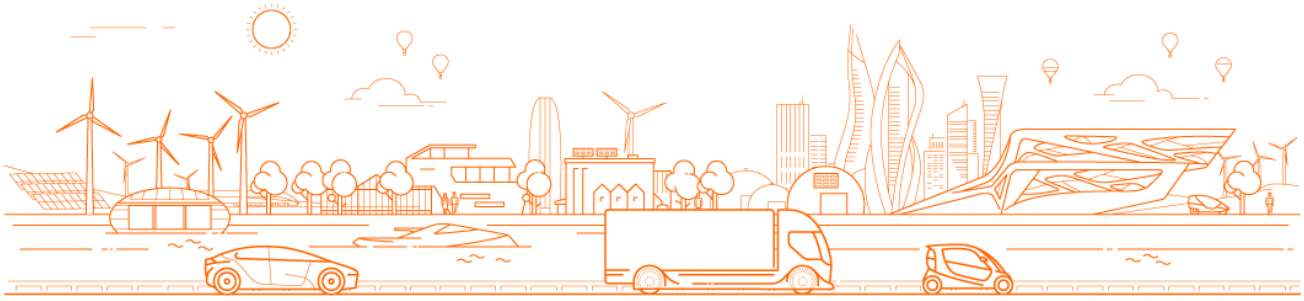


ING

Pre-Issuance
Green Bond Impact Report 2018

ING Green Bond Impact Reporting 2018

Portfolio date: H1 2018

Eligible Project Category	Number of loans		Signed Amount (EUR)	Share of Total Portfolio Financing	Eligibility for Green Bonds	Total installed capacity of renewable energy in MW	Pro-rata installed capacity of renewable energy in MW	GHG emissions avoided in tCO2e
a/			b/	c/	d/	e/	e/	e/
Renewable Energy	134	€	2.935.263.132	64,8%	100%	27.156	3.046	4.263.256
Green Buildings	2.422	€	1.595.650.000	35,2%	100%			25.151
Total	**2.556**	**€**	**4.530.913.132**	**100%**	**100,0%**			**4.288.407**

Portfolio based green bond report according to the Harmonized Framework for Impact Reporting

a/ Eligible category

b/ Signed amount represents the amount legally committed by the issuer for the portfolio or portfolio components eligible for Green Bond financing

c/ This is the share of the total portfolio cost that is financed by the issuer

d/ This is the share of the total portfolio costs that is Green Bond eligible

e/ Impact indicators

- Installed capacity of renewable energy in MW (total and pro-rata)
- GHG emissions avoided in tCO2e (pro-rata)
- For refurbished buildings: GHG emissions reduced in tCO2e when compared to the reference building code of the construction year

External consultant reports detailing the environmental impact of the 2018 ING Green Bond are presented in the next pages.

ING RENEWABLE ENERGY PORTFOLIO

CLIMATE IMPACT ASSESSMENT

2018 ASSESSMENT

SEPTEMBER 24, 2018

NAVIGANT

ING RENEWABLE ENERGY PORTFOLIO
CLIMATE IMPACTS – 2018 ASSESSMENT

By the Numbers

Total ING Portfolio (M€)
2,935

Number of Projects
134

Annual, avoided Emissions (megatons CO2eq)
4.2

Average Avoided Emissions per Euro Invested (kg CO2eq/€)
1.5

Avoided Emissions are Equal to…

Number of Vehicles (million per year)
1.8

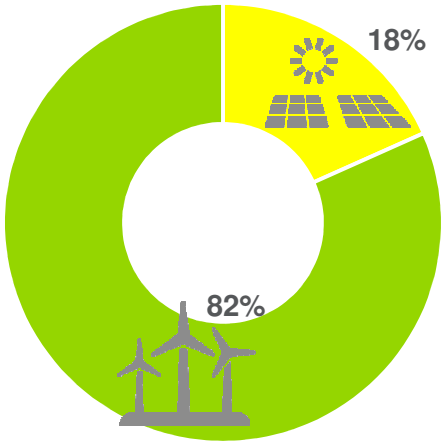
Number of Trees (for 100 years)
682,000

Key Findings

» The total ING Renewable Energy Portfolio was successful in creating positive climate impacts

