A partnership built on trust

Berlin Hyp

Editorial

Dear Sir or Madam,

On 27 April 2015 Berlin Hyp broke new ground in becoming the first bank to issue a Green Pfandbrief. Although we meticulously prepared for the issue, the overwhelming success of the bond and the positive reception by the general public still came as a surprise. One year later, to the day, we achieved another milestone by publishing our first annual reporting for the Green Pfandbrief.

It is a great pleasure to describe in this report the progress the bank has made in that time with regard to financing green buildings. We have boosted the volume of green loans in our mortgage cover pool from € 657 million at issue to € 1,021 million at the reporting date of 29 February 2016. What is more, we have also succeeded in including a further € 176 million in new green building financings in the mortgage cover pool.

Thanks in part to the expertise of our advisors from the Sustainable Banking Team at Crédit Agricole, whom I would like to sincerely thank for their support, we are now in a position to quantify the Green Pfandbrief's environmental added value with greater precision and also publish an Impact Report. The annual report consists of the following three sections:

A – Portfolio Report,

B – New Business Report, and

C – Impact Report.

That being said, the sustainable development of our bank goes far beyond the progress derived from the data presented in this report. Data for loans considered suitable for the Green Pfandbrief was still being gathered and systematised manually prior to the initial issue, but we have since then introduced efficient processes to identify green building financings and adjusted our IT infrastructure in line with the new requirements. Now, employees in our sales units flag up potentially suitable assets in the corresponding IT system, even before the transaction has been concluded. If the energy certificate of the financed property or its sustainability certificate indicate the suitability of a loan in terms of usage in future green bonds, the corresponding certificate is entered into the bank's legal system by the Loans division once the loan has been issued. Berlin Hyp has published an overview of the required features in the organisational manual, which serves as orientation for employees. The decision as to whether a loan is eligible is then made by Treasury in collaboration with the Valuation division. The development of the green building financings within the mortgage cover pool is presented monthly in corresponding reports on both a net present value and nominal.

The introduction of new processes and corresponding IT systems is just one element that shows the importance we attach to the financing of sustainable and energy-efficient properties. But to generate further expansion in this area of business, the Berlin Hyp Board of Management also decided in early 2016 to introduce price incentives for green loans. This system has already been implemented and enjoying its initial success.

Financing green buildings and refinancing through green bonds is not more and not less than one important cornerstone of our sustainability management concept. This concept includes social, environmental and governance aspects. Since issuing the Green Pfandbrief, Berlin Hyp has also made a number of other important developments in this respect, too. For example, the bank designed a sustainability filter for its own investments and prepared for the introduction of an EMAS-certified environmental management system, which is set to receive final certification in 2016. There are many more examples besides, but perhaps these two help to show the degree of importance with which Berlin Hyp regards sustainability.

The best way to underline the strategic significance of this issue to the capital market would be for Berlin Hyp to issue a second green bond. Given the positive business development so far, I am optimistic about achieving a second issue much quicker than we would have imagined a year ago. However, it must also be said that the usual conditions apply, namely that new business development and the capital market situation must be appropriate.

I hope I have piqued your interest and that you enjoy reading our inaugural Green Pfandbrief annual reporting!

Yours sincerely,

Gero Bergmann

A – Portfolio Report

Development of green building financings in Berlin Hyp's mortgage cover pool

On 27 April 2015 Berlin Hyp issued the first Green Pfandbrief. The 7y € 500 million benchmark bond carries a coupon of 0.125% and is rated Aaa/AA+ by Moody's and Fitch. oekom research AG confirmed the overall positive sustainability quality of the Green Pfandbrief in its second party opinion as of 1 April 2015[1].

At issuance of the first Green Pfandbrief Berlin Hyp's mortgage cover pool contained 17 loans for green buildings with a nominal value of € 657 million. By 29 February 2016 the number of green building financings in the cover pool increased to 30. The total nominal value of these loans is € 1,021 million.

