# 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, Instituto de Crédito Oficial (ICO) keeps its institutional strategy fully aligned with the Spanish Government's sustainability targets, as well as with the SDGs. 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 4,050 million euros to be channelled to sustainable projects as of May 2020.

One year after it issued its first Green Bond in 2019, worth 500 million euros, ICO published its impact report.[1] In order to promote transparency, ICO is now publishing the 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 Green Bond Framework (hereinafter ICO Green Bond Framework). The impact measurement is conducted by the Study and Evaluation Service Area, in accordance with this methodology.

# 3. Scope of application

## 3.1. Geographical Scope

This methodology is applicable to assets located in any location. This methodology has been applied to calculate the impact generated by the projects associated with ICO's first Green Bond. The impact calculated is for projects located in: Spain, United Kingdom, Portugal, Chile and Mexico.

## 3.2. Project selection

[1] The result of the calculation of the impact of projects financed with the Green Bond issued by ICO in 2019 can be reviewed in the documentation published on ICO's website: https://www.ico.es/documents/19/2289903/Reporting+ICO+Green+Bonds++ABRIL+2019/fc64677a-9554-4410-ad0c-571615fe9385

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

## 3.3. Project categories according to the Green Bond Framework

The projects categories included in the ICO Green Bond Framework are listed below:

**Renewable energy**

Loans to finance acquisition, maintenance, refurbishment and/or repowering of renewable energy facilities (solar, wind, biomass). Development, construction, equipment, operation and maintenance of new or additional Energy Transmission and Distribution networks from renewable sources.

**Energy efficiency**

Loans to finance the development, operation, distribution and maintenance of equipment or technology helping reduce energy consumption and increase energy savings including and loans to finance the acquisition, construction, development, renovation of buildings that have, or are designed and intended to receive a certification scheme at the defined threshold level or better (LEED "Gold", BREEAM "Very Good"). In the case of the uncertified level, the ones that rank in the top 15% on energy efficiency measures within the local market equivalent (using the Spanish EPC categories A and B for new buildings and A, B and C for existing buildings)

**Clean transportation**

Loans to finance Public mass and freight transportation, electrified and/or low-carbon transportation systems that meet carbon intensity which meet the thresholds for a 2-degree scenario as defined by the Climate Bonds Initiative's Low Carbon Transportation Standard.

**Pollution prevention and control**

Loans for the development, manufacture, construction, operation and maintenance of waste management activities, such as preventing, reducing and recycling waste, among others.

**Environmentally sustainable management of living natural resources and land use**

Loans to finance 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 and aquaculture (MSC and ASC or equivalent certifications) and environmentally sustainable forestry (FSC, PEFC or equivalent certifications).

**Sustainable water and wastewater management**

Loans to finance the development, construction and maintenance of water network and equipment for efficient water supply, distribution and storage, wastewater discharge, water treatment and rainwater harvesting.

# 4. Impact measurement

This section of the document outlines the methodologies used to calculate the impact in each project category. 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.

The calculation of the impact avoided (CO2, volume of treated water, among others) for each of the categories included in the ICO Green Bond Framework is detailed below.

## 4.1. Renewable energy

**Calculation methodology**

The amount of CO2 emissions avoided is calculated to estimate the environmental benefits derived from the renewable energy projects defined in the ICO Green Bond Framework.

CO2 emissions avoided is calculated by applying a methodology 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 for the production of energy from renewable sources, the 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)
- ***P₁*** = Energy generated by the asset (kWh)
- ***F₁nationalmix*** = Emission factor according to the country's energy mix (tons $CO_{2eq}$ /kWh)
- ***F₂technology*** = 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 in question is located. For these calculations, latest data published by recognized national or international organizations will be used.

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

where:

- ***Avoided CO2 tons*** = Carbon dioxide emissions avoided through the project (tons CO2)
- ***P₁*** = Energy generated by the asset (kWh)
- ***F₁mixnacional*** = Emission factor according to the country's energy mix (tons $CO_{2eq}$ /kWh)
- ***M*** = Plant mass volume used for energy generation (tons)
- ***P₁*** = Percentage of plant mass volume by type of fuel 1 (tons of CO2eq / ton of fuel)
- ***F₁***= Emission factor according to fuel type 1 (tons of CO2eq / kWh)
- ***P₂*** = Percentage of plant mass volume by type of fuel 2 (tons of CO2eq / ton of fuel)
- ***F₂***= 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. Energy efficiency

### Calculation methodology

The energy saved and the CO2 emissions avoided thanks to this saving are calculated to estimate the environmental benefits derived from the energy efficiency projects defined in the ICO Green Bond Framework.

There are two types of projects in this category:

a) Reduction and saving equipment

CO2 emissions avoided is 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 recognised national or international organisations.

$$Avoided\ CO_2 tons = (E_1 - E_2) \times (F_{nationalmix})$$

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)

b) Certified buildings

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

In the case of the 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.

In the case of new buildings, energy consumption is compared with the new certification against the national average consumption of a standard building.

The energy consumption that has been avoided thanks to projects involving LEED certifications 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.

For non-certified buildings that are in the top 15% in terms of energy efficiency, the accredited savings may be considered, indicating the methodology used.

The avoided emissions are estimated by assuming that the energy whose consumption has been avoided thanks to the implementation of the project 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 recognised national or international organisations.

$$Avoided\ CO_2 tons = (E_1 - E_2) \times (F_{nationalmix})$$

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.

## 4.3. Clean transportation

### 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 recognised national or international organisations) from the emissions that would have been generated by the transport of passengers or goods through a combination of alternative means of transport.

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

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 of transport
- $P_1$ = 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 of CO2eq / ton of goods or tons of CO2eq / per passenger per km)
- $F_{alternative}$= Emission factor according to the alternative means of transport used and the country of the asset (tons of CO2eq / per ton of goods per km or tons of CO2eq / per passenger per km)

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

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.

## 4.4. Pollution prevention and control

### 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 defined in the ICO Green Bond Framework. 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 recognised national or international organisations.

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

where:

- ***Avoided CO2 tons*** = Carbon dioxide emissions avoided through the project (tons CO2)
- ***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 CO2eq / ton of waste)
- $P_{2a}$ = Percentage of the volume that is managed, of pre-project maintenance, according to method 2 (%)
- $F_2$= Emission factor of management method 2 (kilograms of CO2eq / 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 to method 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.

## 4.5. Environmentally sustainable management of living natural resources and land use

## Calculation methodology

An estimate is made according to the type of project to estimate the environmental benefits derived from the natural resource management projects defined in the ICO Green Bond Framework.

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 Organisation (FAO).

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

where:

- ***Avoided CO2 tons*** = Carbon dioxide emissions avoided through the project (tons CO2)
- ***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) Environmentlly sustainable forestry

The environmental benefit derives from the emissions avoided thanks to 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.

$$Avoided\ CO_2 tons = (A \times C)$$

where:

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

### c) 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.

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. Sustainable water and waterwaste management

### 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 defined in the ICO Green Bond Framework.

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 recognised national or international organisations is applied for this.

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

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)
- $\boldsymbol{V_{treated}}$= Volume of water treated through the project (m3)
- $\boldsymbol{V_{collected}}$ = 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.