GHG Emissions of NWB Bank Loan Portfolio

Reporting year 2021

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Management summary

Since the 2015 Paris Climate Conference, the banking sector has been 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.

The first method for carbon accounting for Dutch financials was launched in November 2017 followed by yearly updates. Measuring and disclosing the GHG emissions associated with the lending and investment activities of financial institutions are necessary conditions for transparency and accountability. But PCAF is not only about measuring and disclosing the carbon footprint of a financial institutions portfolio. It's also about setting targets, developing strategies, and taking action by these institutions to align their portfolio with the Paris Climate Agreement and by monitoring on an annual basis if organizations are making progress towards achieving the targets set by themselves.

NWB Bank committed itself to PCAF in 2019. In 2018, Telos[1] adapted the PCAF methodology in such a way that it could be used to measure the GHG emissions associated with the bank's public sector loan portfolio. For the reporting years 2019 and 2020, based on this for public banks adapted PCAF methodology, the GHG emissions of the bank's loan portfolio have been calculated and disclosed in the NWB Annual Reports.[2] For some sectors certain amendments to the methodology were made in reporting year 2020 (in comparison to reporting year 2019). Finding opportunities to improve the methodology, for instance by changing the calculation methodology or using other data sources, is an ongoing process. These improvements in quality of the PCAF methodology also can be seen as a further contribution from NWB Bank to the development of the PCAF methodology. For the reporting year 2021, again some methodological changes have been implemented by Het PON & Telos. The reasoning behind and justification for these changes are being discussed in detail in this report. Because certain amendments to the methodology were implemented by Het PON & Telos, the GHG emissions of the sectors for which the methodology was changed were recalculated for reporting years 2019 and 2020. Therefore, also the results of the reporting years 2019 and 2020 are shown in the overview tables. That makes it possible for the bank to monitor the development of the GHG emissions over time.

The current report describes as well the outcome as the methodology of the Greenhouse Gas emissions assessment of the NWB Bank loan portfolio for reporting year 2021. The climate impact has been (re)calculated in line with the harmonised approach for the financial sector in the Netherlands 2019.[3]

[1] At that time Telos was an independent research institute, based at Tilburg University. In January 2020 Het PON & Telos have merged and are going further as one organization called Het PON & Telos. At the same moment this new institute , Het PON & Telos, became official partner of Tilburg University.
[2] https://nwbbank.com/over-nwb-bank/publicaties/jaarverslagen
[3] Accounting GHG emissions and taking action: harmonised approach for the financial sector in the Netherlands PCAF The Netherlands, report 2019

Available data on CO_2 equivalent emissions (representing the targeted Greenhouse Gasses-GHG), or estimated emissions by using impact data and appropriate emission factors, were used to calculate the impact of different sectors of NWB Bank's loan portfolio. The impact data includes direct (scope 1) as well as indirect emissions (scope 2 and is available scope 3). Besides the calculation of the GHG emissions, a ratio between outstanding loan portfolio per client and the total balance sheet of the respective client was used for the attribution of NWB Bank loans to the total assets of GHG emitting clients. This results in the attributed GHG emissions for NWB Bank's loans.

At this time, due to a lack of sufficient data, it is practically impossible for banks in general, to measure the GHG emissions for their whole loan portfolio. When 60-70% of the loan portfolio in the PCAF analysis could be included, already a major achievement would be realized. For NWB Bank it has been possible, because of its unique position in the market, to cover 93.6% of its portfolio in this GHG emission report, as illustrated in Table S-1.

As can be seen in Table S-2, the NWB Bank loan portfolio for reporting year 2021 has a total emission of 1,481 kiloton CO_2 equivalent.
In comparison to reporting year 2020 the total emissions decreased by 125 kiloton. The reduction was mainly due to a reduction of GHG emissions for the social housing sector (-60 kiloton CO_2 equivalent), for the water authorities (-35 kiloton CO_2 equivalent), and for the municipalities (-33 kiloton CO_2 equivalent). For the social housing and municipalities the CO_2 equivalent emissions reduced for all scopes. For the social housing sector the largest reduction was seen for scope 1 (natural gas use). For the municipalities and water authorities the largest reduction was seen for scope 2 (electricity use).
The reduction of 125 kiloton CO_2 equivalent is a significant reduction. The loan portfolio covered by the GHG footprint calculation decreased by 84 million Euro. Although the loan portfolio covered by the GHG footprint calculation decreased, the relative emission (ton CO_2-eq/million Euro) also decreased from 34.3 to 31.7 ton per million Euro.

The absolute and relative decrease of GHG emissions of NWB's loan portfolio is positive. Many factors play a role in explaining why this development is taking place. It can be due to changes at the side of the bank, such as changes in clients, changes in the outstanding loan volumes, changes in the total balance sheet of the clients, and changes in the ratio outstanding loan volumes / total balance sheet. It can also be due to a change in absolute CO_2 equivalent emissions by the clients due to several possible factors. If a decrease is seen, this can be a result of the fact that more and more investments are made to make real estate more sustainable. There is more attention for energy savings, but there is also more invested in renewable energy. Another important factor is the influence of the weather. A mild winter often results in lower natural gas use. The most recent data used for this report is 2019 or 2020. The winter of 2019/2020 was the second warmest since recording began.[4]
Another factor that may have influenced the results of reporting year 2021 is the worldwide COVID crisis that started in the beginning of 2020. Various measures were taken to control this crisis. More people worked at home which resulted in less traffic on the roads and due

[4] https://www.knmi.nl/nederland-nu/klimatologie/maand-en-seizoensoverzichten/2020/winter

to this probably less natural gas was used to heat offices. But on the other hand, more natural gas was used to heat homes.
Nevertheless, the absolute and relative decrease of GHG emissions is a positive development. By monitoring the CO_2 footprint of the bank's loan portfolio longitudinal, the results will show whether the reduction is temporary or a long term positive development.

Table S-1 Total outstanding loan volumes of NWB Bank and part covered in the GHG assessment for reporting years 2019, 2020, and 2021[5]

Market segment	Sector	Loan portfolio (million EUR)	Loan portfolio Covered with GHG footprint (%)	Loan portfolio (million EUR)	Loan portfolio Covered with GHG footprint (%)	Loan portfolio (million EUR)	Loan portfolio Covered with GHG footprint (%)
		2021	**2021**	**2020**	**2020**	**2019**	**2019**
Social housing	Social housing associations	30,391	99.9%	30,813	99.9%	30,265	99.8%
Public sector	Municipalities	6,665	100%	7,071	100%	6,583	100%
	Provinces	202	100%	225	100%	247	100%
	Water authorities	7,172	100%	6,501	100%	6,327	100%
Healthcare	Healthcare	1,878	75%	2,053	73.6%	2,119	70.7%
Education	Education institutions	88	93%	70	91.4%	73	91.6%
Networks	Drinking water utilities	836	91%	666	87.3%	477	85.5%
Other		2,614	0%	2,037	0%	1,554	0%
Total		**49,846**	**93.6%**	**49,436**	**94.6%**	**47,645**	**95.1%**

[5] Reference dates for reporting year: 2021 is 31-12-2020; reference date for reporting year 2020 is 31-12-2019, and reference date for reporting year 2019 is 31-12-2018

Table S-2 Absolute and relative CO_2 equivalent emissions for reporting years 2019, 2020, and 2021

Market segment	Sector^	Part covered with GHG footprint (million EUR)	Attributed emissions (ton CO_2-eq)	CO_2-eq relative (ton CO_2-eq/million EUR)	Part covered with GHG footprint (million EUR)	Attributed emissions (ton CO_2-eq)	CO_2-eq relative (ton CO_2-eq/million EUR)	Part covered with GHG footprint (million EUR)	Attributed emissions (ton CO_2-eq)	CO_2-eq relative (ton CO_2-eq/million EUR)	Data quality (score 1-5)
		2021	**2021**	**2021**	**2020**	**2020**	**2020**	**2019**	**2019**	**2019**	
Social housing	Social housing associations	30,369	693,255	22.8	30,790	753,366	24.5	30,199	841,201	27.9	2
Public sector	Municipalities	6,665	387,653	58.3	7,071	420,362	59.4	6,583	400,779	60.9	3
	Provinces	202	6,230	30.8	225	9,051	36.7	247	10,096	40.9	3
	Water authorities	7,172	291,847	40.7	6,501	326,577	50.2	6,327	372,266	58.8	2
Healthcare	Healthcare	1,410	74,078	52.5	1,511	88,495	58.6	1,498	88,557	59.1	3
Education	Education institutions	82	3,496	42.8	64	2,671	41.8	67	2,452	36.8	2
Networks	Drinking water utilities	760	24,021	31.6	582	4,799*	8.2*	408	2,722*	6.7*	2
Total		**46,660**	**1,480,580**	**31.7**	**46,744**	**1,605,321**	**34.3**	**45,329**	**1,718,073**	**37.9**	

^Avoided emissions need to be reported separately from actual emissions, therefore the avoided emissions that are calculated for this report are not included in this table, but are presented separately in chapter 20.

*For the drinking water utilities the methodology for reporting year 2021 changed in comparison to reporting years 2020 and 2019. Reporting years 2020 and 2019 could not be recalculated. Therefore, the values for reporting years 2020 and 2019 cannot be compared with the values of reporting year 2021. The methodology is explained in chapter 8.

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1 Introduction

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 available capital globally, but also because the largest banks have still invested heavily in the fossil fuel sector, since the Paris Climate Agreement nearly $3.8 trillion. This is equivalent to $2 billion for every day since the end of 2015, with no downward trend and no assessment of the carbon impact of that finance.[6]

1.1 A Partnership for Carbon Accounting Financials: PCAF

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

In 2015, the Dutch Carbon Pledge (PCAF) 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 loan and investment portfolios.[8] In 2019, NWB 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 globally, and ultimately to make GHG accounting common practice within the financial industry.[9]

In October 2021, 161 financial institutions have committed to measure and disclose the greenhouse gas emissions associated with their portfolio of loans and investments with total financial assets of $ 53.7 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 towards a low-carbon society.

[6] https://carbonaccountingfinancials.com/about
[7] https://carbonaccountingfinancials.com/about
[8] https://carbonaccountingfinancials.com/about
[9] https://carbonaccountingfinancials.com/about#our-mission
[10] https://carbonaccountingfinancials.com/financial-institutions-taking-action#overview-of-financial-institutions

1.2 NWB Bank and PCAF

NWB Bank committed itself to PCAF in January 2019. In 2019, NWB Bank asked Telos[11] to measure the GHG emissions associated with the bank's public loan portfolio, using the PCAF methodology. The public sector loans methodology was not yet covered by the PCAF approach at that time. Therefore, a new methodology for this specific sector had to be developed.

In the first half of 2019 this methodology was developed and the results have been discussed with the chairman of the Dutch PCAF group. In line with the open source nature of PCAF, this new methodology has been made publicly available by adding it to the 2019 PCAF Harmonised approach for the financial sectors in the Netherlands.[12]

For the reporting years 2019 and 2020 the GHG emissions of the bank's loan portfolio have been calculated and disclosed in the NWB Bank Annual Report.[13] For some sectors certain amendments to the methodology were made in reporting year 2020 (in comparison to reporting year 2019). Finding opportunities to improve the methodology, for instance by changing the calculation methodology or using other data sources, is an ongoing process. These improvements in quality of the PCAF methodology also can be seen as a further contribution from NWB Bank to the development of the PCAF methodology. For the reporting year 2021, again some methodological changes have been implemented by Het PON & Telos. The reasoning behind and justification for these changes are discussed in detail in this report.

1.3 From CO_2 equivalent footprint to action

Measuring and disclosing the GHG emissions associated with the lending and investment activities of financial institutions are necessary conditions 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.

[11] At that time Telos was an independent research institute, based at Tilburg University. In January 2020 Het PON & Telos have merged and are going further as one organization called Het PON & Telos. At the same moment this new institute , Het PON & Telos, became official partner of Tilburg University.

[12] PCAF, The Netherlands., (2019). Accounting GHG emissions and taking action: Harmonised approach for the financial sector in the Netherlands. Navigant, 2019. p90-91.

[13] https://nwbbank.com/en/about-nwb-bank/publications/annual-reports

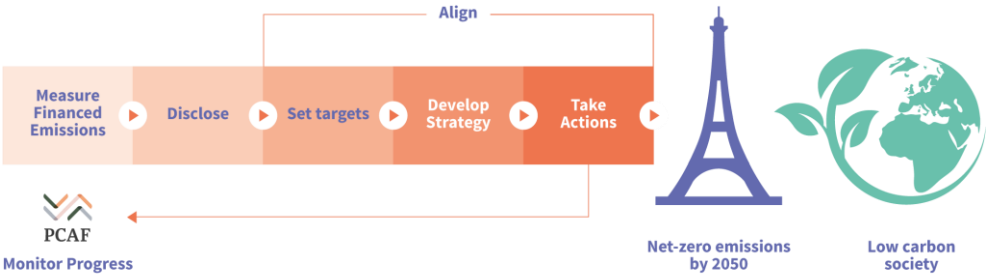

Figure 1. Visualization from CO_2 footprint to action

Charting the climate impact of its lending is an important step towards developing objectives for how NWB Bank can contribute to achieving the Paris climate targets. Based on this insight, the bank would also like to have a positive impact on the (sustainability) policy of its clients. In 2021 the bank started to work on a climate action plan.

1.4 Reading guide

This report describes the methodology and the outcome of the Greenhouse Gas emissions assessment of the NWB Bank loan portfolio.

Chapter 2 describes the PCAF methodology in general and chapter 3 up to 11 describe the methodology for the sectors mentioned below. Chapter 12 up to 21 contain the results of the coverage rate and the absolute and relative GHG emissions for each sector in the loan portfolio.
The following sectors are included in this report:

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

In addition, in this report, the GHG emissions of the wind power project portfolio have been measured and disclosed:

- Avoided emissions from wind farms.

In comparison to last year, the methodology of the following sectors has been further developed or added:

- Public sector: Scope 3 for Municipalities and Provinces;
- Healthcare sector;
- Drinking water utilities;
- Avoided emissions from wind farms.

The details about the reasoning behind and the justification for the improvements in methodology are discussed in the individual chapters.
This report mainly contains the GHG emissions of reporting year 2021. However, in these cases that the methodology was improved causing changes in methodology in comparison

to last year, the GHG emissions of the reporting years 2020 and 2019 had to be recalculated and are also disclosed. With exception of the drinking water utilities, for this sector reporting years 2020 and 2019 could not be recalculated.
In the management summary and in chapter 21 the loan portfolio, coverage rate, and GHG emissions are shown for the reporting years 2019 up to 2021. That makes it possible for the bank to monitor the development of the GHG emissions over time. For each of the reporting years 2019, 2020, and 2021, the reference date for the loan portfolio was ultimo of the year. For the calculation of the GHG emissions the latest data that were available were used. These data are either from 2019 or 2020.

The methodology of reporting year 2021 is described in chapter 3 up to 11. For the methodology of the reporting years 2019 and 2020 we refer to the methodology approach report, released in October 2020.[14] Results of the reporting years 2019 and 2020 are taken from the report of last year with exception for scope 3 for municipalities and provinces and scope 1 and 2 for the healthcare sector. The results for these scopes and sectors had to be recalculated due to amendments to the methodology and therefore, all three years are shown in the result chapters of these three sectors.

The final overview of all the calculations of reporting years 2019, 2020, and 2021 can be found in the datafiles mentioned in the factsheet below.

List of the calculation sheets	Note	Location
20210929 cijfers NWB Bank incl waterleidingbedrijven.xlsx	Reporting year 2021	Werkmap\Bankcijfers
20210929 cijfers NWB 2018 en 2019.xlsx	Reporting years 2019 and 2020	Werkmap\Bankcijfers

[14] Mulder, R., Roovert, I. van, Dagevos, J., Verhoeven, L., Wentink C. (2020), Loan Portfolio Climate Impact of BNG Bank & NWB Bank, Methodological approach report 2020

2 PCAF methodology

The methodology used in this study, is based on the GHG Protocol and the harmonised approach for the financial sector in the Netherlands[15] (PCAF The Netherlands, report 2019 and update report 2020). The report has four overall reporting guidelines:

- Purpose: meet the specific carbon footprint goals of the financial institution; for instance, because the financial institution is working towards a specific carbon footprint target or to monitor the effectiveness of its wider strategic goals in this area;
- Frequency: at least disclose annually, in line with the financial reporting cycle;
- Form of reporting: In publicly available reports such as (semi) annual reports, website;
- Past performance: disclose the carbon footprint of multiple comparable time periods (e.g., years).

2.1 Scopes

The GHG Protocol is the basis for carbon accounting. In line with PCAF and the GHG Protocol, the methodology used in this report is respecting basic accounting principles of Completeness, Consistency, Transparency, Prudence, Balance, and Accuracy. The GHG protocol defines three different scopes all entities may report about separately (see Figure 2). In the present report these scopes are defined from the perspective of the reporting financial institution i.c. NWB Bank (see the blue circle in Figure 2) and focus on all the direct and indirect greenhouse gas emissions NWB Bank is responsible for outside of its own walls by financing different types of organizations. In the PCAF methodology scope 1, 2, and 3 refer to the scopes from the viewpoint of the investee, project, company or government.

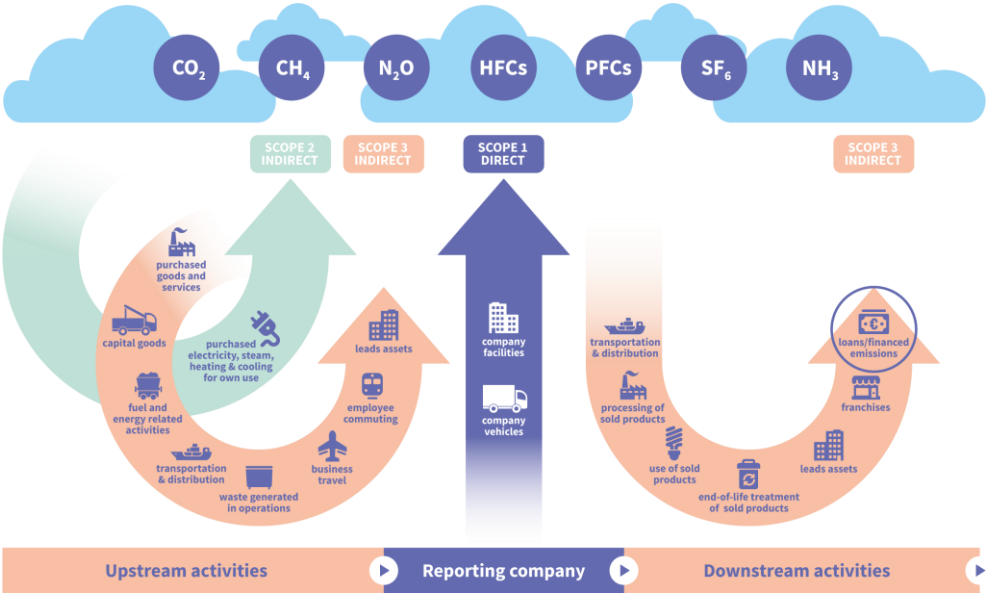

Figure 2. The scope definitions from the GHG Protocol (Image created from GHG Protocol).

[15] https://carbonaccountingfinancials.com

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, such as natural gas use, and fuel for company vehicles of the investee, project, company or government.
- Scope 2: Indirect emissions from the consumption of purchased electricity, heat or steam of the investee, project, company or government.
- Scope 3 covers other indirect emissions such as the extraction and production of purchased materials and fuels, outsourced activities, business travel, waste disposal etc. of the investee, project, company or government.

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 CO_2 equivalent footprint of NWB Bank is calculated based on the GHG emissions of individual organizations. The GHG emissions of an individual organization are multiplied by the proportional share of the outstanding loan volume with NWB Bank in the total balance sheet of the client, using the following formula:

$$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan}}{\boldsymbol{Total\ balance\ sheet}}$$

In the end, the separate scopes and the sum of the scopes of all individual organizations are aggregated.

When interpreting the results in this report, it is important to realize that especially in smaller sectors changes in the ratio outstanding loan / total balance sheet between two years have an effect on the change in CO_2 equivalent emissions attributable to the bank. It can happen that an increase or decrease in the absolute CO_2 equivalent emissions between two years is a result of a change in the ratio outstanding loan / total balance sheet rather than for example structural changes in energy consumption.

2.3 Data quality

An important element of carbon accounting is the quality of data on emissions of 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 and investment, such as: type of loan/investment, 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.

The following data scoring is used to score and improve data quality. The data quality presented in each chapter is valid for all calculated years. In this report, data quality scores are rounded to a whole number.

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

2.4 Calculating GHG emissions 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.[16]
However, the methodology used in this report is not yet a set and fixed method. Methodology development is an ongoing process in which we are continually looking for improvements.
The total carbon footprint that is presented in chapter 21 of this report is definitely not conclusive. By improving the method or using better data sources, the world of today may look different next year. If the method is improved, the results of the earlier year will be recalculated so comparison in time will be possible.

[16] Accounting GHG emissions and taking action: harmonised approach for the financial sector in the Netherlands. PCAF The Netherlands, report 2019

3 Social housing sector approach

3.1 Scope 1 and 2

3.1.1 Adjustments in methodology

The methodology used for the calculations for the social housing sector did not change in comparison to last year.

