,209	7.2	8.8	8.0	5.0	6.1	6.2
Fossil fuel use (cars)	Scope 1	2,633	4,227	6,441	0.1	0.2	0.3	0.1	0.2	0.2
Electricity use	Scope 2	91,016	107,515	122,617	4.8	5.7	6.1	3.4	3.9	4.7
Purchased goods and services	Scope 3	1,655,593	1,608,909	1,719,668	87.9	85.3	85.6	61.2	59.1	66.2
Total		**1,884,274**	**1,886,854**	**2,009,935**	**100.0***	**100.0***	**100.0***	**69.7**	**69.3**	**77.4**
Total scope 1 and 2		**228,681**	**277,945**	**290,267**	**12.1**	**14.7**	**14.4**	**8.5**	**10.2**	**11.2**

*The sum in these columns it not always exactly 100% due to rounding per sector

Between 2021 and 2022 the absolute GHG emissions have decreased for scope 1 (natural gas use and fossil fuel use (cars)) and scope 2 electricity use. The GHG emissions for scope 3 have increased, probably because the expenses of the municipalities in the categories 3.1, 3.2, 3.5, and 3.8 (more details in paragraph 5.2.2) increased for 2022 in comparison to 2021. Higher expenses can lead to higher GHG emissions for scope 3. In total the absolute GHG emissions have decreased by 2,580 ton. The loan volume to municipalities has decreased

from 27,230 to 27,061 million Euro. The percentage of outstanding loan volume/ total balance sheet has slightly decreased in comparison to 2021 (from 28.7% to 27.4%). The relative GHG emissions has increased by 0.4 ton / million Euro. Scope 3 and the reduction in loan volume plays a role in this increase. The GHG emissions for scope 3 have increased and influence both the absolute and relative GHG emissions. Because data quality of scope 3 is poor (score 4), the conclusions based on these data are to a certain extent uncertain.

The GHG emissions per m^2 due to natural gas- (scope 1) and electricity use (scope 2) have decreased over the years from 13.7 kg CO_2-eq per m^2 to 10.9 kg CO_2-eq per m^2. The reduction between 2021 and 2022 is larger than the reduction between 2018 and 2021.

Table 5-3 GHG emissions per m^2 due to natural gas- and electricity use for municipalities in 2018, 2021, and 2022

	GHG emissions / m^2 (kg CO_2-eq)		
	2022	**2021**	**2018**
GHG emissions per m^2 due to natural gas- (scope 1) and electricity use (scope 2)	10.9	13.2	13.7

5.2 Public sector: municipalities approach

5.2.1 Scope 1 and 2

Adjustments in methodology

The methodology for calculating scope 1 and 2 for municipalities has been changed in comparison to previous years. In the previous years, per municipality the energy supply to the sector public administration and government has been used. However, the energy supply to the sector public administration and government is not exclusively used by municipalities, for example in The Hague also the national government is located. For this reason, in previous years, the percentage of employees working at municipalities versus employees working for the total sector of public administration and government has been used to estimate the energy supply to the municipality as an organization. This year, energy consumption data are based on actual consumption data from a sample set of buildings, owned by municipalities.

The method for calculating scope 2 fossil fuel use by company cars did not change in comparison to previous years.

In the previous years, GHG emissions for scope 1 natural gas use and scope 2 electricity use was subtracted from GHG emissions for scope 3 to avoid double counting. Due to the change in methodology, scope 1 and 2 cover more than only the municipality as an organization. Also rented properties such as sports halls and theaters are part of the new dataset. Scope 3 covers the activities of the municipality as an organization, whereas in de new method scope 1 natural gas use and scope 2 electricity use cover the real estate owned by the municipality. Therefore subtracting scope 1 and 2 from scope 3 would result in a negative value for scope 3, which is not possible. Therefore scope 1 natural gas use and

scope 2 electricity were not subtracted from scope 3. Compared to the previous method, scope 3 is higher, and there is a risk of double counting; however, at the moment it is not possible to solve this issue.

When the results of the previous and new method are compared, it can be seen that the GHG emissions for scope 1 have increased and the GHG emissions for scope 2 have decreased for both 2018 and 2020. It can be concluded that with the previous method the GHG emissions for scope 1 natural gas use were underestimated, whereas for scope 2 electricity use the GHG emissions were overestimated. As mentioned earlier it can also be seen that the GHG emissions for scope 3 have increased due to the double counting mentioned above. The methods for scope 1 fossil fuel use by company cars has not been changed and is therefore not discussed in this paragraph. The differences between the results of the new and previous method are presented in Table 5-4.

Table 5-4 Effect of the change in methodology on the GHG emissions

Scopes	New 2021	Previous 2021	Difference* (%)	New 2018	Previous 2018	Difference* (%)
Scope 1 Natural gas	166,203	59,153	181	161,209	77,571	108
Scope 2 Electricity	107,515	184,478	-42	122,617	209,900	-42
Scope 3	1,608,909	1,371,885	17	1,719,668	1,432,018	20

*The difference is calculated with the following formula: (New - Previous)/Previous*100

General factsheet

Topic	Description
Scopes covered	For municipalities, scope 1 natural energy use, scope 1 fossil fuel use by company cars, scope 2 electricity use, and scope 3 purchased goods and services are covered.
Portfolio covered	Data is collected for all municipalities in the Netherlands. This implies the portfolio coverage rate for this sector is 100%.
Data	For scope 1 natural gas use and scope 2 electricity use, data of 2022 has been used. For scope 1 fossil use by company cars, the calculation has been made with partial use of 2021 data. The data used in this approach comes from multiple sources. For scope 1 natural gas use and scope 2 electricity use, energy consumption data for buildings owned by municipalities has been used. Republiq provided Het PON & Telos with the energy consumption data. Republiq has used estimated values for different functions and building periods. Het PON & Telos have calculated the GHG emissions for scope 1 fossil fuel use by company cars, utilizing multiple data sources. Ideally, the liters of fuel consumed or driven kilometers by the company cars would be multiplied by the correct emission factor to result in the GHG emissions of company cars. However, data about fuel consumption or driven kilometers are not available per municipality. Therefore a calculation is performed to estimate the GHG emissions of company cars by using several data sources. Data used for this calculation is summarized here and the used calculation is explained below at the section calculation steps. Data regarding the number of employees working for SBI-code 8411 (general government administrations which includes municipalities, as well as provinces and ministries) and the data about the number of employees working for the total public administration and government services sector comes from Lisa. Lisa serves as the

	national information system for jobs in the Netherlands, housing a comprehensive database that encompasses information on all locations where paid work is conducted. The data is provided based on the 2022 municipality division. Consequently, all other utilized data has been reclassified to align with the 2022 municipality division, ensuring coverage of all municipalities present in Lisa's dataset. Data regarding the number of employees working for the provincial government organization comes from 'A&O fonds provincies'. 'A&O fonds provincies' is an organization that provides practical tools, knowledge, and subsidies for governments. This data is available on the aggregation level of provinces. Data about the number of cars owned by companies per sector comes from the Dutch Central Bureau of Statistics (CBS). The data originates from motor vehicle registration (RDW[38]), ensuring its reliability and accuracy. Data about the number of kilometers driven with a car per year comes from the Dutch Central Bureau of Statistics (CBS) and covers the average kilometers per year of a passenger car with a Dutch registration. The original data comes from the online kilometer registration (OKR) of the RDW ensuring its reliability. This data is not available for company cars.
Grid emission factors	Paragraph 2.4 contains more information on emission factors. The following emission factors from Table 2-3 have been used: - Natural gas; - Electricity (unknown source); - Passenger transport, Car, Fuel type unknown, weight class unknown.
Calculation steps	**Scope 1 natural gas and scope 2 electricity** The following steps have been performed by Republiq: 1. Inventory of buildings owned by municipalities 2. Joining consumption data 1. Inventory of buildings owned by municipalities Republiq has a dataset called 'dataset maatschappelijk vastgoed'. This dataset contains all buildings that are owned by municipalities and/or used for public functions, such as education, sports, wellbeing, and culture. Republiq has sorted out all the buildings owned by municipalities, removing those designated for residential, industrial, retail, or lodging purposes. 2. Joining consumption data For different years Republiq has estimated values available for energy consumption for different types of functions and building periods: for instance, the energy consumption for a sports center constructed in 1960. Republiq has joined these estimated values to the dataset from step 1 on the function and building period of the buildings. The result of this step is a dataset containing all buildings owned by municipalities with an estimated value for energy consumption for the years 2018, 2021, and 2022. Republiq has delivered the following data to Het PON & Telos: - Total electricity consumption (in kWh) - Total gas consumption (in Nm^3) - Surface area (m^2) The following step has been performed by Het PON & Telos: In order to make the final calculations for both Scope 1 natural gas use and Scope 2 electricity use, the total electricity and natural gas use have been multiplied by the correct emission factor (from the same year as the data). For Scope 1 Natural gas use the emission factor Natural gas (Nm^3) has been used. For Scope 2 Electricity use the emission factor Electricity from unknown sources (kWh) has been used.

[38] RDW is the holder of het vehicle registration register in the Netherlands.

	Surface area The source for the surface area data is the Basic Registration of Addresses and Buildings (BAG). The reference data for the total surface area of the buildings in possession of municipalities is 1-1-2023. This surface area is used for all three years. To calculate the GHG emissions per m^2 the total attributed GHG emissions in kg CO_2-eq for the municipalities is divided by the total surface area (m^2) of the municipalities. **Scope 1 fossil fuel for company cars** Scope 1 emissions also include the fossil fuel emissions of company cars. To calculate these emissions, the number of employees that work for the total public administrations and government services sector as well as the number of employees that work for a general government administration (SBI-code 8411: general government administrations which includes municipalities, as well as provinces and ministries), both per municipality have been used. The number of company cars used in the total public administration and government services sector is known (CBS Statline). The total number of company cars for Dutch municipalities has been multiplied by the percentage of employees working for that municipality, relative to all employees working for Dutch municipalities to result in the number of company cars per municipalities. This has been multiplied by the number of kilometers driven per company car (all fuel types) and multiplied by the emission factor for passenger transport, car, fuel type unknown, weight class unknown (Table 2-3). The GHG emissions have been divided by the factor 1000, to result in ton GHG emissions for company cars. After calculating the scope 1 and 2 GHG emissions, the total amount has been multiplied by the percentage of loans to the municipalities in the total balance sheet. When for example the percentage of the outstanding loan at BNG Bank in the total balance sheet of a municipality is 25%, 25% of scope 1 and 2 GHG emissions of that municipality has been allocated to BNG Bank. The absolute GHG emissions and relative emissions are reported per scope. To calculate the relative emissions, the absolute GHG emissions have been divided by the loans covered with a GHG footprint to calculate the relative emissions in ton CO_2-eq per million EUR. The final calculated values for scope 1 and 2 and total balance sheet have been reallocated to the municipality division of 2022, for all years calculated.
Avoided emissions	Avoided emissions are not taken into account in current calculation. There is no insight into which buildings generate (part of) their own energy.
Asset class specific considerations	The approach for municipalities is in line with the public loan approach in the PCAF methodology.
Attribution	To calculate the GHG footprint following the PCAF principles, a general approach has been developed. First, GHG emissions of the different entities in the sector are calculated. Subsequently the Bank loan ratio of the total balance sheet is used to determine which part of the emissions BNG Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan\ volume}}{\boldsymbol{Total\ balance\ sheet\ (equity + debt)}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations have been aggregated.
Absolute vs. relative emissions	For the municipalities the total absolute GHG emissions have been calculated in ton. The relative emissions have been calculated by dividing the absolute GHG emissions by the outstanding loan volume for which a carbon footprint has been calculated in this report. This results in ton CO_2-eq / mln Euro.
Limitations	**Scope 1 natural gas and scope 2 electricity**

	The energy consumption data are estimated values based on actual consumption data. While it is preferred to have actual consumption data available for all buildings owned by municipalities. Some primary school building are in possession of municipalities. It might be possible that for some primary school buildings the energy consumption is included in the GHG emissions of Municipalities and also in the education institutions. For electricity the emission factor Electricity (unknown source) has been used. It is unknown whether a municipality purchases green energy from the Netherlands. For that reason this emission factor is used. Due to more awareness about the importance of sustainable energy, the purchase of green energy from the Netherlands might increase. In that case the GHG emissions due to electricity use is overestimated by using the emission factor Electricity (unknown source). The reference data for the total surface area for the building in possession of a municipality is 1-1-2023. This surface area is used for all three years. It is possible that for the years 2021 and 2018 the total surface area of the building in possession of a municipality was different than in 2022, but this has not been taken into account. The expected renewal rate is less than 1%. An effect by change in surface area will be limited. **Scope 1 fossil fuel by company cars** There is no recorded data per municipality regarding company cars, including details such as the number of cars, car types, and fuel types. The best possible result is achieved by using the current model(s). Many municipalities are actively striving to enhance the sustainability of their operations. As part of this effort, they are focusing on transitioning their vehicle fleets more sustainable. In the calculation method in this project, this development is not visible. As a result, the GHG emissions caused by company cars are a relative rough estimate and may deviate from the actual situation due to developments in the field of making the municipalities vehicle fleet more sustainable. Besides cars, municipalities also own other means of transport, such as scooters and (electric) bikes. The use of these means of transport is not included in the calculated GHG emissions for company cars.
Data quality estimate	**Scope 1 natural gas and scope 2 electricity:** data quality score 3. The indicators for energy consumption are based on actual consumption from 2018 and 2020. For the 2021 and 2022 data, estimates have been made based on the developments in energy consumption based on trends within the sector published by CBS. **Scope 1 company cars:** data quality score 5. The GHG emissions calculations are based on average car information. Brand, model, and type are unknown and the distance traveled is based on local or regional statistical data. Therefore, data quality score is 5. See option 3b in Table 5-16 on page 106 of the report PCAF (2022)[39]

Factsheet per data source used for scope 1 and 2

Topic	Description
Data	Dataset public real estate
Data files	Dataset Maatschappelijk Vastgoed.csv
Data Source	Republiq
Year	2023
Last update	Not applicable
Date of download	Not applicable
Link to webpage	Not applicable

[39] https://carbonaccountingfinancials.com/standard.
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	Score 2 Data is obtained from Kadaster. However this data is reliable it is not 100% accurate with regard to the actual list of buildings owned by municipalities.
Unit of measurement	Not applicable
Selections	Exclude the following buildings: - Buildings not owned by municipalities - Buildings with one of the following functions: living, industrial, retail, lodging
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

Topic	Description
Data	Energy consumption public real estate
Data files	20230904 - Energieverbruik Maatschappelijk Vastgoed 2018-2022.xlsx
Data Source	Republiq
Year	2018, 2020, 2021, 2022
Last update	Not applicable
Date of download	Not applicable
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	Score 2. Data is based on actual consumption data from a sample set of buildings.
Unit of measurement	kWh for electricity and Nm^3 for gas
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

Topic	Description
Data	Supply of energy to municipalities
Data file	Original files (datafiles received from Republiq): 20230904 – BNG_energieverbruik_gemeentelijk.xlsx 20230904 – NWB_energieverbruik_gemeentelijk.xlsx 20230913 – Energieverbruik_gemeentelijk_aanvulling.xlsx Edited files: 230913_aanpassing_energiedata_gemeenten.xlsx 230913_energiedata_gemeenten.xlsx 230913_missende_gemeenten_energiedata.xlsx 230929_energiedata_gemeenten_defintief.xlsx
Data Source	Republiq
Year	2018, 2021, and 2022
Last update	Not applicable
Date of download	Not applicable
Link to webpage	Not applicable

Filters used to obtain the datafile	Not applicable
Internal location	Original files: \5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data\Gemeente Edited files: \5_Data-analyse\Gemeente en provincie scope 1 en 2\Voorbewerking data
Data quality	Score 3
Unit of measurement	Natural gas: Nm^3 Electricity: kWh
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

Topic	Description
Data	Number of employees working for the public administrations and government services sector
Data file	LISA-statistiek_(ordernr_202200020)_sector O.xlsx 20230801_LISA-statistiek_(ordernr_202200020)_sector O.xlsx LISA-statistiek_(ordernr_202300020)_sector O.xlsx
Data Source	Lisa; het werkgelegenheidsregister van Nederland
Year	2018, 2021, and 2022
Last update	June 2022; August 2023
Date of download	Data purchased on 29-06-2022; 01-08-2023
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data\Gemeente
Data quality	Score 2 Data from LISA are based on observations/measurements of all locations of companies. Self-employed persons are taken into account as well. This makes it possible to present an overview of employment on both geographic and sectoral level.
Unit of measurement	Number of employees
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\Gemeente Fwd Bestelling LISA-data (ordernummer 202200020).msg FW Bestelling LISA-data (ordernummer 202300020).msg

Topic	Description
Data	Number of employees working for a general government administration
Data file	LISA-statistiek_(ordernr_202200019)_8411.xlsx LISA-statistiek_(ordernr_202300021)_8411.xlsx
Data Source	Lisa; het werkgelegenheidsregister van Nederland
Year	2018, 2021, and 2022
Last update	June 2022; August 2023
Date of download	Data purchased on 21-06-2022 and 03-08-2023
Link to webpage	Not applicable
Filters used to obtain the datafile	SBI08-omschrijving: O-8411-Algemeen overheidsbestuur

Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data\Gemeente
Data quality	Score 2 Data from LISA are based on observations/measurements of all locations of companies. Self-employed persons are taken into account as well. This makes it possible to present an overview of employment on both geographic and sectoral level.
Unit of measurement	Number of employees
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\Gemeente FW Bestelling LISA-data (ordernummer 202200019).msg FW Bestelling LISA-data (ordernummer 202300021).msg

Topic	Description
Data	Number of employees working at provinces
Data file	20220926 berekening sbi 8411 zonder provincies_aangepast_18-1-23.xlsx in sheet: Banen provinciehoofdsteden 20230803 berekening sbi 8411 zonder provincie.xlsx in sheet: Banen provinciehoofdsteden
Data Source	A & O Fonds Provincies
Year	2018, 2021, and 2022
Last update	June 2022; August 2023
Date of download	21-09-2022; 01-08-2023
Link to webpage	https://personeelsmonitorprovincies.onderzoek.nl/index.cfm?action=main.report
Filters used to obtain the datafile	No filters used
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data\Gemeente
Data quality	Score 2 Data is directly acquired from provinces, using a questionnaire. Data quality is therefore indicated as high.
Unit of measurement	Number of employees
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\Gemeente\Banen provincie

Topic	Description
Data	Number of company cars owned by companies in the public administration and government services sector.
Data file	20231013 aantal bedrijfsautos 2017 2019 2020.xslx 20231013 aantal bedrijfsautos 2021.xlsx
Data Source	CBS Statline
Year	2017, 2020, and 2021 Data from 2017 is used for year 2018, 2020 for year 2021, 2021 for year 2022.
Last update	2017 & 2020: 24-01-2022 2021: 7-9-2023
Date of download	13-10-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81481NED/table?ts=1626174554210 https://opendata.cbs.nl/#/CBS/nl/dataset/85620NED/table?dl=975E8

Filters used to obtain th datafile	Onderwerp: Bedrijfsbestelauto's Bedrijfstakken/branches: O Openbaar bestuur en overheidsdiensten Bedrijfsgrootte/leeftijd bestelauto: Totaal Perioden: 2017, 2020, 2021
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data
Data quality	Score 2 The research method of this data can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/bezit-en-gebruik-bestelauto-s The additional research report can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/aanvullende%20onderzoeksbeschrijvingen/bezit-en-gebruik-bestelauto-s Data comes from motor vehicle registration (RDW) and data is checked on content, quality and usability by Statistics Netherlands
Unit of measurement	Number of company cars
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens 20231013 aantal bedrijfsautos 2017 2019 2020.png 20231013 aantal bedrijfsautos 2021.png

Topic	Description
Data	Average kilometers driven with a passenger car with a Dutch registration per year
Data file	20231208 km bedrijfsautos 2017 2019 2020.xslx 20231012 km bedrijfsautos 2021.xlsx
Data Source	CBS Statline
Year	2017, 2020, and 2021 Data from 2017 is used for year 2018, 2020 for year 2021, 2021 for year 2022.
Last update	2017: 10-11-2021 2020 & 2021: 11-11-2022
Date of download	2017: 23-10-2022 2020 & 2021: 26-07-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/71107ned/table?ts=1626174732075 https://opendata.cbs.nl/#/CBS/nl/dataset/85396NED/table
Filters used to obtain the datafile	Gewichtsklasse leeggewicht: Totaal Leeftijd voertuig: Totaal Tenaamstelling: Totaal Brandstofsoort: Alle brandstofsoorten Onderwerp: Gemiddelde jaarkilometrage Perioden: 2017, 2020, 2021
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data
Data quality	Score 2 The research method of this data can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/verkeersprestaties-personenauto-s The original data comes from the online kilometer registration (OKR) of the RDW. This data is reliable.
Unit of measurement	Kilometers
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\