Nominal value		€ mn	Number
Total by 31 March 2015		**657**	**17**
–	Repayments	–144	–4
+/–	Amortisation / Increase of existing green building financings	–20	
+	Green building financings that were already in the mortgage cover pool but then were not identified as green assets	+352	+12
+	New green building financings included in the mortgage cover pool after issuance of the inaugural Green Pfandbrief	+176	+5
Total by 29 February 2016		**1,021**	**30**

A.1 to A.4 provide further details on the green building financings in Berlin Hyp's mortgage cover pool according to different parameters. All data are again as of 29 February 2016.

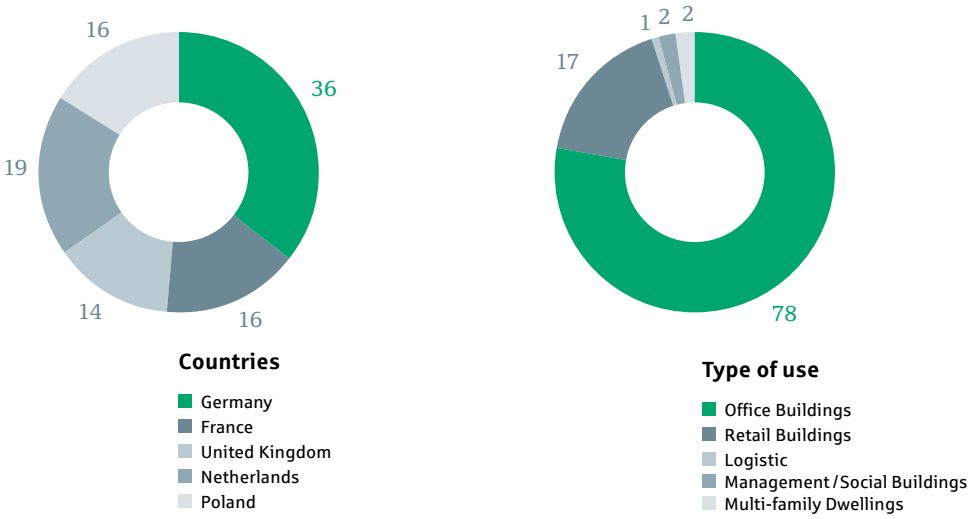
A.1 Green building financings according to their term to maturity

Maturity Structure	€ mn	in %
≤ 0.5 year	8	1
> 0.5 year and ≤ 1 year	7	1
> 1 years and ≤ 1.5 years	94	9
> 1,5 years and ≤ 2 years	7	1
> 2 years and ≤ 3 years	348	34
> 3 years and ≤ 4 years	68	7
> 4 years and ≤ 5 years	134	13
> 5 years and ≤ 10 years	286	28
> 10 years	69	7
Total	**1,021**	**100**

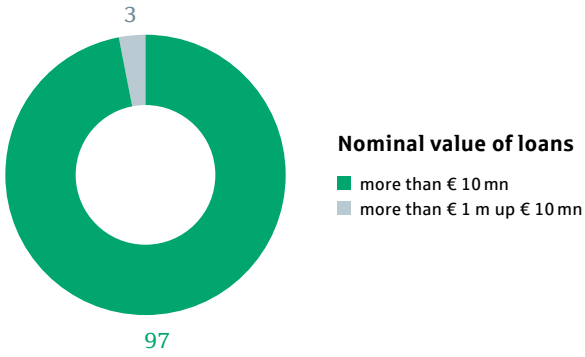
A.2 Green building financings according to certification levels

Certificates	€ mn	in %
BREEAM Excellent	104	10
BREEAM Very Good	217	21
BREEAM Good	72	7
DGNB Platinum	133	13
DGNB Gold	11	1
DGNB Silver	26	3
HQE High Level	59	6
HQE Basic Level	28	3
LEED Gold	19	2
EPC Level A	351	35
Total	**1,021**	**100**

A.3 Green building financings according to countries and to type of use (in %)



A.4 Green building financings according to nominal values of loans (in %)



B – New Business Report

New green building financings that have been included in the mortgage cover pool after issuance of the inaugural Green Pfandbrief

Five green building financings with a total nominal value of € 176 million were newly included in the cover pool after issuance of the inaugural Green Pfandbrief.