3.1.2 General factsheet

Topic	Description
Scopes covered	For the social housing sector scope 1 and 2 are 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 is 99.9%.
Data	The data used in this approach are from multiple sources. Most data are from The Human Environment and Transport Inspectorate (ILenT): National Authority of Social Housing Associations, Aedes, and the Dutch Central Bureau of Statistics (CBS). Data on energy labels, dwellings per association and municipality, and types of dwellings are coming from The National Authority of Social Housing Associations, and are available at the level of individual social housing associations. These data are based on audited registration data, provided by the social housing associations themselves, and therefore very reliable. Data on average floor space per dwelling are based on registration data from the Dutch Central Bureau of Statistics (CBS). This data is based on the "Basisregistratie Adressen en Gebouwen" (BAG), which includes of all buildings in the Netherlands. It therefore is very reliable. This data is available at the aggregation level of municipalities. Data of the number of residents per households are based on registration data from the Dutch Central Bureau of Statistics (CBS). The whole Dutch population is in this sample. This data is available at the aggregation level of municipalities. The data on natural gas use 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 very reliable. This data is aggregated on the basis of type of dwelling, energy label, and average floor space. The data on electricity use 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 very reliable. This data is aggregated on the basis of type of dwelling, number of residents in households, and average floor space. 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 very reliable. This data is aggregated on the basis of type of dwelling, number of residents in households, and average floor space. In a few cases of missing data, data from 2017 has been used because data from 2018 and 2019 was not available. If that is the case, it is shown in the calculations sheets.
Grid emission factors	Chapter 11 contains more information on emission factors. The following emission factors from Table 11-1 are used: - Natural gas - Electricity (unknown source) - District heating

Calculation steps	**Scope 1: Natural gas** The exact use of natural gas per social housing association is unknown. Therefore, an estimation had to be made. To make this estimation as accurate as possible, various calculations were made. The natural gas consumption of certain types of homes collected by the Dutch Central Bureau of Statistics (CBS) is used and is allocated to the individual housing associations on the basis of various characteristics. The following characteristics were taken into account: energy-labels of the rental units, the number of rental units per social housing association in a certain municipality, the type of rental unit (different types of single-family houses or multifamily house), and the floor surface of the rental unit. Unfortunately, no data is available about the car fleet of the social housing associations, therefore this is not taken into account in scope 1. **Scope 2: District heating** No exact district heating statistics per social housing association are known. Therefore, an estimation had to be made. To make this estimation as accurate as possible, various calculations were made. First the amount of natural gas consumption is calculated as described at scope 1 and as a last step, based on the share of district heating in a municipality, the amount of district heating is determined and the remaining amount of natural gas use is reported under scope 1. It can be expected that social housing associations have a higher than average percentage of district heating. However, no data is available for this. So this has not been taken into account. **Scope 2: Electricity use** The exact use of electricity per social housing association is unknown. Therefore, an estimation had to be made. To make this estimation as accurate as possible, various calculations were made. The electricity use based on connection registers of energy network companies, collected by the Dutch Central Bureau of Statistics (CBS) is used and is allocated to the individual housing associations on the basis of various characteristics. The following characteristics were taken into account: the number of rental units per social housing association in a certain municipality, type of rental unit (different types of single-family houses or multifamily house), the floor surface of the rental unit, the estimated number of residents per rental unit, and floor surface.
Avoided emissions	The PCAF harmonised approach states that for the asset class mortgages: "A mortgage on a house that is climate positive, i.e., generating more energy than it consumes, could be seen as avoided emissions." There is no data available about climate-positive houses or property that generates more energy than it consumes owned by social housing associations. So, considering the guidelines in the PCAF harmonised approach, and the lack of data, avoided emissions are not taken into account.
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 CO_2 equivalent footprint following the PCAF principles, a general approach was 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 the Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan}}{\boldsymbol{Total\ balance\ sheet}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations are aggregated.
Absolute vs. relative emissions	For the social housing sector the total absolute CO_2 equivalent emissions are calculated in ton. The relative emissions are calculated by dividing the absolute CO_2 equivalent emissions by the amount of loans with a carbon footprint. This results in ton CO_2-eq / mln Euro.
Limitations	Due to data availability, only independent dwellings have been taken into account for the calculation of the total CO_2 equivalent footprint. This is about 85.3% of all the property of the social housing associations. Besides, 7% of the property consists of parking spaces (which generally do not use any energy). The remaining property consists of care-units (6%) or commercial real estate (1.4%). Unfortunately, there is not enough data available to make reliable assumption about this part of the stock.

	The distribution of households by type of single-family houses dates from 2015. This data is dated, but researchers of Het PON & Telos assume that this distribution has not changed significantly over the past 5 years.
Data quality estimate	The factsheets per data source show that data quality varies between 1 and 3. The most important data sources about average natural gas use, average electricity use, and district heating have data quality score 2, 2, and 3, respectively. Therefore, the overall data quality score is 2: non-audited GHG emissions data, or other primary data.

3.1.3 Factsheet per data source used

Topic	Description
Data	General data on social housing associations
Data file	dVI2019H1
Data Source	Inspectie Leefomgeving en Transport (ilent); Autoriteit Woningcorporaties
Year	2019
Last update	17-7-2021
Date of download	20-7-2021
Link to webpage	https://data.overheid.nl/dataset/verantwoordingsinformatie-woningcorporaties-dvi2019-hfd1
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 1 Audited data per social housing association specific.
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\DVI

Topic	Description
Data	Number of dwellings per social housing association and energy label
Data file	dPI2020 H2
Data Source	Inspectie Leefomgeving en Transport (ilent); Autoriteit Woningcorporaties
Year	2020 & 2025 only the year 2020 used for calculations
Last update	23-08-2021
Date of download	24-8-2021
Link to webpage	https://data.overheid.nl/dataset/prognose-informatie-woningcorporaties-dpi2020-hfd2
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 1 Audited data per social housing association specific. There were some issues about the data quality found by the WSW (Waarborgfonds Sociale Woningbouw), which can be found here: https://servicedesk.sbr-wonen.nl/support/solutions/articles/75000055665-kwaliteit-van-de-aangeleverde-gegevens-dpi2020
Unit of measurement	Energy index
Selections	Only TI (institution with its own annual accounts) was selected.
Data transformation	Transformation of Energy-index to Energy-label: Energy Index <= 0,6 AAA 0,6 < Energy Index <= 0,8 AA 0,8 < Energy Index <= 1,2 A 1,2 < Energy Index <= 1,4 B

	1,4 < Energy Index <= 1,8 C 1,8 < Energy Index <= 2,1 D 2,1 < Energy Index <= 2,4 E 2,4 < Energy Index <= 2,7 F Energy index > 2,7 G Energy Index unknown O For the calculations the categories AAA / AA / A were added up to category A
Data missing	Not applicable
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\Dpi

Topic	Description
Data	Number of dwellings per social housing association and municipality
Data file	DVI2019 H2
Data Source	Inspectie Leefomgeving en Transport (ilent); Autoriteit Woningcorporaties
Year	2019
Last update	5-7-2021
Date of download	20-7-2021
Link to webpage	https://data.overheid.nl/dataset/verantwoordingsinformatie-woningcorporaties-dvi2019-hfd2
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 1 Audited data per social housing association specific.
Unit of measurement	Number of dwellings
Selections	Not applicable
Data transformation	Not applicable
Data missing	For five social housing associations it was unknown in which municipality the dwellings were located. In that case the number of dwellings were added to one of the other municipalities the social housing association had dwellings. The number of dwellings varied from 1 till 21 and the impact is insignificant.
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\DVI

Topic	Description
Data	Type of dwellings per social housing association
Data file	Type - woningcorporaties
Data Source	Aedes Datacentrum; dVi (de Verantwoordingsinformatie)
Year	2018 & 2019 only the year 2019 used for calculations
Last update	23-4-2021
Date of download	20-7-2021
Link to webpage	https://aedesdatacentrum.nl/jive
Filters used to obtain the datafile	Beschikbaarheid > kenmerken woningen > aantallen > type > Eengezinswoningen, Etagebouw zonder lift, Etagebouw met lift en hoogbouw Alle woningcorporaties Jaren: 2018 en 2019
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 1 Audited data per social housing association specific.
Unit of measurement	Number of dwellings
Selections	Not applicable
Data transformation	Not applicable

Data missing	For 4 social housing associations data of 2018 and 2019 were missing. In that case data of 2017 was used from the spreadsheet of last year.
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\Type woningcorporaties

Topic	Description
Data	Average floor space per type of dwelling and municipality
Data file	20210720 - Gemiddelde oppervlakte per type woning
Data Source	CBS, Statline
Year	2019 & 2020 only the year 2020 used for calculations
Last update	2-4-2021
Date of download	21-7-2021
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/82550NED/table?dl=566F4
Filters used to obtain the datafile	Bouwjaarklasse: Totaal Woningtype: Totaal, Eengezinswoning, Meergezinswoning Regio's: Totalen, gemeenten per provincie Perioden: 2019, 2020 Onderwerp: Gemiddelde oppervlakte
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 1 Based on audited registration data of all buildings registered in BAG (Basisregistratie Adressen en Gebouwen). Municipalities are responsible for the collection of this data. Kadaster and the Ministry of Infrastructure and Water Management perform a triennial audit.
Unit of measurement	m^2
Selections	Not applicable
Data transformation	Not applicable
Data missing	For the calculations no crucial data was missing.
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\Gemiddeld oppervlak

Topic	Description
Data	Average natural gas use per square meter, type of dwelling, energy label and average floor space.
Data file	20210824 – Aardgaslevering woningkenmerken
Data Source	CBS, Statline
Year	2018 & 2019 only the year 2019 used for calculations
Last update	19-1-2021
Date of download	24-8-2021
Link to webpage	https://opendata.cbs.nl/#/CBS/nl/dataset/83878NED/table?dl=57BFE
Filters used to obtain the datafile	Bouwjaarklasse: Totaal (Gebruiks)oppervlakteklasse: Alle Woningkenmerken: Alle Onderwerp: Aardgasleveringen; openbare net Energielabelklasse: Alle Percentielen: Gemiddelde Perioden: 2018, 2019
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 2 Highly reliable data, because of the manner of registration. There have been a lot of control- and correction methods used, which can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/energiekentallen-woningen It is not a score 1 because links are made between several registers to do the calculations.

Unit of measurement	m^3/m^2
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\Aardgaslevering

Topic	Description
Data	Number of dwellings per type of dwelling in the Netherlands
Data file	Maatwerk-Woningkenmerken-tijdreeks
Data Source	CBS, Maatwerktabel
Year	2016
Last update	April 2016
Date of download	21-07-2021
Link to webpage	https://www.cbs.nl/nl-nl/maatwerk/2016/14/woningkenmerken-tijdreeks
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 2 Based on WoON questionaire (woon onderzoek Nederland). This is a sample survey. This means that the data are based on reliable estimates, with a 95% confidence interval. More information: http://www.cbs.nl/nl-NL/menu/themas/bouwen-wonen/methoden/dataverzameling/korte-onderzoeksbeschrijvingen/woningonderzoek-nederland-art.htm
Unit of measurement	Percentage of households per type of single-family houses
Selections	Not applicable
Data transformation	For terraced houses and corner houses one percentage was divided by 2 to have one percentage for each type of house.
Data missing	Not applicable
Print Screens	Not applicable

Topic	Description
Data	Percentage of dwellings connected to district heating per municipality
Data file	20210824 – Aandeel stadsverwarming - Gemeenten
Data Source	Klimaatmonitor; CBS, Statline
Year	2018 & 2019 only the year 2019 used for calculations
Last update	10-6-2021
Date of download	24-8-2021
Link to webpage	https://klimaatmonitor.databank.nl/Jive
Filters used to obtain the datafile	Energieverbruik > Gebouwde Omgeving (fysieke eenheden) > Woningen > Stadsverwarming Alle gemeenten Jaren: 2018, 2019
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 3 Highly reliable data, because of the manner of registration. There have been a lot of control- and correction methods used, which can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/energiekentallen-woningen Data is available on municipality level and unknown per dwelling. Calculation steps performed by klimaatmonitor are unknown.
Unit of measurement	Percentage of district heating per municipality
Selections	Not applicable
Data transformation	Not applicable

Data missing	For the calculations no crucial data was missing.
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\Stadsverwarming

Topic	Description
Data	Energy-content of natural gas
Data file	Energie-inhoud aardgas
Data Source	Klimaatmonitor
Year	2020
Last update	10-7-2019
Date of download	24-8-2021
Link to webpage	https://klimaatmonitor.databank.nl/Jive
Filters used to obtain the datafile	Emissie-, energie- en temperatuurfactoren > Energie-inhoud aardgas (onderwaarde, in GJ/m^3) Nederland Jaren: 2019, 2020
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 1 Official statistic. https://www.infomil.nl/onderwerpen/duurzaamheid-energie/energiebesparing/vragen-antwoorden/overige-vragen/omrekening-verbruik/
Unit of measurement	GJ/m^3
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\20210824 Energie-inhoud aardgas.png

Topic	Description
Data	Municipalities and codes
Data file	Gebieden_in_Nederland_2020_20072021_170653
Data Source	CBS Statline
Year	2020
Last update	18 December 2020
Date of download	20-7-2021
Link to webpage	https://opendata.cbs.nl/#/CBS/nl/dataset/84721NED/table?dl=B165
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Not applicable
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\Gebieden in Nederland

Topic	Description
Data	Total number of households per municipality
Data file	20210721 – Totaal particuliere huishoudens
Data Source	CBS Statline
Year	2019 & 2020 only the year 2020 used for calculations
Last update	11-08-2020
Date of download	21-7-2021

Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/71486ned/table?dl=566F8
Filters used to obtain the datafile	Leeftijd referentiepersoon: Totaal Onderwerp: Particuliere huishoudens: samenstelling Regio's: Totalen, gemeenten per provincie Perioden: 2019, 2020
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 1 Based on audited registration data of all Dutch citizens. More information: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/huishoudensstatistiek
Unit of measurement	Number of households
Selections	Not applicable
Data transformation	Not applicable
Data missing	For the calculations no crucial data was missing.
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\ 202110721 Totaal particuliere huishoudens.png

Topic	Description
Data	Total number citizens living in households per municipality
Data file	20210721 – Totaal in particuliere huishoudens
Data Source	CBS Statline
Year	2019 & 2020 only the year 2020 used for calculations
Last update	9-7-2021
Date of download	21-7-2021
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/71488ned/table?dl=566F9
Filters used to obtain the datafile	Geslacht: Mannen en vrouwen Leeftijd: Totaal Onderwerp: Personen in particuliere huishoudens Regio's: Totalen, gemeenten per provincie Perioden: 2019, 2020
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 1 Based on audited registration data of all Dutch citizens. More information: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/huishoudensstatistiek
Unit of measurement	Number of citizens living in households
Selections	Not applicable
Data transformation	Not applicable
Data missing	For the calculations no crucial data was missing.
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\ 202110721 Totaal in particuliere huishoudens.png

Topic	Description
Data	Average electricity use per inhabitant, type of dwelling, number of residents in households and average floor space
Data file	202110721 – Elektriciteitslevering vanuit het openbare net
Data Source	CBS Statline
Year	2018 & 2019 only the year 2019 used for calculations
Last update	19-1-2021
Date of download	21-7-2021
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83882NED/table?dl=566FA
Filters used to obtain the datafile	Woningkenmerken: Alle

	(Gebruiks)oppervlakteklasse: Alle Bewonersklasse woningen: Alle Onderwerp: Elektriciteitsleveringen; openbare net Percentielen: Gemiddelde Perioden: 2018, 2019
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 2 Highly reliable data, because of the manner of registration. There have been a lot of control- and correction methods used, which can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/energiekentallen-woningen It is not score 1 because links are made between several registers to do the calculations.
Unit of measurement	kWh per inhabitant
Selections	Not applicable
Data transformation	Not applicable
Data missing	For the calculations no crucial data was missing.
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\Elektriciteitslevering openbaar net

Topic	Description
Data	Total balance sheet
Data file	dVi2019H3 Balanstotaal 2019
Data Source	Inspectie Leefomgeving en Transport (ilent); Autoriteit woningcorporaties
Year	2019
Last update	5-7-2021
Date of download	20-7-2021
Link to webpage	https://data.overheid.nl/dataset/verantwoordingsinformatie-woningcorporaties-dvi2019-hfd3
Filters used to obtain the datafile	Sheet: data 3.1 Column B (Soort_instelling) selected on TE Column D (Jaar) selected on 2019 Column E (Balanskant) selected on PASSIVA Columun F (Balanstype) selected on PASSIVA
Internal location	Werkmap\Woningcorporaties\Data
Data quality estimate	Score 1 Audited data per social housing association specific.
Unit of measurement	Euro
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Woningcorporaties\Printscreens\DVI

List of the calculation sheets	Location
Elektriciteitsverbruik woningen 2020.xlsx	Werkmap\Woningcorporaties
Gasverbruik woningen 2020.xlsx	Werkmap\Woningcorporaties
Doorrekening NWB Bank.xlsx	Werkmap\Woningcorporaties

4 Public sector: municipalities approach

4.1 Scope 1 and 2

4.1.1 Adjustments in methodology

The methodology used for the calculations of scope 1 and 2 for municipalities did not change in comparison to last year.

4.1.2 General factsheet

Topic	Description
Scopes covered	For municipalities, scope 1 natural energy use, scope 1 fossil fuel use by company vehicles, scope 2 electricity use and scope 3 purchased goods and services are covered. Scope 1 emissions includes the direct GHG emissions of the organization. For municipalities, these emissions result from the use of natural gas for heating of buildings and the use of fossil fuel for vehicles. The exact figures for these sources are unknown per municipality, therefore some estimations had to be made using multiple calculation factors 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 municipality is unknown and therefore scope 2 focuses on the use of purchased electricity. As exact figures per municipality are unknown, estimations are made using multiple calculation steps to make the data as precise as possible.
Portfolio covered	Data is collected for all 352 municipalities in the Netherlands. This means the portfolio coverage rate for this sector is 100%
Data	For scope 1 natural gas use and scope 2 electricity use, data of 2020 has been used. For scope 1 fossil use by company vehicles, the calculation has been made with partial use of 2019 data. The data used in this approach come from multiple sources. Data regarding the average number of employees (Full Time Equivalent; FTE) per size of municipality comes from A&O fonds gemeenten. A&O is an organization for all Dutch municipalities. A&O provides practical tools, knowledge, and subsidies for municipalities. This data is available on the aggregation level of municipality size classes. Data on the number of inhabitants per municipality comes from the Dutch Central Bureau of Statistics (CBS) and is available on the aggregation level of municipalities. It contains the population per municipality on January 1 of each year. It is based on the population register of a municipality and is therefore highly reliable. Data about the number of jobs (FTE) per COROP (NUTS3) area 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. This data is available on the aggregation level of COROP (NUTS3) areas. A COROP area is a regional area within the Netherlands. There are in total 40 COROP areas. A COROP area has a central location, surrounded by a service area. A COROP area can contain multiple municipalities, but is usually smaller than a province.[17] 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