» The annual avoided emissions for this total portfolio was **4.2** megatons of CO2eq, or an average **1.5 kg** CO2eq per Euro Invested

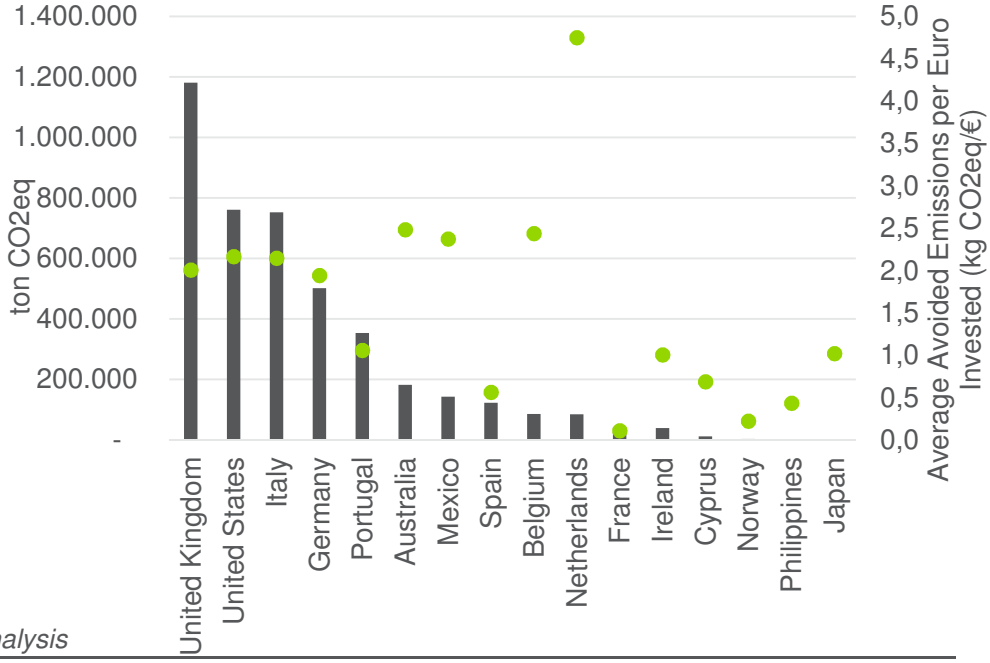
Avoided Emissions by Technology



Total avoided Emissions (ton CO2eq) (number of projects in parentheses)

Wind	3,482,000 (96)
Solar	781,000 (38)

Avoided Emissions (Bar Chart) and Avoided Emissions per Euro Invested (Secondary Axis) by Project Country



Source: ING Data and Navigant Analysis

NAVIGANT

ING RENEWABLE ENERGY PORTFOLIO
CLIMATE IMPACTS - METHODOLOGY

Introduction

The ING Bank contributes to sustainability by financing projects that accelerate their clients' transition to a low carbon economy. By financing projects that reduce the need for carbon intensive technologies on the electricity grid, ING can contribute to a low carbon economy and help their clients' contribution as well. Such renewable energy projects diversify the grid and reduce the need for electricity generated by fossil fuel technologies (such as natural gas, coal, or oil).

Navigant was asked to calculate the positive climate impacts of ING's renewable energy portfolio. The positive climate impacts are expressed by the avoided greenhouse gas (GHG) emissions of hydro, solar, and wind projects financed through ING.

Methodology

The method used to calculate the avoided GHG emissions for ING's portfolio is based on Chapter 4.3 of PCAF's *Paving the way towards a harmonised Carbon Accounting Approach for the Financial Sector*[1] and the *IFI Approach to GHG Accounting for Renewable Energy Projects*[2].

