

REPORT

AIB Power Storage Facilities Impact Assessment

For eligible Power Storage Facilities projects

December 2022



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Abbreviations

GHG: Greenhouse gases

PSF: Power storage facility

1. Introduction

Aligned with its sustainability strategy, Allied Irish Banks (“**AIB**”) is intending to issue green bonds to finance and / or refinance loans that meet the requirements as described in the AIB Green Bond Framework (“**Framework**”)¹. The objective of the Framework, and subsequent green bonds issued from it, is to fund projects or assets that mitigate climate change by reducing emissions, protect ecosystems, or otherwise have a positive environmental impact. The Framework has been aligned to the ICMA Green Bond Principles and has received a Second Party Opinion from Sustainalytics.

The ICMA Green Bond Principles are a set of voluntary guidelines that recommend transparency and disclosure and promote integrity in the development of the green bond market by clarifying the approach for issuing a green bond. The Framework therefore has four key components:

1. Use of Proceeds
2. Process for Project Evaluation and Selection
3. Management of Proceeds
4. Reporting

For each green bond issued, AIB asserts that it will adopt (1) Use of Proceeds, (2) Process for Project Evaluation and Selection, (3) Management of Proceeds, (4) Reporting, as set out in the Framework.

AIB, at its discretion but in accordance with the Green Bond Principles, will allocate the net proceeds of the Green Bonds to an eligible loan portfolio of new and existing green loans (“Eligible Green Project Portfolio”). The Eligible Green Project Portfolio are to be financed and/or refinanced in whole or in part by an allocation of the bond proceeds.

The Eligible Green Project Portfolio for “Power Storage Facilities” includes loans to finance or refinance equipment, development, manufacturing, construction, operation, distribution and maintenance of power storage facilities; the specific technology types for power storage facilities are set out below, as per AIB’s Green Bond Framework¹:

- Compressed air
- Flywheels
- Synchronous Condensers
- Batteries

1.1. Who We Are

The Carbon Trust are a trusted, expert guide to Net Zero, bringing purpose led, vital expertise from the climate change frontline. We have been pioneering decarbonisation for more than 20 years for businesses, governments and organisations around the world.

We draw on the experience of over 300 experts internationally, accelerating progress and providing solutions to this existential crisis. We have supported over 3,000 organisations in 50 countries with their climate action planning, collaborating with 150+ partners in setting science-based targets, and supporting cities across 5 continents on the journey to Net Zero.

¹ [AIB Green Bond Framework \(2022\)](#)

The Carbon Trust's Green Finance team helps financial institutions navigate the risks and opportunities of climate change and the transition to a low carbon economy. We are independent experts who understand the environmental impacts, technologies and global markets that underpin green asset classes. We leverage this bottom-up understanding to create bespoke solutions and help financial institutions deliver genuinely green outcomes. We offer a comprehensive advisory and assurance service for green bonds and loans. We provide feasibility assessments, help identify eligible assets (Green Tagging), and build Green Bond and Loan Frameworks. For assuring green bonds and loans, we provide Second Party Opinions and certifications to recognised standards. We are approved verifiers to the Climate Bonds Initiative Standard and we are members of the ICMA Green Bond Principles, contributing in both cases as technical advisors. As impartial experts, we advise on methodologies and reporting on the environmental impacts of the use of proceeds, giving investors clarity and reassurance on the impact of their investment.

2. Methodology

2.1. Reporting Principles

Reporting of the environmental impacts of green bonds is evolving and is a relatively new concept. However, AIB is committed to reporting on the method used to calculate the avoided GHG emissions for its Green Bond Framework based on:

- PCAF's *The Global GHG Accounting and Reporting Standard for the Financial Industry (November 2020)*², chapter 5.3 Project Finance;
- Green Bond Principles, *Voluntary Process Guidelines for Issuing Green Bonds (June 2022)*³; and,
- ICMA Harmonised Framework for Impact Reporting (2022)⁴.

AIB follows the key recommendations outlined in the Green Bond Principles, with external reviewers present across their reporting process. In addition, AIB is committed to reporting greenhouse gas emissions in accordance with the five principles contained within the Greenhouse Gas Protocol, namely: relevance; completeness; consistency; transparency; and, accuracy. In accordance with the principles of reporting described above, AIB commits to transparent disclosure of any assumptions and estimations used in the calculation of its reporting framework.

