European Commission

# #NextGenerationEU
# GREEN BONDS
## ALLOCATION AND IMPACT REPORT

### 2024

Budget

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**COMMISSION STAFF WORKING DOCUMENT**

**NGEU Green Bonds Allocation and Impact report 2024**

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# Foreword

I am delighted to present the third annual allocation and impact report charting the progress of the EU's NextGeneration Green Bond programme. It proves that we have achieved a lot in record time: I remember when we set up the programme back in 2021, with great expectations and ambitious targets as part of ramping up of the EU issuance programme. And we managed to translate this into action. At the COP 28 in Dubai last year, I had the pleasure to demonstrate that the Europe's green financing is acting as a catalyst for the green transition and serving as a global inspiration. Our Green Bond Programme has become one of the world's largest – reaching far beyond the European Union.

This year's report proves that the positive trend continues. Our NGEU Green Bonds remain highly attractive, offering a high return on investment – not only financially but also allowing investors and markets to be part of the solution. The programme has developed steadily through a series of well-supported and many times oversubscribed transactions to arrive at a volume of EUR 60.2 billion outstanding as of 1 August 2024, the cut-off date of this report (increased to EUR 65.2 billion by end October 2024). And as this report shows, it has the potential to grow significantly further and steadily in the years ahead.

This is even more important as the proceeds generated by NGEU Green Bonds have an impact across the entire EU: they finance investments in areas such as clean transport, renewable energy, energy efficiency, and biodiversity. This report documents the substantial expansion of the pool of NGEU expenditure that qualifies as 'climate transition' relevant. This increase stems from the partial reorientation of the original national Recovery and Resilience Plans towards energy diversification and energy security. I count on the Member States to continue their climate-relevant investments in line with their national recovery plans.

Our common efforts have boosted the maximum potential expenditure that NGEU Green Bonds can finance to EUR 264.6 billion as of 1 August 2024. It is estimated that the full roll-out of this planned expenditure will reduce the EU's greenhouse gas emissions (GHG) by 54.7 million tonnes of $CO_2$ per year, or 1.5% of the aggregate 2022 EU GHG emissions. These expected avoided emissions are equivalent to the combined emissions of approximately 15 million households in the EU.

This ensures our NGEU Green Bonds embody a unique combination: fulfilling all criteria to be an asset worth a Triple "A" – and a Triple "S", which stands for safe, sustainable, and successful – both in attracting investor support and funding the climate-friendly adaptation of our economies. This report delivers on our commitment to transparency – and I hope that it will give all institutions and investors who want their money to contribute to a green transition the confidence they need to continue supporting this EU flagship programme.

**Johannes Hahn**

EU Commissioner for
Administration & Budget

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# Abbreviations

| | |
|---|---|
| **CO2e** | Carbon dioxide equivalent |
| **DNSH** | 'Do no significant harm' |
| **ERTMS** | European Rail Traffic Management System |
| **FIs** | Financial instruments |
| **GHG** | Greenhouse gas |
| **ICMA** | International Capital Market Association |
| **IF** | Intervention Field |
| **NGEU** | Next Generation EU |
| **RRF** | Recovery and Resiliency Facility |
| **RRP** | Recovery and Resilience Plan |
| **SCC** | EU Taxonomy Substantial Contribution Criteria |
| **TSC** | EU Taxonomy Technical Screening Criteria |

# Executive summary

Under the NextGenerationEU (NGEU) instrument at least 37% of spending in Member States' Recovery and Resilience Plans (RRPs) must be used for sustainable investments and reforms in areas addressing climate change. Proceeds from NGEU Green Bonds are used to finance these investments.

This report provides investors and stakeholders with information on the allocation of proceeds from the issuance of NGEU Green Bonds and their estimated realised and expected climate impacts. The report builds on NGEU Green Bonds Allocation and Impact Reports, published in December 2022[1] and December 2023[2], and presents data based on a cut-off date of 1 August 2024. As for previous editions, this report has been subject to a limited assurance assessment by an independent auditor of the information pertaining to allocation of NGEU Green Bond proceeds and realised impact.

### The pool of eligible NGEU Green Bond expenditures expands to EUR 264.6 billion

The most significant development since the 2023 report is the expansion of the pool of NGEU expenditure that can be financed with the proceeds of Green Bonds (eligible Green Bond expenditure) to EUR 264.6 billion on 1 August 2024 (from EUR 190.6 billion on 1 August 2023). The growth in the share of climate-transition relevant expenditure in the overall NGEU expenditures results from the revision of Member State RRPs to integrate the REPowerEU Plan. With its focus on saving energy, producing clean energy, and diversifying our energy supplies through reforms and investments, the integration of REPowerEU has significantly boosted the climate-transition footprint of NGEU. The increase in eligible expenditure is based on rigorous screening of revised plans from 25 Member States which were finalised in time for this report[3]. The growth in the size of the eligible NGEU Green Bond expenditure pool to these levels further confirms the potential scale of the NGEU Green Bond programme as the relevant investments and reforms are implemented.

'*Clean transport & infrastructure*' (EUR 72.4 billion), '*Energy efficiency*' (EUR 67.8 billion) and '*Clean energy & network*' (EUR 61.0 billion), remain the three largest categories in the NGEU Green Bond expenditure pool, accounting for 76.0% of the maximum pool. Most of the EUR 74.0 billion growth in the NGEU Green Bond pool came from increases in expenditure category '*Clean energy & network*' (EUR 29.8 billion) and '*Energy Efficiency*' (EUR 18.5 billion). Categories such as '*Research and innovation activities supporting the green transition*', '*Water supply & waste management*' and '*Clean transport & infrastructure*', also increased significantly.

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[1] https://commission.europa.eu/system/files/2022-12/SWD_2022_442_F1_STAFF_WORKING_PAPER_EN_V4_P1_2417689.PDF

[2] https://op.europa.eu/en/publication-detail/-/publication/a07eed09-94b8-11ee-b164-01aa75ed71a1/language-en?WT_mc_id=Searchresult&WT_ria_c=55576&WT_ria_f=7664&WT_ria_ev=search&WT_URL=https%3A//commission.europa.eu

[3] REPowerEU plan for Luxembourg is awaiting approval by the Council. REPowerEU plan for Bulgaria is awaiting its submission to the Commission.

## NGEU Green Bond issuance and reported expenditures increase steadily

As of 1 August 2024, the European Commission has issued EUR 60.2 billion of NGEU Green Bonds compared to EUR 44.2 billion as of 1 August 2023 (an increase of 36.2% over the year).

NGEU Green Bond issuances reflect the increase in the reported expenditure by Member States. Specifically, as of 1 August 2024, 19 Member States (compared to 14 in 2023) have reported allocation financed by NGEU Green Bond proceeds, with a total value of EUR 44.0 billion (versus EUR 21.0 billion in 2023). The increase in this reported expenditure reflects the increased pace of completion of milestones and targets across Member States, with 332 completed and assessed milestones and targets in 22 Member States, compared to 153 in 2023 across 14 Member States. 84.5% of the reported expenditures relates to the three main expenditure categories '*Clean transport & infrastructure*' (33.8%), '*Energy efficiency*' (42.0%) and '*Clean Energy & network*' (8.7%). A further 281 milestones and targets have been declared as 'completed' by Member States but are still subject to assessment by the Commission.

As of 1 August 2024, unallocated proceeds (i.e. the difference between the amount of NGEU Green Bonds issued and reported expenditures) amounted to EUR 16.2 billion (compared to EUR 23.2 billion in 2023). As implementation of the NGEU programme is advancing, Green Bond issuances will be increasingly calibrated to reported green expenditures by Member States, thereby ensuring diminishing unallocated proceeds. To allow for the situation that some green expenditures is reported to the Commission by Member States after 2026, the Commission may issue NGEU Green Bonds also during the planned refinancing phase of the NGEU[4]. This will allow the Commission to establish full confidence that eligible expenditures have been realised before raising funds through NGEU Green Bond issuances.

## NGEU Green Bond pool remains strongly aligned with the EU Taxonomy

As of 1 August 2024, 63.4% of the total pool of NGEU Green Bond eligible expenditure is assessed as, being fully or substantially aligned with the substantial contribution criteria and additional 'do no significant harm' criteria of the EU Taxonomy (compared to 57.5% in 2023). A further 33.6% is partially aligned, while the remaining 3.0% is not covered (e.g. for spending categories such as biodiversity or air pollution prevention, where specific EU Taxonomy metrics have not yet been developed).

The improved taxonomy alignment of the NGEU Green Bond Pool also reflects the relative increase in climate-relevant/taxonomy-aligned elements of the pool following REPowerEU revisions (for example in the areas of renewable energy and transport) as well as revisions of the Taxonomy regulation that came into effect in January 2024.

## NGEU Green Bond financing has the potential to reduce total EU GHG emissions by 1.5% per annum

Taking into account the increased pool of NGEU Green Bond eligible expenditure and building on the 2023 methodological approach for calculating impacts across different intervention fields, it is estimated that full implementation of quantifiable milestones and targets up until 2026 funded by

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[4] In line with Article 5 of the [2020/2053 Own Resource Decision](), new net borrowing under the NGEU programme will need to be completed by end 2026. However, the Commission will continue to execute borrowing operations in the form of roll overs of maturing existing liabilities after that date as part of the management of NGEU related borrowing until the repayment of all debt by end 2058. In that context the Commission can also consider issuing NGEU Green Bonds.

NGEU Green Bonds will reduce the EU's greenhouse gas emissions (GHG) by 54.7 million tonnes of $CO_2$ per year (compared to the 44.2 million tonnes of $CO_2$ per year in 2023).

This is equivalent to 1.5% of the aggregate 2022 EU GHG emissions. These expected avoided emissions are equivalent to the combined emissions of approximately 15 million households in the EU[5].

This represents a conservative estimate, derived solely from 510 milestones and targets which can be confidently translated into quantifiable GHG emission impacts, representing 46% of the total pool of NGEU Green Bond eligible expenditure. No impacts are claimed for the more than half of targets and milestones where impacts could not be quantified under the current approach.

The climate impact of investments that are already implemented is calculated at 1,481,276 tonnes of CO2e/year of emissions avoided (compared to 224,143 tonnes of CO2e/year in the 2023 edition of this report) – or 2.7% of the total estimated reduction of GHG emissions of full programme implementation. The limited realised climate impact reflects the relatively early stage in the implementation of the projects financed by the NGEU Green Bonds and is expected to increase progressively.

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[5] Based on the average total activities' emissions per household in 2022.

# Introduction

# 1. Introduction

As of 1 August 2024, the Commission has issued EUR 60.2 billion of NGEU Green Bonds. NGEU Green Bond issuances are underpinned by the NGEU Green Bond Framework (Box 1), which is aligned with the Green Bond Principles of the International Capital Market Association (ICMA).

This document constitutes the Commission's annual comprehensive report on the allocation of proceeds from the issuance of NGEU Green Bonds and of the estimated climate impacts of related realised and expected investments across EU Member States.

Building on the 2022[6] and 2023[7] editions this report presents:

(i) An update, on the amount and break-down of each Member State Recovery and Resilience Facility (RRF) expenditure that is eligible to receive financing from NGEU Green Bonds based on the approved Recovery and Resilience Plans (RRPs);

(ii) The evolution of NGEU Green Bond issuances and how the net proceeds have been allocated;

(iii) An update of the EU Taxonomy alignment of the pool of Green Bond eligible measures and of the allocated proceeds, taking into account changes in the EU Taxonomy related regulations that came into effect in January 2024; and

(iv) An update of the expected and realised climate impacts for the quantifiable parts of the pool of NGEU Green Bond expenditures and related reported expenditures. This update incorporates an expansion of the coverage of the impact analysis, with 12 more intervention fields covered relative to the 2023 report. The report describes the methodology used to derive the climate impacts (GHG emissions avoided presented in tonnes of CO2e/year of emissions avoided) based on the expected and current implementation of quantifiable milestones and targets for measures eligible for NGEU Green Bond financing.

In line with the 2023 report, information included in this report is based on a cut-off date of 1 August 2024.

This report is supplemented by an independent auditor's limited assurance report in respect of information relating to allocation of NGEU Green Bond proceeds and realised impact.

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[6] https://commission.europa.eu/system/files/2022-12/SWD_2022_442_F1_STAFF_WORKING_PAPER_EN_V4_P1_2417689.PDF
[7] https://op.europa.eu/en/publication-detail/-/publication/a07eed09-94b8-11ee-b164-01aa75ed71a1/language-en?WT_mc_id=Searchresult&WT_ria_c=55576&WT_ria_f=7664&WT_ria_ev=search&WT_URL=https%3A//commission.europa.eu/

## Box 1: The NGEU Green Bond framework[8] and due diligence procedure

The Commission has put in place a robust multi-level framework of control and assessment procedures to determine whether individual measures will receive financing from the proceeds of NGEU Green Bonds. All NGEU Green Bond issuances are underpinned by the NGEU Green Bond framework.

The framework, adopted in September 2021, ensures alignment with market standards on the use, management and reporting of proceed through four main pillars[9]:

- **Use of proceeds.** NGEU Green Bond proceeds are used for nine predefined broad expenditure categories, including 'energy efficiency', 'clean energy & network' and 'climate change adaptation' as defined in the NGEU Green Bond framework.
- **Process for expenditure evaluation and investment selection.** The investments are, in a first instance, identified based on the 37% climate expenditure of the RRPs – the spending roadmaps under the RRF at the heart of the NGEU recovery instrument.
- **Management of proceeds.** The Commission is tracking the net proceeds of the NGEU Green Bonds and the related payments, which are based on data submitted by EU Member States.
- **Reporting.** The Commission is providing investors and the wider public with transparent reporting on the allocation of proceeds and on the impact of the expenditures financed by NGEU Green Bonds, including through annual Allocation and Impact Reports and the regularly updated on-line NGEU Green Bond Dashboard.

### NGEU Green Bond Framework
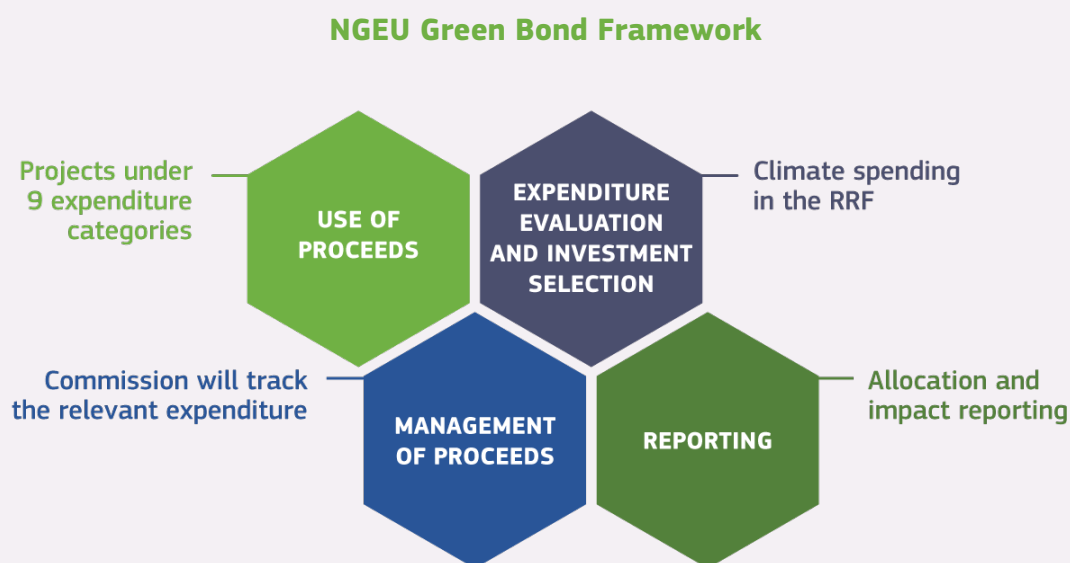


The NGEU Green Bond Framework is aligned with the Green Bond principles of the International Capital Market Association (ICMA) and reviewed by a second party opinion provider, Vigeo Eiris, now part of Moody's ESG Solutions.

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[8] https://commission.europa.eu/system/files/2021-09/nextgenerationeu_green_bond_framework.pdf

[9] The NGEU framework is aligned, to the extent feasible, with the European green bond standard, which defines requirements for compliance of green financing with the EU Taxonomy. However, as the NGEU Green Bond Framework had to be established prior to the EU Taxonomy certain differences exist. These differences were extensively presented in 2022 NGEU Green Bonds Allocation Report.

# The pool of NGEU Green Bond eligible expenditure

# 2. The pool of NGEU Green Bond eligible expenditure

In determining the individual measures that are eligible for financing from NGEU Green Bonds, the Commission applies a multi-level framework of control and assessment procedures. This evaluation and selection process starts with a careful screening of the climate relevant expenditures notified by Member States as part of their national RRPs. The screening is reinforced by a second layer of in-house due diligence of measures aimed at ensuring that only measures that meet the conservative standards of the NGEU Green Bond framework are included in the pool of eligible measures (see Annex I). Only measures passing this due diligence are considered eligible for financing under the NGEU Green Bonds. In accordance with this control framework, no measures for energy creation from nuclear or from natural gas are included in the NGEU Green Bond eligibility pool.

**As of the cut-off date of 1 August 2024, the pool of measures eligible for receiving financing under NGEU Green Bonds consists of EUR 264.6 billion[10] of eligible assets** (made up of 1,058 measures). This represents a EUR 74.0 billion increase of the pool compared to EUR 190.6 billion as of 1 August 2023 (made up of 875 measures).

The significant increase in the pool of NGEU Green Bond eligible expenditure reflects amendments in 25[11] Member States' national Recovery and Resilience Plans[12]. These revisions were driven by amendments to allocations related to grant support, requests for additional loans for Member States that wished to apply for these and adjustments to reflect additional funding opportunities under the REPowerEU Plan, EU's plan to bolster energy resilience, increase renewable energy generation, and promote sustainable energy sources[13, 14].

Of the EUR 74.0 billion increase in the NGEU Green Bond pool since the 2023 report, EUR 34.7 billion was due to changes resulting from new REPowerEU measures, with EUR 39.3 billion coming from other RRPs changes[15]. A detailed analysis of the impact of these changes to the NGEU Green Bond pool (following the Commission's subsequent due diligence) broken down by expenditure category is presented in Table 2.

Most of the EUR 74.0 billion growth in the NGEU Green Bond Pool relative to 2023 came from increases in expenditure category '*Clean energy & network'* (EUR 29.8 billion increase of which EUR 25.3 billion driven by REPowerEU related changes) and '*Energy Efficiency'* (EUR 18.5 billion

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[10] For non-Eurozone Member States, an exchange rate is specified in the Council Implementing Decision for the costing of measures in the RRP. When reporting on expenditures, non-Eurozone Member States report to the Commission in their local currency, a weighted exchange rates of all disbursement dates is used to convert the local currency amount to EUR.

[11] The revised RRPs of 2 Member States (Estonia and Luxembourg) are not captured in this report as at the time of the cut-off date their Plans were still under technical assessment.

[12] The 2023 Report included revisions only from 4 Member States: Estonia, Slovakia, France and Finland

[13] The REPowerEU Regulation was presented by the European Commission in May 2022 and came into force in March 2023. Under REPowerEU Member States are allowed to add specific chapters to their national RRPs in order to finance key investments and reforms to will help achieve the REPowerEU objectives. These objectives include energy savings, the diversification of energy supplies and the accelerated roll-out of renewables. Measures under REPowerEU chapters are financed with RRF loans and an additional grant envelope stemming from new resources outside NGEU.

[14] Overview of Member States' loan requests received by the Commission by 31 August 2023 – European Commission (europa.eu)

[15] It is noted that certain RRP amendments include REPowerEU "top-ups" and "scale-ups" of existing measures. In most cases they are identified for the purpose of this report as REPowerEU measures but, in some cases, they are included as extension of existing RRP measures and counted under RRP amendments.

increase, of which EUR 14.1 billion driven by other changes in RRPs). Categories such as '*Research and innovation activities supporting the green transition, 'Water supply & waste management' and 'Clean transport & infrastructure*', also increased significantly.

Notwithstanding these changes, as of 1 August 2024, '*Clean transport & infrastructure*' (EUR 72.4 billion), '*Energy efficiency*' *(*EUR 67.8 billion) and '*Clean energy & network*' (EUR 61.0 billion) remain the three largest categories in the NGEU Green Bond pool, accounting for 76.0% of the pool. Additionally, '*Water supply & waste management*' accounts for EUR 21.4 billion, '*Research and innovation activities supporting the green transition*' for EUR 20.6 billion, '*Climate change adaptation*' for EUR 7.3 billion, 'Nature *protection, rehabilitation and biodiversity*' for EUR 6.2 billion, '*Digital technologies supporting the green transition'* for EUR 0.4 billion and '*Other*' for EUR 7.5 billion.

**Table 1: NGEU Green Bond pool broken down by expenditure category (in EUR)**

| Expenditure Category | NGEU Green Bonds Eligible Amount (as of 1 August 2024) | NGEU Green Bonds Eligible Amount (as of 1 August 2023) |
|---|---|---|
| Clean energy & network | 61,020,459,508 | 31,205,299,035 |
| Clean transport & infrastructure | 72,376,106,537 | 64,693,956,318 |
| Climate change adaptation | 7,301,397,751 | 11,760,281,770 |
| Digital technologies supporting the green transition | 444,981,838 | 402,970,079 |
| Energy efficiency | 67,759,575,211 | 49,262,056,890 |
| Nature protection, rehabilitation and biodiversity | 6,153,732,676 | 5,867,904,567 |
| Other | 7,520,337,611 | 4,256,118,393 |
| Research and innovation activities supporting the green transition | 20,568,882,665 | 11,018,668,481 |
| Water supply & waste management | 21,434,950,864 | 12,138,876,319 |
| **Grand Total** | **264,580,424,661** | **190,606,131,852** |

**Table 2: Changes to the NGEU Green Bond pool since 2023 report broken down by expenditure category and source (in EUR)**

| Expenditure Category | Changes from REPowerEU chapters | Changes from broader Recovery and Resilience Plans (RRP) revisions |
|---|---|---|
| Clean energy & network | 25,327,577,747 | 4,487,582,726 |
| Clean transport & infrastructure | 2,022,499,999 | 5,659,650,220 |
| Climate change adaptation | 63,200,000 | –4,522,084,019[16] |
| Digital technologies supporting the green transition | 14,328,000 | 27,683,758 |
| Energy efficiency | 4,397,232,240 | 14,100,286,081 |
| Nature protection, rehabilitation and biodiversity | 3,449,448 | 282,378,661 |
| Other | 827,674,329 | 2,436,544,889 |
| Research and innovation activities supporting the green transition | 2,034,935,539 | 7,515,278,645 |
| Water supply & waste management | 0 | 9,296,074,545 |
| **Grand Total** | **34,690,897,302** | **39,283,395,507** |

**Table 3: NGEU Green Bond pool broken down by Member State (in EUR)**

| | Sum of NGEU Green Bonds Eligible Amount (as of 1 August 2024) | Sum of NGEU Green Bonds Eligible Amount (as of 1 August 2023) |
|---|---|---|
| Austria | 2,316,051,610 | 2,230,585,000 |
| Belgium | 2,605,414,993 | 2,952,051,778 |
| Bulgaria | 3,157,521,543 | 3,497,684,000 |
| Croatia | 2,329,321,211 | 2,053,820,674 |
| Cyprus | 517,730,164 | 456,504,000 |
| Czechia | 3,396,549,661 | 2,197,855,805 |
| Denmark | 764,336,503 | 646,870,171 |
| Estonia | 546,280,000 | 546,280,000 |
| Finland | 842,948,000 | 742,800,000 |
| France | 17,468,829,083 | 15,211,477,614 |
| Germany | 11,303,645,165 | 8,074,220,165 |

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[16] The revision of the RRPs included reorientation of national priorities which in some cases resulted to a reduction of the expected climate contributions for certain expenditure categories for certain Member States.

| | | |
|---|---|---|
| Greece | 12,621,483,552 | 11,003,177,155 |
| Hungary | 4,641,113,217 | 2,050,429,849 |
| Ireland | 572,049,000 | 406,199,000 |
| Italy | 74,801,620,602 | 70,286,458,550 |
| Latvia | 815,937,878 | 534,004,500 |
| Lithuania | 1,412,898,275 | 829,236,000 |
| Luxembourg | 60,500,000 | 60,500,000 |
| Malta | 225,677,223 | 163,760,000 |
| Netherlands | 3,517,576,000 | 2,451,476,000 |
| Poland | 25,480,314,524 | 13,944,730,000 |
| Portugal | 8,707,481,307 | 5,753,554,432 |
| Romania | 12,715,943,850 | 12,391,528,228 |
| Slovakia | 2,516,651,253 | 2,664,908,977 |
| Slovenia | 1,271,793,887 | 1,030,980,682 |
| Spain | 68,340,336,413 | 27,212,642,999 |
| Sweden | 1,630,419,748 | 1,212,396,274 |
| **Grand Total** | **264,580,424,661** | **190,606,131,852** |

An important additional element since the 2023 report has been the increased use of 'Financial instruments' (FIs) by some Member States as means of using the NGEU proceeds (both under the REPowerEU chapters and the broader RRPs). Following the in-depth screening of the revised RRF plans, preliminary estimates indicate that about 25% of the pool of NGEU Green Bond eligible expenditure may be implemented using FIs. Through the use of FIs, funds can be transferred to implementing partners, such as national promotional banks, to support investment programmes, including for NGEU Green Bond eligible expenditures. Recourse to FIs means that disbursement of RRF funds to Member States can precede the realisation of the actual investments, which may take place beyond the RRF deadline of 2026. However, before recognising these amounts as reported green expenditure to which NGEU Green Bond proceeds can be allocated, the Commission needs to be satisfied that the funds have ultimately been used by the financial intermediary to support climate relevant investments.

Reporting on these investments will be ensured through the binding conditions laid down in the relevant agreements between the Member States and the implementing partner. Under these conditions the Commission will receive reporting from Member States and related implementing partners on the implementation of measures executed via financial instruments. This reporting will form the basis for the Commission's own assessment of the realisation of such climate-relevant investments against which NGEU Green Bonds can be issued. The Commission will nevertheless implement a cautious approach before issuing NGEU Green Bonds against eligible expenditure implemented through financial instruments.

# Allocation of NGEU Green Bond proceeds

# 3. Allocation of NGEU Green Bond proceeds

Under the RRF, Member States can receive payments up to twice per year, after the fulfilment of their respective milestones and targets – in line with the performance-based nature of the programme. Member States are also required to report to the Commission with each payment request the total cumulative expenditures incurred for the implementation of each reform and investment with a positive climate marker[17]. This requirement is set out in the financing and loan agreements between the Commission and Member States and allows the Commission to match proceeds raised through NGEU Green Bonds with the concrete expenditure for climate relevant measures.

The central role that milestones and targets have in the design and implementation of the RRF enables the Commission to determine the actual expenditure incurred for projects financed through NGEU Green Bonds. The pool of eligible NGEU Green Bond expenditures hence represents the maximum amount to which the NGEU Green Bond proceeds can be allocated.

The Commission monitors closely the reporting of actual incurred expenditures by Member States, as a key input for the pace of NGEU Green Bond issuances. As set out in the sections below, since the 2023 report there has been an increase in the reported expenditure by Member States, allowing the Commission to increase in tandem its NGEU Green Bond issuances. This avoids 'over-issuance' of NGEU Green Bonds that cannot ultimately be matched by demonstrable climate-relevant expenditure.

## IMPLEMENTATION OF MILESTONES AND TARGETS

Out of the total 7,098 milestones and targets for the whole RRF financing, the Commission has identified 2,096 milestones and targets that can be directly linked to the EUR 264.6 billion worth of measures which are included in the NGEU Green Bond pool. These 2,096 milestones and targets relate to 1,058 individual measures or sub-measures that form the NGEU Green Bond eligible pool.

**As of the cut-off date of 1 August 2024, out of 2,096 milestones and targets linked to measures in the NGEU Green Bond pool, 332 are considered as 'Fulfilled' across 22 Member States (compared to 153 in 2023 across 14 Member States)**. These are associated mostly to measures that are defined by the NGEU Green Bond Framework as contributing towards improved '*Energy Efficiency*' (e.g. energy Efficient Renovation of private or public buildings) and '*Clean transport & infrastructure*' (e.g. improved transportation links). A number of these milestones are linked to enabling implementation measures, such as signature of contracts to commence construction.

A further 281 of these milestones and targets have been declared as 'completed' by Member States but are still subject to assessment by the Commission. However, it is noted that the

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[17] The Commission relies on Member States data availability and quality. The Commission, in its institutional capacity, cannot directly assess the progress of the measures in the Member States. This report is constructed based on available and assessed data as they were presented and submitted to the Commission by the Member States.

implementation status of milestones and targets is neither directly proportional to the financial envelope of reported expenditure, nor to the outputs implemented by a given Member State[18].

**Figure 1: Implementation status of milestones and targets directly linked to the NGEU Green Bond pool (as of 1 August 2024)**



■ Not Completed    ■ Fulfilled    ■ Declared (not assessed):
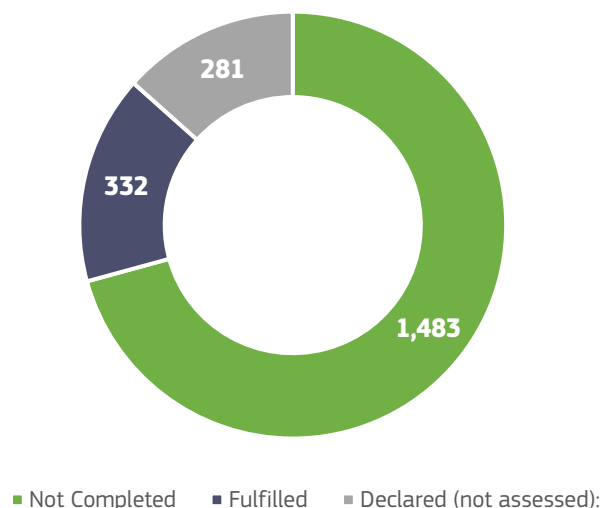
**Box 2: Milestones and Targets labelling and declaration process[19]:**

Under the RRF, Member States' national RRPs set out planned reforms and investments structured around broad expenditure categories (e.g. energy efficiency). Investments and reforms themselves consist of groups or portfolios of individual projects (measures and sub-measures) related to the same economic activities (e.g. renovation of public buildings). Each reform and investment is linked to qualitative milestones and quantitative targets that represent steps towards implementing these reforms and investments.

According to the RRF Regulation, Member States must report twice a year on the progress made in the implementation of their Recovery and Resilience Plan. The progress status of each milestone and target, can be reported by a Member State, as:

- 'completed' or
- 'not completed'.

Milestones and targets which Member States declare as 'completed' and have already been assessed as satisfactorily fulfilled by the Commission in the context of a payment request, are labelled for the purposes of this report as 'Fulfilled'. Milestones and Targets that are "Not completed" or "Declared (not assessed)"[20], are presented in Figure 1 above.

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[18] Milestones and targets are reported by Member States within a 12-month window, which is followed by the Commission assessment. In addition, the number of milestones and targets does not necessarily correspond to the financial envelope of related measure (or sub-measure).
[19] Bi-annual Reporting Factsheet – Spring 2023
[20] Declared (not assessed) denotes Milestones and Targets declared 'completed' by Member States, but still under assessment by the Commission.

**Table 4: Fulfilled milestones and targets by Member State (as of 1 August 2024)**

| Member State | Number of fulfilled milestones |
|---|---|
| Austria | 11 |
| Belgium | 0 |
| Bulgaria | 1 |
| Croatia | 21 |
| Cyprus | 3 |
| Czechia | 20 |
| Denmark | 23 |
| Estonia | 13 |
| Finland | 7 |
| France | 40 |
| Germany | 15 |
| Greece | 28 |
| Hungary | 0 |
| Ireland | 8 |
| Italy | 42 |
| Latvia | 5 |
| Lithuania | 8 |
| Luxembourg | 0 |
| Malta | 7 |
| Netherlands | 0 |
| Poland | 1 |
| Portugal | 26 |
| Romania | 8 |
| Slovakia | 6 |
| Slovenia | 12 |
| Spain | 27 |
| Sweden | 0 |
| **Total** | **332** |

**Figure 2: Fulfilled milestones and targets per expenditure category[21]**

Energy efficiency — **23.7%**
Clean transport & infrastructure — **20.6%**
Research and innovation activities supporting the green transition — **14.1%**
Clean energy and network — **12.2%**
Other — **8.1%**
Water supply & waste management — **8.1%**
Nature protection, rehabilitation and biodiversity — **5.7%**
Climate change adaptation — **5.7%**
Digital technologies supporting the green transition — **1.7%**
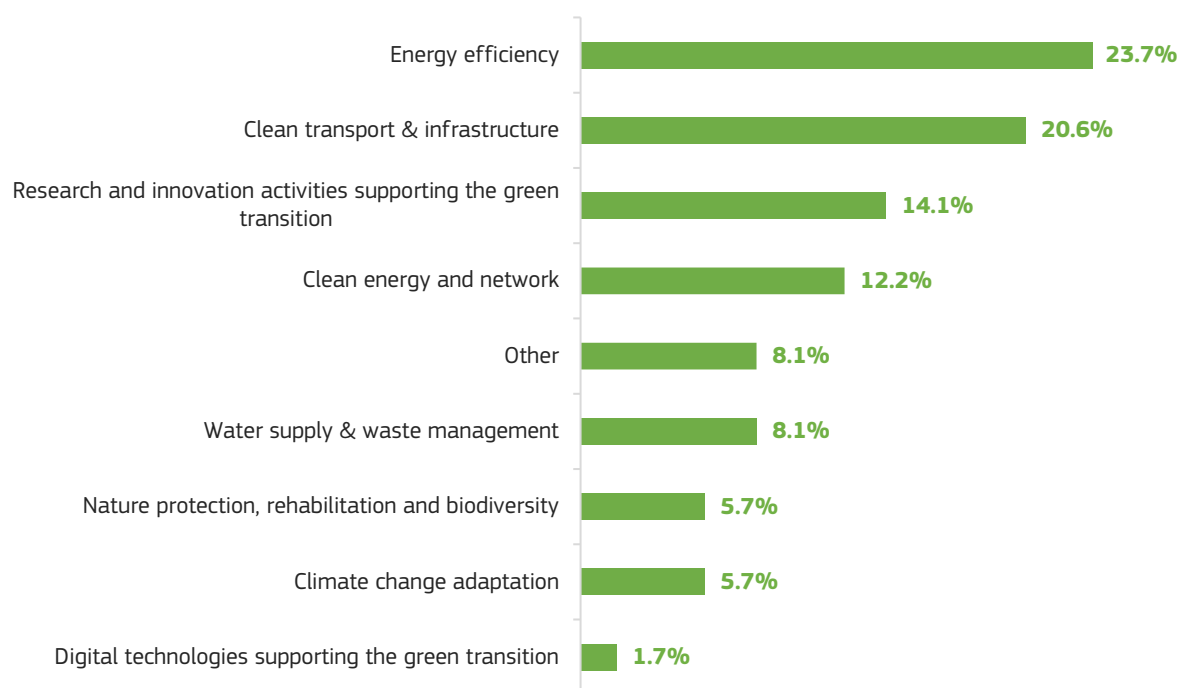
## NGEU GREEN BOND ISSUANCES

**As of 1 August 2024, the European Commission had issued EUR 60.2 billion of NGEU Green Bonds** across five different maturity points. This represents an increase of EUR 16.0 billion (or 36.2%), relative to the EUR 44.2 billion issued at the time of the 2023 report. All NGEU Green Bond issuances have been met with strong demand in both syndicated transactions and auctions, indicating a continuous strong investor appetite.

The increase is NGEU Green Bond issuances reflects the increased pace of overall RRF disbursements since 2023 and the associated increase in the reported green expenditure by Member States as described below.