[17] https://www.cbs.nl/nl-nl/dossier/nederland-regionaal/gemeente/gemeenten-en-regionale-indelingen/landelijk-dekkende-indelingen

	gas to businesses and other utility buildings. The data is based on the connection register of the energy network and is therefore very reliable. Data is divided by sector and region. Data about the number of kilometers driven with a vehicle per year comes from the Dutch Central Bureau of Statistics (CBS) and covers the number of company vehicles owned by companies per sector. The data originally comes from motor vehicle registration (RDW) and is therefore reliable. Data about the number of kilometers driven with a vehicle per year comes from the Dutch Central Bureau of Statistics (CBS) and covers the average kilometers per year of a passenger vehicle with a Dutch registration. The original data comes from the online kilometer registration (OKR) of the RDW and is therefore reliable.
Grid emission factors	Emission factors for natural gas, electricity and for a company vehicle are used. The used emission factors are described in chapter 11 and shown in Table 11-1.
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) per COROP (NUTS3) area. This includes municipalities, but also other governments. To calculate scope 1 and 2 for municipalities, several calculation steps were necessary. The number of employees (in FTE) that works for the total public administration and government services sector is known for each COROP area. For every municipality, the number of employees in FTE working for the municipality is calculated. Using the percentage based on the number of employees in FTE working for municipalities per COROP area and the total number of employees in FTE working in the public administration and government services sector per COROP area, the supply of natural gas and electricity per COROP area is calculated. Afterwards, the supply of natural gas and electricity can be calculated per municipality. First the number of FTE per municipality was calculated (A) using the average number of FTE per municipality size (A&O fonds gemeenten). According to the populations of each municipality, the municipality is assigned to one of the five size classes: G4, > 100.000 inhabitants (excluding the G4 municipalities: Amsterdam, Rotterdam, Den Haag, and Utrecht), 50.000 to 100.000 inhabitants, 20.000 to 50.000 inhabitants and < 20.000 inhabitants. For each municipality, the percentage of inhabitants was calculated relative to the total number of inhabitants for all municipalities in one size class. This percentage is multiplied by the number of FTE per municipality of that particular size. This results in the number of FTE per municipality (A). This number was added up for each COROP area (B). Per COROP area, the total number of FTE is known with the public administration and government services sector. The number of FTE working for municipalities per COROP area (B) is divided by the total number of FTE in the public administration and government services sector to result in the percentage of FTE working in municipalities, relative to all FTE in the sector public administration and government services per COROP area (C). The supply of natural gas and electricity for the public administration and government services sector is known per COROP area (CBS). The percentage of FTE working in municipalities relative to all FTE in the public administration and government services sector per COROP area was multiplied by the supply of natural gas and electricity for public administration and government services sector. This results in the supply of natural gas and electricity per municipality within a COROP area (D). The final calculation done to calculate the CO_2 equivalent emissions for scope 1 and 2 started with the number of FTE per municipality (A). This number was divided by the sum of all FTE working for a municipality within one COROP area, to result in the percentage of FTE per municipality relative to the total of FTE working in municipalities within a COROP area (E). This percentage (E) was multiplied by the supply of natural gas and electricity per municipality within a COROP area (D), to result in the supply of natural gas and electricity per municipality (F). The amount of natural gas per municipality (F) was multiplied by the emission factor for natural gas (1,785 kg CO_2 equivalent emissions per m^3; Table 11-1) and the amount of electricity was multiplied by the emission factor for electricity (0,405 kg CO_2 equivalent emissions per kWh; Table 11-1). The amount of CO_2 equivalent emissions is divided by the factor 1000, to result in ton CO_2 equivalent emissions for scope 1 (natural gas) and scope 2 (electricity). **Scope 1 fossil fuel for company vehicles** Scope 1 emissions also includes the fossil fuel of company vehicles. This calculation also starts with the average number of FTE per municipality (A). This number (A) has been divided by all FTE working

	at all the Dutch municipalities, to result in the percentage of FTE of a municipality relative to all FTE working at Dutch municipalities (G). It is known how many company vehicles are used in the public administration and government services sector (H; CBS). To calculate the total number of company vehicles for Dutch municipalities (I), the number of company vehicles used by the public administration and government services sector (H) was multiplied by the average percentage of FTE working at municipalities. The total number of company vehicles for Dutch municipalities (I) was multiplied by the percentage of FTE of that municipality, relative to all FTE working in Dutch municipalities (G) to result in the number of company vehicles per municipality (J). This (J) was multiplied by the number of kilometers driven per company vehicle (all fuel types) and multiplied by the emission factor (0,163 kg CO_2 equivalent emissions/km; Table 11-1), to result in the CO_2 equivalent emissions for company vehicles. The final calculated values for scope 1, 2, 3, and total balance sheet were reallocated to the municipality classification of the year 2021.
Avoided emissions	In the calculations, the supply of electricity to a COROP (NUTS3) area is used to calculate the supply of electricity to each Dutch municipality. If a municipality has solar panels, the supply of electricity will be less and consequently, also the supply of electricity to a COROP (NUTS3) area is less. The reduction in CO_2 equivalent emissions due to for example solar panels is therefore indirectly included in this calculation. In addition, local and regional public authorities can make investments that lead to avoided emissions. Unless these investments are financed by ring-fenced projects it is not possible to account for avoided emissions.
Asset class specific considerations	The approach for municipalities is in line with the public loan approach in the PCAF methodology.
Attribution	To calculate the CO_2 equivalent footprint following the PCAF principles, a general approach was 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 the Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan}}{\boldsymbol{Total\ balance\ sheet}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations are aggregated.
Absolute vs. relative emissions	For the municipalities the total absolute CO_2 equivalent emissions are calculated in ton. The relative emissions are calculated by dividing the absolute CO_2 equivalent emissions by the amount of loans with a carbon footprint. This results in ton CO_2-eq / mln Euro.
Limitations	A risk of double counting arises 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. Limitations of the current method are that the supplies of natural gas and electricity per municipality are unknown. It is therefore calculated according to the size of the municipality and available data on the aggregation level of the COROP (NUTS3) area. There is also no data registered about company vehicles (number of vehicles, type of vehicle, type of fuel etc.) per municipality. The best possible result is achieved by using the current model(s).
Data quality estimate	The factsheets per data source show that data quality varies between score 2 and 3. There is no primary data available on natural gas and electricity use by municipalities. The COROP area is used to calculate natural gas and electricity use for municipalities. Therefore, the overall data quality score is 3: averaged data that is peer/(sub)-sectorspecific.

4.1.3 Factsheet per data source used for scope 1

Topic	Description
Data	Number of jobs (FTE) per size of municipality
Data file	Not applicable
Data Source	A & O fonds gemeenten
Year	Data used from 2020 to calculate scope 1 natural gas use and scope 2 electricity use
Last update	Not applicable
Date of download	Received by email: 8-6-2021
Link to webpage	https://personeelsmonitor2020.aeno.nl/
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Gemeenten\Scope 1 en 2\Ruwe data\Scope 1 & 2
Data quality estimate	Score 2 Data quality is indicated as high, as it has directly been acquired from municipalities, using a questionnaire.
Unit of measurement	Occupation in FTE
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	Not applicable

Topic	Description
Data	Inhabitants per municipality
Data file	20210601 ruwe data bevolking per gemeente 2020.xls
Data Source	CBS Statline
Year	2020
Last update	9-6-2021
Date of download	1-6-2021
Link to webpage	https://opendata.cbs.nl/#/CBS/nl/dataset/03759ned/table
Filters used to obtain the datafile	Onderwerp: Bevolking per 1 januar Geslacht: Totaal mannen en vrouwen Leeftijd: Totaal mannen en vrouwen Burgerlijke staat: Totaal burgerlijke staat Perioden: 2020 Regio's: Gemeenten per provincie
Internal location	Original data: Werkmap\Gemeenten\Scope 1 en 2\Ruwe data\Scope 1 & 2 20210601 ruwe data bevolking per gemeente 2020.xls
Data quality estimate	Score 2 Based on registration data of the whole population. Data is checked and corrected if necessary by CBS. For more information about the data quality, see https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/bevolkingsstatistiek
Unit of measurement	Number of inhabitants
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Gemeenten\Scope 1 en 2\Printscreens\Bevolking

Topic	Description
Data	Number of jobs (FTE) per COROP (NUTS3) area
Data file	20210705 ruwe data aantal overheidsbanen per corop.xlsx
Data Source	Lisa; het werkgelegenheidsregister van Nederland
Year	Data used from 2020 to calculate scope 1 natural gas and scope 2 electricity use
Last update	July 2021
Date of download	5-7-2021
Link to webpage	https://www.lisa.nl/data/gratis-data/overzicht-lisa-data-per-corop
Filters used to obtain the datafile	Welke coropgebieden: allemaal Welke jaren: 2020 Welke sectoren: Overheid Welke gegevens: Banen totaal
Internal location	Original data: Werkmap\Gemeenten\Scope 1 en 2\Ruwe data\Scope 1 & 2 20210705 ruwe data aantal overheidsbanen per corop.xlsx
Data quality estimate	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	FTE
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Gemeenten\Scope 1 en 2\Printscreens\Overheidsbanen

Topic	Description
Data	Supply of energy to the public administration and government services sector
Data file	20211006 ruwe data elektra aardgas.xlsx
Data Source	CBS Statline
Year	2020
Last update	8-10-2021
Date of download	11-10-2021
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: 2020 Regio's: COROP gebieden per provincie Bedrijfstakken/branches: Bedrijfstakken 1e digit (SBI 2008), O Openbaar bestuur en overheidsdiensten
Internal location	Original data: Werkmap\Gemeenten\Scope 1 en 2\Ruwe data\Scope 1 & 2 20211006 ruwe data elektra aardgas.xlsx
Data quality estimate	Score 2. Highly reliable data, because of the manner of registration. There are multiple control and correction methods 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
Unit of measurement	Natural gas: 1000 m^3 Electricity: 1000 kWh
Selections	Not applicable
Data transformation	In sheet Aardgas en elektra O sector bew, the missing values are replaced by data from previous years as described in column Data missing.

Data missing	For CR15, CR17 and CR36 natural gas 2018 data is used. For CR33, CR35 and CR37 natural gas 2019 data is used. For CR20 and CR21 electricity 2019 data is used.
Print Screens	In folder: Werkmap\Gemeenten\Scope 1 en 2\Printscreens\Aardgas & elektra

Topic	Description
Data	Number of company vehicles owned by companies in the public administration and government services sector
Data file	20210601 ruwe data bedrijfsautos 2019.xlsx
Data Source	CBS Statline
Year	Data used from 2019 to calculate scope 1 fossil fuel use by vehicles
Last update	20-4-2021
Date of download	1-6-2021
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81481NED/table?ts=1626174554210
Filters used to obtain the datafile	Onderwerp: Bedrijfsbestelauto's Bedrijfstakken/branches: O Openbaar bestuur en overheidsdiensten Bedrijfsgrootte/leeftijd bestelauto: Totaal Perioden: 2019
Internal location	Original data: Werkmap\Gemeenten\Scope 1 en 2\Ruwe data\Scope 1 & 2\ 20210601 ruwe data bedrijfsautos 2019.xlsx
Data quality estimate	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 CBS
Unit of measurement	Number of company vehicles
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Gemeenten\Scope 1 en 2\Printscreens\20210601 bedrijfsautos 2019.png

Topic	Description
Data	Average kilometers driven with a passenger vehicle with a Dutch registration per year
Data file	20210601 ruwe data km bedrijfswagens.xlsx
Data Source	CBS Statline
Year	Data used from 2019 to calculate scope 1 fossil fuel use by vehicles
Last update	4-11-2020
Date of download	1-6-2021
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/71107ned/table?ts=1626174732075
Filters used to obtain the datafile	Gewichtsklasse leeggewicht: Totaal Leeftijd voertuig: Totaal Tenaamstelling: Bedrijf Brandstofsoort: Alle brandstofsoorten Onderwerp: Gemiddelde jaarkilometrage Perioden: 2019
Internal location	Original data: Werkmap\Gemeenten\Scope 1 en 2\Ruwe data\Scope 1 & 2\ 20210601 ruwe data km bedrijfswagens.xlsx

Data quality estimate	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 very reliable.
Unit of measurement	Kilometers
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Gemeenten\Scope 1 en 2\Printscreens\20210601 km bedrijfswagens.png

Topic	Description
Data	Gemeenten 2020 onbewerkte IV3-data
Data file	20210928 passiva gemeenten 2020.xlsx
Data Source	CBS Statline
Year	2021
Last update	22-09-2021
Date of download	28-09-2021
Link to webpage	https://iv3statline.cbs.nl/#/IV3/nl/dataset/45050NED/table?ts=1632405785668
Filters used to obtain the datafile	Gemeenten: allemaal Verslagsoort: Jaarrekening Categorie: Ultimo Onderwerp: 2e plaatsing Taakveld/balanspost: Passiva
Internal location	Original data: Werkmap\Gemeenten\Scope 1 en 2\Ruwe data\Scope 1 & 2\20210928 passiva gemeenten 2020.xlsx
Data quality estimate	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	Not applicable
Print Screens	In folder: Werkmap\Gemeenten\Scope 1 en 2\Printscreens\iv3

Topic	Description
Data	Municipalities per COROP region
Data file	20210802 corop gemeente indeling 2020.xlsx
Data Source	CBS Statline
Year	2021
Last update	18-12-2020
Date of download	2-8-2021
Link to webpage	https://opendata.cbs.nl/#/CBS/nl/dataset/84721NED/table?dl=2A5C9
Filters used to obtain the datafile	Regio's: alle gemeenten Onderwerp: Codes en namen van gemeenten / lokaliseringen van gemeente (COROP)
Internal location	Original data: Werkmap\Gemeenten\Scope 1 en 2\Ruwe data\20210802 corop gemeente indeling 2020.xlsx
Data quality estimate	Score 1

Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Gemeenten\Scope 1 en 2\Printscreens\COROP

List of the calculation sheets	Location
20210601 scope 1 en 2 gemeenten 2020	Werkmap\Gemeenten\Scope 1 en 2

4.2 Scope 3

4.2.1 Adjustments in methodology

The methodology to calculate scope 3 for municipalities was further improved this year. The methodology is described in detail in the general factsheet. The GHG emissions of the reporting years 2019 and 2020 are recalculated, based on the adapted methodology. The methodology was changed in two ways. One change is that last year the expenditures were linked twice to the most appropriate production sector(s). First as taskfield (what is the money used for) and second as category (according to the type of expenditure). As a result, the same expenditure was linked twice to a production sector(s). This is unnecessary because for scope 3 only expenditures of some categories in “Goods and Services” are used for the calculation as described in detail in the general factsheet. Therefore this year, only the expenditures in the categories of “Goods and Services” were linked to the most appropriate production sector(s).

The other change to the methodology of last year is the way the different categories of “Goods and Services” are linked to the most appropriate production sector(s). When one category is linked to more than one production sector, the share per sector has to be determined. The methodology for this determination has changed. Last year, we received the budget of one municipality and according to the average expected expenditure for five years per cost center we determined the share for each production sector per economic category. This year, we received budgets of more municipalities and found out that using the description of the cost centers is too subjective to determine the share for each production sector per economic category. Therefore, the methodology was changed.

For reporting year 2020, the new methodology increased the absolute CO_2 equivalent emissions for scope 3 from 365,783 to 371,255 ton, which is an increase of 1.5%. For reporting year 2019, the new methodology decreased the absolute CO_2 equivalent emissions for scope 3 from 372,074 to 355,757 ton, which is a decrease of 4.4%.

4.2.2 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 352 municipalities in the Netherlands. This means the coverage rate for this sector is 100%.
Data	For scope 3, most recent data about CO_2 equivalent emissions by the Dutch economy is from 2019. Therefore, for scope 3 data from the years 2017, 2018 and 2019 are used for the calculations. 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 about CO_2 equivalent emissions by the Dutch economy to the air also comes 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. 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) as well as the data about the expenses of municipalities. The municipalities are the source for these data 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) which classifies government expenditure data from the System of National Accounts by the purpose for which the funds are used. 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. This indicates 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 are used.
Calculation steps	For the calculation of scope 3 only one economic category is relevant: “Goods and Services”. This category describes the expenses of municipalities for goods and services for which they pay, either in a purchase or in hire construction. A number of subcategories can be distinguished. 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 3.3 (areal lease) and category 3.4 (social benefits) are not included due to the nature of the underlying goods or services. Category 3.5 describes the insourced employees and 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’s necessary to have per subcategory mentioned above (3.1, 3.2, 3.5, and 3.8) a value that links CO_2 equivalent emissions (per kg) and expenses (in Euro). To come to this value per category 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. So that in a next step, using the environmental accounts, the expenses could be linked to the emission data. First, we had a closer look at the description of the 4 mentioned categories (3.1, 3.2, 3.5, and 3.8).[18] According to the detailed description, the most appropriate production sector(s) was/were linked to the category (Table 4-1). Category 3.1 was linked to only one sectoral production category, whereas

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

categories 3.2, 3.5, and 3.8 were linked to multiple sectoral production categories. The share of each production sector per subcategory is unknown. Therefore, the share of each production sector per category was assumed by the researchers of Het PON & Telos. The weighing was done based on an estimate of the relative share of the various relevant industries in the expenditure per subcategory (Table 4-2).

Table 4-1. 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 4-2. 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 we know per subcategory the composition per production sectors (in %)(A). Using the environmental accounts we know per production sector the total CO_2 equivalent emissions and we know the annual monetary value per production sector. So we can calculate per production sector the CO_2 equivalent emissions per Euro (B). Knowing A and B we can calculate for each subcategory the specific CO_2 equivalent emissions per Euro expenditure (C).

For reporting year 2021 this resulted in the following value for kg CO_2 per Euro (C).

Category 3.1: 0.01 kg CO_2 per Euro

Category 3.2: 0.20 kg CO_2 per Euro

Category 3.5: 0.03 kg CO_2 per Euro

Category 3.8: 0.47 kg CO_2 per Euro

The IV3 spending database of all municipalities was used (CBS, Statline). From this database the categories 3.1, 3.2, 3.5, and 3.8 were selected. Only the positive expenditures were taken into account. The expenditure of the municipality per sub-function and category was multiplied by the kg CO_2 per Euro (C). This resulted in kg CO_2 equivalent emissions per expenditure (D). Per municipality these values for all the subfunctions x subcategories were added up to result in scope 3 per municipality in kg. Finally, the CO_2 equivalent emissions were calculated per municipality.

The expenses on natural gas and electricity are supposedly also included in the spending on category 3.8. Therefore in the end, the scope 1 and scope 2 emissions were subtracted from the total scope 3 emissions to avoid double counting.

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 CO_2 equivalent footprint following the PCAF principles, a general approach was 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 the Bank is accountable for. $$\sum CO_2eq \times \frac{Outstanding\ loan}{Total\ balance\ sheet}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations are aggregated.
Limitations	A risk of double counting arises 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. However, by using the current model(s), the best result possible is achieved. Emission data from 2017, 2018 and 2019 was used to calculate the scopes for 2018, 2019 and 2020 as 2020 data was not available yet.
Data quality estimate	See data quality estimate in the general factsheet of scope 1 and 2.

4.2.3 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	2021EP02 SBI Structuur_WEB.pdf
Data Source	CBS
Year	2019
Last update	2021
Date of download	23-09-2021
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-2019
Filters used to obtain the datafile	Not applicable
Internal location	Original data: Werkmap\Gemeenten\Scope 3\2021EP02 SBI Structuur_WEB.pdf
Data quality estimate	Not applicable
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	Not applicable

Topic	Description
Data	CO2 equivalent emissions to the air by the Dutch economy
Data file	20211027 CO2 emissies 17 18 19.xlsx
Data Source	CBS Statline
Year	2017, 2018, 2019
Last update	9-11-2020
Date of download	27-10-2021
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, 2018, 2019 Nederlandse economie: Economische activiteiten A, B, C, D, E, F, G-I, J, K, L, M-N, O-Q, R-U
Internal location	Original data: Werkmap\Gemeenten\ 20210923 CO2 emissies 17 18 19.xlsx
Data quality estimate	Score 3 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.
Unit of measurement	CO_2 equivalent emissions: mln kilogram
Selections	Not applicable
Data transformation	Calculations were made with the data as described in the section calculation steps of municipalities (scope 3).
Data missing	Not applicable
Print Screens	In folder: Werkmap\Gemeenten\Scope 3 \Printscreens\20211027 broeikasgas-equivalent_1.PNG

Topic	Description
Data	The monetary value of all produced goods and services in the Netherlands
Data file	20210923 bbp 18 19 20.xlsx
Data Source	CBS Statline
Year	2018, 2019, 2020
Last update	24-06-2021
Date of download	23-09-2021
Link to webpage	https://opendata.cbs.nl/#/CBS/nl/dataset/84087NED/table?ts=1601538240382
Filters used to obtain the datafile	Perioden: 2018/2019/2020 Onderwerp: BBP vanuit de productie: Output basisprijzen; intermediair verbruik (-) Bruto toegevoegde waarde basisprijzen; A, B, C, D, E, F, G-I, J, K, L, M-N, O-Q, R-U
Internal location	Original data: Werkmap\Gemeenten\20210923 bbp 18 19 20.xlsx
Data quality estimate	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	No specific selections
Data transformation	Calculations were made with the data as described in the section calculation steps of municipalities (scope 3)

Data missing	Not applicable
Print Screens	In folder: Werkmap\Gemeenten\Scope 3 \Printscreens\20210923 bbp vanuit productie 18 19 20.PNG

Topic	Description
Data	Expenses of all Dutch municipalities per IV3/COFOG code
Data file	20210923 iv3 2018 gemeente.xlsx 20210923 iv3 2019 gemeente.xlsx 20210923 iv3 2020 gemeente.xlsx
Data Source	CBS Statline
Year	2018, 2019, 2020
Last update	2018: 23-09-2021 2019: 03-03-2021 2020: 22-09-2021
Date of download	23-09-2021
Link to webpage	2018: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45042NED/table?ts=1632405676148 2019: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45046NED/table?ts=1632405620694 2020: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45050NED/table?ts=1632405785668
Filters used to obtain the datafile	Onderwerp: 2e plaatsing Taakveld/balanspost: alle taakvelden 0 t/m 8 Verslagsoort: Jaarrekening Gemeenten: alle gemeenten
Internal location	Original data: Werkmap\Gemeenten\Ruwe data\20210923 iv3 2018 gemeente.xlsx Werkmap\Gemeenten\Ruwe data\20210923 iv3 2019 gemeente.xlsx Werkmap\Gemeenten\Ruwe data\20210923 iv3 2020 gemeente.xlsx
Data quality estimate	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 for the municipalities ‘Zederik’, ‘Vianen’ and ‘Leerdam’ is missing 2020: Data for the municipalities ‘Hof van Twente’ and ‘Renswoude’ is missing
Print Screens	In folder: Werkmap\Gemeenten\Scope 3\Printscreens\iv3

List of the calculation sheets	Location
20210923 scope 3 gemeente 2018.xlsx	Werkmap\Gemeenten\Scope 3
20210923 scope 3 gemeente 2019.xlsx	Werkmap\Gemeenten\Scope 3
20210923 scope 3 gemeente 2020.xlsx	Werkmap\Gemeenten\Scope 3

5 Public sector: provinces approach

5.1 Scope 1, 2, and 3

5.1.1 Adjustments in methodology

The methodology to calculate scope 3 for municipalities was further improved this year. This improvement to calculate scope 3 is also used for provinces. The resulting changes to the methodology are described in detail in the general factsheet of municipalities. Also for provinces, the GHG emissions of the reporting years 2019 and 2020 are recalculated, based on the adapted methodology.
For reporting year 2020, the new methodology increased the absolute CO_2 equivalent emissions for scope 3 from 6,656 to 8,284 ton which is an increase of 24%. For reporting year 2019, the new methodology increased the absolute CO_2 equivalent emissions for scope 3 from 6,635 to 9,275 ton which is an increase of 40%.

5.1.2 General approach

The method to calculate scope 1, 2, and 3 for provinces is the same as the method to calculate scope 1, 2, and 3 for municipalities. The only exception is that for provinces, the number of jobs (FTE) is known, while for the municipalities the number of jobs (FTE) per municipality had to be calculated.

For scope 1 natural gas use and scope 2 electricity use, data of the year 2020 was used for the calculations.

For scope 1 fossil fuel use by company vehicles, data of the year 2019 was used for the calculations. Data for the year 2019 about the number of company vehicles and kilometers was the most recent available data.

For scope 3, most recent data about CO_2 equivalent emission to the air by the Dutch economy was of the year 2019.

The approach for provinces is in line with the public loan approach in the PCAF methodology.

