European Commission

#NextGenerationEU
Green Bonds
Allocation and Impact Report 2025

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PART 1/2

NGEU Green Bonds Allocation and Impact report 2025

COMMISSION STAFF WORKING DOCUMENT

EN   **EN**

Foreword

I am delighted to present to you the 2025 edition of the NextGenerationEU Green Bonds annual allocation and impact report.

This report comes precisely a year after I took over the responsibility for the EU borrowing operations. Over this period, I have experienced first-hand the role of NextGenerationEU Green Bonds in supporting green investments and reforms - allowing investors and markets to be part of the solution.

Only four years after the first NextGenerationEU Green Bond issuance, the EU has become one of the largest issuers of green bonds globally. Backed by reporting of green expenditure from Member States, NextGenerationEU Green Bonds reached a volume of EUR 75.1 billion outstanding as of 1 August 2025, the cut-off date of this report, and increased to EUR 78.5 billion by early December 2025.

Expenditure, financed from the sale of NextGenerationEU Green Bonds, has an impact across the entire EU: it finances investments in areas such as clean transport, renewable energy, energy efficiency, and biodiversity. It improves our climate. Thanks to the financing provided by NextGenerationEU Green Bonds, 14.0 million tonnes of CO2e / year are estimated to be avoided based on milestones and targets already implemented by EU Member States. A full roll out of the currently planned expenditure (standing on 1 August 2025 at EUR 262.8 billion) will increase further this climate impact, reducing the EU's greenhouse gas emissions (GHG) by 53.4 million tonnes of CO2 per year, or 1.5% of the aggregate 2022 EU GHG emissions.
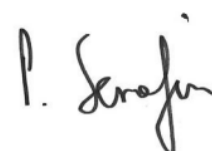
As this report shows, reported expenditure from Member States on green bond eligible projects increased by almost 50% between 1 August 2024 and 1 August 2025, reaching a total of EUR 64.9 billion. After the cut-off date of this report, an additional EUR 15 billion has been reported. At the time of writing, Recovery and Resilience Plans are under review for a number of Member States, with potential impacts also on the amounts of expenditure eligible for financing through NextGenerationEU Green Bonds.

As noted in the June 2025 Communication on NextGenerationEU - The road to 2026, we count on Member States to review the implementation state of their climate related projects and ensure that their reporting is timely and up to date. Significant further reporting is needed to be able to reach the issuance levels envisaged at the start of the NGEU Green Bond programme.

This annual report delivers on our commitment to transparency and illustrates how NextGenerationEU Green Bonds contribute to the climate transition.

Piotr Serafin

COMMISSIONER | Budget, Anti-Fraud and Public Administration

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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
SDG	UN Sustainable Development Goals
TSC	EU Taxonomy Technical Screening Criteria

Table 1: Key Figures

Key Metric	Definition	Ref. Page	As of 1 August 2025	As of 1 August 2024
NGEU Green Bonds Issued Amount [EUR]	Funds raised from capital markets via NGEU Green Bonds to finance NGEU green expenditure.	Pg.26	75,081,000,000	60,231,000,000
NGEU Reported Expenditure (allocated proceeds) [EUR]	Expenditure reported by Member States that is eligible for allocation of NGEU Green Bond.	Pg.27	64,894,265,889	44,017,776,775
Unallocated Proceeds [EUR]	The difference between NGEU Green Bonds issued and NGEU Reported Expenditure	Pg.30	10,186,734,111	16,213,223,225
NGEU Green Bond Pool [EUR]	Total planned expenditure in Member States' Recovery and Resilience Plans that is assessed to be eligible for NGEU Green Bonds financing.	Pg.17	262,768,768,109	264,580,424,661
EU Taxonomy Alignment [%]	Share of NGEU Green Bond Pool that is assessed to be aligned with the EU Taxonomy	Pg.33	Full: 22.1% Substantial: 41.5% Partial: 34.2% Not Aligned/ Covered: 2.2%	Full: 25.5% Substantial: 37.9% Partial: 33.6% Not Aligned/ Covered: 3.0%
Estimated Expected Impact [tCO2e/year]	Estimated expected quantifiable tonnes of CO_2 equivalent avoided per year based on full implementation of NGEU Green Bond Pool	Pg.41	53,393,052	54,747,076
Realised Impact [tCO2e/year]	Estimated quantifiable tones of CO_2 equivalent avoided per year based on implemented milestones and targets	Pg.42	14,007,295	1,481,276

Graph 1a – Eligible NGEU Green Bond Pool with EU Taxonomy Alignment, (as of 1 August 2025, EUR billion)

Not included in the Pool
32.3

Green Bond Pool
262.8

Pool of Eligible investments

Taxonomy alignment Pool

5.7

58.2

89.9

108.9

- Full Alignment
- Substantial Alignment
- Partial Alignment
- Not Covered/Aligned
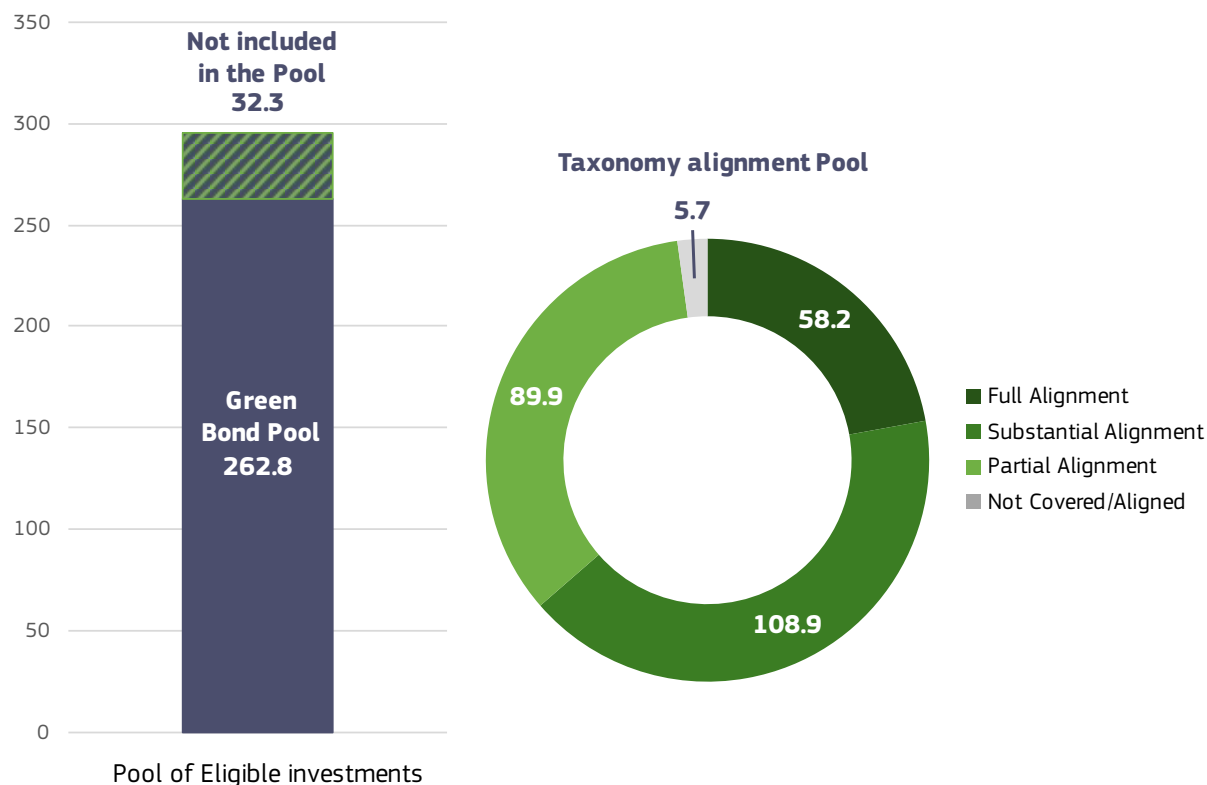
Graph 1b: Green Bond Issuance and Allocated Proceeds (as of 1 August 2025, EUR billion)

Unallocated proceeds

10.2

Green Bonds issued
75.1

Allocated proceeds

64.9
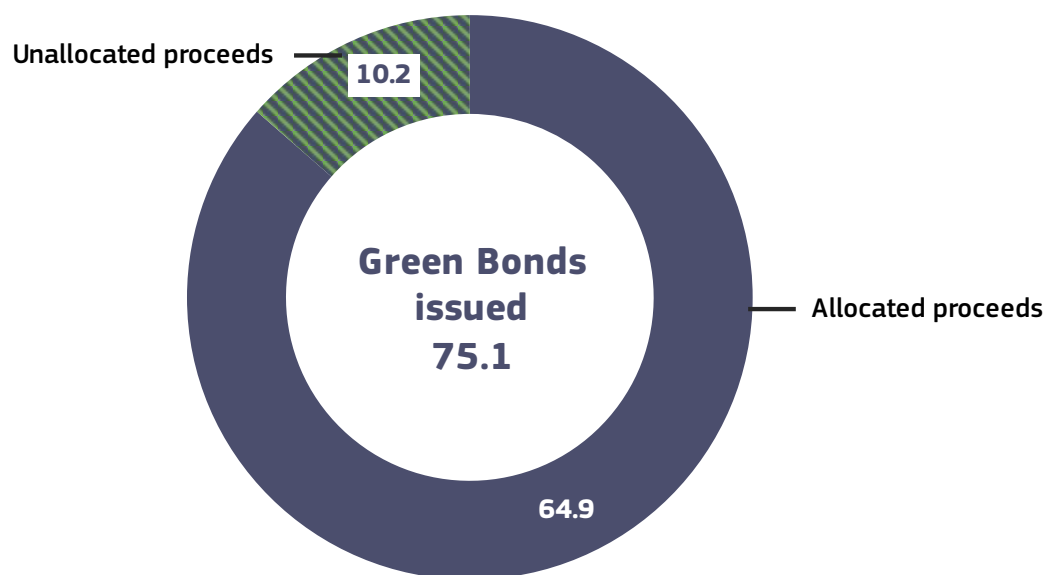
Graph 2: Climate impact of NGEU Green Bond proceeds (mtCO2e/year)
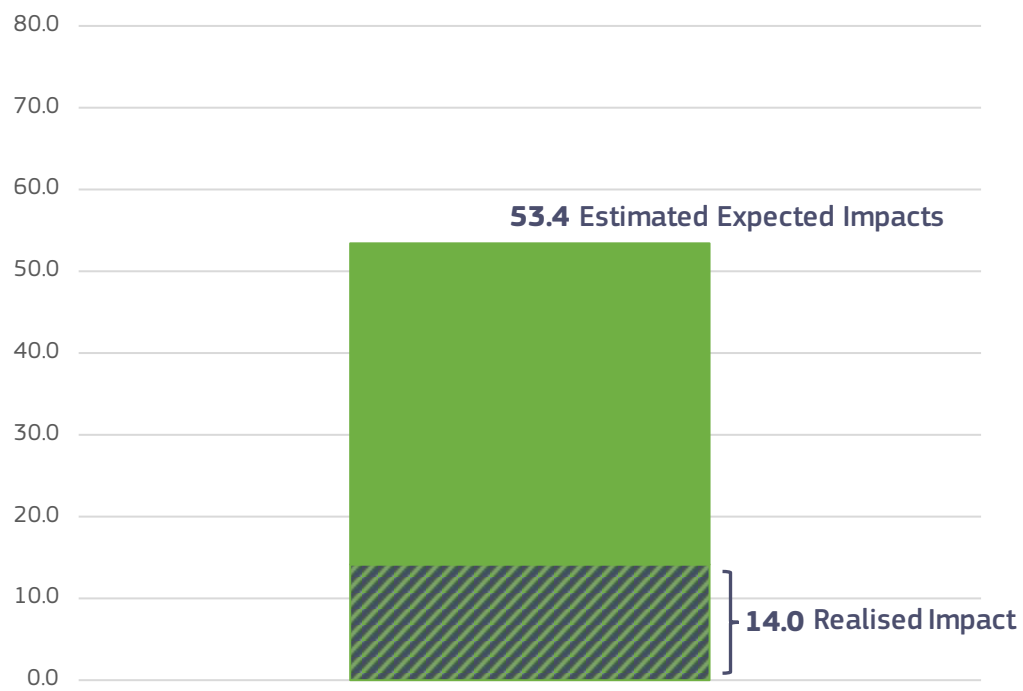
Executive summary

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 constitutes the annual update to investors and stakeholders on the allocation of proceeds from the issuance of NGEU Green Bonds and their estimated realised and expected climate impacts. The report builds on previous NGEU Green Bonds Allocation and Impact Reports (December 2022[1] December 2023[2] and November 2024[3]), and **presents data based on a cut-off date of 1 August 2025**. Given this cut-off date, this report does not reflect changes in Member States' RRPs aimed at streamlining these plans and confirming the expected use of the remaining available financial allocations ahead of the last payment requests under the Recovery and Resilience Facility (RRF) in 2026 (with potential impacts also on the NGEU Green Bond Pool). As new information becomes available over the coming months the Commission will report on the impact of these changes through its regularly updated online NGEU Green Bonds Dashboard[4].

As for previous annual 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.

KEY DEVELOPMENTS BETWEEN AUGUST 2024 AND AUGUST 2025:

- The **Pool of expenditure in Member States' Recovery and Resilience Plans that could be eligible for NGEU Green Bond financing assuming full implementation of the plans (NGEU Green Bond Pool), remained stable at EUR 262.8 billion** on 1 August 2025 compared to the EUR 264.6 billion on 1 August 2024. 'Clean transport & infrastructure' (EUR 71.6 billion), 'Energy efficiency' (EUR 67.9 billion) and 'Clean energy & network' (EUR 62.2 billion) remained the three largest categories in the NGEU Green Bond Pool as it stood on 1 August 2025.
- **Reported expenditure (allocated proceeds) from the Member States on green bond eligible projects reached a total of EUR 64.9 billion,** increasing by EUR 20.9 billion between 1 August 2024 and 1 August 2025. A total of 26 Member States (compared to 19 in 2024) reported expenditure financed by NGEU Green Bond proceeds.
- NGEU Green Bond **issued increased by EUR 14.9 billion,** remaining closely calibrated to the amount of eligible green expenditure reported by Member States over the same period. As a result, NGEU Green Bond issued stood at a total of EUR 75.1 billion: on 1 August 2025, with unallocated proceeds decreasing to EUR 10.2 billion (compared to EUR 16.2 billion on 1 August 2024)[5].

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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] https://commission.europa.eu/document/download/abdee617-a078-4ee3-a3ec-20c7d32725b5_en?filename=NextGenerationEU%20Green%20Bonds%20Allocation%20and%20Impact%20Report%202024.pdf

[4] Dashboard – European Commission

[5] As implementation of the NGEU programme is advancing, unallocated proceeds will continue to reduce in order to ensure that funds raised through NGEU Green Bond issuances remain close to realised eligible expenditure.

- **63.6%** of the NGEU Green Bond Pool continued to be assessed as **fully or substantially aligned to the EU Taxonomy** (2024: 63.4%).
- In terms of climate impact, the **realised impact is estimated at 14.0 million tonnes of CO2e / year avoided** (versus only 1.5 million tonnes of CO2e / year in 2024). This represents 26% of the total estimated expected impact following full implementation of the quantifiable[6] milestones and targets in the NGEU Green Bond Pool (which now stands at 53.4 million tonnes of CO2e / year avoided, equivalent to 1.5% of the aggregate EU GHG emissions in the year 2022). The exponential increase in realised GHG emission reductions compared to last year reflects the extended lifespan of project implementation, where planning and administrative phases need to be completed before 'on the ground' implementation can take place.

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[6] Due to methodological constraints impact calculations cover only approximately 49% of the entire investment Pool financed by NGEU Green Bonds.

Introduction

Introduction

As of 1 August 2025, the Commission has issued EUR 75.1 billion of NGEU Green Bonds. All NGEU Green Bonds are underpinned by the NGEU Green Bond Framework (Box 1) and 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. It also presents the Commission's assessment of the estimated climate impacts of expected and realised investments financed by NGEU Green Bonds across EU Member States.

Building on the 2022[7], 2023[8] and 2024[9] 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 approved Recovery and Resilience Plans (RRPs). For the first time the report also includes an indicative alignment of the NGEU Green Bond Pool to NACE categories;

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

(iii) An update of the assessed EU Taxonomy alignment of the measures in the NGEU Green Bond Pool and of the allocated proceeds; and

(iv) An update of the expected and realised climate impacts for the quantifiable parts of the expenditures in the NGEU Green Bond Pool.

As per previous years, information included in this report is based on a cut-off date of 1 August 2025.

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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[7] https://commission.europa.eu/system/files/2022-12/SWD_2022_442_F1_STAFF_WORKING_PAPER_EN_V4_P1_2417689.PDF
[8] 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/
[9] https://op.europa.eu/en/publication-detail/-/publication/cfd70610-aae6-11ef-acb1-01aa75ed71a1/language-en

Box 1: The NGEU Green Bond framework[10] and Second Party Opinion

The NGEU Green Bond framework is a multi-level framework of control and assessment procedures which determine whether individual measures can 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 proceeds through four main pillars:

1. **Use of proceeds:** NGEU Green Bond proceeds are used for nine predefined broad expenditure categories as set out in the NGEU Green Bond framework (see list below).
2. **Process for expenditure evaluation and investment selection:** Investments are, in a first instance, identified based on the 37% climate expenditure of Member States' RRPs.
3. **Management of proceeds:** Based on data submitted by EU Member States, net proceeds of the NGEU Green Bonds and of related payments is tracked by the Commission.
4. **Reporting:** Transparent reporting on the allocation of proceeds and on the impact of the expenditures financed by NGEU Green Bonds is provided by the Commission to investors and the wider public, including through annual Allocation and Impact Reports and the regularly updated on-line NGEU Green Bond Dashboard.