	20231208 km bedrijfsautos 2017 2019 2020.png 20231012 km bedrijfsautos 2021.png

Topic	Description
Data	Total balance sheet municipalities
Data file	20230926 passiva 2022.xlsx
Data Source	CBS Statline
Year	2022
Last update	22-09-2023
Date of download	26-09-2023
Link to webpage	https://iv3statline.cbs.nl/#/IV3/nl/dataset/45059NED/table?ts=1691070420108
Filters used to obtain the datafile	Gemeenten: allemaal Verslagsoort: Jaarrekening Categorie: Ultimo Onderwerp: 2e plaatsing Taakveld/balanspost: Passiva
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data\Gemeente This folder also contains data from previous years: 2018: 20201014 totaal passiva per Gemeente doorgerekend 2018.xlsx Passiva 2018 heringedeeld naar 2022.xlsx 2021: 20220922 passiva gemeenten 2021 heringedeeld naar 2022.xlsx
Data quality	Score 2 High quality data. The data is directly delivered to CBS by municipalities from internal accounting systems. The data has not been edited by CBS.
Unit of measurement	Euro
Selections	Not applicable
Data transformation	Not applicable
Data missing	Data for the municipalities Almelo, Dordrecht and Twenterand is missing for 2022. Therefore data from 2021 is used for the calculations.
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\Gemeente

List of the calculation sheets	Location
Banen_sectorO_gemeente_2018_2020_2021_2022.csv LeningportefeuilleBNG_gemeente_2018_2021_2022.csv Aardgas_Elektra_Gemeente.csv Banen_gemeente_2018_2020_2021_2022.csv Passiva_gemeente_2018_2020_2021_2022.csv Emissiefactoren.csv	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Tabellen voor SQL \5_Data-analyse\Emissiefactoren
20230801 script BNG gemeente 2018.ipynb 20230801 script BNG gemeente 2021.ipynb 20230801 script BNG gemeente 2022.ipynb	\5_Data-analyse\Gemeente en provincie scope 1 en 2\SQL Scripts
231206_pBNG.vGemeente_2018_CO2voetafdruk_Absoluut_Totaal.xlsx pBNG.vGemeente_2021_CO2voetafdruk_Absoluut_Totaal.xlsx 231212_pBNG.vGemeente_2022_CO2voetafdruk_Absoluut_Totaal.xlsx 231206_pBNG.vGemeente_2018_CO2voetafdruk_Relatief_Totaal.xlsx	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Tabellen uit SQL - Gemeente – BNG

pBNG.vGemeente_2021_CO2voetafdruk_Relatief_Totaal.xlsx 231212_pBNG.vGemeente_2022_CO2voetafdruk_Relatief_Totaal.xlsx 231206_pBNG.vGemeente_2018_Ratio_Lening_Passiva.xlsx pBNG.vGemeente_2021_Ratio_Lening_Passiva.xlsx 231212_pBNG.vGemeente_2022_Ratio_Lening_Passiva.xlsx	
20230719 gemeente scope 3 2018.xlsx 20230719 gemeente scope 3 2021.xlsx 20230719 gemeente scope 3 2022.xlsx Gemeente scope 3_2018_2020_2021_2022.csv	\5_Data-analyse\Gemeente en provincie scope 3\Gemeente

5.2.2 Scope 3

Adjustments in methodology

As mentioned in paragraph 5.2.1 scope 3 has changed. In the previous method, GHG emissions for scope 1 natural gas use and scope 2 electricity use were subtracted from GHG emissions for scope 3 to avoid double counting. In Table 5-5, category 3.8 it is shown that distribution and trading of electricity, natural gas, steam and chilled air are part of category 3.8 and therefore part of scope 3. This was the reason for subtracting the GHG emissions for scope 1 natural gas use and scope 2 electricity use from scope 3.

Due to the change in methodology, scope 1 and 2 cover more than only the municipality as an organization. Also rented properties such as sports halls and theaters are part of the new dataset. Scope 3 covers all indirect emissions caused by the municipality as an organization, whereas in de new method scope 1 natural gas use and scope 2 electricity use cover the real estate owned by the municipality. Therefore subtracting scope 1 and 2 from scope 3 would result in a negative value for scope 3, which is not possible. Therefore, compared to the previous method, scope 3 is higher, and there is a risk of double counting; however, at the moment it is not possible to solve this issue. The changes in data were shown in paragraph 5.2.1 in Table 5-3.

General factsheet

Topic	Description
Scopes covered	Scope 3 covers all other indirect emissions. Some examples of scope 3 activities that are prominent in government activities include emissions from employee commuting, business travel, and outsourced contractor activities. The scope 3 emissions per municipality are unknown, but they can be estimated by the annual spending of municipalities (IV3/COFOG; classification of the function of government).
Portfolio covered	Data is collected for all municipalities in the Netherlands. This implies the coverage rate for this sector is 100%.
Data	Data about the standard business classification (‘standaard bedrijfsindeling’) comes from the Dutch Central Bureau of Statistics (CBS). CBS uses the standard business classification to classify business units by their main activity. Data regarding greenhouse gas (GHG) emissions by the Dutch economy is also sourced from the Dutch Central Bureau of Statistics (CBS). The data contains emissions of harmful substances to the air. The data is based on the environmental accounts. Environmental accounts links the system of national accounts and environmental statistics. Environmental accounts include both physical and

	monetary data on the environment. The main sources for the environmental accounts are the environmental statistics (mainly emission registrations), the energy statistics (mainly Dutch energy balance) and the national accounts. Data regarding greenhouse gas (GHG) emissions from the Dutch economy lags behind by one year, with the most recent available data being from 2021. Therefore, for scope 3 data from the years 2017, 2020, and 2021 have been used for the calculations of the years 2018, 2021, and 2022, respectively. The national accounts contain data on the monetary value of all produced goods and services in the Netherlands. These data come from the Dutch Central Bureau of Statistics (CBS). Because the GHG emissions by the Dutch economy are divided by the monetary value of all produced goods and services in the Netherlands, data of the monetary value of all produced goods and services in the Netherlands of the years 2017, 2020, and 2021 have been used for the calculations of the years 2018, 2021, and 2022, respectively. Data on the expenses of municipalities come from the Dutch Central Bureau of Statistics (CBS). The data is sourced directly from the municipalities themselves. They deliver the data directly to CBS in an uniform prescribed format. CBS does not check or edit these data. The OECD has developed the Classification of the Function of Government (COFOG), a system that categorizes government expenditure data from the System of National Accounts based on the specific purposes for which the funds are allocated.. Municipal budgets are divided into 48 tasks (second level), clustered in 9 divisions (first level). The tasks indicate the purpose of the expenditure. The following tasks are included: management and support; safety; traffic, transport and water management; economy; education; sport, culture and recreation; social domain; public health and environment; public housing, spatial planning and urban renewal. The expenditures are also classified by economic categories. These categories indicate the type of expenditure. The following categories are included: salaries and social charges; taxes; goods and services; transfers; interest and dividends; financial transactions; settlements.
Grid emission factors	No emission factors have been used from paragraph 2.4. The emissions factor (kg CO_2-eq / Euro) has been calculated by dividing the GHG emissions by the Dutch economy (kg CO_2-eq) by the monetary value of all produced goods and services in the Netherlands (Euro)
Calculation steps	For the calculation of scope 3 only one economic category is relevant: 'Goods and Services'. This category describes the expenses of municipalities on goods and services. A number of subcategories can be distinguished. The following categories have been used in the calculation of scope 3: Category 3.1 describes expenses on the purchase or sale of areal positions; Category 3.2 are the purchases of sustainable goods and services. These are goods with a lifespan longer than one year; Category 3.5 describes the insourced employees; Category 3.8 contains other goods and services, such as tools, food, and other expenses. To calculate the GHG emissions for scope 3 for municipalities, it is necessary to have a value per subcategory mentioned above (3.1, 3.2, 3.5, and 3.8) that links GHG emissions (per kg) to expenses (in Euro). To come to this value per category (in kg CO_2-eq/Euro) as a first step, the most appropriate production sector(s) (the standard business format; SBI codes; CBS) has to be linked to the four mentioned categories. In a next step, using the environmental accounts, the expenses have been linked to the emission data. First, the description of the 4 mentioned categories (3.1, 3.2, 3.5, and 3.8) has been checked.[40] According to the detailed description, the most appropriate production sector(s) has/have been linked to the category (Table 5-5). Category 3.1 has been linked to only one sectoral production category, whereas categories 3.2, 3.5, and 3.8

[40] https://findo.nl/content/30---Goederen-en-diensten

have been linked to multiple sectoral production categories. The share of each production sector per subcategory is unknown. Therefore, the researchers at Het PON & Telos have estimated the proportion of each production sector within each category. The allocation was determined using an estimate of the proportional contribution of relevant industries to the expenditure within each subcategory, as indicated in Table 5-6.

Table 5-5. The categories with the linked sectoral production category

Category	SBI code
3.1	Rental and trading real estate (L)
3.2	Industry (C); construction industry (F); wholesale and retail, and repair of motor vehicles (G); rental and trading of real estate (L); consultancy, research, rental of movable property, other services (M/N); public administration, public services and compulsory social security (O).
3.5	Consultancy, research, rental of movable property, other services (M/N); public administration, public services and compulsory social security (O).
3.8	Extraction of minerals (B); industry (C); production, distribution and trading of electricity, natural gas, steam and chilled air (D); water collection and distribution; waste and waste water management and remediation (E); rental of movable property and other services (N); public administration, public services and compulsory social security (O).

Table 5-6. The share of each production sector per subcategory

Category	Share per SBI code
3.1	100% L
3.2	20% C-F-G-L 10% M/N 10% O
3.5	50% M/N 50% O
3.8	20% B-C-D-E 10% N 10% O

Based on the method described above the composition per production sectors has been known per subcategory (in %)(A). Using the environmental accounts, the total GHG emissions has been known per production sector (in kg) and the annual monetary value per production sector has been known (in Euro). So per production sector the kg GHG emissions per Euro has been calculated (B). Knowing A and B for each subcategory the specific kg GHG emissions per Euro expenditure (C) has been calculated.

For the year 2022, this resulted in the values for kg CO_2 per Euro (C) presented in Table 5-7. To have insight in how this has changed over the years also the values used for the years 2021 and 2018 are shown.

Table 5-7 The kg CO_2 equivalent per euro that is used in the calculation

Year	2022	2021	2018
Category 3.1	0.006 kg CO_2-eq / Euro	0.006 kg CO_2-eq / Euro	0.009 kg CO_2-eq / Euro
Category 3.2	0.19 kg CO_2-eq / Euro	0.20 kg CO_2-eq / Euro	0.22 kg CO_2-eq / Euro
Category 3.5	0.03 kg CO_2-eq / Euro	0.03 kg CO_2-eq / Euro	0.03 kg CO_2-eq / Euro
Category 3.8	0.44 kg CO_2-eq / Euro	0.47 kg CO_2-eq / Euro	0.52 kg CO_2-eq / Euro

	The IV3 spending database of all municipalities has been used (CBS, Statline). From this database the categories 3.1, 3.2, 3.5, and 3.8 have been selected. Only the positive expenditures have been taken into account. The expenditure of the municipality per sub-function and category has been multiplied by the kg CO_2-eq per Euro (C). This has resulted in kg GHG emissions per expenditure (D). Per municipality these values for all the subfunctions x subcategories have been added up to result in scope 3 per municipality in kg. This has been divided by 1000 to result in ton GHG emissions. Finally, the GHG emissions have been calculated per municipality. After calculating scope 3 GHG emissions, this total amount has been multiplied by the percentage of loan of the municipalities in the total balance sheet. When for example the percentage of the outstanding loan at BNG Bank in the total balance sheet of a municipality is 25%, 25% of the scope 3 GHG emissions of that municipality has been allocated to BNG Bank. The absolute GHG emissions and relative emissions are reported per scope. To calculate the relative emissions, the absolute GHG emissions have been divided by the loans covered with a GHG footprint to calculate the relative emissions in ton CO_2-eq per million EUR. To calculate the emission factors for category 3.1, 3.2, 3.5, and 3.8 data of the years 2017, 2020, and 2021 have been used for the years 2018, 2021, and 2022, respectively. However, expenditure of the municipalities, outstanding loans, and total balance sheet of the municipalities have been used of the years 2018, 2021, and 2022 for the years 2018, 2021, and 2022, respectively.
Avoided emissions	Not applicable
Asset class specific considerations	The approach for municipalities is in line with the public loan approach in the PCAF methodology.
Attribution	To calculate the GHG footprint following the PCAF principles, a general approach has been developed. First, GHG emissions of the different entities in the sector are calculated. Subsequently the Bank loan ratio of the total balance sheet is used to determine which part of the emissions BNG Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan\ volume}}{\boldsymbol{Total\ balance\ sheet\ (equity + debt)}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations have been aggregated.
Limitations	A risk of double counting stems from that local and regional government related collaborations, companies, and projects might be included in the financial and emission reporting of municipalities and provinces. This can only be assessed by individual entities, and this has not been corrected for in this report. An uncertainty in the method described under calculations earlier in this factsheet is that the exact share of each production sector per category is unknown. It was not possible to specify this by more detailed information from several municipalities. Therefore, a share was assumed by the researchers of Het PON & Telos. Another limitation is the possible double counting in scope 1 and 2 in comparison to scope 3. It is assumed that the expenses on natural gas use and electricity use are included in the spending on category 3.8. For that reason there might be some double counting in scope 1, 2, and 3. As mentioned earlier scope 3 is not corrected for this. The emission factor (kg CO_2-eq / Euro) has been calculated with data from the years 2017, 2020, and 2021 for the years 2018, 2021, and 2022, respectively, because more recent data was not available.
Data quality estimate	Scope 3: data quality score 4. The GHG emissions are calculated based on economic activity. The expenses made in the categories 3.1, 3.2, 3.5, and 3.8 were multiplied by a value for kg CO_2-eq / Euro. The value for kg CO_2-eq / Euro has been calculated based on proxy data on the basis of country. Therefore, data quality is score 4.

Data Factsheet per datafile used

Topic	Description
Data	Standard business format: description per sectoral production category. The description of the sectoral production categories in this document is used to link categories of municipalities their finances to one or more sectoral production categories.
Data file	2022EP06 SBI Structuur.pdf
Data Source	CBS
Year	2022
Last update	2022
Date of download	31-10-2022
Link to webpage	https://www.cbs.nl/nl-nl/onze-diensten/methoden/classificaties/activiteiten/sbi-2008-standaard-bedrijfsindeling-2008/de-structuur-van-de-sbi-2008-versie-2018-update-2022
Filters used to obtain the datafile	Not applicable
Internal location	\5_Data-analyse\Gemeente en provincie scope 3\Ruwe data
Data quality	Not applicable
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 3\Printscreens\20223110 SBI codes.PNG

Topic	Description
Data	GHG emissions by the Dutch economy
Data file	20230719 emissies naar lucht 2017 2020 2021.xlsx
Data Source	CBS Statline
Year	2017, 2020, and 2021
Last update	05-12-2022
Date of download	19-07-2023
Link to webpage	https://opendata.cbs.nl/#/CBS/nl/dataset/83300NED/table?dl=5932E
Filters used to obtain the datafile	Onderwerp: Broeikasgassen (klimaatverandering); Broeikasgas-equivalent Perioden: 2017, 2020, 2021 Nederlandse economie: Economische activiteiten A, B, C, D, E, F, G-I, J, K, L, M-N, O-Q, R-U
Internal location	\5_Data-analyse\Gemeente en provincie scope 3\Ruwe data
Data quality	Score 4 The research method used to obtain the data can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/milieurekeningen Data is based on environmental accounts. Important sources for the environmental accounts are environmental statistics, such as emission registrations, energy statistics (Dutch energy balance) and a macro economic system used by CBS. It is data on the basis of country and therefore data quality score is 4.
Unit of measurement	GHG emissions: mln kilogram
Selections	Not applicable
Data transformation	Calculations made with the data are described in the section calculation steps of municipalities (scope 3).
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 3\Printscreens\ 20230719 emissies naar lucht 2017 2020 2021.png

Topic	Description
Data	The monetary value of all produced goods and services in the Netherlands
Data file	20230719 bbp 2017 2020 2021.xlsx
Data Source	CBS Statline
Year	2017, 2020, and 2021
Last update	23-06-2023
Date of download	19-07-2023
Link to webpage	https://opendata.cbs.nl/#/CBS/nl/dataset/84087NED/table?ts=1601538240382
Filters used to obtain the datafile	Perioden: 2017/2020/2021 Onderwerp: BBP vanuit de productie: Waarde prijsniveau 2015 Bruto toegevoegde waarde basisprijzen; A, B-E, B, C, D, E, F, G-I, J, K, L, M-N, O-Q, R-U
Internal location	\5_Data-analyse\Gemeente en provincie scope 3\Ruwe data
Data quality	Score 3 Based on registered production statistics. The data quality has increased due to a number of checks and control functions in the method. The research method used to obtain the data can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/nationale-rekeningen
Unit of measurement	Mln Euro
Selections	Not applicable
Data transformation	Calculations made with the data are described in the section calculation steps of municipalities (scope 3)
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 3\Printscreens\ 20230719 opbouw bbp 2017 2020 2021.png

Topic	Description
Data	Expenses of all Dutch municipalities per IV3/COFOG code
Data file	20210923 iv3 2018 gemeente.xlsx 20220922 iv3 2021 gemeente.xlsx 20230929 iv3 2022 gemeente.xlsx
Data Source	CBS Statline
Year	2018, 2021, and 2022
Last update	2018: 23-09-2019 2021: 22-09-2022 2022: 22-09-2023
Date of download	23-09-2021; 22-09-2022; 22-09-2023
Link to webpage	2018: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45042NED/table?ts=1632405676148 2021: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45054NED/table 2022: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45059NED/table?ts=1691070420108
Filters used to obtain the datafile	Onderwerp: 2e plaatsing Taakveld/balanspost: alle taakvelden 0 t/m 8 Categorie: Lasten: L3.1 grond, L3.2 Duurzame goederen, L3.5.1. Ingeleend personeel, L3.8 Overige goederen en diensten Verslagsoort: Jaarrekening
Internal location	\5_Data-analyse\Gemeente en provincie scope 3\Ruwe data\Gemeente
Data quality	Score 2 High data quality. Data is directly supplied by municipalities from internal accounting systems. Provinces deliver the data to CBS, the data has not been edited by CBS.

Unit of measurement	Euro
Selections	Not applicable
Data transformation	Not applicable
Data missing	2018: Data of municipalities 'Zederik', 'Vianen' and 'Leerdam' are missing and 2017 data is used for those municipalities. 2022: Data of municipalities 'Almelo', 'Dordrecht' and 'Twenterand' are missing, therefore 2021 data has been used for those municipalities.
Print screens	\5_Data-analyse\Gemeente en provincie scope 3\Printscreens\Gemeente

List of the calculation sheets	Location
20230719 gemeente scope 3 2018.xlsx	\5_Data-analyse\Gemeente en provincie scope 3\Gemeente
20230719 gemeente scope 3 2021.xlsx	\5_Data-analyse\Gemeente en provincie scope 3\Gemeente
20230719 gemeente scope 3 2022.xlsx	\5_Data-analyse\Gemeente en provincie scope 3\Gemeente

6 Public sector: provinces

6.1 Results public sector: provinces

The provinces represent a small share of the bank's loan portfolio with 0.5% of the total loan portfolio of BNG Bank in 2022.

6.1.1 Coverage

It has been possible to provide all provinces in the loan portfolio with a GHG footprint resulting in a 100% coverage rate. Between 2021 and 2022, the outstanding loan volume has increased by 84 million Euro. For 2018, 2021, and 2022, the loan portfolio and coverage rate are shown in Table 6-1 .

Table 6-1 Loan portfolio and coverage rate for the provinces in 2018, 2021, and 2022

Provinces	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)
2022	421	100%	0.5%	100%
2021	337	100%	0.4%	100%
2018	137	100%	0.2%	100%

6.1.2 GHG emissions

Table 6-2 shows the GHG footprint results for the provinces in 2018, 2021, and 2022.

Table 6-2 Absolute and relative GHG emissions for the provinces in 2018, 2021, and 2022

Source of emissions	Scope	GHG emissions (ton/year)			GHG emissions (%)			Relative GHG emissions (ton CO_2/million EUR)		
		2022	**2021**	**2018**	**2022**	**2021**	**2018**	**2022**	**2021**	**2018**
Natural gas use	Scope 1	159	138	93	1.2	1.3	1.7	0.4	0.4	0.7
Fossil fuel use (cars)	Scope 1	15	19	13	0.1	0.2	0.2	0.04	0.1	0.1
Electricity use	Scope 2	609	583	345	4.7	5.5	6.3	1.4	1.7	2.5
Purchased goods and services	Scope 3	12,185	9,820	4,998	94.0	93.0	91.7	28.9	29.2	36.5
Total		**12,968**	**10,560**	**5,449**	**100.0***	**100.0***	**100.0***	**30.8**	**31.4**	**39.8**
Total scope 1 and 2		**783**	**740**	**451**	**6.0**	**7.0**	**8.2**	**1.8**	**2.2**	**3.3**

*The sum in these columns it not always exactly 100% due to rounding per sector

Between 2021 and 2022 the absolute GHG emissions have increased for all scopes. In total the absolute GHG emissions have increased by 2,410 ton. This increase is mainly due to an increase in scope 3 by 2,365 ton. Because provinces represent a small sector within the loan portfolio of BNG Bank, client specific details have a large effect on the results. The percentage of outstanding loan volume / total balance sheet has increased in comparison to 2021 (from 8.3% to 9.9%). This implies that more of the GHG emissions of the client is allocated to the BNG Bank. The relative GHG emissions have decreased by 0.6 ton per

million Euro. Although the absolute GHG emissions have increased, the relative GHG emissions have decreased. Because the largest increase was established in scope 3 and data quality for scope 3 is poor (score 4), the conclusions based on these data are to a certain extent uncertain.