The factsheets per data source show that data quality varies between score 2 and 3.
There is no primary data available on natural gas and electricity use by provinces. Delivered natural gas and electricity is known for the total sector government per Province. Therefore, the overall data quality score is 3: averaged data that is peer/(sub)-sectorspecific.

Emission factors for natural gas, electricity, and company vehicles

Emission factors for natural gas, electricity and for company vehicles are used. In chapter 11 of this report, is explained which emission factors are used and why these emission factors are used.

5.1.3 Factsheet per data source used

Topic	Description
Data	Number of jobs (FTE) working in the public administration and government services sector per province
Data file	20210705 ruwe data overheidsbanen 2020.xlsx
Data Source	Lisa; het werkgelegenheidsregister van Nederland
Year	2020
Last update	July 2021
Date of download	5-7-2021
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: 2020 Welke sectoren: Overheid Welke gegevens: Banen totaal
Internal location	Original data: Werkmap\Provincies\Ruwe data\20210705 ruwe data overheidsbanen 2020.xlsx
Data quality estimate	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.
Unit of measurement	FTE
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Provincies\Printscreens\ 20210705 printscreen overheidsbanen per provincie.png

Topic	Description
Data	Number of jobs (FTE) working at the province
Data file	Not applicable
Data Source	A & O Fonds Provincies
Year	2020
Last update	June 2021
Date of download	23-6-2021
Link to webpage	https://personeelsmonitorprovincies.onderzoek.nl/index.cfm?action=main.report
Filters used to obtain the datafile	No filters used
Internal location	Werkmap\Provincies\20210621 scope 1 en 2 provincie 2020.xlsx Sheet: FTE overheid
Data quality estimate	Score 2 Data is directly acquired from provinces, using a questionnaire. Data quality is therefore indicated as high.
Unit of measurement	FTE
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Provincies\Printscreens\FTE provincie

Topic	Description
Data	Supply of energy to the public administration and government services sector per province
Data file	20211007 ruwe data aardgas elektriciteit 2020.xlsx
Data Source	CBS Statline
Year	2020
Last update	8-10-2021
Date of download	11-10-2021
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: 2020 Regio's: Provincies Bedrijfstakken/branches: Bedrijfstakken 1e digit (SBI 2008), O Openbaar bestuur en overheidsdiensten
Internal location	Original data: Werkmap\Provincies\Ruwe data\20211007 ruwe data aardgas elektriciteit 2020.xlsx
Data quality estimate	Score 2. 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
Unit of measurement	Natural gas: 1000 m^3 Electricity: 1000 kWh
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Provincies\Printscreens\20211007 printscreen aardgas elektriciteit provincie.PNG

Topic	Description
Data	Number of company vehicles owned by companies in the public administration and government services sector.
Data file	20210622 ruwe data bedrijfsautos provincie 2019.xlsx
Data Source	CBS Statline
Year	Data used from 2019 to calculate scope 1 fossil fuel use by vehicles
Last update	20-4-2021
Date of download	1-6-2021
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81481NED/table?ts=1626174554210
Filters used to obtain the datafile	Onderwerp: Bedrijfsbestelauto's Bedrijfstakken/branches: O Openbaar bestuur en overheidsdiensten Bedrijfsgrootte/leeftijd bestelauto: Totaal Perioden: 2019
Internal location	Original data: Werkmap\Provincies\Ruwe data\20210622 ruwe data bedrijfsautos provincie 2019.xlsx
Data quality estimate	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 vehicles
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Provincies\Printscreens\20210622 printscreen aantal bedrijsautos provincie.PNG

Topic	Description
Data	Average kilometers driven with a passenger vehicle with a Dutch registration per year
Data file	20210601 ruwe data km bedrijfswagens.xlsx
Data Source	CBS Statline
Year	Data used from 2019 to calculate scope 1 fossil fuel use by vehicles
Last update	4-11-2020
Date of download	1-6-2021
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/71107ned/table?ts=1626174732075
Filters used to obtain the datafile	Gewichtsklasse leeggewicht: Totaal Leeftijd voertuig: Totaal Tenaamstelling: Bedrijf Brandstofsoort: Alle brandstofsoorten Onderwerp: Gemiddelde jaarkilometrage Perioden: 2019
Internal location	Original data: Werkmap\Provincies\Ruwe data\20210622 ruwe data km bedrijfsautos provincie.xlsx
Data quality estimate	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 very reliable.
Unit of measurement	Kilometers
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Provincies\Printscreens\20210622 printscreen km bedrijfsautos provincie.PNG

Topic	Description
Data	Expenses of all Dutch provinces per IV3/COFOG code
Data file	20210928 passiva 2020 provincie.xlsx
Data Source	CBS Statline
Year	2020
Last update	22-09-2021
Date of download	28-09-2021
Link to webpage	https://iv3statline.cbs.nl/#/IV3/nl/dataset/45051NED/table?ts=1632307113240
Filters used to obtain the datafile	Onderwerp: 2e plaatsing Verslagsoort: Jaarrekening Categorie: Ultimo Taakveld/balanspost: Passiva Provincies: alle provincies
Internal location	Original data:

	Werkmap\Provincies\Ruwe data\20210928 passiva 2020 provincie.xlsx
Data quality estimate	Score 2 High quality data. The data is directly delivered to CBS by provinces from their internal accounting systems. 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	In folder: Werkmap\Provincies\Printscreens\20210928 printscreen passiva provincie 2020.PNG

Topic	Description
Data	Provincies onbewerkte IV3-data
Data file	20210923 iv3 2018 provincie.xlsx 20210923 iv3 2019 provincie.xlsx 20210923 iv3 2020 provincie.xlsx
Data Source	CBS Statline
Year	2018, 2019, 2020
Last update	22-09-2019, 22-09-2020, 22-09-2021
Date of download	23-09-2021
Link to webpage	2018: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45043NED/table?ts=1602676730545 2019: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45047NED/table?ts=1607547635424 2020: https://iv3statline.cbs.nl/#/IV3/nl/dataset/45051NED/table?ts=1632307113240
Filters used to obtain the datafile	Onderwerp: 2e plaatsing Taakveld/balanspost: alle taakvelden 0 t/m 8 Verslagsoort: Jaarrekening
Internal location	Original data: Werkmap\Provincies\Ruwe data\20210923 iv3 2018 provincie.xlsx Werkmap\Provincies\Ruwe data\20210923 iv3 2019 provincie.xlsx Werkmap\Provincies\Ruwe data\20210923 iv3 2020 provincie.xlsx
Data quality estimate	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	In folder: Werkmap\Provincies\Printscreens\iv3 provincie

Topic	Description
Data	CO_2 equivalent emissions to the air by the Dutch economy
Data file	20211027 CO2 emissies 17 18 19.xlsx
Data Source	CBS Statline
Year	2017, 2018, 2019
Last update	9-11-2020
Date of download	27-10-2021
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 2018 2019

	Nederlandse economie: Economische activiteiten A, B, C, D, E, F, G-I, J, K, L, M-N, O-Q, R-U
Internal location	Original data: Werkmap\Provincies\ 20211027 CO2 emissies 17 18 19.xlsx
Data quality estimate	Score 3 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 Statistics Netherlands.
Unit of measurement	CO_2 equivalent emissions: mln kilogram
Selections	Not applicable
Data transformation	Calculations were made with the data as described in the section calculation steps of municipalities (scope 3).
Data missing	Not applicable
Print Screens	In folder: Werkmap\Provincies\Printscreens\20211027 broeikasgas-equivalent_1.PNG

Topic	Description
Data	The monetary value of all produced goods and services in the Netherlands
Data file	20210923 bbp 18 19 20.xlsx
Data Source	CBS Statline
Year	2018, 2019, 2020
Last update	24-06-2021
Date of download	23-09-2021
Link to webpage	https://opendata.cbs.nl/#/CBS/nl/dataset/84087NED/table?ts=1601538240382
Filters used to obtain the datafile	Perioden: 2018/2019/2020 Onderwerp: BBP vanuit de productie: Waarde in werkelijke prijzen/intermediair verbruik (-) Bruto toegevoegde waarde basisprijzen; A, B, C, D, E, F, G-I, J, K, L, M-N, O-Q, R-U
Internal location	Original data: Werkmap\Provincies\20210923 bbp 18 19 20.xlsx
Data quality estimate	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:
Unit of measurement	Mln Euro
Selections	No specific selections
Data transformation	Calculations were made with the data as described in the section calculation steps of municipalities (scope 3)
Data missing	Not applicable
Print Screens	In folder: Werkmap\Provincies\Printscreens\20210923 bbp vanuit productie 18 19 20.PNG

List of the calculation sheets	Location
20210621 scope 1 en 2 provincie 2020.xlsx	Werkmap\Provincies
20210923 scope 3 provincie 2018.xlsx	Werkmap\Provincies
20210923 scope 3 provincie 2019.xlsx	Werkmap\Provincies
20210923 scope 3 provincie 2020.xlsx	Werkmap\Provincies

6 Public sector: water authorities approach

6.1 Scope 1, 2, and 3

The climate monitor water authorities (Arcadis, 2021) forms the basis for the calculations for water authorities. This monitor is developed by Arcadis for the Union of Water Authorities (Unie van Waterschappen) and the NWB Bank. This monitor describes the emissions in the three scopes in detail, and per individual water authority. Therefore, the description of this approach is brief. For more information on the realization of the emissions we refer to the 'klimaatmonitor waterschappen 2021' (Arcadis, 2021).[19]

6.1.1 Adjustments in methodology

Last year Arcadis used emission factors based on 'Well to Wheel' (WTW) to calculate the GHG emissions for the water authorities. The results had to be converted by using the emission factors based on 'Tank to Wheel' (TTW). This year, Arcadis calculated the GHG emissions for the water authorities by using emission factors based on 'Tank to Wheel'. Therefore this year no extra calculations were necessary.

6.1.2 General factsheet

<table>
<tr><th>Topic</th><th>Description</th></tr>
<tr><td>Scopes covered</td><td>The report Climate monitor water authorities (Arcadis, 2021) covers all three scopes in detail. Table 6-1 shows the underlying themes of the scopes. All scopes presented by Arcadis in the report Climate monitor water authorities in Table 1[20] are also used for this report, but the categories per scope are classified slightly different.

Table 6-1. The different scopes included in the water authorities approach
<table>
<tr><th>Emissions</th><th>Scope</th></tr>
<tr><td>Fuel for water treatment management</td><td>Scope 1</td></tr>
<tr><td>Fuel for water systems</td><td>Scope 1</td></tr>
<tr><td>Other fuel use (buildings)</td><td>Scope 1</td></tr>
<tr><td>Transport fuel</td><td>Scope 1</td></tr>
<tr><td>Biogas discharge</td><td>Scope 1</td></tr>
<tr><td>Electricity use</td><td>Scope 2</td></tr>
<tr><td>Warmth</td><td>Scope 2</td></tr>
<tr><td>Fuel commuting, maintenance and transport</td><td>Scope 3</td></tr>
<tr><td>Purchase of metal salts and polymer</td><td>Scope 3</td></tr>
</table></td></tr>
<tr><td>Portfolio covered</td><td>Data is collected for all 21 water authorities in the Netherlands. This means the portfolio coverage rate is 100%.</td></tr>
<tr><td>Data</td><td>Data was used from the report Climate monitor water authorities (Arcadis, 2021). This monitor is developed by Arcadis for the Union of Water Authorities (Unie van Waterschappen) and the 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 found in the file 'Overzicht CO_2-voetafdruk vj 2020 TTW.pdf'.</td></tr>
</table>

[19] https://www.uvw.nl/10-jaar-klimaatmonitor-waterschappen-succesvol-verduurzamen/

[20] https://www.uvw.nl/publicatie/klimaatmonitor-waterschappen-verslagjaar-2020/

	Arcadis acquired the data from water authorities via a questionnaire, in which quantitative and qualitative data were collected.
Grid emission factors	The consumed fuel, warmth, and electricity can be converted to CO_2 equivalent emissions using grid emission factors. Within the Netherlands, www.CO2emissiefactoren.nl gives a list of widely accepted and uniform grid emission factors. The 'klimaatmonitor waterschappen' (Arcadis, 2021) 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 harmonised 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 'Overzicht CO_2-voetafdruk vj 2020 TTW.pdf' contained all TTW values. The values were added up to result in the categories per scope that are shown in Table 6-1. For the exact calculation steps per scope, consult the Arcadis (2021) report[21].
Avoided emissions	Data on renewable energy use per water authority are available in the Arcadis (2021) report. Avoided emissions as such are however not calculated. In the future, when PCAF develops a more elaborate plan to deal with avoided emissions, this could be interesting to follow up.
Asset class specific considerations	The approach for water authorities is in line with the public loan approach in the PCAF methodology. The Arcadis (2021) report gives a lot of specific considerations and recommendations for the water authorities sector. For a detailed presentation, please refer to the Climate monitor for water authorities (Arcadis, 2021).
Attribution	To calculate the CO_2 equivalent footprint following the PCAF principles, a general approach was 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 the Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan}}{\boldsymbol{Total\ balance\ sheet}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations are aggregated.
Absolute vs. relative emissions	For the water authorities, the absolute CO_2 equivalent emissions are presented in tons / year. The relative emissions are calculated by dividing the absolute CO_2 equivalent emissions by the amount of loans with a carbon footprint. This results in tons CO_2-eq / mln Euro.
Limitations	Not all the process emissions are in scope yet. It is desired by the water authorities and the national climate agreement that these will be taken in consideration as well. For more information see Arcadis report p.17 and further.
Data quality estimate	Arcadis provides detailed information for each water authority, but the data is not audited. Therefore, data quality score for water authorities is 2.

[21] https://www.uvw.nl/publicatie/klimaatmonitor-waterschappen-verslagjaar-2020/

6.1.3 Factsheet per data source used

Topic	Description
Data	Fuel, warmth and electricity use per water authority
Data file	Klimaatmonitor-Watershappen-verslagjaar-2020.pdf
Data Source	Arcadis, 2021
Year	2020
Last update	17-9-2021
Date of download	13-10-2021
Link to webpage	https://www.uvw.nl/wp-content/uploads/2021/09/Klimaatmonitor-Waterschappen-verslagjaar-2020.pdf
Filters used to obtain the datafile	No filters were used.
Internal location	Werkmap\Waterschappen
Data quality estimate	Score 2 The method for water authorities is scaled into data quality level 2, because of the detailed underlying information provided in the Arcadis (2021) study. The data is however not audited. Especially the data on energy consumption is of high liability. The transport data is more model based and might therefore also be quality level 2.5.
Unit of measurement	Multiple
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	Not applicable

Topic	Description
Data	Fuel, warmth and electricity use per water authority in TTW
Data file	Overzicht CO2-voetafdruk vj 2020 TTW.pdf
Data Source	Arcadis, 2021
Year	2020
Last update	August 2020
Date of download	Received by email from Arcadis at 30-8-2021
Link to webpage	Not public
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Waterschappen
Data quality estimate	The method for water authorities is scaled into data quality level 2, because of the detailed underlying information provided in the Arcadis (2021) study.
Unit of measurement	Multiple
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	Not applicable

Topic	Description
Data	Total passiva per water authority 2020
Data file	Totale passive waterschappen 2020
Data Source	Unie van Waterschappen, WAVES, ABF Research
Year	2020
Last update	2-7-2021
Date of download	4-10-2021
Link to webpage	https://live-waves.databank.nl/jive
Filters used to obtain the datafile	Waterschapsspiegel > Alle gegevens > Financien > Gerealiseerd > Balans > Passiva All water authorities Year: 2020
Internal location	Werkmap\Waterschappen
Data quality estimate	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	In folder: Werkmap\Waterschappen\Printscreens\Totale passiva waterschappen 2021_boven.png Totale passiva waterschappen 2021_onder.png

List of the calculation sheets	Location
Totaaloverzicht emissies waterschappen 2020 NWB.xlsx	Werkmap\Waterschappen
Totale passiva waterschappen 2020.xlsx	Werkmap\Waterschappen

7 Healthcare sector approach

7.1 Scope 1, 2, and 3

7.1.1 Adjustments in methodology

The starting point for this report was not to change the calculation method for the healthcare sector compared to last year. However, by looking in detail in annual reports of a few healthcare institutions we discovered that we made a wrong assumption last year. Therefore, the scope 1 and 2 CO_2 equivalent emissions for reporting year 2019 and 2020 had to be recalculated.

The dataset of 2017 contains 1959 healthcare institutions. Five hundred two healthcare institutions reported costs for natural gas and electricity use. Three hundred and thirty-eight healthcare institutions reported total energy costs, but these costs were reported in either the column costs for natural gas or costs for electricity. Last year's calculations assumed that these were not total energy costs, but costs for natural gas or electricity depending on the column in which the costs were reported. This year, by checking a few annual reports of the healthcare institutions it was discovered that these costs were total energy costs. Therefore, the calculation method is changed as described in the calculation section.

The effect of this change in methodology is that the coverage rate increased compared to last year methodology. For the reporting years 2019 and 2020 the recalculated coverage rate increased respectively by 0.2 and 1%. Due to the change in methodology also the recalculated GHG emissions for scope 1 and 2 increased for the reporting years 2019 and 2020. For the reporting years 2019 and 2020 the GHG emissions for scope 1 increased respectively by 3 and 5% (40,155 to 41,224 and 39,350 to 41,430, respectively). For the reporting years 2019 and 2020 the GHG emissions for scope 2 increased respectively by 2 and 4% (29,637 to 30,200 and 28,595 to 29,831, respectively).

7.1.2 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 the costs for natural gas and electricity use or costs for total energy use. Scope 3 in the current healthcare approach contains emissions from employee commuting and business travel.
Portfolio covered	All healthcare institutions provide an annual report to the Ministry of Health, Welfare and Sport. The Ministry of Health, Welfare and Sport has published datasets for 2019 and before. Unfortunately, the datasets of 2019 and 2018 only contain data on energy and maintenance costs together. The dataset of 2017 contains costs for most healthcare institutions costs for natural gas and electricity separately, but for some it only contains data on total energy costs. In order to increase the coverage rate, we looked in the annual reports of the healthcare institutions with a share in the sectoral loan portfolio of more than 1% for the energy data. Unfortunately, also in the annual reports total energy costs are often combined with maintenance costs. In that case the data is not usable. The portfolio coverage rate for this sector is 75%.

Data	Data on energy costs per healthcare institute per year, are coming from the compulsory annual reports of the healthcare institutions (DigiMV) to the Ministry of Health, Welfare and Sport. The Ministry of Health, Welfare and Sport combines the data of all individual annual reports in a dataset. Data of the total balance sheet per healthcare institute per year, are coming from the compulsory annual reports of the healthcare institutions (DigiMV) to the Ministry of Health, Welfare and Sport. The Ministry of Health, Welfare and Sport combine the data of all individual annual reports in a dataset. Data about transaction prices for natural gas and electricity come from the Dutch Central Bureau of Statistics (CBS). The data is obtained from energy companies by sending them surveys. 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. Healthcare sector specific electricity and natural gas use data is retrieved from CBS Statline, and is highly reliable because it is based on network registrations. The trends in energy consumption in these data have been used to estimate the energy use for individual healthcare institutions in reporting year 2020 and 2021. In a few cases data was taken from the annual reports of the healthcare institutions. If that is the case, it is shown in the calculations sheets and the annual reports are included in the data folder.
Grid emission factors	Chapter 11 contains more information on emission factors. The following emission factors from Table 11-1 are used: - Natural gas - Electricity (unknown source) - Bus (unknown type) - Tram - Metro - Train (unknown type) - Car (average type, weight class medium heavy, fuel mix 79.3% petrol, 15.8% diesel, 1.5% lpg, 3.0% petrol-hybrid, 0.2% electric)
Calculation steps	Scope 1 emissions are the direct GHG emissions of the organizations. For healthcare organizations, 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 consumption of purchased electricity, heat or steam. Because the heat and steam use per healthcare organization is unknown, scope 2 will be based on the use of purchased electricity. The datasets of the Ministry of Health, Welfare and Sport for the year 2018 and 2019 contain data on energy and maintenance costs and no separate data for natural gas and electricity or energy. It is not possible to derive electricity and natural gas costs from the combined figure for energy and maintenance. Energy costs can be quite stable over time, however, the costs for maintenance can vary greatly amongst different institutions and years. Therefore, the data for energy and maintenance costs cannot be used. Because the datasets of the Ministry of Health, Welfare and Sport for the year 2018 and 2019 don't contain data on the costs for natural gas and electricity (energy), the dataset from 2017 had to be used again to calculate the scope 1 and 2 emissions for reporting year 2021. In addition, as mentioned above some mistakes were discovered in the dataset from 2017. Therefore, the scope 1 and 2 CO_2 equivalent emissions for the reporting years 2019 and 2020 had to be recalculated. The dataset contains 1959 healthcare institutions. 502 healthcare institutions reported costs for natural gas use and electricity use. Three hundred and thirty-eight healthcare institutions reported total energy costs. To divide the energy costs in costs for natural gas and electricity the 502 healthcare institutions were divided into 7 categories: university medical center, general hospital, categorical hospital, rehabilitation center, independent treatment center, a group of mental health care/home care/care