NGEU Green Bond Framework

Projects under 9 expenditure categories — 1. USE OF PROCEEDS

Climate spending in the RRF — 2. EXPENDITURE EVALUATION AND INVESTMENT SELECTION

Commission will track the relevant expenditure — 3. MANAGEMENT OF PROCEEDS

4. REPORTING — Allocation and impact reporting

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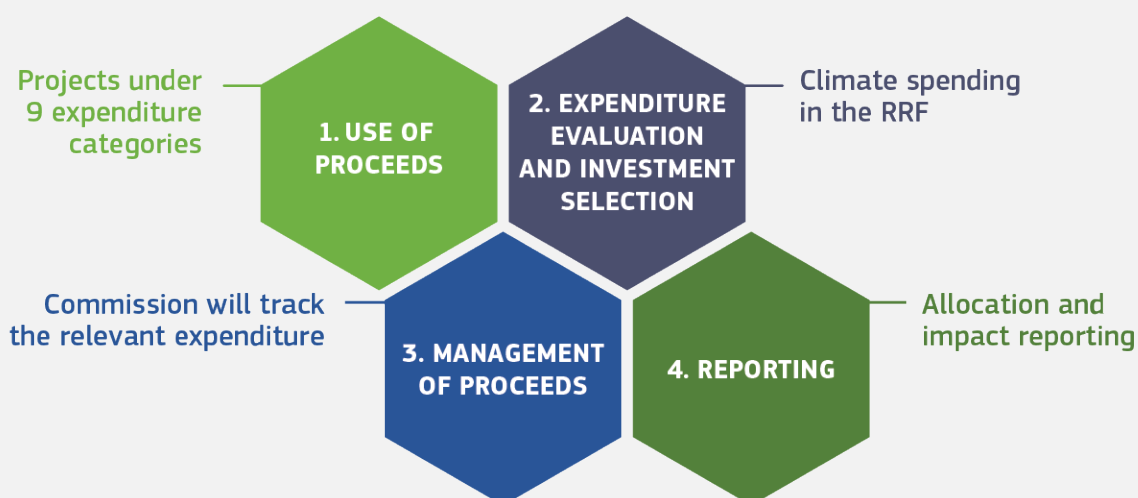
[10] https://commission.europa.eu/system/files/2021-09/nextgenerationeu_green_bond_framework.pdf

9 Expenditure Categories	SDG Alignment
Clean energy & network	7 AFFORDABLE AND CLEAN ENERGY · 13 CLIMATE ACTION
Clean transport & infrastructure	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE · 11 SUSTAINABLE CITIES AND COMMUNITIES
Climate change adaptation	13 CLIMATE ACTION
Digital technologies supporting the green transition	8 DECENT WORK AND ECONOMIC GROWTH · 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
Energy efficiency	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE · 11 SUSTAINABLE CITIES AND COMMUNITIES
Nature protection, rehabilitation and biodiversity	6 CLEAN WATER AND SANITATION · 14 LIFE BELOW WATER · 15 LIFE ON LAND
Other	N/A
Research and innovation activities supporting the green transition	8 DECENT WORK AND ECONOMIC GROWTH · 11 SUSTAINABLE CITIES AND COMMUNITIES · 12 RESPONSIBLE CONSUMPTION AND PRODUCTION
Water & waste management	6 CLEAN WATER AND SANITATION · 11 SUSTAINABLE CITIES AND COMMUNITIES · 12 RESPONSIBLE CONSUMPTION AND PRODUCTION

Second Party Opinion Findings [11]:

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

Results of assessment:

1. Use of proceeds	**Nine eligible green expenditure categories** which contribute to nine of the Sustainable Development Goals **(SDGs)**	Vigeo Eiris [12] opinion: **Aligned** [13]
2. Expenditure evaluation and investment selection	NGEU Green Bonds will **finance green investments and reforms of Member States' Recovery and Resilience Plans**. Compliance with DNSH Principle is mandatory.	Vigeo Eiris opinion: **Aligned**
3. Management of proceeds	The Commission will **track the net proceeds** of all NGEU Green Bonds from issuance to allocation.	Vigeo Eiris opinion: **Best Practices** [14]
4. Reporting	The European Commission commits to reporting on how the money is spent (**allocation reporting**) and the environmental impact of the investments (**impact reporting**)	Vigeo Eiris opinion: **Best Practices**

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[11] Second party opinion available at 345f2b64-f959-482d-98c4-497418b164da_en
[12] Vigeo Eiris is now part of Moody's
[13] Vigeo Eiris determines alignment to ICMA Green Bond Principles on a scale, Not Aligned, Partially Aligned, Aligned and an additional category of Best Practices, when and issuer goes beyond standard criteria.
[14] Vigeo Eiris determines alignment to ICMA Green Bond Principles on a scale, Not Aligned, Partially Aligned, Aligned and an additional category of Best Practices, when and issuer goes beyond standard criteria.

The NGEU Green Bond Pool

The NGEU Green Bond Pool

The NGEU Green Bond Pool reflects the amount of expenditure in Member States Recovery and Resilience Plans (RRPs) that is assessed to be eligible for NGEU Green Bond financing based on the NGEU Green Bond Framework, and assuming full implementation of the plans.

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 entails:

1. screening of the climate relevant expenditures notified by Member States in their national RRPs, as part of EU Recovery and Resilience Facility (RRF) [15].

2. 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 the in-house due diligence are considered eligible for financing under the NGEU Green Bonds. In accordance with this control framework, no measures supporting energy generation from nuclear or from natural gas are included in the NGEU Green Bond Pool.

EUR 295.0 billion
RRF Pool of Eligible Investments
– pre due diligence

EUR 262.8 billion
NGEU Green Bond pool
– post due diligence

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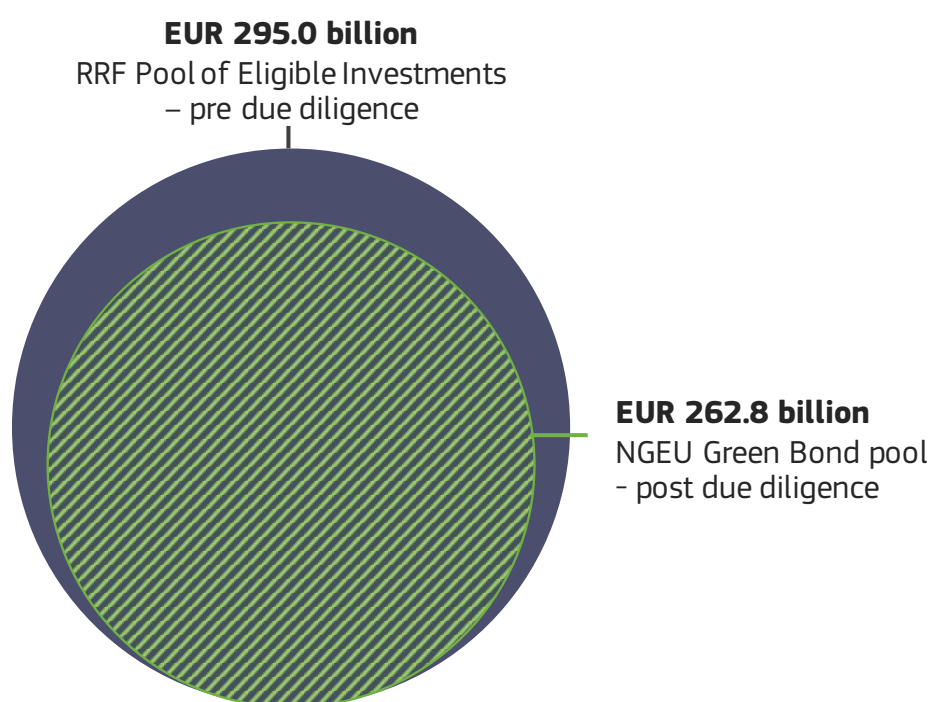
[15] https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en

Taking into account revisions of RRPs during the period 1 August 2024 to 1 August 2025, as of the cut-off date of 1 August 2025, the Pool of measures eligible for receiving financing under NGEU Green Bonds consists of EUR 262.8 billion[16] of eligible assets (made up of 1,045 measures)[17]. This compares to EUR 264.6 billion as of 1 August 2024 (made up of 1,058 measures). The slight decrease in the Pool size is due to adjustments of some projected costs, revisions of existing measures by Member States and updates due diligence of some measures in the Pool[18].

As of 1 August 2025, around 24% of the measures in the RRPs with a positive climate coefficient is assessed to be falling under the implementation of 'Financial instruments'[19]. NGEU Green Bond issuances against these amounts will be subject to reporting from Member States and related implementing partners on the actual implementation of measures[20]. This reporting may take place also beyond the end-2026 RRF deadline, in which case eligible expenditure will be reflected in NGEU Green Bond issuances under the planned refinancing phase of NGEU[21].

NGEU GREEN BOND POOL SPLIT

'Clean transport & infrastructure' (EUR 71.6 billion), 'Energy efficiency' (EUR 67.9 billion) and 'Clean energy & network' (EUR 62.2 billion) remained the three largest categories in the NGEU Green Bond Pool.

Information on the breakdown of the Pool by expenditure category and Member State is included in the tables below. Following investor requests, a table with an illustrative split of the NGEU Green Bond Pool based on the standard NACE[22] classification of Eurostat is also included for information. This split is based on a new sectoral database established for the purposes of the RRF and published by the Commission in May 2025[23]. This analysis is not specific to the NGEU Green Bond eligible measures and hence presents only an indicative split based on available data.

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[16] 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.

[17] While national RRPs establish *measures* and *sub-measures* (e.g. due to geographical regions, splitting costs between green and digital sections, etc), a single term of 'measures' is used in this report for simplicity purposes.

[18] As part of this due diligence the Commission assessed newly or re-assessed in the 2024-2025 period 121 measures (worth EUR 21.8 billion) from 18 Member States. The Commission determined that 59 of these re-assessed measures (worth EUR 4.3 billion) were not considered eligible to be included in the NGEU Green Bond Pool. The remaining 62 measures (EUR 17.5 billion) are new or amended measures that were assessed to be eligible for inclusion in the total NGEU Green Bond Pool.

[19] Example of financial instruments can be found here: Financial instruments: equity, guarantees, and loans – European Commission

[20] Reporting on investments implemented through Financial Instruments will be ensured through binding conditions laid down in the relevant agreements between the Member States and the implementing partner. 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.

[21] 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. In that context the Commission can also consider issuing NGEU Green Bonds.

[22] Nomenclature statistique des activités économiques dans la Communauté européenne

[23] https://economy-finance.ec.europa.eu/publications/economic-impacts-recovery-and-resilience-facility-new-insights-sectoral-level-and-case-germany_en

Table 2: NGEU Green Bond Pool broken down by Expenditure Category (in EUR)

Expenditure Category	NGEU Green Bond Pool (as of 1 August 2025)	NGEU Green Bond Pool (as of 1 August 2024)
Clean energy & network	62,226,975,568	61,020,459,508
Clean transport & infrastructure	71,570,210,051	72,376,106,537
Climate change adaptation	7,267,994,582	7,301,397,751
Digital technologies supporting the green transition	386,092,983	444,981,838
Energy efficiency	67,863,655,596	67,759,575,211
Nature protection, rehabilitation and biodiversity	6,393,054,770	6,153,732,676
Other	5,365,765,261	7,520,337,611
Research and innovation activities supporting the green transition	20,533,779,184	20,568,882,665
Water & waste management	21,161,240,114	21,434,950,864
Grand Total	**262,768,768,109**	**264,580,424,661**

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

Member State	Sum of NGEU Green Bond Pool (as of 1 August 2025)	Sum of NGEU Green Bond Pool (as of 1 August 2024)
Austria	2,316,051,610	2,316,051,610
Belgium	2,675,378,993	2,605,414,993
Bulgaria	3,145,521,543	3,157,521,543
Croatia	2,154,338,579	2,329,321,211
Cyprus	539,450,765	517,730,164
Czechia	3,331,640,191	3,396,549,661
Denmark	734,461,787	764,336,503
Estonia	546,280,000	546,280,000
Finland	842,948,000	842,948,000
France	17,468,829,083	17,468,829,083
Germany	12,083,133,693	11,303,645,165
Greece	12,702,718,559	12,621,483,552
Hungary	4,641,113,217	4,641,113,217
Ireland	572,049,000	572,049,000
Italy	73,063,020,602	74,801,620,602
Latvia	818,250,378	815,937,878
Lithuania	1,428,745,275	1,412,898,275
Luxembourg	45,600,000	60,500,000
Malta	225,677,223	225,677,223
Netherlands	3,518,087,550	3,517,576,000
Poland	26,192,023,590	25,480,314,524
Portugal	7,987,900,158	8,707,481,307
Romania	12,715,943,850	12,715,943,850
Slovakia	2,104,490,469	2,516,651,253
Slovenia	944,357,833	1,271,793,887
Spain	68,340,336,413	68,340,336,413
Sweden	1,630,419,748	1,630,419,748
Grand Total	**262,768,768,109**	**264,580,424,661**

Table 4: Split of the NGEU Green Bond Pool broken down by the 2-digit NACE codes[24]

2-digit NACE code	NGEU Green Bond Pool (as of 1 August 2025)
42 Civil engineering	104,567,406,461
41 Construction of buildings	57,392,738,247
27 Manufacture of electrical equipment	25,987,313,924
29 Manufacture of motor vehicles, trailers and semi-trailers	12,241,083,419
28 Manufacture of machinery and equipment n.e.c.	10,865,162,740
30 Manufacture of other transport equipment	10,265,221,860
64 Financial service activities, except insurance and pension funding	10,084,000,000
72 Scientific research and development	9,037,641,139
62 Computer programming, consultancy and related activities	4,508,063,070
26 Manufacture of computer, electronic and optical products	3,416,315,092
Remaining codes combined	14,403,822,157
Grand Total	**262,768,768,109**

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[24] Due to the study slightly preceding the cut-off date of 1 August 2025, 10 out of 1,370 measures were not tagged by NACE codes. Only two of these measures are included in the Pool of eligible measures (corresponding to the EUR 609.8 million). The Commission has aggregated these two measures under the 'Remaining costs combined'. The full split to two-digit NACE can be found in the *Supporting data files* available here: https://commission.europa.eu/strategy-and-policy/eu-budget/eu-borrower-investor-relations/analyses-and-reports_en#ngeu-green-bonds-reports

Allocation
of NGEU Green
Bond proceeds

Allocation of NGEU Green Bond proceeds

Under the RRF, and in line with the objectives-based nature of the programme, Member States can receive payments up to twice per year, after the fulfilment of their respective milestones and targets. 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[25]. This requirement is set out in the financing and loan agreements between the Commission and Member States.

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 while the NGEU Green Bond Pool represents the maximum amount to which the NGEU Green Bond proceeds can be allocated.

IMPLEMENTATION OF MILESTONES AND TARGETS

RRF financing includes a total of 7,047 milestones and targets. Of these the Commission has identified 2,012 milestones and targets (related to 1,045 individual measures or sub-measures) that can be directly linked to the EUR 262.8 billion worth of measures which are included in the NGEU Green Bond Pool.

As of the cut-off date of 1 August 2025, out of the 2,012 milestones and targets linked to measures in the NGEU Green Bond Pool, 490 are considered as 'Fulfilled' across 25 Member States (compared to 332 across 22 Member States in 2024). 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 387 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 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[26].

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[25] 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.

[26] 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).

Graph 3: Implementation status of milestones and targets directly linked to the NGEU Green Bond Pool (as of 1 August 2025)

Implementation Status

490

1135

387

■ Fulfilled   ▨ Declared (not assessed)
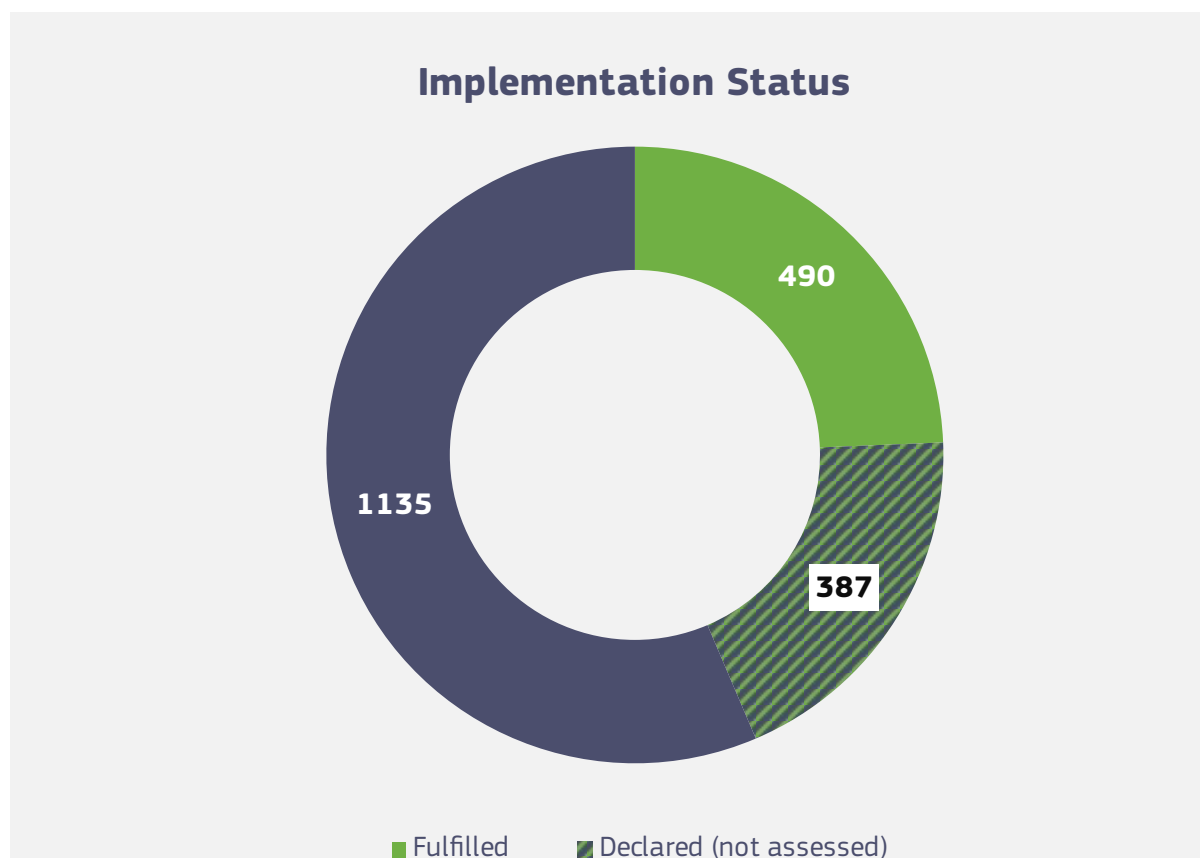
Box 2: Milestones and Targets labelling and declaration process[27]:

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)'[28], are presented in Figure 1 above.

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[27] Bi-annual Reporting Factsheet – Spring 2023
[28] Declared (not assessed) denotes Milestones and Targets declared 'completed' by Member States, but still under assessment by the Commission.

Table 5: Fulfilled milestones and targets by Member State (as of 1 August 2025)[29]

Member State	Number of fulfilled milestones
Austria	11
Belgium	17
Bulgaria	1
Croatia	21
Cyprus	12
Czechia	35
Denmark	20
Estonia	19
Finland	13
France	48
Germany	26
Greece	49
Hungary	0
Ireland	12
Italy	61
Latvia	9
Lithuania	14
Luxembourg	2
Malta	7
Netherlands	6
Poland	0
Portugal	35
Romania	16
Slovakia	9
Slovenia	14
Spain	27
Sweden	6
Total	**490**

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[29] Concerns only milestones and targets for measures included in the NGEU Green Bond Pool.

Graph 4: Fulfilled milestones and targets per Expenditure Category[30]
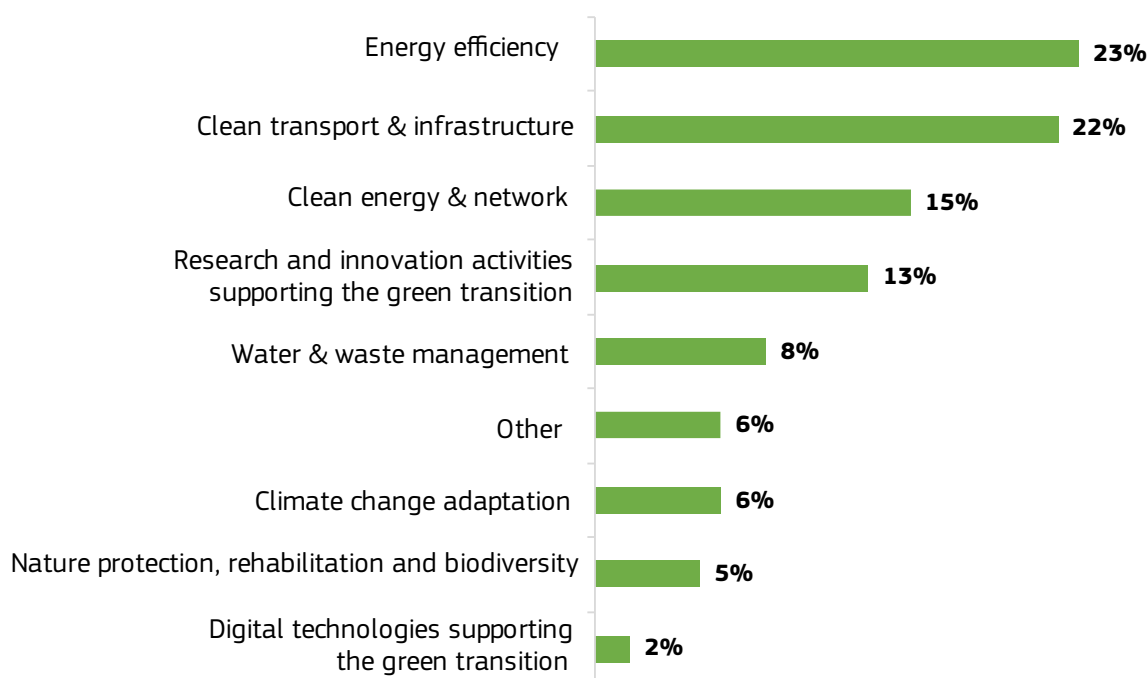
NGEU GREEN BOND ISSUANCES

As of 1 August 2025, the European Commission had issued EUR 75.1 billion of NGEU Green Bonds across five different maturity points (2033, 2037, 2043, 2048 and 2050 maturities). This represents an increase of EUR 14.9 billion (or 24.7%), relative to the EUR 60.2 billion issued at the time of the 2024 report. All NGEU Green Bond issuances have been met with strong demand in both syndicated transactions and auctions, indicating a continuous strong investor appetite. More details on the NGEU Green Bond issuances are presented in the table below.

