stichting W/E adviseurs

W/E report 32161

Avoided CO_2 emissions Green Bond Portfolio NIBC

Status per 31-12-2022

Stichting W/E adviseurs
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Project

W/E 32161

Content

1 NIBC Green Bond

As requested by NIBC, W/E consultants have calculated the CO_2 impact indication of the assets which are financed by the outstanding NIBC Green Bond portfolio as per 31 December 2022. This report covers the impact calculations of the current green bond NIBC portfolio, consisting of ISIN code XS2384734542.

In this report the carbon impact is calculated per eligible asset category (mortgages for residential buildings and for commercial real estate) depending on the distribution of allocated assets per 31 December 2022. Core indicators are reported in accordance with the 'The Global GHG Accounting & Reporting Standard for the Financial Industry' of PCAF[1].

The method for calculating the avoided CO_2-emissions is described in chapter 2. The calculated CO_2-emissions attributed to the NIBC green bond portfolio per use function (in Dutch: gebruiksfunctie) can be found in chapter 3. The benchmark CO_2-emissions are calculated and compared to the CO_2-emissions of the NIBC portfolio in chapter 4. The PCAF CO_2 coefficients and the distribution of the m^2 useful floor area of the average buildings in the Netherlands can be found in chapter 5, the Annex.

The calculated total financed CO_2-emission reduction attributed to the 750 million euro NIBC Green Bond portfolio compared to the benchmark is 2,819.3 tonnes CO_2 per year (-28.0%, please refer to Table 2).

1.1 Characteristics NIBC portfolio

The first table shows an overview of the assets that are part of the Green Bond portfolio. Please note that the total value ('current loan') of all assets equals 933 million euro, where as the Green Bond itself has a value of 750 million euro.

Table 1 Data portfolio NIBC per use function[2].

Use function	number of property units[3]	useful floor area [m²]	property value [€]	current loan [€]
Office	30	97,572	277,911,035	146,930,826
Residential	2,451	333,497	1,185,850,273	785,894,305
TOTAL	**2,481**	**431,069**	**1,463,761,308**	**932,825,130**

1.2 Total (financed) CO_2-emission NIBC portfolio

The proceeds of the current green bond portfolio are allocated to the retail mortgages and the CRE selection project categories of NIBC. For each of these categories, the annual avoided CO_2 emissions (compared to a national benchmark) have been calculated (Table 2). The table shows 3 sets of data:

1. The total emission and emission reduction of all assets
2. As 1., but only the part that is financed by NIBC
3. As 2., but only the part that is used to cover the Green Bond (i.e., 750/933 times the emission and emission reduction in 2.)

[1] PCAF (2020). 'The Global GHG Accounting and Reporting Standard for the Financial Industry. First edition.' 'PCAF-Global-GHG-Standard.pdf', 18th November 2020, https://carbonaccountingfinancials.com/standard

[2] NIBC provided data in two spreadsheets: '2022Q4 NIBC CRE selection for green bond.xlsx' (use functions: office, residential buildings), '2022Q4 NIBC retail mortgages selection for green bond.xlsx'.

[3] In Dutch: 'verblijfsobject'.

Table 2 CO_2-emissions all assets within the Green Bond Portfolio compared to benchmark[4].

		NIBC [tonnes/a]	Benchmark [tonnes/a]	Reduction [tonnes/a]	Reduction [%]
1.	CO_2-emission	14,918.5	20,760.6	-5,842.1	-28.1%
2.	Financed CO_2-emission all assets	8,996.7	12,503.2	-3,506.5	-28.0%
3.	Financed CO_2-emission attributed to NIBC Green Bond	7,233.4	10,052.7	-2,819.3	-28.0%

[4] In this report, we use metric tonnes (1,000 kilograms).

2 Calculation method CO_2-emissions

The method for calculating the financed CO_2 emissions is derived from chapters '5.4 Commercial real estate' and '5.5 mortgages' of the PCAF publication.

The following calculations are made:

- The CO_2-emissions of the buildings in the NIBC portfolio.
- The financed CO_2-emissions of these buildings. This is the calculated CO_2-emission per building multiplied by the attribution factor.
- Avoided emissions: The comparison of these (financed) CO_2-emissions to a relevant benchmark, in this case, the average CO_2-emisions of a comparable set of buildings in the Netherlands.

The annual CO_2-emissions are calculated using CO_2 coefficients per use function per energy label G-A^{++++} (tonnes/m^2.a; see Table 8 in the Annex, taken from the PCAF database[5]) and the relevant data for all buildings in the NIBC portfolio: use function (office, shop, dwelling, etc.), useful floor area [m^2] and the energy label. See formula [1] in the Annex.

The financed CO_2-emissions, as calculated according to formula [3] in the Annex, include the attribution factor in the calculations. The attribution factor is the ratio between the outstanding loan amount and the property value at origination, as calculated in formula [2] in the Annex. Per building the calculated CO_2-emisison is multiplied by the attribution factor of that building.