	for disabled/forensic care, and other care. For each category, the average distribution of energy costs between natural gas and electricity was determined. The 338 healthcare institutions were also divided in the 7 categories and according to the average distribution between natural gas and electricity of the 502 healthcare institutions the energy costs of the 338 institutions were divided between natural gas and electricity. Based on the energy prices for natural gas and electricity in 2017, the amount of natural gas (GJ) and electricity (kWh) has been calculated. The amount of natural gas in GJ has been converted to m^3 by using the conversion factor for natural gas: 0.03165 GJ/m^3. Then the amount of natural gas and electricity is converted into kg CO_2 equivalent using the emission factor for natural gas and electricity. To calculate the scope 1 and 2 CO_2 equivalent emissions for reporting years 2020 and 2021 healthcare sector specific electricity and natural gas use, retrieved from CBS Statline was used to determine the change in natural gas and electricity use over time. Between 2017 and 2018 (reporting years 2019 and 2020) natural gas use in the healthcare sector decreased by 0,4% and electricity use increased by 3.3%. Between 2017 and 2019 (reporting years 2019 and 2021) natural gas use in the healthcare sector decreased by 8.0%, electricity use did not change. In some exceptional cases costs for natural gas or electricity or total energy costs have been extracted from the annual reports of the healthcare institutions. If so, this has been indicated in the calculation sheets. **Scope 3** Scope 3 covers all other indirect emissions. In the current report, scope 3 is incomplete and only emissions from employee commuting and business travel is included in the calculations. From the datasets of the Ministry of Health, Welfare and Sport available for 2019 the number of employees in 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 (6 travel types), the percentage of travelling per travel type was calculated. For every type of transport the number of employees is multiplied by the average distance a person travels per year for work and by percentage of transport type to come to the number of kilometer travelled per year with the 6 travel types. Afterwards, the kilometers per year per travel type was multiplied by the corresponding emission factor resulting in kilogram CO_2 equivalent for each travel type. For car as driver and car as passenger the total kilometer travelled per year was first divided by 1,39 (Conversion factor for passenger kilometers to vehicle kilometers (the average occupancy rate of vehicles is 1.39 per car) (www.CO2emissiefactoren, 2020) and then multiplied by the corresponding emission factor resulting in kilogram CO_2 equivalent. The kilogram CO_2 equivalent for each travel type was added up to result in scope 3. After calculating the scope 1, 2, and 3 CO_2 equivalent emissions, this total amount is multiplied by the percentage of loan of the healthcare institutions in the total balance sheet. When for example the percentage loan in the total balance sheet is 25%, 25% of scope 1, 2, and 3 CO_2 equivalent emissions were allocated to the bank. In the datasets of the Ministry of Health, Welfare and Sport the data of the total balance sheet were missing in the datasets of the years 2018 and 2019. Therefore, the total balance sheet data of 2017 had to be used. In some exceptional cases total balance sheet of 2018 and 2019 were in the dataset of the year 2018 and 2019. If so, this has been indicated in the calculation sheets. The absolute CO_2 equivalent emissions and relative emissions are reported per scope. To calculate the relative emission, the absolute CO_2 equivalent emissions are divided by the loans covered with a CO_2-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 we were able to calculate 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 is generating its own renewable energy the costs for electricity will be lower. Because the dataset of the year 2017 is used for the calculation of scope 2, the effect of an increase in the production of renewable energy in the healthcare sector is not visible.
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 CO_2 equivalent footprint following the PCAF principles, a general approach was 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 the Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan}}{\boldsymbol{Total\ balance\ sheet}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations are aggregated.
Absolute vs. relative emissions	For the healthcare sector the total absolute CO_2 equivalent emissions are calculated in ton. The relative emissions are calculated by dividing the absolute CO_2 equivalent emissions by the amount of loans with a carbon footprint. This results in ton CO_2-eq / mln Euro.
Limitations	The datasets of the Ministry of Health, Welfare and Sport for the years 2018 and 2019 contain data on energy and maintenance costs and no separate data for natural gas and electricity or energy. It is not possible to derive electricity and natural gas costs from the combined figure for energy and maintenance. Energy costs can be quite stable over time, however, the costs for maintenance can vary greatly amongst different institutions and years. Therefore, the data for energy and maintenance costs cannot be used. Because the datasets of the Ministry of Health, Welfare and Sport for the years 2018 and 2019 don't contain data on the costs for natural gas and electricity (energy), the dataset from 2017 had to be used again to calculate the scope 1 and 2 CO_2 equivalent emissions for reporting year 2021. In addition, some mistakes were discovered in the dataset from 2017. Therefore, the scope 1 and 2 CO_2 equivalent emissions for reporting years 2019 and 2020 had to be recalculated. The dataset contains 1959 healthcare institutions. 502 healthcare institutions reported costs for natural gas use and electricity use. Three hundred and thirty-eight healthcare institutions reported total energy costs, but these costs were reported in either the column of natural gas or electricity. Last year's calculations assumed that these were not total energy costs, but costs for natural gas or electricity depending on the column in which the costs were reported. This year by checking some annual reports of the healthcare institutions it was discovered that these costs were total energy costs. Ideally, emissions from other sources in the primary process of healthcare organizations should be taken into account as well. For example emissions of other gasses from ambulances and trauma helicopters used for medical procedures. 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. Scope 3 covers all other indirect emissions. Some examples of scope 3 activities prominent in healthcare include emissions from employee commuting, business travel, waste processing, and food processing. Unfortunately, no data was available to make estimations for waste and food processing.
Data quality estimate	The factsheets per data source show that data quality varies between 1 and 3. For reporting years 2020 and 2021, the development of the energy use for the healthcare sector over the years is used to calculate natural gas use and electricity use for the individual healthcare institutions. Therefore, the overall data quality score is 3: averaged data that is peer/(sub)-sectorspecific.

7.1.3 Factsheet per data source used

Topic	Description
Data	Concern codes and KvK data per healthcare organisation
Data file	x7conc_total_VOLLEDIG sheet: X7conc_total_VOLLEDIG_1
Data Source	CIBG; Ministerie van Volksgezondheid Welzijn en Sport
Year	2017
Last update	Unknown
Date of download	26-10-2020
Link to webpage	https://www.jaarverantwoordingzorg.nl/gegevens-bekijken/verantwoordingsgegevens-per-verslagjaar-datasets
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	Score 2 Data is acquired by CIBG from individual annual reports of healthcare organisations. The source data in the annual report is audited, the composite dataset of CIBG is not.
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

Topic	Description
Data	Cost for natural gas use and electricity use or cost for energy (natural gas use + electricity use)
Data file	x7conc_total_VOLLEDIG sheet: x7conc_total_VOLLEDIG_20
Data Source	CIBG; Ministerie van Volksgezondheid Welzijn en Sport
Year	2017
Last update	Unknown
Date of download	26-10-2020
Link to webpage	https://www.jaarverantwoordingzorg.nl/gegevens-bekijken/verantwoordingsgegevens-per-verslagjaar-datasets
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	Score 2 Data is acquired by CIBG from individual annual reports of healthcare organisations. 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	The database contains cost for natural gas and electricity use from 502 healthcare institutions and contains cost for energy from 338 healthcare institutions. For the 338 healthcare institutions, the energy costs are divided between natural gas and electricity costs on the basis of the natural gas and electricity costs of the 502 healthcare institutions as described earlier in the section calculations. This transformation is performed in the file: Werkmap\Zorginstellingen\Scopes\20210714 overzicht cijfers zorginstellingen.xls
Data missing	From 1119 healthcare institutions (1959 – 502 – 338) data is missing. This leads to missing data for scope 1, 2 and 3. For the healthcare institutions of which the loan volume was more than 1% of the total the healthcare sector the annual reports of these healthcare institutions were checked for energy data. However, this was not very successful because often cost for energy and maintenance are reported as one value.
Print screens	Not applicable

Topic	Description
Data	Energy prices natural gas and electricity
Data file	Aardgas en elektriciteit, gemiddelde prijzen van eindverbruikers
Data Source	CBS, Statline
Year	2015-2020
Last update	31-3-2021
Date of download	14-6-2021
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81309NED/table?ts=1603723562973
Filters used to obtain the datafile	Jaar: 2015-2020 Onderwerp: Aardgasprijs verbruiksklassen niet-huishoudens Elektriciteitsprijs verbruiksklassen niet-huishoudens Prijscomponenten: Transactieprijs Belastingen: Inclusief btw en belastingen
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	Score 2 The research method to obtain these data can be find here:korte onderzoeksbeschrijving Aardgas en elektriciteit, gemiddelde prijzen van eindverbruikers. The data is obtained from energy companies by sending them surveys.
Unit of measurement	Natural gas: Euro/GJ Electricity: Euro/kWh
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	In folder: Werkmap\Zorginstellingen\Printscreens\20210614 aardgas en elektriciteit, gemiddelde prijzen en eindverbruikers Statline.png

Topic	Description
Data	Energy use per sector
Data file	Energiebalans; aanbod en verbruik, sector
Data Source	CBS, Statline
Year	2016-2019
Last update	16-12-2020
Date of download	14-6-2021
Link to webpage	https://opendata.cbs.nl/statline#/CBS/nl/dataset/83989NED/table?ts=1603793762059
Filters used to obtain the datafile	Onderwerp: energie aanvoer Sectoren: overige afnemers / Q Gezondheids- en welzijnszorg Perioden: 2016-2020 Energiedragers: Aardgas Elektriciteit en warmte / elektriciteit
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	Score 2 Data is not audited, but a plausibility check is built in. For more information, see: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/nederlandse-energiehuishouding--neh--
Unit of measurement	PJ
Selections	Not applicable
Data transformation	This data is used to calculate the difference in energy supply to the healthcare sector between the years 2017 and 2018 and between the years 2018 and 2019. This transformation is performed in the file: Werkmap\Zorginstellingen\Scopes\20210614 Scopes zorginstellingen rapportagejaar 2021.xls in sheet Ruwe data energie sector
Data missing	Not applicable

Print screens	In folder: Werkmap\Zorginstellingen\Printscreens\20210614 energiebalans; aanbod en verbruik, sector Statline.png

Topic	Description
Data	Energy-content of natural gas
Data file	Energie-inhoud aardgas (onderwaarde_in GJ_m3)
Data Source	Klimaatmonitor
Year	2020
Last update	Unknown
Date of download	14-6-2021
Link to webpage	https://klimaatmonitor.databank.nl/Jive
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	Score 1 Official statistic. https://www.infomil.nl/onderwerpen/duurzaamheid-energie/energiebesparing/vragen-antwoorden/overige-vragen/omrekening-verbruik/
Unit of measurement	GJ/m^3
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	In folder: Werkmap\Zorginstellingen\Printscreens\20210614 energieinhoud aardgas (onderwaarde in GJ per m^3) 2020 De Klimaatmonitor.png

Topic	Description
Data	Total balance sheet healthcare institutions
Data file	x7conc_total_VOLLEDIG sheet: x7conc_total_VOLLEDIG_11
Data Source	CIBG; Ministerie van Volksgezondheid Welzijn en Sport
Year	2016 & 2017 only data of the year 2017 used for calculations
Last update	Unknown
Date of download	26-10-2020
Link to webpage	https://www.jaarverantwoordingzorg.nl/gegevens-bekijken/verantwoordingsgegevens-per-verslagjaar-datasets
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	Score 2 Data is acquired by CIBG from individual annual reports of healthcare organizations. 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	For the calculations of reporting year 2021, total balance sheet data is missing from 96 healthcare institutions in the loan portfolio of the bank. The loan volume of these 96 healthcare institutions is 16% of the total loans in the healthcare sector.
Print screens	Not applicable

Topic	Description
Data	Concern codes and KvK data per healthcare organisation
Data file	DigiMV2019_20210816_concernbreed_deel1.ods Sheet: x9conc.total_1
Data Source	CIBG; Ministerie van Volksgezondheid Welzijn en Sport
Year	2019
Last update	Unknown
Date of download	31-8-2021
Link to webpage	https://www.jaarverantwoordingzorg.nl/gegevens-bekijken/documenten/publicaties/2021/08/17/digimv-2019-deel-1
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	Score 2 Data is acquired by CIBG from individual annual reports of healthcare organizations. The source data in the annual report is audited, the composite dataset of CIBG is not.
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

Topic	Description
Data	Total balance sheet healthcare institutions
Data file	DigiMV2019_20210816_concernbreed_deel1.ods Sheet: x9conc.total_4
Data Source	CIBG; Ministerie van Volksgezondheid Welzijn en Sport
Year	2018 & 2019
Last update	Unknown
Date of download	31-8-2021
Link to webpage	https://www.jaarverantwoordingzorg.nl/gegevens-bekijken/documenten/publicaties/2021/08/17/digimv-2019-deel-1
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	Score 2 Data is acquired by CIBG from individual annual reports of healthcare organizations. 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	In this database a lot of data is missing. Only a few numbers could be used for the calculations.
Print screens	Not applicable

Topic	Description
Data	Villages and cities overview in the Netherlands.
Data file	Woonplaatsen_in_Nederland_2017_27102020_155216
Data Source	CBS, Statline
Year	2017
Last update	15-3-2017
Date of download	27-10-2020
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/83689NED/table?ts=1603810311539
Filters used to obtain the datafile	Woonplaatsen: Woonplaatsen op alfabet Onderwerp: woonplaatscode Gemeente: naam / code Provincie: naam / code Landsdeel: naam /code
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	Score 1
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	In folder: Werkmap\Zorginstellingen\Printscreens\Woonplaatsen

Topic	Description
Data	Average mobility per person per year
Data file	Mobiliteit; per persoon, persoonskenmerken, motieven en regio's Sheet: Mobiliteit_per_persoon_persoo
Data Source	CBS, Statline
Year	2018-2020
Last update	30-6-2021
Date of download	7-7-2021
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: 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: 2018-2020
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	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	Per province the data for travel motive: to and from work and work kilometers were added.
Data missing	For the year 2020 some data is missing. For two missing numbers, 2019 data is used.

	For two other missing numbers, 2019 data was not available and therefore data from a larger region of the Netherlands was used. E.g.: if the data for the province of Flevoland is missing, than the data for Oost-Nederland (LD) was used. These adjustments are shown in the file: Werkmap\Zorginstellingen\Data\Mobiliteit, per persoon, persoonskenmerken, motieven en regio's.xls in sheet Bewerking bij missende data.
Print screens	In folder: Werkmap\Zorginstellingen\Printscreens\20210707 mobiliteit; per persoon, persoonskenmerken, motieven en regio's Statline deel 1 20210707 mobiliteit; per persoon, persoonskenmerken, motieven en regio's Statline deel 2

Topic	Description
Data	Average mobility per person per year (part 2)
Data file	Mobiliteit; per persoon, persoonskenmerken, motieven en regio's Sheet: Mobiliteit_per_persoon_persoo2
Data Source	CBS, Statline
Year	2018-2020
Last update	30-6-2021
Date of download	7-7-2021
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: Oost-Nederland en West 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: 2018-2020
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	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 sheet Mobiliteit_per_persoon_persoo
Print screens	In folder: Werkmap\Zorginstellingen\Printscreens\20210707 mobiliteit; per persoon, persoonskenmerken, motieven en landsdelen Statline

Topic	Description
Data	Transportation methods used per person per province
Data file	Mobiliteit__per_persoon_persoonskenmerken_voervoerwijzen_en_regio_s_28092021_33501 Sheet: Mobiliteit_per_persoon_persoo
Data Source	CBS, Statline
Year	2020
Last update	30-6-2021
Date of download	28-9-2021
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: 2020 Marge: waarde Regio's: totalen / landsdelen / provincies / overig
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	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	From the original data in sheet: Mobiliteit_per_persoon_persoo a pivot table was made. In the pivot table some numbers were missing.
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. The transformed data is in sheet: Data gebruikt voor berekeningen.
Print screens	In folder: Werkmap\Zorginstellingen\Printscreens\mobiliteit vervoerswijzen afstand per persoon per jaar v1 t/m v5

Topic	Description
Data	FTE per healthcare institution
Data file	DigiMV2019_20210616_concernbreed_deel2.ods Sheet: x9conc_total_24 FTE zorginstellingen
Data Source	CIBG; Ministerie van Volksgezondheid Welzijn en Sport
Year	2019
Last update	Unknown
Date of download	27-10-2021
Link to webpage	https://www.jaarverantwoordingzorg.nl/gegevens-bekijken/verantwoordingsgegevens-per-verslagjaar-datasets
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Zorginstellingen\Data
Data quality estimate	Score 2 Data is acquired by CIBG from individual annual reports of healthcare organizations. 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	There is data missing in this data file. However, when this data was missing also the energy data was missing, so it had no extra consequences for the calculations.
Print screens	Not applicable

List of the calculation sheets	Location
20210614 Scopes zorginstellingen rapportagejaar 2021.xlsx	Werkmap\Zorginstellingen\Scopes
20210714 overzicht cijfers zorginstellingen.xlsx	Werkmap\Zorginstellingen\Scopes

8 Drinking water utilities approach

8.1 Scope 1, 2, and 3

8.1.1 Adjustments in methodology

Last year, the drinking water utilities were included in the calculations for the first time. Scope 1 contained emissions from stationary combustion sources based on fuel consumption (fuel oil, gas/diesel oil, lpg, natural gas & petroleum) and methane emissions from degassing of groundwater. Scope 2 contained electricity use. Scope 3 was not included. To calculate the direct emissions (scope 1) the emission registration from the National Institute for Public Health and the Environment (RIVM) was used.[22] The data to calculate electricity use (scope 2) were obtained from the annual report of Vewin. Vewin is the association of drinking water utilities in the Netherlands. Data like m^3 drinking water production, water origin, and total balance sheet per drinking water utility were derived from the annual report of Vewin or from the individual drinking water utilities. However, by talking to a number of drinking water utilities, we discovered that the calculation method was incomplete.

In 2020, the Dutch drinking water utilities have published a methodology to calculate the CO_2 footprint.[23] This methodology is also based on the GHG protocol. With this methodology, the drinking water industry wants to formalize the calculation method, which should lead to more uniformity and consistency in calculating the CO_2 footprint.

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 CO_2 footprint for drinking water utilities has been published, there are still differences in the way the different drinking water utilities calculate their own CO_2 footprint. One could say that the standard calculation method is a golden mean, but deviates from the real CO_2 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. We know that there are snags in the standard calculation methodology of the drinking water utilities, but in order to match their working methods as closely as possible their so called standard calculation method is used for this report and not the methodology of last year.

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 car fleet
- Emissions linked to the own generation of energy

[22] http://emissieregistratie.nl/erpubliek/bumper.nl.aspx
[23] https://www.praktijkcodesdrinkwater.nl/opbrengst/klimaatneutraliteit/?search=klimaat

Scope 2

- Indirect emissions for purchased energy

Scope 3

- (Air) Travel
- Chemicals
- Transport by third parties (suppliers)
- Transport of drinking water production residues
- Purchase of drinking water and/or semi-finished product

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). The second difference is that the PCAF methodology prescribes to follow CO2emissionfactoren.nl according to the emission factor that should be used for green energy from abroad. CO2emissionfactoren.nl prescribes to calculate with the emission factor for grey electricity[24] 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. In chapter 18 the results of the drinking water utilities are presented at sector level. 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 were contacted by Het PON & Telos for additional data needed to perform the calculation of the CO_2 footprint according to the PCAF methodology.

The calculated CO_2 equivalent emissions results of the methodology of last year were lower than the emissions calculated according to the new methodology mainly due to an underestimation of scope 2 and the lack of scope 3 data. Differences can be seen in Table S-2 and 21-2.

[24] https://www.co2emissiefactoren.nl/lijst-emissiefactoren/

Topic	Description
Scopes covered	In the drinking water utilities approach scope 1, 2 and part of scope 3 are covered.
Portfolio covered	The portfolio coverage rate for this sector is 91%.
Data	Data to calculate the CO_2 equivalent emissions for scope 1, 2 and 3 is 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 no annual financial report was available. Total balance sheet data of this drinking water utility is taken from another report. This is indicated in the calculation sheet.
Grid emission factors	Chapter 11 contains more information on emission factors. The following emission factors from Table 11-1 are used: - Natural gas - Fuel oil (WTW) - Car (fuel and weight class unknown) - Petrol - Diesel - LPG - Grey energy (TTW) - Air travel <700 km - Air travel 700-2500 km - Air travel >2500 km - Bulk and goods transport - District heating (STEG)
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 car fleet - Emissions linked to the generation of energy Methane emissions released during aeration were multiplied by the global warming potential for methane (28 kg CO_2-eq / kg methane). The amount of natural gas used for heating was multiplied by the emission factor for natural gas. The amount of fuel oil used for emergency aggregates was multiplied by the emission factor for fuel oil. This emission factor is only available based on 'Well to Wheel', therefore this emission factor was used for this calculation. To calculate the CO_2 equivalent emissions for the car fleet, the liters of used fuel were multiplied by the correct emission factor or the driven kilometers were multiplied by the emission factor for a car with an unknown fuel and weight class. Self-generated energy by the drinking water utilities was mainly generated by solar panels and the emission factor is 0. The CO_2 equivalent emissions of the individual items of scope 1 were added together to calculate total CO_2 equivalent 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 CO_2 equivalent emissions for the purchase of green electricity from abroad. The amount of electricity purchased from abroad and the amount of purchased grey electricity was multiplied by the emission factor for grey electricity. For green energy purchased from the Netherlands zero emissions were included. When district heating was used, the amount of district heating was multiplied by the emission factor for district heating (STEG). The CO_2 equivalent emissions of the individual items of scope 2 were added together to calculate total CO_2 equivalent emissions for scope 2.

