Annex 1

METHODOLOGY FOR THE CALCULATION OF AVOIDED EMISSIONS OF GREEN BUILDINGS

CRIF
Together to the next level

BANCO BPM GREEN, SOCIAL & SUSTAINABILITY BONDS FRAMEWORK

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1. EMISSIONS METHODOLOGY

This section provides an overview of CRIF's methodology to estimate avoided CO_2 emissions of Banco BPM's green buildings portfolio (following 'Portfolio').

The assessment relies on four pillars:

- Calculation of buildings' related greenhouse gas emissions;
- Identification of a national benchmark;
- Calculation of portfolio positive impact;
- Reporting measures.

1.1. Calculation of buildings' greenhouse gas emissions

The calculation of GHG emissions of Banco BPM's Green Buildings consists of three approaches:

1. The CO_2 emissions are available through a valid Energy Perfo rmance Certificate (following 'EPC'). In Italy, EPCs provide this information in a standard format. Estimated CO_2 emissions result from an automatic computation by professional software in line with existing national legislation on energy efficiency and the characteristics of the assets as provided by the real estate valuer.

   This approach is implemented for the 63% of the Portfolio.

2. The estimation of CO_2 emissions is the result of a data management process through an automatic algorithm implementing the Primary Energy Demand.

   This approach is executed for the 5% the Portfolio for which the EPC label and Primary Energy Demand are available but not CO_2 emissions due to lack of data provided by regional energy cadastres.

3. The CO_2 emissions are estimated by assigning a benchmark value based on the national distribution specific to the energy class of the property, geolocation, age of construction and its physical characteristics.

   This approach is executed for the 32% the Portfolio for which the EPC label and Primary Energy Demand are available but not CO_2 emissions due to lack of data provided by regional energy cadastres.

1.2. Identification of a National benchmark

To address the problems related to the lack of building energy efficiency data through regional energy cadasters, the Ministerial Decree on 26/06/2015 introduced a new national database, SIAPE, managed by ENEA. The SIAPE database represents the most important available data pool on the energy efficiency of Italian real estate stock, and CRIF has identified it as the data source for national benchmarks.

The reference value for emissions of residential properties in Italy is 39,1 kg CO_2 per square meter per year. However, as shown in the left graph in figure 1, it varies according to the climatic zone.

The reference value for the primary energy demand for residential properties at national level is 195,1 kWh per square meter per year. This parameter is strongly related on the climatic zone, higher for the "F" and lower to the "A" and "B".

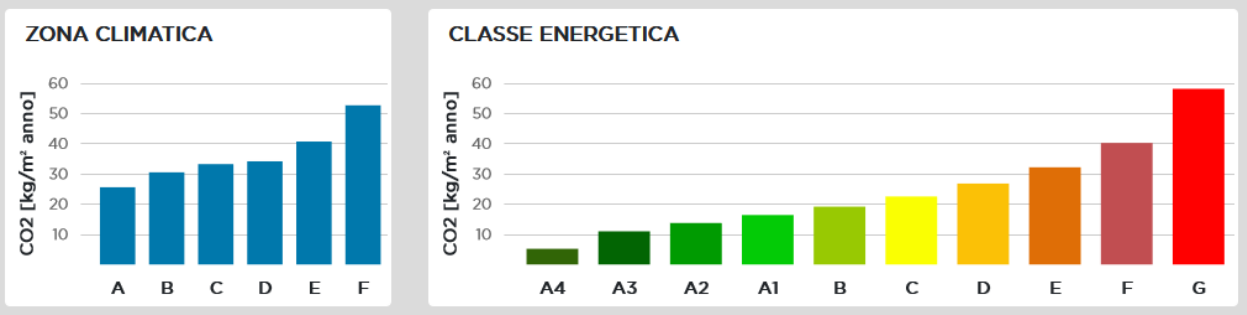

Figure 1 – Residential Buildings - Average of emissions for climate zone (zona climatica) and EPC label (classe energetica) from SIAPE portal

The reference values for emissions and primary energy demand for non-residential properties in Italy are, respectively, 64,3 kg CO2 per square meter per year and 305,6 kWh per square meter per year.

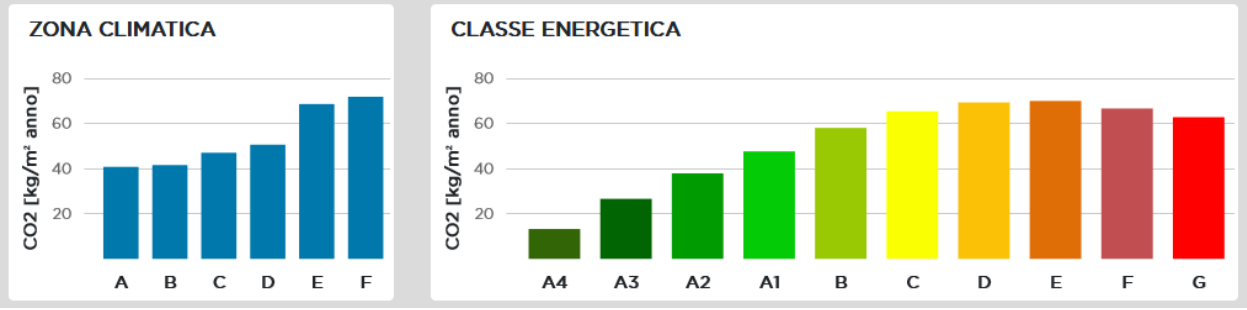

Figure 2 – Commercial Buildings - Average of emissions for climate zone (zona climatica) and EPC label (classe energetica) from SIAPE portal