Navigant measured the climate impacts from ING's renewable energy portfolio by calculating the avoided GHG emissions from projects financed through ING. The avoided GHG emissions were calculated by:

- Taking the estimated electricity production of the project, measured in P50 MWh, multiplied by a country specific emissions factor
- The country specific emissions factor is a weighted average of a *build margin* (BM) and *operating margin* (OM). The OM represents the marginal generating capacity in the existing dispatch hierarchy that will most likely be displaced by the project. The BM is the cohort of the prospective power plants whose construction and operation would be affected by the project, based on an assessment of planned and expected new generation capacity. The weighting varies by generation type. The difference in weighting is driven by the fact that wind and solar are forms of variable generation, while hydro is a firm generation source (i.e. baseload). For wind and solar the OM/BM split is 75%/25%, for hydro it is 50%/50%
- In cases where the estimated electricity production was not provided by ING, production is calculated by multiplying (1) the annual load hours of wind and solar, by (2) the project capacity (MW)
- In most cases, ING does not finance the entire project, therefore the avoided emissions are adjusted by the share for which is financed by ING. This share is calculated by taking (1) the amount outstanding on the deal and dividing by (2) the original deal size amount
- The calculations are valid based on the portfolio as of August 30th, 2018 for the period of one year. Biomass and geothermal projects, and projects where deal size was not provided are excluded from the analysis

[1] http://carbonaccountingfinancials.com/wp-content/uploads/2018/02/PCAF-final-report.pdf
[2] https://www.nib.int/filebank/a/1449216433/c78bcf00c64ba92b3a73673a2217be4d/5023-Joint_GHG_RE.pdf

NAVIGANT

MEMO

Project: Impact assessment ING Green Buildings Loan Portfolio assessment

Subject: CO_2-emission reduction calculation

Date: 31 October 2018

Status: Final

As requested by ING Real Estate Finance, CFP Green Buildings compared the CO_2-emission of a specific, energy-efficient group of real estate (in this document indicated as ING Green Buildings Loan Portfolio) to that of a comparable group of real estate with an average energy-efficiency (indicated as Reference). The objective of this analysis is also to demonstrate that the selected buildings belonged to the top 15% of most sustainable buildings in The Netherlands. In this document the results are shown.

Energy label comparison

Figure 1 shows the distribution of the energy labels of ING Green Buildings Loan Portfolio and the Reference group. In the ING Green Buildings Loan Portfolio, 88% of the objects have a definitive energy label. The other 12% has a calculated energy label, based on the construction year. All objects in the ING Green Buildings Loan Portfolio have an energy label A. The top 10% of the Reference has an energy label A. Therefore buildings in the ING Green Buildings Loan Portfolio belong to the top 10% most energy efficient buildings of the Dutch real estate market.

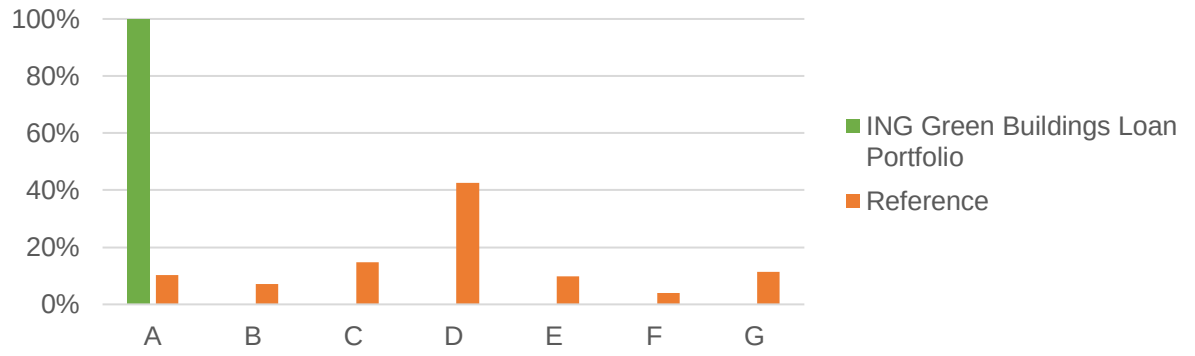


Figure 1: Distribution of energy labels ING Green Buildings Loan Portfolio and Reference

Commercial buildings in this portfolio all have an energy label A. From these buildings, 85% has an Energy Index between 0 and 0,99. Therefore 94,4% of the total portfolio is compliant with the CBI criteria for commercial and residential buildings.