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[21] Due to structural characteristics of RRF milestones and targets this chart should be interpreted as illustrative only and does not fully align with the numbers in Table 4.

**Table 5: Summary of NGEU Green Bond issuances**

| Type | Issue format | Transaction date | Maturity | Volume issued (EUR million) | Yield | ISIN |
|---|---|---|---|---|---|---|
| Tap | Auction | 27-05-24 | 04-02-43 | 2,027 | 3.345% | EU000A3K4DG1 |
| Tap | Auction | 29-04-24 | 04-02-33 | 2,293 | 2.952% | EU000A3K4DW8 |
| New Bond | Syndication | 19-03-24 | 04-02-50 | 7,000 | 3.339% | EU00043K4EU0 |
| Tap | Auction | 27-11-23 | 04-02-33 | 1,731 | 3.182% | EU00043K4DW8 |
| Tap | Syndication | 14-11-23 | 04-02-48 | 3,000 | 3.759% | EU00043K4DM9 |
| Tap | Auction | 17-04-23 | 04-02-33 | 1,732 | 3.087% | EU000A3K4DW8 |
| Tap | Syndication | 28-03-23 | 04-02-48 | 6,000 | 3.348% | EU000A3K4DM9 |
| Tap | Auction | 28-11-22 | 04-02-43 | 1,000 | 2.845% | EU000A3K4DG1 |
| New Bond | Syndication | 15-11-22 | 04-02-33 | 6,000 | 2.820% | EU000A3K4DW8 |
| Tap | Auction | 24-10-22 | 04-02-37 | 1,450 | 3.378% | EU000A3K4C42 |
| New Bond | Syndication | 21-06-22 | 04-02-48 | 5,000 | 2.713% | EU000A3K4DM9 |
| Tap | Auction | 25-04-22 | 04-02-37 | 2,499 | 1.626% | EU000A3K4C42 |
| New Bond | Syndication | 05-04-22 | 04-02-43 | 6,000 | 1.370% | EU000A3K4DG1 |
| Tap | Auction | 24-01-22 | 04-02-37 | 2,499 | 0.374% | EU000A3K4C42 |
| New Bond | Syndication | 12-10-21 | 04-02-37 | 12,000 | 0.450% | EU000A3K4C42 |

## ALLOCATED PROCEEDS

**By 1 August 2024, Member States have received EUR 253.7 billion in RRF grant and loan disbursements. Of this, EUR 101.8 billion is the share of disbursements that is expected to support NGEU Green Bond eligible measures**, based on the share of NGEU Green Bond eligible expenditure in the respective RRPs.

From the total disbursements, as of 1 August 2024, **19 Member States have reported expenditures** (compared to 14 in 2023) relating to fulfilled milestones and targets eligible for NGEU Green Bond financing for a total amount of **EUR 44.0 billion** (versus EUR 21.0 billion in 2023).

Most of the reported expenditure is incurred in the expenditure categories '*Energy efficiency*', which doubled in size since last year (2024: EUR 18.5 billion, 2023: EUR 9.8 billion), '*Clean transport & infrastructure*' (2024: EUR 14.9 billion, 2023: EUR 9.0 billion) and '*Clean energy & network*' (2024: EUR 3.8 billion, 2023: EUR 0.5 billion). This is very closely aligned with the fulfilled RRF milestones and targets.

This increased volume of reported expenditure reflects the completion of the RRP revision process by most Member States as well as the increased pace of implementation of the NGEU Green Bond-funded climate-relevant actions and related reporting as more of the bigger infrastructure projects start to materialise.

**Table 6: Reported expenditure by Member State (in EUR)**

| Member States | Sum of NGEU Green Bond cumulated expenditure (1 August 2024) | Sum of NGEU Green Bond cumulated expenditure (1 August 2023) |
|---|---|---|
| Austria | 184,638,000 | 206,678,000 |
| Croatia | 321,138,088 | 34,659,272 |
| Cyprus | 75,802,000 | 8,938,000 |
| Czechia | 1,368,894,623 | 343,767,144 |
| Denmark | 212,279,450 | 35,310,864 |
| Estonia | 142,310,000 | |
| Finland | 27,252,000 | |
| France | 10,618,788,000 | 5,069,652,000 |
| Germany | 2,171,964,000 | |
| Greece | 6,025,954,614 | 1,120,888,000 |
| Ireland | 55,182,000 | |
| Italy | 17,829,904,000 | 13,447,364,000 |
| Lithuania | 64,000,000 | 19,000,000 |
| Luxembourg | 960,000 | 960,000 |
| Malta | 34,232,000 | |
| Portugal | 1,631,000,000 | 247,400,000 |
| Slovakia | 4,790,000 | 200,000 |
| Slovenia | 123,674,000 | 89,180,000 |
| Spain | 3,125,014,000 | 398,176,000 |
| **Grand Total** | **44,017,776,775** | **21,022,173,280** |

**Table 7: Reported expenditure by expenditure category (in EUR)**

| Expenditure Category | Sum of NGEU Green Bond cumulated expenditure (1 August 2024) | Sum of NGEU Green Bond cumulated expenditure (1 August 2023) |
|---|---|---|
| Clean energy & network | 3,825,830,620 | 475,185,248 |
| Clean transport & infrastructure | 14,865,644,023 | 8,986,779,893 |
| Climate change adaptation | 1,394,823,279 | 1,222,136,053 |
| Digital technologies supporting the green transition | 6,416,000 | 12,000 |
| Energy efficiency | 18,505,514,965 | 9,797,308,047 |
| Nature protection, rehabilitation and biodiversity | 649,660,218 | 90,729,433 |
| Other | 1,020,371,778 | 221,461,267 |
| Research and innovation activities supporting the green transition | 2,229,875,333 | 67,513,689 |
| Water supply & waste management | 1,519,640,560 | 161,047,650 |
| **Grand Total** | **44,017,776,775** | **21,022,173,280** |

Annex III includes granular information on the allocation of proceeds across intervention fields and across Member States.

## UNALLOCATED PROCEEDS

Unallocated proceeds are the difference between the funds raised from NGEU Green Bond issuances and Member States' reported eligible green expenditures. As of 1 August 2024, with EUR 60.2 billion of NGEU Green Bonds issued and EUR 44.0 billion of reported expenditure to which proceeds have been allocated, unallocated proceeds, i.e. the remainder, stands at EUR 16.2 billion, EUR 7.0 billion lower than the EUR 23.2 billion in 2023. These unallocated proceeds are supported by a remainder of the pool of NGEU Green Bond eligible measures (of EUR 220.6 billion) which are expected to receive NGEU Green Bonds allocation as implementation of the NGEU programme progresses.

The scale of unallocated proceeds is restricted through robust risk management processes which ensures calibration of NGEU Green Bond issuances to manage the risk of issuing more NGEU Green Bonds than can eventually be allocated to reported green expenditures[22]. As implementation of the NGEU programme is advancing, unallocated proceeds will diminish with NGEU Green Bond issuances and realised green expenditure reported by Member States converging over time. The scale and pace of issuance of NGEU Green Bonds will hence depend on the scale and pace at which Member States report green expenditures over the lifetime of the programme.

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[22] Before being disbursed to Member States or other EU programmes, NGEU Green Bond proceeds, like all NGEU related bond proceeds, are routed through the Commission's cash account at the European Central Bank (ECB). While all Green Bond proceeds must eventually be allocated to expenditures on Green Bond eligible measures as reported by Member States, proceeds may also be temporarily used for other EU programmes or by Member States for other measures in their budget. The Commission endeavours to allocate all Green Bond proceeds within 24 months of issuance and is currently well on track to do so.

Taking into account that some of this reporting may occur only after end-2026 (for example in relation to the use of FIs – see section 2 on the pool of NGEU Green Bond eligible expenditure), new NGEU Green Bond issuances may also take place post 2026, through the refinancing of conventional bonds via NGEU Green Bonds.

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**Box 3: Refinancing and co-financing**

Under the NGEU Green Bond framework, up to 100% of the NGEU Green Bond issuance proceeds can be used to refinance eligible expenditure. In the context of NGEU Green Bonds, a payment from the Commission to Member States is considered to be refinancing when a Member State pays for the measure first and receives the money at a later stage from the Commission. Based on the timing of expenditure reported by Member States and taking into account the revised reported expenditure, refinancing of reported expenditure amounts to a total of EUR 21.1 billion or 48.0% of reported expenditures (compared to EUR 14.0 billion in 2023).

In addition, under the NGEU Green Bond Framework, it is possible for measures to receive financing from sources other than NGEU Green Bond proceeds. This relates to (i) measures that are tagged with a 40% climate coefficient where the remaining 60% of expenditure is financed from conventional NGEU related bond issuances; and (ii) measures where Member States finance eligible NGEU Green Bond measures partially from their own national budgets. Based on reporting by Member States by 1 August 2024, the financing from these two additional sources corresponds to EUR 12.2 billion (compared to EUR 1.2 billion in 2023). EUR 7.4 billion of this co-financing is co-financing from Member States with EUR 4.9 billion linked to co-financing by conventional EU Bonds (see Annex IV). The Commission does not receive information from Member States to be able to identify other sources of financing from third parties, such as development banks or agencies.

Further details on the methodology applied for the calculation of refinancing, pre-financing and co-financing can be found in the NGEU Green Bonds Allocation Report published in December 2022.

# EU Taxonomy
## alignment

# 4. EU Taxonomy alignment

The Commission has committed to reporting on the alignment of the NGEU Green Bond expenditure with the EU Taxonomy. Although the RRF Regulation, which fixes the parameters for eligible NGEU Green Bond expenditure, predated the delegated acts for the EU Taxonomy, the draft Taxonomy conditions were reflected in the RRF regulation to the extent feasible. The EU Taxonomy alignment of the pool of NGEU Green Bond eligible measures was first disclosed in the 2022 NGEU Green Bonds Allocation Report. This reporting was enhanced in the 2023 report, which included information of the EU Taxonomy alignment also for the allocated proceeds.

In assessing EU Taxonomy alignment, the Commission relies on information contained in the RRF regulation's annex VI on climate tracking intervention fields as well as the technical guidance on the application of the DNSH principle in order to compare the alignment of measures supported under the RRF Regulation with the EU Taxonomy Technical Screening Criteria (TSC)[23]. It also takes into account the Commission Delegated Regulation (EU) 2021/2139 covering climate change mitigation, climate change adaptation and the 'do no significant harm' principle[24].

> ## Box 4: Methodology for classification of EU Taxonomy alignment
>
> The EU Taxonomy alignment for the NGEU Green Bonds is based on the assessment at the level of intervention fields[25] of:
>
> **1)** alignment with the EU Taxonomy's Substantial Contribution Criteria (SCC) to the environmental objectives namely "climate change mitigation and, where relevant, climate change adaptation"; and
>
> **2)** alignment of the DNSH criteria.
>
> Both SCC and DNSH alignment were assessed independently of one another.
>
> For the SCC, alignment can be classified in one of the following categories: 'Fully aligned'; 'Substantially compliant' with the main substantive SCC conditions, but not to the same scale; 'Partially compliant with only some SCC conditions'; 'Not aligned' and 'Not covered' (see Annex V). In order to be considered 'Fully aligned' or 'Substantially aligned' with the main SCC condition, the inclusion of quantitative criteria must be present in both RRF and the EU Taxonomy, but in case of 'Substantial alignment', the degree of the variable covered by the criteria is not the same.
>
> To assess consistency with the DNSH requirements, the analysis is based on the standard DNSH

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[23] The relationship between intervention fields and the EU Taxonomy Technical Screening Criteria (TSC) under the Commission Delegated Regulation (EU) 2021/2139 are set out in the NGEU green bond framework and its annex.

[24] See Commission Delegated Regulation (EU) 2021/2139 of 4 June 2021 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to climate change mitigation or climate change adaptation and for determining whether that economic activity causes no significant harm to any of the other environmental objectives.

[25] The EU Taxonomy alignment assessment at the level of intervention fields is driven by the stable nature of these fields (fixed in the RRF regulation), relative to individual measures which are subject to amendments or revisions under Member States RRPs.

criteria stemming from Annexes 1-4 of the Commission technical guidance on the application of DNSH under RRF[26] along with the additional quantitative conditions present in Annex VI of the RRF Regulation.

The RRF conditions are compared to the EU Taxonomy DNSH conditions, consisting of both basic standard conditions for all activities and additional quantifiable conditions specific to individual EU Taxonomy activities.

Depending on the evidence, consistency between the conditions is assessed on the following scale: 'Fully aligned', 'Partially aligned' or 'Not covering specific DNSH EU Taxonomy conditions'.

In interpreting this assessment, it is noted that, while both the RRF DNSH criteria and the EU Taxonomy DNSH criteria aim to promote sustainability, they have different scopes, purposes, and areas of focus. The RRF criteria are applied to specific measures and reforms related to economic recovery and resilience, while the EU Taxonomy criteria classify entire economic activities based on their environmental and climate sustainability. These differences do not however retract from the sustainability benefits of the respective measures[27].

In addition, while in many cases, the 2,096 milestones or targets attached to the 1,058 measures in the NGEU Green Bond pool include conditions to reinforce compliance with DNSH, this could not be considered for the purpose of this analysis, as EU Taxonomy alignment is performed only up to the level on intervention fields (not of individual measures). These additional safeguards embedded in the milestones and targets, which are expected to lead to a much closer alignment between the EU Taxonomy Delegated act and the RRF, are hence not reflected in this analysis, rendering the presented estimates on the conservative side.

Since the 2023 report, the Commission has published two new Delegated acts amending the EU Taxonomy Regulation as of January 2024[28, 29]. The assessment presented in this report reflects these changes, which impacted 44 out of 64 Intervention fields, which have positive climate coefficient and that were analysed by the Commission for Taxonomy alignment. Most impacts relate to 19 intervention fields representing EUR 60.2 billion of the Green Bond Pool (out of EUR 264.6 billion). The largest intervention field among the 19 impacted was '*Smart Energy Systems'* (EUR 25.2 billion of the pool), with its Taxonomy alignment increasing due to the amendments introducing new activities related to equipment for electrical transmission, previously excluded from their scope.

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[26] Commission Notice C (2021) 1054: Technical guidance on the application of 'do no significant harm' under the Recovery and Resilience Facility Regulation.

[27] For example, one of the specific considerations of Taxonomy are also Minimum Safeguards of labour and human rights: The Commission does not individually confirm each individual RRF measure to be aligned with Minimum Safeguards, however as all EU financing has to comply with EU labour protection, equality and human rights enshrined in EU fundamental treaties, the Commission operates in confidence that RRF financing, same as all EU financing provides such considerations and protections. In case of violations, EU labour protection agencies, EU and local Ombudsman and national and EU courts intervene. Commission also maintains its right to exclude measures which have unreliable implementation from the NGEU Green Bond pool or in case of violations recover funds.

[28] Commission Delegated Regulation (EU) 2023/2485 of 27 June 2023 amending Delegated Regulation (EU) 2021/2139 establishing additional technical screening criteria for determining the conditions under which certain economic activities qualify as contributing substantially to climate change mitigation or climate change adaptation and for determining whether those activities cause no significant harm to any of the other environmental objectives.

[29] Commission Delegated Regulation (EU) 2023/2486 of 27 June 2023 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to the sustainable use and protection of water and marine resources, to the transition to a circular economy, to pollution prevention and control, or to the protection and restoration of biodiversity and ecosystems and for determining whether that economic activity causes no significant harm to any of the other environmental objectives and amending Commission Delegated Regulation (EU) 2021/2178 as regards specific public disclosures for those economic activities.

The other increases in the Taxonomy alignment come from intervention fields related to expenditure categories of *'Nature Protection, Rehabilitation and Biodiversity* and *Climate Change Adaptation'*. The total increase in alignment corresponds to EUR 38.7 billion. A reduction in the alignment (in total EUR 20.3 billion) originates from intervention fields with expenditure category of *'Water Supply & Waste Management'*, while the neutral change[30] originates mainly from one intervention field (in total EUR 1.2 billion) that corresponds to *'Clean Transport & Infrastructure'* expenditure category.

Taking into account these changes and based on the methodological considerations set out in Box 4, as of 1 August 2024, **63.4%, of the pool of eligible measures is assessed to be fully or substantially aligned with the EU Taxonomy** of both SCC and additional quantifiable DNSH criteria (compared to 57.5% in 2023). **Further 33.6% is partially aligned** and the remaining **3.0% is not covered or aligned** (e.g. spending categories such as *'green re-skilling'* or *'industrial sites rehabilitation'* where specific EU Taxonomy activities were not yet developed at the time of assessment[31]).

The increase in the share of the pool assessed to be fully or substantial aligned is also positively impacted from the revision of the national RRPs to include among other new REPowerEU chapters. These changes increased the pool of NGEU Green Bond eligible expenditure from EUR 190.6 billion to EUR 264.6 billion, with a significant part of the increases in intervention fields with higher levels of taxonomy alignment (such as *'Renewable energy: solar' (*increased in the pool by EUR 9.6 billion to EUR 19.0 billion in 2024 versus EUR 9.4 billion in 2023); *'Research and innovation processes, technology transfer and cooperation between enterprises focusing on the low carbon economy, resilience and adaptation to climate change' (*increased by EUR 9.0 billion to EUR 18.6 billion in 2024 versus EUR 9.6 billion in 2023) and *'Clean urban transport infrastructure' (*increased by EUR 7.1 billion to EUR 14.5 billion in 2024 versus EUR 7.4 billion in 2023).
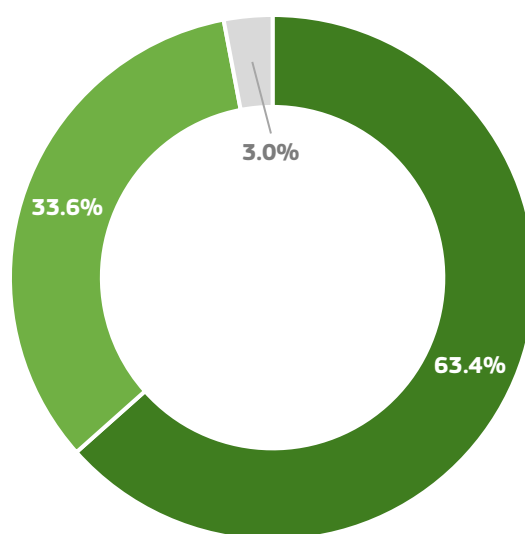
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[30] Neutral change indicates that one of the parameters (SCC or DNSH) increased in alignment while other decreased.

[31] The Commission adopted an Environmental Delegated Act under the Taxonomy Regulation on 27 June 2023 and submitted it to the co-legislators for scrutiny (see the proposal for the Commission Delegated Regulation (EU) 2023/2486 supplementing Regulation (EU) 2020/852 of the European Parliament and of the Council by establishing the technical screening criteria for determining the conditions under which an economic activity qualifies as contributing substantially to the sustainable use and protection of water and marine resources, to the transition to a circular economy, to pollution prevention and control, or to the protection and restoration of biodiversity and ecosystems and for determining whether that economic activity causes no significant harm to any of the other environmental objectives and amending Delegated Regulation (EU) 2021/2178 as regards specific public disclosures for those economic activities). The latest Commission Delegated Regulation (EU) 2023/2486 was adopted on 21 November 2023.

**Table 8: EU Taxonomy-alignment of pool of NGEU Green Bond eligible measure (table in EUR million and chart in %, as of 1 August 2024)[32]**

| | DNSH fully aligned | DNSH partially aligned | DNSH not covering specific EU taxonomy conditions |
|---|---|---|---|
| **Full SCC alignment** | 16 intervention fields<br><br>67,449.8 | 3 intervention fields<br><br>31,967.9 | 4 intervention fields<br><br>44,782.3 |
| **Substantial SCC alignment** | 3 intervention fields<br><br>24,533.6 | 8 intervention fields<br><br>43,863.9 | 1 intervention field<br><br>13,759.3 |
| **Partial SCC alignment** | 0 intervention fields<br><br>0.0 | 10 intervention fields<br><br>20,829.7 | 5 intervention fields<br><br>9,486.5 |
| **Not SCC aligned** | | | 4 intervention fields<br>**118.9** |
| **Not covered** | | | 4 intervention fields<br>**7,788.5** |



- Full & Substantial alignment  63.4%
- Parial alignment  33.6%
- Not covered or aligned  3.0%

For the EUR 44.0 billion of reported expenditure – allocated proceeds, the extent of full/substantial alignment is slightly lower compared to the total pool but stands at 53.5% (increasing compared to 2023: 45.6%), while partial alignment represents 44.0% and not covered/aligned with the substantial contribution criteria and DNSH principles of the EU Taxonomy is 2.5%.
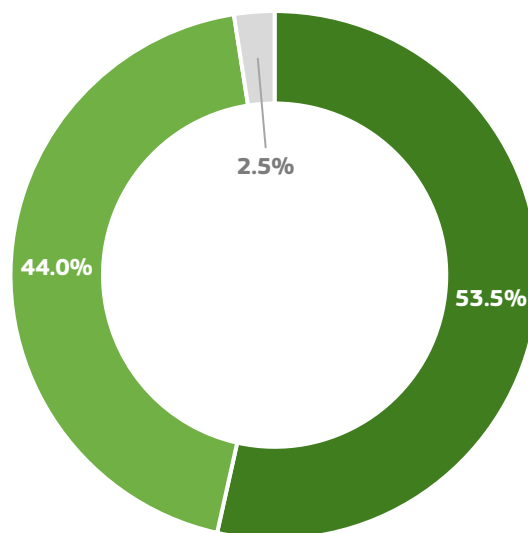
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[32] To avoid double counting of intervention field '*ADHOC*' pool (EUR 3,914.1 million), which is split under Taxonomy alignment assessment between measures in Hydrogen (EUR 231.3 million) and Zero emission vehicles (EUR 3,682.8 million), we count it (only number of IFs, not EUR amounts) under Fully SSC & Fully DNSH aligned due to its majority share under Zero emission vehicles.

The difference between the EU Taxonomy alignment of the total pool, relative to that of allocated proceeds is driven by the slower implementation speed of higher EU Taxonomy aligned measures (e.g. new capital-intensive infrastructure in transportation and energy generation).

**Table 9: EU Taxonomy-alignment of the allocated proceeds**
**(table in EUR million and chart in %, as of 1 August 2024)[33]**

| | DNSH fully aligned | DNSH partially aligned | DNSH not covering specific EU taxonomy conditions |
|---|---|---|---|
| **Full SCC alignment** | 15 intervention fields<br>13,990.5 | 3 intervention fields<br>4,237.2 | 4 intervention fields<br>16,032.6 |
| **Substantial SCC alignment** | 3 intervention fields<br>3,095.3 | 7 intervention fields<br>2,224.1 | 1 intervention field<br>341.8 |
| **Partial SCC alignment** | 0 intervention fields<br>0.0 | 9 intervention fields<br>2,425.7 | 5 intervention fields<br>583.3 |
| **Not SCC aligned** | | | 2 intervention fields<br>**28.2** |
| **Not covered** | | | 4 intervention fields<br>**1,059.0** |



- Full & Substantial alignment
- Parial alignment
- Not covered or aligned

(chart values: 53.5%, 44.0%, 2.5%)

Annex V includes further details on the EU Taxonomy alignment analysis underpinning these results and explaining the differences between different levels of alignment.

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[33] To avoid double counting of intervention field '*ADHOC*' allocated proceeds (EUR 1,101.5 million), which is split under Taxonomy alignment assessment between measures in Hydrogen (EUR 32.6 million) or Zero emission vehicles (EUR 1,068.9 million), we count it (only number of IFs, not EUR amounts) under Fully SSC & Fully DNSH aligned due to its majority share under Zero emission vehicles.

# Climate Impact of NGEU
# Green Bond proceeds

# 5. Climate Impact of NGEU Green Bond proceeds

Under the NGEU Green Bond Framework, the Commission has committed to providing investors and the wider public with transparent reporting on allocation of proceeds as well as on the impact of the expenditures financed by NGEU Green Bonds. In the 2023 Allocation and Impact Report, the Commission published the first quantification of these impacts, setting out the methodological foundations for such calculations (see Box 5).

This impact report presents an update of the estimated climate impact of NGEU Green Bonds, calculated in million tonnes of CO2e/year of emissions avoided, taking into account the revised pool of eligible investments and the revised milestones and targets from Member States. It also builds on the 2023 methodology with 12 new intervention fields added based on new analysis, bringing the total coverage of intervention fields to 31.

Given the still early stages of implementation of projects eligible for financing by NGEU Green Bonds, the report serves as a reference-point for the estimated potential climate impacts that can be achieved through NGEU Green Bond financing, following full implementation of the measures that can currently be quantified.

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**Box 5: Impact Reporting Methodology**

In order to approximate the climate impact from investments financed by NGEU Green Bonds, a three-pronged approach is followed building on the milestones and targets included in the national RRPs.

In a first step, all the milestones and targets are analysed in order to find metrics – referred to as output indicators - that can be used in assessing the implementation progress of certain measures. Examples of such output indicators are MW of solar panel capacity installed, km of railway upgraded or built, or number of dwellings renovated. While for some measures multiple output indicators could be viable, the final decision on the chosen output indicator is based on its usability in making the translation to climate impact. Milestones and targets and their respective target values are only counted for a single output indicator in order to avoid issues of double counting. Output indicators are assigned to the intervention field for which they apply. Table 10 below provides some examples of output indicators per intervention field.

In a second step, for each output indicator (and corresponding intervention field) a methodology for translating the output indicators into GHG emissions avoided is established[34]. These methodologies have been established with the support of Carbone 4, a specialised consultant in the field, and the establishment of such methodologies rely heavily on available academic literature. Once these two steps are completed, the theoretical basis for translating investments in specific measures to GHG emissions avoided is thus established.

In the final step, the actual completion of milestones and targets is tracked. Milestones and targets are only deemed as fulfilled and therefore taken into account for calculating the realised climate impact after the Commission has confirmed that the target has indeed been successfully reached.

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[34] While the Commission recognises that other impact indicators than GHG emissions avoided are available, this report focuses on GHG emissions avoided given its usability for investors in estimating the climate impact of their investments.

Partially achieved milestones or targets are not used for the purpose of impact calculations.

For completed milestones and targets that contain output indicators which are marked as relevant for impact reporting, as per step one, these output indicators are summed up and subsequently used as input in the developed impact estimation model as per the above step. This concludes the final step in calculating the impact from investments in NGEU Green Bonds.

While certain measures receive funding also from other sources than the RRF, for example national budgets, it is worth noting that the output indicators included in the milestones and targets used as input for calculating climate impact, only relate to funding from the RRF.

All expected impact numbers presented in this report relate to the annual amount of GHG emissions avoided resulting from implementation of investments by fulfilling indicated quantifiable milestones and targets scheduled up until end 2026 only. Nevertheless, emissions that are avoided through measures funded by the NGEU Green Bond proceeds will be maintained beyond the duration of the NGEU instrument, which is for the entire lifetime of these investments.

Annex VI provides a more detailed description of the process followed to calculate climate impact per relevant intervention field.

**Table 10: Examples of output indicators and impact indicators**

| Intervention field | Output indicator | Outcome unit | Impact indicator | Impact unit |
|---|---|---|---|---|
| **025bis** – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria | Square meter or amount of dwellings renovated | $m^2$ | GHG emissions avoided | XYZ ton of CO2e/year emissions avoided |
| **064** – Newly built or upgraded railways – TEN-T core network | Km of rail track built or upgraded | km | GHG emissions avoided | XYZ ton of CO2e/year emissions avoided |
| **030bis** – Renewable energy: biomass with high GHG savings | Additional operation capacity installed for renewable energy | MW | GHG emissions avoided | XYZ ton of CO2e/year emissions avoided |
| **029** – Renewable energy: solar | Additional operation capacity installed for solar energy | MW | GHG emissions avoided | XYZ ton of CO2e/year emissions avoided |
| **075** – Cycling infrastructure | Amount of cycling infrastructure installed | km | GHG emissions avoided | XYZ ton of CO2e/year emissions avoided |

## ESTIMATED EXPECTED IMPACT

Taking into account the increased pool of NGEU Green Bond eligible expenditure and building on the 2023 methodological approach for calculating impacts across different intervention fields, it is estimated that, **following full implementation of quantifiable milestones and targets, NGEU Green Bond eligible projects will reduce the EU's greenhouse gas emissions (GHG) by 54.7 million tonnes of CO2 per year.** This compares to 44.2 million tonnes of CO2e/year estimated in 2023, the increase being due to the significant increase in the climate-transition content of national RRF plans. This amount represents approximately 1.5% of the annual GHG emissions of the EU for the year 2022[35].

These estimates are based the analysis of 2,096 milestones and targets related to the NGEU Green Bond eligible pool, 510 of which contained quantifiable data that could be analysed in calculating climate impacts. These milestones and targets represent approximately 46% of the costs eligible for NGEU Green Bond financing[36], related to 39% of the number of NGEU Green Bond eligible measures and to 31 intervention fields[37].

The expenditure categories resulting in the largest amount of estimated GHG emissions avoided are *"Clean transport & infrastructure"*, primarily through investments in rail infrastructure and zero-emission vehicles & vessels, and "*Clean energy & network*", primarily through investments in wind and solar power. In addition, relative to 2023, GHG emissions avoided are now estimated also for the "*Nature protection, rehabilitation and biodiversity*" category, though the estimated impact is comparatively smaller due to the inclusion of only a limited number of measures under one intervention field in the analysis.

It is noted that the amounts of expected GHG emissions avoided per expenditure category do not necessarily correspond directly to the amount of costs eligible for NGEU Green Bond financing in the respective category and cannot be used as a basis to assess the effectiveness of spending in this regard. While some expenditure categories may result in higher amounts of emissions avoided per cost, differences are primarily due to the complexity of the investments under individual categories. In order to achieve climate neutrality by 2050, investments under all expenditure categories are necessary, however, regardless of their individual ratios of funds spent per tonne of emissions avoided.

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[35] Source: EUROSTAT
(https://ec.europa.eu/eurostat/databrowser/view/ENV_AC_AIGG_Q__custom_2691128/bookmark/table?lang=en&bookmarkId=4bb9ab20-296b-4119-88e9-580ea7741c0a)
The reference year of 2022 was chosen to represent an amount of GHG emissions that is not artificially lowered by the effects of the COVID-19 pandemic.
[36] The decline in the relative coverage of the impact analysis compared to last year (from 57% pool coverage in 2023 to 46% in 2024) is due to the extension of the impact coverage to new intervention fields with harder to convert measures, resulting in a lower share of these intervention fields being included, and due to changes to existing milestones and targets in the context of RRP revisions, resulting in some larger measures no longer being part of the impact analysis.
[37] Of the 31 intervention fields, 50% of the measures falling under them were included in the analysis, with the same limitations applying as for the amount of relative coverage of the NGEU green bond pool.

**Table 11: Estimated impact per expenditure category**

| Expenditure Category | GHG Emissions avoided (in tCO2e/year) – Total expected by 2026 |
|---|---|
| Research and innovation activities supporting the green transition | 4,851,793 |
| Energy efficiency | 6,022,942 |
| Clean energy and network | 21,774,354 |
| Water supply & waste management | 1,001,142 |
| Nature protection, rehabilitation and biodiversity | 657,885 |
| Clean transport & infrastructure | 20,438,961 |
| **Grand Total** | **54,747,076** |

## REALISED IMPACT

The nature of the RRF means that for measures financed by NGEU Green Bonds the associated milestones and targets can be achieved up until end 2026 by Member States, with project implementation on the ground possibly taking place also beyond that date. Unlike other sovereign issuers, NGEU Green Bonds issued by the EU do not refinance already implemented projects, but are rather forward looking financing measures that are being implemented or are planned to be implemented in the upcoming years.

As a result, much of the potential impact is likely to only be realised towards the end of the RRF programme, with the impact at the current initial phase being limited. The expected backloaded nature of impacts under the RRF programme is reflected in the structure of milestones and targets included in the calculations, for which the share of quantitative targets that can be used in the quantification of impacts increases towards the end of the programme in 2026.

This backloaded nature of milestones and targets and the fact that the RRF programme contains numerous investments with long lead times, means that in this early stage of implementation realised impacts are limited.

Considering the implementation of milestones and targets up until the cut-off date of 1 August 2024, the realised impact of the allocated NGEU Green Bond proceeds is calculated to be 1,481,276 tonnes of CO2e/year of emissions avoided (compared to 224,143 tonnes of CO2e/year in the 2023 edition of this report). This realised impact has been achieved primarily through energy efficiency renovations, rail infrastructure and zero-emission vehicles. This amounts to 2.7% of the total estimated reduction of GHG emissions from the expected climate impact of full implementation of quantifiable milestones and targets. The limited realised climate impact reflects the early stage in the implementation of the investment part of projects financed by the NGEU Green Bonds and is expected to increase progressively, in line with the increase in the relevant quantifiable milestones and targets.

A detailed list of intervention fields incorporated in the analysis as well as the output indicator and impact indicator results can be found below. Description of methodologies used to calculate the impact indicator results of CO2e/year of emissions avoided for each intervention field and output indicator can be found in the methodological annex (Annex VI).