	Scope 3 contains: - (Air) Travel - Chemicals - Transport by third parties (suppliers) - Transport of drinking water production residues For air travel the amount of kilometers were multiplied by the correct emission factor. 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. We do not have insight in the chemical details of each drinking water utility. Therefore, we used the kg CO_2 equivalent for chemicals that is in the data obtained from Vewin (benchmark). CO_2 equivalent emissions due to transport of chemicals and other materials by third parties were calculated by multiplying the ton-kilometers with the emission factor for bulk and goods transport. We have used the emission factor identified by CO2emissiefactoren.nl as being the most common. The CO_2 equivalent 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'. Based on the data obtained from one particular drinking water utility the CO_2 equivalent emissions were divided by the emission factor based on 'Well to Wheel' and multiplied by the emission factor based on 'Tank to Wheel'. The CO_2 equivalent emissions of the individual items of scope 3 were added together to calculate total CO_2 equivalent emissions for scope 3. From two drinking water utilities we received the total CO_2 equivalent emissions per scope based on 'Well to Wheel', but missed the detailed information to calculate all the individual items in scope 1 based on 'Tank to Wheel' and for one of these two drinking water utilities this information was also missing for scope 2, and 3. To convert the obtained data to the total CO_2 equivalent emissions per scope based on 'Tank to Wheel' the following calculation was performed for scope 1 and 3: from five drinking water utilities we were able to calculate the CO_2 equivalent emissions for the individual items per scope based on 'Tank to Wheel' and also the total CO_2 equivalent emissions for scope 1 and 3 based on 'Well to Wheel' from Vewin (benchmark) were available. For these five drinking water utilities the total CO_2 equivalent emissions for scope 1 and 3 based on 'Tank to Wheel' (calculated) were divided by the CO_2 equivalent emissions based on 'Well to Wheel' (obtained from Vewin) and multiplied by 100 to calculate the percentage. For scope 1 and 3 the average percentage of the five drinking water utilities were calculated. For the two drinking water utilities the CO_2 equivalent emissions based on 'Well to Wheel' for scope 1 were multiplied by this average percentage and resulted in an estimation of the CO_2 equivalent emissions based on 'Tank to Wheel'. For one of these two drinking water utilities this method was also used for scope 3. For one drinking water utility detailed information was missing for scope 2. This drinking water utility uses 100% green energy. It is most likely that this green energy originates from the Netherlands and therefore no emissions are taken into account. After calculating the CO_2 equivalent emissions for scope 1, 2, and 3, the emissions were multiplied by the percentage of loan of the drinking water utilities in the total balance sheet. When for example the percentage loan in the total balance sheet is 25%, 25% of scope 1, 2, and 3 CO_2 equivalent emissions were allocated to the bank. The absolute CO_2 equivalent emissions and relative emissions are reported per scope. To calculate the relative emissions, the absolute CO_2 equivalent emissions were divided by the loans covered with a CO_2-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 CO_2 equivalent emissions. So indirectly part of the avoided emissions can be found 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 CO_2 equivalent footprint following the PCAF principles, a general approach was 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 the Bank is accountable for. $$\sum CO_2eq \times \frac{Outstanding\ loan}{Total\ balance\ sheet}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations are aggregated.
Absolute vs. relative emissions	For the drinking water utilities the total absolute CO_2 equivalent emissions are calculated in ton. The relative emissions are calculated by dividing the absolute CO_2 equivalent emissions by the amount of loans with a carbon footprint. This results in ton CO_2-eq / mln Euro.
Limitations	In 2020, the Dutch drinking water utilities have published a methodology to calculate the CO_2 footprint.[25] 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 CO_2 footprint for drinking water utilities has been published, there are still differences in the way the different drinking water utilities calculate their own CO_2 footprint. One could say that the standard calculation method is a golden mean, but deviates from the real CO_2 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. We know that there are snags in the standard calculation methodology of the drinking water utilities, but in order to match their working methods as closely as possible their so called standard calculation method is used for this report. One limitation is that for the drinking water utility of which we received the total CO_2 equivalent emissions per scope based on 'Well to Wheel' we had to assume that the purchased electricity in scope 2 was green electricity generated in the Netherlands. They use green energy, but according to the received data we cannot be completely sure that this green energy is all purchased from the Netherlands. Therefore, scope 2 might be slightly underestimated. 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. We do not have insight in the chemical details of each drinking water utility. Therefore, we use the kg CO_2 equivalent for chemicals that is in the data that we have obtained from the Vewin benchmark. For transport of drinking water production residues and transport of third parties, there are several uncertainties. We might have used a different emission factor than the drinking water utilities do because there are a few options at CO2emissiefactoren.nl in the bulk and goods transport category. We have chosen 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. To prevent double counting on sector level the purchase of drinking water (normally in scope 3) is not included in this calculation. However, for the drinking water utility of which we only received the total CO_2 equivalent emissions per scope based on 'Well to Wheel', the purchased drinking water is included. It was not possible to correct for this. One of the drinking water utility in the loan portfolio is part of two other drinking water utilities. The CO_2 footprint of this drinking water utility is included in these two other drinking water utilities. However, it is unknown how the loan to this drinking water utility has to be divided over the two other drinking water utilities. Researcher of Het PON & Telos decided to divide the loan equal over the two involved drinking water utilities.
Data quality estimate	The factsheets per data source show that data quality varies between 1 and 2. We received detailed information for each drinking water utility, but the data is not audited. Therefore, data quality score for drinking water utilities is 2.

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

8.1.2 Factsheet per data source used

The data received from the individual drinking water utilities was received in two ways. From six drinking water utilities we received data in the Excel format of the Vewin benchmark.

Topic	Description
Data	Data used to calculate parts of scope 1, 2, and 3 Data that is used for the calculations are marked in green in the different files.
Data folder	Excel bestanden VEWIN Benchmark
Data Source	Vewin and individual drinking water utilities
Year	2020
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: Werkmap\Waterleidingbedrijven\Data\Excel bestanden VEWIN Benchmark The original emails can be find in: Werkmap\Waterleidingbedrijven\Data\Originele emails met ontvangen informatie
Data quality estimate	Score 2 Data received from drinking water utilities, but the data is not audited.
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 CO_2 equivalent 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	Data used to calculate part of scope 1, 2, and 3
Data folder	Extra opgevraagde informatie
Data Source	Individual drinking water utilities
Year	2020
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: Werkmap\Waterleidingbedrijven\Data\Extra opgevraagde informatie
Data quality estimate	Score 2 Data received from drinking water utilities, but the data is not audited.
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

Topic	Description
Data	Total liabilities
Data folder	Jaarverslagen
Data Source	Annual reports of the individual drinking water utilities
Year	2020
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: Werkmap\Waterleidingbedrijven\Data\Jaarverslagen
Data quality estimate	Score 1 Data received from drinking water utilities. This data is audited by an external accountant.
Unit of measurement	Several
Selections	Not applicable
Data transformation	Not applicable
Data missing	From one drinking water utility the total liabilities could not be found in the annual report. The number is taken from another report. This is described in the calculation sheet.
Print Screens	Not applicable

Topic	Description
Data	Emission factor based on well to wheel for transport of drinking water production residues
Data file	Klimaatvoetafdruk reststoffen Aquaminerals
Data Source	One of the drinking water utilities
Year	2020
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: Werkmap\Waterleidingbedrijven\Data\Extra opgevraagde informatie
Data quality estimate	Score 2
Unit of measurement	Kg CO_2-eq / ton-kilometer
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	Not applicable

Topic	Description
Data	Global warming potential methane
Data file	Global-Warming-Potential-Values (FEB 16 2016)_1.pdf
Data Source	Green House Gas Protocol
Year	2016
Last update	Not applicable
Date of download	8-11-2021
Link to webpage	https://ghgprotocol.org
Filters used to obtain the datafile	Not applicable
Internal location	Original data: Werkmap\Waterleidingbedrijven\Data\Emissiefactoren
Data quality estimate	Score 1
Unit of measurement	Kg CO_2-eq / kg methane
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	Not applicable

List of the calculation sheets	Location
Rekensheet waterleidingbedrijven NWB.xlsx	Werkmap\Waterleidingbedrijven\Data

9 Educational institutions approach

9.1 Scope 1 and 2

9.1.1 Adjustments in methodology

The methodology used for the calculations for the education institutions did not change in comparison to last year.

9.1.2 General factsheet

Topic	Description
Scopes covered	Scope 1 and 2 of the education sector. Scope 1 emissions are the direct GHG emissions of the different education sectors. 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 93%.
Data	Data about the supply of energy to the education sector comes from the Dutch Central Bureau of Statistics (CBS). Data covers the supply of electricity and natural gas to businesses and other utility buildings. The supply is via public network. Data is dived by sector and region and comes from connection registers of the energy companies. It is based on actual energy consumption, and therefore very reliable. Data about transaction prices for natural gas and electricity comes from the Dutch Central Bureau of Statistics (CBS). The data is obtained from energy companies by sending them surveys. Data of the addresses of the location of education organizations, data of number of pupils/students per location of the education organizations, costs for energy per education organization and total assets per education organization come from DUO: the Dutch Education Service of Ministry of Education, Culture and Science. Data of actual natural gas and electricity use per educational organization is not available. Data of the costs for energy and water are collected by the ministry of Education, Culture and Science. It is assumed that costs for water are negligible compared to costs for energy. Based on the factsheet energy data primary schools, water usage is less than 5% of the total costs of energy and water.[26]
Grid emission factors	Emission factors for natural gas and electricity are used. In chapter 11 of this report is explained which emission factors are used and why these emission factors are used.
Calculation steps	Per municipality it is known how much natural gas and electricity is delivered to the education sector per year. According to the average price for natural gas and electricity the total costs for natural gas and electricity for the education sector was calculated per municipality. Afterwards, the percentage of costs for natural gas and electricity was calculated relative to the total costs for natural gas, plus electricity. Percentage of costs for natural gas for the education sector per municipality (A) = costs for natural gas / total costs for natural gas + electricity Percentage of costs for electricity for education sector per municipality (B) = costs for electricity / total costs for natural gas + electricity The average price for natural gas was calculated according to four consumption classes, provided by CBS. To calculate the price for natural gas per m^3, the conversion factor for natural gas of 0.03165 GJ/m^3 was used (Klimaatmonitor).

[26] http://32lessenvoordetoekomst.nl/wp-content/uploads/2018/02/24.Energie-besparen-op-school-Factsheet-energiegegevens.pdf

	The average price for electricity was calculated according to six consumption classes provided by CBS. Per education organization, the total costs for energy and water are known (DUO). As stated earlier, the costs for water are not taken into account. The total costs for energy have to be dived in costs for natural gas and costs for electricity. An education organization ('bevoegdgezag') can have several schools located in different municipalities. Per school location, the municipality is known. Per 'BRIN-number' the number of students is known. If a BRIN-number has locations in multiple municipalities, the number of students is equally divided over the locations, as the exact number of students per BRIN-number in a municipality is not known. According to this information, the percentage of students per education organization ('bevoegdgezag') per municipality was calculated. Percentage students per education organization per municipality (C) = number of students per education organization per municipality / total number of students per education organization. The next step was to divide the total costs for energy per education organization to the municipalities that have locations of that organization according to the percentage of students (C). Costs per education organization per municipality = % of students per education organization per municipality (C) * total costs for energy of education organization. The costs per education organization per municipality are divided in costs for natural gas and electricity according to % of costs for natural gas per municipality (A) and % of costs for electricity per municipality (B). After this step, the costs for natural gas and electricity per education organization per municipality were added up, to come to the total costs for natural gas (D) and electricity (E) per education organization. According to the total costs for natural gas (D) and electricity (E) per education organization the correct price per GJ for natural gas and per kWh for electricity was chosen according to the usage of natural gas and electricity (lower price when use is higher). To convert GJ natural gas to m^3 the conversion factor for natural gas of 0.03165 GJ/m^3 was used (Klimaatmonitor, 2020). The costs for natural gas and electricity per education organization were divided by the cost per m^3 (natural gas) and per kWh (electricity). Thereafter, the m^3 natural gas was multiplied by the emission factor for natural gas (Table 11-1) and divided by 1000 to result in ton of CO_2 equivalent emissions for scope 1. The kWh electricity was multiplied by the emission factor for electricity (Table 11-1) and divided by 1000 to result in ton of CO_2 equivalent emissions for scope 2. Per education organization the total balance sheet (equity + total debts) was used to make the attribution to the bank as described in section Attribution below.
Avoided emissions	In the calculations, the total costs for energy is used to calculate total ton of CO_2 equivalent emissions. If a school or university generates its own electricity by for example solar panels, than the costs for energy will be lower. The reduction in CO_2 equivalent emissions due to for example solar panels is therefore indirectly included in the calculations. Unfortunately, there is no specific data available on renewable energy for education organizations.
Asset class specific considerations	The approach for the education institutions is in line with the 'Commercial real estate' approach in the PCAF methodology.
Attribution	To calculate the CO_2 equivalent footprint following the PCAF principles, a general approach was 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 the Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan}}{\boldsymbol{Total\ balance\ sheet}}$$ In the end, the separate scopes and the sum of the scopes of all individual organizations are aggregated.
Absolute vs. relative emissions	For the education sector the total absolute CO_2 equivalent emissions are calculated in ton. The relative emissions are calculated by dividing the absolute CO_2 equivalent emissions by the amount of loans with a carbon footprint. This results in ton CO_2-eq / mln Euro.
Limitations	A limitation is that for some municipalities data on the supply of natural gas and electricity to the education sector is missing. If that was the case, the national average % of costs for natural gas per municipality and national average % of costs for electricity per municipality was used.

	For some education organizations, the exact number of students per municipality was estimated as the number of students per 'BRIN-number' is known and some BRIN-numbers have locations in multiple municipalities. As the exact ratio on how the students are divided over these locations is not known, the students are equally divided over the locations. These numbers were used to calculate the total number of students per education organization per municipality and the percentage of students per municipality per education organization. The education organizations that have BRIN-numbers with locations in multiple municipalities are marked in the calculation sheets. For one education organization, the total costs for energy and water was missing. For this organization, the data was gathered by the annual report of the education organization.
Data quality estimate	The factsheets per data source show that data quality varies between 1 and 2. The energy data comes from the education institutions themselves, but the data is not audited. Therefore, the overall data quality score is 2: non-audited GHG emissions data, or other primary data.

9.1.3 Factsheet per data source used

Topic	Description
Data	Supply of energy to the education sector
Data file	20211007 elektra en aardgas onderwijs.xlsx
Data Source	CBS Statline
Year	Data used from 2020 to calculate scope 1 natural gas and scope 2 electricity use
Last update	8-10-2021
Date of download	18-10-2021
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: 2020 Regio's: Gemeenten per provincie Bedrijfstakken/branches: Bedrijfstakken 1e digit (SBI 2008), P Onderwijs
Internal location	Original data: Werkmap\Onderwijs\Ruwe bestanden\20211007 elektra en aardgas onderwijs.xlsx
Data quality estimate	Score 2 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
Unit of measurement	Natural gas: 1000 m^3 Electricity: 1000 kWh
Selections	Not applicable
Data transformation	When data was missing, data from another year was used. This is marked in the calculation sheet.
Data missing	For the calculations no crucial data was missing.
Print Screens	In folder: Werkmap\Onderwijs\Printscreens\20211007 aardgas en elektra onderwijs 2020.PNG

Topic	Description
Data	Transaction prices for natural gas and electricity
Data file	20210921 ruwe data aardgas en elektriciteitsprijs.xlsx
Data Source	CBS Statline
Year	Data used from 2020 to calculate scope 1 natural gas use and scope 2 electricity use
Last update	30-06-2021
Date of download	21-09-2021
Link to webpage	https://opendata.cbs.nl/statline/#/CBS/nl/dataset/81309NED/table?ts=1599143752393
Filters used to obtain the datafile	Belastingen: Inclusief btw en belastingen

	Onderwerp: Aardgasprijs verbruiksklassen niet-huishoudens/ elektriciteitsprijs verbruiksklassen niet-huihoudens Perioden: 2020 Prijscomponenten: Transactieprijs
Internal location	Original data: Werkmap\Onderwijs\Ruwe bestanden\20210921 ruwe data aardgas en elektriciteitsprijs.xlsx
Data quality estimate	Score 2 The research method used to obtain the data can be found here: https://www.cbs.nl/nl-nl/onze-diensten/methoden/onderzoeksomschrijvingen/korte-onderzoeksbeschrijvingen/aardgas-en-elektriciteit-gemiddelde-prijzen-van-eindverbruikers. The data is obtained from energy companies via surveys
Unit of measurement	Natural gas: GJ calculated to m^3 Electricity: Euro per kWh
Selections	Transaction prices natural gas Euro per GJ: 4 usage classes 1 till 10 TJ 10 till 100 TJ 100 till 1000 TJ 1000 TJ and more Transaction prices electricity Euro per kWh: 6 usage classes 20 till 500 MWh 500 till 2000 MWh 2000 till 20000 MWh 20000 till 70000 MWh 70000 till 150000 MWh 150000 MWh and more
Data transformation	For the minimum and maximum usage per class the total price was calculated (Euro per GJ). This is used to choose the correct price per education organization. If the organization uses less energy or natural gas the price per GJ is higher. The average price for natural gas over the 4 usage classes and average price for electricity over the 6 usage classes were used to calculate the percentage of costs for natural gas and electricity per municipality (see previous data file and calculation steps)
Data missing	Not applicable
Print Screens	In folder: Werkmap\Onderwijs\Printscreens\20210921 aardgas en elektriciteitsprijs.PNG

Topic	Description
Data	Energy-content of natural gas
Data file	20210921 energie-inhoud aardgas onderwaarde in gj_m3.xlsx
Data Source	Klimaatmonitor
Year	2020
Last update	23-09-2020
Date of download	21-09-2021
Link to webpage	https://klimaatmonitor.databank.nl/Jive
Filters used to obtain the datafile	No filters used
Internal location	Original data: Werkmap\Onderwijs\Ruwe bestanden\ 20210921 energie-inhoud aardgas onderwaarde in gj_m3.xlsx
Data quality estimate	Score 1 Official statistic. https://www.infomil.nl/onderwerpen/duurzaamheid-energie/energiebesparing/vragen-antwoorden/overige-vragen/omrekening-verbruik/
Unit of measurement	GJ/m^3
Selections	Not applicable

Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Onderwijs\Printscreens\20210921 energie inhoud aardgas.PNG

Topic	Description
Data	Registration numbers of schools and universities
Data file	Several files, see internal locations in this table.
Data Source	DUO: Education Service of Ministry of Education, Culture and Science
Year	Data used from 2020 to calculate scope 1 natural gas use and scope 2 electricity use
Last update	1-7-2021
Date of download	19-7-2021
Link to webpage	***Primary schools*** https://duo.nl/open_onderwijsdata/databestanden/po/adressen/adressen-po-1.jsp ***Secondary schools*** https://duo.nl/open_onderwijsdata/databestanden/vo/adressen/adressen-vo-6.jsp ***Special primary and secondary schools*** https://duo.nl/open_onderwijsdata/databestanden/po/adressen/adressen-po-2.jsp ***Secondary vocational education*** https://duo.nl/open_onderwijsdata/databestanden/mbo/adressen/adressen-mbo-2.jsp ***Higher professional education and universities*** https://duo.nl/open_onderwijsdata/databestanden/ho/adressen/adressen-ho3.jsp
Filters used to obtain the datafile	Not applicable
Internal location	Original data: Werkmap\Onderwijs\Ruwe bestanden\Bevoegd gezag nr 02-adressen-bevoegde-gezagen.xlsx 03-bevoegde-gezagen-hbo-en-wo.xlsx 03-bevoegde-gezagen-vo.xlsx 05-besturen-bo.xlsx 06-bevoegde-gezagen-speciaal-basisonderwijs.xlsx
Data quality estimate	Not applicable
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Onderwijs\Printscreens\Bevoegd gezag nr

Topic	Description
Data	Addresses of schools and universities
Data file	Several files, see internal locations in this table.
Data Source	DUO: Education Service of Ministry of Education, Culture and Science
Year	Data used from 2020 to calculate scope 1 natural gas use and scope 2 electricity use
Last update	1-7-2021
Date of download	19-7-2021
Link to webpage	***Primary schools*** https://duo.nl/open_onderwijsdata/databestanden/po/adressen/adressen-po-3.jsp ***Secondary schools*** https://duo.nl/open_onderwijsdata/databestanden/vo/adressen/adressen-vo-2.jsp ***Special primary and secondary schools*** https://duo.nl/open_onderwijsdata/databestanden/po/adressen/adressen-po-2.jsp ***Secondary vocational education*** https://duo.nl/open_onderwijsdata/databestanden/mbo/adressen/adressen-mbo-1.jsp ***Higher professional education and universities*** https://duo.nl/open_onderwijsdata/databestanden/ho/adressen/adressen-ho1.jsp
Filters used to obtain the datafile	Not applicable
Internal location	Original data: Werkmap\Onderwijs\Ruwe bestanden\BRIN nummer 01-adressen-instellingen (1).xlsx 01-instellingen-hbo-en-wo.xlsx 02-alle-vestigingen-vo (1).xlsx 02-hoofdvestigingen-sbo-so-en-vso (1).xlsx 03-alle-vestigingen-bo (2).xlsx
Data quality estimate	Not applicable
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Onderwijs\Printscreens\Brin nr

Topic	Description
Data	Number of pupils or students per education organization
Data file	Several files, see internal locations in this table
Data Source	DUO: Education Service of Ministry of Education, Culture and Science
Year	2020
Last update	Primary schools 17-12-2020, higher professional education 17-02-2021, secondary vocational education 04-02-2021, secondary schools 21-12-2020, universities 17-02-2021.
Date of download	2-8-2021
Link to webpage	***Primary schools*** https://duo.nl/open_onderwijsdata/databestanden/po/leerlingen-po/po-totaal/bo-gewicht-leeftijd.jsp ***Secondary schools*** https://duo.nl/open_onderwijsdata/databestanden/vo/leerlingen/leerlingen-vo-1.jsp ***Secondary vocational education*** https://duo.nl/open_onderwijsdata/databestanden/mbo/studenten/studenten-mbo1.jsp ***Higher professional education*** https://duo.nl/open_onderwijsdata/databestanden/ho/ingeschreven/hbo.jsp ***Universities***

	https://duo.nl/open_onderwijsdata/databestanden/ho/ingeschreven/wo.jsp
Filters used to obtain the datafile	Not applicable
Internal location	Original data: Werkmap\Onderwijs\Ruwe bestanden\Aantal leerlingen 20210802 aantal leerlingen bo.xlsx 20210802 aantal leerlingen HBO.xlsx 20210802 aantal leerlingen mbo.xlsx 20210802 aantal leerlingen vo.xlsx 20210802 aantal leerlingen wo.xlsx
Data quality estimate	Score 2 Registration data
Unit of measurement	Not applicable
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print Screens	In folder: Werkmap\Onderwijs\Printscreens\Aantal leerlingen

Topic	Description
Data	Energy and water costs per education organization
Data file	20210921 14-lasten-2016-2020.xlsx
Data Source	DUO: Education Service of Ministry of Education, Culture and Science
Year	2020
Last update	15-09-2021
Date of download	21-09-2021
Link to webpage	https://duo.nl/open_onderwijsdata/databestanden/onderwijs-algemeen/financiele-cijfers/verantwoording-xbrl.jsp
Filters used to obtain the data file	Not applicable
Internal location	Original data: Werkmap\Onderwijs\Ruwe bestanden\ 20210921 14-lasten-2016-2020.xlsx
Data quality estimate	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	One education organization from the portfolio is missing (Stichting Heliomare Onderwijs).
Print Screens	In folder: Werkmap\Onderwijs\Printscreens\20210921 financiele gegevens duo.PNG

Topic	Description
Data	Total assets per education organization
Data file	20210921 01-balans-2016-2020.xlsx
Data Source	DUO: Education Service of Ministry of Education, Culture and Science
Year	2020
Last update	15-09-2021
Date of download	21-09-2021
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 data: Werkmap\Onderwijs\Ruwe bestanden\ 20210921 01-balans-2016-2020.xlsx
Data quality estimate	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	One education organization from the portfolio is missing (Stichting Heliomare Onderwijs).
Print Screens	In folder: Werkmap\Onderwijs\Printscreens\20210921 financiele gegevens duo.PNG

List of the calculation sheets	Location
20210811 scope 1 en 2 onderwijs NWB bank_2.xlsx	Werkmap\Onderwijs

10 Avoided emissions from wind farms

NWB Bank finances several renewable energy projects like wind farms. These projects lead to avoided emissions. By adding chapter 10 to this report some of the avoided emissions financed by NWB Bank are quantified showing the positive contribution of NWB Banks's lending to prevent climate change. Avoided emissions have to be quantified and reported separately from the actual emissions. The PCAF methodology also prescribes to be conservative in calculating the avoided emissions to limit the chance of overstating the avoided emissions.

