Methodology for measuring impacts associated with the ICO Green Bond Framework

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1. Introduction

As the State Financial Agency and the National Promotional Bank in Spain, Instituto de Crédito Oficial (ICO) keeps its institutional strategy fully aligned with the Spanish Government's sustainability targets, as well as with the SDG, the Paris Climate Agreement (COP 21), and the EU Sustainable Finance Action Plan. In this context, ICO has maintained a very active position in supporting the development of sustainable finance in recent years. The institution has played a key role in the market with issues of Social Bonds and Green Bonds, which have allowed 6,550 million euros to be channeled to sustainable projects as of December 2022.

In February 2023, the Institute launched its fifth green bond issue for an amount of €500 million. The funds raised through this issue will support projects of Spanish companies in the field of renewable energy, hydrogen production, energy efficiency, green buildings, clean transport, pollution prevention and control and sustainable management of natural resources as well as water and wastewater.

This issue is the second that ICO has made under the umbrella of the updated framework for green bond issuance, which includes new categories relevant to the transition to an emission free economy, such as hydropower and green hydrogen.

In order to promote transparency, ICO publishes its methodology for measuring the impact associated with the financed assets.

2. Purpose

The purpose of this document is to define the methodology applicable to the calculation of the impact indicators included in Instituto de Crédito Oficial's GreenBond Framework (hereinafter ICO Green Bond Framework). The impact measurement is conducted by the Sustainability Assessment and Methodology Service Area, in accordance with this methodology.

3. Scope of application

3.1. Geographical Scope

This methodology is applicable to assets located anywhere and is applied to calculate the impact generated by the projects associated with ICO's Green Bonds.

3.2. Project selection

Eligible projects will be selected in accordance with the provisions of the ICO Green Bond Framework, which establishes the eligible project categories and compliance with the requirements in the parameters for each activity.

4. Project categories according to the Green Bond Framework and impact measurement

This section of the document outlines the methodologies used to calculate the impact in each project category according to the ICO Green Bond Framework. In all cases, the information related to the asset is obtained from the technical data included in the reference documents at the start of the operation, and/or from subsequent reports from the owner of the asset.

4.1. Renewable energy

In this category ICO will include loans granted to finance:

1. Electricity generation from renewable energies through the acquisition, maintenance, refurbishment and/or repowering of existing and future renewable energy production facilities from the following renewable sources:

- Solar
- Wind
- Bioenergy, as set out in sections 4.8 of the Delegated Act Annex I
- Hydropower, when electricity generation complies with either of the following criteria:
    a) the electricity generation facility is a run-of-river plant and does not have an artificial reservoir;
    b) the power density of the electricity generation facility is above 5 W/m2;
    c) the life cycle GHG emissions from the generation of electricity from hydropower, are lower than 100gCO2e/kWh.

2. Energy transmission and distribution networks through the development, construction, equipment, operation, and maintenance of new or additional Energy Transmission and Distribution networks aligned with the following criteria:

- the system is the interconnected European system;
- construction and operation of direct connection, or expansion of existing direct connection, of low carbon electricity generation below the threshold of 100 gCO2e/kWh measured on a life cycle basis to a substation or network;
- construction or operation of new transmission and distribution networks dedicated to hydrogen;
- conversion/repurposing of existing natural gas networks to 100% hydrogen;
- retrofit of gas transmission and distribution networks that enables the integration of hydrogen and other low-carbon gases in the network.

❖ Calculation methodology

The methodology used to calculate the impact in this project category is based on the amount of CO2 emissions avoided, which is calculated to estimate the environmental benefits derived from the project, based on the GHG Protocol.

The GHG Protocol establishes a global framework for measuring and managing greenhouse gas (GHG) emissions from public and private sector operations, value chains and mitigation measures. Based on a 20-year partnership between the World Resource Institute (WRI) and the World Business Council for Sustainable Development (WBCSD), GHG Protocol works with governments, industry associations, NGOs, companies, and

other organizations.