6.2 Public sector: provinces approach

The method to calculate scope 3 for provinces is the same as the method to calculate scope 3 for municipalities. For details about this approach see paragraph 5.2.2.
The only exception with respect to the methodology for municipalities is that the GHG emissions for scope 1 (natural gas) and scope 2 (electricity) have been subtracted from the total scope 3 emissions. This was done to avoid double counting because the expenses on natural gas use and electricity use are supposedly also included in the spending on category 3.8.

General factsheet

Topic	Description
Scopes covered	For provinces, scope 1 natural energy use, scope 1 fossil fuel use by company cars, scope 2 electricity use and scope 3 purchased goods and services are covered. Scope 1 emissions include the direct GHG emissions of the organization. For provinces, these emissions result from the use of natural gas for heating of buildings and the use of fossil fuel for cars. The exact figures for these sources are unknown per province, therefore estimations have been made using multiple calculation steps in order to achieve the best result possible. Scope 2 emissions include the indirect GHG emissions from consumption of purchased electricity, heat or steam. The heat and steam use per province is unknown and therefore scope 2 only contains the use of purchased electricity. As exact figures per province are unknown, estimations have been made using multiple calculation steps.
Portfolio covered	Data is collected for all provinces in the Netherlands. This implies the portfolio coverage rate for this sector is 100%
Data	For scope 1 natural gas use and scope 2 electricity use, data of 2022 has been used. For scope 1 fossil use by company cars, the calculation has been made with partial use of 2021 data. For provinces energy data and the liters of fuel consumed or driven kilometers by company cars are not available per province. Therefore calculations are performed based on several data sources to estimate the GHG emissions due to natural gas use, electricity use, and the use of company cars. Data used for these calculations are summarized here and the used calculations are explained below at the section calculation steps. Data regarding the number of employees working for the total public administration and government services sector comes from Lisa. Lisa is the national information system for jobs in the Netherlands and contains a database with data of all locations where paid work is done. Data regarding the number of employees working for the provincial government organization comes from 'A&O fonds provincies'. 'A&O fonds provincies' is an organization that provides practical tools, knowledge, and subsidies for governments. This data is available on the aggregation level of provinces.

	Data about the supply of energy to the sector public administration and government services comes from the Dutch Central Bureau of Statistics (CBS). The data covers the supply of electricity and natural gas to businesses and other utility buildings. The data is based on the connection register of the energy network and is therefore reliable. Data is divided by sector and region. Data about the number of company cars owned by companies per sector comes from the Dutch Central Bureau of Statistics (CBS). The data originally comes from motor vehicle registration (RDW) and is therefore reliable. Data about the number of kilometers driven with a car per year comes from the Dutch Central Bureau of Statistics (CBS) and covers the average kilometers per year of a passenger car with a Dutch registration. The original data comes from the online kilometer registration (OKR) of the RDW and is therefore reliable. This data is not available for company cars.
Grid emission factors	Paragraph 2.4 contains more information on emission factors. The following emission factors from Table 2-3 have been used: - Natural gas; - Electricity (unknown source); - Passenger transport, Car, Fuel type unknown, weight class unknown.
Calculation steps	**Scope 1 natural gas and scope 2 electricity** For the sector public administration and government services, the supply of natural gas and electricity is known (CBS) at the aggregation level of provinces and includes both provinces and other governmental authorities, such as municipalities. To calculate scope 1 and 2 for provinces, several calculation steps have been made. The number of employees that work for the total public administrations and government services sector is known on province level (Lisa), as well as the number of employees that work for the province as an organization (A&O fonds Provincies). The supply of natural gas and electricity to the public administration and government services sector is known per province (CBS). The percentage of number of employees working for each provincial organization (A&O fonds Provincies) relative to the number of employees working for the total public administrations and government services sector in each province (Lisa) has been multiplied by the supply of natural gas and electricity to the public administrations and government services sector (CBS). This results in the supply of natural gas and electricity to the province as an organization. The amount of natural gas has been multiplied by the emission factor for natural gas (Table 2-3) and the amount of electricity has been multiplied by the emission factor for electricity (unknown source; Table 2-3). The amount of GHG emissions has been divided by the factor 1000, to result in ton GHG emissions for scope 1 (natural gas) and scope 2 (electricity). **Scope 1 fossil fuel for company cars** Scope 1 emissions also include the fossil fuel emissions of company cars. For this calculation the number of employees that work for the total public administrations and government services sector at province level (Lisa) as well as the number of employees that work for the provincial organization (A&O Fonds Provincies) have been used. The number of company cars used in the total public administration and government services sector is known (CBS Statline). To calculate the total number of company cars for all the provinces together, the number of company cars used by the total public administration and government services sector has been multiplied by the percentage of employees working at the provincial organizations relative to all employees working for the Dutch public administration and government services.

	The total number of company cars for Dutch provinces has been multiplied by the percentage of employees working for that province, relative to all employees working for Dutch provinces to result in the number of company cars per provincial organization. This has been multiplied by the number of kilometers driven per company car (all fuel types) and multiplied by the emission factor for passenger transport, car, fuel type unknown, weight class unknown (Table 2-3). The GHG emissions have been divided by the factor 1000, to result in ton GHG emissions for company cars. After calculating the scope 1 and 2 GHG emissions, this total amount has been multiplied by the percentage of loan of the provinces in the total balance sheet. When for example the percentage of the outstanding loan at BNG Bank in the total balance sheet of a province is 25%, 25% of scope 1 and 2 GHG emissions of that municipality has been allocated to BNG Bank. The absolute GHG emissions and relative emissions are reported per scope. To calculate the relative emissions, the absolute GHG emissions have been divided by the loans covered with a GHG footprint to calculate the relative emissions in ton CO_2-eq per million EUR.
Avoided emissions	The description of CBS states the following: The table of natural gas and electricity supply to the public grid contains figures on the supply of electricity and natural gas to companies and other utility buildings. This includes supply through the public grid, including supply from the public grid to company grids. Electricity produced by companies themselves and used for their own consumption is therefore not included in these figures. When a province invests in renewable energy, the electricity consumption from the energy network will reduce. Indirectly, therefore, investments in renewable energy should be reflected in a decrease of scope 2 electricity in this report. In addition, local and regional public authorities can make investments that lead to avoided emissions. This is not included in this report.
Asset class specific considerations	The approach for provinces is in line with the public loan approach in the PCAF methodology.
Attribution	To calculate the GHG footprint following the PCAF principles, a general approach has been developed. First, GHG emissions of the different entities in the sector are calculated. Subsequently the Bank loan ratio of the total balance sheet is used to determine which part of the emissions BNG Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan\ volume}}{\boldsymbol{Total\ balance\ sheet\ (equity + debt)}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations have been aggregated.
Absolute vs. relative emissions	For the provinces the total absolute GHG emissions have been calculated in ton. The relative emissions have been calculated by dividing the absolute GHG emissions by the outstanding loan volume for which a carbon footprint has been calculated in this report. This results in ton CO_2-eq / mln Euro.
Limitations	**Scope 1 natural gas use and scope 2 electricity use** A risk of double counting stems from that local and regional government related collaborations, companies, and projects might be included in the financial and emission reporting provinces. This can only be assessed by individual entities, and this has not been corrected for in this report. Limitations of the current method are that the supplies of natural gas and electricity to the provinces as organization are unknown. It is therefore calculated according to the estimated number of employees working for the province and the total number of employees working for the total public administration and government services sector per province. For electricity the emission factor Electricity (unknown source) has been used. It is unknown whether a province purchases green energy from the Netherlands. For

	that reason this emission factor is used. Due to more awareness about the importance of sustainable energy, the purchase of green energy from the Netherlands might increase. In that case the GHG emissions due to electricity use is overestimated by using the emission factor Electricity (unknown source). **Scope 1 fossil fuel by company cars** There is no recorded data per province regarding company cars, including details such as the number of cars, car types, and fuel types. The best possible result is achieved by using the current model(s). Provinces are actively striving to enhance the sustainability of their operations. As part of this effort, they are focusing on transitioning their vehicle fleets more sustainable. In the calculation method in this project, this development is not visible. As a result, the GHG emissions caused by company cars are a relative rough estimate and may deviate from the actual situation due to developments in the field of making the provinces vehicle fleet more sustainable. Besides cars, municipalities also own other means of transport, such as scooters and (electric) bikes. The use of these means of transport is not included in the calculated GHG emissions for company cars.
Data quality estimate	Scope 1 natural gas and scope 2 electricity: data quality score 4. The GHG emissions are calculated based on energy supply to the public administration and government services sector at the aggregation level of provinces. This is not only energy supply to the provinces, but also other governmental authorities such as municipalities. Therefore, data is used on the basis of region and data quality score is 4. Scope 1 company cars: data quality score 5. The GHG emissions are calculated based on average car information. Brand, model, and type are unknown and distance traveled is based on local or regional statistical data. Therefore, data quality score is 5. See option 3b in Table 5-16 on page 106 of the report PCAF (2022)[41]

Factsheet per data source used

Topic	Description
Data	Number of employees working in the public administration and government services sector per province
Data file	20201001 ruwe data lisa banen overheid 2018.xlsx 20220905 ruwe data lisa banen overheid 2021.xlsx 20230801 ruwe data lisa banen overheid 2022.xlsx
Data Source	Lisa; het werkgelegenheidsregister van Nederland
Year	2018, 2021, and 2022
Last update	2022: July 2023 Last update for 2018 and 2021 unknown
Date of download	2018: 23-11-2020 2021: 05-09-2022 2022: 01-08-2023
Link to webpage	https://www.lisa.nl/data/gratis-data/overzicht-lisa-data-per-provincie
Filters used to obtain the datafile	Welke provincies: allemaal Welke jaren: 2022 Welke sectoren: Overheid Welke gegevens: Banen totaal
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data\Provincie
Data quality	Score 2 Data from LISA are based on observations/measurements of all locations of companies, and not only one company as a whole. Self-employed persons are taken into account as well. This makes it possible to present an overview of employment at every geographic and sectoral level.

[41] https://carbonaccountingfinancials.com/standard.
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

Unit of measurement	Number of people
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\Provincie\ 20201123 overzicht lisa data.png 20210705 printscreen overheidsbanen per provincie.png 20230801 aantal banen totaal overheid per provincie.png

Topic	Description
Data	Number of employees working at the province
Data file	Not applicable
Data Source	A & O Fonds Provincies
Year	2018, 2021, and 2022
Last update	June 2023
Date of download	01-08-2023
Link to webpage	https://personeelsmonitorprovincies.onderzoek.nl/index.cfm?action=main.report
Filters used to obtain the datafile	No filters used
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\Provincie\Banen provincie
Data quality	Score 2 Data is directly acquired from provinces, using a questionnaire. Data quality is therefore indicated as high.
Unit of measurement	Number of people
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\Provincie\Banen provincie

Topic	Description
Data	Supply of energy to the public administration and government services sector at the aggregation level of province
Data file	20231013 aardgas en elektriciteit provincies 2018 2021 2022.xslx
Data Source	CBS Statline
Year	2018, 2021, and 2022
Last update	13-10-2023
Date of download	13-10-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/82538NED/table?ts=1597657120347
Filters used to obtain the datafile	Onderwerp: Geleverd aardgas, geleverde elektriciteit Perioden: 2018; 2021; 2022 Regio's: Provincies Bedrijfstakken/branches: Bedrijfstakken 1e digit (SBI 2008), O Openbaar bestuur en overheidsdiensten
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data\Provincie
Data quality	Score 4. Highly reliable data, because of the registration manner. Different control and correction methods are used, which can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/leveringen-van-elektriciteit-en-aardgas-via-het-openbare-net.

	The supply of energy is not only to the province organization, but to the total public administration and government services sector at the aggregation level of provinces. Therefore, the data quality score is 4 because it is data on the basis of region.
Unit of measurement	Natural gas: 1000 Nm^3 Electricity: 1000 kWh
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\Provincie 20231013 levering aardgas en elektriciteit provincies 2018 2021 2022.png

Topic	Description
Data	Number of company cars owned by companies in the public administration and government services sector.
Data file	20231013 aantal bedrijfsautos 2017 2019 2020.xslx 20231013 aantal bedrijfsautos 2021.xlsx
Data Source	CBS Statline
Year	2017, 2020, and 2021 Data from 2017 is used for the year 2018, 2020 for the year 2021, 2021 for the year 2022.
Last update	2017, 2019, 2020: 24-01-2022 2021: 7-9-2023
Date of download	13-10-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81481NED/table?ts=1626174554210 https://opendata.cbs.nl/#/CBS/nl/dataset/85620NED/table?dl=975E8
Filters used to obtain the datafile	Onderwerp: Bedrijfsbestelauto's Bedrijfstakken/branches: O Openbaar bestuur en overheidsdiensten Bedrijfsgrootte/leeftijd bestelauto: Totaal Perioden: 2017, 2020, 2021
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data
Data quality	Score 2 The research method of this data can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/bezit-en-gebruik-bestelauto-s The additional research report can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/aanvullende%20onderzoeksbeschrijvingen/bezit-en-gebruik-bestelauto-s Data comes from motor vehicle registration (RDW) and data is checked on content, quality and usability by Statistics Netherlands
Unit of measurement	Number of company cars
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens 20231013 aantal bedrijfsautos 2017 2019 2020.png 20231013 aantal bedrijfsautos 2021.png

Topic	Description
Data	Average kilometers driven with a passenger car with a Dutch registration per year
Data file	231208 km bedrijfsautos 2017 2019 2020.xslx 231012 km bedrijfsautos 2021.xlsx
Data Source	CBS Statline

Year	2017, 2020, and 2021 Data from 2017 is used for the year 2018, 2020 for the year 2021, 2021 for the year 2022.
Last update	2017: 10-11-2021 2020 & 2021: 11-11-2022
Date of download	2017: 23-10-2022 2020 & 2021: 26-07-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/71107ned/table?ts=1626174732075 https://opendata.cbs.nl/#/CBS/nl/dataset/85396NED/table
Filters used to obtain the datafile	Gewichtsklasse leeggewicht: Totaal Leeftijd voertuig: Totaal Tenaamstelling: Bedrijf Brandstofsoort: Alle brandstofsoorten Onderwerp: Gemiddelde jaarkilometrage Perioden: 2017, 2020, 2021
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data
Data quality	Score 2 The research method of this data can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/verkeersprestaties-personenauto-s The original data comes from the online kilometer registration (OKR) of the RDW. This data is reliable.
Unit of measurement	Kilometers
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\ 20231012 km bedrijfsautos 2017 2019 2020.png 20231012 km bedrijfsautos 2021.png

Topic	Description
Data	Total balance sheet of provinces
Data file	20230925 passiva provincies 2022.xslx
Data Source	CBS Statline
Year	2022
Last update	22-09-2023
Date of download	25-09-2023
Link to webpage	https://iv3statline.cbs.nl/#/IV3/nl/dataset/45060NED/table?ts=1693216125130
Filters used to obtain the datafile	Provincies: allemaal Verslagsoort: Jaarrekening Categorie: Ultimo Onderwerp: 2e plaatsing Taakveld/balanspost: passiva
Internal location	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Ruwe data\Provincie This folder also contains data from previous years: 20220922 passiva provincies 2021.xslx 20201014 totaal passiva provincie doorgerekend 2018.xlsx
Data quality	Score 2 High quality data. The data is directly delivered to CBS by provinces from internal accounting systems. The data had not been edited by CBS.
Unit of measurement	Euro
Selections	Not applicable

Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Printscreens\Provincie Passiva provincies 2018 iv3 data_1.png Passiva provincies 2018 iv3 data_2.png Passiva provincies 2018 iv3 data_3.png Passiva provincies 2021_1.png Passiva provincies 2021_2.png Passiva provincies 2022_1.png Passiva provincies 2022_2.png Passiva provincies 2022_3.png

Topic	Description
Data	Expenses of all Dutch provinces
Data file	20210923 iv3 2018 provincie.xlsx 20220922 iv3 2021 provincie.xlsx 20230925 iv3 2022 provincie.xslx
Data Source	CBS Statline
Year	2018, 2021, and 2022
Last update	22-09-2019, 22-09-2022; 22-09-2023
Date of download	23-09-2021; 22-09-2022; 25-09-2023
Link to webpage	2018: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45043NED/table?ts=1602676730545 2021:https://iv3statline.cbs.nl/#/IV3/nl/dataset/45056NED/table?ts=1663853031768 2022: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45060NED/table?ts=1693216125130
Filters used to obtain the datafile	Onderwerp: 2e plaatsing Taakveld/balanspost: alle taakvelden 0 t/m 8 Categorie: Lasten: L3.1 grond, L3.2 Duurzame goederen, L3.5.1. Ingeleend personeel, L3.8 Overige goederen en diensten Verslagsoort: Jaarrekening
Internal location	\5_Data-analyse\Gemeente en provincie scope 3\Ruwe data\Provincie
Data quality	Score 2 High data quality. Data is directly supplied by provinces from internal accounting systems. Provinces deliver the data to CBS, the data has not been edited by CBS.
Unit of measurement	Euro
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 3\Printscreens\Provincie

Topic	Description
Data	GHG emissions by the Dutch economy
Data file	20230719 emissies naar lucht 2017 2020 2021.xlsx
Data Source	CBS Statline
Year	2017, 2020, and 2021
Last update	05-12-2022
Date of download	19-07-2023
Link to webpage	https://opendata.cbs.nl/#/CBS/nl/dataset/83300NED/table?dl=5932E
Filters used to obtain the datafile	Onderwerp: Broeikasgassen (klimaatverandering); Broeikasgas-equivalent Perioden: 2017, 2020, 2021 Nederlandse economie: Economische activiteiten A, B, C, D, E, F, G-I, J, K, L, M-N, O-Q, R-U
Internal location	\5_Data-analyse\Gemeente en provincie scope 3\Ruwe data

Data quality	Score 4 The research method used to obtain the data can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/milieurekeningen Data is based on environmental accounts. Important sources for the environmental accounts are environmental statistics, such as emission registrations, energy statistics (Dutch energy balance) and a macro economic system used by CBS. It is data on the basis of country and therefore data quality score is 4.
Unit of measurement	GHG emissions: mln kilogram
Selections	Not applicable
Data transformation	Calculations made with the data are described in the section calculation steps of municipalities (scope 3).
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 3\Printscreens\ 20230719 emissies naar lucht 2017 2020 2021.png

Topic	Description
Data	The monetary value of all produced goods and services in the Netherlands
Data file	20230719 bbp 2017 2020 2021.xlsx
Data Source	CBS Statline
Year	2017, 2020, and 2021
Last update	23-06-2023
Date of download	19-07-2023
Link to webpage	https://opendata.cbs.nl/#/CBS/nl/dataset/84087NED/table?ts=1601538240382
Filters used to obtain the datafile	Perioden: 2017/2020/2021 Onderwerp: BBP vanuit de productie: Waarde prijsniveau 2015 Bruto toegevoegde waarde basisprijzen; A, B-E, B, C, D, E, F, G-I, J, K, L, M-N, O-Q, R-U
Internal location	\5_Data-analyse\Gemeente en provincie scope 3\Ruwe data
Data quality	Score 3 Based on registered production statistics. The data quality has increased due to a number of checks and control functions in the method. The research method used to obtain the data can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/nationale-rekeningen
Unit of measurement	Mln Euro
Selections	Not applicable
Data transformation	Calculations made with the data are described in the section calculation steps of municipalities (scope 3)
Data missing	Not applicable
Print screens	\5_Data-analyse\Gemeente en provincie scope 3\Printscreens\ 20230719 opbouw bbp 2017 2020 2021.png

List of the calculation sheets	Location
Passiva_provincie_2018_2020_2021_2022.csv Banen_provincie_bijprovincie_2018_2021_2022.csv Banen_provincie_overheid_2018_2021_2022.csv LeningportefeuilleBNG_provincie_2018_2021_2022.csv Emissiefactoren.csv	\5_Data-analyse\Gemeente en provincie scope 1 en 2 \5_Data-analyse\Emissiefactoren

20230803 script BNG provincie 2018.ipynb 20230803 script BNG provincie 2021.ipynb 20230803 script BNG provincie 2022.ipynb	\5_Data-analyse\Gemeente en provincie scope 1 en 2\SQL Scripts
pBNG.vProvincie_2018_CO2voetafdruk_Absoluut_Totaal.xlsx pBNG.vProvincie_2021_CO2voetafdruk_Absoluut_Totaal.xlsx pBNG.vProvincie_2022_CO2voetafdruk_Absoluut_Totaal.xlsx pBNG.vProvinice_2018_CO2voetafdruk_Relatief_Totaal.xlsx pBNG.vProvinice_2021_CO2voetafdruk_Relatief_Totaal.xlsx pBNG.vProvinice_2022_CO2voetafdruk_Relatief_Totaal.xlsx pBNG.vProvincie_2018_Ratio_Lening_Passiva.xlsx pBNG.vProvincie_2021_Ratio_Lening_Passiva.xlsx pBNG.vProvincie_2022_Ratio_Lening_Passiva.xlsx	\5_Data-analyse\Gemeente en provincie scope 1 en 2\Tabellen uit SQL - Provincie – BNG
20230719 scope 3 provincie 2018.xlsx 20230719 scope 3 provincie 2021.xlsx 20230719 scope 3 provincie 2022.xlsx Scope 3 provincies voor SQL.csv	\5_Data-analyse\Gemeente en provincie scope 3\Provincie

7 Public sector: water authorities

7.1 Results public sector: water authorities

The water authorities represent a small share of the bank's loan portfolio with 0.2% of the total loan portfolio of BNG Bank in 2022.