Table 6: Summary of NGEU Green Bond issuances

Type	Issue format	Transaction date	Maturity	Volume issued (EUR million)	Yield	ISIN
Grand Total as of 01.08.2025 (EUR million)				**75,081**		
TAP	Auction	02.06.2025	04/02/2033	1,850	2.748%	EU000A3K4DW8
TAP	Syndication	11.02.2025	04/02/2050	5,000	3.357%	EU000A3K4EU0
TAP	Syndication	19.11.2024	04/02/2043	3,000	3.260%	EU000A3K4DG1
TAP	Syndication	10.09.2024	04/02/2050	5,000	3.262%	EU000A3K4EU0

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[30] 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 5.

Type	Issue format	Transaction date	Maturity	Volume issued (EUR million)	Yield	ISIN
Grand Total as of 01.08.2024 (EUR million)				**60,231**		
Tap	Auction	27.05.2024	04.02.2043	2,027	3.345%	EU000A3K4DG1
Tap	Auction	29.04.2024	04.02.2033	2,293	2.952%	EU000A3K4DW8
New Bond	Syndication	19.03.2024	04.02.2050	7,000	3.339%	EU000A3K4EU0
Tap	Auction	27.11.2023	04.02.2033	1,731	3.182%	EU000A3K4DW8
Tap	Syndication	14.11.2023	04.02.2048	3,000	3.759%	EU000A3K4DM9
Grand Total as of 01.08.2023 (EUR million)				**44,180**		
Tap	Auction	17.04.2023	04.02.2033	1,732	3.087%	EU000A3K4DW8
Tap	Syndication	28.03.2023	04.02.2048	6,000	3.348%	EU000A3K4DM9
Tap	Auction	28.11.2022	04.02.2043	1,000	2.845%	EU000A3K4DG1
New Bond	Syndication	15.11.2022	04.02.2033	6,000	2.820%	EU000A3K4DW8
Tap	Auction	24.10.2022	04.02.2037	1,450	3.378%	EU000A3K4C42
Grand Total as of 19.10.2022 (EUR million)				**27,998**		
New Bond	Syndication	21.06.2022	04.02.2048	5,000	2.713%	EU000A3K4DM9
Tap	Auction	25.04.2022	04.02.2037	2,499	1.626%	EU000A3K4C42
New Bond	Syndication	05.04.2022	04.02.2043	6,000	1.370%	EU000A3K4DG1
Tap	Auction	24.01.2022	04.02.2037	2,499	0.374%	EU000A3K4C42
New Bond	Syndication	12.10.2021	04.02.2037	12,000	0.450%	EU000A3K4C42

ALLOCATED PROCEEDS

Allocated proceeds refers to the expenditure reported by Member States that is related to measures eligible for financing from NGEU Green Bond proceeds.

As of 1 August 2025, **26 Member States** (compared to 19 in 2024) **have reported EUR 64.9 billion of expenditures related to measures eligible for NGEU Green Bond financing** (versus EUR 44.0 billion in 2024). This reported expenditure represents 51% of the expected eligible expenditure of EUR 126.1 billion, based on actual payments to Member States and the share of green bond eligible expenditure in the respective RRPs, indicating a lag in green expenditure reporting from Member States relative to total disbursements [31].

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[31] By 1 August 2025, Member States have received EUR 195.5 billion in RRF grant and EUR 111.2 billion loan disbursements

Similarly to 2024, most of the reported expenditure is incurred in the expenditure categories of '*Energy efficiency*' (EUR 24.8 billion), '*Clean transport & infrastructure*' (EUR 22.7 billion) and '*Clean energy & network*' (EUR 5.8 billion). This is very closely aligned with the fulfilled RRF milestones and targets.

Table 7: Reported expenditure by Expenditure Category (in EUR)

Expenditure Category	Sum of NGEU Reported Expenditure (1 August 2025)	Sum of NGEU Reported Expenditure (1 August 2024)
Clean energy & network	5,809,144,352	3,825,830,620
Clean transport & infrastructure	22,673,647,603	14,865,644,023
Climate change adaptation	2,352,700,920	1,394,823,279
Digital technologies supporting the green transition	34,358,000	6,416,000
Energy efficiency	24,818,456,325	18,505,514,965
Nature protection, rehabilitation and biodiversity	1,711,264,892	649,660,218
Other	1,073,222,721	1,020,371,778
Research and innovation activities supporting the green transition	3,865,085,055	2,229,875,333
Water & waste management	2,556,386,021	1,519,640,560
Grand Total	**64,894,265,889**	**44,017,776,775**

Graph 5: Reported expenditure by Expenditure Category out of the total NGEU Green Bond Pool (in EUR billion, as of 1 August 2025)
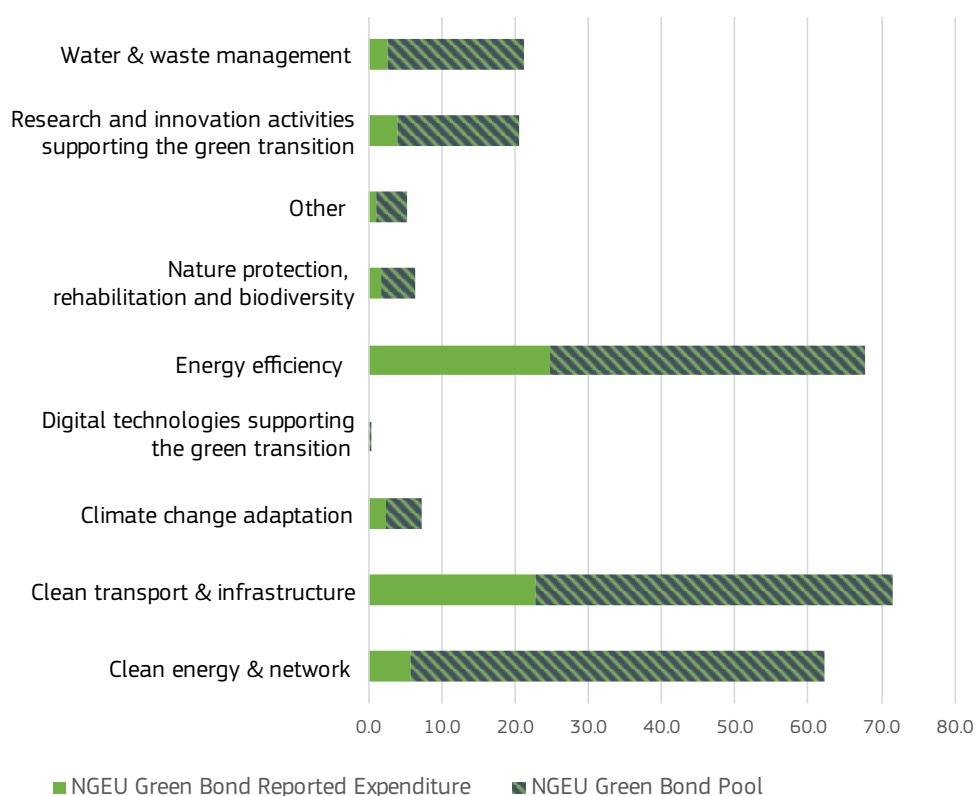
Table 8: Reported expenditure by Member State (in EUR)[32]

Member States	Sum of NGEU Reported Expenditure (1 August 2025)	Sum of NGEU Reported Expenditure (1 August 2024)
Austria	184,638,000	184,638,000
Belgium	915,612,140	0
Bulgaria	404,305,774	0
Croatia	545,696,962	321,138,088
Cyprus	144,204,000	75,802,000
Czechia	2,022,847,666	1,368,894,623
Denmark	280,158,139	212,279,450
Estonia	235,460,000	142,310,000
Finland	135,550,000	27,252,000
France	12,455,860,000	10,618,788,000
Germany	6,666,467,000	2,171,964,000
Greece	6,208,162,331	6,025,954,614
Ireland	212,530,000	55,182,000
Italy	24,969,512,000	17,829,904,000
Latvia	149,450,000	0
Lithuania	91,000,000	64,000,000
Luxembourg	18,800,000	960,000
Malta	64,226,000	34,232,000
Netherlands	1,239,832,000	0
Poland	796,975,337	0
Portugal	2,585,079,314	1,631,000,000
Romania	54,780,056	0
Slovakia	415,444,180	4,790,000
Slovenia	211,949,036	123,674,000
Spain	3,125,014,000	3,125,014,000
Sweden	760,711,955	0
Grand Total	**64,894,265,889**	**44,017,776,775**

[32] Further information on the allocation of proceeds across intervention fields and across Member States can be found in the Supporting data files available at the publication webpage of the Annual NGEU Allocation and Impact Reports webpage (https://commission.europa.eu/strategy-and-policy/eu-budget/eu-borrower-investor-relations/analyses-and-reports_en#ngeu-green-bonds-reports)

UNALLOCATED PROCEEDS

Unallocated proceeds are the difference between the funds raised from NGEU Green Bond issuances and Member States' reported eligible green expenditures (allocated proceeds). As of 1 August 2025, unallocated proceeds stand at EUR 10.2 billion, EUR 6.0 billion lower than the EUR 16.2 billion as of 1 August 2024. These unallocated proceeds are supported by a remainder of the Pool of NGEU Green Bond eligible measures (of EUR 197.9 billion) which are expected to receive NGEU Green Bonds allocation as implementation of the NGEU programme progresses.

The decreasing scale of unallocated proceeds reflects the robust risk management processes, which ensures calibration of NGEU Green Bond issuances so that there is no risk of issuing more NGEU Green Bonds than can eventually be allocated to reported green expenditures[33]. As implementation of the NGEU programme is advancing, these processes ensure that unallocated proceeds will diminish (see Table 9) 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 hence depends on the scale and pace at which Member States report green expenditures over the lifetime of the programme (including post end-2026).

Table 9: Progression of NGEU Green Bonds Issuances and allocated/unallocated proceeds[34]

Year (as of 1 August)	NGEU Green Bonds Issued (EUR million)	Allocated proceeds (EUR million)	Unallocated Proceeds (EUR million)
2025	75,081	64,894	10,187
2024	60,231	44,018	16,213
2023	44,180	21,022	23,158
2022	27,998	13,528	14,470

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[33] 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.

[34] The cut-off date of 2022 report was 19 October, while for other years it was 1 August.

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 15.7 billion or 24.2% of reported expenditures (compared to EUR 15.1 billion in 2024) [35].

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 climate coefficient below 100% (but higher than 0%), where the remainder 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 2025, the financing from these two additional sources corresponds to EUR 21.2 billion (compared to EUR 12.2 billion on 1 August 2024). EUR 12.6 billion of this co-financing is co-financing from Member States with EUR 8.6 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 [36].

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[35] Note that the 2024 report erroneously noted the level of refinancing as EUR 21.1bn. However, this number included a misclassification of EUR 6.0bn of reported green expenditures from Greece as re-financing rather than pre-financing.
[36] All past reports available here: https://commission.europa.eu/strategy-and-policy/eu-budget/eu-borrower-investor-relations/analyses-and-reports_en#ngeu-green-bonds-reports

EU Taxonomy
alignment

EU Taxonomy alignment

NGEU Green Bond issuances take place outside the EU Taxonomy as the RRF Regulation, which fixes the parameters for eligible NGEU Green Bond expenditure, predated the delegated acts for the EU Taxonomy. Nevertheless, the Commission has committed to reporting on its assessment of the alignment of the NGEU Green Bond expenditures with the EU Taxonomy.

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). 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 (see Box 4).

In line with the methodology used in previous years, **63.6%, of the NGEU Green Bond Pool is assessed to be fully or substantially aligned with the EU Taxonomy** of both SCC and additional quantifiable DNSH criteria (compared to 63.4% in 2024). A further **34.2% of the NGEU Green Bond Pool is assessed to be partially aligned** (compared to 33.6% in 2024) and the remaining **2.2% is not covered or aligned** (compared to 3.0% in 2024).

The stable nature of these numbers reflects the limited changes in the NGEU Green Bond Pool and the absence of new legislation that would warrant a holistic revision[37] of EU Taxonomy alignment assessment[38].

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[37] Nevertheless, the Commission continued to update its Taxonomy assessment when deemed necessary, including in cases of new information on practical challenges in fulfilling EU Taxonomy DNSH criteria. This includes a change of classification for projects financing zero-emission vehicles in ADHOC and 074 Intervention Fields from full to partial alignment given limited available information to justify full taxonomy alignment for these projects. This change does not arise from changes in projects financed by the NGEU Green Bonds, but from more general market feedback on the practical requirements for full EU Taxonomy alignment for these specific type of projects.

[38] While the Omnibus I package published in February 2025 (https://finance.ec.europa.eu/publications/omnibus-i-package-commission-simplifies-rules-sustainability-and-eu-investments-delivering-over-eu6_en) is expected to also lead to changes in requirements for alignment of the EU Taxonomy Activities (https://finance.ec.europa.eu/publications/commission-cut-eu-taxonomy-red-tape-companies_en) these changes have not yet been adopted as of 1 August 2025. Such changes will be reflected in future report if appropriate.

Table 10: EU Taxonomy alignment of NGEU Green Bond Pool
(table in EUR million and chart in %, as of 1 August 2025)

	DNSH fully aligned	DNSH partially aligned	DNSH not covering specific EU taxonomy conditions
Full SCC alignment	14 intervention fields 58,197.7	5 intervention fields 41,428.2	4 intervention fields 47,283.6
Substantial SCC alignment	3 intervention fields 23,442.2	8 intervention fields 44,056.0	1 intervention field 13,200.9
Partial SCC alignment	0 intervention fields 0.0	10 intervention fields 20,741.2	5 intervention fields 8,683.1
Not SCC aligned			4 intervention fields **102.0**
Not covered			4 intervention fields **5,633.9**

Donut chart:
- Full alignment: 22.1%
- Substantial alignment: 41.5%
- Partial alignment: 34.2%
- Not covered/aligned: 2.2%
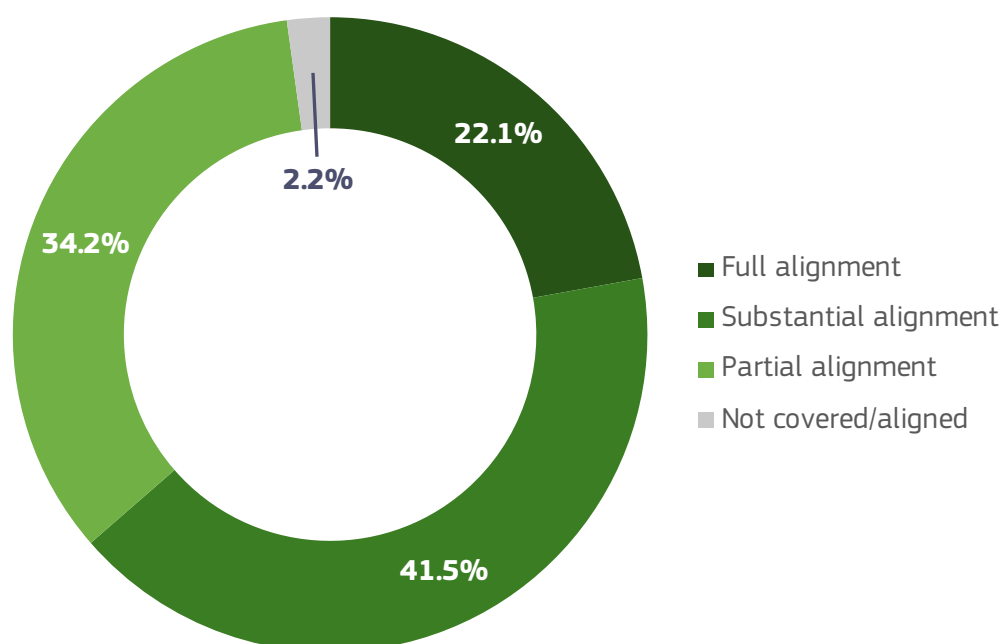
For the EUR 64.9 billion of allocated proceeds, the extent of **full or substantial alignment** to the Taxonomy is slightly lower compared to the total Pool but stands at **56.7%** (slightly increasing compared to 2024: 53.5%), while **partial alignment** represents **41.5%** (2024: 44.0%) and **not covered or aligned** at **1.8%** (2024: 2.5%).

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

Table 11: EU Taxonomy alignment of the allocated proceeds (table in EUR million and chart in %, as of 1 August 2025)

	DNSH fully aligned	DNSH partially aligned	DNSH not covering specific EU taxonomy conditions
Full SCC alignment	14 intervention fields 16,443.6	5 intervention fields 10,272.1	4 intervention fields 19,399.9
Substantial SCC alignment	3 intervention fields 5,166.6	7 intervention fields 4,895.3	1 intervention field 524.0
Partial SCC alignment	0 intervention fields 0.0	9 intervention fields 4,588.9	5 intervention fields 2,447.6
Not SCC aligned			4 intervention fields **44.2**
Not covered			4 intervention fields **1,112.2**

- Full alignment
- Substantial alignment
- Partial alignment
- Not covered/aligned

25.3%
1.8%
41.5%
31.3%
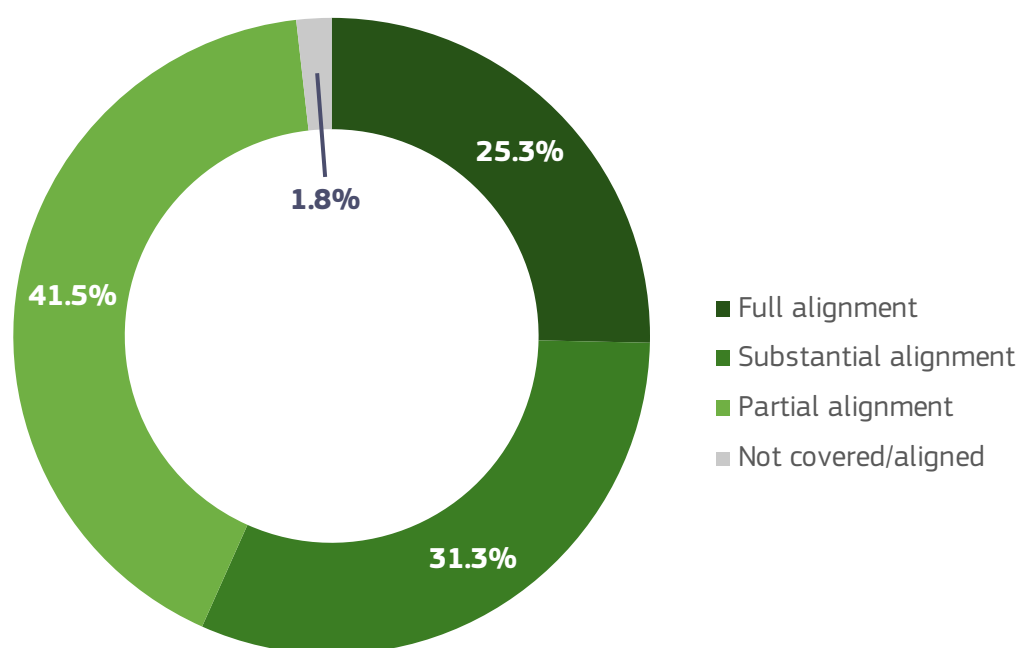
Box 4: Methodology for classification of EU Taxonomy alignment

The EU Taxonomy alignment for the NGEU Green Bonds is based on the assessment at the level of intervention fields[39] of:

- 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

- 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 SCC aligned'; 'Substantially SCC compliant' with the main substantive qualitative SCC criteria[40], but not to the same scale; 'Partially SCC 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 (e.g. percentage change in energy consumption) must be present in both RRF and the EU Taxonomy, but in case of 'Substantially SCC compliance', the degree of the quantitative criteria covered by the criteria is not the same. To assess consistency with the DNSH requirements, the analysis is based on the standard DNSH criteria stemming from Annexes 1-4 of the Commission technical guidance on the application of DNSH under RRF[41] along with the additional quantitative conditions present in Annex VI of the RRF Regulation.