**Table 12: Realised impact per expenditure category**

| Expenditure Category | GHG Emissions avoided (in tCO2e/year) – realised impact |
|---|---:|
| Research and innovation activities supporting the green transition | |
| Energy efficiency | 822,783 |
| Clean energy and network | |
| Water supply & waste management | 113 |
| Nature protection, rehabilitation and biodiversity | |
| Clean transport & infrastructure | 658,379 |
| **Grand Total** | **1,481,276** |

**Table 13: Climate impact per intervention field (expected and realised)**

| INTERVENTION FIELD | OUTPUT | | | | IMPACT GHG Emissions avoided (in tCO2e/year) | |
|---|---|---|---|---|---|---|
| | Indicator | Current result | Total 2026 | Unit | Current result | Total 2026 |
| **022** – Research and innovation processes, technology transfer and cooperation between enterprises focusing on the low carbon economy, resilience and adaptation to climate change | Electrolyser capacity – Hydrogen production | 0 | 2 000 | MW | 0 | 3 754 286 |
| | Number of zero emission vehicles | 0 | 83 768 | Number | 0 | 85 152 |
| | Square Meters renovated (non-residential) | 0 | 4 000 | m2 | 0 | 75 |
| | CO2 savings | | | | 0 | 1 012 280 |
| **024** – Energy efficiency and demonstration projects in SMEs | Inhabitants equipped with smart water meter | 0 | 372 200 | Number | 0 | 170 |
| | CO2 savings | | | | 0 | 133 333 |
| **024ter** – Energy efficiency and demonstration projects in large enterprises | Square Meters renovated (non-residential) | 0 | 1 519 298 | m2 | 0 | 22 209 |
| | Electric vehicles | 0 | 20 000 | Number | 0 | 32 197 |
| | Installed Capacity of Solar Panels | 0 | 30 | MWp | 0 | 17 206 |
| | Energy savings in industry | 0 | 16 | PJ | 0 | 619 039 |
| | CO2 savings | | | | 0 | 2 029 424 |
| **025bis** – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria | Square Meters renovated (residential and non-residential) | 86 342 000 | 286 451 253 | m2 | 648 362 | 2 215 394 |
| **025ter** – Construction of new energy efficient buildings | Square Meters renovated (residential and non-residential) | 0 | 1 140 668 | m2 | 0 | 9 035 |
| | Square Meters constructed (residential and non-residential) | 2 880 | 9 714 474 | m2 | 7 | 30 042 |
| **026** – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | Square Meters renovated (non-residential) | 0 | 4 268 667 | m2 | 0 | 38 680 |
| | Square Meters constructed (non-residential) | 0 | 389 000 | m2 | 0 | 1 767 |
| **026bis** – Energy efficiency renovation or energy efficiency | Square Meters renovated (non-residential) | 20 720 757 | 47 324 958 | m2 | 174 415 | 575 553 |

| INTERVENTION FIELD | OUTPUT | | | | IMPACT GHG Emissions avoided (in tCO2e/year) | |
|---|---|---|---|---|---|---|
| measures regarding public infrastructure, demonstration projects and supporting measures compliant with energy efficiency criteria | Square Meters constructed (non-residential) | 0 | 30 051 982 | m2 | 0 | 157 524 |
| | Additional MWh saved per year | 0 | 354 760 | MWh | 0 | 141 371 |
| **028** – Renewable energy: wind | Installed Capacity of Wind Farms | 0 | 3 141 | MW | 0 | 3 311 115 |
| **029** – Renewable energy: solar | Installed Capacity of Solar Panels | 0 | 38 821 | MW | 0 | 10 084 963 |
| **030bis** – Renewable energy: biomass with high GHG savings | Production of bioethanol equivalent | 0 | 3 127 249 | tons | 0 | 2 082 421 |
| | Production capacity of hydrogen | 0 | 560 000 | m3 | 0 | 476 596 |
| **032** – Other renewable energy (including geothermal energy) | Installed Capacity of Solar Panels | 0 | 488 | MWp | 0 | 562 748 |
| | Number of smart electricity meters | 0 | 130 000 | Number | 0 | 6 540 |
| | Installed Capacity of Wind Farms | 0 | 475 | MWp | 0 | 508 943 |
| | Installed Capacity of renewable energy | 0 | 1 455 | MWp | 0 | 1 579 153 |
| | Installed Capacity of Hydropower plants | 0 | 10 | MWp | 0 | 5 859 |
| | Installed Capacity of geothermal electricity plants | 0 | 27 | MWp | 0 | 68 132 |
| | Installed Capacity of geothermal heat plants | 0 | 40 | MWp | 0 | 82 834 |
| | Electrolyser capacity – Hydrogen production | 0 | 447 | MW | 0 | 559 389 |
| | Reduction of electricity consumption | 0 | 3 832 | MWh | 0 | 962 |
| | Avoided energy consumption through building renovation | 0 | 15 430 | TJ/yr | 0 | 1 140 927 |
| | CO2 savings | | | | 0 | 569 000 |
| **033** – Smart Energy Systems (including smart grids and ICT systems) and related storage. | Number of smart electricity meters | 0 | 1 570 634 | Number | 0 | 105 717 |
| | Electrolyser capacity – Hydrogen production | 0 | 75 | MW | 0 | 93 857 |
| | Installed Capacity of Wind Farms | 0 | 7 | MW | 0 | 7 470 |
| | Installed Capacity of Solar Panels | 0 | 200 | MW | 0 | 115 580 |

| INTERVENTION FIELD | OUTPUT | | | | IMPACT GHG Emissions avoided (in tCO2e/year) | |
|---|---|---|---|---|---|---|
| | Installed Capacity of renewable energy | 0 | 1 503 | MW | 0 | 392 288 |
| | Zero-emission buses | 0 | 10 | Number | 0 | 542 |
| | Zero-emission bus charging points | 0 | 1 030 | Number | 0 | 1 181 |
| **034bis0** – High efficiency co-generation, efficient district heating and cooling with low lifecycle emissions | Energy savings resulting from the modernisation of heat distribution | 0 | 68 139 | MWh/Yr | 0 | 18 138 |
| **039bis** – Provision of water for human consumption (extraction, treatment, storage and distribution infrastructure, efficiency measures, drinking water supply) compliant with efficiency criteria | Inhabitants equipped with smart water meter | 0 | 45 000 | Number | 0 | 23 |
| | Length of drinking water network projects | 743 | 4 199 | km | 113 | 390 |
| **041bis** – Waste water collection and treatment compliant with energy efficiency criteria | Urban waste water treatment plants | 0 | 40 | Number | 0 | 7 848 |
| **042** – Household waste management: prevention, minimisation, sorting, reuse, recycling measures | Number of sorting facilities – Plastic waste | 0 | 3 | Number | 0 | 992 881 |
| | Number of sorting facilities – Municipal waste | 0 | 38 | Number | | |
| **050** – Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure | Electric recharging points for electric vessels at the sea and quay | 0 | 10 | Number | 0 | 657 885 |
| **064** – Newly built or upgraded railways – TEN-T core network | Length of railway | 0 | 4 510 | km | 0 | 238 525 |
| **065** – Newly built or upgraded railways – TEN-T comprehensive network | Length of railway | 0 | 1 254 | km | 0 | 99 476 |
| **066bis** – Other newly or upgraded built railways – electric/zero emission | Length of railway | 0 | 104 | km | 0 | 25 251 |
| **067** – Reconstructed or modernised railways – TEN-T core network | Length of railway | 0 | 145 | km | 0 | 48 412 |
| **068** – Reconstructed or modernised railways – TEN-T comprehensive network | Length of railway | 1 698 | 3 698 | km | 326 101 | 705 738 |
| **069bis** – Other reconstructed or modernised railways – electric/zero emission | Length of railway | 0 | 1 076 | km | 0 | 101 480 |
| **070** – Digitalisation of transport: rail | Length of railway | 0 | 305 | km | 0 | 26 536 |
| | Bicycle parking spaces constructed | 0 | 1 500 | Number | 0 | 36 676 |
| **071** – European Rail Traffic Management System (ERTMS) | Number of trains/locomotives | 0 | 153 | Number | 0 | 364 |
| | Length of railway | 0 | 2 815 | km | 0 | 367 126 |

| INTERVENTION FIELD | OUTPUT | | | | IMPACT GHG Emissions avoided (in tCO2e/year) | |
|---|---|---|---|---|---|---|
| **072bis** - Mobile zero emission/electric powered rail assets | Number of trains/locomotives | 0 | 885 | Number | 0 | 1 855 |
| **073** - Clean urban transport infrastructure | Length of constructed tram or metroway | 0.13 | 898 | km | 326 | 2 140 069 |
| | Zero-emission vehicles | 0 | 119 000 | Number | 0 | 176 501 |
| | Zero-emission buses | 0 | 3 000 | Number | 0 | 127 311 |
| | Zero-emission car charging points (public and private) | 0 | 121 044 | Number | 0 | 692 178 |
| | Zero-emission bus charging points | 0 | 450 | Number | 0 | 548 |
| **074** - Clean urban transport rolling stock | Zero-emission buses | 0 | 18 373 | Number | 0 | 988 482 |
| | Electric vessels | 0 | 302 | | 0 | 1 986 813 |
| | Zero-emission bus charging points | 0 | 1 007 | Number | 0 | 1 347 |
| **075** - Cycling infrastructure | Cycle path constructed | 49 | 6 120 | km | 2 186 | 418 361 |
| | Bicycle parking spaces constructed | 0 | 10 000 | Number | | |
| **077** - Alternative fuels infrastructure | Zero-emission car charging points (public and private) | 1 500 | 912 015 | Number | 9 922 | 10 660 292 |
| | Zero-emission bus charging points | 0 | 581 | Number | 0 | 4 828 |
| | Zero-emission vehicles | 0 | 15 250 | Number | 0 | 24 774 |
| | Production of bioethanol equivalent | 0 | 6 800 | tons | 0 | 4 528 |
| | Biogas refuelling stations (compressed) | 0 | 34 | Number | 0 | 186 524 |
| | CO2 savings through hydrogen refuelling stations | | | | 0 | 48 955 |
| **ADHOC** - Ad hoc intervention field [zero-emission vehicles] | Zero-emission vehicles | 240 000 | 993 131 | Number | 319 845 | 1 325 012 |
| | Zero-emission car charging points (public and private) | 0 | 200 | Number | 0 | 997 |
| **TOTAL** | | | | | **1 481 276** | **54 747 076** |

## METHODOLOGICAL CONSTRAINTS

While the Commission strives to provide a large overview of NGEU Green Bond's achievements in terms of climate impact, the analysis presented in this report is subject to a number of methodological constraints.

To start, the impact reporting methodology is based on establishing reasonable output indicators per intervention field as the first step and assessing the climate impact of the respective intervention field as the next step. For the current report, this climate impact is defined primarily in terms of climate change mitigation through the use of the impact indicator of GHG emissions avoided. While all measures financed by NGEU Green Bonds contribute to furthering the EU's climate ambitions, only these measures where the translation into the desired impact indicator (GHG emissions avoided) was possible have been included in the impact reporting. Primarily, this concerns measures where an effect of GHG emissions avoided could reasonably be expected (such as clean energy or renovation actions). Further efforts were made to also include intervention fields where such a specific impact metric was less readily evident (e.g., Water management and water resource conservation, Nature conservation). However, due to the less direct nature of measures under these intervention fields to the amount of GHG emissions avoided, only a select number of measures could be factored in for these intervention fields, though their contribution to the green transition remains undisputed. Similarly, some intervention fields (e.g. Adaptation to climate change measures and management of climate related risks), remained outside the scope of this analysis given methodological constraints in converting these actions to GHG emissions avoided. Nevertheless, the analysis attempts to cover all major intervention fields, even if not all measures under these intervention fields could be included in the impact calculations.

In addition, this type of analysis necessitates translation of measures' quantitative targets into output indicators. By nature, only those targets that provide reasonable quantitative information can be taken into account. As not all measures have quantifiable milestones or targets that can be incorporated in the calculation of the output indicators, not all measures can be factored into the calculation of the output metrics per intervention field. Where only qualitative information was available, the available data was not suitable for aggregation or there was no methodology available to translate the output indicator into an impact indicator, milestones or targets were not taken into account. For example, while most measures under intervention field *"Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria* dealing with renovations" will have provided targets indicating the square meters or number of dwellings/buildings to be renovated, some measures only provided the number of actions. Since this did not allow for a reasonable conversion towards m$^2$ or number of dwellings, these measures could not be included in the analysis.

It should be noted that most measures contain more qualitative milestones than quantitative targets, as milestones often refer to the necessary prerequisites to start implementation. For example, while milestones may refer to necessary legislation being passed, the quantitative target may then refer to the actual implementation at a later stage.

The Commission has sought to cover as much eligible expenditure and allocated proceeds as possible in this impact reporting cycle. Methodological constraints meant that the analysis is based to a large degree on intervention fields in terms of their importance to the NGEU Green Bond pool and for which calculations of outputs and impacts were deemed feasible, with intervention fields that do not have such a direct link having less of their green bond eligible expenditure covered in the impact analysis.

In addition, changes made to milestones and targets in the context of the revision of national recovery and resilience plans also affected the inclusion of measures, as did the additional milestones and targets added in the new REPowerEU chapters. Some milestones and targets also changed compared to 2023, to a degree that did not allow their further inclusion in the impact analysis while some others did not correspond to a metric that would allow for their inclusion in the analysis.

Due to the above-mentioned limitations, while the NGEU Green Bond pool comprises 2,096 milestones and targets, only 510 of these provide quantitative data that could be incorporated in the analysis of outputs and impacts presented in this report. Despite this limited absolute number, these quantifiable milestones and targets represent around 46% of the total NGEU Green Bond eligible expenditures. The remaining measures, while relevant in terms of climate impact, could not be quantified at the time of this report, though the Commission will continue to strive to include more investments in future reports where possible.

The Commission will continue to provide updates of the realised climate impacts from projects financed by NGEU Green Bonds until full allocation of NGEU Green Bond proceeds has been completed.

# Case studies of investments financed by NGEU Green Bonds

# 6. Case studies of investments financed by NGEU Green Bonds

Case studies help exemplify the transformative power of investments financed by NGEU Green Bonds. The examples presented below correspond only to a small sample of projects that are being financed with the help of the NGEU Green Bonds across Member States and that highlight the breadth of impact from large infrastructure projects to biodiversity protection, ecosystem restoration, water conservation and waste management [38].

## LITHUANIA: SUSTAINABLE ELECTRICITY PRODUCTION

Installation of other electricity storage infrastructure



| Reference | LT-C[C2]-R[B-1-1-.B-1-1-3-] |
|---|---|
| Intervention field | 033 - Smart Energy Systems (including smart grids and ICT systems) and related storage. |
| GB eligible amount | 100,000,000 EUR |
| GB reported expenditure | 60,000,000 EUR |

Source: EC RRF Map of Projects [39]

The electricity storage project, which forms part of a package of measures aimed at supporting Lithuania's electricity network, will expand the country's electricity storage capacity by 200 MWh (4 centres of 50 MWh each) with additional 15.2 MWh in individual electricity storage for self-consumption.

The project will guarantee security and stability of energy supply in Lithuania. It will also enable Lithuania to disconnect from the Russian controlled electricity grid and synchronise with the continental European electricity grid. In case of accidents, batteries will provide instantaneous electricity reserve service in less than one second. In the future, batteries will help to integrate renewable energy sources. Due to methodological constraints the $CO_2$ emission avoidance impact of this project is not included in the estimates presented in this report.

The construction of the project, which will receive up to EUR 100 million of funding from the Recovery and Resilience Facility, has already finished and is currently in test phase.

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[38] Further examples of reforms and investments financed by the RRF including in the area of green transition can be found in the Commission project database here: Recovery and Resilience Facility - European Union (europa.eu)

[39] https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en#map

# ITALY: HIGH SPEED RAILWAY

High-speed lines in the North connecting to the rest of Europe (Brescia-Verona-Padova)


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| Reference | IT-C[M3C1]-I[I1.2.a] |
|---|---|
| Intervention field | 064 - Newly built or upgraded railways - TEN-T core network |
| GB eligible amount | 4,470,000,000 EUR |
| GB reported expenditure | 1,953,440,000 EUR |

EUR 8.7 billion of Italy's RRP is being spent on new and newly reconstructed high speed rail lines in the North of Italy. The high-speed rail lines are of larger strategic importance at national and European level, and part of the Mediterranean Trans European Transportation (TEN-T) Core Corridor, connecting Spain through France to northern Italy and Slovenia.

This measure represents EUR 4.5 billion of eligible expenditure that finances 165 km of new and upgraded high speed rail tracks between Milan and Venice, both for passenger and freight rail transport. While track construction started in 2018 its completions faced challenges due to the COVID pandemic. Thanks to the support provided under the NGEU financing, project delivery is progressing with the section from Brescia to Verona to be activated by February 2026 and to Padova by June 2026. The project is calculated to result in avoiding 21,588 tons of $CO_2e$ emissions annually.

Out of EUR 4.5 billion eligible amount, EUR 2.0 billion has been already paid out by the Commission to Italy, with the next payment request already under review.

## CZECHIA: REFORESTATION AND FOREST PROTECTION

Building forests resilient to climate change



| Reference | CZ–C[C2.6]–I[I4] |
|---|---|
| Intervention field | 037 – Adaptation to climate change measures and prevention and management of climate related risks: others, e.g. storms and drought[40] |
| GB eligible amount | 335,401,775 EUR |
| GB reported expenditure | 213,839,709 EUR |

Source: European Commission
EU funds supported planting over 1 million trees in Vysočina region (west of Brno) to protect against bark beetle, since 2021.

The total amount of financing towards this measure amounts to up to EUR 335.4 million (CZK 228.4 billion). Out of this, EUR 213.8 million have already been paid out. The NGEU Green Bond funds are being used for restoring and expanding the forest cover in Czechia by 36,000 ha with ameliorative and stabilising tree species. This ensures stability of local biodiversity through the tree species more resilient to the climate change. The measure addresses directly the impact in Czechia by the spread of Bark beetle, which particularly effected monoculture types of forests.

The first 12,000 ha of forests have already successfully been restored by the end Q3 2022, while the next 24,000 ha are on track to be restored by the end of Q3 2024, with related payment requests under review. Due to methodological constraints the CO2 emission avoidance impact of this project is not included in the estimates presented in this report.

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[40] Full name of IF: 037 – Adaptation to climate change measures and prevention and management of climate related risks: others, e.g. storms and drought (including awareness raising, civil protection and disaster management systems, infrastructures and ecosystem based approaches)

## FRANCE: SOCIAL HOUSING REHABILITATION

Energy renovation and major rehabilitation of social housing



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| Reference | FR-C[C1]-I[I2] |
|---|---|
| Intervention field | 025bis - Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria[41] |
| GB eligible amount | 500,000,000 EUR |
| GB reported expenditure | 500,000,000 EUR |

Housing & dwelling's renovation is one of largest areas of financing under the NGEU Green Bond pool, with EUR 30.9 billion of eligible financing under the intervention field '*025bis - Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria*'.

The French measure C1.I2 is one of most advanced in this segment, having been already concluded and assessed in full. Under the measure, EUR 500.0 million has been provided for the renovation of 40,000 social housing dwellings, spread over 96 French departments (including 3,323 renovated dwellings in the city of Lille, 2,685 in Seine-Saint-Denis in the North-East of Paris, and 1,764 in Seine-et-Marne towards the East of Paris). The renovation of 40,000 social housing dwellings resulted in avoiding 21,344 tons of $CO_2e$ emissions annually.

The measure was fully implemented by the end of 2022.

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[41] Full name of IF: 025bis - Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria (including river basin management, specific climate change adaptation measures, reuse, leakage reduction)

## SPAIN: PRESERVATION OF AQUIFERS AND BIODIVERSITY PROTECTION

Monitoring and restoration actions in river ecosystems



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| Reference | ES-C[C5]-I[I2.a] |
|---|---|
| Intervention field | 040 - Water management and water resource conservation |
| GB eligible amount | 225,000,000 EUR |
| GB reported expenditure | 83,050,000 EUR |

The set of 4 sub-measures that correspond to a parent measure ES-C[C5]-I[I2] (worth EUR 1.1 billion of Green Bond eligible expenditure) are contributing to a comprehensive water management and biodiversity protection, with climate change adaptation and prevention in Spain. The sub-measure presented here (ES-C[C5]-I[I2.a]) funds monitoring and river ecosystem protection (EUR 225.0 million eligible amount, EUR 83.1 million paid).

The other sub-measures are financing flood protection measures (EUR 225.0 million eligible amount, EUR 9.9 million paid), reduction of extraction of groundwater, from the four aquafer of Doñana, Segura-Mar Menor, Mancha Oriental and Rules, from 510 hm3/year to 470 hm3/year (EUR 350.0 million eligible amount, EUR 4.1 million paid) as well as monitoring and restoration of the related ecosystem (EUR 285.0 million eligible amount, no pay-outs).

By the end of 2022, Spain has restored 200 km of riverbanks, protecting 40,000 inhabitants from floods, while it is on track to reduce annual water extraction from the four aquifers by mid-2025. The project also has cross-sectional impacts resulting from the protection of local biodiversity and reduction of water consumption in water deprived regions. Due to methodological constraints the $CO_2$ emission avoidance impact of this project is not included in the estimates presented in this report.

## GREECE: FOREST FIRES PREVENTION AND REFORESTATION

National Reforestation Plan, restoration and prevention ("Antinero"),
anti-erosion and flood protection measures


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| Reference | EL-C[1,4]-I[16849.a] |
|---|---|
| Intervention field | 036 - Adaptation to climate change measures and prevention and management of climate related risks: fires[42] |
| GB eligible amount | 408,306,816 EUR |
| GB reported expenditure | 240,020,000 EUR |

The Greek "Antinero" measure finances forest recovery and fire prevention through the three sub-measures which are included in the NGEU Green Bond Pool: (i) reforestation and upgrading four forest nurseries; (ii) fire prevention by improving access for firefighters and pre-emptive shrubs clearance; and (iii) pruning and measures to prevent erosion and flood protections. In this section we present EL-C[1,4]-I[16849.a], sub-measure (i), that finances the four forest nurseries (Ambrosias, Lagada, Organis and Aliartos), with EUR 408.3 million of Green Bond eligible expenditure and EUR 240.0 million paid out expenditure.

Measures related to the re-forestation will restore 5,700 ha of degraded forests by the end of the 2025. In parallel, measures related to the upgrade of 68,000 ha of degraded forests are expected to be completed by the end of 2025. Due to methodological constraints, the CO2 emission avoidance impact of this project is not included in the estimates presented in this report.

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[42] Full IF name: 036 - Adaptation to climate change measures and prevention and management of climate related risks: fires (including awareness raising, civil protection and disaster management systems, infrastructures and ecosystem based approaches)

## BELGIUM: RECYCLING OF COMMERCIAL AND INDUSTRIAL WASTE

Recycling hub



| Reference | BE-C[C53]-I[I-514] |
|---|---|
| intervention field | 044 - Commercial, industrial waste management: prevention, minimisation, sorting, reuse, recycling measures |
| GB eligible amount | 30,000,000 EUR |
| GB reported expenditure | 0 EUR |

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Belgium is financing six new recycling facilities (with Green Bond eligible expenditure amounting to EUR 30.0 million) in Flanders, which focus on enabling the local circular production, such as the recycling of nappies, mattresses, and textiles. Investments are also sought in the plastic and chemical sectors. The new and adapted facilities are to be compliant with DNSH criteria, in line with all other projects to be financed through RRF. The six facilities will result in avoiding 94,560 tons of CO2e emissions annually.

By the end of 2022, Belgium successfully awarded six public contracts for establishment of the new facilities (newly built, adapted or enlarged). At the time of writing this Report Commission is assessing the first reported results under this measure. The overall measure is due to be completed by June 2026.

# Limited Assurance
# Report

# 7. Limited Assurance Report

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**Independent Auditor's Assurance Report on selected information of the European Union (EU)**

**The Directorate General for Budget of the European Commission (DG Budget)**

In accordance with our agreed terms of engagement dated 25 July 2022 and 27 July 2023, we have completed our limited assurance engagement to report on the preparation of the selected information for the NextGenerationEU (NGEU) green bonds (ISIN: EU000A3K4C42, EU000A3K4DG1, EU000A3K4DM9, EU000A3K4DW8 and EU00043K4EU0 of the EU prepared by the DG Budget (Selected Information) and contained in Annex III: "Allocation of NGEU Green Bond proceeds by Member State, category and intervention field" and Table 12: "Realised impact per expenditure category" under section 5 "Climate Impact of NGEU Green Bond proceeds" in the EU's NGEU Green Bonds Allocation and Impact Report. The applicable criteria on the basis of which the DG Budget has prepared the Selected Information are described in Annex I: "Evaluation and selection of eligible NGEU Green Bond measures" and Annex VI: "Impact methodologies per Intervention Fields" in the NGEU Green Bonds Allocation and Impact Report (Basis of Preparation).

*Responsibility of the DG Budget for the Selected Information*

The DG Budget is responsible for the preparation of the Selected Information on the basis of the applicable criteria described in the Basis of Preparation.

*Our independence and quality management*

We have complied with the independence and other ethical requirements of the Code of Ethics for Professional Accountants issued by the International Ethics Standards Board for Accountants (IESBA) and as adopted for Luxembourg by the *Commission de Surveillance du Secteur Financier* (CSSF), which is founded on fundamental principles of integrity, objectivity, professional competence and due care, confidentiality and professional behavior.

Our firm applies International Standard on Quality Management 1, as adopted for Luxembourg by the CSSF, which requires the firm to design, implement and operate a system of quality management including policies or procedures regarding compliance with ethical requirements, professional standards and applicable legal and regulatory requirements.

*Inherent limitations*

The absence of a significant body of established practice on which to draw to evaluate and measure non-financial information allows for different, but acceptable, measures and measurement techniques and can affect comparability between entities.

*Responsibilities of the Réviseur d'entreprises agréé*

Our responsibility is to express a limited assurance conclusion on the Selected Information based on the procedures we have performed and the evidence we have obtained. We conducted our limited assurance engagement in accordance with International Standard on Assurance Engagements 3000 (Revised) 'Assurance Engagements other than Audits or Reviews of Historical Financial Information', as issued by the International Auditing and Assurance Standards Board (IAASB) and as adopted for Luxembourg by the Institut des Réviseurs d'Entreprises (IRE) and in accordance with the Luxembourg legislation and with the professional standards issued by the IRE.

This standard requires that we plan to perform our work to obtain limited assurance as to whether the Selected Information were prepared by the DG Budget, in all material respects, in accordance with the Basis of Preparation.

The procedures performed in a limited assurance engagement vary in nature and timing from, and are less in extent than for, a reasonable assurance engagement. Consequently, the level of assurance obtained in a limited assurance engagement is substantially lower than the assurance that would have been obtained had a reasonable assurance engagement been performed.

The selection of such procedures depends on our professional judgment, including the assessment of the risks of management's assertion being materially misstated. The scope of our work comprised, among others, of the following procedures:

- assessing and testing the design and functioning of the systems and processes used for data-gathering, collection, consolidation and validation, including the methods used for calculating and estimating the information and data presented in the Selected Information;

- conducting interviews with responsible officers; and

- inspecting internal and external documentation.

We have evaluated the Selected Information against the Basis of Preparation. The accuracy and completeness of the Selected Information are subject to limitations given their nature and the methods for determining, calculating, or estimating such information.

We believe that the evidence we have obtained is sufficient and appropriate to provide a basis for our conclusion.

*Limited assurance conclusion*

Based on the procedures we have performed and the evidence we have obtained, nothing has come to our attention that causes us to believe that the Selected Information has not been prepared, in all material respects, in accordance with the Basis of Preparation.

*Restriction of use and distribution of the report*

This report, including the opinion, has been prepared for and only for the DG Budget in accordance with the terms of our engagement letters and is not suitable for any other purpose. We do not accept any responsibility to any other party to whom it may be distributed.

PricewaterhouseCoopers, Société coopérative                    Luxembourg, 13 November 2024

Represented by

Electronically signed by:
Malik Lekehal

*Lekehal*

Malik Lekehal
Réviseur d'Entreprises Agréé

# Annexes

**COMMISSION STAFF WORKING DOCUMENT**

**NGEU Green Bonds Allocation and Impact report 2024**

**EN**

# 8.  Annexes

## Annex I: Evaluation and selection of eligible NGEU Green Bond measures

The Commission has put in place a robust multi-level framework of control and assessment procedures to determine whether individual measures will receive financing from NGEU Green Bonds. These processes and associated results for 2024 are described here.

### RECOVERY AND RESILIENCE PLAN ASSESSMENT

All Member States submit RRPs to the Commission, listing planned investments under the RRF and their expected cost. Of these investments, at least 37% of the value of the RRP must be invested into measures combating climate change or adapting to it, with many Member States striving to do even more.

All the national RRPs are assessed for compliance with the eligibility and assessment criteria under the RRF Regulation. The criteria of particular relevance from a NGEU Green Bond perspective are: a) whether the measure is correctly assigned to the notified intervention field, which in turn determines the corresponding climate coefficient of 40% and 100%; b) whether the measures comply with the 'DNSH' principle as defined in Article 17 of the EU Taxonomy Regulation[1] and specific RRF-related guidance[2]; and c) whether the measures are consistent with National Energy and Climate Plans. The assessment also ensures that appropriate milestones and targets are agreed, allowing the Commission to track the implementation of the measures in a meaningful and rigorous way.

Following a positive assessment by the Commission, the RRPs are adopted by the Council through a Council Implementing Decision, which sets out the reforms and investments to be implemented, the milestones and targets to be reached, and the amount of funding to be released if specific sets of milestones/targets are met.

### SECOND 'DUE DILIGENCE' SCREENING OF NGEU ELIGIBLE EXPENDITURES

Following the adoption of the RRPs by the Council, all climate-relevant measures in the RRPs are subject to an additional due diligence exercise by Commission services prior to being admitted to the NGEU Green Bond eligibility pool of measures that will receive financing from NGEU Green Bonds. The due diligence exercise aims to ensure that individual projects financed by NGEU Green Bonds are in line with the strict standards and the prudent approach that investors expect with respect to their climate relevance and impact. It is important to stress that the criteria for inclusion in the NGEU Green Bond eligibility pool come on top of the criteria applied to determine whether measures contribute to climate objectives. This means that inclusion of a measure in the NGEU Green Bond eligibility pool has no impact on the attribution of climate intervention fields in the context of the RRF Regulation.

**Figure 1: The due diligence process**

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[1] EU taxonomy for sustainable activities (europa.eu)

[2] Commission Notice Technical guidance on the application of 'do no significant harm' under the Recovery and Resilience Facility Regulation 2021/C 58/01.

For measures to be admitted to the final NGEU Green Bond pool of eligible expenditures, a multi-step due diligence process has been developed. In the first step, based on the structured information in national RRPs, every single measure as well as every intervention field is given a risk score on the basis of pre-defined risk factors. This scoring is based on nine risk factors at the level of the assigned intervention fields and ten risk factors at the level of individual measures. For example, if there is a chance that a measure might have a link with natural gas (which is excluded from financing from NGEU Green Bonds), the measure receives a high risk score. Based on this scoring, measures are divided in three groups:

1) measures that are well defined in terms of the precise investment they entail and where the probability is very high that the original assessment for the purpose of approving the RRP can be relied on also for NGEU Green Bond eligibility; those measures are considered eligible,

2) measures that require additional in-depth review (because the risk score for either the intervention field or the individual measure was too high or both) and

3) measures for which the initial risk was considered too high and who were directly considered ineligible.

In the second step, a thorough in-depth analysis is conducted on all the measured that require an additional check. From an initial pool of 1,391 measures, 1,058 measures corresponding to almost EUR 264.6 billion have been included in the final pool of measures eligible for financing from NGEU Green Bonds, resulting in a NGEU Green Bond pool that allows for a high level of investor confidence.

**Figure 2: Summary of the results of the due diligence process**
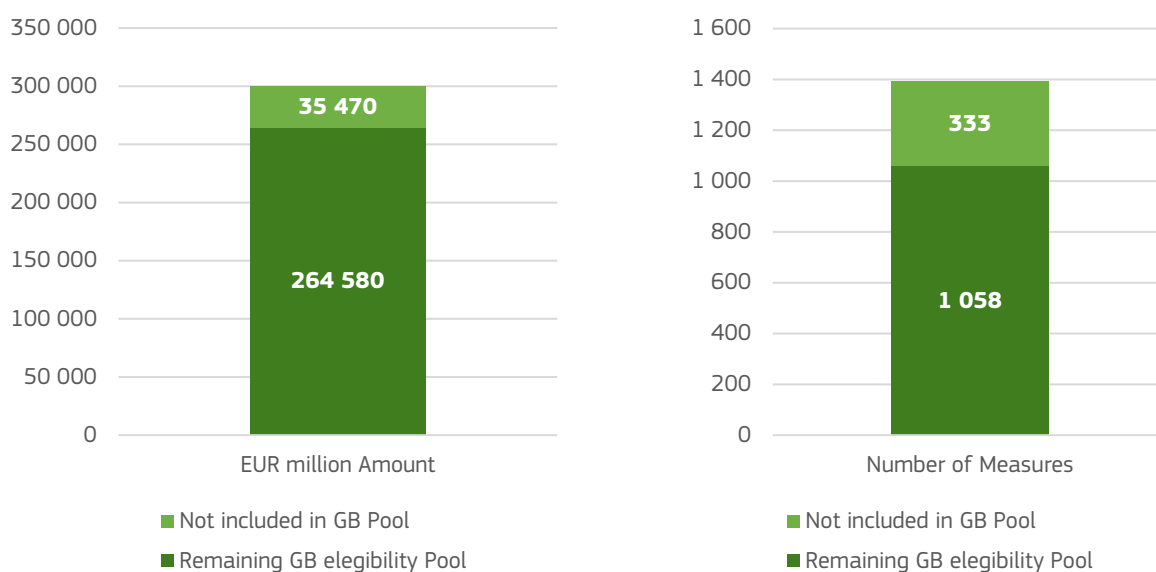
# Annex II: The pool of eligible expenditures per intervention field