1.3. Financed emissions

Intending to measure Banco BPM's financed emissions for both mortgages for residential properties and commercial real estate, CRIF's methodology is in line with PCAF[1] standard. Accordingly, the following steps are followed:

1.3.1. Filtering data

In order to examine records with the best data quality we applied the following filter:

- The initial appraisal amount has to be higher than 10,000 euros;
- Loans without positive outstanding debt are not evaluated.

Only the residential properties have been evaluated because the EPC is related to these properties and not to the garage or basement.

1.3.2. Attribution of emissions

The first step consists of the identification of a proper attribution factor: Loan-to-value (LTV)
Thus, the attribution is equal to the ratio of the outstanding amount at the time of GHG accounting (t) to the property value at loan origination[2] (t_0):

$$Attribution\ factor_t = \frac{Outstanding\ amount_t}{Property\ Value_{t_0}}$$

The attribution factor is constantly updated by changing the numerator following the mortgage repayment plan. The denominator remains constant over time, and it represents the whole value of properties (e.g. the sum of dwelling and garage values). A cap of 1 is applied to the attribution factor.[3]

[1] Available at: https://carbonaccountingfinancials.com/files/downloads/PCAF-Global-GHG-Standard.pdf, pag. 77-88.

[2] When the property value at origination is not feasible to obtain, financial institutions shall use the latest property value available and fix this value for the following years of GHG accounting (i.e., the denominator remains constant). The scope of this methodology is on-balance mortgages; off-balance are not included.

[3] The bank emission saving cannot be greater than the real one.

1.3.3. Financed emissions

The emissions of buildings are calculated as the product of a building's energy consumption and computed attribution factor as in the previous section:

$$Financed\ emissions = \sum_i^t Attribution\ factor_{i,t} \times Estimated\ emissions_{i,t}$$

Where, i = property in Banco BPM's portfolio at time t.

Estimated emissions' calculation relies on **Section 1.1**. In the applied methodology, no distinction is made between private or corporate mortgages. Concerning energy and emissions data, higher limits have been applied to limit errors in data. The limits for emissions are 80 kg per square meter per year, which is the average emissions of buildings in the worst energy class. Instead, the upper limit for energy consumption is 300 kWh, the average of buildings with poor efficiency.

1.3.4. Positive carbon impact

Starting from SIAPE's data, the portfolio's positive impact in terms of emission is calculated.

$$Positive\ Carbon\ Impact = [(\sum_i^t Attribution\ factor_{i,t} \times Benchmark\ emissions_{i,t}) - Financed\ emission] \times Building\ surface$$

The formula expresses the total amount of savings in kg of CO^2 for the guarantees under investigation, considering the attribution factor and a market benchmark. A cap of 2,000 and a floor of 20 square meters is applied to the building surface. In case of missing data, the surface has been estimated from the cadastral category, using the statistics provided by *Agenzia della Entrate.*

1.3.5. Positive carbon impact for renovations

As for the subset of BPM portfolio relating to renovations, the positive carbon impact is calculated taking into consideration the estimated emissions ante and post renovation:

$$Positive\ Carbon\ Impact = (Financed\ emission\ ante - Financed\ emission\ post) \times Building\ surface$$

Where:

$$Financed\ emissions\ ante = \sum_i^t Attribution\ factor_{i,t} \times Estimated\ emissions\ ante_{i,t}$$
$$Financed\ emissions\ post = \sum_i^t Attribution\ factor_{i,t} \times Estimated\ emissions\ post_{i,t}$$

1.4. Reporting measures

Once the emissions of every building are known or estimated (section 1.1), an analysis of all the mortgage guarantees shows portfolio performance, and the difference with the national benchmark is executed (section 1.2). Finally, the financial impact of each contract is calculated (see section 1.3), and the following impact indicators show the portfolio features in terms of energy efficiency:

- **Positive carbon impact:** It measures the positive impact of lower carbon emissions by considering the attribution factor and a benchmark. It is expressed in tons per year.
- **Positive carbon impact per million euros invested:** It measures the positive impact per million euros invested in tons per year.
- **Energy-saving:** Portfolio energy savings are calculated starting from the EPC and the national benchmark information. The measure is obtained from the difference between actual data and benchmark and by multiplying the result for the surface. As for the subset of portfolio relating to renovations, the measure is obtained from the difference between the actual primary energy demand ante and post renovation multiplied by the surface.