The RRF conditions are compared to the EU Taxonomy Activities' DNSH conditions, consisting of both *basic standard conditions* for all Activities[42] 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'. (see Annex V)

In interpreting the *basic standard conditions' 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.

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[39] 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.

[40] For the purpose of EU Taxonomy alignment assessment for both SCC and DNSH, Commission relies on Member States to have implemented various EU legislation and Directives that are referenced as conditions in EU Taxonomy Delegated Acts.

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

[42] EU Taxonomy Regulation (EU) 2020/852 – Article 17

These differences do not however retract from the sustainability benefits of the respective measures[43].

In addition, while in many cases, the 2,012 milestones or targets attached to the 1,045 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.

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

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[43] For example, one of the specific considerations of Taxonomy are also Minimum Safeguards (EU Taxonomy Regulation (EU) 2020/852 – Article 18) 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 (Charter of Fundamental Rights of EU), 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.

Climate Impact
of NGEU Green Bond
proceeds

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 the climate impact of 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 was further expanded in the 2024 Allocation and Impact Report.

The current impact report presents a further 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.

Given the ongoing 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.

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.

Step 1
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 12 provides some examples of output indicators per intervention field.

Step 2
For each output indicator (and corresponding intervention field) a methodology for translating the output indicators into GHG emissions avoided is established[44]. 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 prospective GHG emissions avoided is thus established.

Step 3
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

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[44] 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.

Commission has confirmed that the target has indeed been successfully reached. 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 12: 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 tonnes 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 tonnes 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 tonnes of CO2e/year emissions avoided
029 – Renewable energy: solar	Additional operation capacity installed for solar energy	MW	GHG emissions avoided	XYZ tonnes of CO2e/year emissions avoided
075 – Cycling infrastructure	Amount of cycling infrastructure installed	km	GHG emissions avoided	XYZ tonnes of CO2e/year emissions avoided

ESTIMATED EXPECTED IMPACT

Taking into account the composition of the NGEU Green Bond Pool as of 1 August 2025 and building on the 2023 and 2024 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 53.4 million tonnes of CO2 per year.** This amount represents approximately 1.5% of the annual GHG emissions of the EU for the year 2022[45].

These estimates are based on the analysis of 2,012 milestones and targets related to the NGEU Green Bond Pool (versus 2,096 in 2024), 545 of which contained quantifiable data that could be analysed in calculating climate impacts (versus 510 in 2024). These milestones and targets represent approximately 49% of the NGEU Green Bond Pool costs, related to 43% of the number of NGEU Green Bond Pool measures and to 36 intervention fields[46].

The slight decrease in the estimated amount of million tonnes of CO2 per year reductions (from 54.7 million tonnes of CO2e/year estimated in 2024 to 53.4 million tonnes of CO2e/year in 2025) reflects the ongoing revisions is the national RRP that affect the usability of milestones and targets for the calculation of estimated avoided emissions. While the level of green ambition of the RRF remains as high as ever, over time measures included in national plans are revised and refined, including with their respective milestones and targets. This can result in some measures no longer providing data for which a calculation methodology is available (see Box 5). In line with the Commission's commitment to a prudent, data-based reporting approach, such measures are excluded from the Commission's estimates leading to a nominal (but not actual) decrease in estimated emissions avoided.

In terms of expenditure categories, as in previous years, *'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), result in the largest amount of estimated GHG emissions avoided.

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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[45] 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.
[46] Of the 36 intervention fields, 52% 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 13: 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	3,452,641
Energy efficiency	10,303,447
Clean energy & network	19,945,935
Other	18,261
Water & waste management	2,049,531
Nature protection, rehabilitation and biodiversity	657,885
Clean transport & infrastructure	16,965,352
Grand Total	**53,393,052**

REALISED IMPACT

Based on the implementation of milestones and targets up until the cut-off date of 1 August 2025, **the realised impact of the allocated NGEU Green Bond proceeds is calculated to be 14.0 million tonnes of CO2e/year of emissions avoided** (compared to 1.5 million tonnes of CO2e/year in 2024 and 224,143 tonnes of CO2e/year in the 2023). This represents 26% of the total estimated impact following full implementation of the quantifiable milestones and targets in the NGEU Green Bond Pool (versus 2.7% in 2024).

This exponential increase in realised GHG emission reductions reflects the extended lifespan of project implementation, where planning and administrative phases need to be completed before 'on the ground' implementation can take place. Under the RRF, milestones and targets must be completed by 31 August 2026. Unlike other sovereign issuers, NGEU Green Bonds do not refinance already implemented projects, but rather finance measures that are being implemented or are planned to be implemented in the upcoming years.

As the RRF programme contains some investments with long lead times, which is reflected in the structure of milestones and targets included in the calculations of the GHG emission reductions, these investments will continue delivering reductions also after the lifetime of the RRF.

This realised impact has been **achieved primarily through energy efficiency renovations, rail infrastructure and zero-emission vehicles**.

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 14: 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	1,588,266
Clean energy & network	2,423,318
Water & waste management	113
Nature protection, rehabilitation and biodiversity	-
Clean transport & infrastructure	9,995,599
Other	-
Grand Total	**14,007,296**

Graph 6: Realised impact per expenditure category of the total expected (in MtCO2e/year as of 1 August 2025)
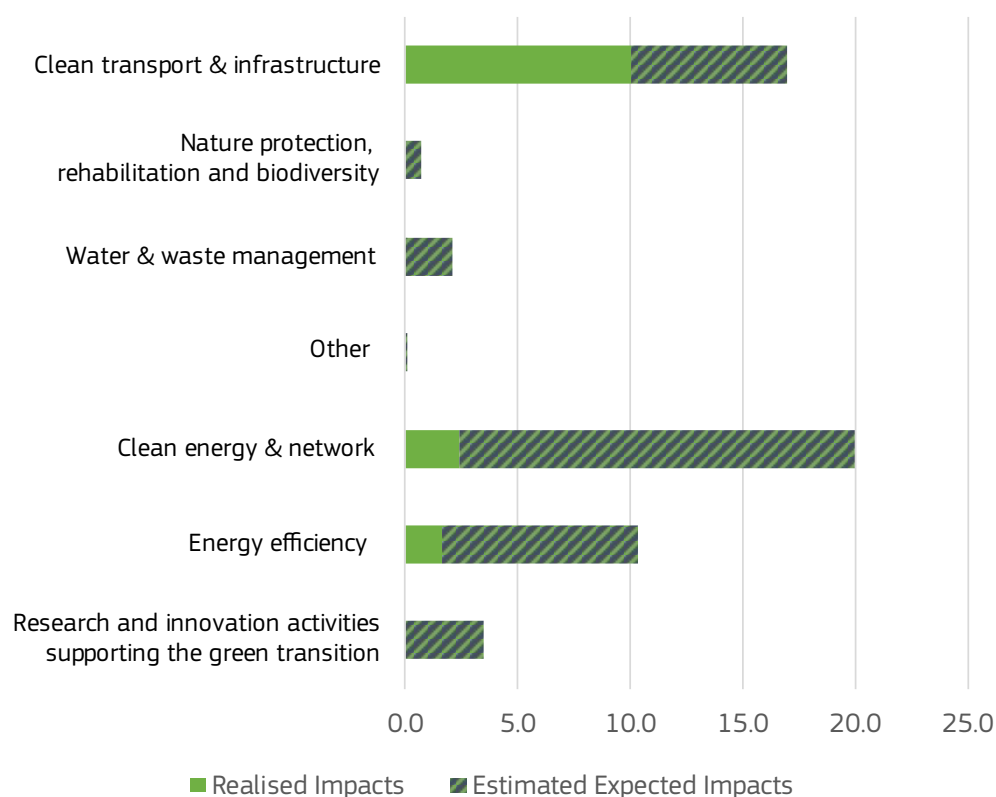
Table 15: Climate impact per intervention field (expected and realised)

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	1,300	MW	0	2,440,286
	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
	Production of bioethanol equivalent	0	53	tonnes	0	35
	Square Meters renovated (non-residential)	620,000	620,000	m2	2,609	2,609
	CO2 savings			tonnes	0	133,333
024bis – Energy efficiency and demonstration projects in large enterprises and supporting measures	CO2 savings			tonnes	86,705	86,705
024ter – Energy efficiency and demonstration projects in large enterprises	Square Meters renovated (non-residential)	0	50,631,298	m2	0	697,970
	Zero-emission vehicles	0	20,000	Number	0	32,197
	Energy savings in industry	0	1	PJ	0	36,305
	CO2 savings				540,000	2,005,936
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	Square Meters renovated (residential and non-residential)	0	839	m2	0	10
	Square Meters constructed (residential and non-residential)	0	1,558	m2	0	11
	Energy savings through energy class upgrades	0	28,261,093	kWh/year	0	3,194
	CO2 savings				0	2,003,000
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)	87,056,900	397,864,189	m2	655,194	4,381,575

Intervention Field	Output				Impact GHG Emissions avoided (in tCO2e/year)	
025ter – Construction of new energy efficient buildings	Square Meters renovated (residential and non-residential)	744,800	2,908,334	m2	2,070	14,808
	Square Meters constructed (residential and non-residential)	365,312	9,578,632	m2	535	29,508
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	Square Meters renovated (non-residential)	52,297	4,810,089	m2	220	38,842
	Square Meters constructed (non-residential)	0	401,440	m2	0	1,815
	Additional MWh saved per year	12,692	21,418	MWh	3,202	5,403
026bis – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures compliant with energy efficiency criteria	Square Meters renovated (non-residential)	31,435,685	47,428,236	m2	297,730	573,596
	Square Meters constructed (non-residential)	0	3,913,039	m2	0	10,665
	Additional MWh saved per year	0	343,860	MWh	0	135,759
	CO2 savings				0	110,000
027 – Support to enterprises that provide services contributing to the low carbon economy and to resilience to climate change including awareness-raising measures	Installed Capacity of Solar Panels	0	44	MW	0	18,032
	Zero-emission car charging points (public and private)	0	40	Number	0	229
028 – Renewable energy: wind	Installed Capacity of Wind Farms	2,000	3,074	MW	2,141,685	3,268,760
029 – Renewable energy: solar	Installed Capacity of Solar Panels	1	39,687	MW	720	10,353,095
	Square Meters renovated (residential and non-residential)	0	285,011	m2	0	4,603
030bis – Renewable energy: biomass with high GHG savings	Production of bioethanol equivalent	0	2,339,109	tonnes	0	1,557,602
	Zero-emission vehicles	0	300	Number	0	419
	Energy savings through renovations	0	6,009	MWh	0	1,083
	Electrolyser capacity – Hydrogen production	0	4	MW	0	5,006

Intervention Field	Output				Impact GHG Emissions avoided (in tCO2e/year)	
032 – Other renewable energy (including geothermal energy)	Installed Capacity of Solar Panels	0	514	MWp	0	296,656
	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	1,473	MWp	0	1,581,803
	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	448	MW	0	560,640
	Reduction of electricity consumption	0	3,832	MWh	0	962
	Avoided energy consumption through building renovation	1,500	6,415	TJ/yr	110,913	474,339
	Production of bioethanol equivalent	0	48,472	tonnes	0	32,277
	CO2 savings			tonnes	170,000	736,000
033 – Smart Energy Systems (including smart grids and ICT systems) and related storage.	Number of smart electricity meters	0	1,316,569	Number	0	91,825
	Electrolyser capacity – Hydrogen production	0	75	MW	0	93,857
	Installed Capacity of Wind Farms	0	76	MW	0	59,524
	Installed Capacity of Solar Panels	0	204	MW	0	117,874
	Installed Capacity of renewable energy	0	3	MW	0	1,491
	Zero-emission buses	0	15	Number	0	813
	Zero-emission bus charging points	0	1,030	Number	0	1,181

Intervention Field	Output			Impact GHG Emissions avoided (in tCO2e/year)	
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
	Energy savings resulting from the modernisation of heat distribution	0	20	kTOE	0	57
	Quantity of RES energy connected to district heating	0	32	GWh	0	7,542
	Installed Capacity of renewable energy	0	15	MW	0	8,083
039bis – Provision of water for human consumption (extraction, treatment, storage and distribution infrastructure, efficiency measures, drinking water supply) compliant with efficiency criteria	Water savings	0	56,500,000	m3/year	0	13,139
	Length of drinking water network projects	743	4199	km	113	390
041bis – Waste water collection and treatment compliant with energy efficiency criteria	Waste water treatment units	0	26	Number	0	3,247
042 – Household waste management: prevention, minimisation, sorting, reuse, recycling measures	Number of sorting facilities – Plastic waste	0	3	Number	0	1,213,521
	Number of sorting facilities – Municipal waste	0	52	Number	0	0
	Plastic avoided	0	275,000	tonnes	0	598,950
	Zero-emission trucks	0	79	Number	0	4,293
044 – Commercial, industrial waste management: prevention, minimisation, sorting, reuse, recycling measures	Number of sorting facilities – Municipal waste	0	6	Number	0	94,560
	Production of bioethanol equivalent	0	175,200	tonnes	0	116,665
046bis – Rehabilitation of industrial sites and contaminated land compliant with efficiency criteria	Square Meters renovated (non-residential)	0	132,544	m2	0	4,766
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

Intervention Field	Output				Impact GHG Emissions avoided (in tCO2e/year)	
064 – Newly built or upgraded railways – TEN-T core network	Length of railway	0	4,295	km	0	225,510
065 – Newly built or upgraded railways – TEN-T comprehensive network	Length of railway	0	964	km	0	87,143
066bis – Other newly or upgraded built railways – electric/zero emission	Length of railway	40	50	km	1,844	2,308
067 – Reconstructed or modernised railways – TEN-T core network	Length of railway	0	333	km	0	113,017
068 – Reconstructed or modernised railways – TEN-T comprehensive network	Length of railway	1,698	4,198	km	326,101	725,095
069bis – Other reconstructed or modernised railways – electric/zero emission	Length of railway	100	1,031	km	11,205	81,263
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	181	Number	0	442
	Length of railway	0	2,815	km	0	367,126
072bis – Mobile zero emission/electric powered rail assets	Number of trains/locomotives	0	637	Number	0	1,273
073 – Clean urban transport infrastructure	Length of constructed tram or metroway	20	849	km	53,417	2,026,133
	Bicycle parking spaces constructed	6,000	6,000	Number	131,737	131,737
	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	120,822	Number	0	691,181
	Zero-emission bus charging points	0	1,007	Number	0	1,226

Intervention Field	Output				Impact GHG Emissions avoided (in tCO2e/year)	
074 – Clean urban transport rolling stock	Zero-emission buses	145	7,374	Number	6,283	298,640
	Zero-emission vehicles	0	8,977	Number	0	11,898
	Zero-emission bus charging points	0	1,007	Number	0	1,347
	Square Meters renovated (non-residential)	0	244,050	m2	0	1,567
075 – Cycling infrastructure	Cycle path constructed	285	6,308	km	14,971	426,717
	Bicycle parking spaces constructed	0	10,000	Number		
077 – Alternative fuels infrastructure	Zero-emission car charging points (public and private)	690,500	815,088	Number	8,698,406	9,679,878
	Zero-emission bus charging points	0	489	Number	0	4,061
	Zero-emission vehicles	0	3,850	Number	0	5,943
	Production of bioethanol equivalent	0	6,800	tonnes	0	4,528
	Biogas refuelling stations (compressed)	0	2	Number	0	10,972
	CO2 savings through hydrogen refuelling stations			tonnes	0	309,647
ADHOC – Ad hoc intervention field [zero-emission vehicles]	Zero-emission vehicles	564,000	1,038,751	Number	751,635	1,388,679
	Zero-emission car charging points (public and private)	0	200	Number	0	997
TOTAL					**14,007,296**	**53,393,052**

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, ongoing changes made to milestones and targets in the context of the revision of national recovery and resilience plans also affect the inclusion of measures. In this context some milestones and targets were changed or removed compared to previous years, 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 2,012 milestones and targets, only 545 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 49% of the total NGEU Green Bond Pool 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. These updates will integrate whenever possible additional methodologies and environmental considerations on the impact of investments financed by NGEU Green Bonds.

Case studies
of investments financed
by NGEU Green Bonds

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 [47].

Each case study includes the unique identifier assigned to each measure or submeasure (the 'Reference'). In some cases, measures can then be divided in multiple submeasures, taking into account regional implementation, type of financing (e.g. green vs. non-green financing) or phases/sections of construction. Each measure or submeasure can further include multiple individual projects (several construction sites, multitude of apartments, electricity plants, etc.) [48].

'Intervention fields' are defined in the RRF Regulation and are assigned to each individual submeasure or measure.

The 'NGEU Green Bond eligible amount' presented in the case studies refers to the costs after the application of the Green Bond eligibility coefficient (0%, 40% or 100%) in line with the NGEU Green Bond Framework.

'NGEU Green Bond reported expenditure' denotes the amount of expenditure that Member States have reported under each individual measure or submeasure (also referred to as allocated proceeds).

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[47]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 – RRF Map: Recovery and Resilience Facility – European Union (europa.eu).

[48] While case studies presented in this Section make reference to the RRF Map, it is noted that some data points may not always match due to either timing of updates or due to scope of referred projects within the relevant measure or submeasure.

FRANCE: URBAN DENSIFICATION – BROWNFIELDS

Source: EC RRF Map of Projects[49]

Reference	FR-C[C2]-I[I3]
Intervention field	050 – Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure
NGEU Green Bond eligible amount	260,000,000 EUR
NGEU Green Bond reported expenditure	260,000,000 EUR

Measure aimed to rehabilitate and recycle brownfield and wasteland sites, which represent a significant source of lands. The goal is to contribute to the trajectory of the 'zero net artificialisation' by 2050 set by the French government, with the objectives of controlling urban sprawl and supporting urban revitalisation and consequently limiting the consumption of natural areas. The measure also supports the development of land knowledge tools.

One of the projects financed by the measure concerns the conversion of an industrial brownfield in the suburbs of Le Mans into 25 social housing units.

The project, concluded in Spring 2023 entailed the conversion of a former factory in Yvré-L'Evêque (covering a total area of 26,156 m2, including 6,400 m2 of buildings), into a 25 social housing eco-district (2,000 m2) and a cultural and social space following deconstructing and depolluting the old factory site. The project included deconstruction and depolluting of the old factory site and preservation of natural areas, particularly wetlands located on the banks of the Huisne river.

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[49] https://commission.europa.eu/projects/recycling-brownfield-social-housing-yvre-leveque_en

GREECE: REFORM OF THE PRIMARY HEALTH CARE SYSTEM – GREEN INVESTMENTS
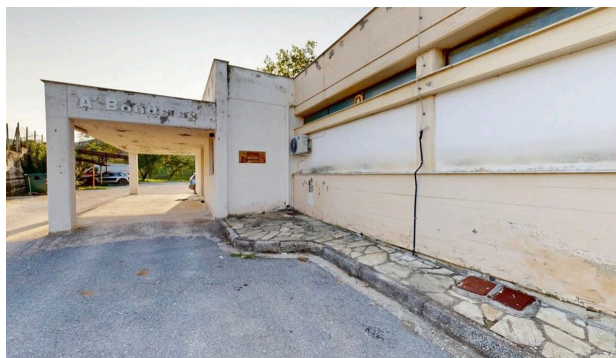
Reference	EL-C[3,3]-R[16755.b]
Intervention field	026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures
NGEU Green Bond eligible amount	75,598,886 EUR
NGEU Green Bond reported expenditure	75,598,886 EUR

Source: EC RRF Map of Projects [50]

The submeasure involves the Renovation of Primary Healthcare Infrastructure across Greece.

Only green investments are financed through NGEU Green Bonds. Specifically, this involves comprehensive infrastructure improvements aimed at achieving energy and operational upgrades of the buildings, including improvements to thermal insulation, electromechanical equipment and networks, as well as the overall condition of the facilities. Thus, also the quality of healthcare services is enhanced.

As part of this submeasure, energy efficiency upgrades and renovation works are currently underway at the Health Centre of Velestino, Region of Thessaly with the project being on track to be concluded by end of 2025.