Energy Index	***#***	***%***
0,99 - 1,05	136	15%
0,89 - 0,98	186	21%
0,69 - 0,88	295	33%
0,39 - 0,68	266	29%
0,00 - 0,38	24	3%
Total	***907***	***100%***

Table 1: Energy Index breakdown commercial buildings

Methodology

Within this study the CO_2-emission of 2.422 objects, as selected by ING, was determined using the calculated real energy consumption of these objects. The energy usage is based on the algorithms and benchmarks from the expert system of CFP Green Buildings. This is the largest building database in The Netherlands with actual data on energy consumption and building characteristics. These algorithms and benchmarks are the same as those used in the online tool www.ingrefduurzaam.nl. In this study, the calculated real energy consumption of Dutch real estate (the Reference) was determined using the same methodology for an analysis of all ING Real Estate Finance objects derived from the online tool. The CO_2-emissions were calculated with the Dutch market standard conversion factors, derived from the Green Deal CO_2-Emissionfactors.

CO_2-emission - natural gas

The CO_2-emission of Dutch natural gas is 1,890 kg/m3.[1]

CO_2-emission - electricity

Values for carbon intensity, in kg per produced kWh of electricity, vary depending on assumptions made in the calculation method. In this assessment, an emission of 0,413 kg/kWh was used.[2]

Group composition

The group composition of the 2.422 objects is shown in table 2. Residential buildings account for 61% of the portfolio (1.482 from 2.422). Industrial buildings have the largest footprint with 31% of total square meters. More than half of the portfolio (53%) are new buildings[3], 47% is refurbished to obtain an energy label A.

	#	m^2	Refurbished	New
Industry	142	429.999	65%	35%
Office	149	272.597	82%	18%
Retail	556	388.263	84%	16%
Residential building	1.482	210.746	27%	73%
Other	93	97.134	68%	32%
Total	***2.422***	***1.398.739***	***47%***	***53%***

Table 2: Group composition ING Green Buildings Loan Portfolio

Energy consumption

Table 3 shows the calculated real energy consumption of the ING Green Buildings Loan Portfolio. Calculated real energy consumption for electricity is 97 million kWh each year and 8,2 million m^3 natural gas each year.

	Electricity consumption (kWh)	Natural gas consumption (m^3)
Industry	16.948.729	988.676
Office	21.419.701	2.466.950
Retail	52.469.483	2.190.305
Residential building	2.816.339	1.589.658
Other	3.619.190	951.810
Total	***97.273.442***	***8.187.401***

Table 3: Calculated energy consumption ING Green Buildings Loan Portfolio

[1] Source: https://www.co2emissiefactoren.nl with WTW emission for natural gas in kg/CO_2 per m^3

[2] Source: https://www.co2emissiefactoren.nl with WTW emission for electricity (unknown) in kg/CO_2 per kWh

[3] New buildings are defined as constructed in 2006 or later.

CO_2-emission

Table 4 shows the CO_2-emisions of both groups, based on calculated real energy consumption. The total CO_2-emission of the ING Green Buildings Loan Portfolio is 55.648 ton CO_2 per year. The Reference CO_2-emission is 72.765 ton CO_2 per year.

