



ING

Green Bond Impact Report

Financial Year 2018

ING Green Bond Impact Report

31 December 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	153	€ 3.816.233.176	77,7%	100%	24.659	4.942	4.126.160
Green Buildings	1.244	€ 1.096.154.836	22,3%	100%			23.027
Total	1.397	€ 4.912.388.012	100%	100,0%			4.149.187

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 per Eligible Category

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 Eligible Green Loan Portfolio as per December 31st 2018, are presented in the next pages.

ING RENEWABLE ENERGY PORTFOLIO

CLIMATE IMPACT ASSESSMENT

PORTFOLIO AS OF
31 DECEMBER, 2018

MAY 16, 2019


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CLIMATE IMPACTS – PORTFOLIO AS OF 31 DECEMBER, 2018

By the Numbers

 Total ING Portfolio (M€)
3,816


 Number of Projects
153

 Annual, avoided Emissions (megatons CO₂eq)
4.1

 Average Avoided Emissions per Euro Invested (kg CO₂eq/€)
1.1

Avoided Emissions are Equal to...

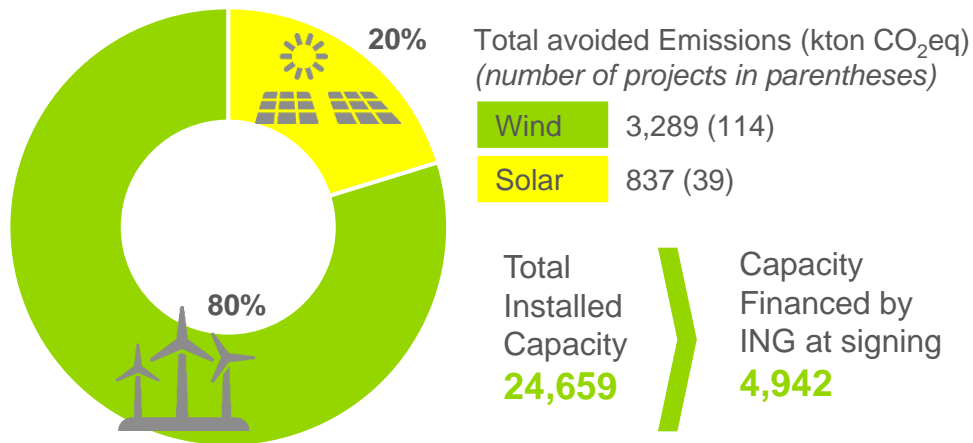
 Number of Vehicles
1.7M

 Number of Trees
660,000

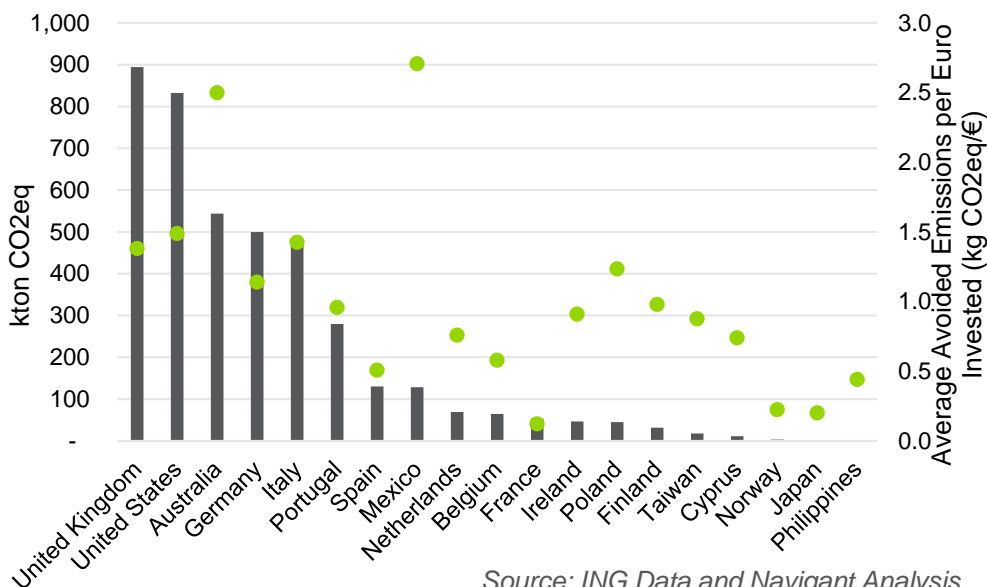
Key Findings

- » The total ING Renewable Energy Portfolio was successful in creating positive climate impacts
- » The annual avoided emissions for this total portfolio was **4.1** megatons of CO₂eq, or an average **1.1 kg** CO₂eq per Euro Invested