The methodology used to calculate the avoided emissions from wind farms is described in the general factsheet.

10.1.1 General factsheet

Topic	Description
Scopes covered	Not applicable
Portfolio covered	15% of all financed wind farms are included in the calculation.
Data	Data on theoretical production, actual energy production in 2020, estimated lifespan, and total balance sheet was obtained from NWB bank (the bank's own account manager). Data on the number of wind turbines per project and type of wind turbines is obtained from NWB Bank or the website of the wind farms. Data on CO_2 equivalent emissions due to production, maintenance, and decommissioning comes from the wind turbine manufacturer itself, or if this information was not available from scientific literature.
Grid emission factors	The emission factor is based on the grey 'Well to Wheel' (WTW) energy mix of the Netherlands of 0.556 kg CO_2 / kWh.
Calculation steps	For the wind farms, first, the CO_2 equivalent emissions due to production, maintenance, and decommissioning was calculated. For each type of wind turbine the CO_2 equivalent emissions in grams per kWh for production, maintenance, and decommissioning was established. The theoretical annual capacity (P90) per wind turbine was multiplied by the estimated lifespan of a wind farm. The total production was multiplied by the CO_2 equivalent emissions in grams per kWh for production, maintenance, and decommissioning. This value was than multiplied by the number of turbines at the wind farm and divided by the estimated lifespan to calculate the CO_2 equivalent emissions for production, maintenance, and decommissioning for one year. The actual energy production in the year 2020 was multiplied by the emission factor 0.556 kg CO_2 / kWh. This results in the gross emissions avoided. The CO_2 equivalent emissions for production, maintenance, and decommissioning calculated per year was subtracted from the gross emissions to result in the net avoided emissions per year.
Avoided emissions	Not applicable
Asset class specific considerations	For the calculation of avoided emissions from wind farms asset class Project finance is followed.
Attribution	To calculate the CO_2 equivalent footprint following the PCAF principles, a general approach was developed. First, emissions of the different entities in the sector are calculated. Subsequently the Bank loan ratio of the total balance sheet of the individual wind farms is used to determine which part of the emissions the Bank is accountable for. $$\sum \boldsymbol{CO_2eq} \times \frac{\boldsymbol{Outstanding\ loan}}{\boldsymbol{Total\ balance\ sheet}}$$

Absolute vs. relative emissions	The avoided emissions are calculated in ton CO_2. The relative emissions are calculated by dividing the absolute CO_2 equivalent emissions by the amount of loans to wind farms for which the avoided emissions were calculated. This results in ton avoided CO_2-eq / mln Euro.
Limitations	For some wind turbines the CO_2 equivalent emissions in grams per kWh for production, maintenance, and decommissioning was unknown. In that case data from scientific literature was used to decide which value was best to use. The decision to use a certain number was made by at least two researchers from Het PON & Telos. Some financed wind farms were not or not yet fully operational in 2020. Wind farms that were not operational in 2020 were not taken into account. Wind farms that were not yet fully operational were taken into account for the months in which energy was produced.
Data quality estimate	The factsheets per data source show that data quality varies between 2 and 3. Most of the data comes from the wind farms themselves, but the data is not audited. Therefore, the overall data quality score is 2: non-audited GHG emissions data, or other primary data.

10.1.2 Factsheet per data source used

Topic	Description
Data	Energy production, total balance sheet, number and type of wind turbines
Data file	Email with name: Energieproductie en passiva windpark A en B Energieproductie en passiva windpark C en D
Data Source	Accountmanagers of the bank
Year	2020
Last update	Not applicable
Email received	Energieproductie en passiva windpark A en B: 3-8-2021 Energieproductie en passiva windpark C en D: 8-7-2021
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Windparken\Data
Data quality estimate	Score 2 Data is not audited, but data comes from the wind farms themselves.
Unit of measurement	Energy production: MWh Total balance sheet: Euro
Selections	Not applicable
Data transformation	Not applicable
Data missing	When the information about the number and type of wind turbines were missing in the email, this information was retrieved from the website of the wind farms.
Print screens	Not applicable

Topic	Description
Data	Theoretical production (P90) and lifespan
Data file	Email with name: Theoretische productie en levensduur windpark A en B Theoretische productie en levensduur windpark C en D
Data Source	Accountmanagers of the bank
Year	2020
Last update	Not applicable
Email received	Theoretische productie en levensduur windpark A en B: 15-10-2021 Theoretische productie en levensduur windpark C en D: 28-9-2021
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Windparken\Data
Data quality estimate	Score 2 Data is not audited, but data comes from the wind farms themselves.
Unit of measurement	Theoretical production (P90): MWh Lifespan: years
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

Topic	Description
Data	Detailed information about the wind farm that was not yet fully operational in 2020
Data file	Email with name: Laatste informatie over windpark A
Data Source	Accountmanager NWB Bank
Year	2020
Last update	Not applicable
-mail received	15-10-2021
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Windparken\Data
Data quality estimate	Score 2 Data is not audited, but data comes from the wind farms themselves.
Unit of measurement	Theoretical production (P90): MWh Lifespan: years
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

Topic	Description
Data	CO2 emissions due to production, maintenance, and decommissioning
Data file	Bonou_2016_Applied_Energy_LCAonshoreoffshore.pdf (Table 4 onshore D3) swt 4.0 130 siemens.pdf (page 9) ENERCON_Sustainability_Report_2019_Rev000.pdf (page 31)
Data Source	Siemens Enercon Scientific article: Bonou et al., 2016
Year	Siemens: unknown Enercon: 2019 Bonou et al., 2016
Last update	Not applicable
Date of download	Siemens: 24-9-2021 Enercon: 30-9-2021 Bonou et al., 2016: 24-9-2021
Link to webpage	Not applicable
Filters used to obtain the datafile	Not applicable
Internal location	Werkmap\Windparken\Achtergrond LCA gegevens
Data quality estimate	Score between 2 and 3. Some information is wind turbine specific (score 2) and some information is not (score 3).
Unit of measurement	g CO_2 / kWh
Selections	Not applicable
Data transformation	Not applicable
Data missing	Not applicable
Print screens	Not applicable

List of the calculation sheets	Location
20210908 Vermeden emissies windparken.xlsx	Werkmap\Windparken
20211030 financiering windparken NWB.xlsx	Werkmap\Windparken

11 Emission factors

For the calculation of the carbon footprint of the bank loan portfolio and clients from NWB Bank, emission factors were used to calculate emissions to ton CO_2 equivalent. The selection of the correct emission factors is crucial. For this publication the emission factors from CO2emissiefactoren.nl were used. This list of emission factors is developed by the Dutch National Government, SKAO, Stimular, Connekt, and Milieu Centraal.[27] 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 www.co2emissiefactoren.nl. This emission factor only includes the emission from the use of the energy carrier and not the production of the energy carrier.

An emission factor can change over time. The factors can change due to changes in methodology on scientific insights of due to changes in the context of the emission factor. This latter is the case for example for the emission factor for electricity from 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 CO_2 emissions. Therefore, when calculating CO_2 emissions, for a correct comparison, that the footprint of previous years may need to be recalculated.
At www.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 revised in 2020 retroactively from January 2018.

In this report, when emission data is longitudinally presented, we follow three basic principles to determine what emission factor to use:

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 2020 means using the emission factor of 2020.

[27] 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 increasing social attention for CO_2 emission factors, more and more tools are created to make a comparison or calculate a footprint. However, confusion arises when companies and organizations use different figures. Creating a uniform list is a solution to this and that is why the Green Deal was created.

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 CO_2 equivalent emissions.

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 2020 means using the emission factor of 2020.
3 Changes in emission factors over time due to new methodology or scientific insights: use the most recent emission factor. E.g. data from 2020 means using the emission factor of 2021

An overview of the emission factors used per year can be found in Table 11-1. In general, for every calculation and approach, emission factors were chosen in accordance to the data year.

Table 111-1 Emission factors used per data year (TTW)

Source	Emission factor (kg CO_2 eq/unit) (TTW)	Emission factor (kg CO_2 eq/unit) (TTW)	Emission factor (kg CO_2 eq/unit) (TTW)	Emission factor (kg CO_2 eq/unit) (TTW)	Note	Choices made
	2017	**2018**	**2019**	**2020**		
Petrol (E95) (NL)	2.269	2.269	2.269	2.269		
Diesel (NL)	2.606	2.606	2.606	2.606		
LPG (NL)	1.61	1.61	1.61	1.61		
Fuel oil	3.185 (WTW)	3.185 (WTW)	3.185 (WTW)	3.185 (WTW)		
Natural gas (m^3)	1.791	1.791	1.791	1.785	Slight decrease due to revised energy mix.	Use the emission factor in accordance to the data year
Grey energy	-	-	0.572	0.476 (TTW) 0.556 (WTW)		Use the emission factor in accordance to the data year
Electricity from unknown sources (kWh)	~~0.301~~	~~0.361~~	~~0.361~~	0.405	Slight increase due to new methodology	Use the most recent emission factor
Passenger transport by car, unknown fuel & weight (vehicle km)*	0.181	0.181	0.181	0.163	Slight decrease due to technological development and actualization	Use the emission factor in accordance to the data year
Public transport in general (traveled kms)	-	-	0.025	0.025		
Public transport by train (traveled kms; unknown train type)	0.005	0.005	0.005	0.005		
Public transport by busses (traveled kms; type unknown)	0.113	0.113	0.113	0.113		
Public transport by trams (traveled kms)	0	0	0	0		
Public transport by metro (traveled kms)	0	0	0	0		
Air travel <700 km	0.278	0.278	0.278	0.278		
Air travel 700-2500 km	0.187	0.187	0.187	0.187		
Air travel >2500 km	0.137	0.137	0.137	0.137		
Bulk goods, Truck, unit with semi-trailer heavy	0.064	0.064	0.064	0.064		
District heating (STEG)	32.53	32.53	32.53	32.53		
Source	*LINK*[28]	*LINK*[29]	*LINK*[30]	*LINK*[31]	*LINK*[32]	

[28] https://www.co2emissiefactoren.nl/wp-content/uploads/2019/01/co2emissiefactoren-2017.pdf
[29] https://www.co2emissiefactoren.nl/wp-content/uploads/2019/01/co2emissiefactoren-2018.pdf
[30] https://www.co2emissiefactoren.nl/wp-content/uploads/2019/01/co2emissiefactoren-2019.pdf
[31] https://www.co2emissiefactoren.nl/wijzingingen-overzicht/
[32] https://www.co2emissiefactoren.nl/wijzingingen-overzicht/

12 Introduction Results

In the chapters 12 up to 21 the results of the GHG emission calculations are presented. These chapters contain mainly the GHG emissions of reporting years 2020 and 2021. However, when in comparison to last year the methodology has been changed, the GHG emissions of reporting years 2019 and 2020 are recalculated and also shown. In chapter 21 an overview is given of the development of the loan portfolio, coverage rate, and GHG emissions over the last three reporting years (2019 up to 2021). For the calculation of GHG emissions of reporting year 2021 the most recent available data has been used. The most recent data can be either from 2019 or 2020.

When the results show an increase or decrease in CO_2 equivalent emissions between reporting years, these changes can be caused by various factors. It can be due to changes in clients, changes in the outstanding loan volumes, changes in the total balance sheet of the clients, changes in the ratio outstanding loan volumes / total balance sheet, and also by a change in absolute CO_2 equivalent emissions by the clients due to several possible factors, like energy savings, weather conditions, investment in renewable energy, more projects etc. Within this study, there is no insight into the specific changes that might have taken place at the clients.

12.1 NWB Bank loan portfolio

The NWB Bank loan portfolio consists of different market segments. These segments cover multiple sectors or sub-sectors. An overview of these sectors is given in Table 12-1.

Table 12-1 Overview of NWB Bank loan portfolio for reporting years 2019, 2020, and 2021[33]

Market segment	Sector	Loan portfolio (million EUR)	Percentage of all loans	Loan portfolio (million EUR)	Percentage of all loans	Loan portfolio (million EUR)	Percentage of all loans
		2021	**2021**	**2020**	**2020**	**2019**	**2019**
Social housing	Social housing associations	30,391	61%	30,813	62%	30,265	64%
Public sector	Municipalities	6,665	13%	7,071	14%	6,583	14%
	Provinces	202	0%	225	0%	247	1%
	Water authorities	7,172	14%	6,501	13%	6,327	13%
Healthcare	Healthcare	1,878	4%	2,053	4%	2,119	4%
Education	Education institutions	88	0%	70	0%	73	0%
Networks	Drinking water utilities	836	2%	666	1%	477	1%
Other		2,614	5%	2,037	5%	1,554	3%
Total		**49,846**	**100%**	**49,436**	**100%**	**47,645**	**100%**

[33] Reference dates for reporting years 2019, 2020, and 2021 are 31-12-2019, 31-12-2020, and 31-12-2021, respectively

As can be seen in Table 12-1, the social housing associations, water authorities, and municipalities are the largest sectors in the NWB Bank loan portfolio. The total loan portfolio increased by 410 million Euro in 2021.

13 Results Social housing sector

The social housing sector is the largest sector within the loan portfolio of NWB Bank. The sector has a share of 61% within the bank's loan portfolio.

13.1 Coverage

It was possible to calculate the CO_2 equivalent footprint for 99.9% of the loan portfolio within the social housing sector. Data quality score for the social housing sector is 2, meaning: non-audited GHG emissions data, or other primary data. Between reporting year 2020 and 2021, the outstanding loan volume decreased by 421 million Euro. For reporting years 2020 and 2021, the loan portfolio, coverage rate, and data quality score are shown in Tables 13-1 and 13-2.

Table 13-1 Coverage rate and data quality score for the social housing sector for reporting year 2021

Social housing sector	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)	Data quality score
Social housing associations	30,369	99.9%	61%	100%	
Others	21	0.07%	0%	0%	
Total	**30,391**	**100%**	**61%**	**99.9%**	**2**

Table 13-2 Coverage rate for the social housing sector for reporting year 2020

Social housing sector	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)
Social housing associations	30,790	99.9%	62.3%	100.0%
Others	23	0.1%	0.0%	0.0%
Total	**30,813**	**100.0%**	**62.3%**	**99.9%**

13.2 CO_2 equivalent emissions

The results of the CO_2 equivalent footprint of the outstanding NWB Bank loans to the social housing sector for the reporting years 2020 and 2021 are shown in Table 13-3.

Table 13-3 Absolute and relative CO_2 equivalent emissions for the social housing sector for reporting years 2020 and 2021

Source of emissions	Scope	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)
		2021	**2021**	**2021**	**2020**	**2020**	**2020**
Natural gas use	Scope 1	456,729	65.9%	15.0	504,345	66.9%	16.4
Electricity use	Scope 2	214,803	31.0%	7.1	226,225	30.0%	7.3
District heating	Scope 2	21,723	3.1%	0.7	22,796	3.0%	0.7
Total		**693,255**	**100%**	**22.8**	**753,366**	**100.0%**	**24.5**

Between reporting year 2020 and 2021 the absolute CO_2 equivalent emissions decreased for all scopes. The total absolute CO_2 equivalent emissions decreased by 60,111 ton. This decrease is mainly caused by a decrease in scope 1 natural gas use, which decreased by 47,616 ton. The part of the loans covered with a CO_2 footprint decreased from 30,790 to 30,369 million Euro. The percentage of outstanding loan volumes / total balance sheet also decreased in comparison to reporting year 2020 (from 9.5% to 8.7%). This reduction in loans covered with a CO_2 footprint and percentage of outstanding loan volumes / total balance sheet have a share in the decrease of the absolute CO_2 equivalent emissions. The total relative CO_2 equivalent emissions decreased by 1.7 ton per million Euro. Which shows that the absolute reduction of the GHG emissions is not only due to a reduction in the outstanding loan volume. In conclusion, the absolute and relative GHG emissions for the social housing sector decreased between reporting year 2020 and 2021.

14 Results public sector: municipalities

With a share of 13% of the total loan portfolio of NWB Bank the municipalities are the second largest sector within the total loan portfolio of NWB Bank together with the water authorities.

14.1 Coverage

For the municipalities, it was possible to provide 100% of the loan portfolio with a CO_2 equivalent footprint. Data quality score for municipalities is 3, meaning: averaged data that is peer/(sub)-sectorspecific. Between reporting year 2020 and 2021, the outstanding loan volume decreased by 406 million Euro. For reporting years 2019 up to 2021, the loan portfolio, coverage rate, and data quality score are shown in Table 14-1.

Table 14-1 Coverage rate and data quality score for the municipalities for reporting years 2019, 2020, and 2021

Municipalities	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)	Data quality score
2021	6,665	100%	13%	100%	3
2020	7,071	100%	14%	100%	
2019	6,583	100%	14%	100%	

14.2 CO_2 equivalent emissions

The results of the CO_2 equivalent footprint of the outstanding NWB Bank loans to Dutch municipalities for reporting years 2019 up to 2021 are shown in Table 14-2.

Table 14-2 Absolute and relative CO_2 equivalent emissions for municipalities for reporting years 2019, 2020, and 2021

Source of emissions	Scope	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)
		2021	**2021**	**2021**	**2020**	**2020**	**2020**	**2019**	**2019**	**2019**
Natural gas use	Scope 1	9,026	2.3%	1.4	11,348	2.7%	1.6	11,372	2.8%	1.7
Fossil fuel use (cars)	Scope 1	1,089	0.3%	0.2	1,127	0.3%	0.2	1,034	0.3%	0.2
Electricity use	Scope 2	27,695	7.1%	4.2	36,632	8.7%	5.2	32,616	8.1%	5.0
Purchased goods and services	Scope 3	349,842	90.2%	52.5	371,255	88.3%	52.5	355,757	88.8%	54.0
Total		**387,652**	**100%**	**58.3**	**420,362**	**100%**	**59.4**	**400,779**	**100%**	**60.9**

Between reporting year 2020 and 2021 the absolute CO_2 equivalent emissions decreased for all scopes. In total the absolute CO_2 equivalent emissions decreased by 32,710 ton. This decrease is mainly caused by a decrease for scope 2 by 8,937 ton. The part of the loans covered with a CO_2 footprint decreased from 7,071 to 6,665 million Euro. The percentage of outstanding loan volumes / total balance sheet also decreased in comparison to reporting year 2020 (from 10% to 9%). This reduction in loans covered with a CO_2 footprint and percentage of outstanding loan volumes / total balance sheet have a share in the decrease of the absolute CO_2 equivalent emissions. The total relative CO_2 equivalent emissions decreased by 1.1 ton per million Euro. Which shows that the absolute reduction of the GHG emissions is not only due to a reduction in the outstanding loan volume. In conclusion, the absolute and relative GHG emissions for the municipalities decreased between reporting year 2020 and 2021.

15 Results public sector: provinces

The Dutch provinces have a small share within the bank's loan portfolio with only 0.4% of the total loan portfolio of NWB Bank in reporting year 2021.

15.1 Coverage

The coverage rate of this sector is 100%. Data quality score for provinces is 3, meaning: averaged data that is peer/(sub)-sectorspecific. The outstanding loan volume decreased by 23 million Euro between reporting year 2020 and 2021. For reporting years 2019 up to 2021, the loan portfolio, coverage rate, and data quality score are shown in Table 15-1.