7.1.1 Coverage

Is has been possible to provide all water authorities with a GHG footprint, resulting in a 100% coverage rate. The outstanding loan volume has decreased by 7 million Euro between 2021 and 2022. For 2018, 2021, and 2022, the loan portfolio and coverage rate are shown in Table 7-1.

Table 7-1 Loan portfolio and coverage rate for the water authorities in 2018, 2021, and 2022

Water authorities	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)
2022	197	100%	0.2%	100%
2021	204	100%	0.2%	100%
2018	233	100%	0.3%	100%

7.1.2 GHG emissions

Table 7-2 shows the GHG footprint results for water authorities in 2018, 2021, and 2022.

Table 7-2 Absolute and relative GHG emissions for the water authorities in 2018, 2021 and 2022

Source of emissions	Scope	GHG emissions (ton/year)			GHG emissions (%)			Relative GHG emissions (ton CO_2/million EUR)		
		2022	**2021**	**2018**	**2022**	**2021**	**2018**	**2022**	**2021**	**2018**
Direct CO_2 emissions										
Water treatment management	Scope 1									
Natural gas use		51	67	111	0.3	0.3	0.3	0.3	0.3	0.5
Other fuels		2	0	50	0.0	0.0	0.1	0.0	0.0	0.2
Water systems	Scope 1									
Natural gas use		21	28	30	0.1	0.1	0.1	0.1	0.1	0.1
Other fuels		24	21	111	0.1	0.1	0.3	0.1	0.1	0.5
Other	Scope 1									
Natural gas use		47	53	50	0.2	0.3	0.1	0.2	0.3	0.2
Other fuels		0	0	0	0.0	0.0	0.0	0.0	0.0	0.0
Own mobility, transport and maintenance	Scope 1	218	189	502	1.1	1.0	1.3	1.1	0.9	2.2
GHG sewage treatment plant	Scope 1	13,524	14,336	22,881	70.6	75.0	58.0	68.5	70.3	98.1
Indirect CO_2 emissions										
Water treatment management^	Scope 2									
Electricity		2,730	1,999	12,291	14.3	10.5	31.2	13.8	9.8	52.7
Heat		55	64	70	0.3	0.3	0.2	0.3	0.3	0.3
Water systems^	Scope 2									
Electricity		648	694		3.4	3.6		3.3	3.4	
Heat		3	0		0.0	0.0		0.0	0.0	
Other^	Scope 2									
Electricity		75	76		0.4	0.4		0.4	0.4	
Heat		0	3		0.0	0.0		0.0	0.0	
Own mobility, transport and maintenance*	Scope 2	16	4		0.1	0.0		0.1	0.0	
Commuting	Scope 3	159	115	484	0.8	0.6	1.2	0.8	0.6	2.1
Outsourced transport, and maintenance	Scope 3	884	666	1,377	4.6	3.5	3.5	4.5	3.3	5.9
Materials and raw materials	Scope 3	696	802	1,462	3.6	4.2	3.7	3.5	3.9	6.3
Total all scopes		**19,153**	**19,117**	**39,419**	**100.0#**	**100.0#**	**100.0#**	**97.0**	**93.8**	**169.0**
Total scopes 1 and 2		**17,414**	**17,534**	**36,096**	**91.0**	**91.6**	**91.6**	**88.2**	**85.9**	**154.8**

^For 2018 the indirect CO_2 emissions for water treatment management , water systems, and other are reported as one value under Water treatment management electricity and heat.

*Own mobility, transport, and maintenance was not in the data of 2018.

#The sum in these columns it not always exactly 100% due to rounding per sector

Between 2021 and 2022 the total absolute GHG emissions have increased by 36 ton. For some items the GHG emissions have increased and for other items the GHG emissions have decreased. The increase in GHG emissions for own mobility, transport and maintenance in

scope 2 is a positive result of using more electric vehicles. Commuting (scope 3) and business traveling have increased because the Corona pandemic has come to an end. The GHG emissions for the majority of the water authorities before attribution to BNG Bank have decreased between 2021 and 2022. Due to a change in clients in this sector in the loan portfolio and due to an increase in the percentage of outstanding loan volume / total balance sheet in comparison to 2021 (from 3.3% to 3.6%), the absolute and relative GHG emissions have increased for BNG Bank. Relative GHG emissions have increased by 3.2 ton CO_2 per million Euro. In conclusion, for BNG Bank the absolute and relative GHG emissions have increased.

Overall, the water authorities are making good progress in all three scopes. In the 'Klimaatmonitor Waterschappen' (Arcadis, 2023) it is shown that water authorities are making progress in solar energy generation and the production of green gas.[42] The investment in sustainable energy that has been made is clearly visible in the reduction of the GHG emissions in scope 2 when 2022 is compared with the reference year 2018. Although energy efficiency measures are taken by the water authorities, it is expected that energy consumption will further increase in the future.[43] The GHG emissions from the sewage treatment plants contain methane and nitrous oxide emissions. These emissions are determined with an IPCC model. Water authorities take actions to reduce methane and nitrous oxide emissions. However, these reductions are not yet evident through the model-based determination. The GHG emissions from the sewage treatment plants calculated for the year 2022 have been certainly overestimated. It is expected that the GHG emissions of purchased electricity will decrease coming years because more water authorities are willing to purchase electricity from renewable sources in the Netherlands. Also more water authorities have plans to make their mobility more sustainable.

7.2 Public sector: water authorities approach

7.2.1 Scope 1, 2, and 3

The climate monitor water authorities (Arcadis, 2023) forms the basis for the calculations of water authorities. This monitor is developed by Arcadis for the Unie van Waterschappen and NWB Bank. This monitor describes the emissions per scopes in detail, and per individual water authority. Therefore, the description of this approach is brief. For more information check the 'klimaatmonitor waterschappen, verslagjaar 2022' (Arcadis, 2023).[44]

Adjustments in methodology

In comparison to last year, no adjustments have been made to the methodology.

[42] Klimaatmonitor_Waterschappen_Verslagjaar_2022.pdf (nwbbank.com)
[43] Klimaatmonitor_Waterschappen_Verslagjaar_2022.pdf (nwbbank.com)
[44] Klimaatmonitor_Waterschappen_Verslagjaar_2022.pdf (nwbbank.com)

General factsheet

Topic	Description
Scopes covered	The report Climate monitor water authorities (Arcadis, 2023) covers all three scopes in detail. Table 7-3 shows the underlying themes of the scopes. All scopes presented by Arcadis in the report Climate monitor water authorities in Table 1[45] are also used for this report. Table 7-3. The different scopes included in the water authorities approach **Direct CO_2 emissions** | Water treatment management | Scope 1 Water systems | Scope 1 Other | Scope 1 Own mobility, transport and maintenance | Scope 1 GHG emissions of the sewage treatment plant | Scope 1 **Indirect CO_2 emissions** | Water treatment management | Scope 2 Water systems | Scope 2 Other | Scope 2 Own mobility, transport and maintenance | Scope 2 Commuting | Scope 3 Outsourced transport and maintenance | Scope 3 Materials and raw materials | Scope 3
Portfolio covered	Data is collected for all 21 water authorities in the Netherlands. This implies the portfolio coverage rate is 100%.
Data	Data has been used from the report Climate monitor water authorities (Arcadis, 2023). This monitor is developed by Arcadis for the Union of Water Authorities (Unie van Waterschappen) and NWB Bank. This monitor describes the emissions in the three scopes for each individual water authority in detail. For the report Climate monitor water authorities the calculations are performed by using emission factors based on 'well to wheel' (WTW). The PCAF methodology prescribes to use emission factors based on 'tank to wheel' (TTW). Therefore, Arcadis has provided Het PON & Telos with the data from the Climate monitor water authorities calculated based on 'tank to wheel' (TTW). This data can be find in the file 'Data TTW NWB bank.xlsx'. Arcadis acquired the data from water authorities via a questionnaire, in which quantitative and qualitative data have been collected.
Grid emission factors	The 'klimaatmonitor waterschappen' (Arcadis, 2023) uses the same emission factors from www.CO2emissiefactoren.nl. The only difference is that the monitor uses the 'well to wheel' (WTW) factors, and not the 'tank to wheel' factors (TTW). The PCAF harmonized approach prescribes to use the TTW values. Therefore, Arcadis has provided Het PON & Telos with the data from the Climate monitor water authorities calculated based on 'tank to wheel' (TTW).
Calculation steps	The file 'Data TTW NWB bank.xlsx' contains all TTW values. The values have been added up to result in the categories per scope that are shown in Table 7-3. For the exact calculation steps per scope, consult the Arcadis (2023) report[46]. After calculating scope 1, 2, and 3 GHG emissions, this total amount has been multiplied by the percentage of loan of the water authorities in the total balance sheet. When for example the percentage of the outstanding loan at BNG Bank in the total balance sheet of a water authority is 25%, 25% of scope 1, 2, and 3 GHG emissions of that water authority has been allocated to BNG Bank.

[46] Klimaatmonitor_Waterschappen_Verslagjaar_2022.pdf (nwbbank.com)

	The absolute GHG emissions and relative emission are reported per scope. To calculate the relative emissions, the absolute GHG emissions have been divided by the loans covered with a GHG footprint to calculate the relative emissions in ton CO_2-eq per million EUR.
Avoided emissions	Data on renewable energy use per water authority are available in the Arcadis (2023) report.[47]
Asset class specific considerations	The approach for water authorities is in line with the public loan approach in the PCAF methodology.
Attribution	To calculate the GHG footprint following the PCAF principles, a general approach has been developed. First, GHG emissions of the different entities in the sector are calculated. Subsequently the Bank loan ratio of the total balance sheet is used to determine which part of the emissions BNG Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan\ volume}}{\boldsymbol{Total\ balance\ sheet\ (equity + debt)}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations have been aggregated.
Absolute vs. relative emissions	For the water authorities, the absolute GHG emissions have been calculated in ton. The relative emissions have been calculated by dividing the absolute GHG emissions by the outstanding loan volume for which a carbon footprint has been calculated in this report. This results in ton CO_2-eq / mln Euro.
Limitations	Not all scope 3 emissions are monitored yet by the water authorities.
Data quality estimate	The GHG emissions are calculated based on data received from the water authorities themselves, but the data is not audited. Therefore, data quality score is 2. The GHG emissions of methane and nitrous oxide from sewage treatment plants have been determined based on an IPCC model. This does not take into account the individual situations of the sewage treatment plants. But, data is sectorspecific. Therefore, data quality score is 3 for scope 1 GHG emissions from the sewage treatment plant.

Factsheet per data source used

Topic	Description
Data	Fuel, heat and electricity use per water authority in TTW
Data file	Data TTW NWB bank.xlsx
Data Source	Arcadis, 2023
Year	2022
Last update	September 2023
Date of download	Received by email from Arcadis at 19-9-2023 Folder: 5_Data-analyse\Waterschappen\Ontvangen emails\RE data waterschappen.msg
Link to webpage	Not public
Filters used to obtain the datafile	Not applicable
Internal location	\5_Data-analyse\Waterschappen\Ruwe data
Data quality	Score 2 and 3 The method for water authorities is scaled into data quality level 2, because of the detailed underlying information provided in the Arcadis (2023) study. Except for the GHG emissions from the sewage treatment plant. The extent of emissions of methane and nitrous oxide from sewage treatment plants are determined based on an IPCC model. This does not take into account the individual situations of the sewage treatment plants. But, data is sectorspecific. Therefore, data quality score is 3 for scope 1 GHG emissions from the sewage treatment plant.

[47] Klimaatmonitor_Waterschappen_Verslagjaar_2022.pdf (nwbbank.com)

Unit of measurement	Multiple
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

Topic	Description
Data	Total balance sheet per water authority
Data file	230927 passiva waterschappen.xlsx
Data Source	Unie van Waterschappen, WAVES, ABF Research
Year	2022
Last update	26-9-2023
Date of download	27-9-2023
Link to webpage	https://live-waves.databank.nl/jive
Filters used to obtain the datafile	Waterschapsspiegel > Alle gegevens > Financiën > Gerealiseerd > Balans > Passiva All water authorities Year: 2022
Internal location	\5_Data-analyse\Waterschappen\Ruwe data
Data quality	Score 2 High data quality. Directly supplied by water authorities from internal accounting systems.
Unit of measurement	Euro
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Waterschappen\Printscreens\ 230927 passiva waterschappen.png

List of the calculation sheets	Location
231206 Totaaloverzicht emissies waterschappen 2022 BNG Bank.xlsx	5_Data-analyse\Waterschappen
Totaaloverzicht emissies waterschappen 2021 BNG Bank.xlsx	5_Data-analyse\Waterschappen\Vorige jaren
Totaaloverzicht emissies waterschappen 2018 BNG nieuwe indeling.xlsx	5_Data-analyse\Waterschappen\Vorige jaren

8 Healthcare sector

8.1 Results healthcare sector

The healthcare sector represents a small share of the bank's loan portfolio with 7.6% of the total loan portfolio of BNG Bank in 2022.

8.1.1 Coverage

The GHG footprint has been calculated for 95.9% of the loan portfolio within the healthcare sector in 2022 (see Table 8-1). The healthcare sector loan portfolio has decreased by 152 million Euro between 2021 and 2022. For 2018, 2021, and 2022, the loan portfolio and coverage rate are shown in Table 8-1. The coverage rate for 2018 is lower than for the other years, because energy consumption data was requested based on the loan portfolio of 31-12-2022. A few healthcare institutions that were in the loan portfolio of 31-12-2018 are missing in the loan portfolio of 31-12-2022 and therefore not included in the GHG footprint of 2018.

Table 8-1 Loan portfolio and coverage rate for the healthcare sector in 2018, 2021, and 2022

Healthcare sector	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)
2022	6,708	100%	7.6%	95.9%
2021	6,860	100%	7.9%	92.9%
2018	6,973	100%	8.5%	88.4%

8.1.2 GHG emissions

Table 8-2 shows the GHG footprint results for the healthcare sector in 2018, 2021, and 2022.

Table 8-2 Absolute and relative GHG emissions for the healthcare sector in 2018, 2021, and 2022

Source of emissions	Scope	GHG emissions (ton/year)			GHG emissions (%)			Relative GHG emissions (ton CO_2/million EUR)		
		2022	**2021**	**2018**	**2022**	**2021**	**2018**	**2022**	**2021**	**2018**
Natural gas use	Scope 1	120,441	134,769	153,476	57.9	57.6	53.8	18.7	21.1	24.9
Electricity use	Scope 2	59,719	67,608	78,711	28.7	28.9	27.6	9.3	10.6	12.8
Commuting (car, bus, tram, metro, train)	Scope 3	27,787	31,670	53,058	13.4	13.5	18.6	4.3	5.0	8.6
Total		**207,947**	**234,047**	**285,245**	**100.0***	**100.0***	**100.0***	**32.3**	**36.7**	**46.3**
Total scope 1 and 2		**180,160**	**202,377**	**232,187**	**86.5**	**86.5**	**81.4**	**28.0**	**31.7**	**37.7**

*The sum in these columns it not always exactly 100% due to rounding per sector

Between 2022 and 2021 the absolute GHG emissions have decreased for all scopes. In total the absolute GHG emissions have decreased by 26,100 ton. The largest decrease was seen for scope 1 by 14,328 ton. The part of the loans covered with a GHG footprint has increased from 6,374 to 6,432 million Euro. The percentage of outstanding loan volume / total balance sheet is almost the same in comparison to reporting year 2021 (13.3 % in 2022 and

13.4% in 2021). The total relative GHG emissions have decreased by 4.4 ton per million Euro. This shows that the decrease in outstanding loan volume with a GHG footprint cannot be the only reason for the reduction in absolute GHG emissions. In conclusion, the absolute and relative GHG emissions for the healthcare sector have decreased between reporting years 2021 and 2022.

The GHG emissions per m^2 due to natural gas- (scope 1) and electricity use (scope 2) have decreased over the years from 13.2 kg CO_2-eq per m^2 in 2018 to 9.9 kg CO_2-eq per m^2 in 2022 (see Table 8-3).

Table 8-3 GHG emissions per m^2 due to natural gas- and electricity use for the healthcare institutions in 2018, 2021, and 2022

	GHG emissions / m^2 (kg CO_2-eq)		
	2022	**2021**	**2018**
GHG emissions per m^2 due to natural gas- (scope 1) and electricity use (scope 2)	9.9	11.2	13.2

8.2 Healthcare sector approach

8.2.1 Scope 1, 2, and 3

Adjustments in methodology

Like last year, energy consumption data has been received from Republiq. Republiq requested energy consumption data from the three largest network operators in the Netherlands (Enexis, Liander and Stedin) based on cadastral parcels owned by healthcare institutions. The method for scope 1 and 2 did not change in comparison to last year, the data has only been requested again from the three network operators for all three years and some clusters might have changed. Changes in the clusters of buildings affect the energy consumption data. The method for scope 3 did also not change in comparison to last year.

When the results of the previous and new method are compared, it can be seen that the GHG emissions have decreased for all three scopes for 2021 and 2018. As expected, the differences for scope 3 are the smallest. These differences are relatively small because there is no method change for scope 3, only the covered healthcare institutions slightly changed. The differences between the results of the new and previous method are presented in Table 8-4.

Table 8-4 Effect of the change in methodology on the GHG emissions

Scopes	New 2021	Previous 2021	Difference* (%)	New 2018	Previous 2018	Difference* (%)
Scope 1 Natural gas	134,769	163,256	-17.4	153,476	200,218	-23.3
Scope 2 Electricity	67,608	84,289	-19.7	78,711	90,504	-13.0
Scope 3 Commuting	31,670	33,311	-4.9	53,058	53,733	-1.3
Coverage rate	92.9%	86.9%		88.4%	87.4%	

*The difference is calculated with the following formula: (New - Previous)/Previous*100

General factsheet

Topic	Description
Scopes covered	In the healthcare approach scope 1, 2 and part of scope 3 are covered. Scope 1 and 2 are based on energy consumption data obtained from the three largest network operators in the Netherlands (Enexis, Liander, and Stedin). Scope 3 in the current healthcare approach contains emissions from employee commuting.
Portfolio covered	The portfolio coverage rate for this sector is 84.6%
Data	Energy consumption data from healthcare institutions are obtained from three largest network operators in the Netherlands (Enexis, Liander and Stedin). Data of the total balance sheet per healthcare institute per year, are coming from CIBG; Ministerie van Volksgezondheid Welzijn en Sport. Geographically based annual averages (provinces/NUTS2) for commuting distance data is coming from the Dutch Central Bureau of Statistics (CBS). Just as the Geographically based annual averages (provinces/NUTS2) for business travel distance and distance travelled per means of transportation data.
Grid emission factors	Paragraph 2.4 contains more information on emission factors. The following emission factors from Table 2-3 have been used: - Natural gas - Electricity (unknown source) - Public Transport general (Bus/Tram/Metro average) - Train (unknown type) - Passenger transport, Car, Fuel type unknown, weight class unknown.
Calculation steps	**Scope 1 & Scope 2** Scope 1 emissions are the direct GHG emissions of the organizations. For healthcare institutions, these emissions result from the use of natural gas for heating of buildings, or for disinfection of medical tools. Scope 2 emissions include the indirect GHG emissions from the generation of purchased or acquired electricity, steam, heating or cooling consumed by the healthcare institution. Because steam, heating or cooling use per healthcare institution is unknown, scope 2 will only be based on the emissions from purchased electricity. Energy consumption data was received from three largest network operators in the Netherlands based on cadastral parcels owned by healthcare institutions. The following steps has been performed by Republiq: 1. Inventory of buildings owned by healthcare institutions 2. Request to network operators 3. Processing consumption data 4. Estimate missing consumption data

5. Joining energy class
6. Create output file

1. Inventory of buildings owned by healthcare institutions

BNG Bank has provided an overview of healthcare institutions from their portfolio. For these institutions Republiq has inventoried the properties of the healthcare institutions via Kadaster.

2. Request to network operators

Due to privacy reasons it is not allowed to provide consumption data for individual buildings. It is allowed to provide these for clusters of buildings (10 to 15 buildings). Republiq has therefore made clusters of the buildings, taking into account the owner of the buildings and the type of building. Where possible, clusters consist only of buildings of the same owner. If this is not possible, buildings of different owners have been merged into a cluster.

Clusters are made as followed:

1. The network operator has been assigned to the buildings. This has been done on the basis of address details and the area division of the operators (see: https://data.overheid.nl/dataset/gebiedsbedrijven-netbeheers-elektriciteit--gas-en-water). Republiq has only requested consumption data from the three largest network operators (Enexis, Liander and Stedin). Together they provide approximately 95% of the buildings with energy. For buildings that fall in an area of another operator Republiq has made an estimate of the energy consumption.
2. The request for data has been done at the level of unique addresses. Republiq has therefore grouped the data by zip code, house number and house number addition. The number of unique addresses has been counted per institution.
3. Republiq has made clusters of at least 15 addresses. Where possible, Republiq has created multiple clusters per institution.
4. Republiq has created joint clusters for institutions with fewer than 15 unique addresses and calculated the average surface area of the buildings per institution. Republiq has then created clusters of at least 15 buildings, in which the buildings of institutions with a comparable surface area ended up in the same cluster.