	CO_2-emission ING Green Buildings Loan Portfolio (ton CO_2)	***CO_2-emission Reference (ton CO_2)***	***CO_2-emission Reduction (ton CO_2)***
Industry	8.868	12.616	-3.748
Office	13.509	16.671	-3.162
Retail	25.810	29.045	-3.235
Residential building	4.168	9.367	-5.199
Other	3.293	5.066	-1.773
Total	***55.648***	***72.765***	***-17.117***

Table 4: CO_2-emission ING Green Buildings Loan Portfolio compared to Reference

Nearly half of the portfolio consists of refurbished buildings. Another way of calculating reduced CO_2-emissions can be done by comparing the current emissions with the original built quality emissions. Table 5 shows an overview of the calculated CO_2-emissions reduction for the refurbished buildings, compared to the theoretical original built quality based on the expected Energy Index. The total CO_2-emissions of the ING Green Buildings Loan Portfolio for refurbished buildings is 36.478 ton CO_2 per year. The original built quality CO_2-emission is 55.459 ton CO_2 per year.

	CO_2-emission ING Green Buildings Loan Portfolio Refurbished (ton CO_2)	***CO_2-emission according to building code (ton CO_2)***	***CO_2-emission Reduction (ton CO_2)***
Industry	4.633	8.392	-3.759
Office	9.542	14.146	-4.604
Retail	19.429	26.350	-6.921
Residential building	1.541	3.494	-1.953
Other	1.333	3.077	-1.744
Total	***36.478***	***55.459***	***-18.981***

Table 5: CO_2-emission ING Green Buildings Loan Portfolio Refurbished compared to original built quality

Over half of the portfolio consists of non-refurbished buildings or new buildings whose construction year is 2006 or later. Table 6 shows an overview of the calculated CO_2-emissions reduction for the new buildings, compared to the theoretical original built quality based on the expected Energy Index. The total CO_2-emission of the ING Green Buildings Loan Portfolio for new buildings is 19.171 ton CO_2 per year. The original built quality CO_2-emission is 25.342 ton CO_2 per year.

	CO_2-emission ING Green Buildings Loan Portfolio New (ton CO_2)	***CO_2-emission according to building code (ton CO_2)***	***CO_2-emission Reduction (ton CO_2)***
Industry	4.235	5.840	-1.605
Office	3.967	4.986	-1.019
Retail	6.381	7.358	-977
Residential building	2.627	4.462	-1.835
Other	1.961	2.696	-735
Total	***19.171***	***25.342***	***-6.170***

Table 6: CO_2-emission reduction (avoided) ING Green Buildings Loan Portfolio New (new buildings that were more energy efficient than the building code required at the time of construction help to avoid CO_2-emission).

Table 7 below shows the summary of reduced CO_2-emissions according to building code for both refurbished and new buildings.

	Number	**%**	**CO_2-emission ING Green Buildings Loan Portfolio (ton CO_2)**	**CO_2-emission Original building code (ton CO_2)**	**CO_2-emission Reduction (ton CO_2)**
Refurbished buildings	1.150	47%	36.478	55.459	-18.981
New buildings	1.272	53%	19.171	25.342	-6.170
Total	***2.422***	***100%***	***55.649***	***80.801***	***-25.151***

Table 7: CO_2-emission ING Green Buildings Loan Portfolio compared to original building code

Conclusion

From this study the following conclusions are determined:

- Based on the calculated real energy consumption, the ING Green Buildings Loan Portfolio has a CO_2-emission that is 17.117 tons per year lower than the reference, which is a difference of 23,5%.
- Compared to the original building code, the ING Green Buildings Loan Portfolio has a CO_2-emission reduction that is 25.151 tons per year, which is a reduction of 31,1%. This is an energy consumption reduction of 60 million kWh per year.
- Based on the official and calculated energy labels, buildings in the ING Green Buildings Loan Portfolio belong to the top 10% most energy efficient buildings of the Dutch real estate market.
- Excluding the commercial buildings with an energy label A but an Energy Index above 0,99, 94,4% of the total portfolio is compliant with the CBI criteria for commercial and residential buildings.