2.2. Scope of Calculations and Reporting

2.2.1. General scope of green bond impact assessment

AIB intends to report the expected or actual quantitative environmental impact of a power storage facility (PSF) it finances or co-finances through its green bond issuance. The reporting includes the estimated reduction or avoidance in greenhouse gases ("GHGs") estimated to have occurred from its loans. AIB also evaluates other indicators that are appropriate to report for environmental impact and

² PCAF (2020). *The Global GHG Accounting and Reporting Standard for the Financial Industry. First edition.*

³ ICMA (2022). *Green Bond Principles, Voluntary Process Guidelines for Issuing Green Bonds*

⁴ ICMA (2022). *Harmonised Framework for Impact Reporting*

performance, such as the signed amount and total export (MWh). At this stage, social and other economic indicators are not within the scope of the green bonds in question. Governance indicators are also not in scope.

AIB undertakes to report the environmental impact of projects it finances or co-finances through its green bonds based, where possible, on the actual environmental performance of the asset. Where this is not possible, expected performance is used. The reporting includes both green indicators and resulting emissions reductions or avoidance, both of which require assumptions and calculations. The reporting is based on the net-benefit resulting from the asset in a given period of operation, rather than the gross emissions change before or after the life of the asset or project.

Calculations include project-by-project impacts, as well as aggregated results across the portfolio of assets financed or co-financed with the proceeds of AIB's green bonds. Environmental indicators are attributed to AIB on a project-by-project basis, based on the current percentage share financed (where applicable) and disbursed by the bank. The reporting is undertaken on an annual basis, covering the previous 12-month period and considers any dynamic changes in the assets financed or co-financed that occur from one reporting period to another.

In accordance with the principles of reporting described above, AIB has, and continues to commit to transparent disclosure of any assumptions and estimations used in the calculation of its reporting framework.

2.2.2. Scope of Power Storage Facilities impact assessment

The impact of PSF's financing varies depending on the strategy deployed by the facility, these strategies are typically:

- load shifting,
- firm frequency response and/or
- inertia provision

Estimating the avoided emissions arising from the deployment of power storage facilities varies. Avoided emissions refer to the incremental difference in the PSF net export emissions compared with the carbon emissions associated with either the grid emission factor or the grid firm emission factor, depending on the strategy carried out by the PSF. In other words, the estimated annual emissions avoided due to the application of the PSF compared to if the facility would not have been operational.

The emissions accounted for within this assessment originate from the use phase of the PSF and do not include upstream or downstream emissions. Details around the calculations and justifications for all emission scopes are explained below.

2.3. Environmental impact methodology

2.3.1. Emissions from Power Storage Facilities

To account for data availability challenges when estimating the avoided emissions associated with a PSF, three options have been made available, all of which provide a sufficient understanding of the emissions associated with the PSF to assess the impact. Option 1 is the recommended option, with the

highest level of granularity and quality, and option 3 is the least granular but still suitable to sufficiently estimate the impact of the PSF.

The emissions associated with power storage facilities, are calculated based on the net import minus net export stored within the facility, multiplied against the emission factor of the connected electricity system, average carbon intensity for imports and operating margin for exports. Please note this methodology is simplified and may, depending on how the electricity storage asset is utilised, indicate a higher carbon saving than is actually the case. To minimise this risk, data for electricity storage projects should ideally be as granular as possible.

For renewable energy, the imported electricity will be estimated to have no emissions associated with it. This is based on the below options depending on data availability:

Option 1 – Half Hourly

1a – Half hourly PSF import and export data against half hourly regional carbon intensity:

$$PSF \text{ emissions} = \sum_{i=1}^n (\text{Half Hourly Imports} \times \text{Half Hourly Regional Average Carbon Intensity}_i) - (\text{Half Hourly Export} \times \text{Half Hourly Regional Average Carbon Intensity}_i)$$

1b – Half hourly PSF import and export data against half hourly national carbon intensity:

$$PSF \text{ emissions} = \sum_{i=1}^n \text{Half Hourly Net Export (MWh)}_i \times \text{Half Hourly National Average Carbon Intensity}_i$$

Option 2 – Monthly/Annual

2 – Actual monthly/annual PSF import and export data against monthly/annual regional or national grid carbon intensity:

$$PSF \text{ emissions} = \sum_{i=1}^n (\text{Net Import (MWh)}_i \times \text{Monthly/Annual Average Carbon Intensity}_i) - (\text{Monthly/Annual Net Export (MWh)}_i \times \text{Monthly/Annual Average Carbon Intensity}_i)$$