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[50] https://commission.europa.eu/projects/upgrading-infrastructure-facilities-primary-health-carevelestino-health-center_en

SLOVENIA: STRENGTHENING THE ELECTRICITY DISTRIBUTION NETWORK

Reference	SI–C[C1]–I[IF] SI–C[C1]–I[IFL]
Intervention field	033 – Smart Energy Systems (including smart grids and ICT systems) and related storage.
NGEU Green Bond eligible amount	47,430,000 EUR
NGEU Green Bond reported expenditure	19,270,000 EUR

Source: EC RRF Map of Projects[51]

This measure aimed to modernise the electricity distribution grid in line with the increasing consumption of renewable electricity and to enable the connection of generating installations to renewable energy sources, heat pumps and recharging points for electric vehicles. The entire measure consists of the deployment of 838 new transformer stations and a new low-voltage network with a length of 1,300 kilometres.

Within the project of upgrading the low-voltage network by Elektro Gorenjska, 55 transformer stations and 86.7 km of new low voltage grid will be built. The measure started in June 2023 and will be finalised by mid-2026.

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[51] https://commission.europa.eu/projects/elektro-gorenjska-strengthening-electricity-distribution-network-low-voltage-network_en

CZECHIA: BRNO – PROTECTION AGAINST DROUGHTS AND FLOODS

Source: EC RRF Map of Projects[52]

Reference	CZ–C[C2.9]–I[I1]
Intervention field	040 – Water management and water resource conservation[53]
NGEU Green Bond eligible amount	29,926,950 EUR
NGEU Green Bond reported expenditure	28,993,063 EUR

The measure aims to protect persons and property of the inhabitants of the city of Brno from floods, by revitalising the watercourse, making the area concerned more attractive and freeing the area for further development. The proposed interventions will increase the capacity of the Svratka riverbed in the section from km 37,028 to 40,174.

The flood protection will be linked to the river revitalisation, bringing the regulated river and the floodplain closer to the natural state in the entire area under consideration. The measure is on track to be completed by the end of 2025.

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[52] https://commission.europa.eu/projects/implementation-flood-protection-measures-city-brno-stages-vii-and-viii_en

[53] Full name of Intervention Field: Water management and water resource conservation (including river basin management, specific climate change adaptation measures, reuse, leakage reduction)

BELGIUM: BLUE DEAL – ADAPTATION TO CLIMATE CHANGE MEASURES

Source: EC RRF Map of Projects [54]

Reference	BE-C[C13]-I[I-124.S1]
Intervention field	037 – Adaptation to climate change measures and prevention and management of climate related risks [55]
NGEU Green Bond eligible amount	174,130,823 EUR
NGEU Green Bond reported expenditure	159,420,000 EUR

The Flemish Blue deal is a submeasure aiming to increase Flanders' preparedness for longer periods of drought and more frequent heat waves by addressing drought problems in a structural way. Blue Deal projects across Flanders, involve different actors such as industry, farmers and municipalities.

The actions cover:
- landscape projects for drought mitigation,
- a research program in agriculture,
- two projects on waterway pumps and locks,
- a water management support scheme for companies that invest in innovative water saving technologies,
- innovative projects on circular water use and digital monitoring and smart water data systems,
- implementation of nature-based solutions in four defined areas and
- wetland restoration projects.

The restoration of the Romboutswervepolder in Damme, part of the Flemish Blue deal submeasure

includes restoring 700 ha of polder landscape in order to increase water retention, as well as boost local fauna and flora, in coordination with neighbouring farmers.

The supported projects shall be completed by mid-2026.

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[54] https://commission.europa.eu/projects/blue-deal-flemish-region_en
[55] Full name of Intervention Field: 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)

ESTONIA: CONSTRUCTION OF THE TALLINN OLD PORT TRAM LINE

Source: EC RRF Map of Projects [56]

Reference	EE-C[E]-I[5-4-.5-4-]
Intervention field	073 – Clean urban transport infrastructure
NGEU Green Bond eligible amount	36,500,000 EUR
NGEU Green Bond reported expenditure	33,200,000 EUR

A new tramline of 2.5 km connecting Tallinn Airport, Rail Baltic hub in the city centre, the Old Port and the regional train station was opened in the end of 2024.

The connection also aims to integrate future Rail Baltica[57] with Tallinn local public transport. This crucial addition in Tallinn city public transport enables multimodal and clean commute for passengers.[58]

Meanwhile, Rail Baltica aims to connect Estonia with other Baltic EU Member States and Poland through railway – enabling a new key transportation link, representing greener connectivity option of wider strategic importance for the region.[59]

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[56] https://commission.europa.eu/projects/tallinn-old-port-tram-line_en
[57] https://railbaltica.org/
[58] https://www.tallinn.ee/en/vanasadamatramm
[60] RRF map: https://commission.europa.eu/projects/sofia-metro-line-3_en; Picture source: https://www.metropolitan.bg/shema/galeriya-virtualna-razxodka/galeriya/liniya-3-na-metroto/duplicate-of-stancziya-hadzhi-dimitar

BULGARIA: SOFIA METRO LINE 3

Source: Hadzhi Dimitar Station – this is the final station of the operational section from which the extension financed by the RRF starts [60]

Reference	BG-C[C8]-I[I6.b]
Intervention field	073 – Clean urban transport infrastructure
NGEU Green Bond eligible amount	95,234,000 EUR
NGEU Green Bond reported expenditure	81,197,544 EUR

This project related to the construction of a section of line 3 of the Sofia metro for a total length of 3 km, covering 3 stations, which will provide a clean, rapid and efficient public transport service to passengers with intermodal connections.[61]

The investment, supported also by the EIB, is expected to allow the transport of 7.6 million passengers per year on average as of 2026. By enhancing public transport for the city's inhabitants, this investment is expected to lead to a reduction in greenhouse gases and air pollution, and a reduction in the number of cars in circulation in the city.

The investment is expected to be completed by mid-2026.

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[60] RRF map: https://commission.europa.eu/projects/sofia-metro-line-3_en; Picture source: https://www.metropolitan.bg/shema/galeriya-virtualna-razxodka/galeriya/liniya-3-na-metroto/duplicate-of-stancziya-hadzhi-dimitar

[61] https://www.eib.org/en/projects/pipelines/all/20210719

Limited Assurance Report

Limited Assurance Report

pwc

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 Table 1 "NGEU Green Bond pool broken down by Member State (in EUR as of 1 August 2025)" of Annex III: "Detailed allocation of NGEU Green Bond proceeds" and Table 14: "Realised impact per expenditure category" under section "Climate Impact of NGEU Green Bond proceeds" in the EU's NGEU Green Bonds Allocation and Impact Report 2025. 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 2025 (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 Assurance, Société coopérative   Luxembourg, 3 December 2025

Represented by

Malik Lekehal
Réviseur d'Entreprises Agréé

Annexes

Brussels, 9.12.2025
SWD(2025) 419 final

PART 2/2

NGEU Green Bonds Allocation and Impact report 2025

COMMISSION STAFF WORKING DOCUMENT

EN   **EN**

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 2025 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.

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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.

Figure 1: The due diligence process

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 measures that require an additional check. From an initial Pool of 1,370 measures, 1,045 measures corresponding to EUR 262.8 billion are included as of 1 August 2025 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 (as of 1 August 2025)
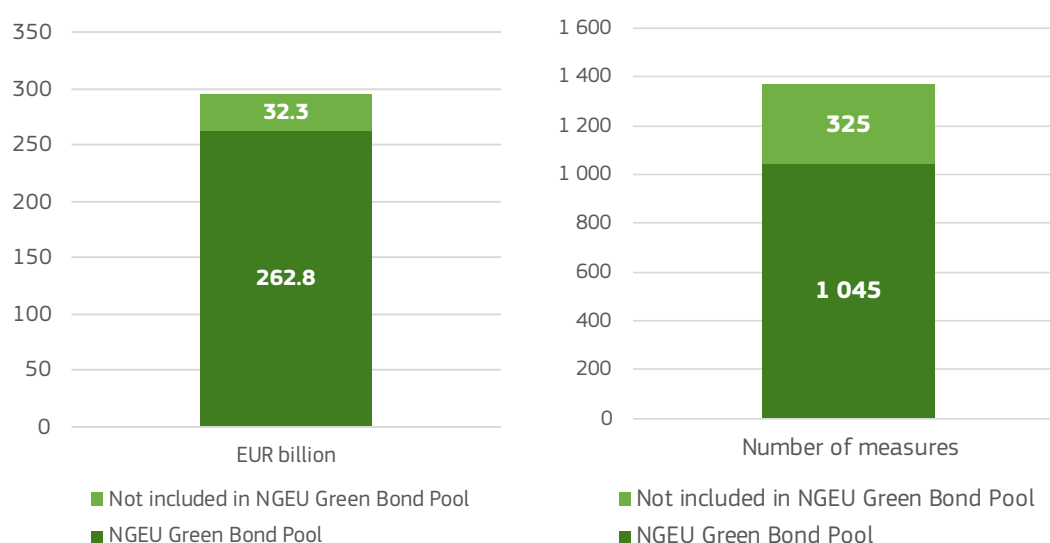
Annex II: The NGEU Green Bond Pool per intervention field

Table 1: NGEU Green Bonds Eligible Amount (as of 1 August 2025)

	Max of NGEU Green Bonds Eligibility Coefficient[3]	Number of NGEU Green Bonds Eligible Measures	Sum of NGEU Green Bonds Eligible Amount, in EUR
Clean energy & network		**188**	**62,226,975,568**
SDG 7, SDG 13			
Climate change mitigation			
028 – Renewable energy: wind	100%	18	6,356,974,926
029 – Renewable energy: solar	100%	52	19,428,175,704
030bis – Renewable energy: biomass with high GHG savings	100%	8	3,141,474,752
032 – Other renewable energy (including geothermal energy)	100%	37	6,972,464,797
033 – Smart Energy Systems (including smart grids and ICT systems) and related storage.	100%	66	25,400,916,863
034bis0 – High efficiency co-generation, efficient district heating and cooling with low lifecycle emissions	100%	7	926,968,526
Clean transport & infrastructure		**265**	**71,570,210,051**
SDG 9, SDG 11			
Climate change mitigation			
063bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: road	40%	3	55,008,000
064 – Newly built or upgraded railways – TEN-T core network	100%	13	18,158,125,001
065 – Newly built or upgraded railways – TEN-T comprehensive network	100%	4	2,125,330,000
066 – Other newly or upgraded built railways	40%	3	44,095,831

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[3] According to Annex VI of the RRF Regulation

	Max of NGEU Green Bonds Eligibility Coefficient[3]	Number of NGEU Green Bonds Eligible Measures	Sum of NGEU Green Bonds Eligible Amount, in EUR
066bis – Other newly or upgraded built railways – electric/zero emission	100%	3	325,271,193
067 – Reconstructed or modernised railways – TEN-T core network	100%	9	1,250,508,958
068 – Reconstructed or modernised railways – TEN-T comprehensive network	100%	10	8,987,085,157
069 – Other reconstructed or modernised railways	40%	15	2,196,210,452
069bis – Other reconstructed or modernised railways – electric/zero emission	100%	12	3,044,475,209
070 – Digitalisation of transport: rail	40%	18	775,658,023
071 – European Rail Traffic Management System (ERTMS)	40%	9	1,153,271,044
072bis – Mobile zero emission/electric powered rail assets	100%	13	4,490,435,998
073 – Clean urban transport infrastructure	100%	24	13,997,727,607
074 – Clean urban transport rolling stock	100%	37	5,967,179,762
075 – Cycling infrastructure	100%	17	1,325,348,238
076bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: urban transport	40%	2	3,860,000
077 – Alternative fuels infrastructure	100%	46	2,908,414,900
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%	20	4,595,267,078
080bis – Seaports (TEN-T) excluding facilities dedicated to transport of fossil fuels	40%	1	4,000,000

	Max of NGEU Green Bonds Eligibility Coefficient[4]	Number of NGEU Green Bonds Eligible Measures	Sum of NGEU Green Bonds Eligible Amount, in EUR
Climate change adaptation		**55**	**7,267,994,582**
SDG 13			
Climate change adaptation			
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	3,597,411,033
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%	17	1,701,006,312
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	1,969,577,237
Digital technologies supporting the green transition		**12**	**386,092,983**
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	248,132,183
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	137,630,800

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[4] According to Annex VI of the RRF Regulation

	Max of NGEU Green Bonds Eligibility Coefficient[5]	Number of NGEU Green Bonds Eligible Measures	Sum of NGEU Green Bonds Eligible Amount, in EUR
Energy efficiency		**270**	**67,863,655,596**
SDG 9, SDG 11			
Climate change mitigation			
024 – Energy efficiency and demonstration projects in SMEs and supporting measures	40%	11	1,771,445,322
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%	20	13,200,846,984
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	40%	27	2,754,038,121
025bis – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria	100%	40	32,937,441,645
025ter – Construction of new energy efficient buildings	40%	60	4,232,187,720
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	40%	48	2,431,462,594
026bis – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures compliant with energy efficiency criteria	100%	61	10,511,086,517
Nature protection, rehabilitation, and biodiversity		**49**	**6,393,054,770**
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	4,977,771,770

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[5] According to Annex VI of the RRF Regulation

	Max of NGEU Green Bonds Eligibility Coefficient[6]	Number of NGEU Green Bonds Eligible Measures	Sum of NGEU Green Bonds Eligible Amount, in EUR
Other		**52**	**5,365,765,261**
N/A			
N/A			
01 – Contributing to green skills and jobs and the green economy	100%	24	1,247,047,475
027 – Support to enterprises that provide services contributing to the low carbon economy and to resilience to climate change including awareness-raising measures	100%	22	2,300,630,332
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	1,789,467,454
Research and innovation activities supporting the green transition		**82**	**20,533,779,184**
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	18,613,216,726
023 – Research and innovation processes, technology transfer and cooperation between enterprises focusing on circular economy	100%	14	1,920,562,458

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[6] According to Annex VI of the RRF Regulation

	Max of NGEU Green Bonds Eligibility Coefficient[7]	Number of NGEU Green Bonds Eligible Measures	Sum of NGEU Green Bonds Eligible Amount, in EUR
Water & waste management		**72**	**21,161,240,114**
SDG 6, SDG 11, SDG 12			
Sustainable use and protection of water and marine resources, Transition to a circular economy, waste prevention and recycling			
039bis – Provision of water for human consumption (extraction, treatment, storage and distribution infrastructure, efficiency measures, drinking water supply) compliant with efficiency criteria	100%	8	5,991,497,960
040 – Water management and water resource conservation (including river basin management, specific climate change adaptation measures, reuse, leakage reduction)	100%	28	5,445,145,037
041bis – Waste water collection and treatment compliant with energy efficiency criteria	100%	6	795,100,000
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%	7	1,323,123,040
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		**1,045**	**262,768,768,109**

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[7] According to Annex VI of the RRF Regulation

Annex III: Detailed allocation of NGEU Green Bond proceeds

Table 1: NGEU Green Bond Pool broken down by Member State

Member State	Sum of NGEU Green Bond Pool (in EUR, as of 1 August 2025)	Sum of NGEU Green Bond Pool (in EUR, as of 1 August 2024)
Austria	2,316,051,610	2,316,051,610
Belgium	2,675,378,993	2,605,414,993
Bulgaria	3,145,521,543	3,157,521,543
Croatia	2,154,338,579	2,329,321,211
Cyprus	539,450,765	517,730,164
Czechia	3,331,640,191	3,396,549,661
Denmark	734,461,787	764,336,503
Estonia	546,280,000	546,280,000
Finland	842,948,000	842,948,000
France	17,468,829,083	17,468,829,083
Germany	12,083,133,693	11,303,645,165
Greece	12,702,718,559	12,621,483,552
Hungary	4,641,113,217	4,641,113,217
Ireland	572,049,000	572,049,000
Italy	73,063,020,602	74,801,620,602
Latvia	818,250,378	815,937,878
Lithuania	1,428,745,275	1,412,898,275
Luxembourg	45,600,000	60,500,000
Malta	225,677,223	225,677,223
Netherlands	3,518,087,550	3,517,576,000
Poland	26,192,023,590	25,480,314,524
Portugal	7,987,900,158	8,707,481,307
Romania	12,715,943,850	12,715,943,850
Slovakia	2,104,490,469	2,516,651,253
Slovenia	944,357,833	1,271,793,887
Spain	68,340,336,413	68,340,336,413
Sweden	1,630,419,748	1,630,419,748
Grand Total	**262,768,768,109**	**264,580,424,661**

The full split of the Expenditure figures, split between the Member States and the Intervention Fields can be found in the Supporting data file for 2025 NGEU Green Bonds Allocation and Impact Report, available at the webpage where the Annual reports are published[8].

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[8] Analyses and reports – European Commission

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)
🇧🇪 **Belgium**	**5,919,860**
026bis – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures compliant with energy efficiency criteria	477,860
032 – Other renewable energy (including geothermal energy)	4,442,000
077 – Alternative fuels infrastructure	1,000,000
🇧🇬 **Bulgaria**	**875,793**
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	875,793
🇭🇷 **Croatia**	**3,590,814**
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
026bis – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures compliant with energy efficiency criteria	3,001,126
🇨🇿 **Czechia**	**57,306,515**
040 – Water management and water resource conservation (including river basin management, specific climate change adaptation measures, reuse, leakage reduction)	87,648
050 – Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure	8,634,549
066bis – Other newly or upgraded built railways – electric/zero emission	31,867,218
069 – Other reconstructed or modernised railways	14,557,004
075 – Cycling infrastructure	496,105
077 – Alternative fuels infrastructure	1,081,490
ADHOC – Ad hoc intervention field	582,501
🇩🇰 **Denmark**	**59,060,967**
025bis – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures compliant with energy efficiency criteria	20,090,827
027 – Support to enterprises that provide services contributing to the low carbon economy and to resilience to climate change including awareness-raising measures	38,970,140
🇫🇷 **France**	**8,557,250,000**
022 – Research and innovation processes, technology transfer and cooperation between enterprises focusing on the low carbon economy, resilience and adaptation to climate change	6,943,500,000
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	268,600,000
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)	12,000,000
042 – Household waste management: prevention, minimisation, sorting, reuse, recycling measures	149,000,000
047 – Support to environmentally-friendly production processes and resource efficiency in SMEs	54,000,000
050 – Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure	177,000,000
068 – Reconstructed or modernised railways – TEN-T comprehensive network	250,000,000
069 – Other reconstructed or modernised railways	133,000,000
077 – Alternative fuels infrastructure	59,500,000
🇩🇪 **Germany**	**1,023,375,000**
ADHOC – Ad hoc intervention field	1,023,375,000
🇬🇷 **Greece**	**2,349,311,236**
024ter – Energy efficiency and demonstration projects in SMEs or large enterprises and supporting measures compliant with energy efficiency criteria	28,155,291
025ter – Construction of new energy efficient buildings	18,492,645
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	3,300
027 – Support to enterprises that provide services contributing to the low carbon economy and to resilience to climate change including awareness-raising measures	623,170,000
029 – Renewable energy: solar	310,320,000
033 – Smart Energy Systems (including smart grids and ICT systems) and related storage.	81,180,000
044 – Commercial, industrial waste management: prevention, minimisation, sorting, reuse, recycling measures	1,287,990,000
🇳🇱 **Netherlands**	**6,190,000**
074 – Clean urban transport rolling stock	6,190,000
🇵🇹 **Portugal**	**2,301,716**
025ter – Construction of new energy efficient buildings	1,301,716
033 – Smart Energy Systems (including smart grids and ICT systems) and related storage.	1,000,000
🇸🇰 **Slovakia**	**2,075,820**
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)	2,075,820
🇸🇮 **Slovenia**	**297,840,410**
01 – Contributing to green skills and jobs and the green economy	66,828,000
025ter – Construction of new energy efficient buildings	1,262,410
033 – Smart Energy Systems (including smart grids and ICT systems) and related storage.	6,130,000
065 – Newly built or upgraded railways – TEN-T comprehensive network	223,620,000
🇪🇸 **Spain**	**79,620,000**
077 – Alternative fuels infrastructure	79,620,000