3. Processing consumption data

From the network operators Republiq has received per cluster the standard annual consumption (in Dutch standaard jaarverbruik (SJV)[48]). Republiq has divided this by the average surface of buildings from a cluster to obtain consumption data per m^2. The consumption data per m^2 has been assigned to the individual buildings belonging to a cluster.
Next, Republiq has performed a check on outliers. When the electricity consumption of an establishment was higher than 200 kWh per m^2, it has been marked as unreliable and has been replaced by an estimated value. When the natural gas consumption of an establishment was higher than 100 m^3 per m^2, it has been marked as unreliable and has been replaced by an estimated value.

4. Estimate missing consumption data

For buildings without actual energy consumption data Republiq has made use of estimated values of electricity use and natural gas use. These estimated values have been based on actual values for electricity and gas usage for the years 2018 and 2020 and are estimated for the years 2021 and 2022 according to the development in energy consumption based on trends published by CBS.

[48] 'Standaard jaarverbruik' is the actual energy consumption recalculated to the expected energy consumption in a standard year. The actual energy consumption is corrected for a warmer or colder year, energy in one m^3, and the gaspressure.

Overview per healthcare institution

For each healthcare institution Republiq has grouped the following measures:

- Total electricity consumption (in kWh)
- Total gas consumption (in Nm^3)
- Surface area (m^2)

The total energy consumption per healthcare institution has been converted into kg GHG emissions using the emission factor for electricity from unknown sources and natural gas use (see paragraph 2.4). These GHG emissions in kg have been divided by 1000 to result in GHG emissions in ton.

Surface area

The source for the surface area data is the Basic Registration of Addresses and Buildings (BAG). The reference data for the total surface area per healthcare institution is 1-1-2023. This surface area is used for all three years. To calculate the GHG emissions per m^2 the total attributed GHG emissions in kg CO_2-eq for the healthcare institutions is divided by the total surface area (m^2) of the healthcare institutions included in the GHG footprint.

Scope 3

Scope 3 should cover all other indirect emissions (not included in Scope 2). In this report, scope 3 is incomplete and only emissions from employee commuting has been included in the calculations.

From the datasets of the Ministry of Health, Welfare and Sport available for 2022 the number of employees in fulltime-equivalent (FTE) were used for the calculations.

According to the average distance a person travels per year by bus/tram/metro, train, bike, car as driver, car as passenger, foot, and other mode of transport (7 travel types), the percentage of travelling per travel type has been calculated.

The average distance a person travels per year is available at province level (CBS Statline). The average distance a person travels per year from and to work and for business is assigned to the healthcare institution based on the province in which the institution is located.

For every type of transport (except for other mode of transport), the number of employees in FTE has been multiplied by the average distance a person travels per year for work and by percentage of transport type to calculate the number of kilometer travelled per year with the travel types (except for other mode of transport).

Afterwards, the kilometers per year per travel type has been multiplied by the corresponding emission factor resulting in kilogram GHG emissions for each travel type. For car as driver and car as passenger the total kilometer travelled per year has been first divided by 1.39 (Conversion factor for travel kilometers to vehicle kilometers (the average occupancy rate of cars is 1.39 per car; CO2emissiefactoren.nl, 2022) and then this has been multiplied by the corresponding emission factor resulting in kilogram GHG emissions.

The kilogram GHG emissions for each travel type has been added up to result in scope 3. These GHG emissions in kg have been divided by 1000 to result in GHG emissions in ton.

After calculating scope 1, 2, and 3 GHG emissions, this total amount has been multiplied by the percentage of loan of the healthcare institutions in the total balance sheet. When for example the percentage of the outstanding loan at BNG Bank in the total balance sheet of a healthcare institution is 25%, 25% of scope 1, 2, and 3 GHG emissions of that healthcare institution has been allocated to BNG Bank.

The absolute GHG emissions and relative emissions are reported per scope. To calculate the relative emissions, the absolute GHG emissions have been divided by the loans covered with a GHG footprint to calculate the relative emissions in ton CO_2-eq per million EUR.

For calculation of the coverage rate only the healthcare institutions were taken into account for whom it has been able to calculate at least scope 1 **and** 2.

Avoided emissions	The avoided emissions for the healthcare sector are not known and therefore not reported in this report. When a healthcare institution invests in renewable energy, the electricity consumption from the energy network will reduce. Indirectly, therefore, investments in renewable energy should be reflected in a decrease of scope 2 electricity in this report.
Asset class specific considerations	The approach for healthcare sector is in line with the 'Commercial real estate' approach in the PCAF methodology.
Attribution	To calculate the GHG footprint following the PCAF principles, a general approach has been developed. First, GHG emissions of the different entities in the sector are calculated. Subsequently the Bank loan ratio of the total balance sheet is used to determine which part of the emissions BNG Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan\ volume}}{\boldsymbol{Total\ balance\ sheet\ (equity + debt)}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations have been aggregated.
Absolute vs. relative emissions	For the healthcare sector the total absolute GHG emissions have been calculated in ton. The relative emissions have been calculated by dividing the absolute GHG emissions by the outstanding loan volume for which a carbon footprint has been calculated in this report. This results in ton CO_2-eq / mln Euro.
Limitations	Several healthcare institutions from the loan portfolio are not included in the calculations of scopes 1, 2, and 3 because there is no information available regarding their total balance sheet. **Scope 1 & scope 2** It is not possible to assign actual consumption data to every building. For the buildings where this is not possible, Republiq has made an estimation of the consumption data. Consumption data has only been collected from the three largest network operators. For health care institutions operating solely outside the regions where these operators are active, there is no data available. Due to privacy regulations it is not possible to collect energy data for individual institutions. The data has therefore been collected for small clusters of institutions. For energy consumption the standard annual consumption (in Dutch 'standaard jaarverbruik' (SJV)[49]) has been used. 'Standaard jaarverbruik' is the actual energy consumption recalculated to the expected energy consumption in a standard year. The actual energy consumption is corrected for a warmer or colder year, energy per m^3, and the gas pressure. Therefore this energy consumption can differ from the actual energy consumption. For electricity the emission factor Electricity (unknown source) has been used. It is unknown whether a healthcare institution purchases green energy from the Netherlands. For that reason this emission factor is used. Due to more awareness about the importance of sustainable energy, the purchase of green energy from the Netherlands might increase. In that case the GHG emissions due to electricity use is overestimated by using the emission factor Electricity (unknown source). Ideally, emissions from other sources in the primary process of healthcare institutions should be taken into account as well. For example emissions of other gasses from ambulances and trauma helicopters used for medical procedures.

[49] 'Standaard jaarverbruik' is the actual energy consumption recalculated to the expected energy consumption in a standard year. The actual energy consumption is corrected for a warmer or colder year, energy in one m^3, and the gaspressure.

	Unfortunately, the data provided on these issues is insufficient to be able to make reliable estimations. Therefore, only natural gas use is taken into consideration under scope 1. The reference data for the total surface area per healthcare institution is 1-1-2023. This surface area is used for all three years. It is possible that for the years 2021 and 2018 the total surface area of the healthcare institutions was different than in 2022, but this has not been taken into account. The expected renewal rate is less than 1%. An effect by change in surface area will be limited. **Scope 3** Scope 3 should cover all other indirect emissions (not included in Scope 2). Only a small part of scope 3 is covered for the healthcare institutions. The part that is covered is based on proxy data and therefore data quality is poor. In the calculation of scope 3, the number of employees (in FTE) has a major impact on the results. The used mobility data from CBS is based on people that work 30 hours per week or more. It was not possible to choose a working week of 40 hours. So this selection of people is larger than the group of people that works between 36 and 40 hours per week (1 FTE). These mentioned factors have an effect on the data quality. Finally, there are several healthcare institutions for which only scope 1 and scope 2 are known, and scope 3 is missing. The number of Full-Time Equivalents (FTEs) is not known for every healthcare institution, leading to the absence of this scope for several of them. This results in an underestimation of the total scope 3.
Data quality estimate	**Scope 1 and 2:** data quality score 3. The GHG emissions are based as much as possible on actual building energy consumption. However, due to privacy reasons it is not allowed to provide energy consumption data for individual buildings. It is allowed to provide these for cluster of buildings (10 to 15 buildings). Where possible, clusters consisted only of buildings of the same owner. If this was not possible, buildings of different owners have been clustered. For the buildings with missing consumption data an estimation for gas and electricity has been assigned on the basis of the building period and surface class. Because the actual building energy consumption had to be clustered and in some cases for the buildings with missing data an estimation was made the data quality score is 3. **Scope 3:** data quality score 5. The GHG emissions are calculated based on average car information. Brand, model, and type are unknown and distance traveled is based on local or regional statistical data. Therefore data quality score is 5. See option 3b in Table 5-16 on page 106 of the report PCAF (2022)[50]

Factsheet per data source used

Topic	Description
Data	Cadastral parcels in ownership of healthcare institutions
Data files	UITVOER_ZORG_KVK_REPUBLIQ_20211101.xlsx
Data Source	Kadaster
Year	2021
Last update	09-12-2021
Date of download	09-12-2021
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	2

[50] https://carbonaccountingfinancials.com/standard.
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

Topic	Description
Data	Energy consumption (Enexis)
Data files	Energierapport Republiq - 20230918.xlsx
Data Source	Enexis
Year	2016-2022
Last update	18-9-2023
Date of download	18-9-2023
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	2
Unit of measurement	kWh for electricity and Nm^3 for natural gas
Selections	Not applicable
Data transformation	Not applicable
Data missing	For some clusters Republiq did not receive energy consumption data. This can have several causes: - Enexis could not find an address (this is most often the case for addresses with an add-on. For example house number 1-A); - The address is assigned to a connection for large consumption (‘grootverbruik’). Net operators are not allowed to share this data.
Print screens	Not applicable

Topic	Description
Data	Energy consumption (Liander)
Data files	Oplevering AL-24540997.xlsx
Data Source	Liander
Year	2018-2022
Last update	20-9-2023
Date of download	20-9-2023
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	2
Unit of measurement	kWh for electricity and Nm^3 for natural gas
Selections	Not applicable
Data transformation	Not applicable
Data missing	For some clusters Republiq did not receive energy consumption data. This can have several causes: - Liander could not find an address (this is most often the case for addresses with an add-on. For example house number 1-A); - The address is assigned to a connection for large consumption (grootverbruik). Net operators are not allowed to share this data.
Print screens	Not applicable

Topic	Description
Data	Energy consumption (Stedin)
Data files	Republiq1-8.xlsx
Data Source	Stedin
Year	2018-2021-2022
Last update	13-9-2023
Date of download	13-9-2023
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	2
Unit of measurement	kWh for electricity and Nm^3 for natural gas
Selections	Not applicable
Data transformation	Not applicable
Data missing	For some clusters Republiq did not receive energy consumption data. This can have several causes: - Stedin could not find an address (this is most often the case for addresses with an add-on. For example house number 1-A); - The address is assigned to a connection for large consumption (grootverbruik). Net operators are not allowed to share this data.
Print screens	Not applicable

Topic	Description
Data	Electricity use (kWh) and natural gas use (Nm^3) of some healthcare institutions
Data files	Original files: 4 files of 4 healthcare institutions 20231101 – BNG_energieverbruik_zorg.xlsx Edited files: Energiedata BNG Bank.csv 231208 Aanvulling zorginstellingen vanuit data vorig jaar BNG Bank.xlsx 231208_Energieverbruik BNG Bank_missende zorginstellingen aangevuld.xlsx 231206_Energieverbruik BNG Bank.csv
Data Source	Republiq and 4 healthcare institutions
Year	2018, 2021 and 2022
Last update	Not applicable
Date of download	Data Republiq received by MSafe at 11-10-2023 Data 4 healthcare institutions received by email at 5-10-2023. \5_Data-analyse\Zorg\Ontvangen emails
Link to webpage	Not applicable
Filters used to obtain the datafile	From original file 20231009 – BNG_energieverbruik_zorg.xlsx only columns instellingsnaam, kvk, opperlvakte, elektra_totaal, gas_totaal has been selected.
Internal location	Original files \5_Data-analyse\Zorg\Ruwe data \5_Data-analyse\Zorg\Ruwe data\Energieverbruik missende zorginstellingen Edited files \5_Data-analyse\Zorg\Voorbewerking data \5_Data-analyse\Zorg\Data voor SQL
Data quality	3

	Part of the data has been based on energy consumption data delivered by the three largest energy operators in the Netherlands for clusters of buildings, but when these data have not been available estimated values have been used based on sector specific data, therefore data quality score is 3.
Unit of measurement	kWh for electricity and Nm^3 for natural gas
Selections	Not applicable
Data transformation	Not applicable
Data missing	Energy consumption data is only available for healthcare institutions located in the areas of the three largest network operators (Enexis, Stedin, and Liander).
Print screens	\5_Data-analyse\Zorg\Printscreens Downloadsite MSafe voor datadeling tussen Republiq en Het PON & Telos energie onderwijs -zorg BNG Bank.png

Topic	Description
Data	Total balance sheet per healthcare institution
Data file	Original files: DigiMV_Origineel_Voorlopige+dataset+2022_20230724.ods 230731_Zorginstellingen BNG Bank 2022.xlsx Edited files: DigiMV2022 _Voorlopige+dataset+2022_20230724.ods 231208_Zorginstellingen BNG Bank met passiva 2022.xlsx 231020_Passiva BNG Bank 2018 en 2020.xlsx 231017_Passiva BNG Bank 2021.xlsx 231209_Passiva BNG Bank.csv
Data Source	Annual reports of healthcare institutions CIBG; Ministerie van Volksgezondheid Welzijn en Sport
Year	2018, 2021 and 2022
Last update	Not applicable
Date of download	Several dates in July – October 2023 for the annual reports of healthcare institutions 31-7-2023 for CIBG; Ministerie van Volksgezondheid Welzijn en Sport
Link to webpage	https://www.jaarverantwoordingzorg.nl/gegevens-bekijken/verantwoordingsgegevens-per-verslagjaar-datasets
Filters used to obtain the datafile	Not applicable
Internal location	Original file \5_Data-analyse\Zorg\Ruwe data \5_Data-analyse\Zorg Edited files \5_Data-analyse\Zorg\Ruwe data \5_Data-analyse\Zorg\Ruwe data\Voorgaande jaren \5_Data-analyse\Zorg\Jaarverslagen \5_Data-analyse\Zorg\Data voor SQL
Data quality	Score 2 Data is acquired from individual annual reports of the healthcare institutions. The source data in the annual report is audited. Data is acquired by CIBG from individual annual reports of healthcare institutions. The source data in the annual report is audited, the composite dataset of CIBG is not.
Unit of measurement	Euro
Selections	Not applicable
Data transformation	Not applicable
Data missing	If total balance sheet data has been missing for one of the three years (2018, 2021, and 2022), but data of one of the three years has been available this value has been used for the missing data. Data of the most recent available year has been used.
Print screens	\5_Data-analyse\Zorg\Printscreens 20230731_Database download DigiMV 2022 (voorlopige dataset).png 20230731_Download locaties datasets Volksgezondheid, Welzijn en sport.png

Topic	Description
Data	Villages and cities overview in the Netherlands
Data file	230726_Woonplaatsen_in_Nederland_2022.xlsx
Data Source	CBS, Statline
Year	2022
Last update	16-4-2022
Date of download	26-7-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/85210NED/table
Filters used to obtain the datafile	Woonplaatsen: Woonplaatsen op alfabet Onderwerp: gemeentenaam, gemeentecode, provincienaam, provinciecode
Internal location	\5_Data-analyse\Zorg\Ruwe data\CBS brontabellen
Data quality	Not applicable
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Printscreens 20230726_Woonplaatsen Nederland 2022 v1 t/m v15.png

Topic	Description
Data	Average mobility per person per year (part 1: data on province level)
Data file	Original file: 230726_Mobiliteit_per_persoon_persoonskenmerken_motieven_en_regio_s_11020 23_120249.xlsx Sheet: Mobiliteit_per_persoon_persoo Edited file: The original file is part of the PCAF-database and all calculation steps to work towards scope 3 with this file are done in the PCAF-database.
Data Source	CBS, Statline
Year	2018, 2021, and 2022
Last update	5-7-2023
Date of download	26-7-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/84713NED/table?ts=1603811773 192
Filters used to obtain the datafile	Populatie: 12 jaar of ouder Marge: waarde Regio's: provincies Reismotieven: van en naar het werk & zakelijk, beroepsmatig Persoonskenmerken: participatie: werkzaam 30 uur pw of meer Geslacht: totaal mannen en vrouwen Onderwerp: gemiddeld per persoon per jaar / afstand Perioden: 2018-2022
Internal location	\5_Data-analyse\Zorg\Ruwe data\CBS brontabellen
Data quality	Score 3 With sample surveys, such as the ODiN, information is collected from only part of the population. The estimated results based on the sample data are generally not equal to the actual values and therefore have margins of inaccuracy. For more information, see https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/onderweg-in-nederland
Unit of measurement	km
Selections	Not applicable

Data transformation	Some data was missing. See for the transformation Data missing.
Data missing	For some provinces data was missing. If possible the missing data was filled with data from a larger region of the Netherlands from data file Mobiliteit_per_persoon_persoonskenmerken_motieven_en_regio_s_09102023_125623.xlsx E.g.: the data for province of Zeeland was missing, therefore data of West-Nederland was used.
Print screens	\5_Data_analyse\Zorg\Printscreens 20230726_mobiliteit_per_persoon_afstand_perjaar_provincie.png

Topic	Description
Data	Average mobility per person per year (part 2: data on level of a region larger than province)
Data file	Original file: 230726_Mobiliteit_per_persoon_persoonskenmerken_motieven_en_regio_s_09102023_125623.xlsx Sheet: Mobiliteit_per_persoon_persoo Edited file: The original file is part of the PCAF-database and all calculation steps to work towards scope 3 with this file are done in the PCAF-database.
Data Source	CBS, Statline
Year	2018, 2021, and 2022
Last update	5-7-2023
Date of download	26-7-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/84713NED/table?ts=1603811773192
Filters used to obtain the datafile	Populatie: 12 jaar of ouder Marge: waarde Regio's: landsdelen: Noord-Nederland, Oost-Nederland, West-Nederland en Zuid-Nederland Reismotieven: van en naar het werk & zakelijk, beroepsmatig Persoonskenmerken: participatie: werkzaam 30 uur pw of meer Geslacht: totaal mannen en vrouwen Onderwerp: gemiddeld per persoon per jaar / afstand Perioden: 2018-2022
Internal location	\5_Data-analyse\Zorg\Ruwe data\CBS brontabellen
Data quality	Score 3 With sample surveys, such as the ODiN, information is collected from only part of the population. The estimated results based on the sample data are generally not equal to the actual values and therefore have margins of inaccuracy. For more information, see https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/onderweg-in-nederland
Unit of measurement	km
Selections	Not applicable
Data transformation	Not applicable
Data missing	Data in this file was used to fill up the missing values in data file: 230726_Mobiliteit_per_persoon_persoonskenmerken_motieven_en_regio_s_11020 23_120249.xlsx These steps were done in the PCAF-database.
Print screens	\5_Data_analyse\Zorg\Printscreens 20230726_mobiliteit_per_persoon_afstand_perjaar_landsdelen.png

Topic	Description
Data	Transportation methods used per person per province
Data file	230726_Mobiliteit_per_persoon_persoonskenmerken_vervoerwijzen_en_regio_s_09102023_130456.xlsx Sheet: Mobiliteit_per_persoon_persoo
Data Source	CBS, Statline
Year	2018, 2021, and 2022
Last update	5-7-2023
Date of download	26-7-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/84709NED/table?ts=1603813016233
Filters used to obtain the datafile	Populatie: 12 jaar of ouder Geslacht: totaal mannen en vrouwen Persoonskenmerken: werkzaam 30 uur pw of meer Vervoerswijzen: totaal / personenauto (bestuurder) / personenauto (passagier) / trein / bus-tram-metro / fiets / lopen / overige vervoerswijze Onderwerp: gemiddeld per persoon per jaar / afstand Periode: 2018 -2022 Marge: waarde Regio's: totalen / landsdelen / provincies / overig
Internal location	\5_Data-analyse\Zorg\Ruwe data\CBS brontabellen
Data quality	Score 3 With sample surveys, such as the ODiN, information is collected from only part of the population. The estimated results based on the sample data are generally not equal to the actual values and therefore have margins of inaccuracy. For more information, see https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/onderweg-in-nederland
Unit of measurement	km
Selections	Not applicable
Data transformation	In the sheet 'Mobiliteit_per_persoon_persoo' some data was missing for provinces. In the PCAF-database missing data was filled with data from a larger area than provinces or the value for the Netherlands.
Data missing	For the missing values the lowest possible available geographic scale level was used. E.g.: if the data for the province of Groningen is missing, than the data for Noord-Nederland (LD) was used. If that data was not available too, the data for the whole Netherlands was used.
Print screens	\5_Data_analyse\Zorg\Printscreens 20230726_mobiliteit vervoerswijzen afstand per persoon per jaar v1 t/m v4.png