To compare the calculated CO_2-emissions to a benchmark, an average CO_2 coefficient [tonnes/m^2.a] per use function is calculated, using the average set of privately-owned dwellings in the Netherlands derived from WoON2018[6] and the average set of other use functions in the Netherlands as derived from the recent calibration for new energy labels of utility buildings in the Netherlands[7].

WoON2018 provides the useful floor area per dwelling. The corresponding energy labels of these dwellings have been calculated with NTA 8800:2022[8].

The calculations of the (financed) CO_2-emission reduction of the buildings in the NIBC portfolio compared to the benchmark are made per building and then summed up per use function and then to a total.

2.1 Step-by-step

Calculations are made per building and then summed per use function and then total.

4. Collect the following data for all buildings in the NIBC portfolio:
    - Use function
    - Current loan amount [euro]
    - Loan amount at origination [euro]
    - % NIBC financing [%]
    - Energy label
    - Useful floor area according to BAG [m^2]

[5] PCAF: Enabling financial institutions to assess greenhouse gas emissions | PCAF (carbonaccountingfinancials.com)

[6] WoON2018: https://2018.woononderzoek.nl/jive/jivereportcontents.ashx?report=homenew

[7] Inijkingsstudie energielabels utiliteitsgebouwen, 2020: https://www.rijksoverheid.nl/documenten/publicaties/2020/04/29/advies-klassenindeling-energielabel-op-basis-van-nta-8800-voor-woningen-en-utiliteitsgebouwen

[8] NTA 8800 https://www.nen.nl/nta-8800-2022-nl-290717

5. Collect the CO_2 coefficients per m^2 useful floor area, per energy label from the PCAF website.
6. Use data from the first steps and the formulas of paragraph 5.3 in the Annex to calculate the CO_2-emission of the buildings in the NIBC portfolio (results in chapter 3).
7. Calculate the average CO_2 coefficient [tonnes/m^2.a] per use function in the Netherlands using the average distribution of the m^2 useful floor area per energy label in the Netherlands and the PCAF CO_2 coefficients per use function and energy label. The average distribution of useful floor area over the energy labels comes from WoON2018 (dwellings) and the calibration for new energy labels of utility buildings in the Netherlands (other use functions).
8. Calculate the benchmark CO_2-emission per building, using the useful floor area of the building and the calculated average CO_2 coefficient for the corresponding use function. See paragraph 4.
9. Sum up all the calculated (financed) CO_2-emissions per building to the CO_2-emissions per use function and the total CO_2-emission.
10. The reduction is calculated to subtract the CO_2-emissions for the NIBC portfolio from the CO_2-emissions of the average building set.

3 CO_2-emissions - Portfolio NIBC

The CO_2 emissions of dwellings are determined on the basis of data on single family dwellings and residential buildings provided in the spreadsheet '2022Q4 NIBC retail mortgages selection for green bond.xlsx' and the data on residential buildings in the spreadsheet '2022Q4 NIBC CRE selection for green bond.xlsx'.

3.1 Energy label distribution

The distribution of useful floor area per use function and per energy label.

Table 3 Useful floor area per use function and per energy label [m^2]

Use function	A++++	A+++	A++	A+	A	Total
Office		1,890	19,668	8,662	67,352	97,572
Residential buildings	79	241	403	2,017	46,865	49,605
Single family dwellings	396	3,341	2,104	4,235	273,816	283,892
TOTAL	**475**	**5,472**	**22,175**	**14,914**	**388,033**	**431,069**

3.2 CO_2-emissions portfolio NIBC

To calculate the CO_2 emissions of all buildings within the NIBC portfolio, the data from Table 3 (useful floor area in m^2) and Table 8 (CO_2 coefficient in tonnes/m^2.a) are combined. The results are given per energy label and use function to be able to follow the calculation.

Table 4 CO_2-emission all buildings within NIBC portfolio [tonnes/a]

Use function	A++++	A+++	A++	A+	A	Total
Office		75,5	1,078.4	569.5	5,565.0	7,288.4
Residential buildings	0.6	2.3	5.3	31.4	909.4	949.1
Single family dwellings	3.4	38.0	33.1	80.1	6,526.6	6,681.1
TOTAL	**3.9**	**115.8**	**1,116.7**	**681.0**	**13,001.1**	**14,918.5**

3.3 CO_2-emissions of financed part portfolio NIBC

Table 5 CO_2-emission of financed part of all buildings within NIBC portfolio [tonnes/a]

Use function	A++++	A+++	A++	A+	A	Total
Office		40.8	570.1	281.9	2,963.6	3,856.3
Residential buildings	0.3	0.7	3.8	17.9	551.4	574.1
Single family dwellings	2.8	27.4	26.5	60.5	4,449.0	4,566.3
TOTAL	**3.1**	**68.9**	**600.4**	**360.2**	**7,964.0**	**8,996.7**

4 CO_2-emissions - Benchmark

The CO_2-emissions of the buildings in the NIBC portfolio are compared to the benchmark: the average CO_2-emissions of buildings in the Netherlands. Calculations are made per building and then summed per use function and then for all buildings.