Table 15-1 Coverage rate and data quality score for the provinces for reporting years 2019, 2020, and 2021

Provinces	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)	Data quality score
2021	202	100%	0.4%	100%	3
2020	225	100%	0.5%	100%	
2019	247	100%	0.5%	100%	

15.2 CO_2 equivalent emissions

The results of the CO_2 equivalent footprint of the outstanding NWB Bank loans to Dutch provinces for reporting years 2019 up to 2021 are shown in Table 15-2.

Table 15-2 Absolute and relative CO_2 equivalent emissions for the provinces for reporting years 2019, 2020, and 2021

Source of emissions	Scope	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)
		2021	**2021**	**2021**	**2020**	**2020**	**2020**	**2019**	**2019**	**2019**
Natural gas use	Scope 1	91	1.5%	0.5	147	1.6%	0.6	165	1.6%	0.7
Fossil fuel use (cars)	Scope 1	16	0.3%	0.1	21	0.2%	0.1	22	0.2%	0.1
Electricity use	Scope 2	385	6.2%	1.9	599	6.6%	2.4	634	6.3%	2.6
Purchased goods and services	Scope 3	5,738	92.1%	28.3	8,284	91.5%	33.6	9,275	91.9%	37.6
Total		**6,230**	**100%**	**30.8**	**9,051**	**100%**	**36.7**	**10,096**	**100%**	**40.9**

Between reporting year 2020 and 2021 the absolute CO_2 equivalent emissions decreased for all scopes. In total the absolute CO_2 equivalent emissions decreased by 2,821 ton. The part of the loans covered with a CO_2 footprint decreased from 225 to 202 million Euro. The percentage of outstanding loan volumes / total balance sheet also decreased in comparison to reporting year 2020 (from 12.9% to 10%). This reduction in loans covered with a CO_2 footprint and percentage of outstanding loan volumes / total balance sheet have a share in the decrease of the absolute CO_2 equivalent emissions. The total relative CO_2 equivalent emissions decreased by 5.9 ton per million Euro. Which shows that the absolute reduction of the GHG emissions is not only due to a reduction in the outstanding loan volume. In conclusion, the absolute and relative GHG emissions for the provinces decreased between reporting year 2020 and 2021.

16 Results public sector: water authorities

With a share of 14% of the total loan portfolio of NWB Bank the water authorities is the second largest sector within the total loan portfolio of NWB Bank together with the municipalities.

16.1 Coverage

For the water authorities it was possible to provide 100% of the loan portfolio with a CO_2 footprint. Data quality score for water authorities is 2, meaning: non-audited GHG emissions data, or other primary data. Between reporting year 2020 and 2021 the outstanding loan volume increased by 671 million Euro. For reporting years 2020 and 2021, the loan portfolio, coverage rate, and data quality score are shown in Table 16-1.

Table 16-1 Coverage rate and data quality score for the water authorities for reporting years 2020 and 2021

Water authorities	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)	Data quality score
2021	7,172	100%	14%	100%	2
2020	6,501	100%	13%	100%	

16.2 CO_2 equivalent emissions

The results of the CO_2 equivalent footprint of the outstanding NWB Bank loans to water authorities for the reporting years 2021 and 2020 are shown in Table 16-2.

Table 16-2 Absolute and relative CO_2 equivalent emissions for the water authorities for reporting years 2020 and 2021

Source of emissions	Scope	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)
		2021	**2021**	**2021**	**2020**	**2020**	**2020**
Fuel for water treatment management	Scope 1	4,653	1.6%	0.6	3,962	1.2%	0.6
Fuel for water systems	Scope 1	2,970	1.0%	0.4	3,589	1.1%	0.6
Other fuel use	Scope 1	1,716	0.6%	0.2	1,419	0.4%	0.2
Transport fuel	Scope 1	7,831	2.7%	1.1	12,657	3.9%	1.9
Biogas discharge	Scope 1	984	0.3%	0.1	475	0.1%	0.1

Electricity use	Scope 2	207,603	71.1%	28.9	225,808	69.1%	34.7
Warmth	Scope 2	1,424	0.5%	0.2	2,056	0.6%	0.3
Fuel commuting, maintenance and transport	Scope 3	36,706	12.6%	5.1	42,833	13.1%	6.6
Purchase of metal salts and polymer	Scope 3	27,961	9.6%	3.9	33,780	10.3%	5.2
Total		**291,847**	**100%**	**40.7**	**326,577**	**100.0%**	**50.2**

Between reporting year 2020 and 2021 the absolute CO_2 equivalent emissions decreased for: fuel for water systems (by 619 ton), transport fuel (by 4,826 ton), electricity use (by 18,205), warmth (by 632 ton), fuel commuting, maintenance and transport (by 6,127), and purchase of metal salts and polymer (by 5,819 ton). On the other hand, the absolute CO_2 equivalent emissions increased for: fuel for water treatment management (by 691 ton), other fuel use (by 297 ton), and biogas discharge (by 509 ton). Overall this resulted in a decrease in the absolute CO_2 equivalent emissions by 34,730 ton. This decrease was mainly due to a decrease for scope 2 electricity use by 18,205 ton. The part of the loans covered with a CO_2 footprint increased from 6,501 to 7,172 million Euro. The percentage of outstanding loan volumes / total balance sheet also increased in comparison to reporting year 2020 (from 68.9% to 70%), so more emissions had to be attributed to the bank. The absolute CO_2 equivalent emissions decreased while the part of the loans covered with a CO_2 footprint increased and the percentage of emissions that had to be attributed to the bank increased. This resulted in a decrease of the relative CO_2 equivalent emissions by 9.5 ton per million Euro. In conclusion, the absolute and relative GHG emissions decreased between reporting year 2020 and 2021.

17 Results healthcare sector

The healthcare sector has a small share within the bank's loan portfolio with 4% of the total loan portfolio of NWB Bank in reporting year 2021.

17.1 Coverage

As shown in Table 17-1, 75.1% of the organizations in the healthcare sector has been provided with a CO_2 equivalent footprint. The increase in coverage rate between reporting year 2020 and 2021 is due to changes in the clients within this sector. A few clients without a CO_2 footprint in 2020 were no longer client in 2021.

Table 17-1 Coverage rate and data quality score for the healthcare sector for reporting years 2019, 2020, and 2021

Healthcare sector	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio[34] (%)	Data quality score
2021	1,878	100%	4%	75.1%	3
2020	2,053	100%	4%	73.6%	3
2019	2,119	100%	4%	70.7%	2

The healthcare sector loan portfolio decreased by 175 million Euro between reporting year 2020 and 2021. Data quality score for the healthcare sector is 3, meaning: averaged data that is peer/(sub)-sectorspecific. The healthcare sector is the only sector for which the data quality score changes over the years. For reporting year 2019, primary data of the healthcare organizations could be used, however for reporting years 2020 and 2021 this was not possible. Therefore, the data quality score increased, which means that the data quality reduced. Reasons for this are explained in chapter 7.

[34] In comparison to the coverage rate that was published in the report of PCAF 2020, the coverage rate has improved by 2.5% between reporting year 2020 and 2021. This is due to a methodology change as described in chapter 7 of this report. When reporting year 2020 is recalculated the difference in coverage rate between reporting year 2020 and 2021 is 1.5%.

17.2 CO_2 equivalent emissions

The results of the CO_2 equivalent footprint of the outstanding NWB Bank loans to healthcare organizations for reporting years 2019 up to 2021 are shown in Table 17-2.

Table 17-2 Absolute and relative CO_2 equivalent emissions for the healthcare sector for reporting years 2019, 2020, and 2021

Source of emissions	Scope	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)
		2021	**2021**	**2021**	**2020**	**2020**	**2020**	**2019**	**2019**	**2019**
Natural gas use	Scope 1	36,945	49.9%	26.2	41,430	46.8%	27.4	41,224	46.6%	27.5
Electricity use	Scope 2	27,066	36.5%	19.2	29,831	33.7%	19.7	30,200	34.1%	20.1
Commuting (car, bus, tram, metro, train)	Scope 3	10,067	13.6%	7.1	17,234	19.5%	11.4	17,133	19.3%	11.4
Total		**74,078**	**100%**	**52.5**	**88,495**	**100%**	**58.6**	**88,557**	**100%**	**59.1**

Between reporting year 2020 and 2021 the absolute CO_2 equivalent emissions decreased for all scopes. In total the absolute CO_2 equivalent emissions decreased by 14,417 ton. The largest decrease was seen for commuting in scope 3 by 7,167 ton. The part of the loans covered with a CO_2 footprint decreased from 1,511 to 1,410 million Euro. The percentage of outstanding loan volumes / total balance sheet also decreased in comparison to reporting year 2020 (from 6.9% to 6.3%). This reduction in loans covered with a CO_2 footprint and percentage of outstanding loan volumes / total balance sheet have a share in the decrease of the absolute CO_2 equivalent emissions. The total relative CO_2 equivalent emissions decreased by 6.1 ton per million Euro. Which shows that the absolute reduction of the GHG emissions is not only due to a reduction in the outstanding loan volume. In conclusion, the absolute and relative GHG emissions for the healthcare sector decreased between reporting year 2020 and 2021.

18 Results drinking water utilities

The drinking water utilities have a small share within the bank's loan portfolio with 2% of the total loan portfolio of NWB Bank in reporting year 2021.

18.1 Coverage

As shown in Table 18-1, 91% of the drinking water utilities has been provided with a CO_2 equivalent footprint. As explained in chapter 8, the approach for drinking water utilities changed in comparison to reporting year 2020. The coverage rate for reporting years 2019 and 2020 could not be recalculated. Therefore, the coverage rates for reporting years 2019 and 2020 are missing in Table 18-1.

Table 18-1 Coverage rate and data quality score for the drinking water utilities for reporting years 2019, 2020, and 2021

Drinking water utilities	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)	Data quality score
2021	836	100%	1.7%	91.0%	2
2020	666	100%	1.3%		
2019	477	100%	1.0%		

The outstanding loan volume to the drinking water utilities increased by 170 million Euro between reporting year 2020 and 2021. Data quality score for the healthcare sector is 2, meaning: non-audited GHG emissions data or other primary data.

18.2 CO_2 equivalent emissions

The results of the CO_2 equivalent footprint of the outstanding NWB Bank loans to drinking water utilities for reporting year 2021 is shown in Table 18-2.

Table 18-2 Absolute and relative CO_2 equivalent emissions for the drinking water utilities for reporting year 2021

Scope	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)
	2021	**2021**	**2021**
Scope 1	5,919	24.6%	7.8
Scope 2	9,458	39.4%	12.4
Scope 3	8,645	36.0%	11.4
Total	**24,021**	**100%**	**31.6**

Unfortunately, the absolute and relative CO_2 equivalent emissions cannot be compared with previous years due to the change in methodology. The percentage of outstanding loan volumes / total balance sheet did not change in comparison to reporting year 2020 (13.4% versus 13.3, respectively).

19 Results educational institutions

The education sector has a small share of 0.2% within the bank's loan portfolio reporting year 2021.

19.1 Coverage

For reporting years 2020 and 2021, the loan portfolio, coverage rate, and data quality score are shown in Table 19-1. The education loan portfolio increased by 18 million Euro between reporting year 2020 and 2021. Within the education sector, coverage rate of total loan portfolio is 93.3% for reporting year 2021. The increase in coverage rate between reporting year 2020 and 2021 is due to changes in the clients within this sector. Data quality score for the education sector is 2, meaning: non-audited GHG emissions data, or other primary data.

Table 19-1 Coverage rate and data quality score for the educational institutions for reporting year 2021

Educational institutions	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Coverage rate of loan portfolio (%)	Data quality score
2021	88	100%	0%	93.3%	2
2020	70	100%	0%	91.4%	

19.2 CO_2 equivalent emissions

The CO_2 equivalent footprint of the outstanding NWB Bank loans to the education sector for reporting year 2020 and 2021 is shown in Table 19-2.

Table 19-2 Absolute and relative CO_2 equivalent emissions for the educational institutions for reporting years 2020 and 2021

Source of emissions	Scope	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)	CO_2-eq absolute (ton/year)	CO_2-eq absolute (%)	CO_2-eq relative (ton/million EUR)
		2021	**2021**	**2021**	**2020**	**2020**	**2020**
Natural gas use	Scope 1	2,108	60.3%	25.8	1,571	58.8%	24.6
Electricity use	Scope 2	1,388	39.7%	17.0	1,100	41.1%	17.2
Total		**3,496**	**100%**	**42.8**	**2,671**	**100%**	**41.8**

Between reporting year 2020 and 2021 the total absolute CO_2 equivalent emissions increased by 825 ton. The relative CO_2 equivalent emissions increased by 1 ton per million Euro. In conclusion, the absolute and relative GHG emissions increased between reporting year 2020 and 2021. The percentage of outstanding loan volumes / total balance sheet also increased in comparison to reporting year 2020 (from 9% to 10.7%). The part of the loans covered with a CO_2 footprint increased from 64 to 82 million Euro. The increase in the outstanding loan volume and percentage of outstanding loan volumes / total balance sheet have a share in the increase of the absolute CO_2 equivalent emissions. The relative CO_2 equivalent emissions increased by 1 ton per million Euro. In conclusion, the absolute and relative GHG emissions increased for the education institutions between reporting year 2020 and 2021.

20 Avoided CO_2-eq emissions by wind farms

NWB Bank finances projects that produce renewable energy. Some of these projects are wind farms. Most of these wind farms were under construction in 2020. For the wind farms that produced renewable energy in 2020, the avoided emissions were calculated.

20.1 Coverage

Avoided emissions have been calculated for 15% of the financed wind farms. This means, 85% of the financed wind farms are not included in the calculation (Avoided emissions not calculated in Table 20-1). Data quality score for the wind farms is 2, meaning: non-audited GHG emissions data, or other primary data. For reporting year 2021, the loan portfolio, coverage rate and data quality score are shown in Table 20-1 .

Table 20-1 Coverage rate and data quality score for the wind farms for reporting year 2021

Wind farms	Loan portfolio (million EUR)	Percentage of sector	Percentage of all loans	Data quality score
Avoided emissions calculated	33	15%	0%	
Avoided emissions **not** calculated	189	85%	0%	
Total	**222**	**100%**	**0%**	**2**

20.2 Avoided CO_2 equivalent emissions

The results of the avoided emissions are shown in Table 20-2.

Table 20-2 The absolute and relative avoided emissions of the wind farms for reporting year 2021

Wind farms	CO_2-eq absolute (ton/year)	Percentage calculated avoided emissions versus total absolute CO2-eq emissions	CO_2-eq relative (ton/million EUR)
Avoided emissions	13,622	0.9%	410

The total avoided emissions from the wind farms included in the calculations is 13,622 ton CO_2 equivalent emissions per year. This is 0.9% of the total CO_2 equivalent emissions of the bank's loan portfolio.

21 Total CO_2-eq emissions for reporting years 2019 up to 2021

21.1 Coverage of the GHG emission assessment

In summary, Table 21-1 shows the overview of outstanding loan volumes per sector and subsectors and the coverage rate for the reporting years 2019, 2020, and 2021.

Table 21-1 Total outstanding loan volumes of NWB Bank and part covered in the GHG assessment for reporting years 2019, 2020, and 2021[35]

Market segment	Sector	Loan portfolio (million EUR)	Loan portfolio Covered with GHG footprint (%)	Loan portfolio (million EUR)	Loan portfolio Covered with GHG footprint (%)	Loan portfolio (million EUR)	Loan portfolio Covered with GHG footprint (%)
		2021	**2021**	**2020**	**2020**	**2019**	**2019**
Social housing	Social housing associations	30,391	99.9%	30,813	99.9%	30,265	99.8%
Public sector	Municipalities	6,665	100%	7,071	100%	6,583	100%
	Provinces	202	100%	225	100%	247	100%
	Water authorities	7,172	100%	6,501	100%	6,327	100%
Healthcare	Healthcare	1,878	75%	2,053	73.6%	2,119	70.7%
Education	Education institutions	88	93%	70	91.4%	73	91.6%
Networks	Drinking water utilities	836	91%	666	87.3%	477	85.5%
Other		2,614	0%	2,037	0%	1,554	0%
Total		**49,846**	**93.6%**	**49,436**	**94.6%**	**47,645**	**95.1%**

For the reporting year 2021, the GHG emission estimates cover 93.6% of NWB Bank loans portfolio. The loan portfolio covered with a GHG footprint slightly reduced by 84 million Euro in comparison to reporting year 2020 (Table 21-2), while the total loan portfolio increased by 410 million Euro (Table 21-1). As can be seen in Table 21-1 market segment residuals increased by 577 million Euro, but has no GHG footprint this influences the total coverage rate.

[35] Reference dates for reporting year: 2021 is 31-12-2020; reference date for reporting year 2020 is 31-12-2019, and reference date for reporting year 2019 is 31-12-2018

21.2 GHG emissions of NWB Bank loan portfolio

The results of the CO_2 equivalent footprint of the total outstanding NWB Bank loans for reporting years 2019 up to 2021 are shown in Table 21-2.

Table 21-2 Absolute and relative CO_2 equivalent emissions and data quality for reporting years 2019, 2020, and 2021

Market segment	Sector^	Part covered with GHG footprint (million EUR)	Attributed emissions (ton CO_2-eq)	CO_2-eq relative (ton CO_2-eq/million EUR)	Part covered with GHG footprint (million EUR)	Attributed emissions (ton CO_2-eq)	CO_2-eq relative (ton CO_2-eq/million EUR)	Part covered with GHG footprint (million EUR)	Attributed emissions (ton CO_2-eq)	CO_2-eq relative (ton CO_2-eq/million EUR)	Data quality (score 1-5)
		2021	**2021**	**2021**	**2020**	**2020**	**2020**	**2019**	**2019**	**2019**	
Social housing	Social housing associations	30,369	693,255	22.8	30,790	753,366	24.5	30,199	841,201	27.9	2
Public sector	Municipalities	6,665	387,653	58.3	7,071	420,362	59.4	6,583	400,779	60.9	3
	Provinces	202	6,230	30.8	225	9,051	36.7	247	10,096	40.9	3
	Water authorities	7,172	291,847	40.7	6,501	326,577	50.2	6,327	372,266	58.8	2
Healthcare	Healthcare	1,410	74,078	52.5	1,511	88,495	58.6	1,498	88,557	59.1	3
Education	Education institutions	82	3,496	42.8	64	2,671	41.8	67	2,452	36.8	2
Networks	Drinking water utilities	760	24,021	31.6	582	4,799*	8.2*	408	2,722*	6.7*	2
Total		**46,660**	**1,480,580**	**31.7**	**46,744**	**1,605,321**	**34.3**	**45,329**	**1,718,073**	**37.9**	

^Avoided emissions need to be reported separately from actual emissions, therefore the avoided emissions that are calculated for this report are not included in this table, but are presented separately in chapter 20.
*For the drinking water utilities the methodology for reporting year 2021 changed in comparison to reporting years 2020 and 2019. Reporting years 2020 and 2019 could not be recalculated. Therefore, the values for reporting years 2020 and 2019 cannot be compared with the values of reporting year 2021. The methodology is explained in chapter 8.

As can be seen in Table 21-2, the NWB Bank loan portfolio for reporting year 2021 has a total emission of 1,481 kiloton CO_2 equivalent.
In comparison to reporting year 2020 the total emissions decreased by 125 kiloton. The reduction was mainly due to a reduction of GHG emissions for the social housing sector (-60 kiloton CO_2 equivalent), for the water authorities (-35 kiloton CO_2 equivalent), and for the municipalities (-33 kiloton CO_2 equivalent). For the social housing and municipalities the CO_2 equivalent emissions reduced for all scopes. For the social housing sector the largest reduction was seen for scope 1 (natural gas use). For the municipalities and water authorities the largest reduction was seen for scope 2 (electricity use).
The reduction of 125 kiloton CO_2 equivalent is a significant reduction. The loan portfolio covered by the GHG footprint calculation decreased by 84 million Euro. Although the loan portfolio covered by the GHG footprint calculation decreased, the relative emission (ton CO_2-eq/million Euro) also decreased from 34.3 to 31.7 ton per million Euro, which shows that the reduction in absolute CO_2 equivalent emissions is not only due to a reduction in loan portfolio covered by the GHG footprint.

The absolute and relative decrease of GHG emissions of NWB's loan portfolio is positive. As mentioned before many factors play a role in explaining why this development is taking place. It can be due to changes at the side of the bank, such as changes in clients, changes in the outstanding loan volumes, changes in the total balance sheet of the clients, and changes in the ratio outstanding loan volumes / total balance sheet. It can also be due to a change in absolute CO_2 equivalent emissions by the clients due to several possible factors. If a decrease is seen, this can be a result of the fact that more and more investments are made to make real estate more sustainable. There is more attention for energy savings, but there is also more invested in renewable energy. Another important factor is the influence of the weather. A mild winter often results in lower natural gas use. The most recent data used for this report is 2019 or 2020. The winter of 2019/2020 was the second warmest since recording began.[36]

Another factor that may have influenced the results of reporting year 2021 is the worldwide COVID crisis that started in the beginning of 2020. Various measures were taken to control this crisis. More people worked at home which resulted in less traffic on the roads and due to this probably less natural gas was used to heat offices. But on the other hand, more natural gas was used to heat homes.

Nevertheless, the absolute and relative decrease of GHG emissions is a positive development. By monitoring the CO_2 footprint of the bank's loan portfolio longitudinal, the results will show whether the reduction is temporary or a long term positive development.

[36] https://www.knmi.nl/nederland-nu/klimatologie/maand-en-seizoensoverzichten/2020/winter

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About Het PON & Telos

Improving social decision-making

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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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