**Table 1: NGEU Green Bonds Eligible Amount (as of 1 August 2024)**

| | Max of NGEU green bond Eligibility Coefficient | Number of NGEU green bonds Eligible Measures | Sum of NGEU green bonds Eligible Amount, in EUR |
|---|---|---|---|
| **Clean energy and network** | **100%** | **188** | **61,020,459,508** |
| **SDG 7, SDG 13** | | | |
| Climate change mitigation | | | |
| 028 – Renewable energy: wind | 100% | 19 | 6,440,844,381 |
| 029 – Renewable energy: solar | 100% | 50 | 19,001,691,785 |
| 030bis – Renewable energy: biomass with high GHG savings | 100% | 8 | 2,504,810,352 |
| 032 – Other renewable energy (including geothermal energy) | 100% | 37 | 6,898,131,680 |
| 033 – Smart Energy Systems (including smart grids and ICT systems) and related storage. | 100% | 66 | 25,229,912,784 |
| 034bis0 – High efficiency co-generation, efficient district heating and cooling with low lifecycle emissions | 100% | 8 | 945,068,526 |
| **Clean transport and infrastructure** | **100%** | **268** | **72,376,106,537** |
| **SDG 9, SDG 11** | | | |
| Climate change mitigation | | | |
| 063bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: road | 40% | 2 | 71,960,000 |
| 064 – Newly built or upgraded railways – TEN-T core network | 100% | 15 | 18,438,559,139 |
| 065 – Newly built or upgraded railways – TEN-T comprehensive network | 100% | 5 | 3,683,057,070 |
| 066 – Other newly or upgraded built railways | 40% | 3 | 110,169,786 |
| 066bis – Other newly or upgraded built railways – electric/zero emission | 100% | 5 | 1,075,366,274 |

| | Max of NGEU green bond Eligibility Coefficient | Number of NGEU green bonds Eligible Measures | Sum of NGEU green bonds Eligible Amount, in EUR |
|---|---|---|---|
| 067 – Reconstructed or modernised railways – TEN-T core network | 100% | 7 | 976,011,979 |
| 068 – Reconstructed or modernised railways – TEN-T comprehensive network | 100% | 9 | 7,502,525,157 |
| 069 – Other reconstructed or modernised railways | 40% | 14 | 2,137,337,652 |
| 069bis – Other reconstructed or modernised railways – electric/zero emission | 100% | 11 | 2,435,430,209 |
| 070 – Digitalisation of transport: rail | 40% | 18 | 740,839,464 |
| 071 – European Rail Traffic Management System (ERTMS) | 40% | 9 | 1,153,271,044 |
| 072bis – Mobile zero emission/electric powered rail assets | 100% | 13 | 4,456,435,999 |
| 073 – Clean urban transport infrastructure | 100% | 25 | 14,528,817,120 |
| 074 – Clean urban transport rolling stock | 100% | 39 | 5,739,043,728 |
| 075 – Cycling infrastructure | 100% | 16 | 1,277,669,148 |
| 076bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: urban transport | 40% | 2 | 3,860,000 |
| 077 – Alternative fuels infrastructure | 100% | 50 | 3,964,703,685 |
| 078 – Multimodal transport (TEN-T) | 40% | 1 | 86,800,000 |
| 079 – Multimodal transport (not urban) | 40% | 3 | 56,497,600 |
| 082bis – Inland waterways and ports (TEN-T) excluding facilities dedicated to transport of fossil fuels | 40% | 1 | 5,160,000 |
| 084bis – Digitising transport when dedicated in part to GHG emissions reduction: other transport modes | 40% | 1 | 14,480,000 |
| ADHOC – Ad hoc intervention field | 100% | 18 | 3,914,111,484 |
| 080bis – Seaports (TEN-T) excluding facilities dedicated to transport of fossil fuels | 40% | 1 | 4,000,000 |
| **Climate change adaptation** | **100%** | **54** | **7,301,397,751** |
| SDG 13 | | | |
| Climate change adaptation | | | |

| | Max of NGEU green bond Eligibility Coefficient | Number of NGEU green bonds Eligible Measures | Sum of NGEU green bonds Eligible Amount, in EUR |
|---|---|---|---|
| 035 – Adaptation to climate change measures and prevention and management of climate related risks: floods (including awareness raising, civil protection and disaster management systems, infrastructures and ecosystem-based approaches) | 100% | 19 | 3,636,045,087 |
| 036 – Adaptation to climate change measures and prevention and management of climate related risks: fires (including awareness raising, civil protection and disaster management systems, infrastructures and ecosystem-based approaches) | 100% | 16 | 1,632,618,930 |
| 037 – Adaptation to climate change measures and prevention and management of climate related risks: others, e.g., storms and drought (including awareness raising, civil protection and disaster management systems, infrastructures and ecosystem-based approaches) | 100% | 19 | 2,032,733,734 |
| **Digital technologies supporting the green transition** | **100%** | **12** | **444,981,838** |
| **SDG 8, SDG 9** | | | |
| Climate change mitigation | | | |
| 010ter – Digitising SMEs or large enterprises (including e-Commerce, e-Business and networked business processes, digital innovation hubs, living labs, web entrepreneurs and ICT start-ups, B2B) compliant with GHG emission reduction or energy efficiency criteria | 100% | 1 | 330,000 |
| 011bis – Government ICT solutions, e-services, applications compliant with GHG emission reduction or energy efficiency criteria | 40% | 8 | 229,021,038 |
| 055bis – ICT: Other types of ICT infrastructure (including large-scale computer resources/equipment, data centres, sensors, and other wireless equipment) compliant with the carbon emission reduction and energy efficiency criteria. | 40% | 3 | 215,630,800 |

| | Max of NGEU green bond Eligibility Coefficient | Number of NGEU green bonds Eligible Measures | Sum of NGEU green bonds Eligible Amount, in EUR |
|---|---|---|---|
| **Energy efficiency** | **100%** | **275** | **67,759,575,211** |
| **SDG 9, SDG 11** | | | |
| Climate change mitigation | | | |
| 024 – Energy efficiency and demonstration projects in SMEs and supporting measures | 40% | 13 | 1,961,845,322 |
| 024bis – Energy efficiency and demonstration projects in large enterprises and supporting measures | 40% | 3 | 25,146,694 |
| 024ter – Energy efficiency and demonstration projects in SMEs or large enterprises and supporting measures compliant with energy efficiency criteria | 100% | 21 | 13,759,311,118 |
| 025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures | 40% | 23 | 2,733,590,606 |
| 025bis – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria | 100% | 41 | 30,916,171,595 |
| 025ter – Construction of new energy efficient buildings | 40% | 63 | 4,463,229,696 |
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 40% | 47 | 3,133,338,700 |
| 026bis – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures compliant with energy efficiency criteria [6] | 100% | 64 | 10,766,941,481 |
| **Nature protection, rehabilitation, and biodiversity** | **100%** | **49** | **6,153,732,676** |
| **SDG 6, SDG 14, SDG 15** | | | |
| The protection and restoration of biodiversity and ecosystems | | | |
| 049 – Protection, restoration, and sustainable use of Natura 2000 sites. | 100% | 7 | 1,415,283,000 |
| 050 – Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure | 100% | 42 | 4,738,449,676 |

| | Max of NGEU green bond Eligibility Coefficient | Number of NGEU green bonds Eligible Measures | Sum of NGEU green bonds Eligible Amount, in EUR |
|---|---|---|---|
| **Other** | **100%** | **57** | **7,520,337,611** |
| **N/A** | | | |
| N/A | | | |
| 01 – Contributing to green skills and jobs and the green economy | 100% | 25 | 1,302,054,333 |
| 027 – Support to enterprises that provide services contributing to the low carbon economy and to resilience to climate change including awareness-raising measures | 100% | 26 | 5,024,032,738 |
| 047 – Support to environmentally friendly production processes and resource efficiency in SMEs | 40% | 2 | 28,620,000 |
| 048 – Air quality and noise reduction measures | 100% | 4 | 1,165,630,540 |
| **Research and innovation activities supporting the green transition** | **100%** | **82** | **20,568,882,665** |
| **SDG 8, SDG 11, SDG 12** | | | |
| All objectives | | | |
| 022 – Research and innovation processes, technology transfer and cooperation between enterprises focusing on the low carbon economy, resilience, and adaptation to climate change | 100% | 68 | 18,648,320,207 |
| 023 – Research and innovation processes, technology transfer and cooperation between enterprises focusing on circular economy | 100% | 14 | 1,920,562,458 |
| **Water supply & waste management** | **100%** | **73** | **21,434,950,864** |
| **SDG 6, SDG 11, SDG 12** | | | |
| Sustainable use and protection of water and marine resources, Transition to a circular economy, waste prevention and recycling | | | |

| | Max of NGEU green bond Eligibility Coefficient | Number of NGEU green bonds Eligible Measures | Sum of NGEU green bonds Eligible Amount, in EUR |
|---|---|---|---|
| 039bis – Provision of water for human consumption (extraction, treatment, storage and distribution infrastructure, efficiency measures, drinking water supply) compliant with efficiency criteria | 100% | 8 | 5,988,482,151 |
| 040 – Water management and water resource conservation (including river basin management, specific climate change adaptation measures, reuse, leakage reduction) | 100% | 28 | 5,491,971,596 |
| 041bis – Waste water collection and treatment compliant with energy efficiency criteria | 100% | 6 | 799,000,000 |
| 042 – Household waste management: prevention, minimisation, sorting, reuse, recycling measures | 100% | 17 | 7,110,560,089 |
| 044 – Commercial, industrial waste management: prevention, minimisation, sorting, reuse, recycling measures | 100% | 8 | 1,549,123,040 |
| 045bis – Use of recycled materials as raw materials compliant with the efficiency criteria | 100% | 2 | 199,030,114 |
| 046bis – Rehabilitation of industrial sites and contaminated land compliant with efficiency criteria | 100% | 4 | 296,783,874 |
| **Grand Total** | **100%** | **1,058** | **264,580,424,661** |

# Annex III: Allocation of NGEU Green Bond proceeds by Member State, category and intervention field

**Table 1: NGEU Green Bond eligible reported expenditure (in EUR million, as 1 of August 2024)**

| | AT | HR | CY | CZ | DK | EE | FI | FR | DE | EL | IE | IT | LT | LU | MT | PT | SK | SI | ES | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Clean energy & network | 9 770 | 68 490 | 840 | 490 081 | | 200 | 590 | 376 000 | | 2 684 750 | | 42 230 | 64 000 | | | 84 000 | 1 110 | | 3 770 | 3 825 831 |
| 028 – Renewable energy: wind | | | | | | | 100 | | | 448 320 | | | 3 000 | | | | | | | 451 420 |
| 029 – Renewable energy: solar | | 140 | 840 | 3,715 | | | 100 | | | 1 339 190 | | 2 080 | | | | 4 000 | 560 | | 640 | 1 351 265 |
| 030bis – Renewable energy: biomass with high GHG savings | | | | | | | 100 | | | | | | 1 000 | | | | | | | 1 100 |
| 032 – Other renewable energy (including geothermal energy) | | 2 550 | | 486 366 | | 100 | 100 | 376 000 | | | | 70 | | | | 75 000 | 380 | | | 940 566 |
| 033 – Smart Energy Systems (including smart grids and ICT systems) and related storage. | | 65 800 | | | | 100 | 90 | | | 897 240 | | 33 700 | 60 000 | | | 5 000 | 170 | | 3 130 | 1 065 230 |
| 034bis0 – High efficiency co-generation, efficient district heating and cooling with low lifecycle emissions | 9 770 | | | | | | 100 | | | | | 6 380 | | | | | | | | 16 250 |
| Clean transport and infrastructure | 174 780 | 125 870 | 6 268 | 555 632 | 20 024 | 7 780 | 4 642 | 4 309 300 | 1 643 850 | 68 560 | 10 710 | 5 810 714 | | | 18 900 | 217 400 | 160 | 89 130 | 1 801 924 | 14 865 644 |
| 064 – Newly built or upgraded railways – TEN-T core network | 172 780 | | | | | | | | | | | 4 106 180 | | | | | | | 684 830 | 4 963 790 |

| | AT | HR | CY | CZ | DK | EE | FI | FR | DE | EL | IE | IT | LT | LU | MT | PT | SK | SI | ES | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 065 – Newly built or upgraded railways – TEN-T comprehensive network | | | | | | | | | | | | 14 620 | | | | | | 89 130 | 321 030 | 424 780 |
| 066bis – Other newly or upgraded built railways – electric/zero emission | 2 000 | | | 278 775 | | | | | | | | | | | | | | | | 280 775 |
| 067 – Reconstructed or modernised railways – TEN-T core network | | 14 700 | | | | | | | | | | | | | | | | | | 14,700 |
| 068 – Reconstructed or modernised railways – TEN-T comprehensive network | | | | | | | | 3 550 000 | | | | 881 100 | | | | | | | | 4 431 100 |
| 069 – Other reconstructed or modernised railways | | | | 233 671 | | | | 172 800 | | | | 113 968 | | | | | | | | 520 439 |
| 069bis – Other reconstructed or modernised railways – electric/zero emission | | | | | | | | | | | 10 710 | | | | | | | | 410 670 | 421 380 |
| 070 – Digitalisation of transport: rail | | | | 12 583 | | | | | 200 000 | | | | | | | 2 400 | | | 12 940 | 227 923 |
| 071 – European Rail Traffic Management System (ERTMS) | | | | | 4 152 | | | | | | | 70 356 | | | | | | | 344 | 74 852 |
| 072bis – Mobile zero emission/electric powered rail assets | | 5 140 | | | | | | | 8 000 | | | 126 230 | | | | | | | | 139 370 |
| 073 – Clean urban transport infrastructure | | 760 | 140 | | | 7 080 | | 400 000 | | 4 520 | | 266 010 | | | | 168 000 | | | 32 770 | 879 280 |

| | AT | HR | CY | CZ | DK | EE | FI | FR | DE | EL | IE | IT | LT | LU | MT | PT | SK | SI | ES | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 074 – Clean urban transport rolling stock | | 105 270 | 5 060 | | | | | | | 62 060 | | 161 610 | | | | 46 000 | | | | 380 000 |
| 075 – Cycling infrastructure | | | | 23 565 | 19 810 | 700 | | | | 720 | | 65 920 | | | | | | | | 110 714 |
| 076bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: urban transport | | | 200 | | | | | | | | | | | | | | | | | 200 |
| 077 – Alternative fuels infrastructure | | | | 5 655 | 214 | | 490 | 186 500 | 360 000 | 760 | | 690 | | | | 1 000 | 160 | | 310 000 | 865 470 |
| 078 – Multimodal transport (TEN-T) | | | | | | | | | | | | | | | | | | | 18 892 | 18 892 |
| 079 – Multimodal transport (not urban) | | | | | | | | | | | | | | | | | | | 10 448 | 10 448 |
| ADHOC – Ad hoc intervention field | | | 868 | 1 383 | | | | | 1 075 850 | 500 | | 4 030 | | | 18 900 | | | | | 1 101 531 |
| Climate change adaptation | | 36 400 | 16 100 | 216 013 | | | | 129 000 | | 507 460 | | 244 030 | | | | 94 000 | 1 110 | 7 680 | 143 030 | 1 394 823 |
| 035 – Adaptation to climate change measures and prevention and management of climate related risks: floods (including awareness raising, civil protection and disaster management systems, infrastructures and ecosystem-based approaches) | | 36 400 | 7 100 | | | | | | | 239 280 | | | | | | | | 7 670 | 25 580 | 316 030 |

| | AT | HR | CY | CZ | DK | EE | FI | FR | DE | EL | IE | IT | LT | LU | MT | PT | SK | SI | ES | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 036 – Adaptation to climate change measures and prevention and management of climate related risks: fires (including awareness raising, civil protection and disaster management systems, infrastructures and ecosystem-based approaches) | | | 4 800 | | | | | | | 247 460 | | | | | | 92 000 | | 10 | 40 190 | 384 460 |
| 037 – Adaptation to climate change measures and prevention and management of climate related risks: others, e.g., storms and drought (including awareness raising, civil protection and disaster management systems, infrastructures and ecosystem-based approaches) | | | 4 200 | 216 013 | | | | 129 000 | | 260 000 | | 4 750 | | | | 2 000 | 1 110 | | 77 260 | 694 333 |
| Digital technologies supporting the green transition | 8 | 224 | 68 | | | | | | | 5 224 | 492 | | | | | 400 | | | | 6 416 |

| | AT | HR | CY | CZ | DK | EE | FI | FR | DE | EL | IE | IT | LT | LU | MT | PT | SK | SI | ES | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 010ter – Digitising SMEs or large enterprises (including e-Commerce, e-Business and networked business processes, digital innovation hubs, living labs, web entrepreneurs and ICT start-ups, B2B) compliant with GHG emission reduction or energy efficiency criteria | | | 40 | | | | | | | | | | | | | | | | | 40 |
| 011bis – Government ICT solutions, e-services, applications compliant with GHG emission reduction or energy efficiency criteria | 224 | 28 | | | | | | | | 5 224 | | | | | | 400 | | | | 5 876 |
| 055bis – ICT: Other types of ICT infrastructure (including large-scale computer resources/equipment, data centres, sensors, and other wireless equipment) compliant with the carbon emission reduction and energy efficiency criteria | 8 | | | | | | | | | 492 | | | | | | | | | | 500 |
| Energy efficiency | | 23 681 | 41 876 | 28 486 | 107 693 | 32 120 | 40 | 4 638 988 | 209 104 | 1 357 711 | 28 540 | 11 287 840 | | | 15 332 | 714 200 | 2 120 | 5 064 | 12 720 | 18 505 515 |

| | AT | HR | CY | CZ | DK | EE | FI | FR | DE | EL | IE | IT | LT | LU | MT | PT | SK | SI | ES | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 024 – Energy efficiency and demonstration projects in SMEs and supporting measures | | | 200 | | | | | 13 200 | | | | 244 | | | | 3 200 | | | 3 620 | 20 464 |
| 024bis – Energy efficiency and demonstration projects in large enterprises and supporting measures | | 12 359 | | | | | | | | | | | | | | | | | | 12 359 |
| 024ter – Energy efficiency and demonstration projects in SMEs or large enterprises and supporting measures compliant with energy efficiency criteria | | | 460 | | 9 945 | | 40 | | | 144 354 | | | | | | 186 000 | 1 010 | | | 341 809 |
| 025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures | | | 332 | | | 1 120 | | | 6 504 | | | 7 448 | | | | 51 600 | | | | 67 004 |
| 025bis – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria | | 26 830 | | | 97 038 | 31 000 | | 1 904 500 | 202 600 | 1 153 000 | | 11 160 000 | | | | 219 000 | | | 6 950 | 14 800 918 |
| 025ter – Construction of new energy efficient buildings | 1 264 | 4 572 | | | | | | | | 19 970 | | 79 656 | | | 1 672 | 178 000 | | 4 896 | | 290 030 |

| | AT | HR | CY | CZ | DK | EE | FI | FR | DE | EL | IE | IT | LT | LU | MT | PT | SK | SI | ES | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 628 | 1 852 | | 111 | | | | 32 288 | | 15 228 | | 40 492 | | | | 8 400 | | 8 | | 99 007 |
| 026bis – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures compliant with energy efficiency criteria | 9 430 | 7 630 | | 28 375 | 710 | | | 2 689 000 | | 25 160 | 28 540 | | | | 13 660 | 68 000 | 1 110 | 160 | 2 150 | 2 873 925 |
| Nature protection, rehabilitation, and biodiversity | | 2 110 | | 5 691 | | | 380 | 350 000 | | 33 939 | 13 710 | 29 030 | | 960 | | 8 000 | | | 205 840 | 649 660 |
| 049 – Protection, restoration, and sustainable use of Natura 2000 sites. | | | | | | | | | | | | 60 | | | | | | | 6 100 | 6 160 |
| 050 – Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure | | 2 110 | | 5 691 | | | 380 | 350 000 | | 33 939 | 13 710 | 28 970 | | 960 | | 8 000 | | | 199 740 | 643 500 |
| Other | | 203 | 30 | 2 569 | 64 900 | 100 040 | | 28 000 | | 567 470 | 1 730 | 990 | | | | 15 000 | | 2 010 | 237 430 | 1 020 372 |
| 01 – Contributing to green skills and jobs and the green economy | | 203 | | | 188 | 40 | | | | 313 470 | 1 730 | | | | | | | 2 010 | | 317 641 |

| | AT | HR | CY | CZ | DK | EE | FI | FR | DE | EL | IE | IT | LT | LU | MT | PT | SK | SI | ES | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 027 – Support to enterprises that provide services contributing to the low carbon economy and to resilience to climate change including awareness-raising measures | | | 30 | 2 569 | 64 712 | 100 000 | | | | 254 000 | | 980 | | | | 15 000 | | | 910 | 438 201 |
| 047 – Support to environmentally friendly production processes and resource efficiency in SMEs | | | | | | | | 28 000 | | | | | | | | | | | | 28 000 |
| 048 – Air quality and noise reduction measures | | | | | | | | | | | | 10 | | | | | | | 236 520 | 236 530 |
| Research and innovation activities supporting the green transition | 80 | | 4 540 | 2 213 | 19 662 | 2 170 | 15 430 | 706 500 | 319 010 | | | 189 870 | | | | 459 000 | 290 | 14 830 | 496 280 | 2 229 875 |
| 022 – Research and innovation processes, technology transfer and cooperation between enterprises focusing on the low carbon economy, resilience, and adaptation to climate change | 80 | | 4 540 | 2 213 | 19 662 | 2 170 | 15 430 | 706 500 | 319 010 | | | 109 950 | | | | 459 000 | 290 | 1 590 | 267 090 | 1 907 525 |
| 023 – Research and innovation processes, technology transfer and cooperation between enterprises focusing on circular economy | | | | | | | | | | | | 79 920 | | | | | | 13 240 | 229 190 | 322 350 |

| | AT | HR | CY | CZ | DK | EE | FI | FR | DE | EL | IE | IT | LT | LU | MT | PT | SK | SI | ES | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Water supply & waste management | | 64 160 | 6 080 | 68 211 | | | 6 170 | 81 000 | | 800 840 | | 225 200 | | | | 39 000 | | 4 960 | 224 020 | 1 519 641 |
| 039bis – Provision of water for human consumption (extraction, treatment, storage and distribution infrastructure, efficiency measures, drinking water supply) compliant with efficiency criteria | | 58 640 | | | | | | | | 116 280 | | 13 050 | | | | | | 2 930 | | 190 900 |
| 040 – Water management and water resource conservation (including river basin management, specific climate change adaptation measures, reuse, leakage reduction) | | 5 520 | 6 080 | 68 211 | | | | | | | | 197 030 | | | | 39 000 | | | 123 580 | 439 421 |
| 041bis – Waste water collection and treatment compliant with energy efficiency criteria | | | | | | | | | | 50 560 | | | | | | | | 2 030 | 33 860 | 86 450 |
| 042 – Household waste management: prevention, minimisation, sorting, reuse, recycling measures | | | | | | | 81 000 | | | | | 15 120 | | | | | | | | 96 120 |

| | AT | HR | CY | CZ | DK | EE | FI | FR | DE | EL | IE | IT | LT | LU | MT | PT | SK | SI | ES | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 044 – Commercial, industrial waste management: prevention, minimisation, sorting, reuse, recycling measures | | | | | | | | | | 634 000 | | | | | | | | | | 634 000 |
| 045bis – Use of recycled materials as raw materials compliant with the efficiency criteria | | | | | | | 6 170 | | | | | | | | | | | | | 6 170 |
| 046bis – Rehabilitation of industrial sites and contaminated land compliant with efficiency criteria | | | | | | | | | | | | | | | | | | | 66 580 | 66 580 |
| **Grand Total** | **184 638** | **321 138** | **75 802** | **1 368 895** | **212 279** | **142 310** | **27 252** | **10 618 788** | **2 171 964** | **6025955** | **55 182** | **17 829 904** | **64 000** | **960** | **34 232** | **1 631 000** | **4 790** | **123 674** | **3 125 014** | **44 017 777** |

# Annex IV: co-financing

The tables below show the intervention fields per Member State for which investments financed by NGEU Green Bonds have also received financing from either the Member States' national budget or from conventional (non-green) EU bonds.

**Table 1: Co-financing by Member State**

| | Sum of Co-financed by Member State *(in EUR)* |
|---|---|
| **Croatia** | **589,688** |
| 01 – Contributing to green skills and jobs and the green economy | 586,728 |
| 024bis – Energy efficiency and demonstration projects in large enterprises and supporting measures | 2,960 |
| **Cyprus** | **4,940,000** |
| 025ter – Construction of new energy efficient buildings | 4,940,000 |
| **Czechia** | **1,244,485** |
| 066bis – Other newly or upgraded built railways – electric/zero emission | 1,062,034 |
| 075 – Cycling infrastructure | 147,138 |
| 077 – Alternative fuels infrastructure | 35,313 |
| **Denmark** | **11,551,136** |
| 027 – Support to enterprises that provide services contributing to the low carbon economy and to resilience to climate change including awareness-raising measures | 11,551,136 |
| **France** | **4,961,250,000** |
| 022 – Research and innovation processes, technology transfer and cooperation between enterprises focusing on the low carbon economy, resilience and adaptation to climate change | 3,943,500,000 |
| 025bis – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria | 510,650,000 |
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 10,600,000 |
| 042 – Household waste management: prevention, minimisation, sorting, reuse, recycling measures | 94,000,000 |
| 047 – Support to environmentally friendly production processes and resource efficiency in SMEs | 51,000,000 |
| 050 – Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure | 3,000,000 |
| 068 – Reconstructed or modernised railways – TEN-T comprehensive network | 250,000,000 |

| | |
|---|---|
| 069 – Other reconstructed or modernised railways | 65,000,000 |
| 077 – Alternative fuels infrastructure | 33,500,000 |
| **Greece** | **2,160,512,910** |
| 024ter – Energy efficiency and demonstration projects in SMEs or large enterprises and supporting measures compliant with energy efficiency criteria | 4,706,455 |
| 025ter – Construction of new energy efficient buildings | 2,815,873 |
| 027 – Support to enterprises that provide services contributing to the low carbon economy and to resilience to climate change including awareness-raising measures | 522,520,000 |
| 029 – Renewable energy: solar | 1,120,110,000 |
| 033 – Smart Energy Systems (including smart grids and ICT systems) and related storage. | 241,400,000 |
| 037 – Adaptation to climate change measures and prevention and management of climate related risks: others, e.g. storms and drought (including awareness raising, civil protection and disaster management systems, infrastructures and ecosystem based approaches) | 42,520,000 |
| 041bis – Waste water collection and treatment compliant with energy efficiency criteria | 1,720,000 |
| 044 – Commercial, industrial waste management: prevention, minimisation, sorting, reuse, recycling measures | 222,850,000 |
| 050 – Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure | 1,870,582 |
| **Malta** | **3,570,000** |
| 026bis – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures compliant with energy efficiency criteria | 3,570,000 |
| **Slovenia** | **136,540,000** |
| 065 – Newly built or upgraded railways – TEN-T comprehensive network | 136,540,000 |
| **Spain** | **79,620,000** |
| 077 – Alternative fuels infrastructure | 79,620,000 |
| **Grand Total** | **7,359,818,219** |

**Table 2: Co-financed by conventional EU bonds**

| | Sum of co-financed by non-green NGEU bonds *(in EUR)* |
|---|---|
| **Austria** | **12,000** |
| 055bis – ICT: Other types of ICT infrastructure (including large-scale computer resources/equipment, data centres, sensors and other wireless equipment) compliant with the carbon emission reduction and energy efficiency criteria. | 12,000 |
| **Croatia** | **21,712,224** |
| 011bis – Government ICT solutions, e-services, applications compliant with GHG emission reduction or energy efficiency criteria | 336,000 |
| 024bis – Energy efficiency and demonstration projects in large enterprises and supporting measures | 18,538,224 |
| 025ter – Construction of new energy efficient buildings | 1,896,000 |
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 942,000 |
| **Cyprus** | **11,778,000** |
| 011bis – Government ICT solutions, e-services, applications compliant with GHG emission reduction or energy efficiency criteria | 42,000 |
| 025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures | 498,000 |
| 025ter – Construction of new energy efficient buildings | 6,858,000 |
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 2,778,000 |
| 076bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: urban transport | 300,000 |
| ADHOC – Ad hoc intervention field | 1,302,000 |
| **Czechia** | **369,546,317** |
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 165,982 |
| 069 – Other reconstructed or modernised railways | 350,505,849 |
| 070 – Digitalisation of transport: rail | 18,874,486 |
| **Estonia** | **1,680,000** |
| 025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures | 1,680,000 |
| **Finland** | **6,228,000** |
| 071 – European Rail Traffic Management System (ERTMS) | 6,228,000 |

| | |
|---|---|
| **France** | **369,432,000** |
| 024 – Energy efficiency and demonstration projects in SMEs and supporting measures | 19,800,000 |
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 48,432,000 |
| 047 – Support to environmentally-friendly production processes and resource efficiency in SMEs | 42,000,000 |
| 069 – Other reconstructed or modernised railways | 259,200,000 |
| **Germany** | **309,756,000** |
| 025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures | 9,756,000 |
| 070 – Digitalisation of transport: rail | 300,000,000 |
| **Greece** | **60,632,476** |
| 011bis – Government ICT solutions, e-services, applications compliant with GHG emission reduction or energy efficiency criteria | 7,836,000 |
| 025ter – Construction of new energy efficient buildings | 29,954,476 |
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 22,842,000 |
| **Ireland** | **738,000** |
| 055bis – ICT: Other types of ICT infrastructure (including large-scale computer resources/equipment, data centres, sensors and other wireless equipment) compliant with the carbon emission reduction and energy efficiency criteria | 738,000 |
| **Italy** | **3,258,246,000** |
| 024 – Energy efficiency and demonstration projects in SMEs and supporting measures | 366,000 |
| 025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures | 11,172,000 |
| 025bis – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria | 2,790,000,000 |
| 025ter – Construction of new energy efficient buildings | 119,484,000 |
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 60,738,000 |
| 069 – Other reconstructed or modernised railways | 170,952,000 |
| 071 – European Rail Traffic Management System (ERTMS) | 105,534,000 |
| **Malta** | **2,508,000** |
| 025ter – Construction of new energy efficient buildings | 2,508,000 |

| Portugal | 366,000,000 |
|---|---|
| 011bis – Government ICT solutions, e-services, applications compliant with GHG emission reduction or energy efficiency criteria | 600,000 |
| 024 – Energy efficiency and demonstration projects in SMEs and supporting measures | 4,800,000 |
| 025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures | 77,400,000 |
| 025ter – Construction of new energy efficient buildings | 267,000,000 |
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 12,600,000 |
| 070 – Digitalisation of transport: rail | 3,600,000 |
| **Slovenia** | **7,356,000** |
| 025ter – Construction of new energy efficient buildings | 7,344,000 |
| 026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures | 12,000 |
| **Spain** | **69,366,000** |
| 024 – Energy efficiency and demonstration projects in SMEs and supporting measures | 5,430,000 |
| 070 – Digitalisation of transport: rail | 19,410,000 |
| 071 – European Rail Traffic Management System (ERTMS) | 516,000 |
| 078 – Multimodal transport (TEN-T) | 28,338,000 |
| 079 – Multimodal transport (not urban) | 15,672,000 |
| **Grand Total** | **4,854,991,017** |

# Annex V: Alignment with the EU Taxonomy Substantial Contribution Criteria

Examples of EU Taxonomy Substantial Contribution Criteria (SCC) alignment with the RRF intervention fields:

| Category | Full alignment |
|---|---|
| Description | The intervention field corresponds to the EU Taxonomy in full substance and criteria. |
| Example | Intervention field 029 – Renewable energy: solar fully encapsulates and translates to the two activities in EU Taxonomy 4.1 and 4.2 Electricity generation using solar photovoltaic technology. Electricity generation using concentrated solar power (CSP) technology. Even though an intervention field is translated to two activities there is no loss of scope or misalignment of criteria. |
| Category | Compliant with the main SCC EU Taxonomy condition |
| Description | The intervention field corresponds closely with the EU Taxonomy activity, however there are minor insubstantial deviations. |
| Example | Intervention field 024ter – Energy efficiency and demonstration projects in SMEs or large enterprises and supporting measures compliant with energy efficiency criteria (3) corresponds closely to EU Taxonomy activity 7.2. Renovation of existing buildings.<br>Though not so immediately obvious but nonetheless a significant divergence is in the additional quantifiable criteria, where the EU Taxonomy demand 30% reduction in Primary Energy Demand, while the RRF demands the 30% reduction of direct and indirect GHG emissions. Conditions are divergent, but thematically interlinked. |
| Category | Compliant with some SCC EU Taxonomy conditions |
| Description | The Intervention field might only in part reference EU Taxonomy activities (or vice versa), while missing key criteria or areas of substance. |
| Example | Intervention field 041bis – Waste water collection and treatment compliant with energy efficiency criteria corresponds in principle to EU Taxonomy activities 5.3. – Construction, extension and operation of waste water collection and treatment and 5.4. – Renewal of waste water collection and treatment.<br>The conditions under the RRF were based on the draft version of the EU Taxonomy available at the time of drafting and adoption of the RRF Regulation. Hence, for instance for activity 5.4, the main SCC criteria of an energy reduction target in the RRF is 10% overall while the EU Taxonomy mandates 20% for specific components. This is a key factor of misalignment.<br>It is important to stress that there are cases, where RRF has both stricter and less strict criteria than the EU Taxonomy given that the EU Taxonomy went through several more iterations after the RRF regulation was agreed. |
| Category | Not aligned |

| | |
|---|---|
| **Description** | The intervention field is not aligned with an activity in the EU Taxonomy, which means that the EU Taxonomy does mention these climate prevention actions, directly or just as a minor reference/footnote, but this vague or indistinctive mention could not reasonably be labelled under any other level of alignment. These intervention fields are rare, as the RRF's climate tracking methodology was designed while taking the EU Taxonomy into account where relevant and possible. |
| **Example** | Intervention field 063bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: road is related, in principle, to the EU Taxonomy activities 6.3. Urban and suburban transport, road passenger transport and 6.6. Freight transport services by road. These two activities both have some elements of improving road infrastructure, but neither of them indicates any exclusive reference to digitalisation with the intention of GHG reduction but instead focus on infrastructure construction standards. We conclude that measures included under NGEU are covered by the EU Taxonomy as digitalisation of road is part of freight road construction sector, but this link is very insignificant and not specific. |
| **Category** | **Not covered** |
| **Description** | Intervention fields include measures with no corresponding activities in the EU Taxonomy, which supports the argument that in some cases NGEU considers larger scope of climate action. |
| **Example** | Intervention field *01 – Contributing to green skills and jobs and the green economy* is not related to any activity. Even though there is a chapter in the EU Taxonomy on education, it relates more to the upgrade and adaptation of education and academic infrastructure. There is no activity in the EU Taxonomy to cover specialized trainings on green economy. Also, to mention that we considered *Not covered intervention* fields to be in regard to biodiversity protection and air quality, which is part of standard DNSH criteria, but otherwise lacking any sort of reference within SCC of activities, at the time of assessment, making them *Not Covered* and not *Not Aligned*. |

# Annex VI: Impact methodologies per Intervention Fields

## FROM GREEN BOND INVESTMENT TO CLIMATE IMPACT – IN DETAIL

The approach for determining impact focuses on the level of the intervention field, since this provides the most granular result while allowing for aggregation across key areas. The analysis establishes the total potential output and related impact per intervention field for the entire programme's length, i.e. in a scenario of full implementation, essentially establishing target values. Realised impacts are then derived on the basis of achievements of milestones and targets until the cut-off date of the report.

## DEFINING OUTPUT INDICATORS

To develop output indicators, the approach aggregates outputs from all RRF measures under a single intervention field to provide a full-overview reporting.

As several RRF measures and sub-measures are encompassed by a single intervention field (IF), to create a singular output indicator, it is necessary to collect data from all milestones and targets associated with the measures in each intervention field. Hence the methodology to determine impact is based on a detailed bottom-up analysis of milestones and targets related to the measures classified under each intervention field. This exercise concerns converting as many of the measures as possible into a quantifiable output indicator. As part of this process measures are screened and classified as "unusable" (e.g. because they do not provide output information) or "usable" for use in the aggregation of the output indicator.

For example, in the case of railway related measures, this approach entails defining output indicators for all the railway related measures present across 10 different intervention fields (e.g. kilometres of railways either build, upgraded or digitised as well as corresponding infrastructure, such as stations and/or crossings). Once measures that can be included in this quantification are defined, aggregation of outputs to a single output number per intervention field is possible, thereby identifying the expected quantifiable output under that intervention field, based on full completion of milestones and targets. This number serves as the output indicator's target, excluding however non-quantifiable measures.

The chosen output indicators are based on advice from experts in the field (Carbone 4) who have also validated the methodology used. Nonetheless, the estimation of single output indicators across different investment areas entails methodological challenges, restrictions and underlying assumptions which need to be accounted for when interpreting the final results.

## TRANSLATING OUTPUT INDICATOR TO IMPACT INDICATORS

For the intervention fields where output indicators have been established, the "output to impact translation methodology" is developed by Carbone 4, based on their experience, market practice, and the most recent studies and academic literature. The methodologies are developed at the level of the intervention field and the focus is on presenting, wherever possible, the GHG avoided through the use of the above output metrics. Many of the intervention fields covered by national RRPs are in standard areas of green investments that are well known and understood (e.g. "energy efficiency", "clean energy & network", "clean transport & infrastructure"). However, some intervention fields are very broad and general (e.g. "support for services to the low carbon economy"). In these areas more innovative methods for translating outputs to impacts are required.

## DETERMINING THE REALISED IMPACT

Realised impact is determined on the basis of fulfilled milestones and targets of measures included in the green bonds eligible pool and that make a quantifiable contribution to the chosen output indicator. The achievement of these milestones and targets is linked to the payment requests, with their satisfactory fulfilment assessed by the Commission.

Intermediary targets / milestones may also be taken into account depending on the type of measure. For example, partial implementation of a housing renovation scheme is likely to have an impact at the level of individual units, while a railroad may need to be built entirely for impact. Milestones and targets are associated to a quarterly planning cycle, allowing predictions for the expected timeline of realised impact. This also allows for adjustments to the results and targets in case of delays and non-fulfilment.

## Methodology per Intervention Field

The methodology for estimating the climate impacts from investments eligible for green bond expenditure is presented on an intervention field and output-indicator basis. For output indicators that occur in multiple intervention fields, the methodology is presented in the primary applicable intervention field.

Wherever necessary and feasible, the methodologies used for determining the GHG emissions avoided take into account measures' lifecycle emissions as well as emissions caused by their respective implementation.

Unless otherwise stated, the underlying data used for the calculations and the calculations themselves have been implemented on EU Member State level wherever applicable.

The methodologies, which are summarized below, were formulated in collaboration with the external consultant, Carbone 4. Compared to the 2023 edition of this report 12 new intervention fields have been added based on new analysis, bringing the total coverage to 31 intervention fields. These are marked as "New" in the detailed description below.

While intervention fields' titles generally indicate which actions are included under the respective intervention field, the nature of the RRF's construction also results in additional measures being covered in this impact report under an intervention field that may not appear fitting. Where this is the case, calculations always rely on methodologies developed for the more appropriate intervention field.

# Intervention Field 022

## Research and innovation processes, technology transfer and cooperation between enterprises focusing on the low carbon economy, resilience and adaptation to climate change

The impact assessments under this intervention field focused on groups of measures around the production of green hydrogen, measures focusing on zero-emission vehicles, and measures concerning building renovation.

However, due to methodological constraints, measures focusing on financing (basic) research were not part of the analysis of GHG emissions avoided.