Avoided Emissions by Technology



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



Source: ING Data and Navigant Analysis

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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 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 is driven by the fact that wind and solar are forms of variable generation. The OM/BM split for these generation technologies is 75%/25%
- 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 December 31st, 2018

¹ <http://documents.worldbank.org/curated/en/758831468197412195/pdf/101532-WP-P143154-PUBLIC-Box394816B-Joint-IFI-RE-GHG-Accounting-Approach-clean-final-11-30.pdf>

² https://www.nib.int/filebank/a/1449216433/c78bcf00c64ba92b3a73673a2217be4d/5023-Joint_GHG_RE.pdf

MEMO

Project: Impact assessment ING Green Buildings Loan Portfolio assessment

Subject: CO₂-emission reduction calculation

Date: 22 May 2019

Status: Final



As requested by ING Real Estate Finance, CFP Green Buildings compared the CO₂-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, 89% of the objects have a definitive energy label. The other 11% 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.

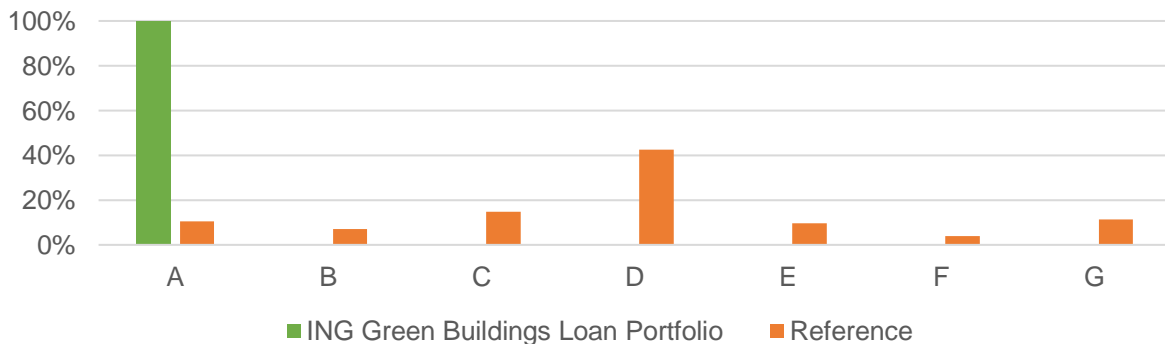


Figure 1: Distribution of energy labels ING Green Buildings Loan Portfolio and Reference

Commercial buildings in this portfolio all have an energy label A. From these buildings, 84% has an Energy Index between 0 and 0,99. Therefore 94,5% of the total portfolio is compliant with the CBI criteria for commercial and residential buildings.

Energy Index	#	%
0,99 - 1,05	125	16%
0,89 - 0,98	158	20%
0,69 - 0,88	253	33%
0,39 - 0,68	241	30%
0,00 - 0,38	22	3%
Total	799	100%

Table 1: Energy Index breakdown commercial buildings

Methodology

Within this study the CO₂-emission of 2.268 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 CO₂-emissions were calculated with the Dutch market standard conversion factors, derived from the Green Deal CO₂-Emissionfactors.

CO₂-emission - natural gas

The CO₂-emission of Dutch natural gas is 1,890 kg/m³.¹

CO₂-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 2.268 objects is shown in table 2. Residential buildings account for 63% of the portfolio (1.439 from 2.268). Industrial buildings have the largest footprint with 31% of total square meters. More than half of the portfolio (55%) are new buildings³, 45% is refurbished to obtain an energy label A.

	#	m ²	Refurbished	New
Industry	122	392.319	62%	38%
Office	139	253.575	81%	19%
Retail	481	338.437	83%	17%
Residential building	1.439	203.413	27%	73%
Other	87	77.617	68%	32%
Total	2.268	1.265.361	45%	55%

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 87 million kWh each year and 7,4 million m³ natural gas each year.