Type of use	Country	Nominal value*	Certificate	Level	Type of project	Rentable area (m^2)	Energy demand (kWh/m^2*a)
Office	Germany	25.0	DGNB	Platinum	Acquisition	14,718	77.6
Office	Poland	19.7	BREEAM	Excellent/Very Good	Development	20,700	112.1
Retail	Germany	81.9	DGNB	Platinum	Development	53,978	41.4
Office	Poland	23.3	EPC	A	Acquisition	18,970	124.0
Office	Germany	25.8	DGNB**	Silver	Acquisition	14,155	55.9

* in cover pool (by 29 February 2016, in € million)
** Pre-certification

German properties are benchmarked against current energy reference values according to the German Energy Savings regulation (Energieeinsparverordnung, EnEV). The reference for retail properties is 70 kWh/m^2*a, and for office buildings 135 kWh/m^2*a. In the absence of appropriate energy references for the Polish market, the Polish properties have to apply to the German benchmark, too.

C – Impact Report

Carbon reporting: results and methodology

On the following pages the results and methodology for estimating avoided carbon emissions related to newly identified Green Buildings[2], e.g. those green building financings that were already in the mortgage cover pool but were not identified as green assets at issuance and the new green building financings included in the mortgage cover pool after issuance of the inaugural Green Pfandbrief, in Berlin Hyp's mortgage cover pool are presented. Thus, calculations are based on 17 green building financings (compare to table in section A).

The calculation was supported by Crédit Agricole's sustainable banking team and has been handed in on a line-by-line basis to oekom research who reviewed the plausibility of the results in their re-verification as of 27 April 2016[3]. Due to data confidentiality this report only contains aggregate numbers.

All calculations are again based on loan data as of 29 February 2016 and on the most current available energy performance certificate (EPC) and/or sustainability certificate for each property. In four cases energy efficiency of the properties had to be estimated as either only a sustainability certificate was available or the EPC only contained the level of energy performance and a percentage number but not the final energy demand in kWh/m^2*year.

C.1 Estimated avoided carbon emissions

Several assumptions significantly influence the estimation of avoided carbon emissions.

First, the quantification of avoided carbon emissions of a specific asset depends on the choice of a "baseline", i.e., the carbon emissions of a reference asset against which the carbon emissions of this specific asset are compared. This choice is highly sensitive since avoided carbon emissions decrease as the energy efficiency of the chosen baseline increase. This is particularly true in the real estate sector where buildings' energy performance varies a lot depending on asset type and construction year.

Second, another important decision is the way carbon emissions are allocated to one given asset. Practically, one can allocate the avoided carbon emissions of a given asset integrally to the debt holder or proportionally to the financing share.

In order to provide a maximum of transparency to investors, this carbon reporting includes four different estimates of avoided carbon emissions corresponding to two baselines:

→ A baseline estimated as the average energy performance of existing European buildings. It means that any building in the pool is compared to the average energy performance of existing European buildings. This baseline provides a large estimate of the positive carbon impact of Berlin Hyp's Green Pfandbrief assets.

→ A baseline estimated as the current energy references for different real estate asset classes according to EnEV. This baseline gives a more conservative assumption of avoided carbon emissions.

In addition, avoided carbon emissions are provided with the two following assumptions:
→ 100% carbon impact of each assets is allocated to the Berlin Hyp financing:
→ Carbon impact allocated proportionally to Berlin Hyp initial share in financing.
Results are provided in the table hereunder.