**Methodology for calculating avoided emissions of new hydrogen production capacity installed:**
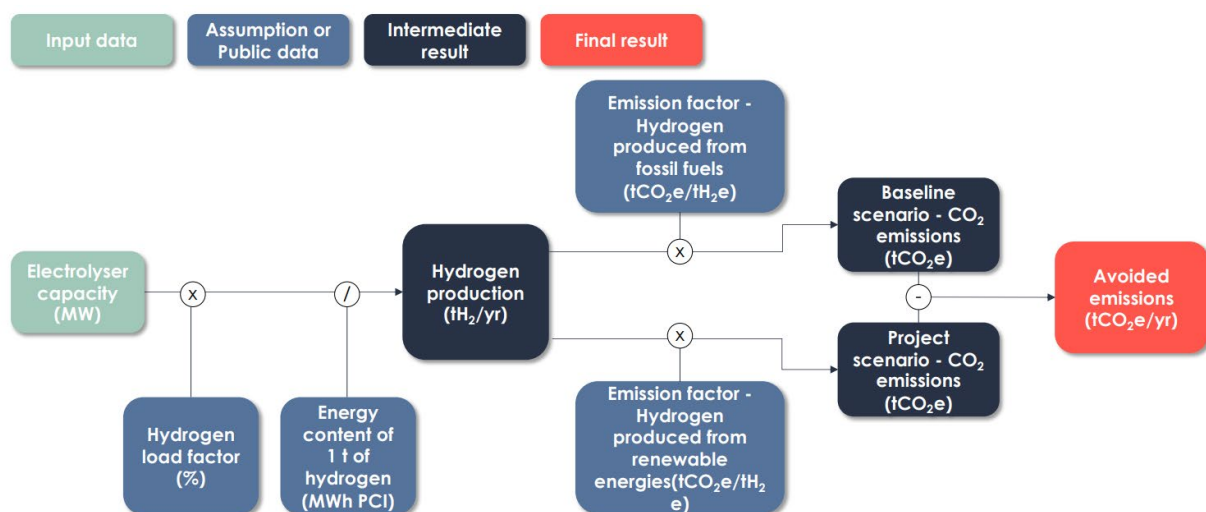


**Assumptions:**

- Conversion: It is considered that 1 kg of hydrogen contains 33.6 kWh PCI.

- Load factor: The load factor of an electrolyser is the ratio of the energy actually produced over a given period to the energy it would have produced if it had been operating at its rated power during the same period. We used an average load factor of 60% of the IEA scenarios.

- Emissions factor: Since it is mainly of fossil origin, hydrogen has a very high carbon footprint, with a world average of 15 kgCO2e / kgH2 for dedicated hydrogen production. Hydrogen is considered low carbon if and only if its carbon footprint is less than or equal to 3 kgCO2e / kgH2, according to the EU Taxonomy. For the calculation of avoided emissions financed by green bonds, the baseline situation consists in fossil hydrogen production and the scenario consists in low-carbon hydrogen production.

**Methodology for calculating avoided emissions of zero-emission vehicles:**

- Please refer to the methodology for zero-emission vehicles under intervention field ADHOC.

- The relevant measures under this intervention field denote zero-emission vehicle production capacity. For the purpose of impact reporting, the assumption is that these vehicles are actually produced.

- Avoided emissions are calculated based on the production of electric vehicles for a given year, based on the data provided. The reference value is 100,000 electric vehicles.

**Methodology for calculating avoided emissions of building renovation:**

Please refer to the methodology for calculating avoided emissions due to building renovation under intervention field 025bis.

# Intervention Field 024 (New)

## Energy efficiency and demonstration projects in SMEs and supporting measures

The impact assessments under this intervention field focused on measures that contribute to water consumption reduction and investments in production processes that reduce final energy consumptions.

Due to methodological constraints, measures focusing on financing energy storage, waste reduction and other demonstration projects were not part of the analysis of GHG emissions avoided.

**Methodology for calculating avoided emissions owing to water savings by smart water metering:**
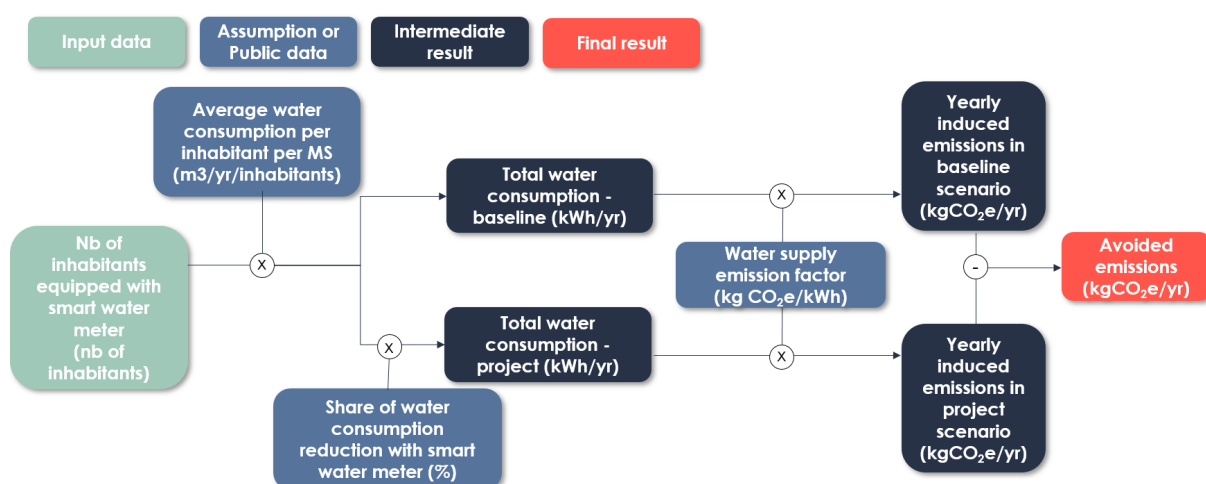
**Assumptions:**

- Reducing water consumption, avoids emissions linked to water treatment and distribution.

- The use of smart water metering reduces water consumption by 2%.[3]

- The volume of water saved is calculated based on the average water consumption per inhabitant per Member State.

- The smart water meter installation projects cover all urban area of cities where investment takes place, and that all inhabitants will reduce their water consumption. The number of inhabitants of the cities is used to calculate water savings.

- Emission factor for water treatment and distribution is sourced from Ecoinvent 3.9 "Tap water, conventional treatment, Europe without Switzerland".

## Methodology for calculating avoided emissions due to fossil energy savings in industry:
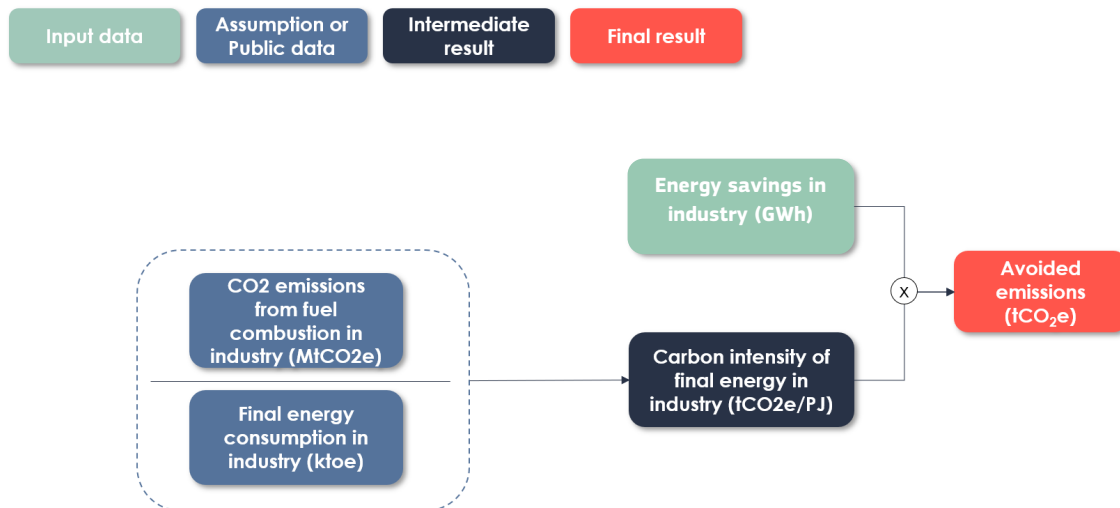


**Assumptions:**

- The methodology converts energy savings in industry into avoided emissions, through an estimation of the carbon intensity of final energy in industry.

- The project concerned by this methodology in IF 024 is a site under ETS. It is thus considered to be an industrial site. The project mentions a reduction of fossil energy consumption. The methodology can apply only to this type of project. Another methodology would be required for electricity savings.

- Conversion: Carbon intensity of final energy in industry (tCO2e/GWh) is estimated through 1) final energy consumption in industry per Member State, and 2) $CO_2$ emissions from fuel combustion in industry per Member State.

- Final energy consumption in industry is expressed in ktoe and to GWh.

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[3] Source: The impact of smart meters on residential water consumption: Evidence from a natural experiment in the Canary Islands, 2021, Daminato et al.

# Intervention Field 024ter (New)

## Energy efficiency and demonstration projects in SMEs or large enterprises and supporting measures compliant with energy efficiency criteria

The impact assessments under this intervention field focused on groups of measures around buildings renovation, solar energy installations, energy savings in industry and measures focusing on zero-emission vehicles.

However, due to methodological constraints, measures that are to finance measures following a call for proposals were not part of the analysis of GHG emissions avoided as of yet.

### Methodology for calculating avoided emissions of building renovation:

Please refer to the methodology for calculating avoided emissions due to building renovation under intervention field 025bis.

### Methodology for calculating avoided emissions of new solar panels installations:

If there is no precise information about the type of projects between solar and wind projects, all projects are assumed to be solar panel projects to be more conservative. The associated emission factor is higher, and the load factor is lower.

Please refer to the methodology for calculating avoided emissions due to new solar energy installations under intervention field 029.

### Methodology for calculating avoided emissions due to energy savings in industry:

Please refer to the methodology for calculating avoided emissions due to energy savings in industry under intervention field 024.

### Methodology for calculating avoided emissions of zero-emission vehicles:

Please refer to the methodology for zero-emission vehicles under intervention field ADHOC.

# Intervention Field 025bis

Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria

The intervention field focuses exclusively on renovation activities.

**Methodology for calculating avoided emissions of building renovation:**
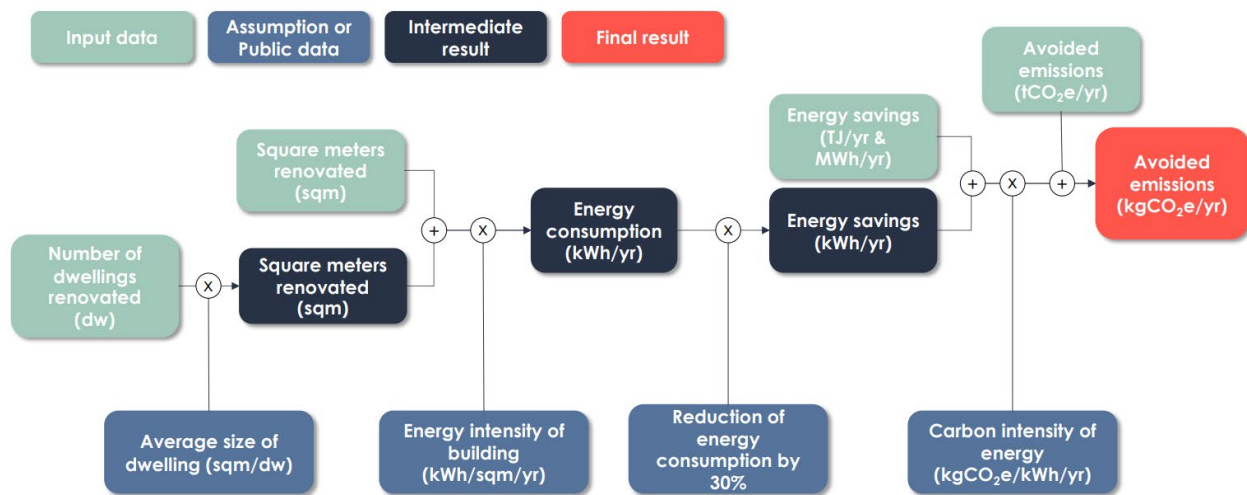


**Assumptions:**

- The calculation differentiates between residential and non-residential buildings.

- Based on a 2019 Eurostat dataset "Average size of dwelling by household type and degree of urbanisation", we used an average size per dwelling per European country for all types of households, all types of urbanisation.

- Energy intensity of building (kWh/sqm/yr): Based on the CRREM data base, last updated in January 2023, uses an average measure of energy intensity per EU Member State per square meter for both residential buildings (multi-family) and non-residential buildings (office).

- Reduction of energy consumption by 30%: Based the European regulation establishing the RRF, requiring that the measures will achieve, on average, at least a 30% reduction of direct and indirect GHG emissions compared to the ex-ante emissions. Measures are therefore assumed to achieve a 30% reduction as a minimum.

- Carbon intensity of energy (kgCO2/kWh/yr): Based on the CRREM database, last updated in January 2023, uses an average measure of the carbon intensity of energy per EU Member State for both residential buildings (multi-family) and non-residential buildings (office).

- The calculation takes into account the Member State of the project, as well as the type of building that is renovated.

# Intervention Field 025ter

## Construction of new energy efficient buildings

Intervention field 025ter targets the construction of new energy efficient buildings. Milestones and targets associated to the measures that apply this intervention field among others, can in some cases also cover energy efficiency renovation of buildings (categorised under relevant intervention fields).

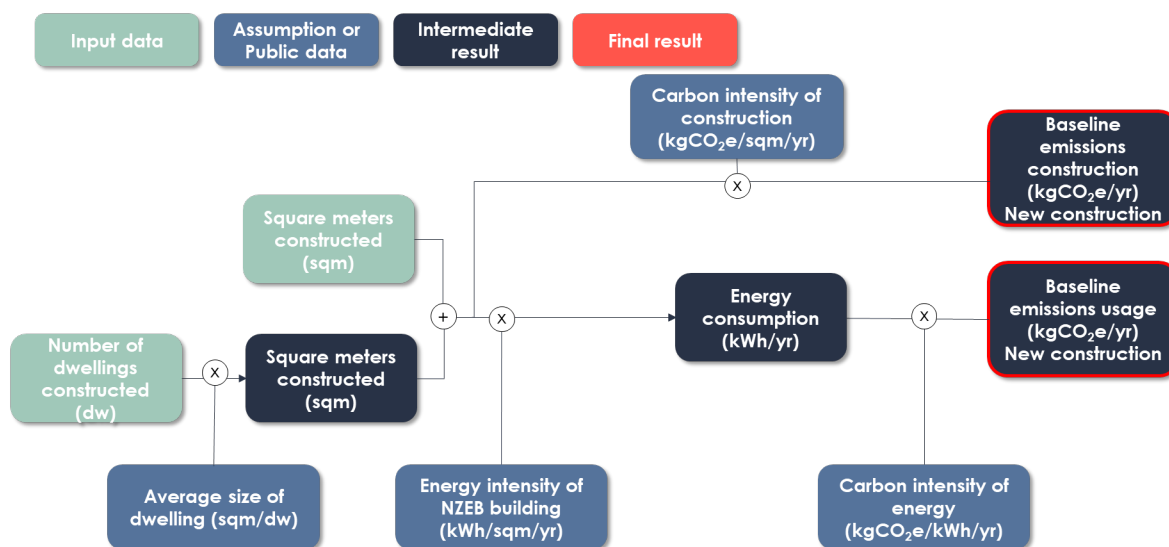**Methodology for calculating avoided emissions of renovation activities:**
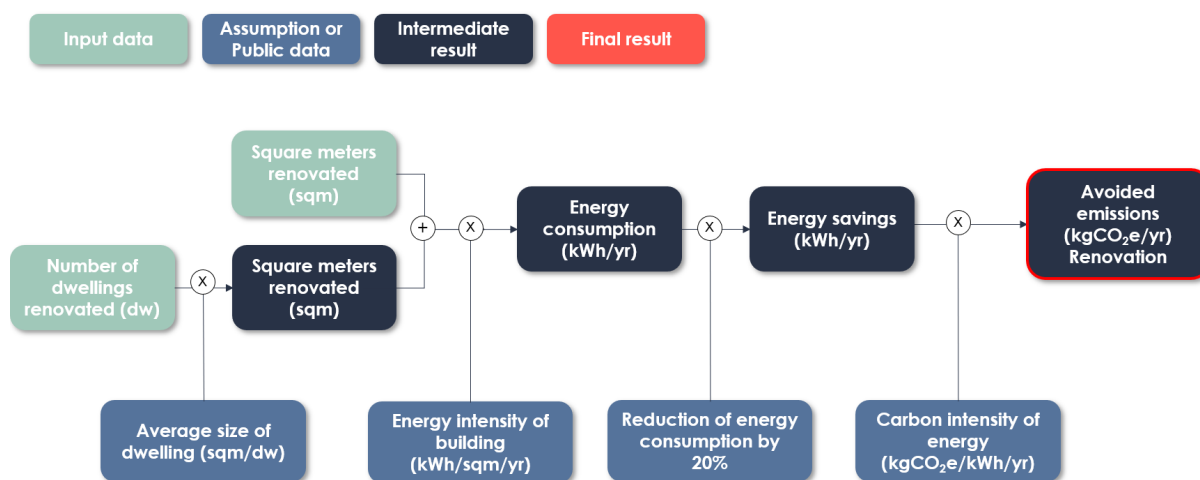


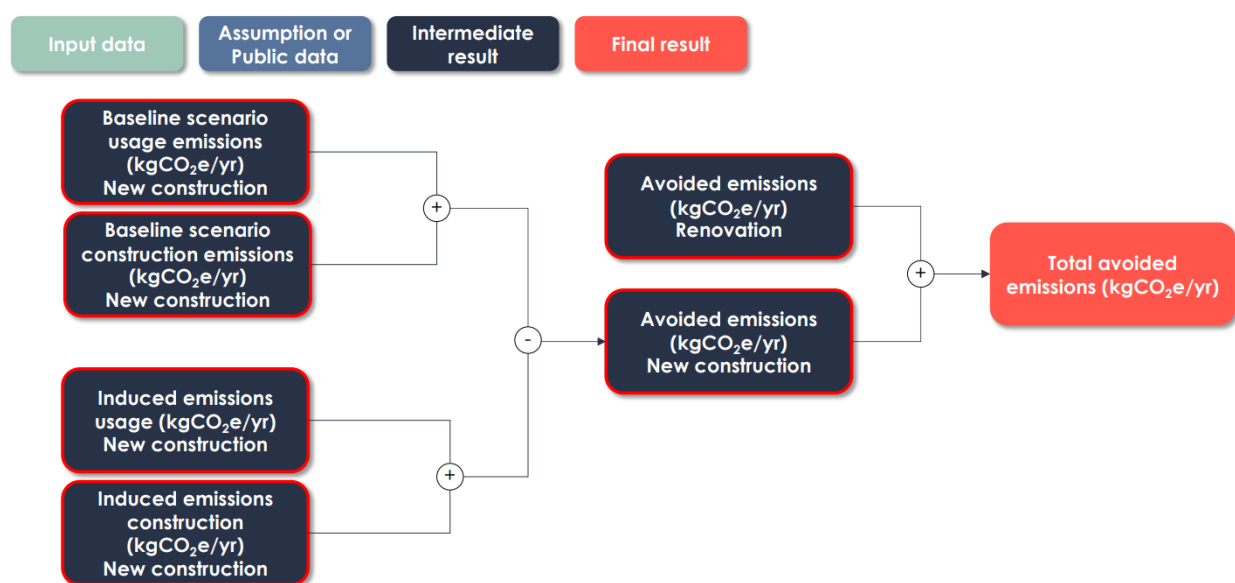**Methodology for calculating avoided emissions of new construction activities:**

- **Induced emissions: from input to intermediate results**



34

-
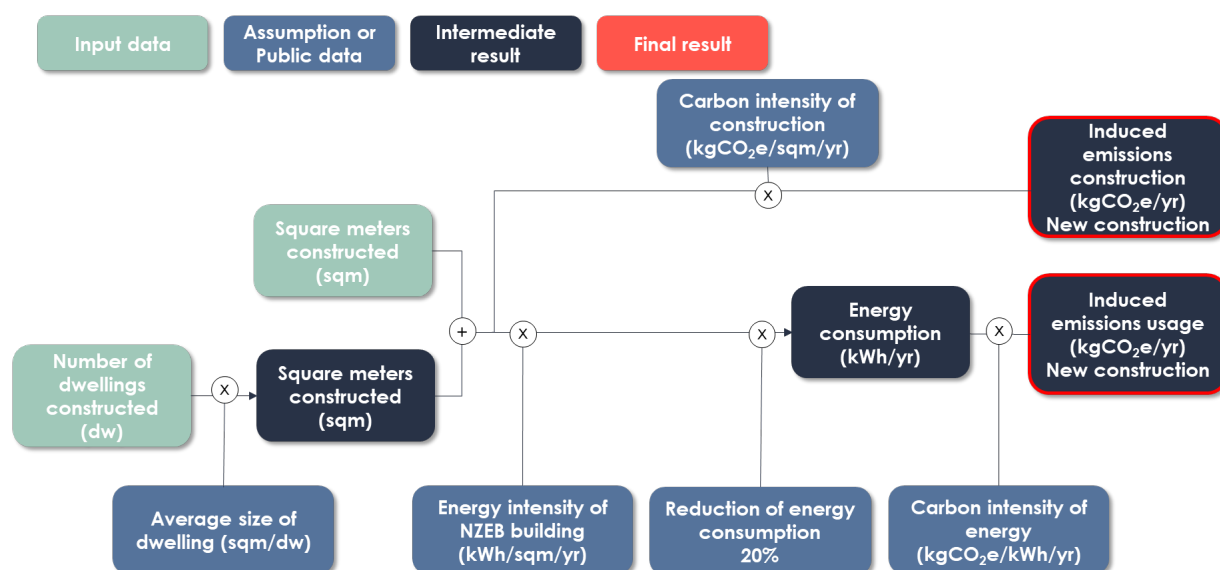
## Baseline scenario: from input to intermediate results



-   ## Residential and non-Residential: from intermediate results to final results for the entire intervention field



**Assumptions:**

-   Reported data: We assumed that the data reported in milestones and targets was correctly tagged by the MS. We added a distinction between Residential and Non-residential projects and between Construction and Renovation projects. It is assumed that this distinction is made correctly and does not alter the precision of the calculation.

- Emissions avoided result from a 20% energy performance improvement of the operation of the building compared to the NZEB standard.

- Energy intensity of building (kWh/sqm/yr): Based on the CRREM data base, last updated in January 2023, uses an average measure of energy intensity per EU Member State per square meter for both residential buildings (multi-family) and non-residential buildings (office).

- Reduction of energy consumption by 20% (New construction): Based on the European regulation establishing the RRF that the new buildings constructed have a Primary Energy Demand (PED) that is at least 20 % lower than the NZEB requirement (nearly zero-energy building).

- Reduction of energy consumption by 20% (Renovation): Based on the European regulation establishing the RRF, we assumed that the measures presented on the Milestones & Targets will achieve, on average, at least a 20% reduction of direct and indirect GHG emissions compared to the ex-ante emissions.

- Carbon intensity of energy (CO2/kWh/yr): Based on the CRREM database, last updated in January 2023, uses an average measure of the carbon intensity of energy per European country for both residential buildings (multi-family) and non-residential buildings (office). The carbon intensity of buildings was considered constant over the project's lifetime and identical between NZEB buildings and the Member States' building stock.

- Construction carbon intensity (kgCO2e/sqm/yr): Data used for the carbon intensity of construction is based on an IFPEB publication that provides us with the carbon intensity of construction in OECD countries when using concrete as the main material.

- Baseline scenario (New construction): The baseline scenario considers that the construction of the buildings would have happened and that the buildings would have achieved a NZEB performance.

- Average size of dwelling (sqm/dw): Based on a 2019 Eurostat dataset named "Average size of dwelling by household type and degree of urbanisation", we used an average size per dwelling per European country for all types of households, all types of urbanization.

- The calculation takes into account the country of the project, as well as the type of building.

# Intervention Field 026

## Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures

The intervention field includes projects related to renovation. Milestones and targets associated to the measures that apply this intervention field among others, can in some cases also cover the construction of energy efficient buildings.

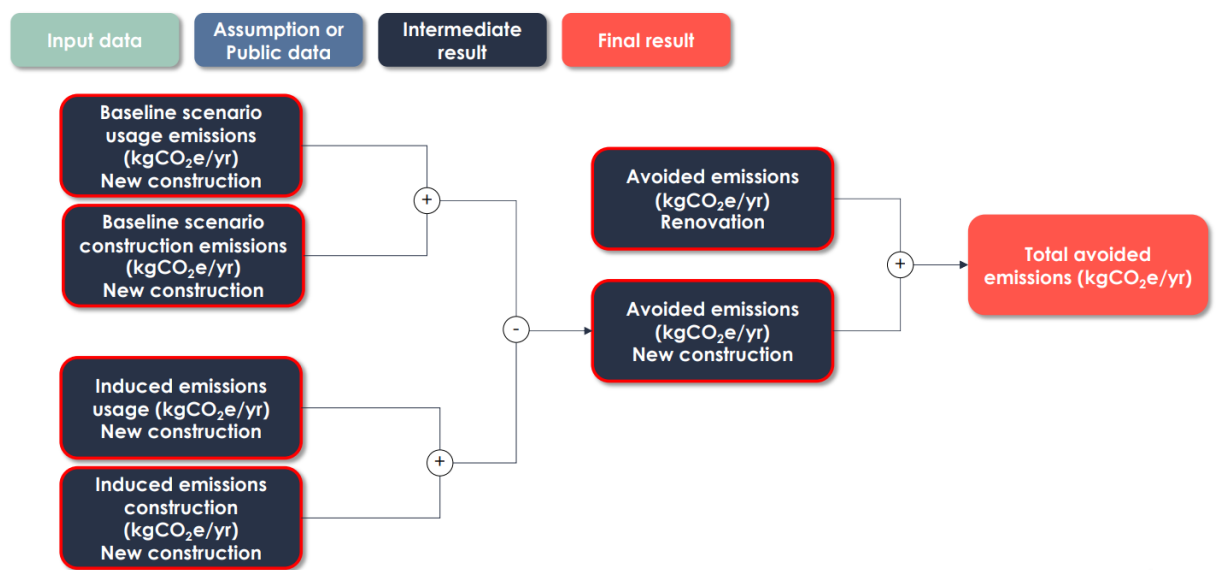**Methodology for calculating avoided emissions of building construction and renovation:**

– **Renovation: from input to intermediate results**
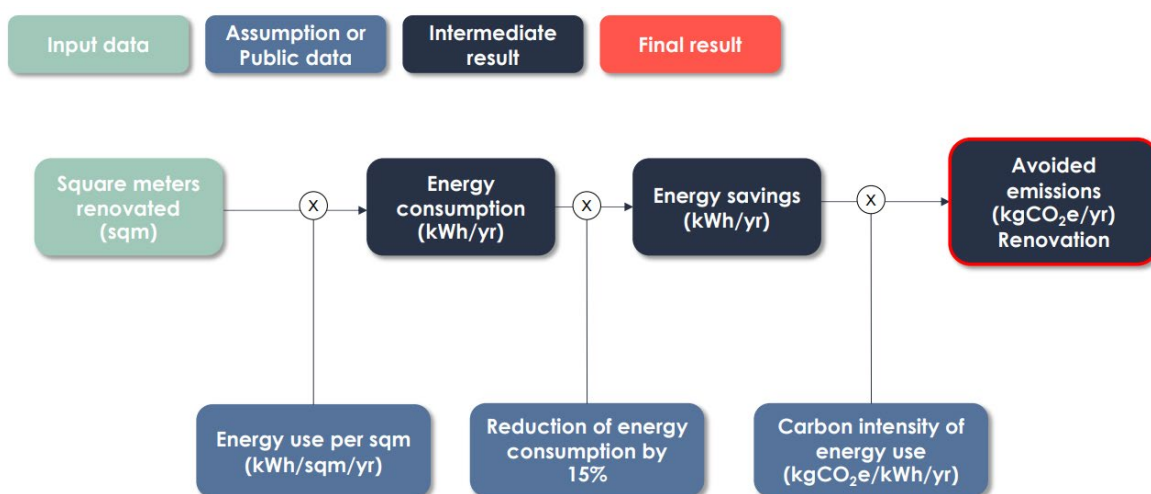


– **New construction: from input to intermediate results**
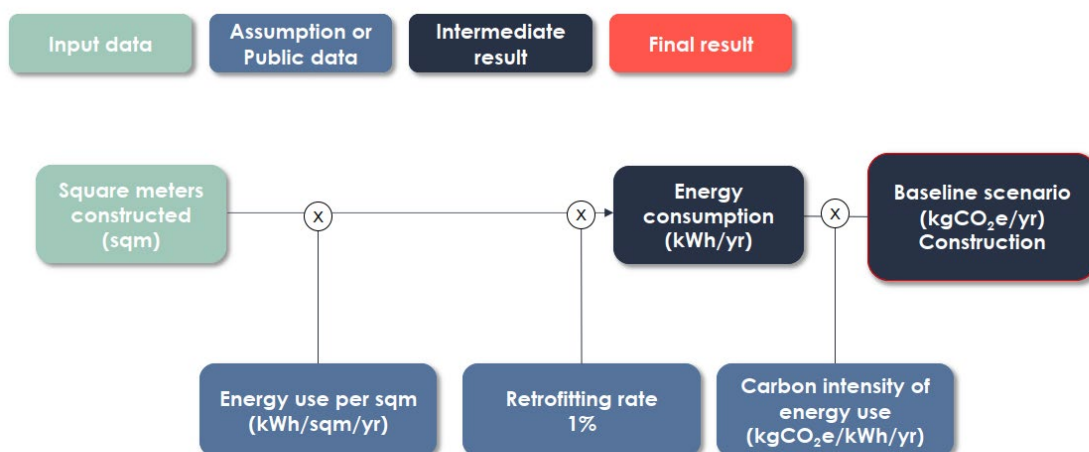
– **Renovation and new construction: from intermediary to final results**



**Assumptions (renovation and new construction):**

- Reported data: We assumed that the data reported in the tab "M&T Selection" was correctly tagged by the MS. When applicable, the data has been divided in two categories: "Renovation" and "Construction" based on the description of the project. When both renovation and construction actions are carried out, we chose to model them as construction actions, as these are the most carbon-intensive actions.

- Energy intensity of building (kWh/sqm/yr): Based on the CRREM database, last updated in January 2023, we used an average measure of energy intensity per European country per square meter for both residential buildings (multi-family) and non-residential buildings (office).

- Reduction of energy consumption by 15% (Renovation): The IF has no objective of energy reduction linked with the projects. We assume that projects are negligible and light renovations with an average energy reduction of 15% compared to the ex-ante energy use.

- Reduction of energy consumption by 20% (Construction): Based on the European regulation establishing the RRF, we assumed that the new buildings constructed have a Primary Energy Demand (PED) that is at least 20% lower than the NZEB requirement (nearly zero-energy building, national directives).

- Retrofitting rate (1%) (Construction): Based on IEA hypotheses, we assumed that newly built buildings replace 1% of the existing stock.

- Carbon intensity of energy (kgCO$_2$/kWh/yr): Based on the CRREM database, last updated in January 2023, we used an average measure of the carbon intensity of energy per European country for non-residential buildings (office). The carbon intensity of buildings was considered constant over the project's lifetime and identical between NZEB buildings and the Member States' building stock.

  Construction carbon intensity (kgCO$_2$e/sqm/yr): Data used for the carbon intensity of construction is based on an IFPEB publication that provides us with the carbon intensity of construction in OECD countries when using concrete as the main material.

# Intervention Field 026bis

Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures compliant with energy efficiency criteria
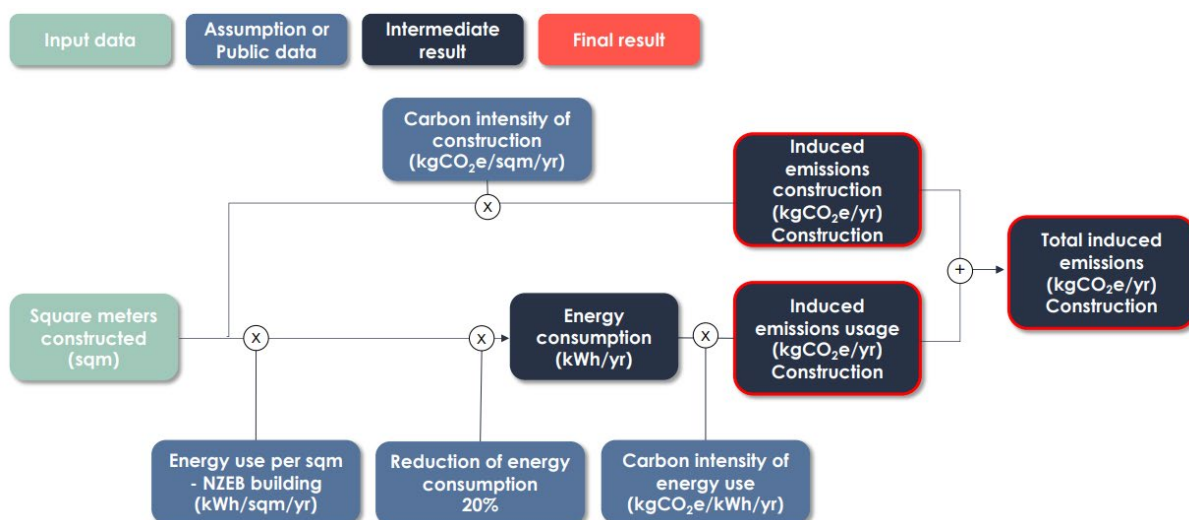
The intervention field includes renovation. Milestones and targets associated to the measures that apply this intervention field among others, can in some cases also cover the construction of energy efficient buildings.

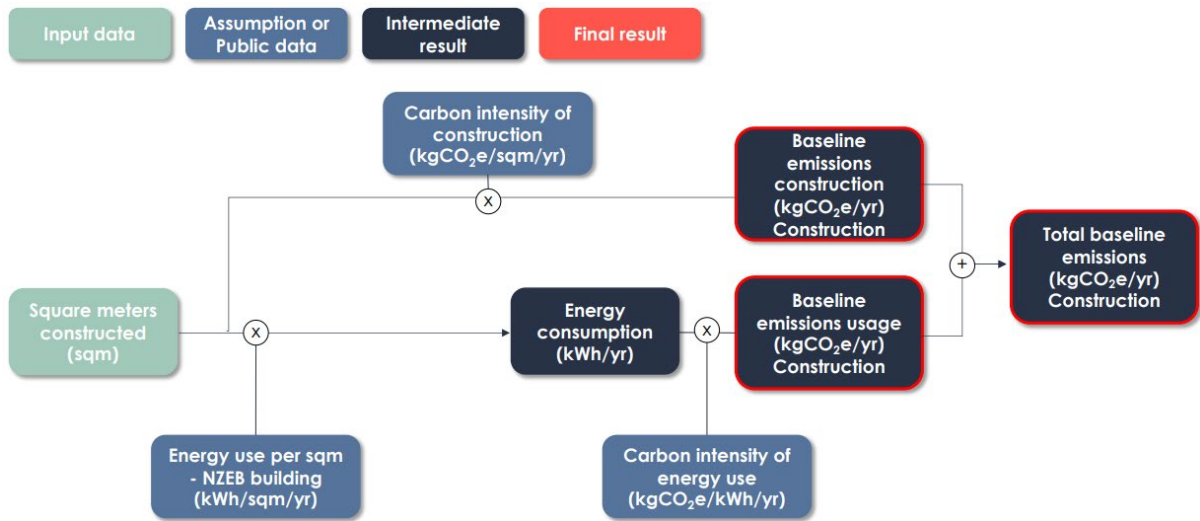**Methodology for calculating avoided of building construction and renovation:**

- **renovation activities: from input to intermediate results**

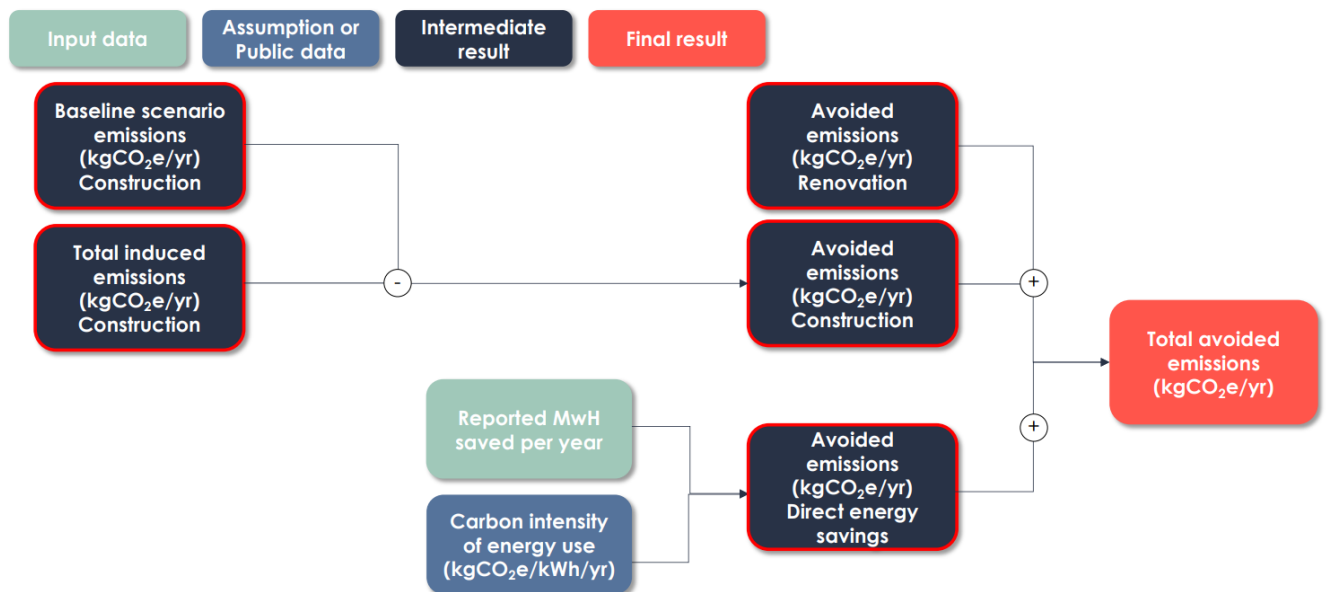Please refer to the methodology listed under intervention field 025bis.