Allocation (mln €)	Positive carbon impact (tons)	Positive carbon impact (tons per 1 mln €)	Square meters	Energy saving (MWh)
1,000 €	20,000	20.0	1,200,000	100,000

Table 1 – Example of portfolio impact

2. POSITIVE CARBON IMPACT ON BBPM' PORTFOLIO

The positive carbon impact on BBPM' portfolio, calculated according with the methodology described above, is shown in table 2 and 3 and represent the eligible portfolio already included in a Bond. The positive carbon impact of the remaining eligible loans id shown in table 3.

Allocated Loan Portfolio mln €	Avoided Emissions tons	PCI tons per mln €	Energy Saving MWh	Square meters
2.289	**30812**	**13,46**	**282.217**	**2.252.096**

Table 2 – Positive Carbon Impact of BBPM' eligible loans already allocated to the Use of Proceeds of Green Bonds issued

Region	Allocation mln €	Avoided Emissions tons	PCI tons per mln €	Energy Saving MWh	Square meteres
LOMBARDIA	**1.167**	**14.710**	**12,60**	**130.507**	**1.057.660**
VENETO	**313**	**4.569**	**14,60**	**44.635**	**335.978**
PIEMONTE	**213**	**3.584**	**16,81**	**30.341**	**260.327**
EMILIA ROMAGNA	**182**	**2.651**	**14,57**	**26.793**	**199.425**
LAZIO	**112**	**1.207**	**10,77**	**10.344**	**77.841**
TOSCANA	90	1.188	13,26	11.884	94.011
SICILIA	60	973	16,26	8.798	74.800
LIGURIA	35	390	11,26	4.234	34.657
TRENTINO ALTO ADIGE	31	265	8,46	2.691	22.825
PUGLIA	22	382	17,59	3.378	26.891
CAMPANIA	20	325	16,60	3.247	25.599
SARDEGNA	9	86	9,60	940	7.494
FRIULI VENEZIA GIULIA	9	132	14,88	1.271	9.649
VALLE D'AOSTA	7	48	6,50	550	5.107
ABRUZZO	5	78	15,17	605	4.416
UMBRIA	5	71	15,42	646	4.937
MOLISE	4	84	19,58	740	5.689
MARCHE	3	41	13,01	361	2.831
BASILICATA	1	17	14,67	146	1.106
CALABRIA	1	11	15,91	105	854
Grand total	**2.289**	**30.812**	**13,46**	**282.217**	**2.252.096**

Table 3 – Positive Carbon Impact of BBPM' eligible loans already allocated to the Use of Proceeds of Green Bonds issued by Region

Eligible Loan Portfolio mln €	Avoided Emissions tons	PCI tons per mln €	Energy Saving MWh	Square meters
1.245	**15.351**	**12,33**	**129.417**	**948.980**

Table 4 – Positive Carbon Impact of BBPM' loans not yet allocated to the Use of Proceeds of Green Bonds

Region	Allocation mln €	Avoided Emissions tons	PCI tons per mln €	Energy Saving MWh	Square meteres
LOMBARDIA	**583**	**6.413**	**10,99**	**55.077**	**400.555**
VENETO	**206**	**3.108**	**15,07**	**24.056**	**170.368**
LAZIO	**95**	**760**	**7,98**	**6.483**	**53.887**
PIEMONTE	**93**	**1.330**	**14,27**	**10.754**	**89.163**
EMILIA ROMAGNA	**89**	**1.329**	**14,94**	**12.102**	**80.401**
TOSCANA	59	730	12,38	6.678	49.118
SICILIA	31	617	20,16	5.037	35.573
LIGURIA	26	280	10,95	2.633	21.218
PUGLIA	15	226	15,08	1.886	13.229
CAMPANIA	12	152	12,55	1.197	9.914
TRENTINO ALTO ADIGE	10	92	9,04	832	5.986
FRIULI VENEZIA GIULIA	7	101	14,34	795	5.907
SARDEGNA	6	56	9,36	481	3.542
VALLE D'AOSTA	4	17	4,92	223	1.496
ABRUZZO	3	48	14,32	400	2.832
MARCHE		31	11,49	252	2.016
UMBRIA	1	28	19,39	285	1.924
BASILICATA	1	13	16,90	101	646
MOLISE	1	16	23,61	114	962
CALABRIA	< 1	3	11,09	33	242
Grand total	**1.245**	**15.351**	**12,33**	**129.417**	**948.980**

Table 5 – Positive Carbon Impact of BBPM' loans not yet allocated to the Use of Proceeds of Green Bonds by Region

CRIF is a global company specializing in credit bureau and business information, outsourcing and processing services, and credit solutions. Established in 1988 in Bologna (Italy), CRIF has an international presence, operating over four continents (Europe, America, Africa and Asia).

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