In avoided tCO_2 / € mn / year	100% allocated to Berlin Hyp financing	Proportionally allocated to Berlin Hyp initial financing share
against European average	34.8	20.1
against current EnEV standards	11.2	6.9

The significant variance between estimations shows the importance of baselines and calculation assumptions in avoided carbon emissions reporting.

C.2 Principles of methodology

The methodology is based on a two-phase process:

I. An estimation of the energy savings per building, which includes:

a: Assessment of each building energy efficiency (kWh final/m²*year)
b: Choice of the energy efficiency baseline (kWh final/m²*year)
c: Calculation of savings in energy efficiency (I.1–I.2) (kWh final/m²*year)

II. An assessment of the carbon intensity of the energy saved based on the country context containing

d: Determination of the carbon intensity of commercial buildings in each country given its energy mix (kg CO_2/kWh final)[4]
e: Calculation of carbon intensity savings (c*d) (kg CO_2/m²*year)
f: Estimation of total carbon savings (e*rentable surface of the building) (kg CO_2/year)
g: Initial Market Value of building (€ million) (Initial Loan / Initial Loan to Value (LTV))
h: Outstanding amount in the cover pool (€ million)
i: Berlin Hyp share expressed in percentage of the initial value market value of asset (Initial LTV) (%)
j: Estimation of financed carbon savings (f*i) (kg CO_2/year)

C.3 Energy Efficiency Baselines

Two sets of comparable values were selected as annual energy efficiency baselines in order to provide different annual estimates of energy savings.

Baseline 1: Average energy efficiency of existing European buildings

Energy needs for heating, cooling and domestic hot water for buildings representative of existing building stock have been modeled in the European project ENTRANZE[5]. Single house, multi-family dwellings, office and school are covered. In accordance with the composition of the cover pool, only the values for apartment block and office are considered for the present calculation. Values for selected relevant countries (Berlin, Vienna, Prague, Paris and Helsinki) are averaged to obtain a robust baseline.
As a result, 207.1 kWh/m²*year is retained as baseline of energy efficiency for European existing offices[6] and 162.6 kWh/m²*year is retained as baseline of energy efficiency for European existing multi-family dwellings.

Baseline 2: Current energy references according EnEV

This set of values leads to estimating buildings' energy savings compared to current standards in Germany and have been cross-validated against other sources[7]. As a result, values of energy efficiency baselines for current standards vary from 50 kWh/m²*year for multi-family dwellings to 135 kWh/m²*year for office buildings.

C.4 Carbon intensity of energy consumed by real estate sector

12 out of the 17 considered green-building-financings are collateralized by properties situated in Germany, three by properties situated in Poland and two by properties in the Netherlands. Carbon intensities of energy used by commercial real estate sector used are the followings:

Country	final kg CO_2/kWh
Germany	0.354
Netherlands	0.293
Poland	0.572

The detailed calculation of these values is presented in the Appendix.

Appendix

The energy mix of commercial real estate in Germany, Poland and the Netherlands is available in the ENTRANZE project[8]. The following table summarizes the share of each energy source used by commercial buildings for their various usages (power, heating/cooling, any other use).

Country	Electricity & Heat (%)	Gas (%)	Oil (%)	Coal (%)	Biomass (%)
Germany	41.6	40.6	16.2	0.1	1.5
Netherlands	40.5	54.9	3.2	0.0	1.4
Poland	56.8	23.1	7.7	2.4	10.0

Electricity and heat are often provided together as many buildings rely on local networks for their power and heating. In that case, it is assumed that the energy mix corresponds to the country average energy mix.
Carbon emissions from the combustion of fossil fuels are assumed to be constant in different countries. Their values are calculated from the International Energy Agency data (2015 Edition[9]):

Gas	15.3 kg C/GJ = 0.202 kg CO_2/kWh
Oil	21.1 kg C/GJ = 0.279 kg CO_2/kWh
Coal	26.8 kg C/GJ = 0.354 kg CO_2/kWh
Biomass	0.201 kg CO_2/kWh[10]