Topic	Description
Data	FTE per healthcare institution
Data files	Original files: DigiMV_Origineel_Voorlopige+dtaset+2022_20230724.ods 230731_Zorginstellingen BNG Bank 2022.xlsx Edited datafiles: DigiMV2022_ Voorlopige+dtaset+2022_20230724.ods 231006_FTE zorginstellingen.xlsx 231016_FTE zorginstellingen BNG Bank 2022.xlsx 231023_FTE 2018-2020-2021 BNG Bank.xlsx 231023_FTE BNG Bank.csv
Data Source	CIBG; Ministerie van Volksgezondheid Welzijn en Sport
Year	2018-2020-2021-2022
Last update	Unknown

Date of download	31-7-2023
Link to webpage	https://www.jaarverantwoordingzorg.nl/gegevens-bekijken/verantwoordingsgegevens-per-verslagjaar-datasets
Filters used to obtain the datafile	Not applicable
Internal location	Original files: \5_Data-analyse\Zorg\Ruwe data DigiMV_Origineel_Voorlopige+dtaset+2022_20230724.ods DigiMV2022_ Voorlopige+dtaset+2022_20230724.ods \5_Data-analyse\Zorg 230731_Zorginstellingen BNG Bank 2022.xlsx Edited files: \5_Data-analyse\Zorg\Ruwe data 231016_FTE zorginstellingen BNG Bank 2022.xlsx \5_Data-analyse\Zorg\Ruwe data\Voorgaande jaren 231006_FTE zorginstellingen.xlsx 231023_FTE 2018-2020-2021 BNG Bank.xlsx \5_Data-analyse\Zorg\Dat voor SQL 231023_FTE BNG Bank.csv
Data quality	Score 2 Data is acquired by CIBG from individual annual reports of healthcare institutions. The source data in the annual report is audited, the composite dataset of CIBG is not.
Unit of measurement	FTE
Selections	Not applicable
Data transformation	Sum of personnel in paid employment, self-employed persons and hired staff.
Data missing	The source file containing Full-Time Equivalent (FTE) for 2022 contains a significant number of missing values, much more than the source files from previous years. In SQL, missing values in FTE for 2022 have been filled with FTE data from 2021 if available.
Print screens	\5_Data-analyse\Zorg\Printscreens 20230731_Database download DigiMV 2022 (voorlopige dataset).png 20230731_Download locaties datasets Volksgezondheid, Welzijn en sport.png

List of the calculation sheets	Location
231005_Leningportefeuille BNG Bank.csv 231208_Energieverbruik BNG Bank.csv 231209_Passiva BNG Bank.csv 231023_FTE BNG Bank.csv	5_Data-analyse\Zorg\Dat voor SQL
230731_Zorginstellingen BNG Bank 2022.xlsx	5_Data-analyse\Zorg
231208 BNG Bank zorg 2018.ipynb 231209 BNG Bank zorg 2021.ipynb 231209 BNG Bank zorg 2022.ipynb	5_Data-analyse\Zorg\SQL notebooks\BNG Bank
231208 BNG Bank zorg 2018.xlsx 231209 BNG Bank zorg 2021.xlsx 231212 BNG Bank zorg 2022.xlsx	5_Data-analyse\Zorg\Data uit SQL

9 Drinking water utilities

9.1 Results drinking water utilities

The drinking water utilities represent a small share of the bank's loan portfolio with 0.6% of the total loan portfolio of BNG Bank in 2022.

9.1.1 Coverage

The GHG footprint has been calculated for 94.3% of the loan portfolio within the drinking water utilities in 2022. In 2021 the calculation method for the drinking water utilities has changed and the coverage rate and GHG emissions for 2018 cannot be recalculated. For drinking water utilities the year 2020 has been chosen as reference year instead of 2018. Therefore, this sector contains the year 2020.
The loans to the drinking water utilities have decreased by 129 million Euro between 2021 and 2022. For 2020, 2021, and 2022, the loan portfolio and coverage rate are shown in Table 9-1.

Table 9-1 Loan portfolio and coverage rate for the drinking water utilities in 2020, 2021, and 2022

Drinking water utilities	Loan portfolio (million EUR)	Percentage of network sector	Percentage of all loans	Coverage rate of loan portfolio (%)
2022	548	46.4%	0.6%	94.3%
2021	677	48.0%	0.8%	87.7%
2020	686	59.3%	0.8%	88.0%

9.1.2 GHG emissions

Table 9-2 shows the GHG footprint results for the drinking water utilities in 2018, 2021, and 2022.

Table 9-2 Absolute and relative GHG emissions for the drinking water utilities in 2020, 2021 and 2022

Scope	GHG emissions (ton/year)			GHG emissions (%)			Relative GHG emissions (ton CO_2/million EUR)		
	2022	**2021**	**2020**	**2022**	**2021**	**2020**	**2022**	**2021**	**2020**
Scope 1	5,365	5,913	5,921	26.4	22.5	19.9	10.4	10.0	9.8
Scope 2	10,585	14,562	16,941	52.0	55.4	56.8	20.5	24.5	28.1
Scope 3	4,406	5,824	6,941	21.6	22.1	23.3	8.5	9.8	11.5
Total	**20,356**	**26,299**	**29,803**	**100.0***	**100.0***	**100.0***	**39.4**	**44.3**	**49.4**
Total scope 1 and 2	**15,950**	**20,475**	**22,862**	**78.3**	**77.9**	**76.7**	**30.9**	**34.5**	**37.9**

*The sum in these columns it not always exactly 100% due to rounding per sector

Between 2021 and 2022 the absolute GHG emissions have decreased for all scopes. In total the absolute GHG emissions have decreased by 5,943 ton. The part of the loans covered with a GHG footprint has decreased from 593 to 517 million Euro. The percentage of outstanding loan volume / total balance sheet has decreased in comparison to 2021 (from

10.2% to 8.4%). The latter may be one of the reasons the GHG emissions allocated to the BNG Bank has decreased. In addition, the GHG emissions per drinking water utility before attribution to BNG Bank have decreased between 2021 and 2022. The total relative GHG emissions have also decreased by 4.9 ton per million Euro. In conclusion, the absolute and relative GHG emissions have decreased for drinking water utilities.

As stated above, the GHG emissions per drinking water utility before attribution to BNG Bank have decreased between 2021 and 2022, but there is still more to achieve. The primary task of the drinking water utilities is to produce and deliver safe and reliable drinking water at acceptable costs. Drinking water utilities realize that still fossil fuels are used for purifying water and to prepare, transport, and distribute drinking water. However, a large part of the energy consumption in the drinking water chain is also the energy that is used to heat up the water at the individual households. Therefore drinking water utilities, water authorities and municipalities have to cooperate to make the drinking water chain more sustainable.

9.2 Drinking water utilities approach

9.2.1 Scope 1, 2, and 3

Adjustments in methodology

In comparison to last year, no adjustments have been made to the methodology.

The methodology of the drinking water utilities has a standard calculation approach[51]. This approach can be extended with extra options to be added to the calculation. Although this methodology to calculate the GHG footprint for drinking water utilities has been published, there are still differences in the way the different drinking water utilities calculate their own GHG footprint. One could say that the standard calculation method is a golden mean, but deviates from the real GHG footprint. Scope 3, for example is incomplete and which emissions are included in the scope 1, 2 or 3 varies between the drinking water utilities. Although the snags in the standard calculation methodology of the drinking water utilities, the standard calculation method has been used for this report in order to match the working methods of the drinking water utilities as closely as possible.

The components of the standard calculation are:

Scope 1

- CH_4 and CO_2 emissions during extraction and treatment of groundwater;
- Emissions due to natural gas use;
- Emissions due to the use of aggregates;
- Emissions caused by the company cars;
- Emissions linked to the own generation of energy;

[51] Oesterholt, F., Van den Brand, T., De Kramer, D. (2022). Berekening CO_2-voetafdruk van drinkwaterbedrijven. KWR|PCD 11|december 2022.

- Since this year (2022), drinking water utilities are allowed to compensate scope 1 GHG emissions for the CO_2 that is captured in the water softening installations[52]. This applies to drinking water utilities that use surface water. In current report this captured CO_2 is left out of the data. This coverage is not part of the GHG emissions that are presented in Table 9-2.

Scope 2
- Indirect emissions for purchased energy.

Scope 3
- (Air) Travel;
- Chemicals;
- Transport by third parties (suppliers of chemicals and materials);
- Transport of drinking water production residues;
- Purchase of drinking water and/or semi-finished product (not taken into account at sector level).

There are two clear differences between the standard calculation method of the drinking water utilities and the PCAF methodology. The first difference is that the drinking water utilities use the emission factors based on 'Well to Wheel' (WTW) for their calculations, whereas the PCAF methodology prescribes to use the emission factors based on 'Tank to Wheel' (TTW). For the methane emissions some of the drinking water utilities use 34 kg CO_2 per kg methane, while CO2emissiefactoren.nl prescribes to use 28 kg CO_2 per kg methane. The second difference is that the PCAF methodology prescribes to follow CO2emissiefactoren.nl to determine the emission factor that should be used for green energy from abroad. CO2emissiefactoren.nl prescribes to calculate with the emission factor for grey electricity instead of zero emissions as probably some drinking water utilities do. In this study the purchase of drinking water and/or semi-finished product is not taken into account in scope 3. Taking into account the purchase of drinking water would lead to double counting at sector level because drinking water utilities purchase drinking water from each other.

Vewin has collected data from the individual drinking water utilities for a national and international benchmark based on the above mentioned standard calculation method. Vewin has send the data from this benchmark to the individual drinking water utilities with the request to share their individual data with Het PON & Telos for this report. All individual drinking water utilities have been contacted by Het PON & Telos and have shared the additional data needed to perform the calculation of the GHG footprint according to the PCAF methodology.

[52]Oesterholt, F., Van den Brand, T., De Kramer, D. (2022). Berekening CO_2-voetafdruk van drinkwaterbedrijven. KWR|PCD 11|december 2022.

General factsheet

Topic	Description
Scopes covered	For the drinking water utilities approach scope 1, 2 and parts of scope 3 are covered.
Portfolio covered	The portfolio coverage rate for this sector is 94.3%.
Data	Data to calculate the GHG emissions for scope 1, 2 and 3 has been obtained from Vewin (benchmark) and the individual drinking water utilities. Total balance sheet data is taken from the annual reports of the drinking water utilities. For one drinking water utility the annual financial report was not available. The total balance sheet data of this drinking water utility has been requested from the drinking water utility itself.
Grid emission factors	Paragraph 2.4 contains more information on emission factors. The following emission factors from Table 2-3 have been used: - Natural gas - Global warming potential methane - Fuel oil (WTW) - Car (fuel and weight class unknown) - Train (train type unknown) - General public transport (metro, bus, tram) - Petrol - Diesel - LPG - Biodiesel - CNG - Bio-CNG - Grey energy (TTW) - Air travel <700 km - Air travel 700-2500 km - Air travel >2500 km - Bulk and goods transport
Calculation steps	Scope 1 contains: - CH_4 and CO_2 emissions during extraction and treatment of groundwater; - Emissions due to natural gas use; - Emissions for the use of aggregates; - Emissions of the company cars; - Emissions linked to the generation of energy; Methane emissions released during aeration has been multiplied by the global warming potential for methane (28 kg CO_2-eq / kg methane; CO2emissiefactoren.nl). The amount of natural gas used for heating has been multiplied by the emission factor for natural gas. The amount of fuel oil used for emergency aggregates has been multiplied by the emission factor for fuel oil. This emission factor is only available based on 'Well to Wheel', therefore this emission factor has been used for this calculation. To calculate the GHG emissions for the car fleet, the liters of used fuel have been multiplied by the correct emission factor or the driven kilometers have been multiplied by the emission factor for a car with an unknown fuel and weight class. To calculate the GHG emissions for train use, the travelled kilometers have been multiplied by the correct emission factor for a train of unknown type. Self-generated energy by the drinking water utilities has been mainly generated by solar panels and the emission factor is 0. The GHG emissions of the individual items of scope 1 have been added together to calculate total GHG emissions for scope 1.

	Scope 2 contains: - Indirect emissions for purchased energy. CO2emissiefactoren.nl prescribes to use the emission factor for grey electricity to calculate the GHG emissions for the purchase of green electricity from abroad. The amount of electricity purchased from abroad and the amount of purchased grey electricity have been multiplied by the emission factor for grey electricity. For green energy purchased from the Netherlands zero emissions have been included. The GHG emissions of the individual items of scope 2 have been added together to calculate total GHG emissions for scope 2. Scope 3 contains: - Commuting traffic (for some drinking water utilities); - (Air) Travel; - Chemicals; - Transport by third parties (suppliers); - Transport of drinking water production residues. For air travel the amount of kilometers have been multiplied by the correct emission factor. To calculate the GHG emissions for the use of the car, the driven kilometers have been multiplied by the emission factor for a car with an unknown fuel and weight class. To calculate the GHG emissions for train use, the travelled kilometers have been multiplied by the correct emission factor for a train of unknown type. To calculate the GHG emissions for general public transport (metro, bus, tram), the travelled kilometers have been multiplied by the correct emission factor for general public transport. The emission factors for chemicals are not described at CO2emissiefactoren.nl. Drinking water utilities obtain the emission factors for chemicals from their suppliers or from another source. There is no insight in the chemical details of each drinking water utility. Therefore, the kg CO_2 equivalent for chemicals has been used that is in the data obtained from Vewin (benchmark). It might be possible that in some cases this also includes transport of chemicals and this might lead to double counting. The GHG emissions due to transport of chemicals and other materials by third parties have been calculated by multiplying the ton-kilometers with the emission factor for bulk and goods transport. The emission factor has been used that is identified by CO2emissiefactoren.nl as being the most common. The GHG emissions due to transport of drinking water production residues are in the data obtained from Vewin (benchmark). For the Vewin benchmark this is calculated based on 'Well to Wheel'. The GHG emissions calculated based on 'Well to Wheel' have been converted to GHG emissions based on 'Tank to Wheel' by using the same method as for the GHG emissions due to transport of chemicals and other materials. The GHG emissions of the individual items of scope 3 have been added together to calculate total GHG emissions for scope 3. From one drinking water utility the total GHG emissions per scope has been shared based on 'Well to Wheel', but missed the detailed information to calculate all the individual items in scope 1, 2, and 3 based on 'Tank to Wheel'. Unfortunately, it has not been possible to make a good conversion factor based on the other drinking water utilities to convert the GHG emissions based on 'Well to Wheel' to GHG emissions based on 'Tank to Wheel'. The GHG emissions of this drinking water utility have been included in the calculation based on 'Well to Wheel' and results in an overestimation of the GHG emissions based on 'Tank to Wheel'. After calculating scope 1, 2, and 3 GHG emissions, this total amount has been multiplied by the percentage of loan of the drinking water utilities in the total balance sheet. When for example the percentage of the outstanding loan at BNG

	Bank in the total balance sheet of a drinking water utility is 25%, 25% of scope 1, 2, and 3 GHG emissions of that drinking water utility has been allocated to BNG Bank. The absolute GHG emissions and relative emissions are reported per scope. To calculate the relative emissions, the absolute GHG emissions have been divided by the loans covered with a GHG footprint to calculate the relative emissions in ton CO_2-eq per million Euro.
Avoided emissions	Drinking water utilities definitely make investments that lead to avoided emissions. For example, part of their residues are used for processes that result in avoided emissions. However, the avoided emissions are not calculated in this drinking water utilities approach. Indirectly some avoided emissions are included in the calculation when a drinking water utility generates green electricity themselves because the use of this electricity does not result in GHG emissions. So indirectly part of the avoided emissions can be find in scope 2 of the drinking water utilities.
Asset class specific considerations	The approach for drinking water utilities is in line with the public loan approach in the PCAF methodology.
Attribution	To calculate the GHG footprint following the PCAF principles, a general approach has been developed. First, GHG emissions of the different entities in the sector are calculated. Subsequently the Bank loan ratio of the total balance sheet is used to determine which part of the emissions BNG Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan\ volume}}{\boldsymbol{Total\ balance\ sheet\ (equity + debt)}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations have been aggregated.
Absolute vs. relative emissions	For the drinking water utilities the total absolute GHG emissions have been calculated in ton. The relative emissions have been calculated by dividing the absolute GHG emissions by the outstanding loan volume for which a carbon footprint has been calculated in this report. This results in ton CO_2-eq / mln Euro.
Limitations	In 2018, 2020, and 2022, the Dutch drinking water utilities have published a methodology to calculate the GHG footprint.[53] This methodology is also based on the GHG protocol. The methodology of the drinking water utilities has a standard calculation approach. This approach can be extended with extra options to be added to the calculation. Although this methodology to calculate the GHG footprint for drinking water utilities has been published, there are still differences in the way the different drinking water utilities calculate their own GHG footprint. One could say that the standard calculation method is a golden mean, but deviates from the real GHG footprint. Scope 3, for example is incomplete and which emissions are included in the scope 1, 2 or 3 varies between the drinking water utilities. A limitation is that from one drinking water utility the total GHG emissions per scope has been shared based on 'Well to Wheel', but missed the detailed information to calculate all the individual items in scope 1, 2, and 3 based on 'Tank to Wheel'. It has not been possible to make a good conversion factor based on the other drinking water utilities to convert the GHG emissions based on 'Well to Wheel' to GHG emissions based on 'Tank to Wheel'. The GHG emissions of this drinking water utility have been included in the calculation based in 'Well to Wheel' and results in an overestimation of the GHG emissions based on 'Tank to Wheel'. Scope 3 contains several limitations. As mentioned earlier, the emission factors for chemicals are not described at CO2emissiefactoren.nl. Drinking water utilities obtain the emission factors for chemicals from their suppliers or from another source. There was no insight in the chemical details of each drinking water utility. Therefore, the kg CO_2 equivalent for chemicals has been used that is in the data that has been obtained from the Vewin benchmark. It might be possible that in some cases this also includes transport of chemicals and this might lead to double counting.

[53] https://www.praktijkcodesdrinkwater.nl/opbrengst/klimaatneutraliteit/?search=klimaat

	For transport of drinking water production residues and transport of third parties, there are several uncertainties. For this report it might be possible that a different emission factor has been used than the drinking water utilities do because there are a few options at CO2emissiefactoren.nl in the bulk and goods transport category. It has been chosen to use the emission factor identified by CO2emissiefactoren.nl as being the most common. There can also be differences in what the drinking water utilities include in transport of third parties. Some only include transport of chemicals and others include more items. These details are unknown. One of the drinking water utilities in the loan portfolio is owned by and operating for two other drinking water utilities. The drinking water utility delivers a semi-finished product to two other drinking water utilities in the portfolio of BNG Bank. The GHG footprint of this drinking water utility has been included in these other drinking water utilities. The loans to this drinking water utility that delivers a semi-finished product to the other drinking water utilities has been allocated to these two drinking water utilities based of the volume of water that has been delivered to the them compared to the total volume of water delivered to 4 clients (being the 2 drinking water utilities and 2 other companies).
Data quality estimate	The GHG emissions have been calculated based on data received from the water utilities themselves, but the data is not audited. Therefore, data quality score for scope 1 and 2 is 2. The GHG emissions for scope 3 are less certain than scope 1 and 2, because traveled distances are known, but details on means of transport are sometimes missing. Therefore, data quality score is 3.

Factsheet per data source used

Topic	Description
Data	Data used to calculate scope 1, 2, and 3
Data folder	Data van waterleidingbedrijven Invulsheets Waterleidingbedrijven Klimaatvoetafdruk
Data Source	Vewin and individual drinking water utilities
Year	2022
Last update	Not applicable
Date of download	Not applicable
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Original data: \5_Data-analyse\Waterleidingbedrijven\Data van waterleidingbedrijven\Invulsheet Waterleidingbedrijven \5_Data-analyse\Waterleidingbedrijven\ Data van waterleidingbedrijven\ Klimaatvoetafdruk The original emails can be find in: \5_Data-analyse\Waterleidingbedrijven\Ontvangen emails waterleidingbedrijven
Data quality	Score 2 for scope 1 and 2 and score 3 for scope 3 Data received from drinking water utilities, but the data is not audited. Data for scope 3 is less accurate.
Unit of measurement	Several
Selections	Not applicable
Data transformation	Some data had to be converted from well to wheel to tank to wheel, see calculation section in the general factsheet.
Data missing	Some detailed data was missing. See calculation section in the general factsheet.
Print screens	Not applicable

To calculate the GHG emissions for the individual items per scope based on 'Tank to Wheel' (TTW) some extra information was requested from the drinking water utilities. In most cases this information was received by email.