- **new construction activities: Induced emissions, from input to intermediate results**

– **new construction activities: baseline emissions, from input to intermediate results**



Input data | Assumption or Public data | Intermediate result | Final result

Carbon intensity of construction ($kgCO_2e/sqm/yr$)

Baseline emissions construction ($kgCO_2e/yr$) Construction

Total baseline emissions ($kgCO_2e/yr$) Construction

Square meters constructed (sqm)

Energy consumption (kWh/yr)

Baseline emissions usage ($kgCO_2e/yr$) Construction

Energy use per sqm - NZEB building (kWh/sqm/yr)

Carbon intensity of energy use ($kgCO_2e/kWh/yr$)

– **renovation and new construction: from intermediate to final results**



Input data | Assumption or Public data | Intermediate result | Final result

Baseline scenario emissions ($kgCO_2e/yr$) Construction

Total induced emissions ($kgCO_2e/yr$) Construction

Avoided emissions ($kgCO_2e/yr$) Renovation

Avoided emissions ($kgCO_2e/yr$) Construction

Total avoided emissions ($kgCO_2e/yr$)

Reported MwH saved per year

Carbon intensity of energy use ($kgCO_2e/kWh/yr$)
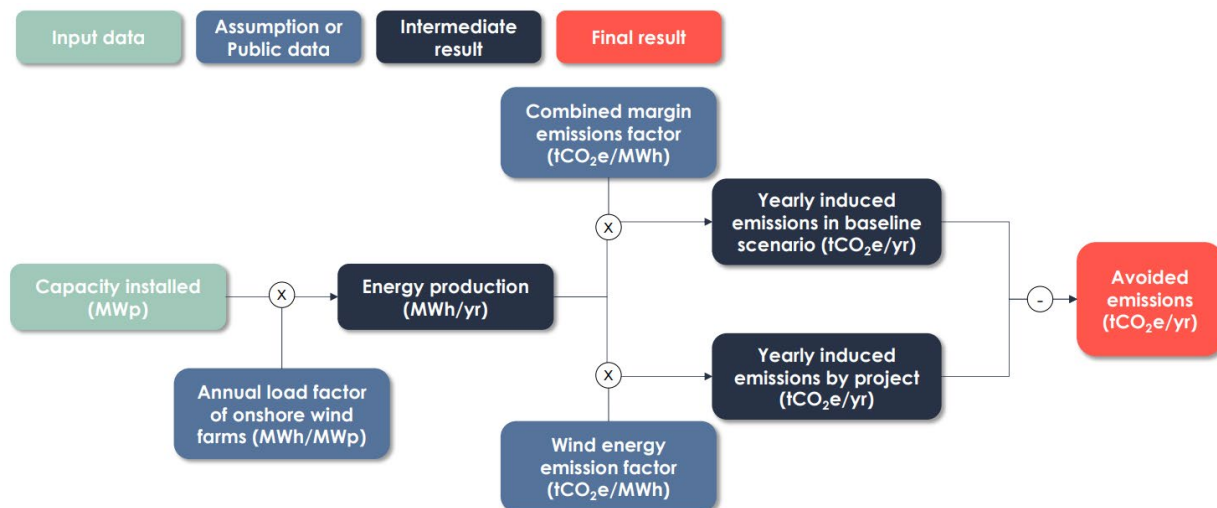
Avoided emissions ($kgCO_2e/yr$) Direct energy savings

# Intervention Field 028

## Renewable energy: wind

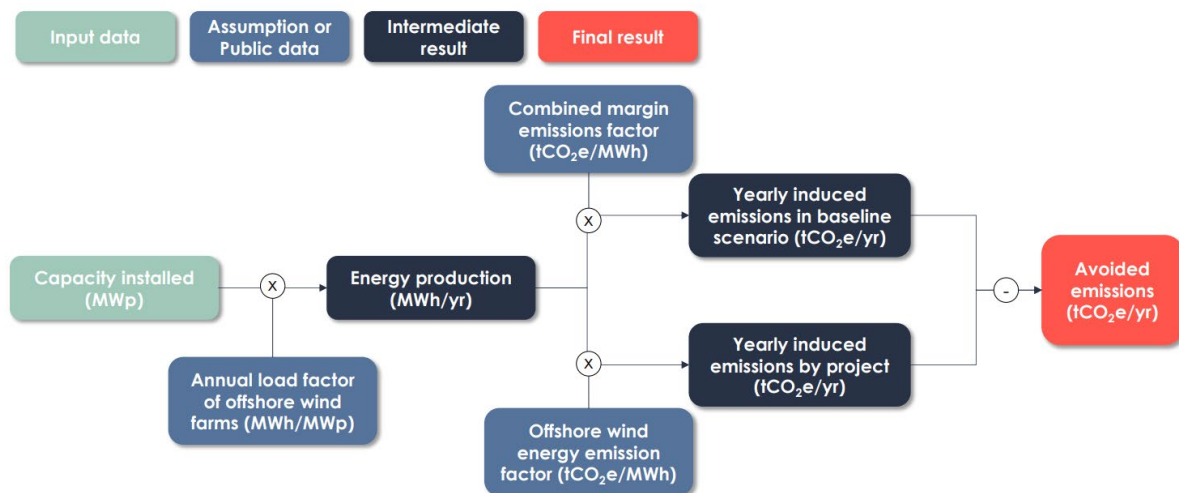The intervention field includes onshore and offshore wind energy.

**Methodology for calculating avoided emissions of onshore windfarms:**



**Assumptions:**

- The calculation takes into account the Member State of the project for load factor and emissions factor of electricity in baseline scenario.

- Load factor: The country load factors are from IRENA.

- Baseline emissions factor: The baseline emissions factor is calculated using OMBM methodology. The emissions factor is the Combined Margin (CM) which takes into account the Operating Margin EF and the Build Margin EF.

- The Operating margin (OM) EF is the emission factor related to existing power plants and current electricity generation.

- The Build margin (BM) EF is the emission factor related to the power plants under construction.

- OMBM emissions factors come from the International Financial Institutions technical working group on GHG accounting. They have been reviewed by Carbone 4 to integrate the upstream emissions factor.

## Methodology for calculating avoided emissions of offshore windfarms:



## Assumptions:

- The calculation takes into account the Member State of the project for load factor and emissions factor of electricity in baseline scenario.

- Load factor: The country load factors are from IRENA.

- Baseline emissions factor: The baseline emissions factor is calculated using OMBM methodology. The emissions factor is the Combined Margin (CM) which takes into account the Operating Margin EF and the Build Margin EF.

- The Operating margin (OM) EF is the emission factor related to existing power plants and current electricity generation.

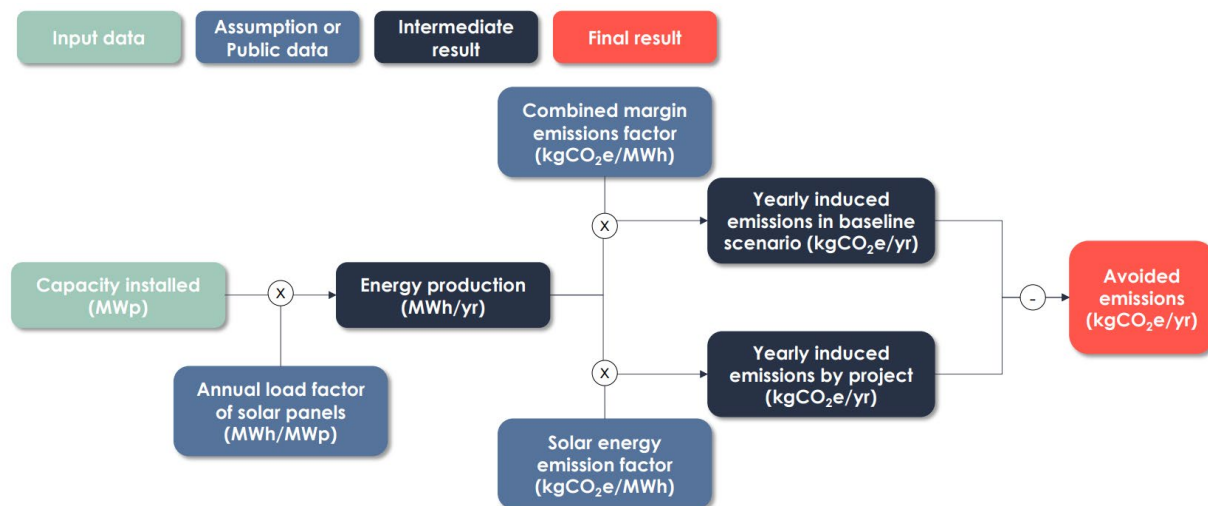- The Build margin (BM) EF is the emission factor related to the power plants under construction.

OMBM emissions factors are from the International Financial Institutions technical working group on GHG accounting. They have been reviewed by Carbone 4 to integrate the upstream emissions factor.

# Intervention Field 029

## Renewable energy: solar

The intervention field includes new solar energy installations.

**Methodology for calculating avoided emissions of new solar energy installations:**



**Assumptions:**

- Load factor: The country load factors are from IRENA.

- Baseline emissions factor: The baseline emissions factor is calculated using OMBM methodology. The emissions factor is the Combined Margin (CM) which takes into account the Operating Margin EF and the Build Margin EF.

  - The Operating margin (OM) EF is the emission factor related to existing power plants and current electricity generation of the respective Member State.
  - The Build margin (BM) EF is the emission factor related to the power plants under construction or planned in the near future in the Member State. It enables to take into account the future evolution of the electrical system.

  OMBM emissions factors are from the International Financial Institutions technical working group on GHG accounting. They have been reviewed by Carbone 4 to integrate the upstream emissions factor.

- Project emissions factor: The emissions from solar energy come from the panel manufacturing. The emissions factor of solar panels installed in France is used to calculate each Member State emissions factor, taking into account the specific load factor of the respective Member State.

- The calculation takes into account the Member State of the project for load factor and emissions factor of electricity in baseline scenario.

# Intervention Field 030bis

## Renewable energy: biomass with high GHG savings

Intervention field 030bis covers both electricity or heat generation and transport activities. In the context of NGEU green bond financing milestones and targets associated to the measures under this intervention field relate to bioethanol and hydrogen production.

**Methodology for calculating avoided emissions of bioethanol production capacity installed:**
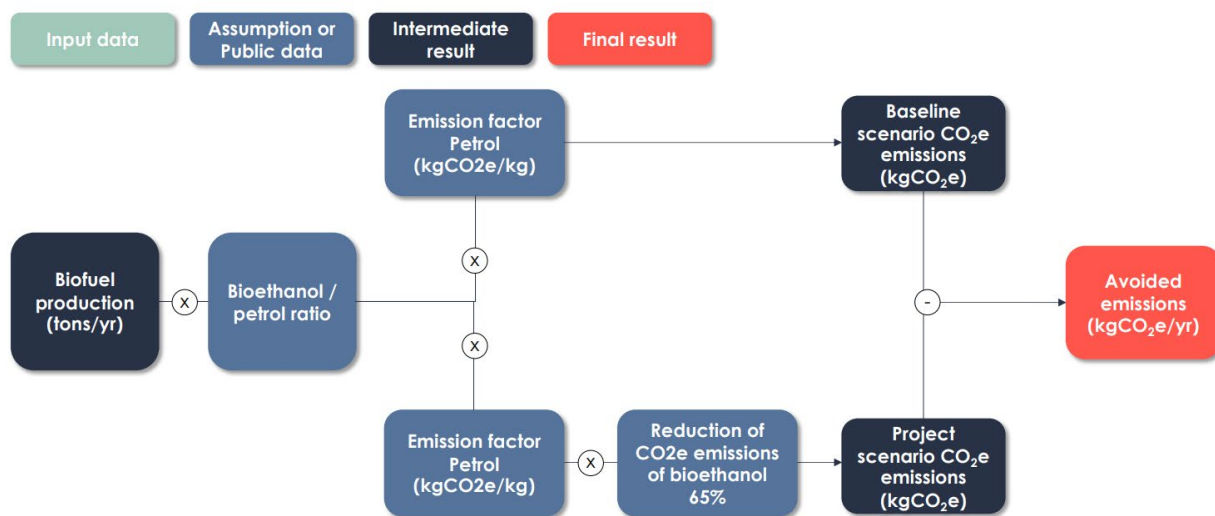


**Assumptions:**

- The usage of bioethanol replaces the usage of pure petrol, therefore using the emission factor of petrol in the baseline scenario. A conversion factor is used to estimate how many kilograms of bioethanol would be used instead of one kilogram of petrol, based on the energy production of each one.

- Avoided emissions are based on the revised renewable energy directive (2018/2001/EU) mandating that bioethanol should induce 65% less emissions compared to petrol.

- The methodology uses tons of bioethanol as the unit of choice.

## Methodology for calculating avoided emissions of new hydrogen production capacity:
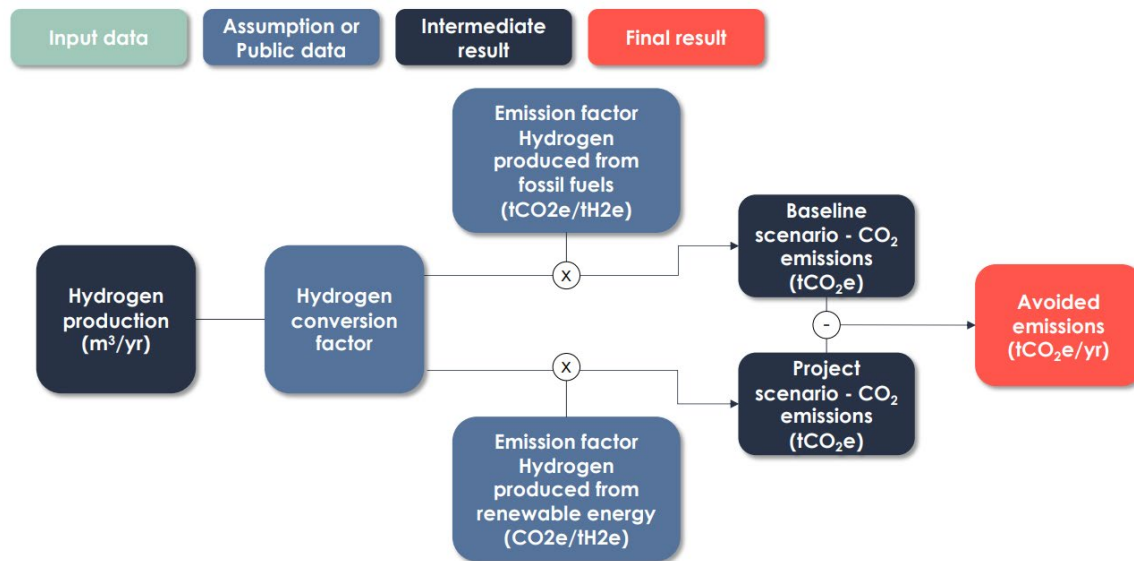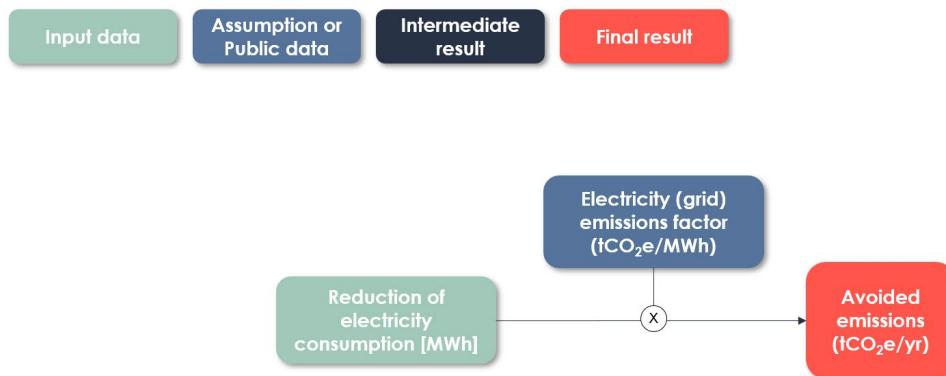


## Assumptions:

- In order to develop this methodology, m3 of hydrogen was chosen as the unit of choice and existing data then converted into tons of hydrogen.

- Emissions factor: Since it is mainly of fossil origin, hydrogen has a very high carbon footprint, with a world average of 15 kgCO2e / kgH2 for dedicated hydrogen production. Hydrogen is considered low carbon if and only if its carbon footprint is less than or equal to 3 kgCO2e / kgH2, according to the EU Taxonomy. For the calculation of avoided emissions financed by green bonds, the baseline situation consists in fossil hydrogen production and the scenario consists in low-carbon hydrogen production.

# Intervention Field 032 (New)

## Other renewable energy (including geothermal energy)

The intervention includes various types of renewable energy production, hydrogen production and reduction of GHGe emissions owing to energy consumption reduction.

**Methodology for calculating avoided emissions from reduced electricity consumption (electricity savings):**



**Assumptions:**

- It is assumed that there has been no change in energy carrier and that it is only a reduction of electricity consumption.

- **Emission factors:** data is retrieved from the IEA database.

- The **baseline scenario** for projects with reduced electricity consumption includes the amount of electricity that was reduced, with a carbon intensity corresponding to the electricity mix of the country.

**Methodology for calculating avoided emissions of geothermal heat plants:**
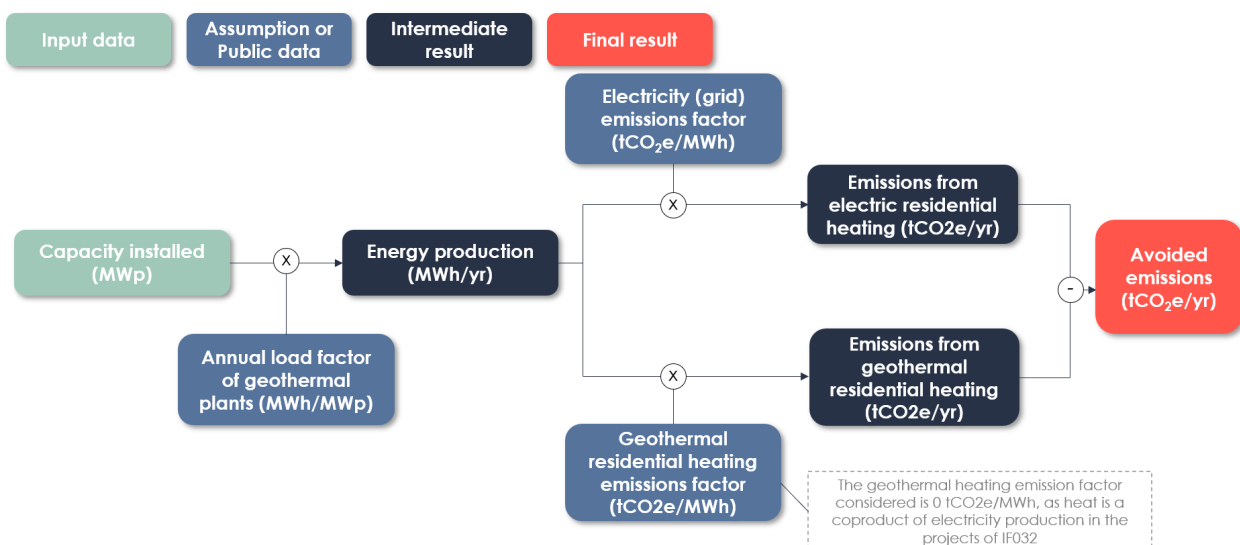
**Assumptions:**

- The energy demand for heat (Primary/Final energy consumption) is expected to stay stable respectively decrease. Therefore, additional energy from renewable sources will (partially) replace the energy previously produced from fossil sources.

- The projects are assumed to be used for residential heating.

- **Load factor:** IRENA database is used to obtain each country's load factors.

- The **reference scenario** is assumed to be residential heating with electricity from the grid.

- The geothermal heat volume is assumed to be produced without any emissions, as it is a coproduct of the electricity production.
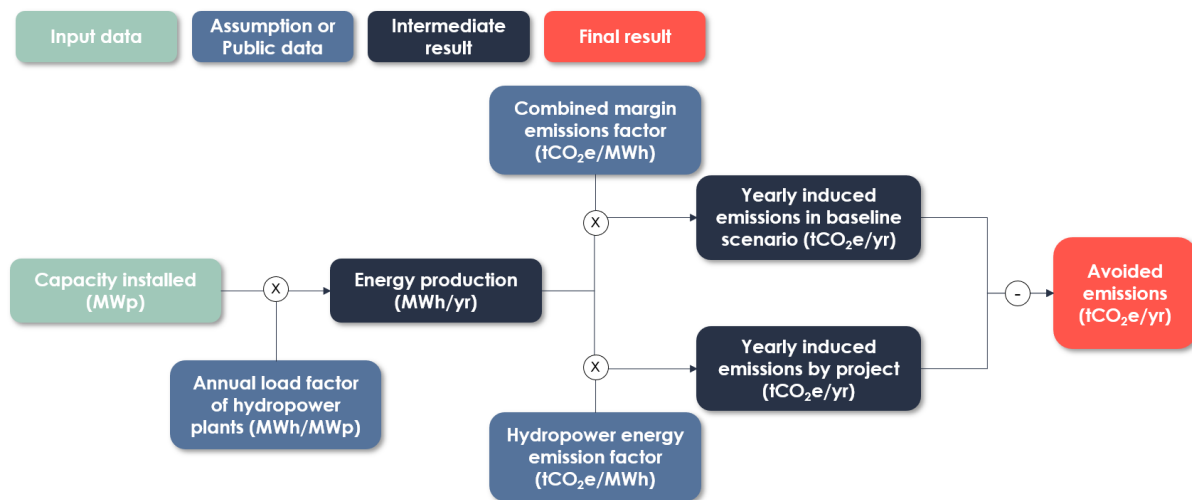
## Methodology for calculating avoided emissions of onshore windfarms:

Please refer to the methodology under intervention field 028.

## Methodology for calculating avoided emissions of new solar panels installations:

Please refer to the methodology under intervention field 029.

## Methodology for calculating avoided emissions of new hydropower plants:



**Assumptions:**

- **Baseline emissions factor:** The baseline emissions factor is calculated using OMBM methodology. The emissions factor is the Combined Margin (CM) which takes into account the Operating Margin EF and the Build Margin EF.

  o The Operating margin (OM) EF is the emission factor related to existing power plants and current electricity generation.

  o The Build margin (BM) EF is the emission factor related to the power plants under construction.

- OMBM emissions factors are from the International Financial Institutions technical working group on greenhouse gas accounting. They have been reviewed by Carbone 4 to integrate the upstream emissions factor.
- **Load factor:** The country load factors are from IRENA

**Methodology for calculating avoided emissions of smart electricity meters:**

Please refer to the methodology under intervention field 033.

**Methodology for calculating avoided emissions of new hydrogen production capacity installed:**

Please refer to the methodology under intervention field 022.

# Intervention Field 033

## Smart Energy Systems (including smart grids and ICT systems) and related storage

The intervention field primarily focuses on smart meters but includes also some measures related to hydrogen and solar panels, and zero-emission vehicles.

**Methodology for calculating avoided emissions of smart electricity meters:**
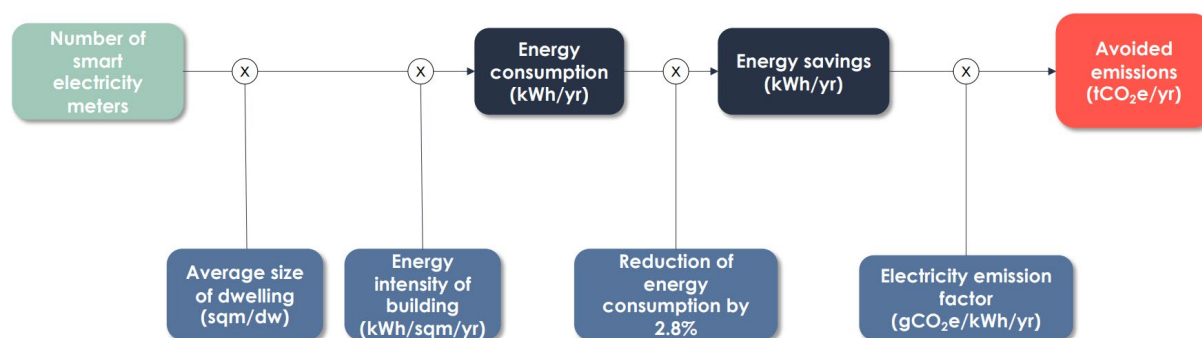


**Assumptions:**

- The calculation takes into account the emission pathway of electricity in each Member State.
- It is assumed that smart/advanced meters, together with provision of data, will reduce electricity consumption by 2.8%.
- As the information is lacking, the projects are tagged as 'Residential' as the energy consumption is lower for most countries. For dwelling size, the data is not differentiated between residential and non-residential.
- It is assumed that there is one smart electricity meter per dwelling.
- The reference emission factor of the electricity is calculated using the carbon intensity pathway of electricity in each Member State over the entire life cycle of the smart meters.

- The lifespan of smart electricity meters is assumed to be 15 years.

## Methodology for calculating avoided emissions of new hydrogen production capacity:

- Please refer to the methodology under intervention field 022 with the following change of assumption:

 – Load factor: The load factor of an electrolyser is the ratio of the energy actually produced over a given period to the energy it would have produced if it had been operating at its rated power during the same period. An average load factor of 40% of the IEA scenarios was used.

## Methodology for calculating avoided emissions of wind farms:

Please refer to the methodology under intervention field 028.

## Methodology for calculating avoided emissions of solar panels:

- Please refer to the methodology under intervention field 029 with the following assumption:

 – If no precise information about the type of projects between solar and wind projects was present, all projects were assumed to be solar panel projects to be more conservative. The associated emission factor is higher, and the load factor is lower.

## Methodology for calculating avoided emissions of zero-emission vehicles:

Please refer to the methodology for zero-emission vehicles under intervention field ADHOC.

# Intervention Field 034bis0 (New)

## High efficiency co-generation, efficient district heating and cooling with low lifecycle emissions

The impact assessment under this intervention field reviewed a measure of modernisation of distribution of heat in district heating systems.

**Methodology for calculating avoided emissions due to modernisation of distribution of heat in district heating systems:**

Please refer to the methodology for calculating avoided emissions due to building renovation under intervention field 025bis.

# Intervention Field 039bis (New)

## Provision of water for human consumption (extraction, treatment, storage and distribution infrastructure, efficiency measures, drinking water supply) compliant with efficiency criteria

The intervention field focuses on investments in drinking water networks and smart water meter compliant energy efficiency criteria.

**Methodology for calculating avoided emissions of water savings by usage of smart water meter:**
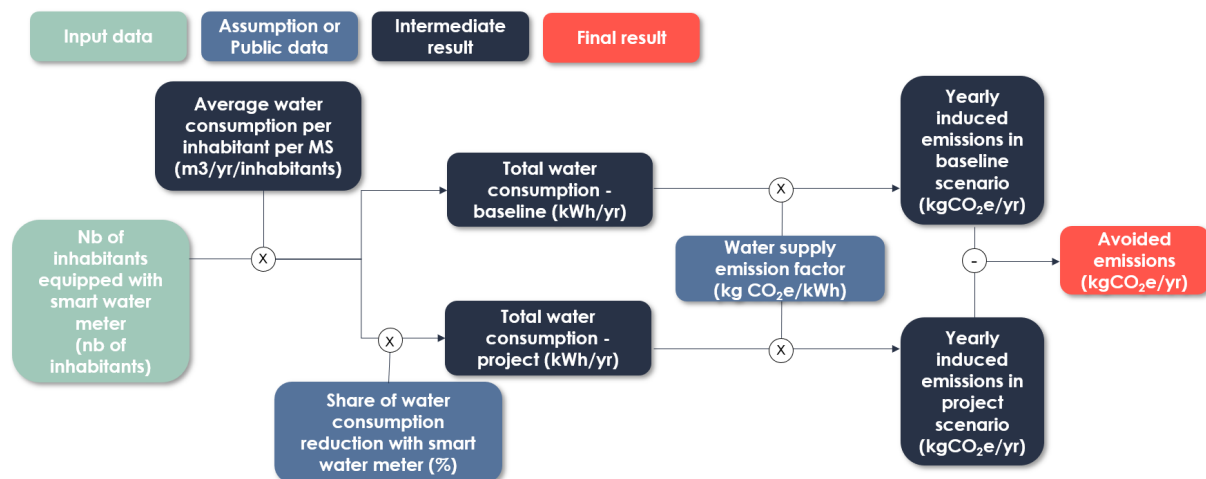
- **Reducing water consumption, avoids emissions linked to water treatment and distribution.**

- **The use of smart water metering reduces water consumption by 2%.** This figure is sourced from [_"The impact of smart meters on residential water consumption: Evidence from a natural experiment in the Canary Islands", 2021, Daminato et al_](link).

- The volume of water saved is computed based on the **average water consumption per inhabitant** per Member State.

- The **number of inhabitants** equipped with smart water meters is used to compute water savings.

- Emission factor for water treatment and distribution is sourced from **Ecoinvent 3.9** "Tap water, conventional treatment, Europe without Switzerland"

## Methodology for calculating avoided emissions of energy efficiency projects for drinking water networks
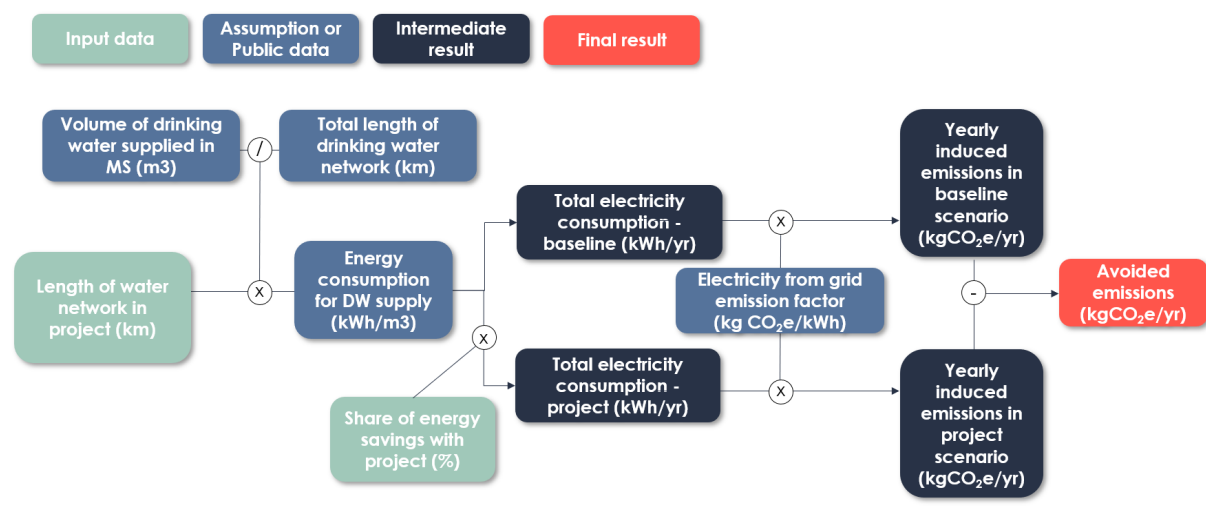


**Assumptions:**

- **New more efficient networks and reconstructed more efficient networks are treated equally.** The baseline in both cases is a network with average energy efficiency.

- Projects can be described directly by the **length of drinking water network in km**, or by the number of projects in MS. For the latter, the value is converted in length in km with the assumption that one project is 100km of network

- The **volume of drinking water** supplied by the project is estimated using the **ratio of m3/km** of network at the Member State level. If data is not available for a given MS for drinking water volumes or for length of drinking water network, the European ratio is used.

- The **energy consumption for treatment and distribution of drinking water (kWh/m3)** is used to compute the electricity consumption of the project. If values are missing for a given MS, the average of all MS is used.

- Values of energy saving by projects at the MS level is the weighted average of energy savings of each project, weighted by length of project, if there are several projects in the same country

- **Emissions pathways of electricity (baseline)**: Based on IEA's scenarios, we take into account the evolution of the emission factors of electricity in each of the MS to calculate emissions associated with electric consumption of waste-water treatment plants.

# Intervention Field 041bis (New)

## Waste-water collection and treatment compliant with energy efficiency criteria

The intervention field focuses on investments in waste-water treatment units compliant with energy efficiency criteria.