The basic principle of calculating the average CO_2-emissions is the same as used for the NIBC portfolio (formula [1] in the Annex). The deciding parameters are the distribution of useful floor area of Dutch buildings per use function over the energy labels and the CO_2 coefficients per use function and energy label in the PDAC data. The difference between the distribution of useful floor area of the buildings in the NIBC portfolio compared to the average distribution in the Netherlands. In the Annex data are given of the distribution of useful floor area and the average CO_2 coefficients per use function (see Table 9 and Table 10 in the Annex). See paragraph 4.1.

For comparing the financed CO_2-emissions of the buildings in the NIBC portfolio, the calculated 'average' CO_2-emission per building is multiplied by the attribution factor for that building (formulas [1], [3]).

4.1 CO_2-emissions NIBC and Benchmark NL

Table 6 CO_2-emission of the NIBC portfolio (calculated with actual energy labels) compared to an equivalent building stock (calculated with average CO_2 coefficients for Dutch buildings).

Use function	Benchmark CO_2-emission [tonnes/a]	NIBC CO_2-emission [tonnes/a]	Reduction CO_2-emission [tonnes/a]
Office	10,269.0	7,288.4	-2,980.6
Residential buildings	1,305.0	949.1	-355.9
Single family dwellings	9,186.6	6,681.1	-2,505.6
TOTAL	**20,760.6**	**14,918.5**	**-5,842.1**

4.2 Financed CO_2-emission reduction

Table 7 CO_2-emission of the financed part of the NIBC portfolio (calculated with actual energy labels) compared to an equivalent building stock (calculated with average CO_2 coefficients for Dutch buildings).

Use function	Benchmark CO_2-emission [tonnes/a]	NIBC CO_2-emission [tonnes/a]	Reduction CO_2-emission [tonnes/a]	[%]
Office	5,427.9	3,856.3	-1,571.56	-29.0%
Residential buildings	788.3	574.1	-214.2	-27.2%
Single family dwellings	6,287.0	4,566.3	-1,720.7	-27.4%
TOTAL	**12,503.2**	**8,996.7**	**-3,506.5**	**-28.0%**

5 Annex

5.1 CO_2-coefficients PCAF

PCAF has CO_2-emissions available for several commercial real estate classes (use function) per energy label.

Table 8 CO_2 coefficients on PCAF website (April 2023) [tonnes CO_2/m^2a]

CRE	A++++	A+++	A++	A+	A	B	C	D	E	F	G
Office	0.030	0.040	0.055	0.066	0,083	0.100	0.117	0.137	0.154	0.172	0.190
Residential buildings	0.007	0.010	0.013	0.016	0.019	0.023	0.027	0.032	0.036	0.040	0.044
Single family dwelling	0.008	0.011	0.016	0.019	0.024	0.029	0,034	0.040	0.045	0.050	0.055

5.2 Distribution m^2 useful floor area over energy labels & CO_2 coefficient NL

Table 9 The current distribution of m^2 useful floor area per use function over the energy labels in the Netherlands [% per use function]. Sources are WoON2018 (single family dwellings and residential buildings) and the calibration study for energy labels (non-residential).

CRE	A++++	A+++	A++	A+	A	B	C	D	E	F	G
Office	0.1%	3.5%	13.9%	9.5%	20.9%	11.1%	12.6%	9.2%	4.9%	3.4%	11.0%
Residential buildings	0.0%	0.0%	0.3%	2.2%	35.5%	12.3%	22.4%	9.2%	7.7%	3.6%	6.8%
Single family dwelling	0.2%	0.6%	1.0%	1.6%	19.1%	21.0%	35.6%	10.4%	6.0%	3.0%	1.4%

Table 10 Average CO_2-emission per use function [tonnes/m^2.a]

Use function	CO_2-emission [tonnes/m^2.a]
Office	0.1052
Residential buildings	0.0263
Single family dwelling	0.0324

5.3 Formulas

The following formulas are used to calculate the CO_2 emission of the buildings in the portfolio. All calculations have been done per building. Summed results per use function (and when necessary per energy label) are presented in the report.

[1] CO_2-emission = CO_2 coefficient PCAF * useful floor area
> CO_2 emission [tonnes CO_2/a]
> CO_2 coefficient PCAF, as given in Table 8 in the Annex [tonnes CO_2/m^2.a]
> useful floor area, as given in the NIBC datasheets [m^2]

[2] Attribution factor = outstanding amount / property value at origination
> attribution factor, ratio between outstanding amount and property value at origination [-]
> outstanding amount, as is found in the NIBC data under 'current loan amount' [€]
> property value at origination, as can be calculated with the NIBC data:
= 'loan amount at origination' / '% NIBC financing' [€]

[3] Financed CO_2-emission = CO_2-emission * attribution factor
> Financed CO_2-emission, as the main result of the calculation [tonnes CO_2/a]