🇸🇪 **Sweden**	**193,695,232**
023 – Research and innovation processes, technology transfer and cooperation between enterprises focusing on circular economy	125,141,636
077 – Alternative fuels infrastructure	68,553,596
Grand Total	**12,638,413,363**

Table 2: Co-financed by conventional EU-Bonds

	Sum of co-financed by non-green NGEU bonds
🇦🇹 **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
🇧🇪 **Belgium**	**151,698,000**
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	91,686,000
025ter – Construction of new energy efficient buildings	2,280,000
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	16,320,000
047 – Support to environmentally-friendly production processes and resource efficiency in SMEs	474,000
063bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: road	5,172,000
066 – Other newly or upgraded built railways	1,488,000
069 – Other reconstructed or modernised railways	10,500,000
070 – Digitalisation of transport: rail	12,744,000
076bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: urban transport	1,782,000
079 – Multimodal transport (not urban)	9,252,000
🇧🇬 **Bulgaria**	**60,601,445**
024 – Energy efficiency and demonstration projects in SMEs and supporting measures	4,501,536
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	4,501,536
025ter – Construction of new energy efficient buildings	2,732,856
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	45,638,291
071 – European Rail Traffic Management System (ERTMS)	3,227,226
🇭🇷 **Croatia**	**31,702,224**
011bis – Government ICT solutions, e-services, applications compliant with GHG emission reduction or energy efficiency criteria	720,000
024bis – Energy efficiency and demonstration projects in large enterprises and supporting measures	18,538,224
025ter – Construction of new energy efficient buildings	10,794,000
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	1,446,000
070 – Digitalisation of transport: rail	204,000

🏳️ **Cyprus**	**20,406,000**
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	1,842,000
025ter – Construction of new energy efficient buildings	10,188,000
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	4,578,000
076bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: urban transport	318,000
ADHOC – Ad hoc intervention field	3,438,000
🇨🇿 **Czechia**	**387,424,117**
025ter – Construction of new energy efficient buildings	2,357,943
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	673,698
050 – Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure	1,058,668
069 – Other reconstructed or modernised railways	362,352,937
070 – Digitalisation of transport: rail	20,980,872
🇪🇪 **Estonia**	**3,540,000**
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	3,480,000
050 – Nature and biodiversity protection, natural heritage and resources, green and blue infrastructure	60,000
➕ **Finland**	**11,640,000**
01 – Contributing to green skills and jobs and the green economy	480,000
071 – European Rail Traffic Management System (ERTMS)	11,160,000
🇫🇷 **France**	**1,211,040,000**
024 – Energy efficiency and demonstration projects in SMEs and supporting measures	21,600,000
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	856,440,000
047 – Support to environmentally-friendly production processes and resource efficiency in SMEs	42,000,000
069 – Other reconstructed or modernised railways	291,000,000
🇩🇪 **Germany**	**1,314,108,000**
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	1,003,962,000
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	10,146,000
070 – Digitalisation of transport: rail	300,000,000
🇬🇷 **Greece**	**251,426,433**
011bis – Government ICT solutions, e-services, applications compliant with GHG emission reduction or energy efficiency criteria	30,282,000
024bis – Energy efficiency and demonstration projects in large enterprises and supporting measures	450,000
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	17,484,000
025ter – Construction of new energy efficient buildings	23,368,413

|	
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	158,440,020
069 – Other reconstructed or modernised railways	16,110,000
070 – Digitalisation of transport: rail	5,292,000
🇮🇪 **Ireland**	**9,360,000**
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	9,360,000
🇮🇹 **Italy**	**4,109,718,000**
024 – Energy efficiency and demonstration projects in SMEs and supporting measures	23,958,000
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	65,238,000
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	226,848,000
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	186,234,000
069 – Other reconstructed or modernised railways	534,012,000
071 – European Rail Traffic Management System (ERTMS)	283,428,000
🇲🇹 **Malta**	**6,834,000**
025ter – Construction of new energy efficient buildings	6,834,000
🇳🇱 **Netherlands**	**63,828,000**
063bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: road	11,184,000
071 – European Rail Traffic Management System (ERTMS)	47,334,000
084bis – Digitising transport when dedicated in part to GHG emissions reduction: other transport modes	5,310,000
🇵🇱 **Poland**	**10,609,586**
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	10,609,586
🇵🇹 **Portugal**	**646,618,970**
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	9,000,000
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	168,000,000
025ter – Construction of new energy efficient buildings	446,818,970
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	18,600,000
070 – Digitalisation of transport: rail	3,600,000
🇷🇴 **Romania**	**3,943,305**
025ter – Construction of new energy efficient buildings	3,943,305

🛡 **Slovakia**	**15,720,000**
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	1,704,000
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	54,000
070 – Digitalisation of transport: rail	13,590,000
ADHOC – Ad hoc intervention field	372,000
🛡 **Slovenia**	**21,940,554**
025ter – Construction of new energy efficient buildings	18,232,554
026 – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures	3,708,000
🛡 **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
🛡 **Sweden**	**172,960,954**
025 – Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures	39,864,805
025ter – Construction of new energy efficient buildings	133,096,149
Grand Total	**8,574,497,585**

Annex V: Alignment with the EU Taxonomy

Taxonomy assessment Schematic[9]:
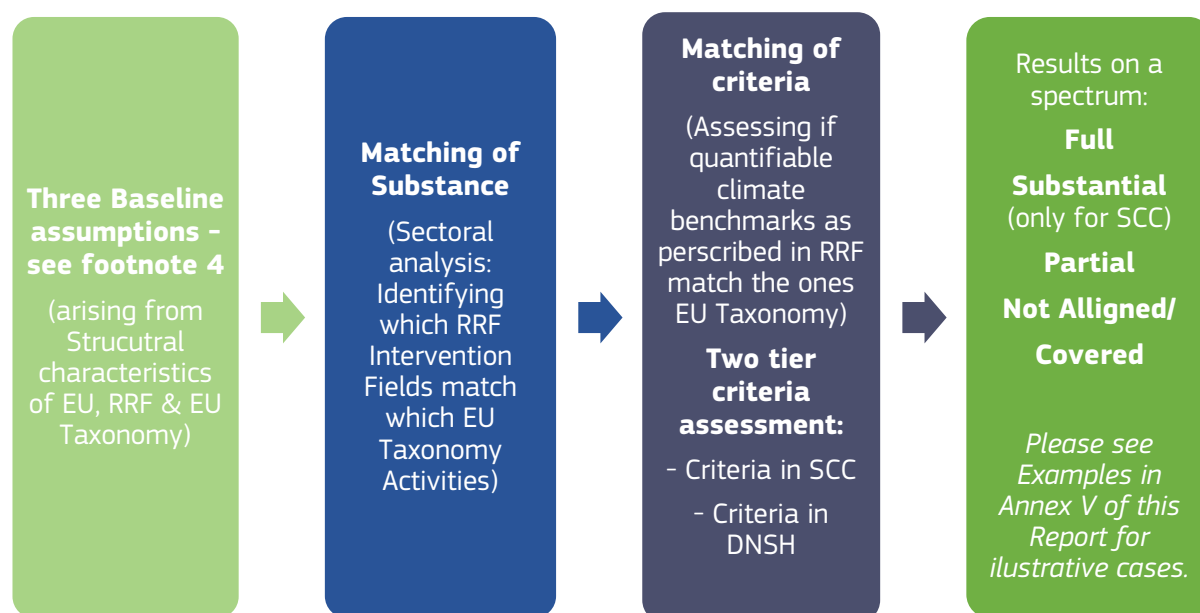
Examples of alignment of the RRF intervention fields with the EU Taxonomy **Substantial Contribution Criteria (SCC)**:

Category	Full SCC alignment
Description	RRF climate benchmarks fully cover substance and quantifiable criteria of EU Taxonomy
Example	026bis – Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting i. **Contextual:** Energy Efficient renovation **[of RRF]** *equals* Renovation of existing buildings **[of Taxonomy]** ii. **Benchmarks:** Medium depth renovation (aka 30–60% energy savings) or 30% GHG emissions reduction **[of RRF]** *is stricter and fully covers* 30% energy reduction or major renovation as defined by Member States **[of Taxonomy]**

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[9] Three baseline assumptions are: 1) DNSH as defined in RRF Regulation, is sufficiently aligned with EU Taxonomy standard baseline DNSH (EU Taxonomy Delegated Act Appendices to Annex I and Annex II); 2) Member States are responsible for implementation of various EU legislation and Directives that are referenced in EU Taxonomy; 3)Member States are responsible for implementation of EU treaties (such as, but not limited to, Fundamental Principles and Rights at Work and International Bill of Human Rights) that underpin Minimal Standards from EU Taxonomy legislation.

Category	**Substantial SCC alignment**
Guidance	RRF climate benchmarks are either not fully reaching EU Taxonomy or substance has been amended. Precautionary labelling of such cases as only Substantial level of alignment.

Example	041bis – Waste water collection and treatment compliant with energy efficiency criteria
	
	  i. **Contextual:** Provision of water for human consumption **[of RRF]** *equals* Operation of water collection, treatment and supply **[of Taxonomy]**
	  ii. **Benchmarks:** Max energy consumer 0.5 kWh or max Leakage Index is 1.5 or decreasing energy or leakage by at least 20% **[of RRF]** *equals to condition After Taxonomy 2023 amendment*: Leakage Index is 1.5 for new or 2.0 for existing or closing the gap by at least 20% to prescribed levels of Leakage Index **[of Taxonomy]**

Category	**Partial SSC alignment**
Description	RRF climate benchmarks are present in EU Taxonomy, but not reaching EU Taxonomy's scale

Example	024 – Energy efficiency and demonstration projects in SMEs and supporting measures
	
	  i. **Contextual:** Energy efficiency projects in SMEs **[of RRF]** *partially equals* Renovation of existing building **[of Taxonomy]**
	  ii. **Benchmarks:** No specific conditions, only energy efficiency intention **[of RRF] is** *probably below* 30% energy savings or major renovation as defined by Member States **[of Taxonomy]**

Category	**Not SCC aligned or Not covered**
Description	RRF includes areas of intervention that are not covered by the EU Taxonomy, or Taxonomy introduces climate benchmarks not even implied in the RRF

Example	063bis – Digitalisation of transport when dedicated in part to GHG emissions reduction: road
	
	  i. **Contextual:** Digitalisation of Roads for GHG reduction **[of RRF]** *is not covered by* Urban passenger transport or Freight transport by road upgrade **[of Taxonomy]**
	  ii. **Benchmarks:** No quantifiable criteria only digitalisation **[of RRF]** *is not aligned to* zero emissions vehicles or 'zero or low emission heavy duty vehicles' **[of Taxonomy]**

Examples of EU Taxonomy **Do-No-Significant-Harm DNSH** alignment with the RRF intervention fields:

Category	**DNSH fully aligned**
Description	When EU Taxonomy DNSH (Activity specific) objectives refer only to appendix A – C[10]; or don't apply (N/A); or make only references to existing EU Regulation
Example	029 – Renewable energy: solar i. **Contextual:** Renewable energy solar **[of RRF]** *is equal to* Photovoltaic solar or concentrated solar ii. **Benchmarks:** Taxonomy DNSH Conditions: Appendix A & B, N/A and where feasible highly durable & recyclable components (nothing quantifiable)
Category	**DNSH partially aligned**
Description	When EU Taxonomy DNSH (Activity specific) objectives include more significant climate benchmarks, which do not fully reach RRF climate benchmarks or EU Taxonomy Activities have been amended for which the NGEU Green Bond team cannot confirm alignment
Example	042 – Household waste management: prevention, minimisation, sorting, reuse, recycling measures i. **Contextual:** Household waste management **[of RRF]** *is equal to* Collection and transport of non-hazardous waste & material recovery **[of Taxonomy]** ii. **Benchmarks: Taxonomy** *DNSH Conditions Amended in 2023*: Referring to appendix A & B or N/A, while pollution prevention objective, although not having anything quantifiable, now introduces new legal conditions. As precaution lower alignment is assumed.
Category	**DNSH not covering specific EU taxonomy conditions**
Description	When EU Taxonomy DNSH (Activity specific) objectives include quantifiable criteria that go beyond RRF
Example	024 – Energy efficiency and demonstration projects in SMEs and supporting measures i. **Contextual:** Energy efficiency projects in SMEs **[of RRF]** *partially equals* Renovation of existing building **[of Taxonomy]** ii. **Benchmarks: Taxonomy** DNSH criteria present *significant quantifiable criteria* in almost all DNSH six objectives, which go beyond **RRF**

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[10] EU Taxonomy Delegated Act – Commission Delegated Regulation (EU) 2021/2139 (and where applicable later revisions), Annex I, Appendices A, B, C, D, E.

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 summarised below, were formulated in collaboration with the external consultant, Carbone 4. Compared to the 2024 edition of this report, 5 new intervention fields have been added based on new methodologies that were developed in line with the Commission's ongoing efforts of obtaining additional output data. As a result of these developments the total coverage of the 2025 impact calculation is 36 intervention fields. The 5 new intervention fields 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:
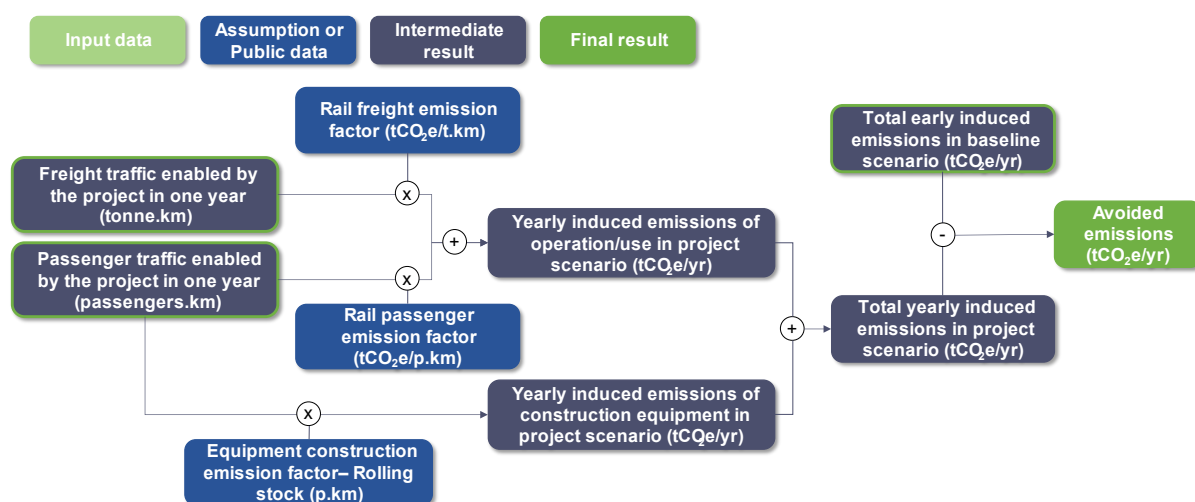
Assumptions:

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

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:
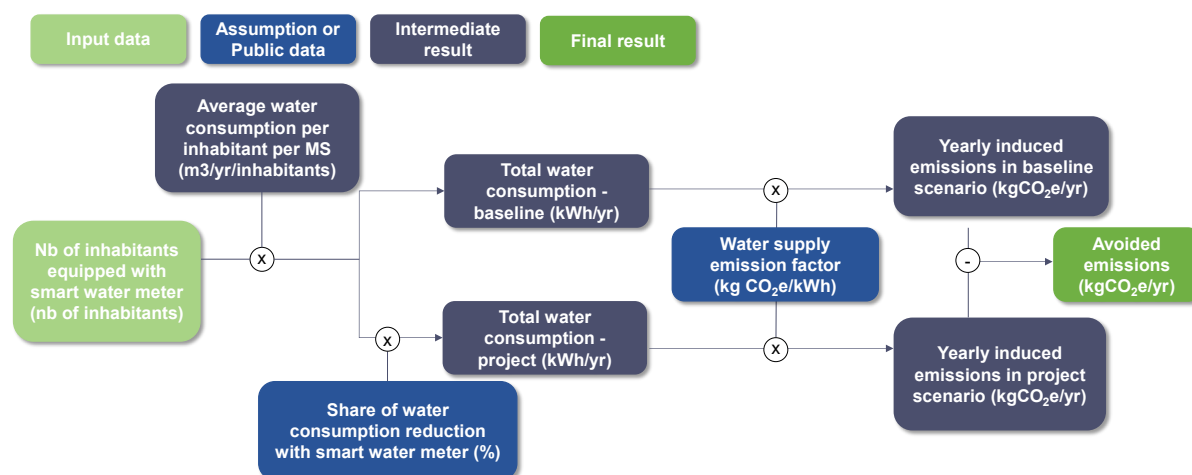
Assumptions:

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

The use of smart water metering reduces water consumption by 2%.[11]

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:
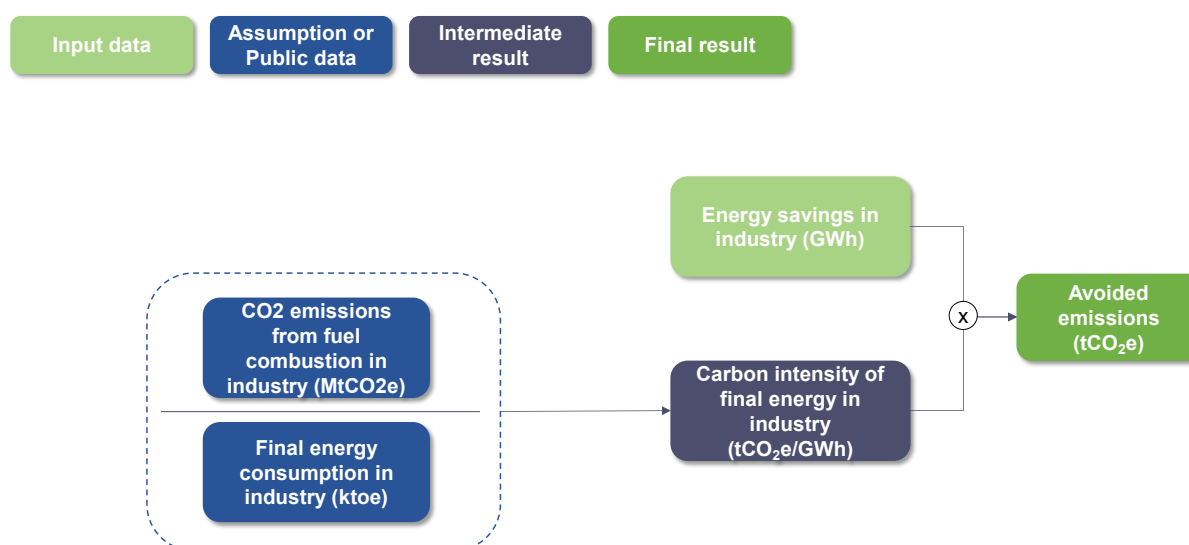
Assumptions:

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

Intervention Field 024bis (New)

Energy efficiency and demonstration projects in large enterprises and supporting measures

The impact assessments under this intervention field include a measure concerning energy savings in industry.

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.

Intervention Field 024ter

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 025 (New)

Energy efficiency renovation of existing housing stock, demonstration projects and supporting measures

The intervention field focuses exclusively on renovation activities.

Methodology for calculating avoided emissions of renovation activities

For renovations resulting in reduction of energy consumption of 20%, please refer to the methodology under intervention field 025ter.