**Methodology for calculating avoided emissions of energy efficiency projects for waste-water treatment plants**

- From output to electricity consumption of an average plant:
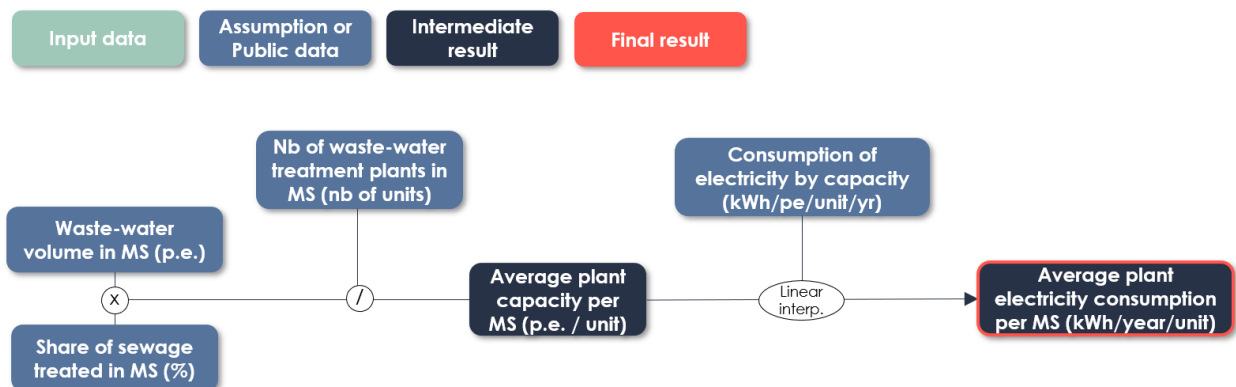
- **Calculating avoided emissions, taking into account electricity consumption of an average plant:**
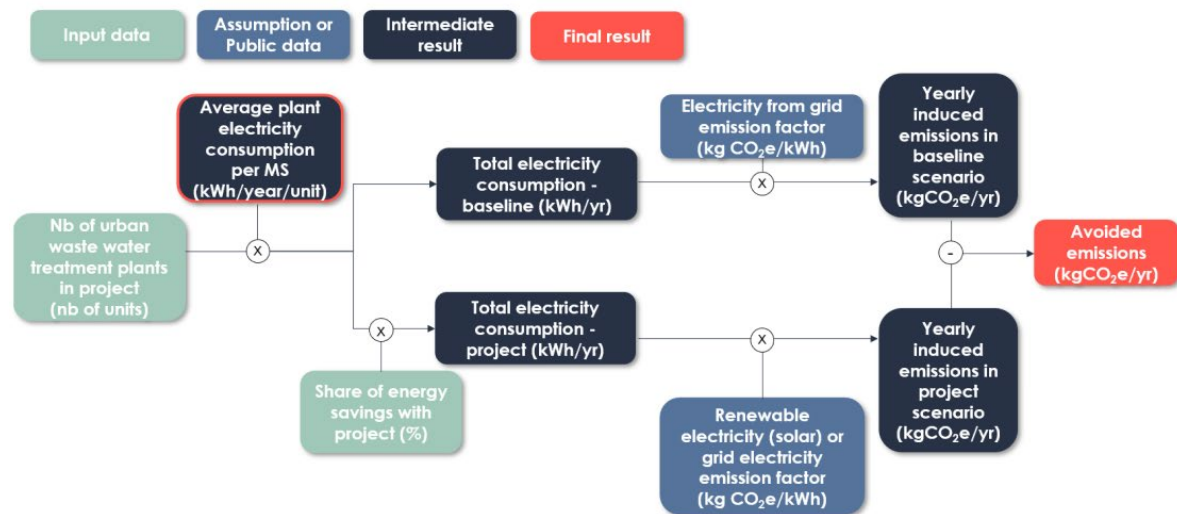


**Assumptions:**

- **Newly built waste-water treatment plants** and **upgrading of existing plants are treated equally**. It is considered that without the project, an average waste-water treatment plant would be in operation (baseline).

- Emissions from waste-water treatment plants are computed based on the average for each Member State

  - o **Average capacity** is computed based on data of volume of waste-water, share treated and number of treatment plants in the MS. Data is sourced from WISE freshwater – Country profiles on urban waste water treatment

  - o **Average consumption** is computed based on electricity consumption profile of plants as a function of their capacity. Values are sourced from *Opportunities to improve energy use in urban wastewater treatment: a European-scale analysis, Ganora et al., 2019.*

- **Emissions pathways of electricity (baseline):** Based on IEA's scenarios, we take into account the evolution of the emission factors of electricity in each of the MS to calculate emissions associated with electric consumption of waste-water treatment plants.

- Project emissions factor:

  - o "Net zero energy" as mentioned in projects is considered to be **renewable electricity**. Taking a conservative assumption, it is considered to be produced with **solar panels**. The associated emission factor is higher and the load factor is lower.

  - o The emissions from solar energy come from the panel manufacturing. The emissions factor of solar panels installed in France is used to calculate each country emissions factor, taking into account the specific load factor of the country.

  - o **Load factor:** Country load factors are from IRENA

- o  For projects, the emission factor of electricity used is either the grid one (same as baseline) if no mention is made in the project description of the type of electricity used, or the solar electricity one, if a "net zero energy" mention is made.

# Intervention Field 042

## Household waste management: prevention, minimisation, sorting, reuse, recycling measures

The intervention field groups a large number of waste prevention and processing activities. For the purpose of impact reporting however, only the ones pertaining to plastic and municipal waste sorting/processing were included due to the lack of data for other activities.
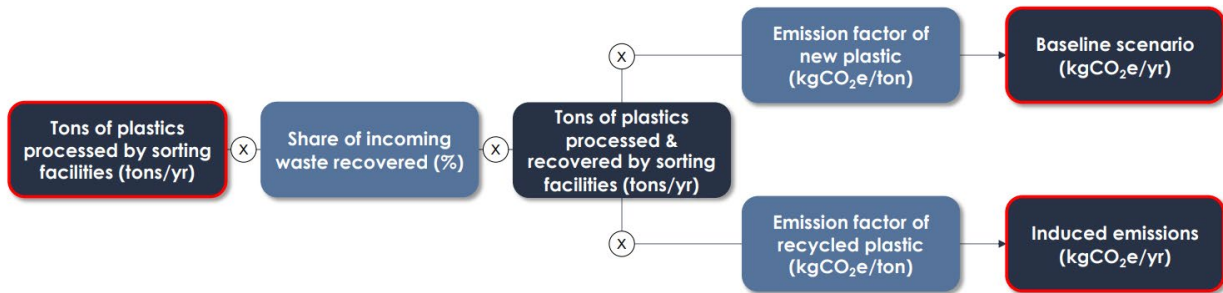
**Methodology for calculating avoided emissions of sorting facilities:**

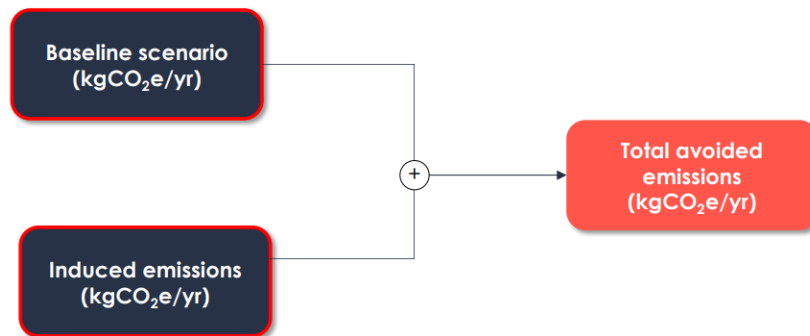- – **from input to intermediate results**
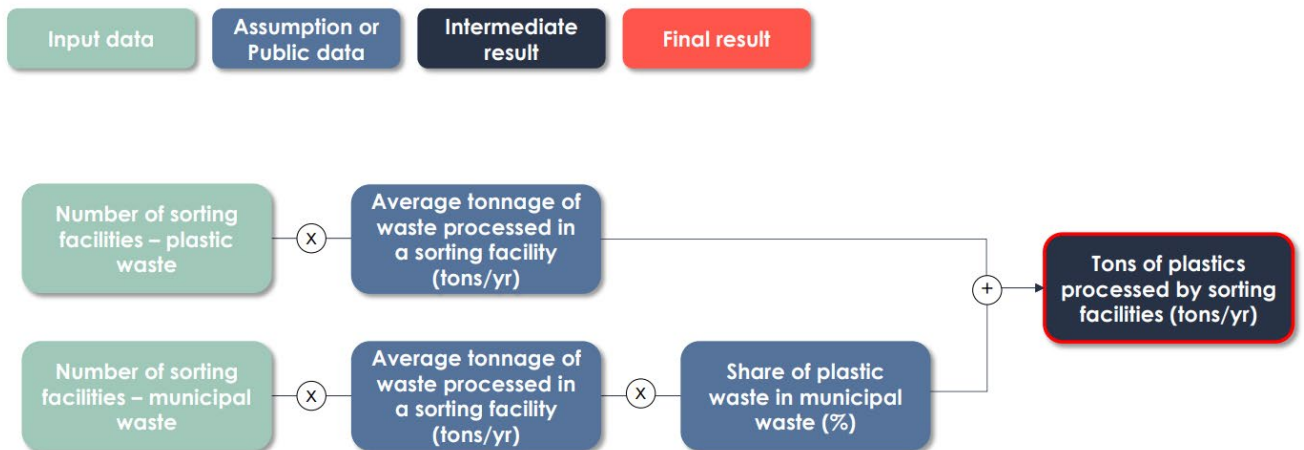
– **from intermediate to final results (1)**



– **from intermediate to final results (2)**
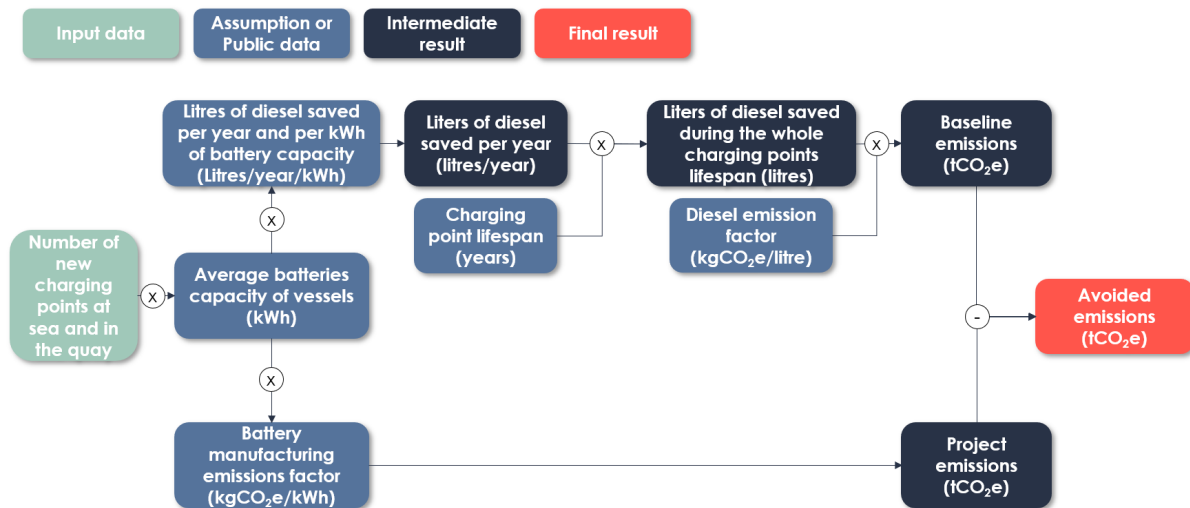


**Assumptions:**

- Recycling facilities are not covered in this IF as there is not enough data available. Moreover, this would lead to double counting of emissions, as recycling facilities and sorting facilities are on the same value chain. All emissions are allocated to the sorting plant.

- The assumption for the number of kilograms of plastic waste treated by the plant is based on data from existing plants in Europe.

- For sorting facilities that treat municipal waste, the assumption for the kilograms of plastic waste treated was based on the average ratio of plastic waste in municipal waste in Europe.

- In order to calculate avoided emissions, it is assumed that 90% plastic waste treated will lead to the use of recycled plastic and thus avoid the use of new plastic.

# Intervention Field 050 (New)

## Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure

The intervention field focuses on investments in charging points for electric or hybrid vessels.

**Methodology for calculating avoided emissions of charging points for electric or hybrid vessels:**



**Assumptions:**

- The methodology is **based on a volume of diesel saved per kWh of vessels battery capacity and per year**. The methodology assumes that **each charging point is associated to a battery capacity in kWh**.

- The battery capacity of vessels using the evaluated charging points being not provided, **the evaluated charging points are considered to be associated with vessels with an average battery capacity.**

- The litres of diesel saved per year / kWh of battery capacity (litres/year /kWh) is considered to **be identical to the case of the vessel Ampere,** the world's first electric ferry (commissioned in 2015).

- The total volume of diesel saved is obtained using conservative assumption on charging point lifespan.

- CO2 emissions in baseline scenario are estimated using diesel emissions factor (Marine Diesel Oil).

- CO2 emissions in project scenario are estimated using battery manufacturing emissions factor. Electricity consumed is considered to be zero-emissions, as the electricity is produced through offshore wind (M&T). Emissions of charging points manufacturing are considered to be not significant and are thus excluded.
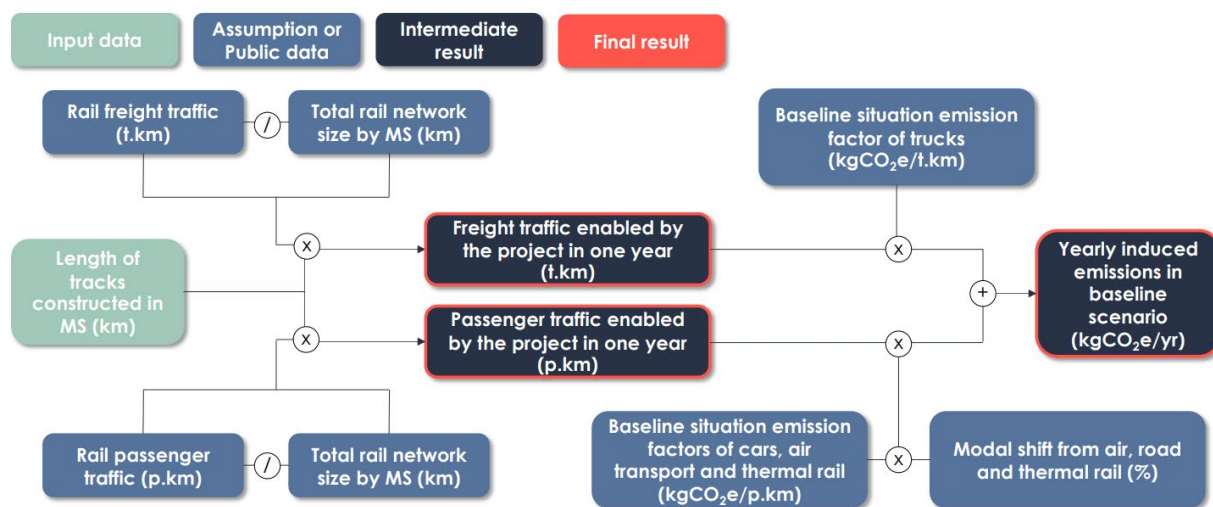
# Intervention Field 064

## Newly built or upgraded railways – TEN-T core network
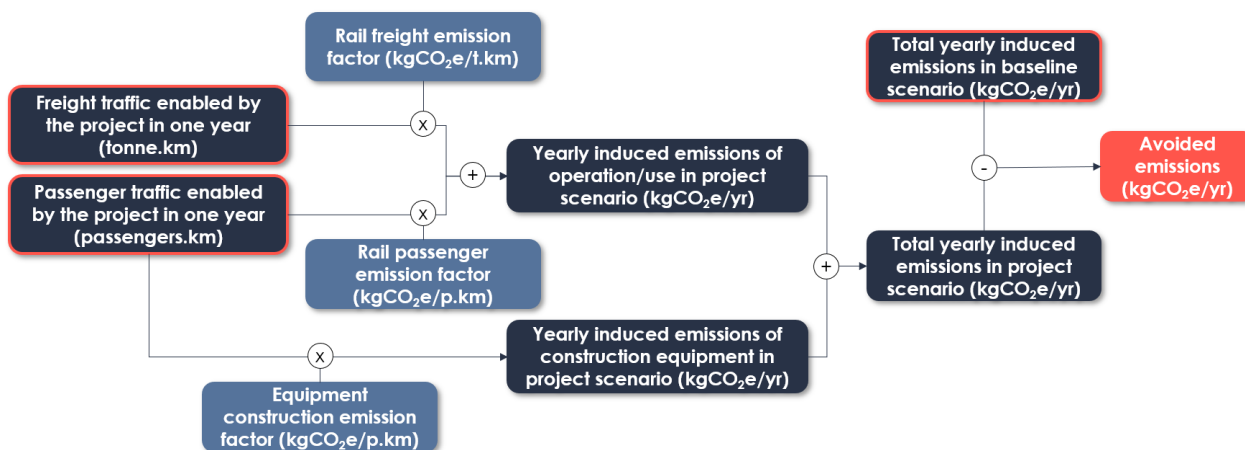
The intervention field includes passenger and freight rail.

**Methodology for calculating avoided emissions of newly built or upgraded railways:**

– **from input to intermediate results**



– **from intermediate to final results**

**Assumptions:**

- The calculation takes into account the emission pathway of electricity in each Member State.

- Traffic enabled by the project in one year: The traffic enabled by the project is calculated using total passenger-kilometre and total ton-kilometre of the year 2019 using Eurostat divided by the total train network length in kilometres per Member State. This is multiplied by the new kilometres built to estimate the traffic enabled by the investments.

- The year 2019 was chosen to avoid the effects of COVID-19 on the data.

- Induced emissions: Based on IEA's scenarios, we take into account the evolution of the emission factors of electricity in each of the Member States to calculate emissions associated with electric train usage.

- Modal shift:

- Passenger transport: Estimates the added passenger traffic by the project as well as the modal shift from cars, thermal trains, and aviation to electric trains.

- Freight: It is considered that all freight induced by the project is additional freight. In the absence of the project, the freight would have occurred by road.

- Baseline scenario:

- Emission from car usage: Based on data from the International Energy Agency, takes into account the increase in electric fleet in the next years. The emissions factor from car usage is a weighted average between emissions from a medium thermal car and a medium electric car.

- The emissions from thermal trucks and thermal trains are considered to be identical in all Member States.

- Emissions from air transport: The emissions factor that was chosen is for travel between 0 and 1000km, a distance range that is the most likely to be replaced by rail travel after the project completion.

- Due to lack of data, Belgium and Netherlands are not covered.

# Intervention Field 065

## Newly built or upgraded railways – TEN-T comprehensive network

The intervention field includes passenger and freight rail.

**Methodology for calculating avoided emissions of newly built or upgraded railways:**

- Please refer to the methodology under intervention field 064.

# Intervention Field 066bis (New)

## Other newly or upgraded built railways – electric/zero emission

The intervention field includes passenger and freight rail.

**Methodology for calculating avoided emissions of newly built or upgraded railways:**

- Please refer to the methodology under intervention field 064 with the following additional assumption:
  - An update of an existing railway track towards higher possible speed, an update to an electrified track as well as a newly built railway track are treated equally with respect to the emissions saved per updated/built km of railway track.

# Intervention Field 067 (New)

## Reconstructed or modernised railways – TEN-T core network

The intervention field includes upgraded railways.

**Methodology for calculating avoided emissions of newly built or upgraded railways:**

- Please refer to the methodology under intervention field 064 with the following additional assumption:
  - An update of an existing railway track towards higher possible speed, an update to an electrified track as well as a newly built railway track are treated equally with respect to the emissions saved per updated/built km of railway track.

# Intervention Field 068

## Reconstructed or modernised railways – TEN-T comprehensive network

The intervention field includes investments in upgrading passenger and freight rail that is part of the TEN-T comprehensive network.

**Methodology for calculating avoided emissions of reconstructed or modernised railways:**

- Please refer to the methodology under intervention field 064.

**Assumptions:**

- For the purpose of the analysis, the rail reconstructed or modernized is assumed to be similar to newly constructed. This will lead to an underestimation of GHG emissions avoided due to higher construction emissions being assumed.

# Intervention Field 069bis (New)

## Other reconstructed or modernised railways – electric/zero emission

The intervention field includes investments in upgrading passenger and freight rail, other than that part of the TEN-T network.

**Methodology for calculating avoided emissions of newly built or upgraded railways:**

- Please refer to the methodology under intervention field 064 with the following additional assumption:
  - An update of an existing railway track towards higher possible speed, an update to an electrified track as well as a newly built railway track are treated equally with respect to the emissions saved per updated/built km of railway track.

# Intervention Field 070 (New)

## Digitalisation of transport: rail

The intervention field includes investments in upgrading passenger and freight rail, and bicycle infrastructure.

**Methodology for calculating avoided emissions of reconstructed or modernised railways:**

- Please refer to the methodology under intervention field 064.

**Methodology for calculating avoided emissions of new cycle paths and cycle biking places:**

- Please refer to the methodology under intervention field 075.

# Intervention Field 071 (New)

## European Rail Traffic Management System (ERTMS)

The intervention field includes investments financing purchasing new trains and locomotives, and upgrading passenger and freight rail.

**Methodology for calculating avoided emissions of ERTMS projects – methodology for rolling stock:**

- Please refer to the methodology under intervention field 072bis with the following additional assumption:
  - New rolling stock and retrofitting of existing rolling stock are treated equally with respect to the emissions saved per train.

**Methodology for calculating avoided emissions of ERTMS projects – methodology for railway assets:**

- Please refer to the methodology under intervention field 064 with the following additional assumption:
  - An update of an existing railway track towards higher possible speed, an update to an electrified track as well as a newly built railway track are treated equally with respect to the emissions saved per updated/built km of railway track.
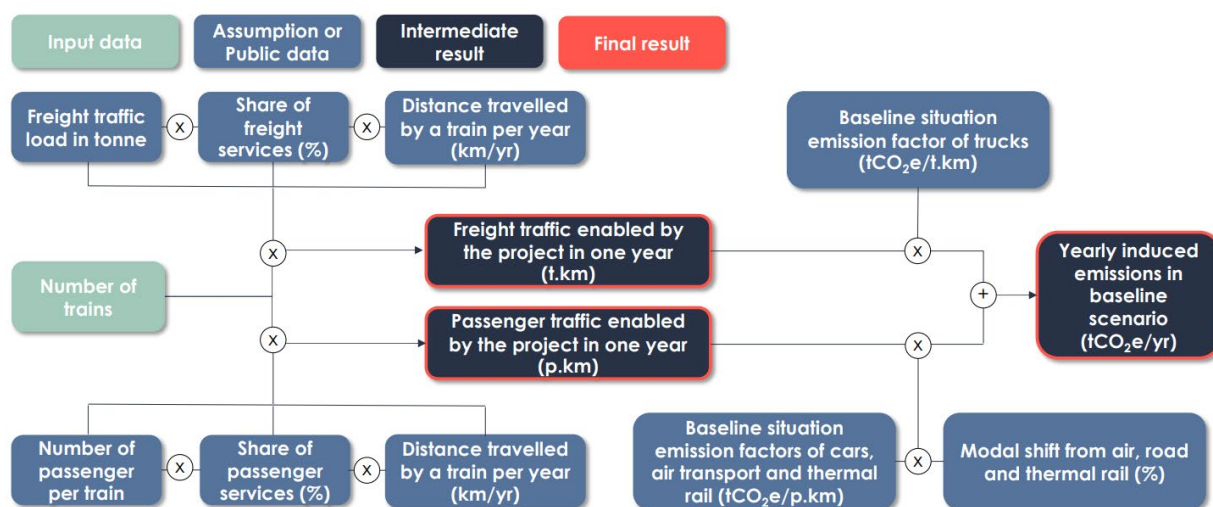
# Intervention Field 072bis

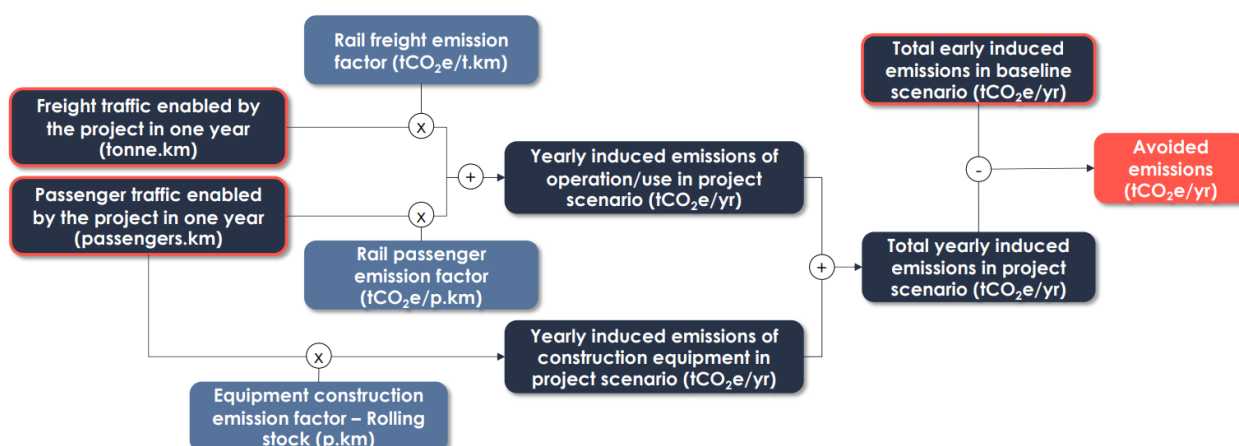## Mobile zero emission/electric powered rail assets

The intervention field includes trains and locomotives.

**Methodology for calculating avoided emissions of mobile zero emission/electric powered rail assets (trains):**

– **from input to intermediate results**



– **from intermediate to final results**



**Assumptions:**

- Emission pathways of electricity: Estimating the evolution of the emission factors associated with the train and the electric car and the evolution of the share of electric vehicles in Europe.
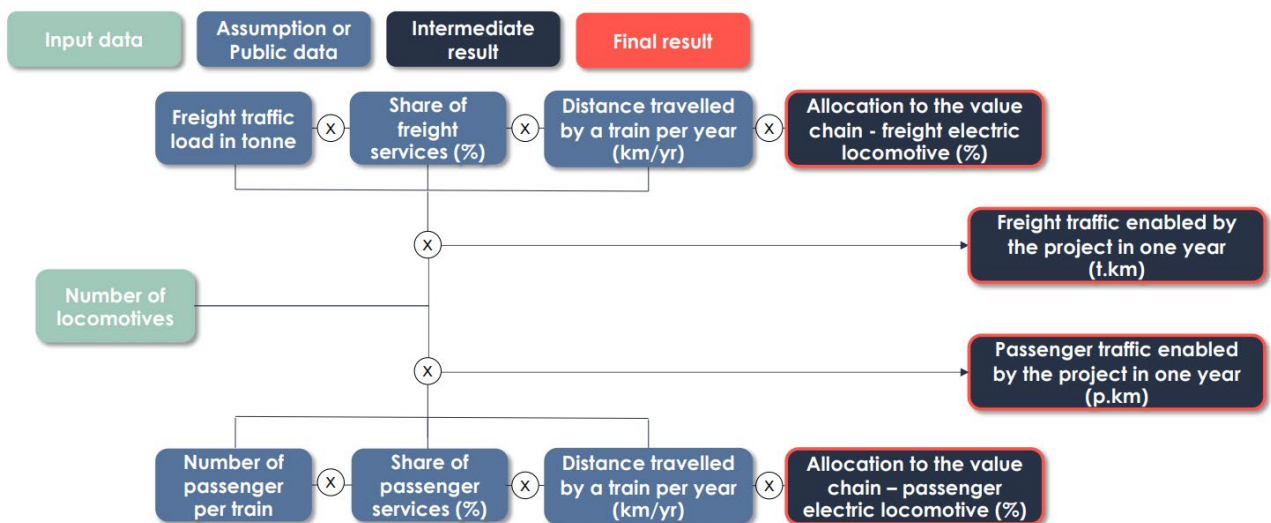
- Modal shift:

  - Passenger transport: estimates the added passenger traffic by the project as well as the modal shift from cars, thermal trains, and aviation to electric trains.

  - Freight: It is considered that all freight induced by the project is additional freight. In the absence of the project, the freight would have occurred by road.

    - Traffic enabled by the project in one year: Passenger and freight activity data are estimated from national averages from the IRG-rail. The distance travelled by a train is estimated from a French national average.

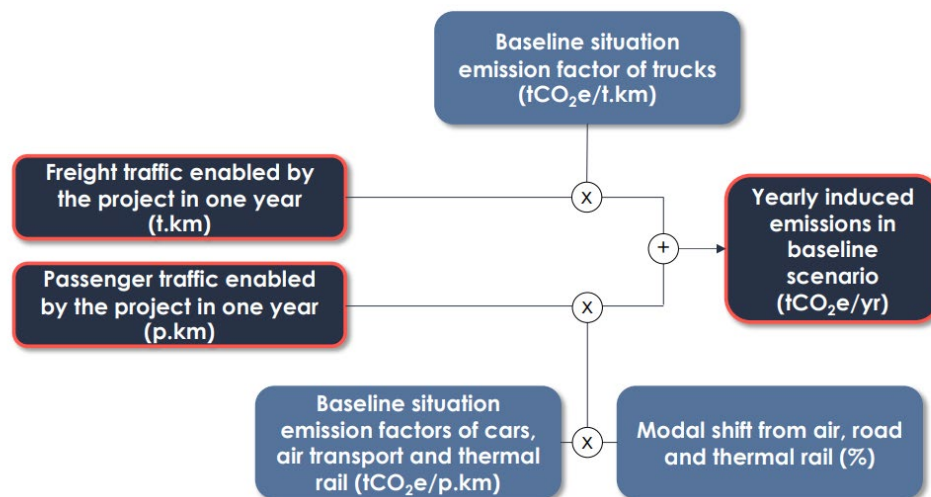    - The calculation takes into account the emission pathway of electricity in each Member State.

**Methodology for calculating avoided emissions of mobile zero emission/electric powered rail assets (locomotives):**

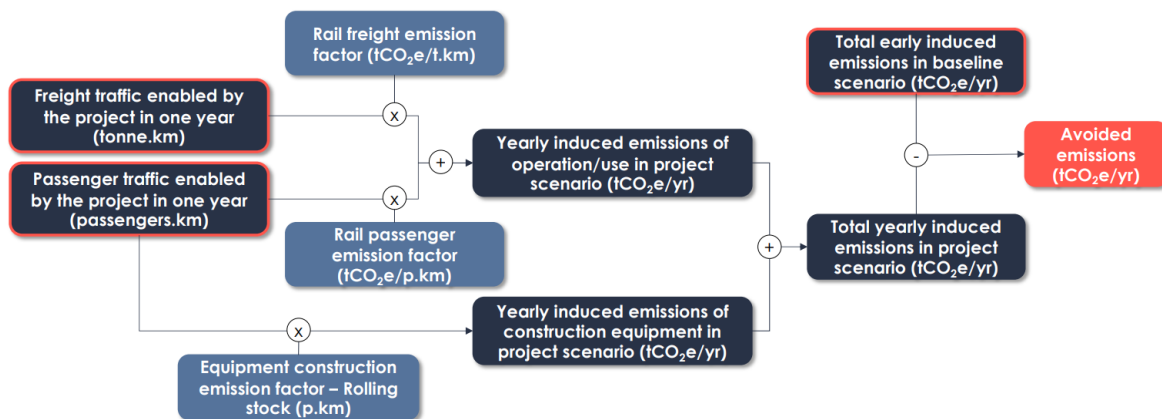- **from input to intermediate results**

- **from intermediate to final results (1)**



- **from intermediate to final results (2)**



**Assumptions:**

- Emission pathways of electricity: estimating the evolution of the emission factors associated with the train and the electric car and the evolution of the share of electric vehicles in Europe.

- Modal shift:

- Passenger transport: estimates the added passenger traffic by the project as well as the modal shift from cars, thermal trains, and aviation to electric trains.

- Freight: It is considered that all freight induced by the project is additional freight. In the absence of the project, the freight would have occurred by road.

- Traffic enabled by the project in one year: Passenger and freight activity data are estimated from national averages from the IRG-rail. The distance travelled by a train is estimated from a French national average.

- The allocation of avoided emissions to locomotives is estimated from the allocation to the value chain, based on the distribution of rolling stock costs between cars and

locomotives. It is assumed that there are 1 locomotive and 8 cars per passenger train, 1 locomotive and 35 cars per freight train.
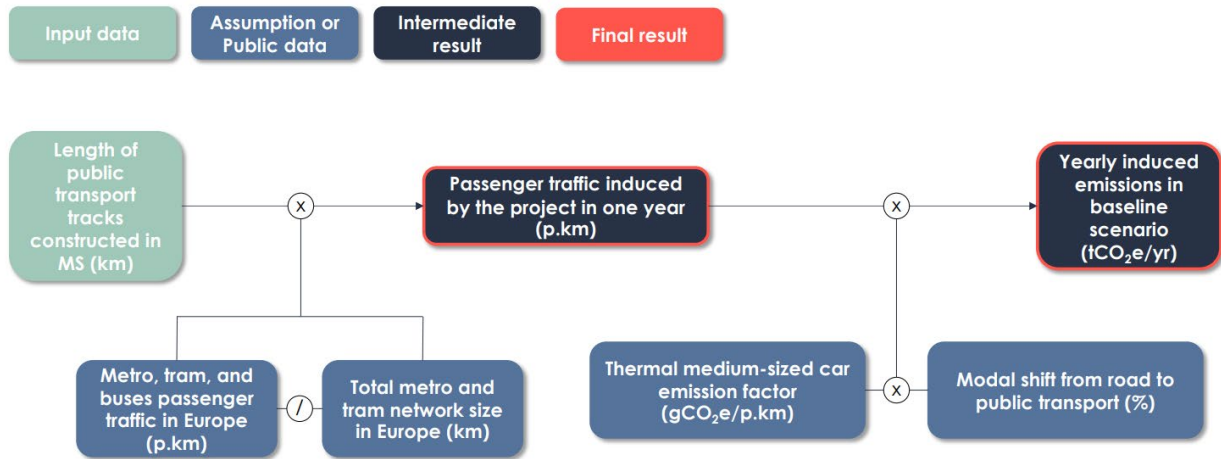
- The calculation takes into account the emission pathway of electricity in each Member State.

# Intervention Field 073
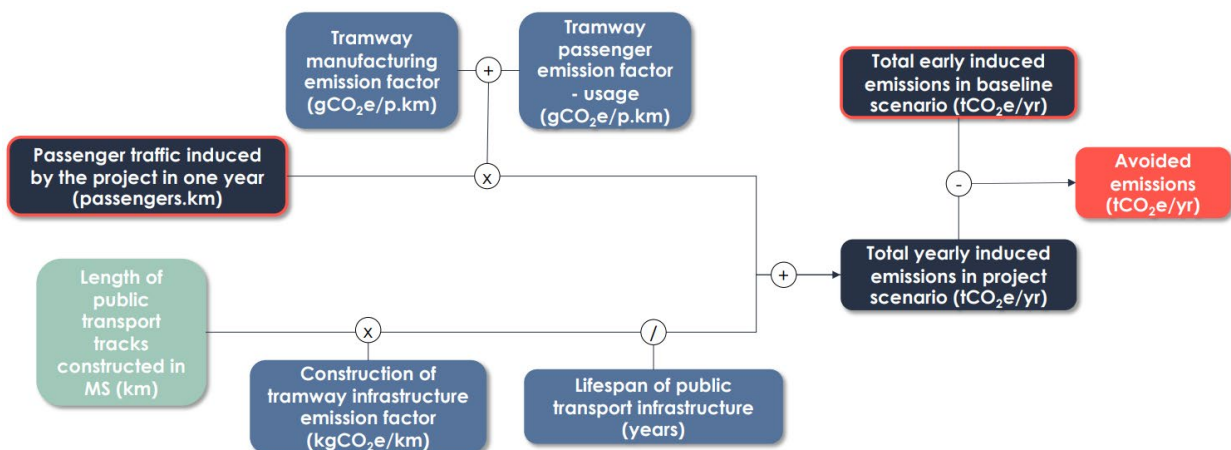
## Clean urban transport infrastructure

**Methodology for calculating avoided emissions of newly built or upgraded clean urban transport:**

- **from input to intermediate results**



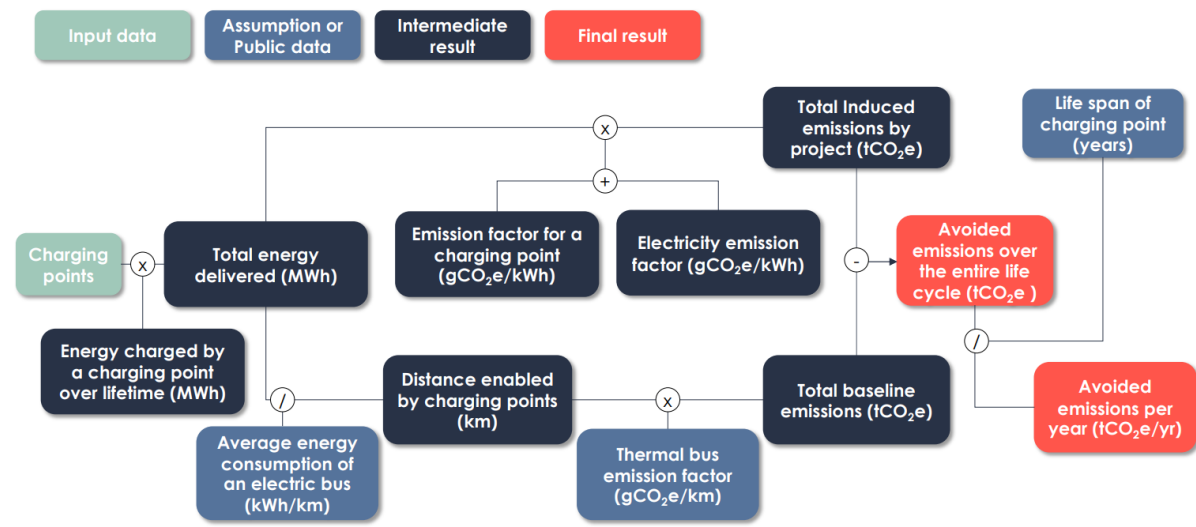- **from intermediate to final results**

**Assumptions:**

- All projects are considered to be tramway line projects. This may introduce inaccuracies for projects that are bus lines and metro lines.