In the different technologies used to produce energy from renewable sources (solar, wind, bioenergy or hydropower), avoided emissions are estimated as those that would have been emitted for its production according to the national energy mix of the country in which the asset is located.

$$Avoided\ CO_2tons = (P_1 \times F_{1nationalmix}) - (P_1 \times F_{2technology})$$

where:

- ***Avoided CO2 tons*** = Carbon dioxide emissions avoided through the project (tons CO2)
- P_1 = Energy generated by the asset (kWh)
- $F_{1nationalmix}$ = Emission factor according to the country's energy mix (tons CO_{2eq} /kWh)
- $F_{2technology}$ = Emission factor according to the technology used (tons CO_{2eq}/kWh)

In the specific case of biomass projects, the emissions avoided are estimated by subtracting the emissions produced by burning the fuel used (plant mass) for energy generation, from the emissions that would have been emitted had it been produced according to the national energy mix of the country in which the asset is located.

Latest data published by recognized national or international organizations will be used for these calculations.

$$Avoided\ CO_2tons = (P_1 \times F_{1nationalmix}) - ((M \times P_1 \times F_1) + (M \times P_2 \times F_2) + \cdots)$$

where:

- ***Avoided CO2 tons*** = Carbon dioxide emissions avoided through the project (tons CO2)
- P_1 = Energy generated by the asset (kWh)
- $F_{1nationalmix}$ = Emission factor according to the country's energy mix (tons CO_{2eq} /kWh)
- M = Plant mass volume used for energy generation (tons)
- P_1 = Percentage of plant mass volume by type of fuel 1 (tons of CO2eq / ton of fuel)
- F_1= Emission factor according to fuel type 1 (tons of CO2eq / kWh)
- P_2 = Percentage of plant mass volume by type of fuel 2 (tons of CO2eq / ton of fuel)
- F_2= Emission factor according to fuel type 2 (tons of CO2eq / kWh)

Finally, to determine the impact attributable to ICO, the total impact generated by the asset is multiplied by the share (%) of ICO's participation in the total investment received by the project.

4.2. Hydrogen production

In this category ICO will include loans granted to finance:

1. Hydrogen production through the development, construction, and upgrade of hydrogen electrolysis, with related lifecycle emissions that comply with the European taxonomy threshold of 3tCO2e per tH2.

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❖ Calculation methodology

The methodology used to calculate the impact in this project category is based on the amount of CO2 emissions avoided, which is calculated to estimate the environmental benefits derived from the project, based on the GHG Protocol.

The avoided emissions are estimated as those that would have been emitted for its production according to the national hydrogen production mix in the country in which the asset is located.

$$Avoided\ CO2tons = (\mathrm{Q1} \times F1nationalmix) - (\mathrm{Q1} \times F2technology)$$

where:

- **Avoided CO2 tons** = Carbon dioxide emissions avoided through the project (tons CO2)
- **Q1**= Quantity of hydrogen produced (kg H2)
- $F_{1nationalmix}$ = Emission factor of hydrogen production mix of the country (tons CO2eq/kg H2)
- $F_{2technology}$ = Emission factor according to the technology used (tons CO2eq/kg H2)

Finally, to determine the impact attributable to ICO, the total impact generated by the asset is multiplied by the share (%) of ICO's participation in the total investment received by the project.

4.3. Energy efficiency

In this category ICO will include loans granted to finance the development, operation, distribution and maintenance of equipment or technology helping reduce energy consumption and increase energy savings including:

- Construction and operation of electricity storage including pumped hydropower storage;
- Construction of hydrogen storage facilities, and conversion of existing underground gas storage facilities into storage facilities dedicated to hydrogen-storage;
- District heating using at least 50 % renewable energy, 50 % waste heat, 75 % cogenerated heat or 50 % of a combination of such energy and heat;
- Smart grids, such as smart meters, sensors or remote-control devices contributing to energy efficiency;
- Efficient lighting (light sources rated in the highest two populated classes of energy efficiency).

❖ Calculation methodology

The energy saved and the CO2 emissions avoided as a result to this energy savings are calculated to estimate the environmental benefits derived from the projects.

The CO2 emissions avoided are calculated by applying a methodology based on the GHG Protocol.