Methodology to account for avoided emissions for energy efficiency in dwellings –
multiple variables:
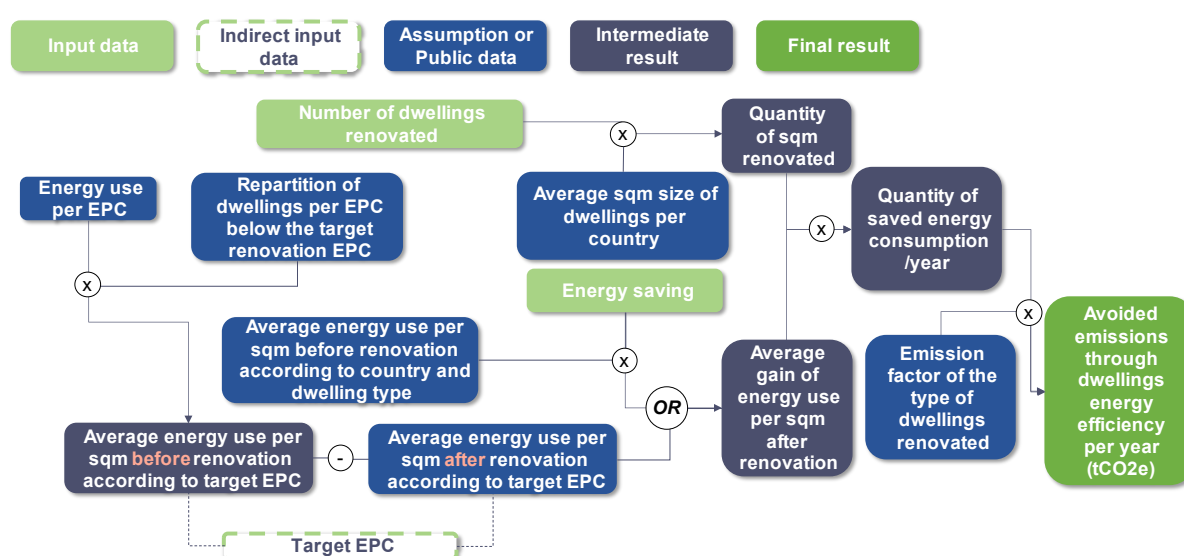
Assumptions:

The calculation differentiates between residential and non-residential buildings.

Only two emissions factors are used: residential multi-family and office. When information is missing, the project is assumed to be non-residential as the emission factor is higher for those in most countries.

Carbon intensity of buildings was considered constant over the project's lifetime.

The data providing the distribution of dwellings from Energy Performance Certificate (EPC), provides a scale that stop at energy class E. Thus, all dwellings with an energy class below E are automatically considered as class E. This leads to an underestimation of emissions avoided.

Each country has a different rating of the energy use per sqm according to EPCs. Moreover, each energy class has a lower and upper limit of energy use. The lower limits are used to determine the energy use of each energy class.

Using the average of energy use per energy class per country is not completely representative as across each country the definition of the energy class varies a lot as far as energy use is concerned. Additionally, considering the average distribution of dwellings per energy class in

each country is not completely representative as this distribution varies a lot from one country to another.

To estimate the energy use per sqm after renovation according to the target energy class, the European average energy use for the target energy class was used, assuming that the energy use improvement of the renovation is never above the target energy class.

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:
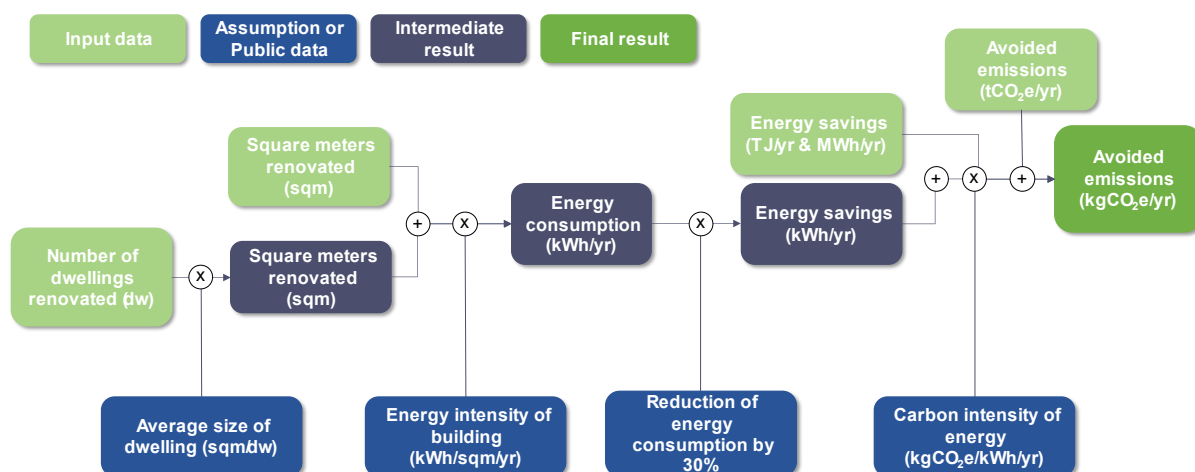
Assumptions:

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 O25ter

Construction of new energy efficient buildings

Intervention field O25ter 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:
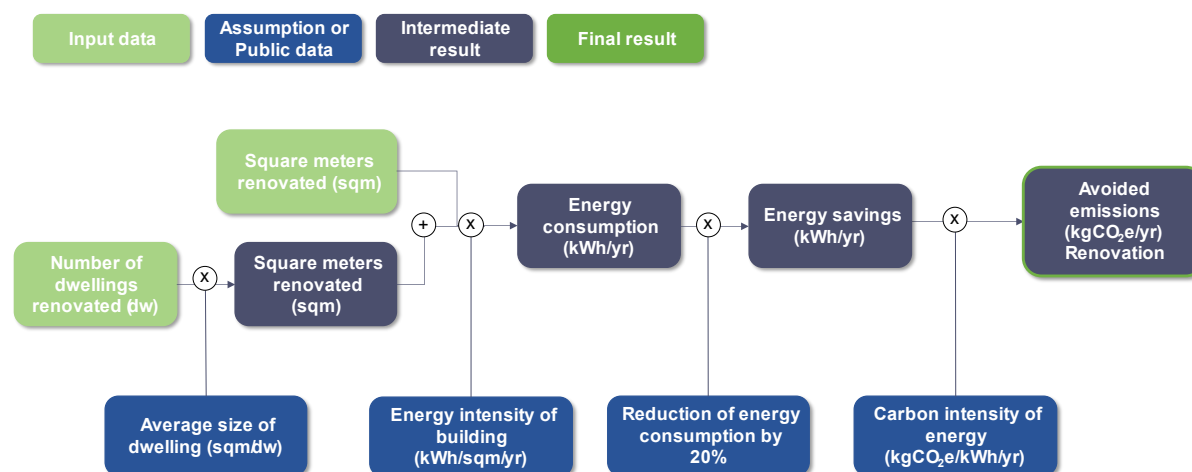
Methodology for calculating avoided emissions of new construction activities:

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

27
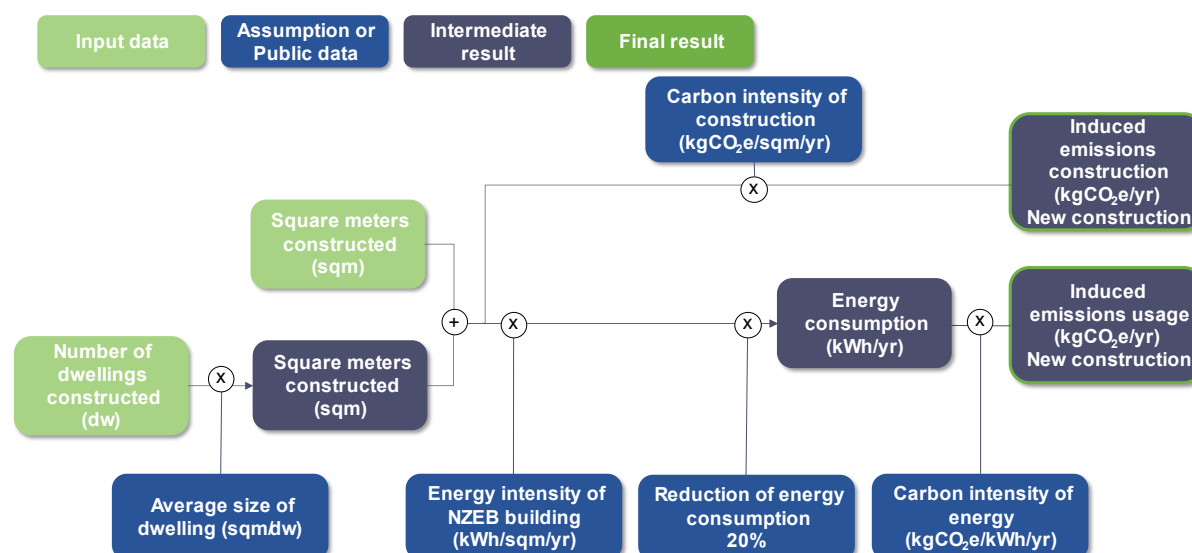
– **Baseline scenario: from input to intermediate results**
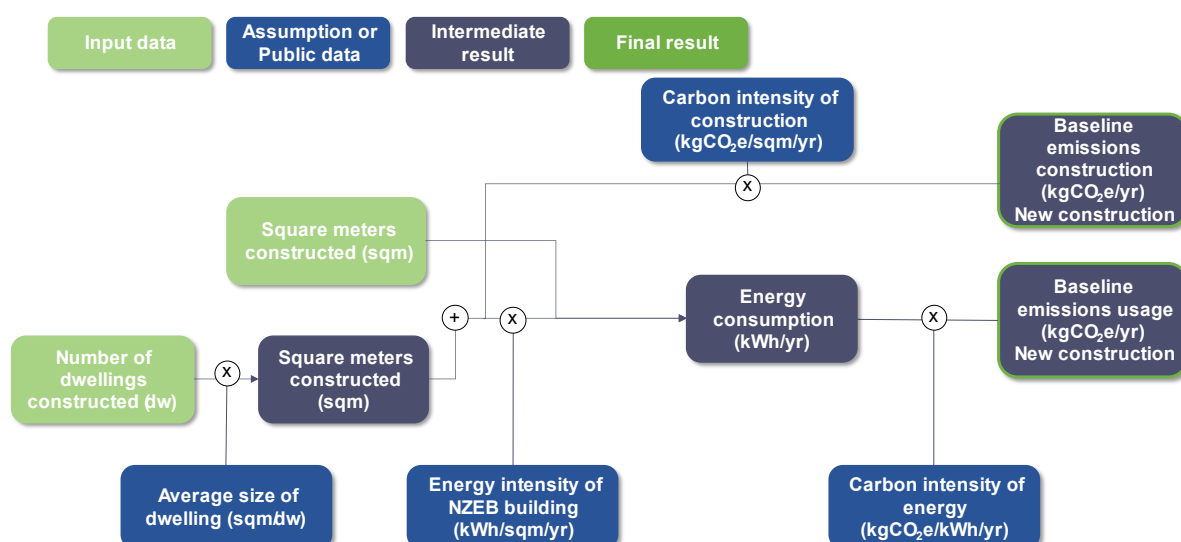
– **Residential and non-Residential: from intermediate results to final results for the entire intervention field**
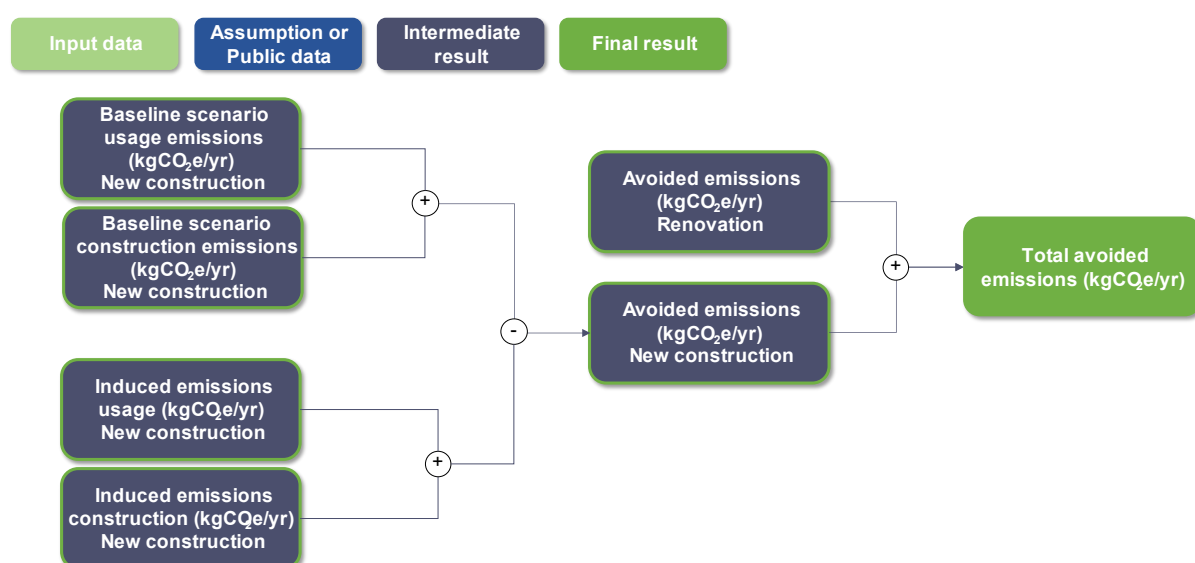
Assumptions:

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 (CO_2/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 (kgCO_2e/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**

Input data	Assumption or Public data	Intermediate result	Final result

Square meters renovated (sqm) × Energy consumption (kWh/yr) × Energy savings (kWh/yr) × Avoided emissions ($kgCO_2e/yr$) Renovation

Energy use per sqm (kWh/sqm/yr)

Reduction of energy consumption by 15%

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

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

Input data	Assumption or Public data	Intermediate result	Final result

Baseline scenario usage emissions ($kgCO_2e/yr$) New construction

Baseline scenario construction emissions ($kgCO_2e/yr$) New construction

Induced emissions usage ($kgCO_2e/yr$) New construction

Induced emissions construction ($kgCO_2e/yr$) New construction

Avoided emissions ($kgCO_2e/yr$) Renovation

Avoided emissions ($kgCO_2e/yr$) New construction

Total avoided emissions ($kgCO_2e/yr$)

5

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.
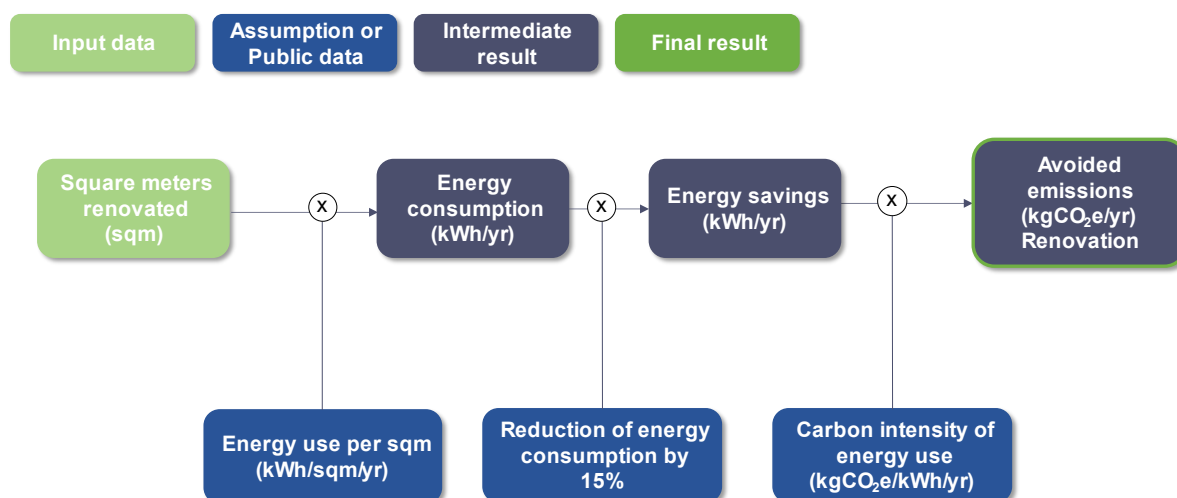
Intervention Field 026bis

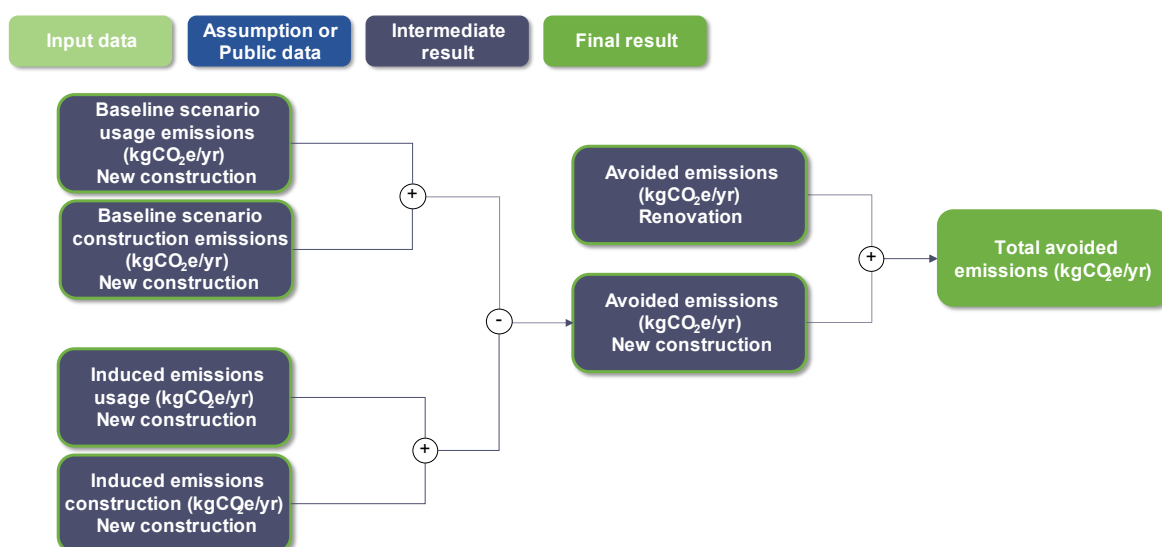Energy efficiency renovation or energy efficiency measures regarding public infrastructure, demonstration projects and supporting measures compliant with energy efficiency criteria

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**

Input data	Assumption or Public data	Intermediate result	Final result

Carbon intensity of construction (kgCO$_2$e/sqm/yr)

Induced emissions construction (kgCO$_2$e/yr) Construction

Total induced emissions (kgCO$_2$e/yr) Construction

Square meters constructed (sqm)

Energy consumption (kWh/yr)

Induced emissions usage (kgCO$_2$e/yr) Construction

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

Reduction of energy consumption 20%

Carbon intensity of energy use (kgCO$_2$e/kWh/yr)

  – **new construction activities: baseline emissions, from input to intermediate results**
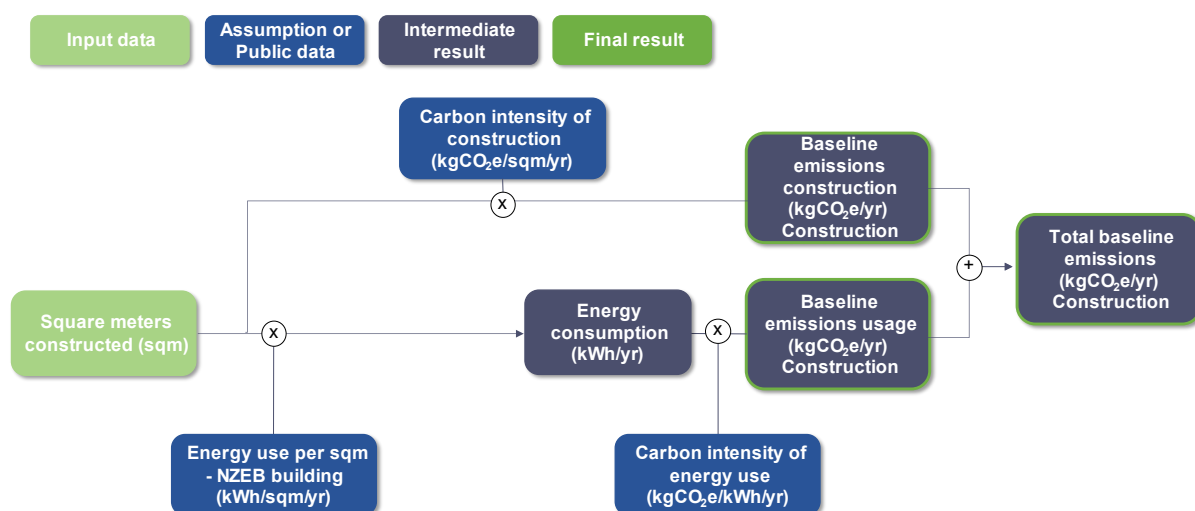
Input data	Assumption or Public data	Intermediate result	Final result

Carbon intensity of construction (kgCO$_2$e/sqm/yr)

Baseline emissions construction (kgCO$_2$e/yr) Construction

Total baseline emissions (kgCO$_2$e/yr) Construction

Square meters constructed (sqm)

Energy consumption (kWh/yr)

Baseline emissions usage (kgCO$_2$e/yr) Construction

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

Carbon intensity of energy use (kgCO$_2$e/kWh/yr)
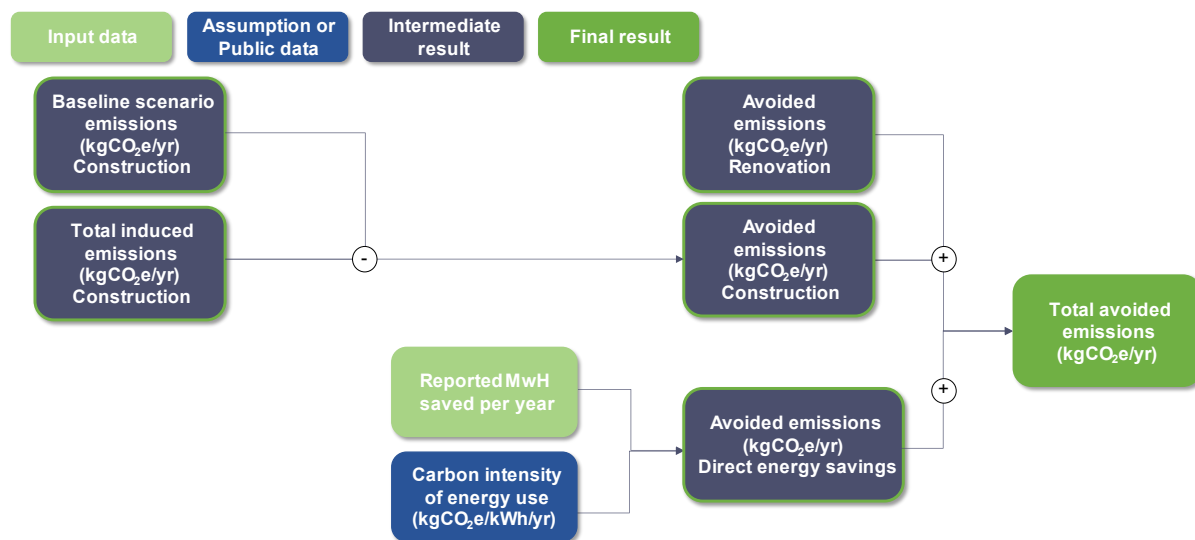
Intervention Field 027 (New)

Support to enterprises that provide services contributing to the low carbon economy and to resilience to climate change including awareness-raising measures

The intervention field includes solar energy production and e-vehicles charging infrastructure.