- The emission factor of electricity is calculated using the carbon intensity pathway of electricity in each Member State over the entire life cycle of the tramway. It is assumed that the lifespan of a tramway is 35 years.

- Baseline emissions factor: The reference factor of the thermal car is estimated using the emission factor of a medium-sized gasoline car, which is considered to be constant over time.

- Modal shift: Passenger transport: Based on a report by UK Tram, estimates the modal shift from road to public transport.

- Traffic enabled by the project in one year: Based on European commission databases to calculate the traffic induced by the project. Uses the total tram, metro, and bus passenger-kilometres of the year 2019 divided by the total tram and metro network in kilometres. Results are multiplied by new kilometres built to estimate the traffic enabled by the project.

- The emission factor for the construction of public transport infrastructure: Estimated from the emission factors for the construction of a tramway track, multiplied by the km built in each Member State, divided by the lifetime of the infrastructure. It is assumed that the lifetime of a public transport infrastructure is 35 years.

- The calculation takes into account the emission pathway of electricity in each country.

## Methodology for calculating avoided emissions of bus charging points:

- **intermediary calculation**

| | | |
|---|---|---|
| Annal energy production of a publicly available charging point (MWh) | = | $\dfrac{\text{Bus electricity demand (TWh) x share of public chargers in installed capacity (\%)}}{\text{Total installed capacity (units)}}$ |
| Carbon intensity of charging point manufacturing (kgCO$_2$e/unit) | = | Charger weight (kg)  x manufacturing emissions (kgCO$_2$e/kg) |
| Energy charged by a charging point over lifetime (MWh) | = | Annual energy production of a charging point (MWh) x charging point lifetime (years) |
| Emission factor for a charging point (gCO$_2$e/kWh) | = | $\dfrac{\text{Carbon intensity of charging point manufacturing (kgCO}_2\text{e/unit)}}{\text{Energy charged by a charging point over lifetime (MWh)}}$ + Electrical losses x  Electricity emission factor over the charging point lifetime (gCO$_2$e/kWh) |
| Emission factor of electricity for electric bus (gCO$_2$e/kWh) | = | (Electricity emission factor over the charging point lifetime (gCO$_2$e/kWh) |

66

- **from intermediate to final results**



**Assumptions:**

- The annual production of a charging station is calculated using the total electricity consumption of electric buses in Europe and the total installed capacity. For this purpose, it is estimated that 25% of the recharging is done in public stations.

- The emissions of the charged electricity are compared to the fuel needed for average combustion cars. Emissions may be avoided in two contexts:

- When an electric bus replaces an existing bus
- When an electric bus prevents the purchase of another new bus

- The emission factor of a charging station is calculated by the ratio of the carbon intensity of the production phase of the charging station and the energy charged during its lifetime. Electricity losses are also considered.

- It is assumed that the electrical losses are 5%.
- It is assumed that charging points have a lifetime of eight years.
- The reference charging point for manufacturing emissions calculations weighs 6.2kg

- The emission factor of electricity is calculated using the carbon intensity pathway of electricity in each Member State over the entire life cycle of the charging point.

- The emissions factor of the thermal bus is estimated using the emission factor of a diesel bus purchased in 2020 in Europe. It is considered to be constant over time.

- It is assumed that the number of electric buses purchased with support under the RRF (for which the emission reduction is accounted for under intervention field ADHOC) is a small proportion of the electric bus fleet in the EU, and as such the electric charging stations are predominantly used by electric buses not supported under the RRF which makes double counting negligible.

**Methodology for calculating avoided emissions of electric buses:**

- Please refer to the methodology under intervention field 074.

**Methodology for calculating avoided emissions of zero-emission vehicles:**

- Please refer to the methodology under intervention field ADHOC.

**Methodology for calculating avoided emissions of public and private charging points:**

- Please refer to the methodology under intervention field 077.

# Intervention Field 074

## Clean urban transport rolling stock

**Methodology for calculating avoided emissions of electric buses:**
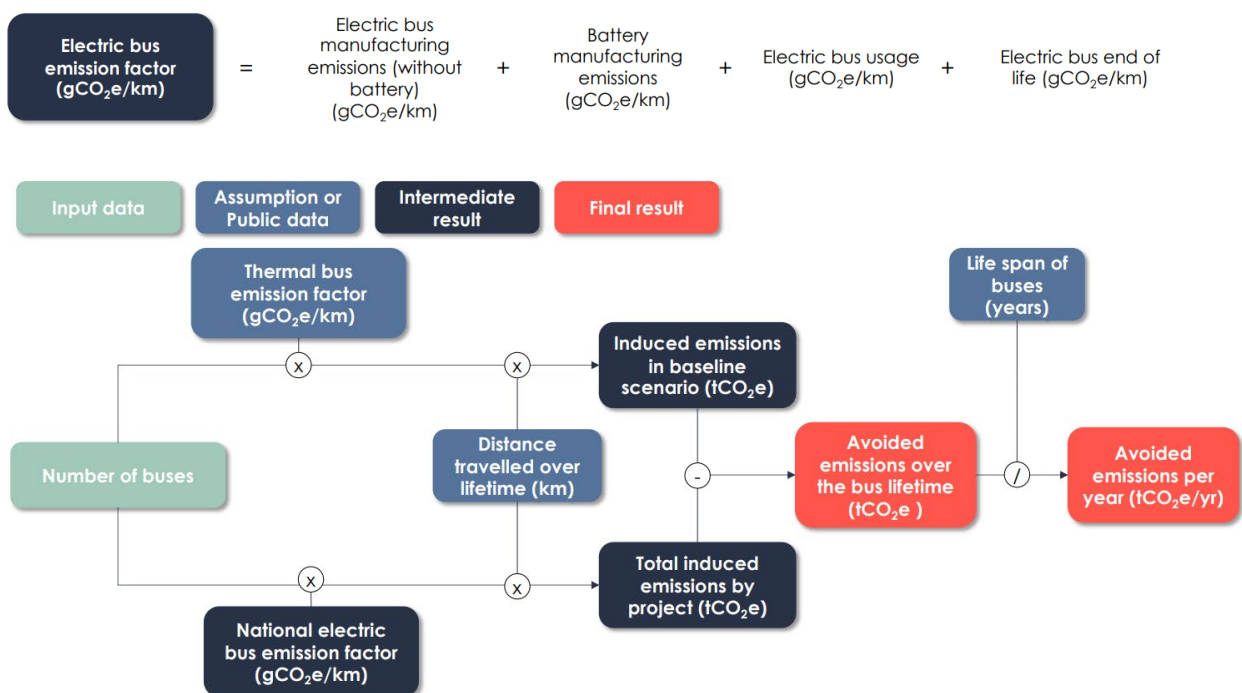


**Assumptions:**

- It is assumed that both thermal and electric buses have a lifespan of 12 years.
- It is assumed that both thermal and electric buses travel 480,000 km over their entire life cycle.
- It is assumed that the purchase of electric buses replaces 100% of thermal buses.

- Baseline emissions factor: The reference factor of the thermal bus is estimated using the emission factor of a diesel bus purchased in 2020 in Europe, which is considered to be constant over time.

- Project emissions factor: The emissions induced by the use of an electric bus (gCO2e/km) are equal to its electricity consumption (kWh/km) multiplied by the electricity emissions factor (gCO2e/kWh). In this methodology, the input data is the emissions induced by electric buses purchased in 2020 for a European electricity mix. It is assumed that electric buses financed by a Member State will be used in this Member State. Each Member State's electric bus usage emissions factor is obtained as the product of the European electric bus emissions factor and the share of the Member State's electricity emission factor of the European electricity mix emission factor.

- The emission factor of the electric bus is calculated using the carbon intensity pathway of electricity in each Member State over the entire life cycle of the bus.

- The buses emissions factors considered the entire life cycle (manufacturing battery manufacturing (for electric buses), usage, and end of life).

**Methodology for calculating avoided emissions of charging points:**

- Please refer to the methodology under intervention field 073.

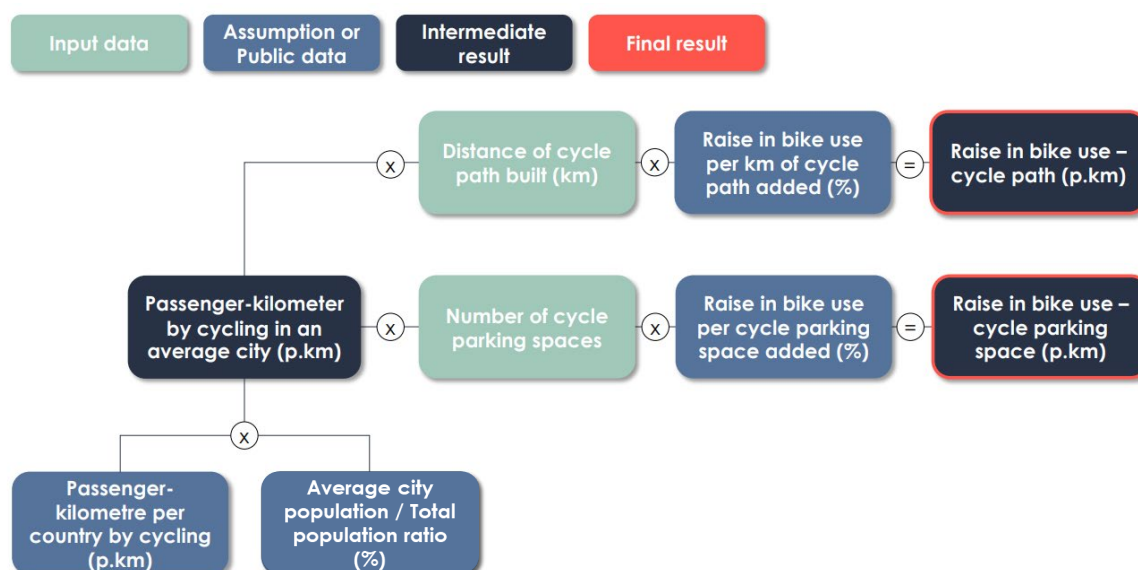**Methodology for calculating avoided emissions of electric vessels:**

- Please refer to the methodology under intervention field 050.
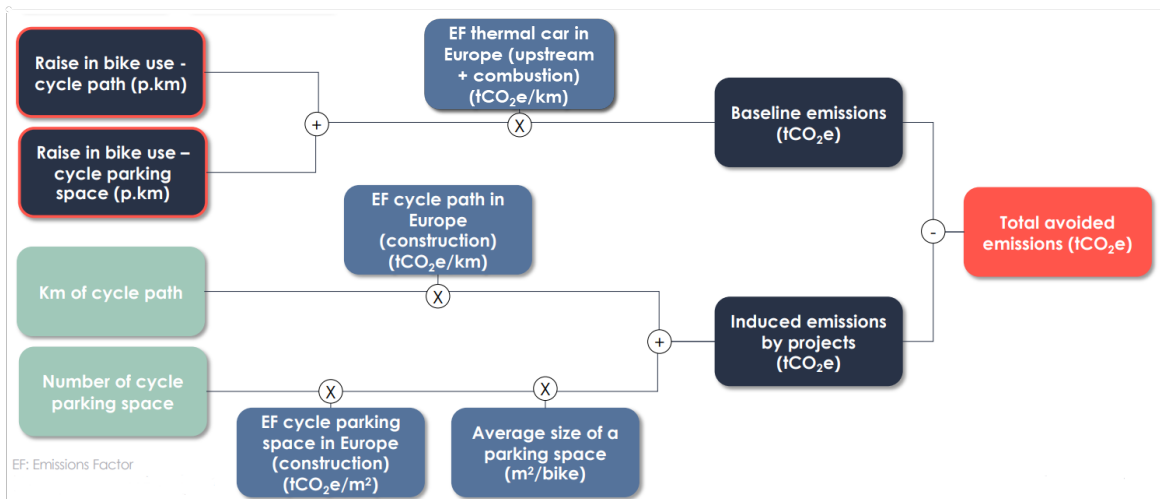
# Intervention Field 075

## Cycling infrastructure

**Methodology for calculating avoided emissions of new cycle paths and cycle biking places:**

- **from input to intermediate results**



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**Assumptions:**

- Calculation basis:

- The calculation base is reduced to one medium-sized city per Member State. This base is calculated based on the Member State's total population, the rate of urbanisation and the number of towns in the city, in order to deduce the size of an average city.

- The calculations focus on urban mobility as bike is mostly used for short-distance mobility and urban mobility.

- Induced emissions:

- Induced emissions for cycle path are calculated as if all cycle paths are newly built.

- Induced emissions for cycle parking space are based on the emission factor of a parking space of 1m2.

- Avoided emissions:

- The analysis of the environmental impacts of new cycle paths and cycle parking spaces was based on the evolution of modal shift and the reduction in car use in favour of cycling. Car is the predominant mode of transport in Europe for all trips, including short-distance trips and urban mobility.

- Considering the existing car fleet, it is assumed that all cars whose usage is replaced by cycling are thermal cars. Electric cars represent only a negligible proportion of the car fleet today (<2%). The average emission factor for a thermal car in each country is calculated by taking a weighted average based on the number of diesel and petrol vehicles.

- The ratios used to calculate the raise in bike use per km of cycle path added and per number of cycle parking place added are based on empirical observations in some European cities.

- Only the usage of mechanical bikes is taken into account and, for the usage phase alone, their carbon emissions are none.

# Intervention Field 077

## Alternative fuels infrastructure

The intervention field contains a number of different actions, which were addressed separately.

**Methodology for calculating avoided emissions of public and private charging point (electric cars):**

- **intermediary calculation**

| | | |
|---|---|---|
| Annual energy production of a publicly available charging point (MWh) | = | $\dfrac{\text{EV electricity demand (TWh) x share of public chargers in installed capacity (\%)}}{\text{Total installed capacity (units)}}$ |
| Carbon intensity of charging point manufacturing (kgCO$_2$e/unit) | = | Charger weight (kg) x manufacturing emissions (kgCO$_2$e/kg) |
| Energy charged by a charging point over lifetime (MWh) | = | Annual energy production of a charging point (MWh) x charging point lifetime (years) |
| Emission factor for a charging point (gCO$_2$e/kWh) | = | $\dfrac{\text{Carbon intensity of charging point manufacturing (kgCO}_2\text{e/unit)}}{\text{Energy charged by a charging point over lifetime (MWh)}}$ + Electrical losses x Electricity emission factor over the charging point lifetime (gCO$_2$e/kWh) |
| Emission factor of electricity for electric vehicle (gCO$_2$e/kWh) | = | (Electricity emission factor over the charging point lifetime (gCO$_2$e/kWh) + Emission factor for a charging point (gCO$_2$e/kWh)) |

- **from intermediate to final results**
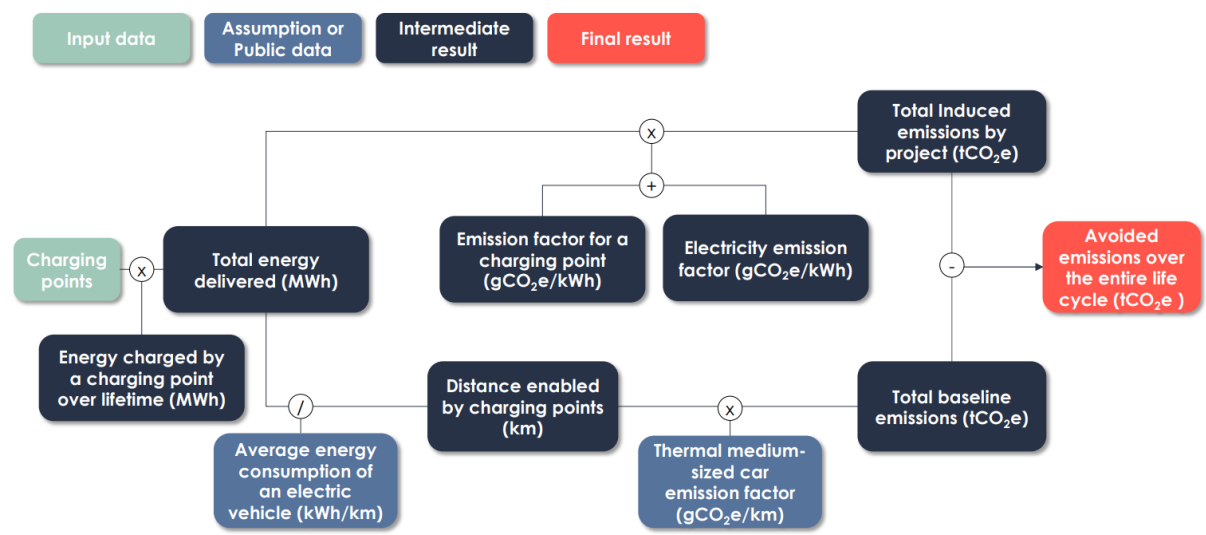


## Assumptions:

- The annual production of a charging station is calculated using the total electricity consumption of electric vehicles in Europe and the total installed capacity. For this
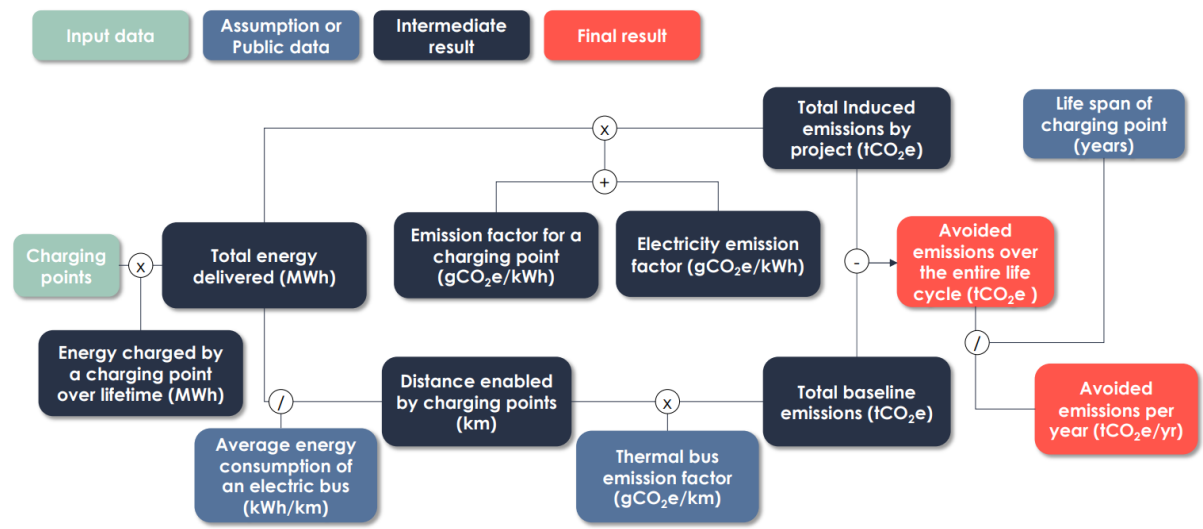
purpose, it is estimated that 25% of the recharging is done in public stations, 60% at home, 15% at work.

- The emissions of the charged electricity are compared to the fuel needed for average combustion cars. Emissions may be avoided in two contexts:

   – When an electric vehicle replaces an existing vehicle

   – When an electric vehicle prevents the purchase of another new vehicle

- The emission factor of a charging station is calculated by the ratio of the carbon intensity of the production phase of the charging station and the energy charged during its lifetime. Electricity losses are also considered.

   – It is assumed that the electrical losses are 5%.

   – It is assumed that charging points have a lifetime of eight years.

   – The reference charging point for manufacturing emissions calculations weighs 6.2kg

- The emission factor of electricity is calculated using the carbon intensity pathway of electricity in each Member State over the entire life cycle of the charging point.

- The emissions factor of the thermal car is estimated using the emission factor of a medium-sized gasoline car purchased in 2020 in Europe. It is considered to be constant over time.

- Only electric charging stations projects have been included. In the absence of detailed information, it cannot be ensured hydrogen vehicles would avoid emissions. Hydrogen vehicles avoid emissions only if the hydrogen is produced from a renewable mix. If an emission factor is applied based on the average production of hydrogen by electrolysis in Europe, the CO2 emissions would be higher than those of diesel vehicles. As the energy mix used to produce hydrogen is not known in all cases, we choose not to calculate avoided emissions.

- It is assumed that the number of electric cars purchased with support under the RRF (for which the emission reduction is accounted for under intervention field ADHOC) is a small proportion of the electric car fleet in the EU, and as such the electric charging stations are predominantly used by electric cars not supported under the RRF which makes double counting negligible.

- The methodology takes the life span of charging points into account to arrive at annual emissions avoided.

**Methodology for calculating avoided emissions of charging points (electric buses):**

   – **from intermediary calculation to final results**

- Please refer to the above intermediary calculation.

**Assumptions:**

- The annual production of a charging station is calculated using the total electricity consumption of electric buses in Europe and the total installed capacity. For this purpose, it is estimated that 25% of the recharging is done in public stations.

- The emissions of the charged electricity are compared to the fuel needed for average combustion buses. Emissions may be avoided in two contexts:

– When an electric bus replaces an existing bus

– When an electric bus prevents the purchase of another new bus

- The emission factor of a charging station is calculated by the ratio of the carbon intensity of the production phase of the charging station and the energy charged during its lifetime. Electricity losses are also considered.

– It is assumed that the electrical losses are 5%.

– It is assumed that charging points have a lifetime of eight years.

– The reference charging point for manufacturing emissions calculations weighs 6.2kg

- The emission factor of electricity is calculated using the carbon intensity pathway of electricity in each Member State over the entire life cycle of the charging point.

- The emissions factor of the thermal bus is estimated using the emission factor of a diesel bus purchased in 2020 in Europe. It is considered to be constant over time.

- Only electric charging stations projects have been included. In the absence of detailed information, it cannot be ensured hydrogen vehicles would avoid emissions. Hydrogen vehicles avoid emissions only if the hydrogen is produced from a renewable mix. If an emission factor is applied based on the average production of hydrogen by electrolysis in Europe, the CO2 emissions would be higher than those of diesel vehicles. As the energy mix used to produce hydrogen is not known in all cases, we choose not to calculate avoided emissions.

- It is assumed that the number of electric buses purchased with support under the RRF (for which the emission reduction is accounted for under intervention field ADHOC) is a small proportion of the electric bus fleet in the EU, and as such the electric charging stations are predominantly used by electric buses not supported under the RRF which makes double counting negligible.

**Methodology for calculating avoided emissions of electric buses:**

- Please refer to the methodology under intervention field 074 with these additional assumptions:

  o Only electric vehicles projects have been included. In the absence of detailed information, it cannot be ensured hydrogen vehicles would avoid emissions. Hydrogen vehicles avoid emissions only if the hydrogen is produced from a renewable mix. If an emission factor is applied based on the average production of hydrogen by electrolysis in Europe, the CO2 emissions would be higher than those of diesel vehicles. As the energy mix used to produce hydrogen is not known in all cases, we choose not to calculate avoided emissions.

  o For some projects, the quantified distinction between hydrogen vehicles and electric vehicles is not specified. In this case we choose not to calculate avoided emissions, as we consider that there are not avoided emissions with hydrogen vehicles. Avoided emissions could be underestimated.

**Methodology for calculating avoided emissions of production capacity of new zero-emission vehicles installed:**

- Please refer to the methodology under intervention field ADHOC.

**Methodology for calculating avoided emissions of biogas stations (compressed and liquefied):**

- **intermediary calculations**

| | | |
|---|---|---|
| Annual energy production of a CBG station (kg) | = | $\dfrac{\text{Biomethane demand (bcm}^1\text{) in Europe x share of gas station delivering biomethane (\%) x conversion in kg}}{\text{Total installed capacity (units) in Europe}}$ |
| Carbon intensity of a CBG station manufacturing (kgCO$_2$e/unit) | = | Manufacturing emissions (kgCO$_2$e/unit) |
| Energy delivered by a CBG station over lifetime (kg) | = | Annual energy production of a CBG station (kg) x CBG station lifetime (years) |
| Emission factor for a CBG station (kgCO$_2$e/kg) | = | $\dfrac{\text{Carbon intensity of CBG station manufacturing (kgCO}_2\text{e/unit)}}{\text{Energy delivered by a CBG station over lifetime (kg)}}$ + CBG emission factor (including methane losses) (kgCO$_2$e/kg) |
| CBG emission factor of semi-trailer truck (kgCO$_2$e/kg) | = | CBG emission factor (kgCO$_2$e/kg) + Emission factor for a CBG station (kgCO$_2$e/kg) |

| | | |
|---|---|---|
| Annual energy production of a LBG station (kg) | = | $\dfrac{\text{LBG demand (GWh) in France / conversion in m3 of gas x conversion in kg}}{\text{Total installed capacity of LBG stations (units) in France}}$ |
| Carbon intensity of a LBG station manufacturing (kgCO$_2$e/unit) | = | Manufacturing emissions (kgCO$_2$e/unit) |
| Energy delivered by a LBG station over lifetime (kg) | = | Annual energy production of a LBG station (kg) x LBG station lifetime (years) |
| Emission factor for a LBG station (kgCO$_2$e/kg) | = | $\dfrac{\text{Carbon intensity of LBG station manufacturing (kgCO}_2\text{e/unit)}}{\text{Energy delivered by a LBG station over lifetime (kg)}}$ + LBG emission factor (including methane losses) (kgCO$_2$e/kg) |
| LBG emission factor of semi-trailer truck (kgCO$_2$e/kg) | = | LBG emission factor (kgCO$_2$e/kg) + Emission factor for a LBG station (kgCO$_2$e/kg) |

- **from intermediate calculations to final results**
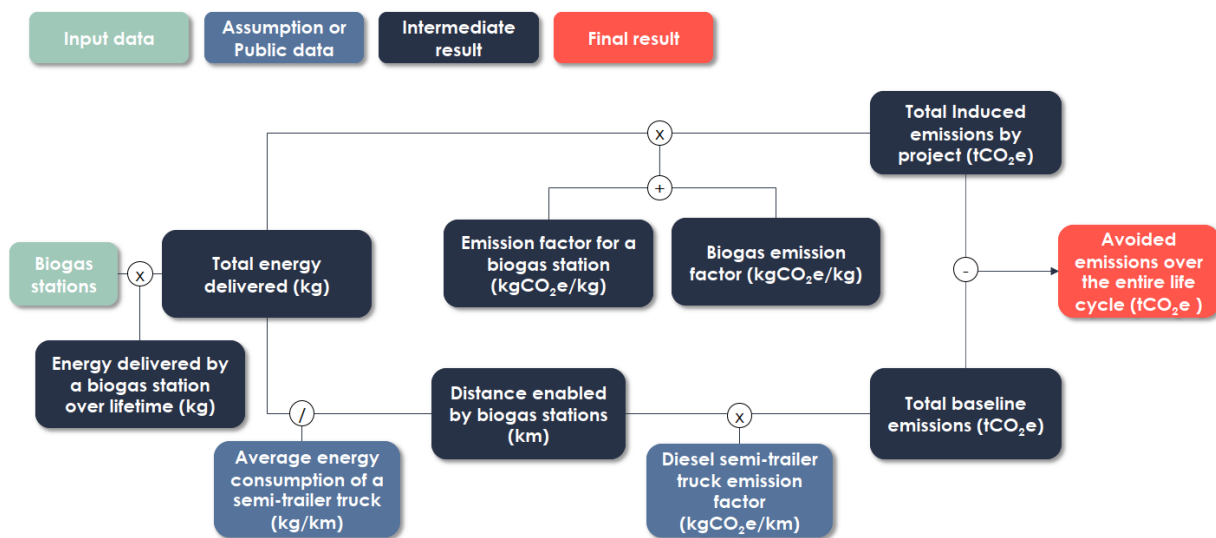


**Assumptions:**

- 1: bcm refers to billion cubic meters of natural gas.

- The annual production of a CBG station is calculated using the total CBG consumption of biogas semi-trailer trucks in Europe and the total installed capacity. For this purpose, it is estimated that 25% of the gas stations are delivering biomethane. As no LBG consumption figures were available for Europe, a ratio based on LBG consumption in France was used to estimate the annual production of a LBG station.

- The emissions of the delivered biogas are compared to the fuel needed for average combustion semi-trailer trucks. Emissions may be avoided in two contexts:

- When a biogas semi-trailer truck replaces an existing semi-trailer truck
- When a biogas semi-trailer truck prevents the purchase of another new semi-trailer truck

  - The emission factor of a station is calculated by the ratio of the carbon intensity of the production phase of the station and the energy delivered during its lifetime. It is assumed that stations have a lifetime of 50 years.

- Two different emissions factors are used for biogas stations:

- A bio-CNG emission factor for CBG stations
- A bio-LNG emission factor for LBG stations
- These emissions factors are Well-to-Wheel (WTW) emissions factors, considering the full fuel life cycle. Methane slip, which is the impact of any unburned fuel that is released to the atmosphere, is included in the calculation of the emissions factors.

  - The emission factor of the diesel semi-trailer truck is estimated using the emission factor of a diesel semi-trailer truck purchased in 2020 in Europe.

  - In order to convert consumption data of biogas to biogas delivered by the stations, it is assumed that CBG density is 0.79 kg/m3, LBG density is 445 kg/m3, and high heating value of natural gas is 11.27 kWh/m3.

# Intervention Field ADHOC

## Ad hoc intervention field

The intervention field is not part of the list of climate intervention field in the methodological annex of the regulation establishing the Recovery and Resilience Facility. Nevertheless, under the regulation Member States may apply a climate coefficient to investments that are deemed climate relevant but outside of the scope of the methodology, subject to approval by the Commission. This option was primarily used to include zero-emission cars.

### Methodology for calculating avoided emissions of electric vehicles:
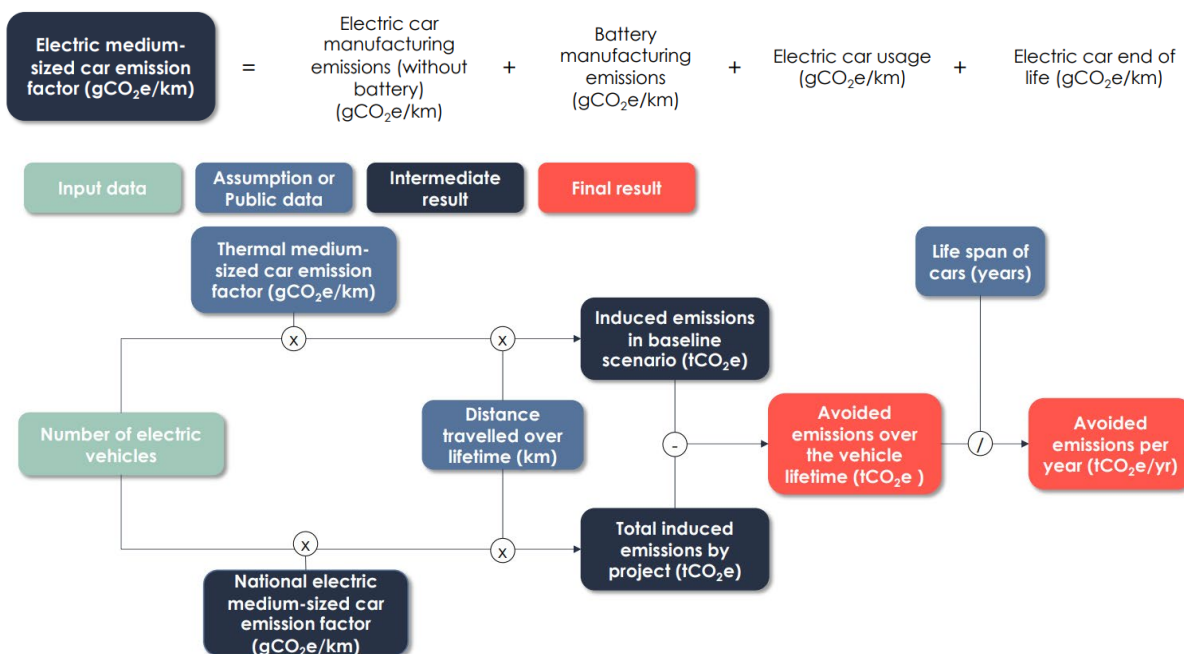


**Assumptions:**

- It is assumed that both thermal and electric vehicles have a lifespan of 12 years.
- It is assumed that both thermal and electric vehicles travel 150,000 km over their entire life cycle.

- It is assumed that the purchase of electric vehicles replaces 100% of thermal vehicles.
- Baseline emissions factor: The reference factor of the thermal car is estimated using the emission factor of a medium-sized gasoline car purchased in 2020 in Europe. It is considered to be constant over time.
- Project emissions factor: The emissions induced by the use of an electric car (gCO2e/km) are equal to its electricity consumption (kWh/km) multiplied by the electricity emissions factor (gCO2e/kWh). In this methodology, the input data is the emissions induced by electric cars purchased in 2020 for a European electricity mix. It is assumed that electric cars financed by a Member State will be used in this Member State. Each Member State's electric car usage emissions factor is obtained as the product of the European electric car emissions factor and the share of the Member State's electricity mix-emission factor of the European electricity mix emission factor.
- The emission factor of the electric car is calculated using the carbon intensity pathway
  of electricity in each Member State over the entire life cycle of the car.
- The cars emissions factors considered the entire life cycle (manufacturing, battery manufacturing (for electric vehicles), usage, and end of life).
- Only electric vehicles projects have been calculated. In the absence of detailed information, it cannot be ensured that hydrogen vehicles would avoid emissions. Hydrogen vehicles avoid emissions only if the hydrogen is produced from a renewable mix. If an emission factor based on the average production of hydrogen by electrolysis in Europe is applied, the CO2 emissions would be higher than those of diesel vehicles. As the energy mix used to produce hydrogen is unknown, avoided emissions are not calculated.
- For some projects, quantified distinction between hydrogen vehicles and electric vehicles is not specified. In this case, avoided emissions were not calculated. Avoided emissions could be underestimated.
- It is assumed that the number of electric cars purchased with support under the RRF (for which the emission reduction is accounted for under intervention field ADHOC) is a small proportion of the electric car fleet in the EU, and as such the electric charging stations are predominantly used by electric cars not supported under the RRF which makes double counting negligible.

**Methodology for calculating avoided emissions charging points:**

- Please refer to the methodology under intervention field 077.

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