	Electricity consumption (kWh)	Natural gas consumption (m ³)
Industry	15.463.544	902.040
Office	19.925.022	2.294.805
Retail	45.736.046	1.909.222
Residential building	2.718.343	1.534.345
Other	2.858.321	775.804
Total	86.701.277	7.416.216

Table 3: Calculated energy consumption ING Green Buildings Loan Portfolio

¹ Source: <https://www.co2emissiefactoren.nl> with WTW emission for natural gas in kg/CO₂ per m³

² Source: <https://www.co2emissiefactoren.nl> with WTW emission for electricity (unknown) in kg/CO₂ per kWh

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

CO₂-emission

Table 4 shows the CO₂-emissions of both groups, based on calculated real energy consumption. The total CO₂-emission of the ING Green Buildings Loan Portfolio is 49.524 ton CO₂ per year. The Reference CO₂-emission is 65.422 ton CO₂ per year.

	CO₂-emission ING Green Buildings Loan Portfolio (ton CO₂)	CO₂-emission Reference (ton CO₂)	CO₂-emission Reduction (ton CO₂)
Industry	8.121	11.511	-3.390
Office	12.981	15.508	-2.526
Retail	21.909	25.318	-3.409
Residential building	4.034	9.042	-5.008
Other	2.479	4.044	-1.565
Total	49.524	65.422	-15.898

Table 4: CO₂-emission ING Green Buildings Loan Portfolio compared to Reference

Nearly half of the portfolio consists of refurbished buildings. Another way of calculating reduced CO₂-emissions can be done by comparing the current emissions with the original built quality emissions. Table 5 shows an overview of the calculated CO₂-emissions reduction for the refurbished buildings, compared to the theoretical original built quality based on the expected Energy Index. The total CO₂-emissions of the ING Green Buildings Loan Portfolio for refurbished buildings is 32.102 ton CO₂ per year. The original built quality CO₂-emission is 49.610 ton CO₂ per year.

	CO₂-emission ING Green Buildings Loan Portfolio Refurbished (ton CO₂)	CO₂-emission according to building code (ton CO₂)	CO₂-emission Reduction (ton CO₂)
Industry	4.511	8.167	-3.656
Office	9.014	12.849	-3.835
Retail	15.759	22.201	-6.442
Residential building	1.497	3.359	-1.862
Other	1.322	3.035	-1.714
Total	32.102	49.610	-17.508

Table 5: CO₂-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 CO₂-emissions reduction for the new buildings, compared to the theoretical original built quality based on the expected Energy Index. The total CO₂-emission of the ING Green Buildings Loan Portfolio for new buildings is 17.421 ton CO₂ per year. The original built quality CO₂-emission is 22.940 ton CO₂ per year.

	CO₂-emission ING Green Buildings Loan Portfolio New (ton CO₂)	CO₂-emission according to building code (ton CO₂)	CO₂-emission Reduction (ton CO₂)
Industry	3.610	4.823	-1.213
Office	3.967	4.986	-1.019
Retail	6.150	7.145	-995
Residential building	2.537	4.321	-1.784
Other	1.157	1.665	-508
Total	17.421	22.940	-5.519

Table 6: CO₂-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 CO₂-emission).

Table 7 below shows the summary of reduced CO₂-emissions according to building code for both refurbished and new buildings.

	Number	%	CO₂- emission ING Green Buildings Loan Portfolio (ton CO₂)	CO₂- emission Original building code (ton CO₂)	CO₂- emission Reduction (ton CO₂)
Refurbished buildings	1.027	45%	32.102	49.610	-17.508
New buildings	1.241	55%	17.421	22.940	-5.519
Total	2.268	100%	49.523	72.550	-23.027

Table 7: CO₂-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 CO₂-emission that is 15.898 tons per year lower than the reference, which is a difference of 24,3%.
- Compared to the original building code, the ING Green Buildings Loan Portfolio has a CO₂-emission reduction that is 23.027 tons per year, which is a reduction of 31,7%. This is an energy consumption reduction of 50 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, 94,5% of the total portfolio is compliant with the CBI criteria for commercial and residential buildings.