Carbon emissions from the electricity used in the real estate sector are related to the electricity production energy mix. It varies strongly among the European countries. Corresponding emission factors are also estimated from the International Energy Agency data.
Total consumptions of electricity and heat for 2013[11] are the following[12]:

Country	Electricity (ktoe)	Heat (ktoe)	Oil (ktoe)	Coal (ktoe)
Germany	44,556	10,384	54,940	638.9
Netherlands	9,131	1,883	11,014	128.1
Poland	10,669	5,940	16,609	193.2

ktoe = kilo ton of oil equivalent

Corresponding CO_2 emissions are available in the International Energy Agency database of CO_2 Emissions[13]:

Country	Electricity & Heat Production (mt CO_2/year)
Germany	342.3
Netherlands	54.0
Poland	157.6

The carbon intensity of the electricity and heat consumption is obtained by the following formula:

$$\text{Electricity \& Heat Carbon Intensity} = \frac{CO_2 \text{ Emissions of Electricity \& Heat Production}}{\text{Electricity \& Heat Total Consumption}}$$

And results are the following:

Country	Electricity & Heat Carbon Intensity (kg CO_2/kWh final)
Germany	0.536
Netherlands	0.421
Poland	0.816

Thus the different carbon intensities are the following (kg CO_2/kWh final):

Country	Electricity & Heat	Gas	Oil	Coal	Biomass
Germany	0.536	0.202	0.279	0.354	0.201
Netherlands	0.421	0.202	0.279	0.354	0.201
Poland	0.816	0.202	0.279	0.354	0.201

The average of carbon intensities weighted by the energy mix consumed by the real estate (RE) sector is calculated as follows:

RE Energy Mix Carbon Intensity = $\sum_{\text{Energy Mix}}$ **Carbon Intensity (Energy) × Share (Energy)**

It gives the following results (compare to section C.4):

Country	kg CO_2/kWh final
Germany	0.354
Netherlands	0.293
Poland	0.572

1 Can be downloaded on http://www.green-pfandbrief.com
2 As defined in the Use of Proceeds of the Berlin Hyp Green Pfandbrief (available at http://www.green-pfandbrief.com)
3 Published on http://www.green-pfandbrief.com
4 Compare to section C.4 and the Appendix
5 ENTRANZE, March 2014. Heating and cooling energy demand and loads for building types in different countries of the EU – D2.3. of WP2 of the Entranze Project.
http://www.entranze.eu/files/downloads/D2_3/Heating_and_cooling_energy_demand_and_loads_for_building_types_in_different_countries_of_the_EU.pdf
6 In Berlin Hyp's carbon reporting used for all commercial properties as ENTRANZE doesn't contain data for other commercial real estate than office buildings
7 Economidou M., March 2012, Energy Performance Requirements for buildings in Europe, REHVA Journal.
http://www.rehva.eu/fileadmin/hvac-dictio/03-2012/energy-performance-requirements-for-buildings-in-europe.pdf
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https://ec.europa.eu/energy/sites/ener/files/documents/2014_final_report_eu_building_heat_demand.pdf
8 http://www.entranze.enerdata.eu/#/total-unit-consumption-per-m²-in-non-residential-at-normal-climate.html
9 IEA, 2015, Fuel Combustion Highlights – Carbon Content Values (kg C/GJ).
https://www.iea.org/publications/freepublications/publication/co$_2$-emissions-from-fuel-combustion-highlights-2015.html
10 Source: http://www.eumayors.eu/IMG/pdf/technical_annex_en.pdf, from 0 kg CO_2/kWh (if wood is harvested in a sustainable manner) to 0.403 kg CO_2/kWh (if wood is harvesting in unsustainable manner). The mean value is considered in this case.
11 No more recent data are available.
12 The data are extracted from the IEA-HeadlineEnergyData-2015. http://www.iea.org/statistics/
13 http://www.iea.org/publications/freepublications/publication/co$_2$-emissions-from-fuel-combustion-highlights-2015.html

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