Option 3 – High level estimate

3 – Estimated import and export based on PSF capacity against national grid carbon intensity:

$$PSF \text{ emissions} = \sum_{i=1}^n (\text{Estimated Net Import (MWh)}_i \times \text{Monthly/Annual Average Grid Carbon Intensity}_i) - (\text{Estimated Net Export (MWh)}_i \times \text{Monthly/Annual Average Grid Carbon Intensity}_i)$$

Table 1 Summary of inputs to calculate PSF emissions

| Description | Unit | Input | Source(s) |
|---|------|-------|-----------------|
| Number of PSF's in the Eligible Project Portfolio | # | | Provided by AIB |
| Total (net) export | MWh | | Provided by AIB |

| | | | |
|---|---|--|---|
| Total imports | MWh | | |
| Average round-trip efficiency of battery | % | | Provided by AIB if imports volumes are not available. |
| Input source carbon intensity | tCO ₂ e/MWh or kgCO ₂ e/kWh | | Zero if co-located with renewable generation, otherwise Carbon Trust Research |
| PSF emissions | kgCO₂ | | |

2.3.2. Avoided emission methods

A baseline was calculated to estimate the avoided emissions. The baseline can be considered as a hypothetical scenario in which the PSF financed by AIB were not present within the grid. In other words, the baseline refers to what would have happened if AIB had not, in recent years, increased the avoidance of carbon intensive electricity generation sources and increasing the resilience of the electricity grid, it calculates the emissions that would have occurred if the grid had continued to operate as usual, using either the typical grid emission factor or the average operating margin emission factor.

The baseline for CO₂ emissions will vary depending on the strategy deployed from the PSF. For times when the PSF is not directly co-located with a renewable energy plant, the baseline will be the average grid emission factor (either half hourly, monthly or annually). It should also be noted that the approach taken is a conservative estimation of the avoided baseline emissions.

Grid baseline

$$\text{Grid baseline emissions} = \text{PSF Net Export (MWh)} \times \text{Half Hourly Carbon Intensity}$$

If the primary operating mode is to provide grid support services such as balancing, dynamic containment, firm frequency response or inertia response, the counterfactual baseline is assumed to be a plant at the operating margin. If PSFs provide both turn-up (charge) and turn-down (discharge) services, the PSF will need to maintain “headroom” in the battery at all times. For simplicity, the assumption made by CT is that when the PSF provides grid support services, the state-of-charge of the battery is 50% (half-full).

The impact of this assumption is that when comparing to the counterfactual average operating margin plant, only half of the nominal battery capacity is used (the turn-up service part) multiplied against the number of hours the PSF has been operational. This is then multiplied against the average operational margin grid carbon intensity of the host country.

Grid stability services counterfactual baseline

Grid stability Baseline Emissions

$$= \text{Half the capacity of the PSF} \times \text{number of hours PSF is operational} \\ \times \text{Country grid operational margin}$$

Table 2 Summary of inputs to calculate Grid Stability Services avoided emissions

| Description | Unit | Input | Source(s) |
|--|---|-------|-----------------------|
| Capacity of PSF | MW | | Provided by AIB |
| Hours the PSF provided grid stability services | Hours or % of year | | Provided by AIB |
| Operating margin of PSF host country | tCO ₂ e/MWh or kgCO ₂ e/kWh | | Carbon Trust Research |
| Indirect (Scope 2) emissions 2022 | kg CO₂ | | |

Note: only includes the inputs not already outlined in Table 1

2.3.3. Annual avoided emissions

Once the estimate for the emissions from the grid that would have taken place without the PSF (the baseline), and the emissions associated with the PSF were obtained, the avoided emissions were calculated by subtracting the PSF emissions from the baseline, depending on the strategy as per the below formula:

$$\text{Avoided emissions} = \text{AIB attribution} \times (\text{PSF Net Operating Emissions})$$

| | |
|--------------------------------------|--------------------------|
| Annual avoided emissions 2022 | kg CO₂ |
|--------------------------------------|--------------------------|

2.3.4. Attributed impact to AIB

In some cases, AIB does not finance the entire project. As a result, the avoided emissions are adjusted by the share of financing attributable to AIB. This share is calculated by taking the amount outstanding on the deal and dividing by the project value:

$$\text{Attribution Factor} = \frac{\text{Amount of AIB Financing Outstanding (mEUR)}}{\text{Total Project Value (mEUR)}}$$

| | |
|--|--------------------------|
| AIB annual avoided emissions 2022 | kg CO₂ |
|--|--------------------------|

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