First, the energy whose consumption has been avoided is calculated, with this being the result of the difference between consumption prior to and subsequent to the project. Subsequently, the emissions avoided are calculated by assuming that the energy whose consumption has been avoided would have been generated according to the national energy mix of the country in which the project is located, using the latest data published by recognized national or international organizations.

$$Avoided\ CO2tons = (E1 - E2\ ) \times (Fnationalmix)$$

where:

- **Avoided CO2 tons** = Carbon dioxide emissions avoided through the project (tons CO2)
- **E1** = Energy consumed by the asset prior to the project (kWh)
- **E2** = Energy consumed by the asset after the project (kWh) –
- $F_{nationalmix}$ = Emission factor according to the country's energy mix (tons of CO2eq / kWh)

4.4. Green buildings

In this category ICO will include loans granted to finance the acquisition, construction, development and renovation of buildings:

- Built before 31 December 2020, with an Energy Performance Certificate (EPC) at least equal to class A, or rank in the top 15% on energy efficiency measures within the local market equivalent;
- Built after 31 December 2020, with the Primary Energy Demand (PED) at least 10 % lower than the threshold set for the nearly zero-energy building (NZEB);
- Required to have, or are designed and intended to receive:
    a) a design stage certification
    b) a post-construction certification
    c) an in-use certification in any of the following building certification schemes:
        - LEED "Gold"
        - BREEAM "Excellent"
        - any other equivalent recognized regional certification with similar standards
- For which renovation leads to energy savings of at least 30%, in comparison to the baseline performance of the building before the renovation.

❖ Calculation methodology

CO2 emissions avoided are calculated by applying a methodology based on the GHG Protocol.

- Refurbishment of already constructed buildings: the energy consumed is compared based on the previous certification, compared to the energy that is consumed once the certification received is obtained and after the implementation of the project.
- New buildings: energy consumption is compared with the new certification against the national average consumption of a standard building.
- Projects involving LEED certifications: energy consumption that has been avoided is obtained from the building's resulting score in the Energy and Atmosphere section of the LEED questionnaire. This score directly correlates with annual energy savings.
- Non-certified buildings, ranking 15% top in terms of energy efficiency: the accredited savings may be considered, indicating the methodology used.

To calculate an estimation of the avoided emissions, we assume that the energy consumption avoided as a result of the project implementation, would have been generated according to the national energy mix of the country in which the project is located, using the latest data published by recognized national or international organizations.

$$Avoided\ CO_2tons = (E_1 - E_2) \times (F_{nationalmix})$$

where:

- ***Avoided CO2 tons*** = Carbon dioxide emissions avoided through the project (tons CO2)
- E_1 = Energy consumed by the asset prior to the project (kWh)
- E_2 = Energy consumed by the asset after the project (kWh)
- $F_{nationalmix}$ = Emission factor according to the country's energy mix (tons of CO2eq / kWh)

Finally, to determine the impact attributable to ICO, the total impact generated by the asset is multiplied by the share (%) of ICO's participation in the total investment received by the project.

4.5. Clean transportation

In this category ICO will include loans granted to finance low carbon vehicles and infrastructure, such as:

- Rolling stock and infrastructure for electrified transportation systems, for public mass transportation and for freight transportation;
- Fleet of vehicles, (including passenger cars, light commercial vehicles, and large vehicles) emitting less than 50gCO2/km until 2025 and 0gCO2/km by 2026 onwards;
- Construction and operation of electronic vehicle (EV) charging stations and supporting electric infrastructure for the electrification of transport;
- Infrastructure for hydrogen refueling installations for road and off-road transportation, such as passengers' cars, public transportation, road freight, waterborne transport, and aircrafts.

❖ Calculation methodology

The amount of CO2 emissions avoided through the project is calculated to estimate the environmental benefits derived from the sustainable mobility projects defined in the ICO Green Bond Framework.