Topic	Description
Data	Total balance sheet
Data folder	Jaarverslagen
Data Source	Annual reports of the individual drinking water utilities
Year	2022
Last update	Not applicable
Date of download	Not applicable
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Original data: \5_Data-analyse\Waterleidingbedrijven\Jaarverslagen
Data quality	Score 1 Data received from drinking water utilities. This data is audited by an external accountant.
Unit of measurement	Euro
Selections	Not applicable
Data transformation	Not applicable
Data missing	From one drinking water utility the total balance sheet could not be find in the annual report. The data has been received by email and was added to the Excel file of this drinking water utility.
Print screens	Not applicable

List of the calculation sheets	Location
20231220 Waterleidingbedrijven BNG Bank.xlsx	5_Data-analyse\Waterleidingbedrijven\Berekeningen
20231016 Volume verdeling WRK.xlsx	5_Data-analyse\Waterleidingbedrijven\Berekeningen
20221221 Waterleidingbedrijven BNG Bank na correctie.xlsx	5_Data-analyse\Waterleidingbedrijven\Berekeningen
Rekensheet waterleidingbedrijven BNG 2021 met aanpassingen.xlsx	5_Data-analyse\Waterleidingbedrijven\Berekeningen

10 Educational institutions

10.1 Results educational institutions

The education sector represents a small share of the bank's loan portfolio with 1.2% of the bank's loan portfolio in 2022.

10.1.1 Coverage

The GHG footprint has been calculated for 62.2% of the loan portfolio within the education institutions in 2022 (see Table 10-1). The education loan portfolio has increased by 64 million Euro between 2021 and 2022. For 2018, 2021, and 2022, the loan portfolio and coverage rate are shown in Table 10-1. The coverage rate for 2018 is lower than for the other years, because energy consumption data was requested based on the loan portfolio of 31-12-2022. A few educational institutions that were in the loan portfolio of 31-12-2018 are missing in the loan portfolio of 31-12-2022 and therefore not included in the GHG footprint of 2018.

Table 10-1 Loan portfolio and coverage rate for the educational institutions in 2018, 2021, and 2022

Educational institutions	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)
2022	1057	100%	1.2%	62.2%
2021	993	100%	1.1%	64.6%
2018	954	100%	1.2%	55.6%

10.1.2 GHG emissions

Table 10-2 shows the GHG footprint results for the education institutions in 2018, 2021, and 2022.

Table 10-2 Absolute and relative GHG emissions for the educational institutions in 2018, 2021, and 2022

Source of emissions	Scope	GHG emissions (ton/year)			GHG emissions (%)			Relative GHG emissions (ton CO_2/million EUR)		
		2022	**2021**	**2018**	**2022**	**2021**	**2018**	**2022**	**2021**	**2018**
Natural gas use	Scope 1	8,066	9,714	9,453	62.4	62.4	59.4	12.3	15.2	17.8
Electricity use	Scope 2	4,853	5,856	6,469	37.6	37.6	40.6	7.4	9.1	12.2
Total		**12,919**	**15,570**	**15,922**	**100.0***	**100.0***	**100.0***	**19.6**	**24.3**	**30.0**

*The sum in these columns it not always exactly 100% due to rounding per sector

Between 2021 and 2022 the absolute GHG emissions have decreased for all scopes. The scopes have decreased by 2,651 ton. This increase is mainly due to a decrease of scope 1 natural gas use by 1648 ton. The part of the loans covered with a GHG footprint has increased from 641 to 657 million Euro. The percentage of outstanding loan volume / total balance sheet has decreased in comparison to 2021 (from 10.4% to 9.6%). The total relative GHG emissions have decreased in 2022 by 4.7 ton per million Euro in comparison to 2021. In conclusion the absolute and relative GHG emissions have decreased.

The GHG emissions per m^2 due to natural gas- (scope 1) and electricity use (scope 2) have decreased between 2018 and 2022 (see Table 10-3).

Table 10-3 GHG emissions per m^2 due to natural gas- and electricity use for the education institutions in 2018, 2021, and 2022

	GHG emissions / m^2 ($kg\ CO_2$-eq)		
	2022	**2021**	**2018**
GHG emissions per m^2 due to natural gas- (scope 1) and electricity use (scope 2)	3.0	3.7	4.4

10.2 Educational institutions approach

10.2.1 Scope 1 and 2

Adjustments in methodology

Previous years, the GHG emissions were calculated by using cost for energy and water per educational institution. Several calculation steps and assumptions were necessary to convert the costs for energy and water into estimates for electricity and natural gas use. For the calculations of the year 2022, the methodology was improved for scope 1 and 2. Energy data has been received from Republiq. Republiq requested energy consumption data from the three largest network operators in the Netherlands (Enexis, Liander and Stedin) based on cadastral parcels owned by educational institutions. The new method should lead to more accurate GHG emission estimates.

The differences between the results of the new and previous method are presented in Table 10-4. It can be seen that scope 1 was overestimated with the old method and scope 2 was underestimated. In the old method the costs for energy and water was the starting point of the calculation. One assumption was the distribution of costs between natural gas and electricity. It seems according to the new method that this distribution was not correct. In addition, for 2018, the reduction in coverage rate influences the difference between old and previous results as well.

Table 10-4 Effect of the change in methodology on the GHG emissions

Scopes	New 2021	Previous 2021	Difference * (%)	New 2018	Previous 2018	Difference * (%)
Scope 1	9,714	12,206	-20.4	9,453	14,828	-36.2
Scope 2	5,856	14,001	-58.2	6,469	19,090	-66.1
Coverage rate	64.6%	62.7%		55.6%	65.7%	

*The difference is calculated with the following formula: (New - Previous)/Previous*100

General factsheet

Topic	Description
Scopes covered	The education sector covers scope 1 and 2. Scope 1 emissions are the direct GHG emissions. These emissions result from the use of natural gas for heating buildings, or other purposes. Scope 2 emissions include the indirect GHG emissions from consumption of purchased electricity, heat or steam. The heat and steam use per educational organization is unknown. Scope 2 therefore only includes purchased electricity.
Portfolio covered	The portfolio coverage rate for this sector is 61.6%.
Data	Energy consumption data from educational institutions are obtained from three largest network operators in the Netherlands (Enexis, Liander and Stedin). Data of the total balance sheet per educational institute per year, are coming from DUO, the Dutch Education Service of Ministry of Education, Culture and Science.
Grid emission factors	Paragraph 2.4 contains more information on emission factors. The following emission factors from Table 2-3 have been used: - Natural gas - Electricity (Unknown source)
Calculation steps	The following steps has been performed by Republiq: 1. Inventory of buildings owned by educational institutions; 2. Request to network operators; 3. Processing consumption data; 4. Estimate missing consumption data; *1. Inventory of buildings owned by educational institutions* Republiq has made a list of all buildings that are owned by the educational institutions that are client at BNG Bank. To make this list for primary and secondary schools, Republiq made use of sources of DUO (Dienst Uitvoering Onderwijs). For some missing primary and secondary schools and for higher education, Republiq has manually looked up which buildings are used by the educational institutions or Republiq has obtained these data from Kadaster. *2. Request to network operators* Due to privacy reasons it is not allowed to provide consumption data for individual buildings. It is allowed to provide these for clusters of buildings (10 to 15 buildings). Republiq therefore has made clusters of the buildings, taking into account the owner of the buildings and the type of building. Where possible, clusters consist only of buildings of the same owner. If this is not possible, buildings of different owners have been merged into a cluster. Clusters are made as followed: a. The network operator has been assigned to the buildings. This has been done on the basis of address details and the area division of the operators (see: https://data.overheid.nl/dataset/gebiedsbedrijven-netbeheers-elektriciteit--gas-en-water). Republiq has only requested consumption data from the three largest network operators (Enexis, Liander and Stedin). These operators provide approximately 95% of the buildings with energy. For buildings that fall in an area of another operator Republiq has estimated the consumption. b. The request for energy consumption data at the three operators is at the level of unique addresses. Republiq has therefore grouped the data by zip code, house number and house number addition. The number of unique addresses has been counted per education institution.

c. Republiq has made clusters of at least 15 addresses. Where possible, Republiq has created multiple clusters per institution.
d. Republiq has created joint clusters for institutions with fewer than 15 unique addresses and has calculated the average surface area of the buildings per institution. Then clusters has been created of at least 15 buildings, in which the buildings of institutions with a comparable surface area ended up in the same cluster.

3. Processing consumption data

From the network operators Republiq has received per cluster the standard annual consumption (in Dutch: standaard jaarverbruik (SJV)[54]). Republiq has divided this by the average surface of buildings from a cluster to obtain consumption data per m^2. The consumption data per m^2 has been assigned to the individual buildings belonging to a cluster.
Next, Republiq has performed a check on outliers. When the electricity consumption of an establishment was higher than 200 kWh per m^2, Republiq has marked this as unreliable and has replaced this value with an estimated value. When the natural gas consumption of an establishment was higher than 100 m^3 per m^2, Republiq has marked this as unreliable and has replaced this value with an estimated value.

4. Estimate missing consumption data

For buildings without actual energy consumption data Republiq has made use of estimated values of electricity use and natural gas use. These estimated values have been based on actual values for electricity and gas usage for the years 2018 and 2020 and are estimated for the years 2021 and 2022 according to the development in energy consumption based on trends published by CBS.

Overview per educational institution

For each educational institution Republiq has grouped the following measures:
- Total electricity consumption (in kWh)
- Total gas consumption (in Nm^3)
- Surface area (m^2)

The total energy consumption per educational institution has been converted into kg GHG emissions using the emission factor for electricity from unknown sources and natural gas use (see paragraph 2.4). These GHG emissions in kg have been divided by 1000 to result in GHG emissions in ton.

After calculating the scope 1 and 2 GHG emissions, this total amount has been multiplied by the percentage of loan of the educational institutions in the total balance sheet. When for example the percentage of the outstanding loan at BNG Bank in the total balance sheet of an educational institution is 25%, 25% of scope 1 and 2 GHG emissions of that healthcare institution has been allocated to BNG Bank.

The absolute GHG emissions and relative emissions are reported per scope. To calculate the relative emissions, the absolute GHG emissions have been divided by the loans covered with a GHG footprint to calculate the relative emissions in ton CO_2-eq per million EUR.

Surface area

The source for the surface area data is the Basic Registration of Addresses and Buildings (BAG). The reference data for the total surface area per education institution is 1-1-2023. This surface area is used for all three years. To calculate the GHG emissions per m^2 the total attributed GHG emissions in kg CO_2-eq for the education institutions is divided by the total surface area (m^2) of the education institutions included in the GHG footprint.

[54] 'Standaard jaarverbruik' is the actual energy consumption recalculated to the expected energy consumption in a standard year. The actual energy consumption is corrected for a warmer or colder year, energy in one m^3, and the gaspressure.

Avoided emissions	The avoided emissions for the educational institutions are not known and therefore not reported in this report. When an educational institution invests in renewable energy, the electricity consumption from the energy network will reduce. Indirectly, therefore, investments in renewable energy should be reflected in a decrease of scope 2 electricity in this report.
Asset class specific considerations	The approach for the educational institutions is in line with the 'Commercial real estate' approach in the PCAF methodology.
Attribution	To calculate the GHG footprint following the PCAF principles, a general approach has been developed. First, GHG emissions of the different entities in the sector are calculated. Subsequently the Bank loan ratio of the total balance sheet is used to determine which part of the emissions BNG Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan\ volume}}{\boldsymbol{Total\ balance\ sheet\ (equity + debt)}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations have been aggregated.
Absolute vs. relative emissions	For the education sector the total absolute GHG emissions have been calculated in ton. The relative emissions have been calculated by dividing the absolute GHG emissions by the outstanding loan volume for which a carbon footprint has been calculated in this report. This results in ton CO_2-eq / mln Euro.
Limitations	It is not possible to assign actual consumption data to every building. For the buildings where this is not possible, Republiq has made an estimation of the consumption data. Consumption data has only been collected from the three largest network operators. For health care institutions operating solely outside the regions where these operators are active, there is no data available. Due to privacy regulations it is not possible to collect energy data for individual institutions. The data has therefore been collected for small clusters of institutions. For energy consumption the standard annual consumption (in Dutch 'standaard jaarverbruik' (SJV)[55]) has been used. 'Standaard jaarverbruik' is the actual energy consumption recalculated to the expected energy consumption in a standard year. The actual energy consumption is corrected for a warmer or colder year, energy in one m^3, and the gaspressure. Therefore this energy consumption can differ from the actual energy consumption. For electricity the emission factor Electricity (unknown source) has been used. It is unknown whether an educational institution purchases green energy from the Netherlands. For that reason this emission factor is used. Due to more awareness about the importance of sustainable energy, the purchase of green energy from the Netherlands might increase. In that case the GHG emissions due to electricity use is overestimated by using the emission factor Electricity (unknown source). Ideally, GHG emissions of cars in possession of educational institutions should also be part of scope 1. Unfortunately these data are not available. Some primary school building are in possession of municipalities. It might be possible that for some primary school buildings the energy consumption is included in the GHG emissions of Municipalities and also in the education institutions. The reference data for the total surface area per education institution is 1-1-2023. This surface area is used for all three years. It is possible that for the years 2021 and 2018 the total surface area of the education institution was different than in 2022,

[55] 'Standaard jaarverbruik' is the actual energy consumption recalculated to the expected energy consumption in a standard year. The actual energy consumption is corrected for a warmer or colder year, energy in one m^3, and the gaspressure.

	but this has not been taken into account. The expected renewal rate is less than 1%. An effect by change in surface area will be limited.
Data quality estimate	3 Part of the data is based on energy consumption data delivered by the three largest energy operators in the Netherlands for clusters of buildings, but when these data has not been available estimated values have been used based on sector specific data, therefore data quality score is 3.

Factsheet per data source used

Topic	Description
Data	Energy consumption (Enexis)
Data file	Energierapport Republiq - 20230918.xlsx
Data Source	Enexis
Year	2016-2022
Last update	18-9-2023
Date of download	18-9-2023
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	2
Unit of measurement	kWh for electricity and Nm^3 for natural gas
Selections	Not applicable
Data transformation	Not applicable
Data missing	For some clusters Republiq did not receive energy consumption data. This can have several causes: - Enexis could not find an address (this is most often the case for addresses with an add-on. For example house number 1-A); - The address is assigned to a connection for large consumption (grootverbruik). Net operators are not allowed to share this data.
Print screens	Not applicable

Topic	Description
Data	Energy consumption (Liander)
Data file	Oplevering AL-24540997.xlsx
Data Source	Liander
Year	2018-2022
Last update	20-9-2023
Date of download	20-9-2023
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	2
Unit of measurement	kWh for electricity and Nm^3 for natural gas
Selections	Not applicable
Data transformation	Not applicable
Data missing	For some clusters Republiq did not receive energy consumption data. This can have several causes:

	- Liander could not find an address (this is most often the case for addresses with an add-on. For example house number 1-A); - The address is assigned to a connection for large consumption (grootverbruik). Net operators are not allowed to share this data.
Print screens	Not applicable

Topic	Description
Data	Energy consumption (Stedin)
Data file	Republiq1-8.xlsx
Data Source	Stedin
Year	2018-2021-2022
Last update	13-9-2023
Date of download	13-9-2023
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Data can be requested from Republiq
Data quality	2
Unit of measurement	kWh for electricity and Nm^3 for natural gas
Selections	Not applicable
Data transformation	Not applicable
Data missing	For some clusters Republiq did not receive energy consumption data. This can have several causes: - Stedin could not find an address (this is most often the case for addresses with an add-on. For example house number 1-A); - The address is assigned to a connection for large consumption (grootverbruik). Net operators are not allowed to share this data.
Print screens	Not applicable

Topic	Description
Data	Electricity use (kWh) and natural gas use (Nm^3) per education institution
Data file	Original file : 20231009 - BNG_energieverbruik_onderwijs.xlsx Edited file : 231018_Energieverbruik BNG Bank.csv
Data Source	Republiq
Year	2018, 2021 and 2022
Last update	Not applicable
Date of download	Received by MSafe 11-10-2023
Link to webpage	Not applicable
Filters used to obtain the datafile	From original file only column instellingsnaam, kvk, jaar, elektra,and gas has been selected.
Internal location	\5_Data-analyse\Onderwijs\Data voor SQL
Data quality	3 Part of the data is based on energy consumption data delivered by the three largest energy operators in the Netherlands for clusters of buildings, but when these data has not been available estimated values have been used based on sector specific data, therefore data quality score is 3.
Unit of measurement	kWh for electricity and Nm^3 for natural gas
Selections	Not applicable
Data transformation	Not applicable

Data missing	Energy consumption data is only available for houses located in the areas of the three largest network operators (Enexis, Stedin, and Liander).
Print screens	Downloadsite MSafe voor datadeling tussen Republiq en Het PON & Telos energie onderwijs -zorg BNG Bank.png

Topic	Description
Data	Total balance sheet per educational institution
Data files	Original files: 231018_28.-informatie-over-de-rechtspersoon-2018-2022.xlsx 20231016_Passiva onderwijs_2018-2022.xlsx Edited file: 231208_Passiva BNG Bank.xlsx 231208_Passiva BNG Bank.csv
Data Source	DUO: Education Service of Ministry of Education, Culture and Science
Year	2018-2020-2021-2022
Last update	19-9-2023
Date of download	16-10-2023
Link to webpage	https://duo.nl/open_onderwijsdata/databestanden/onderwijs-algemeen/financiele-cijfers/verantwoording-xbrl.jsp
Filters used to obtain the datafile	Not applicable
Internal location	Original files: \5_Data-analyse\Onderwijs\Ruwe data Edited file: \5_Data-analyse\Onderwijs\Voorbewerking data \5_Data-analyse\Onderwijs\Data voor SQL
Data quality	Score 2 Schoolboards send the data to DUO. The numbers are not checked by accountants or by DUO/the Ministry of Education, Culture and Science.
Unit of measurement	Euro
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse\Onderwijs\Printscreens 20231016_DUO_Balans met passiva onderwijs.png 20231018_DUO_kvknummers.png

List of the calculation sheets	Location
231018_Energieverbruik BNG Bank.csv 231018_Leningportefeuille BNG Bank.csv 231208_Passiva BNG Bank.csv	5_Data-analyse\Onderwijs\Data voor SQL
231207 BNG Bank onderwijs 2018.ipynb 231207 BNG Bank onderwijs 2021.ipynb 231207 BNG Bank onderwijs 2022.ipynb	5_Data-analyse\Onderwijs\BNG Bank\SQL notebooks
231207 BNG Bank onderwijs 2018.xlsx 231207 BNG Bank onderwijs 2021.xlsx 231207 BNG Bank onderwijs 2022.xlsx	5_Data-analyse\Onderwijs\BNG Bank\Data uit SQL

11 Joint regulations

11.1 Joint Regulations

This chapter covers loans to joint regulations. The joint regulations represent a small share within the bank's loan portfolio with 2.2% of the total loan portfolio of BNG Bank in 2022.

11.1.1 Coverage

As shown in Table 11-1 (coverage rate), the GHG emissions of the joint regulations have not been included for 2022. For 2021 and 2022, the loan portfolio and coverage rate are shown in Table 11-1 .

Table 11-1 Loan portfolio and coverage rate for the joint regulations in 2021 and 2022

Joint Regulations	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)
2022	1,933	100%	2.2%	0.0%
2021	1,935	100%	2.2%	35.6%

11.1.2 GHG emissions

The results of the GHG footprint of the joint regulations for 2021 is shown in Table 11-2.

Table 11-2 Absolute and relative GHG emissions for the joint regulations in 2021

Scope	GHG emissions (ton/year)	GHG emissions (%)	Relative GHG emissions (ton CO_2/million EUR)
	2022	**2022**	**2022**
Scope 1	0	0	0
Scope 2	17.3	100	0.03
Total	**17.3**	**100**	**0.03**

11.2 Joint regulation approach

For the joint regulation approach check the report of last year.[56]

[56] Greenhouse Gas Emissions of BNG Bank Loan Portfolio, Reporting year 2022

12 Other organizations

12.1 Results other organizations

This chapter covers loans to organizations and projects in the mobility, environment, energy, and other sectors. In contrast to other sectors, there is no public database available with information about these organizations. Therefore, for a selection of the organizations in the loan portfolio, data is collected from annual reports of these organizations.

12.1.1 Coverage

The 5 market segments represent a share of 3.7% within the bank's loan portfolio of 2022. Due to the variety in organizations within this sector, it is difficult to find adequate data in order to map the GHG footprint of this sector. It was possible to calculate the GHG footprint for 35.8% of the loan portfolio within the sectors. For 2018, 2021, and 2022, the loan portfolio and coverage rate are shown in Tables 12-1, 12-2, and 12-3.

Table 12-1 Loan portfolio and coverage rate for the organizations and projects in 2022

Others	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)
Energy	914	28.1%	1.0%	0.0%
Environment	679	20.9%	0.8%	0.0%
Mobility	1,234	38.0%	1.4%	89.7%
Others	206	6.3%	0.2%	28.2%
Financial institutions	218	6.7%	0.2%	0.0%
Total	**3,251**	**100.0%**	**3.6%**	**35.8%**

Table 12-2 Loan portfolio and coverage rate for the organizations and projects in 2021

Others	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)
Energy	836	24.9%	1.0%	0.0%
Environment	745	22.2%	0.9%	0.0%
Mobility	1,229	36.6%	1.4%	86.1%
Others	320	9.5%	0.4%	19.0%
Financial institutions	226	6.7%	0.3%	0.0%
Total	**3,356**	**100.0%**	**4.0%**	**33.3%**

Table 12-3 Loan portfolio and coverage rate for the organizations and projects in 2018

Others	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)
Energy	541	17.5%	0.7%	0.0%
Environment	759	24.6%	0.9%	0.0%
Mobility	1,512	48.9%	1.9%	58.5%
Others	120	3.9%	0.1%	0.0%
Financial institutions	157	5.1%	0.2%	0.0%
Total	**3,089**	**100.0%**	**3.8%**	**28.7%**

12.1.2 GHG emissions

The results of the GHG footprint of the outstanding BNG Bank loans to the 5 mentioned sectors for 2021 and 2022 are shown in Table 12-4. Due to the general character of the analysis it is not possible to express the GHG emissions for scope 1, 2, and 3 separately. Table 12-4 shows the combined total of all scopes.

Table 12-4 Absolute and relative GHG emissions for the organizations and projects in 2018, 2021, and 2022

Source of emissions	Scope*	GHG emissions (ton/year)			GHG emissions (%)			Relative GHG emissions (ton CO_2/million EUR)		
		2022	**2021**	**2018**	**2022**	**2021**	**2018**	**2022**	**2021**	**2018**
Energy	All scopes	-	-	-	-	-	-	-	-	-
Environment	All scopes	-	-	-	-	-	-	-	-	-
Mobility	All scopes	16,805	16,894	14,017	98.7	98.8	100	15.1	16.0	15.8
Others	All scopes	214	206	-	1.3	1.2	-	3.7	3.4	-
Financial institutions	All scopes	-	-	-	-	-	-		-	-
Total		**17,019**	**17,100**	**14,017**	**100.0#**	**100.0#**	**100.0#**	**14.5**	**15.3**	**15.8**

*For the calculation of coverage rate in BNG Bank's climate action plan these scopes are treated as scopes 1 and 2

#The sum in these columns it not always exactly 100% due to rounding per sector

Between 2021 and 2022 the absolute GHG emissions have decreased by 81 ton. The part of the loans covered with a GHG footprint has increased from 1,119 to 1,171 million Euro. The percentage of outstanding loan volume / total balance sheet has increased in comparison to 2021 (from 3.9% to 4.3%). The relative GHG emissions have decreased by 0.8 ton per million Euro. In conclusion, the absolute and relative GHG emissions for mobility and other organizations decreased between 2021 and 2022.

12.2 Other organizations approach

12.2.1 Scopes

Adjustments in methodology

The methodology used for the calculations for the other organizations did not change in comparison to last year.

General factsheet

Topic	Description
Scopes covered	For other organizations no distinction has been made in scope 1, 2, and 3.
Portfolio covered	The coverage rate for this sector is 89.7% for mobility and 28.2% for others.
Data	From four of the twenty-one companies included in the GHG footprint the data that has been used comes from the annual reports of the companies. For the other seventeen companies, emissions data based on the standard industrial classifications (SBI in Dutch) has been estimated.
Grid emission factors	No emission factors used.
Calculation steps	Four companies has reported their GHG emissions in their annual report, mostly in kilotons. These kilotons have been converted from kilotons to kilograms in order to make further calculations.

	GHG emissions for the other seventeen companies that have not reported about their GHG emissions in their annual reports, are obtained via CBS Statline by looking at GHG emissions based on the Standard Industrial Classifications (SBI). Every company is classified via SBI codes. For each SBI code a measure for total GHG emissions is available. De total GHG emissions for a particular SBI code have been divided by the total net revenue for that SBI. This results in the average GHG emissions in kilograms per net revenue in millions per SBI code. The next step is to look at the total net revenue of the companies that have not reported about their GHG emissions. The average GHG emissions per net revenue has been multiplied by the total net revenue of each company. This results in the total GHG emissions based on SBI codes. After calculating the GHG emissions, this total amount has been multiplied by the percentage of loan of the projects in the total balance sheet. When for example the percentage of the outstanding loan at BNG Bank in the total balance sheet of a project is 25%, 25% of the GHG emissions of that project has been allocated to BNG Bank. The absolute GHG emissions and relative emissions are reported. To calculate the relative emissions, the absolute GHG emissions have been divided by the loans covered with a GHG footprint to calculate the relative emissions in ton CO_2-eq per million EUR.
Avoided emissions	In the calculation method that uses the SBI codes, no correction for avoided emissions has been made. It might be possible that the four companies that reported about their GHG footprint in their annual report has corrected their footprint for energy that they generated themselves, but this is not always clear.
Asset class specific considerations	The approach for other organizations is in line with project finance approach in the PCAF methodology. The companies in this sector are (partly) owned by municipalities or other regional authorities. This could lead to double counting. This is not taken into account in the calculations for this report.
Attribution	To calculate the GHG footprint following the PCAF principles, a general approach has been developed. First, GHG emissions of the different entities in the sector are calculated. Subsequently the Bank loan ratio of the total balance sheet is used to determine which part of the emissions BNG Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan\ volume}}{\boldsymbol{Total\ balance\ sheet\ (equity + debt)}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations have been aggregated.
Absolute vs. relative emissions	For the other organizations, the absolute GHG emissions have been presented in tons. The relative emissions are calculated by dividing the absolute GHG emissions by the amount of loans with a carbon footprint. This results in tons CO_2-eq / mln Euro.
Limitations	The data availability is highly dependent on the disclosure of information of individual companies. Especially relatively smaller companies do not disclose information on GHG emissions. For relatively large companies it is also not always documented how GHG emissions are calculated. It is unknown whether they have used the emission factors based on 'Tank to Wheel' or 'Well to Wheel' and whether they have subtracted their avoided emissions from the total GHG emissions. Therefore, the used GHG emissions for annual reports might be calculated by using a different method than used for current report.
Data quality estimate	The GHG emissions for 20% of the other organizations are based on GHG emissions published in their annual reports which are audited. For 80% of the other organizations, the GHG emissions are based on emission factors for the sector per unit of revenue. Therefore, data quality score is 4.

	See option 3a in Table 5-10 on page 83 of the report PCAF (2022)[57]

Factsheet per data source used

Topic	Description
Data	Net revenue per SBI code
Data file	230913_netto omzet per SBI.xlsx
Data Source	CBS
Year	2021
Last update	10-3-2023
Date of download	13-9-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81837NED/table?ts=1694599146738
Filters used to obtain the datafile	Totaal, ex. Financiële sector, vastgoed Bedrijfstakken 1e digit Netto omzet 2021
Internal location	\5_Data-analyse \Projecten\Brondata CBS
Data quality	Score 2 Data is acquired on the basis of actual tax forms from Dutch companies and organizations. The data is therefore of high quality. More information about the accuracy and checks and controls can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/statistiek-financien-van-ondernemingen
Unit of measurement	Million Euro
Selections	All types of organizations on 1 digit of the SBI; net revenue in millions for 2021.
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse \Projecten\Printscreens\20230726_netto omzet per SBI 2021.png

Topic	Description
Data	GHG emissions to the air by the Dutch economy
Data file	230913_Emissies broeikasgas-equivalent per SBI.xlsx
Data Source	CBS
Year	2021
Last update	5-12-2023
Date of download	13-9-2023
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83300NED/table?ts=1694599363167
Filters used to obtain the datafile	Broeikasgassen (klimaatverandering) Broeikasgas-equivalent Economische activiteiten (SBI 2008): A-U, A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S
Internal location	\5_Data-analyse \Projecten\Brondata CBS
Data quality	Score 4 The research method used to obtain the data can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/milieurekeningen

[57] https://carbonaccountingfinancials.com/standard.
PCAF(2022). The Global GHG Accounting and Reporting Standard Part A: Financed Emissions. Second edition.

	Data is based on environmental accounts. Important sources for the environmental accounts are environmental statistics, such as emission registrations, energy statistics (Dutch energy balance) and a macro economic system used by CBS. It is data on the basis of country and therefore data quality score is 4.
Unit of measurement	GHG emissions: mln kg
Selections	All types of organizations on 1 digit of the SBI; greenhouse gas equivalent in millions for 2021.
Data transformation	Not applicable
Data missing	Not applicable
Print screens	\5_Data-analyse \Projecten\Printscreens\20230913_emissies broeikasgas-equivalent.png

Topic	Description
Data	Annual reports of organizations containing net revenue and/or GHG emissions
Data file	Multiple files in 5_Data-analyse \Projecten\Jaarverslagen
Data Source	Webpage of the organization or company.info
Year	2021 and 2022
Last update	Not applicable
Date of download	Between 31-7-2023 and 14-9-2023
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	\5_Data-analyse \Projecten\Jaarverslagen
Data quality	Score 2 It's primary data from the annual reports of the organizations
Unit of measurement	Net revenue: mln Euro GHG emissions: Kton
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

List of the calculation sheets	Location
240227_Overzicht projecten BNG Bank.xlsx	5_Data-analyse \Projecten

13 Total CO_2-eq emissions for 2018, 2021, and 2022

13.1 Coverage of the GHG emission assessment

In summary, Table 13-1 shows the overview of outstanding loan volume per sector and subsectors and the coverage rate for 2018, 2021, and 2022.

Table 13-1 Total outstanding loan volume of BNG Bank and part covered in the GHG assessment in 2018, 2021, and 2022[58]

Market segment	Sector	Loan portfolio (million EUR)			Loan portfolio Covered with GHG footprint (%)		
		2022	**2021^**	**2018**	**2022**	**2021**	**2018**
Social housing	Social housing associations*	44,815	43,336	38,739	95.3	95.1	94.5
	Others	33	67	9	0.0	0.0	0.0
Public sector	Municipalities*	27,061	27,272	26,033	100.0	99.9	99.8
	Provinces	421	337	137	100.0	100.0	100.0
	Water authorities	197	204	233	100.0	100.0	100.0
	Joint regulations	1,933	1,935	2,014	0.0	35.6	0.0
	Others	1,299	1,344	1,290	0.0	0.0	0.0
Healthcare	Healthcare*	6,708	6,860	6,973	95.9	92.9	88.4
Education	Educational institutions*	1,057	993	954	62.2	64.6	55.6
Networks	Drinking water utilities	548	677	811[#]	94.3	87.7	0.0
	Others	634	731	435	0.0	0.0	0.0
Mobility	Mobility	1,235	1,229	1,512	90.1	86.1	58.5
Energy	Energy	914	836	541	0.0	0.0	0.0
Environment	Environment	679	745	759	0.0	0.0	0.0
Financial institutions	Financial institutions	218	226	157	0.0	0.0	0.0
Others		206	320	120	28.2	19.0	0.0
Remaining				911			0.0
Total		**87,958**	**87,112**	**81,628**	**90.0**	**90.0**	**86.4**

*In the climate action plan, BNG Bank focuses on the GHG emissions of scope 1 and 2 of 4 sectors, namely social housing associations, municipalities, healthcare institutions, and educational institutions.
The coverage rate for these scopes (1 and 2) of these four sectors is 96% for 2022.
^In current report, data of the years 2019 and 2020 are not included. It is decided to calculate 3 years:
The reference year (2018) and the two most recent years, 2021 and 2022 current report.
#For drinking water utilities the reference year is not 2018, but 2020. Sector specific data is presented in chapter 9.

For 2022, the GHG emission estimates cover 90.0% of BNG Bank loans portfolio. The coverage rate has not increased in comparison to 2021. In comparison to 2018, the coverage rate has increased. Although the coverage rate for 2022 is 90.0%, not all sectors in table S-1 include

[58] Reference date for 2022 is 31-12-2022; reference date for 2021 is 31-12-2021, and reference date for 2018 is 31-12-2018.

scope 1, 2, and 3 emissions (see Tabel 2-1). If scope 3 is included it is not always complete, such as for the healthcare sector.

13.2 GHG emissions of BNG Bank loan portfolio

The GHG footprint results for the total outstanding loans of BNG Bank in 2018, 2021, and 2022 are shown in Table 13-2.

Table 13-2 Absolute and relative GHG emissions in 2018, 2021, and 2022

Market segment	Sector ^	Scopes included#	Part covered with GHG footprint (million EUR)			GHG emissions (ton CO_2-eq)			Relative GHG emissions (ton CO_2-eq/million EUR)			Data quality**
			2022	**2021^**	**2018**	**2022**	**2021**	**2018**	**2022**	**2021**	**2018**	
Social housing	Social housing associations	1-2	42,688	41,221	36,617	492,425	514,444	635,242	11.5	12.5	17.3	2.0
Public sector	Municipalities	1-2-3	27,061	27,230	25,973	1,884,274	1,886,854	2,009,935	69.7	69.3	77.4	3.9
	Provinces	1-2-3	421	337	137	12,969	10,559	5,449	30.8	31.4	39.8	3.9
	Water authorities	1-2-3	197	204	233	19,152	19,117	39,419	97.0	93.8	169.0	2.7
	Joint Regulations	1-2	0	689	0	-	17	-	-	0.03	-	2.0
Healthcare	Healthcare	1-2-3	6,432	6,376	6,167	207,947	234,047	285,245	32.3	36.7	46.3	3.3
Education	Educational institutions	1-2	657	641	531	12,919	15,570	15,922	19.6	24.3	30.0	3.0
Networks	Drinking water utilities	1-2-3	517	593	0	20,356	26,299	-	39.4	44.3	-	2.2
Mobility	Mobility		1,113	1,058	885	16,805	16,894	14,017	15.1	16.0	15.8	4.0
Others	Others		58	61	0	214	206	-	3.7	3.4	-	4.0
Total	**All sectors**	**1-2-3**	**79,144**	**78,410**	**70,543**	**2,667,061**	**2,724,007**	**3,005,229**	**33.7**	**34.7**	**42.6**	
Total	**Social housing** **Municipalities** **Healthcare** **Education***	**1-2***	**76,838**	**75,466**	**69,254**	**914,185**	**1,010,336**	**1,173,618**	**11.9**	**13.4**	**16.9**	

^In current report, data of the years 2019 and 2020 are not included. It is decided to calculate 3 years:
The reference year (2018) and the two most recent years, 2021 and 2022 current report.
#This column presents which sectors contain only scope 1 and 2 and which sectors contain (parts of) scope 3. For mobility and others the scopes cannot be specified.
*In the climate action plan, BNG Bank focuses on the GHG emissions of scope 1 and 2 of 4 sectors, namely social housing associations, municipalities, healthcare institutions, and educational institutions.

Tabel 13-3 Absolute GHG emissions divided in the different scopes for the years 2018, 2021, and 2022

Market segment	Sector	GHG emissions (ton CO_2-eq)			Relative GHG emissions (ton CO_2-eq/million EUR)		
		2022	**2021**	**2018**	**2022**	**2021**	**2018**
		Scopes 1 and 2					
Social housing	Social housing associations	492,425	514,444	635,242	11.5	12.5	17.3
Public sector	Municipalities	228,681	277,945	290,267	8.4	10.2	11.2
	Provinces	783	740	451	1.9	2.2	3.3
	Water authorities	17,414	17,534	36,096	88.4	86.0	154.9
	Joint Regulations	-	17	-	-	0.02	-
Healthcare	Healthcare	180,160	202,377	232,187	28.0	31.7	37.6
Education	Educational institutions	12,919	15,570	15,922	19.6	24.3	30.0
Networks	Drinking water utilities	15,950	20,475	-	30.9	34.5	-
Mobility	Mobility*	16,805	16,894	14,017	15.1	16.0	15.8
Others	Others*	214	206	-	3.7	3.4	-
Total scopes 1 and 2		**965,351**	**1,066,202**	**1,224,182**	**12.2**	**13.6**	**17.4**
		Scope 3					
Public sector	Municipalities	1,655,593	1,608,909	1,719,668	61.2	59.1	66.2
	Provinces	12,185	9,820	4,998	28.9	29.1	36.5
	Water authorities	1,739	1,583	3,323	8.8	7.8	14.3
Healthcare	Healthcare	27,787	31,670	53,058	4.3	5.0	8.6
Networks	Drinking water utilities	4,406	5,824	-	8.5	9.8	-
Total scope 3		**1,701,710**	**1,657,806**	**1,781,047**	**21.5**	**21.1**	**25.2**

*For mobility and others the scopes cannot be specified in scope 1 and 2 and scope 3.

The absolute GHG emissions presented in Table 13-2 depend on the following factors:

- Loan volume;
- Coverage rate;
- Completeness of the scopes;
- Ratio outstanding loan / total balance sheet;
- Emissions factors;
- Absolute GHG emissions of the clients.

For the attributed GHG Emissions it is beneficial when clients reduce their GHG emissions, but increase their loan volume to reduce the relative emissions in ton CO_2-eq/million Euro.

Table 13-1 shows that total loan volume has increased over the years and Table 13-2 shows that the total loan volume with a GHG footprint has increased as well. In comparison to 2021 the coverage rate did not change. This means that the increase in total loan volume and the increase in loan volume with a GHG footprint increased in the same proportion. Although the loan volume with a GHG footprint increased, the absolute GHG emissions have decreased by 57 kiloton CO_2-eq. Overall this resulted in a decrease in the relative GHG

emissions by 1.0 ton CO_2-eq per million Euro between 2021 and 2022 and a decrease by 9 ton CO_2-eq per million Euro over a period of five years. In this reduction not all sectors are included, like joint regulation (no data in 2022 and 2018 and drinking water utilities (no data in 2018).
The absolute GHG emissions have decreased by 57 kiloton CO_2-eq (Table S-2) between 2021 and 2022 and by 338 kiloton CO_2-eq between 2018 and 2022. Overall this resulted in a decrease in the relative GHG emissions by 1.0 ton CO_2-eq per million Euro between 2021 and 2022 and a decrease by 9 ton CO_2-eq per million Euro over a period of five years.

The reduction of scope 1 and 2 GHG emissions is larger than the total reduction of 57 kiloton CO_2-eq between 2021 and 2022, namely 101 kiloton CO_2-eq (Table S-3). This was mainly due to a reduction of scope 1 and 2 GHG emissions for municipalities (-49 kiloton CO_2 equivalent), social housing sector (-22 kiloton CO_2 equivalent), and healthcare sector (-22 kiloton CO_2 equivalent).
For the social housing sector the largest reduction was seen for scope 2 electricity use. This reduction might be caused by an increase in solar panels on the homes of social housing associations. For the municipalities and healthcare sector the largest reduction was seen for scope 1 natural gas use. For municipalities this concerns buildings that are owned by municipalities and used for different public functions, such as education, sports, wellbeing, and culture. This is a divers set of buildings and the natural gas use depends on the building function. Therefore the measures taken to reduce natural gas use will vary per building and an explanation for the reduction of scope 1 cannot be given based on the results in this report. For the healthcare sector scope 1 mainly contains the use of natural gas for building heating and the use of warm tap water. From the results of this report it cannot be concluded why the reduction of scope 1 has occurred. Healthcare institutions might replace the use of natural gas by heat pump installations.

On the other hand, scope 3 GHG emissions has increased by 44 kiloton CO_2-eq. Scope 3 GHG emissions increased for municipalities, provinces, and water authorities. Because data quality of scope 3 of municipalities and provinces is poor (score 4), the conclusions based on these data are to a certain extent uncertain.

Per million Euro, the water authorities and municipalities have the highest GHG emissions for reporting year 2022 (Table 13-2). During the last four years, the water authorities have shown a large decrease in the relative emissions.

For the four sectors: social housing, municipalities, healthcare, and education the GHG emissions for scope 1 and 2 are presented per m^2. The social housing sector has the lowest GHG emissions per m^2 (2.7 kg CO_2-eq/m^2; 2022) and municipalities the highest (10.9 kg CO_2-eq/m^2; 2022). For all four sectors the GHG emissions per m^2 have reduced over time.

Despite the fact that direct comparison between the years at the level of the complete loan portfolio is not possible due to differences in coverage rate for instance, this report demonstrates a decreasing trend in the GHG emissions of BNG Bank's loan portfolio expressed in ton CO_2-eq per million Euro. The aim of BNG Bank is to accelerate this reduction in the coming years. In all sectors that are part of BNG Bank's loan portfolio, goals

are being set to reduce GHG emissions. BNG Bank will build client partnership to promote this and will encourage their clients to reduce GHG emissions. In addition, BNG Bank aims to enhance the completeness of its loan portfolio's GHG footprint each year, ensuring that actions taken in the field are reflected in the footprint.

External factors will continuously impact GHG emissions. Over the past five years, events like the COVID-19 crisis and the conflict between Ukraine and Russia have influenced energy prices, energy consumption and travel patterns. Also changes in weather conditions and changes in energy usage due to climate change, particularly during winter, have impact on GHG emissions. By longitudinal monitoring of the GHG footprint of the bank’s loan portfolio, the results will show whether the reduction is temporary, for example as a result of external factors, or whether it really is a long term positive development due to structural behavior changes or investments in sustainable energy sources and/or investments in making real estate more sustainable.

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About Het PON & Telos

Improving social decision-making

Het PON & Telos is a social knowledge organization at the heart of society. We consider it our mission to improve social decision-making. We do this by linking scientific knowledge to practical knowledge. In this process every voice counts! We collect, investigate, analyze, and interpret opinions and facts using stimulating approaches and innovative methods. In doing so, we are always focused on sustainable development: the harmonious connection between social, environmental and economic objectives. In this way we contribute to the quality of society at large, now and in the future.

With a multidisciplinary and creative team of nearly 30 research consultants, we work mainly for local and regional authorities in the Netherlands, but also for corporate bodies, banks, care and welfare institutions, funds, and social organizations. We work closely with civic organizations and other knowledge institutions and are an official partner of Tilburg University. We use our knowledge and insights to advise initiators, policy-makers and managers. This enables them to make informed choices and give a positive impulse to the society of tomorrow.

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