There are two types of projects in this category:

a) Mass transportation
b) Freight transportation

In both cases, the avoided emissions are estimated by subtracting the emissions generated by the new means of transport (if it is an electric means of transport, emissions are calculated by assuming that the electricity consumed has been generated according to the energy mix of the country in which the project is located, using the latest data published by recognized national or international organizations), from the emissions that would have been generated by the transport of passengers or goods through a combination of alternative means of transport.

$$Avoided\ CO_2tons = (((D \times V) \times (P_1 \times F_1)) + \cdots) - ((D \times V) \times (F_{alternative}))$$

where:

- ***Avoided CO2 tons*** = Carbon dioxide emissions avoided through the project (tons CO2)
- D = Distance traveled by the asset (km / ton or km / passenger)

- ***V*** = Volume of merchandise (tons) or passengers (number of people) transferred by the means oftransport
- P_1 = Percentage of the volume that is transferred by means of transport 1 (%)
- F_1 = Emission factor of the means of transport 1 according to the country of the asset (tons ofCO_2eq / ton of goods or tons of CO_2eq / per passenger per km)
- $F_{alternative}$= Emission factor according to the alternative means of transport used and the countryof the asset (tons of CO_2eq / per ton of goods per km or tons of CO_2eq / per passenger per km)

The emission factors applied to calculate the emissions avoided by means of transport and type of fuel will be obtained from the latest data published by recognized national or international organizations.

Finally, to determine the impact attributable to ICO, the total impact generated by the asset is multiplied by the share (%) of ICO's participation in the total investment received by the project.

4.6. Pollution prevention and control

In this category ICO will include loans granted to support a sustainable management of waste through the development, manufacture, construction, operation, and maintenance of waste management activities, such as:

- Separated non-hazardous waste collection and transportation (Segregated at source intended for preparation for reuse or recycling operations);
- Bio-waste (as set out in sections 5.7 and 5.8 of the Delegated Act Annex I) anaerobic digestion or composting;
- Material recovery from nonhazardous waste (the activity converts at least 50 %, in terms of weight, of the processed separately collected non-hazardous waste into secondary raw materials that are suitable for the substitution of virgin materials in production processes).

❖ Calculation methodology

The amount of CO2 emissions avoided through the project is calculated to estimate the environmental benefits derived from the pollution prevention and control projects. The avoided emissions are estimated by subtracting those generated by the new waste management system, from the emissions that would have been emitted by managing the same volume of waste through the previously established management system. The emissions generated by both the new and previous system, are calculated using the emission factors published by recognized national or international organizations.

$$Avoided\ CO_2 tons = ((V \times P_{1\alpha} \times F_1) + (V \times P_{2\alpha} \times F_2) + \cdots) - ((V \times P_{1p} \times F_1) + (V \times P_{2p} \times F_2) + \cdots)$$

where:

- ***Avoided CO2 tons*** = Carbon dioxide emissions avoided through the project (tons CO_2)
- ***V*** = Volume of waste managed (Ton)
- P_{1a} = Percentage of the volume that is managed, prior to the project, according to method 1 (%)
- F_1 = Emission factor of management method 1 (kilograms of CO_2eq / ton of waste)
- P_{2a} = Percentage of the volume that is managed, of pre-project maintenance, according to method2 (%)
- F_2= Emission factor of management method 2 (kilograms of CO_2eq / ton of waste)
- P_{1p} = Percentage of the volume that is managed, after the project, according to method 1 (%)
- P_{2p} = Percentage of the volume that is managed, of post-project maintenance, according tomethod 2 (%)

Finally, to determine the impact attributable to ICO, the total impact generated by the asset

is multiplied by the share (%) of ICO's participation in the total investment received by the project.

4.7. Environmentally sustainable management of living natural resources and land use

In this category ICO will include loans granted to finance a sustainable agriculture and forestry through the development, manufacturing, construction, operation and maintenance of:

- Sustainable agriculture and climate smart farm input (organic farming certified with the EU label);
- Environmentally sustainable fishery (MSC and ASC or equivalent certifications) and aquaculture (ASC or equivalent certifications);
- Environmentally sustainable forestry (FSC, PEFC or equivalent certifications).

❖ Calculation methodology

An estimate is made according to the type of project to assess the environmental benefits derived from the natural resource management projects.

There are three types of projects in this category:

a) Sustainable agriculture and climate smart farm

The environmental benefit derives from the decrease in emissions from the manure generated and/or applied in the land managed, which is transformed into nitrous oxide and finally into CO2, through its Global Warming Potential (GWP). The avoided emissions are estimated by subtracting the emissions generated by the new sustainable agriculture management system (using the latest data published by the European Union) from the emissions that would have been emitted under the previous management model (according to the difference in nitrogen concentration per hectare of the asset in question), using the latest data published by the Food and Agriculture Organization (FAO).

$$Avoided\ CO_2 tons = (A \times F_1) - (A \times F_2)$$

where:

- ***Avoided CO2 tons*** = Carbon dioxide emissions avoided through the project (tonsCO2)
- ***A*** = Managed area (hectares)
- F_1 = Emission factor of the previous management method (tons of CO2eq / hectare)
- F_2 = Emission factor of the management method according to the standards of the European certification (tons of CO2eq / hectare)

b) Environmentally sustainable fishery

The environmental benefit derived from projects that have the sustainable fishery certifications indicated within the ICO Green Bond Framework (which do not include emission criteria) has been limited to quantifying the number of credits granted to projects that meet the characteristics described in the ICO Green Bond

Framework.

c) Environmentally sustainable forestry

The environmental benefit derives from the emissions avoided as a result of the carbon sequestration generated by the project. The CO2 emissions sequestered by the projects is calculated by applying a methodology based on Woodland Carbon CO2 from DEFRA (Department for Environment, Food and Rural Affairs of the United Kingdom). This methodology analyses the average annual CO2 capture per hectare of twelve different tree species over a period of 50 years. By applying this to the tree mass financed by ICO, the CO2 sequestered thanks to said project can be estimated.

$$Avoided\ CO_2tons = (A \times C)$$

where:

- ***Avoided CO2 tons*** = Carbon dioxide emissions avoided through the project (tonsCO2)
- ***A*** = Managed area (hectares)
- ***C***= CO2 capture ratio of the managed space (tons of CO2eq / hectare)

Finally, to determine the impact attributable to ICO, the total impact generated by the asset is multiplied by the share (%) of ICO's participation in the total investment received by the project.

4.8. Sustainable water and wastewater management

In this category ICO will include loans granted to finance water and wastewater management through the development, construction and maintenance of:

- Water collection, treatment, and supply systems (as set out in sections 5.1 and 5.2 of the Delegated Act Annex I) where the net average energy consumption is equal or lower than 0.5 kWh per cubic meter produced water supply; energy consumption is reduced by at least 20%;
- Centralized wastewater treatment provided that the new wastewater treatment substitutes more GHG emission intensive wastewater treatment system (projects selected under this category will provide demonstrable water savings or other quantifiable benefits).

❖ **Calculation methodology**

The water consumption avoided through the project is calculated to estimate the environmental benefits derived from the sustainable water management and wastewater treatment projects.

There are two types of projects in this category:

a) Efficient water consumption

The water consumption avoided is estimated by subtracting the volume of water lost due to possible leaks after the implementation of the project, from the volume of water lost due to previous leaks. The latest data published by recognized national or international organizations will be used.

$$Water\ consumption\ saved = F_{previous} - F_{posterior}$$

where:

- ***Water consumption saved*** = Water saved thanks to the project (m3)
- $F_{previous}$ = Volume of water lost due to leakage prior to the project (m3)
- $F_{posterior}$ = Volume of water lost due to leak after the project (m3)

b) Rainwater harvesting

Avoided water consumption is estimated based on the volume of water treated and the volume of rainwater collected, considering that the given volume of water would have been obtained from alternative sources.

$$Water\ consumption\ saved = V_{treated} - V_{collected}$$

where:

- ***Water consumption saved*** = Water saved thanks to the project (m3)
- $V_{treated}$ = Volume of water treated through the project (m3)
- $V_{collected}$ = Volume of rainwater collected through the project (m3)

Finally, to determine the impact attributable to ICO, the total impact generated by the asset is multiplied by the share (%) of ICO's participation in the total investment received by the project.