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 public and private charging points:

Please refer to the methodology under intervention field 077.

Intervention Field 028

Renewable energy: wind

The intervention field includes onshore and offshore wind energy.

Methodology for calculating avoided emissions of onshore windfarms:
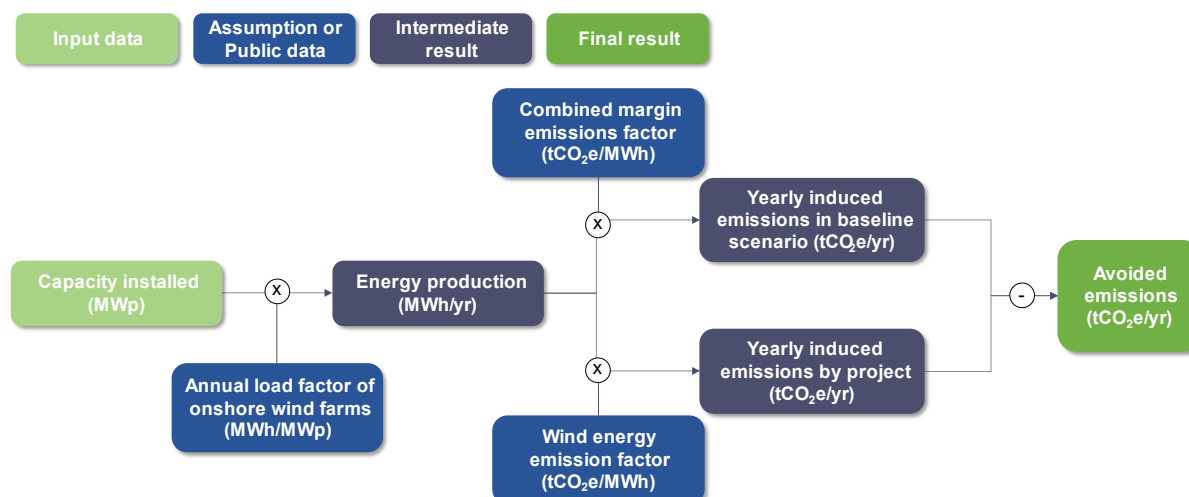
Assumptions:

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:
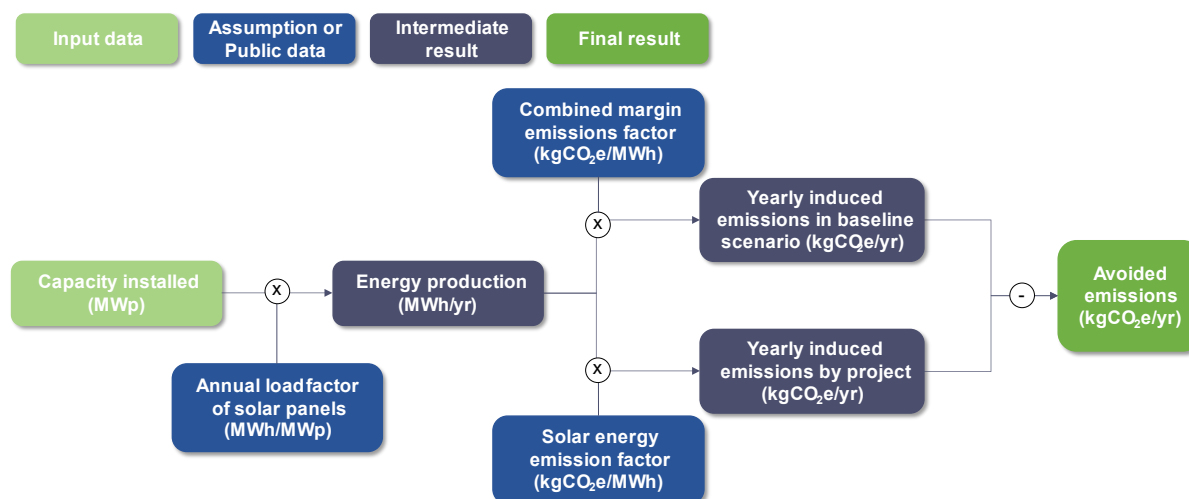
Assumptions:

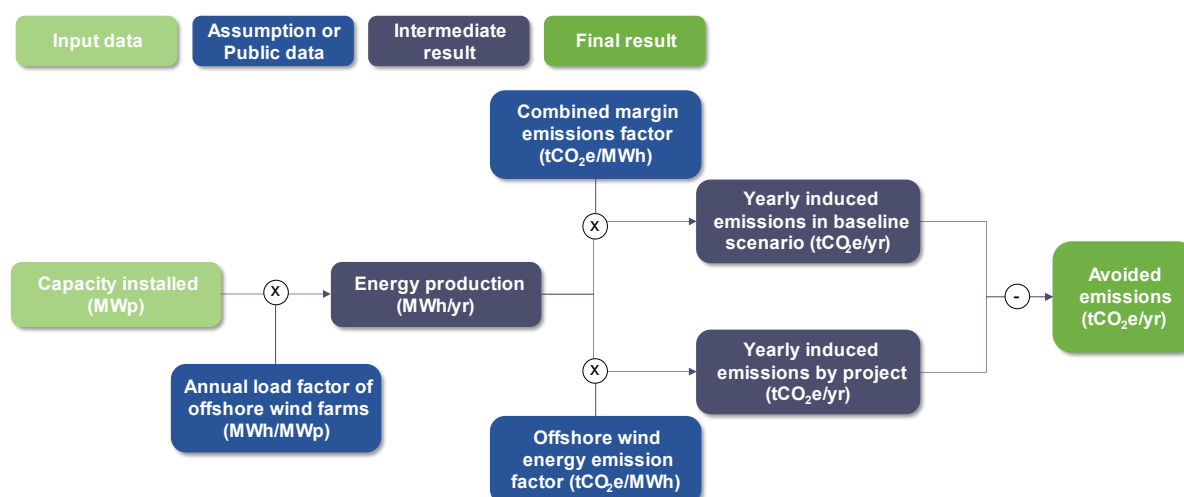Load factor: The country load factors are from IRENA.

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:
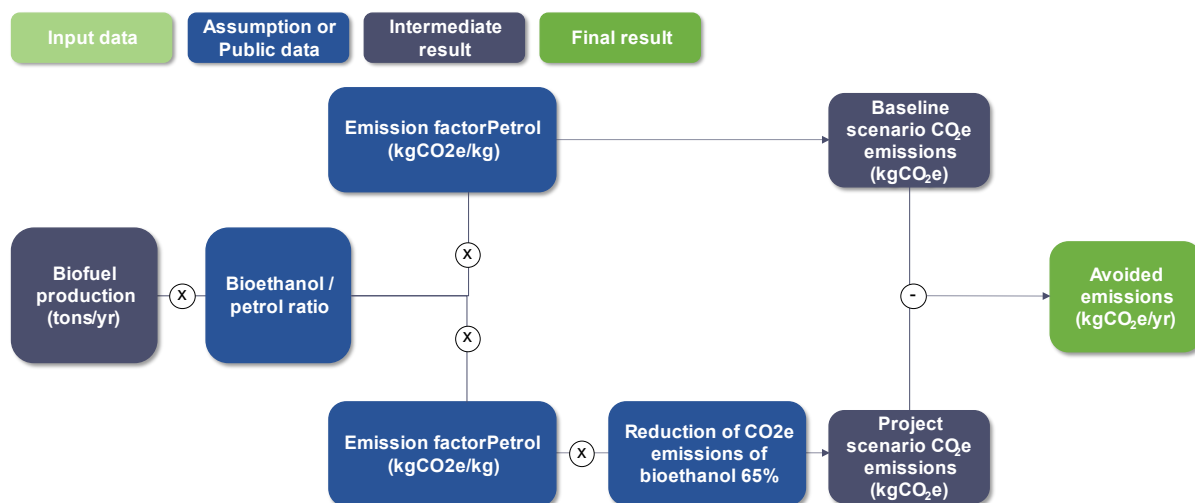
Assumptions:

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:
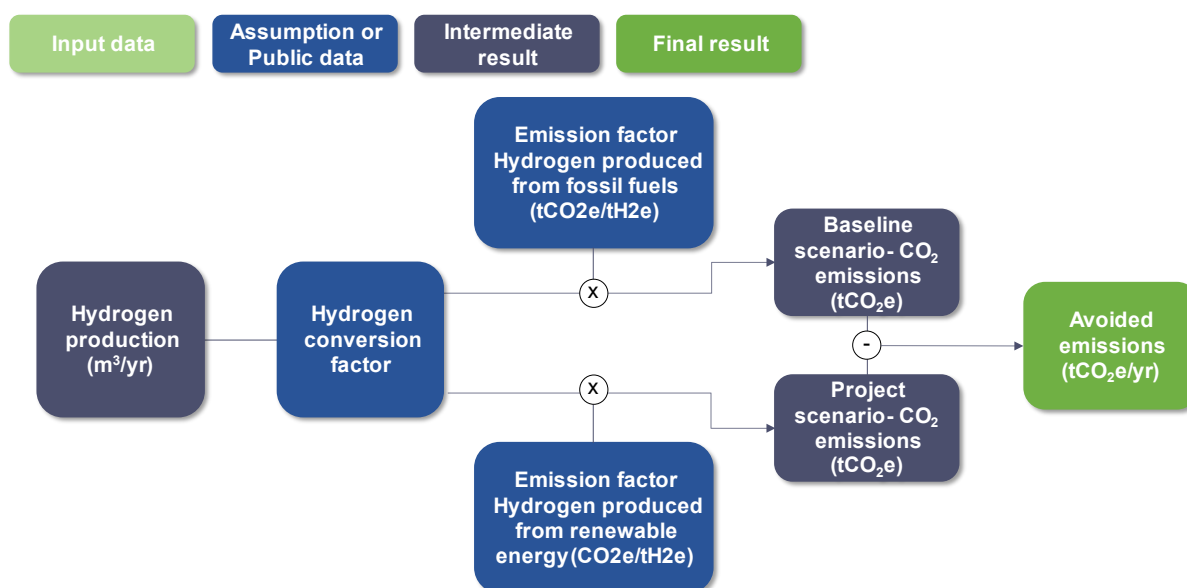
Assumptions:

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

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):
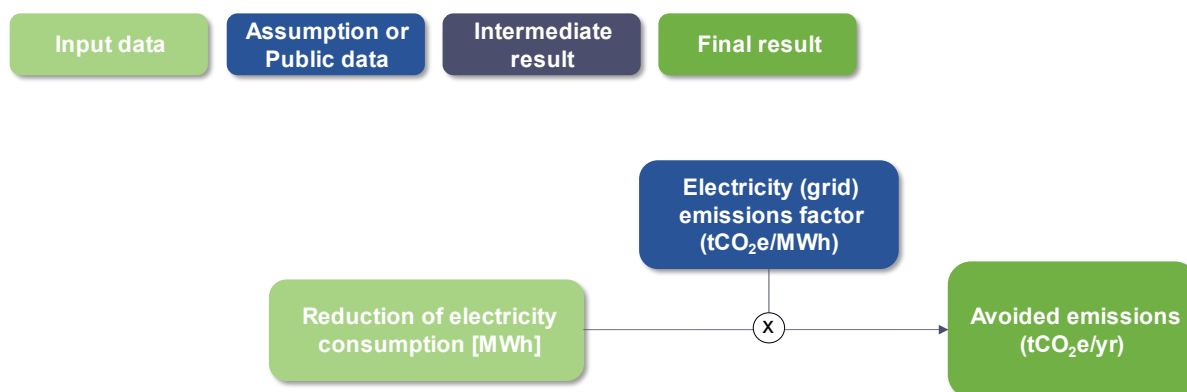
Assumptions:

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:
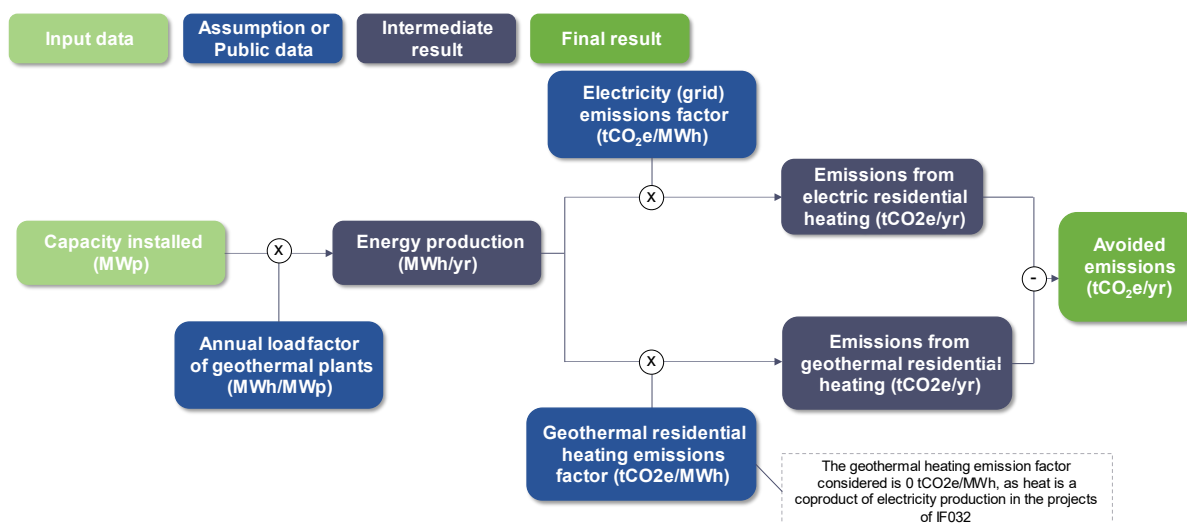
Assumptions:

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:
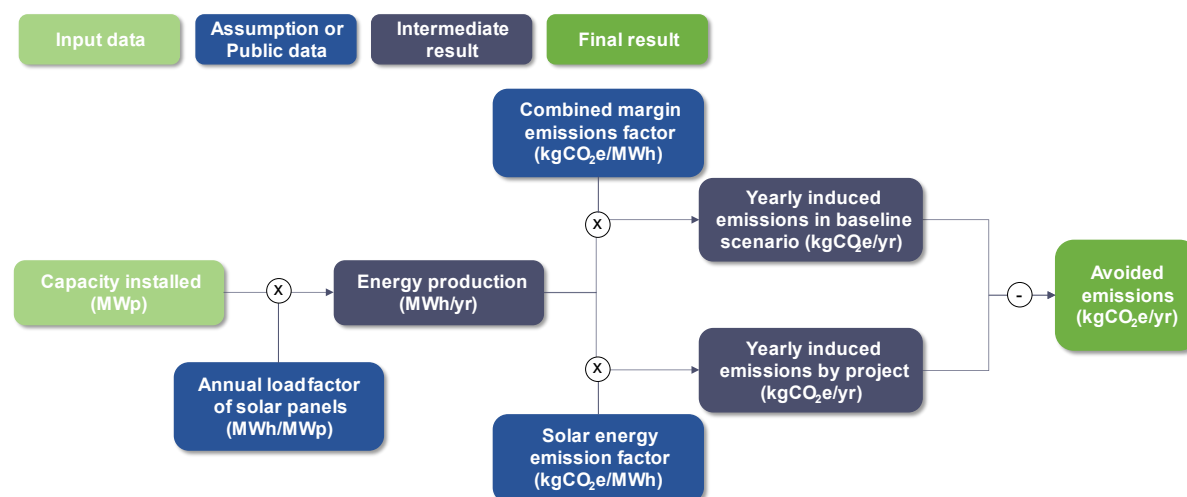
Assumptions:

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.

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 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:
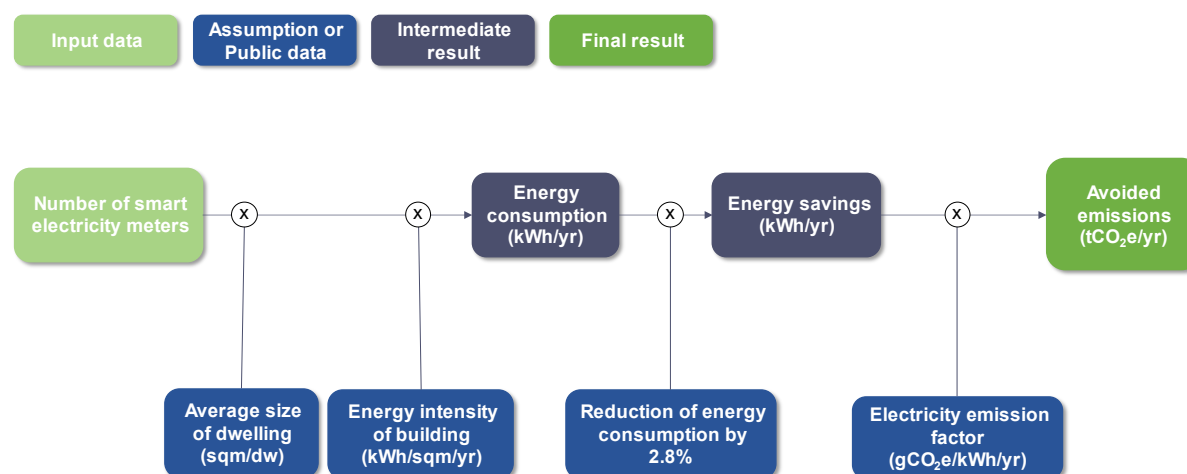
Assumptions:

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

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

The impact assessment under this intervention field includes measures aiming at modernisation and efficiency of district heating systems, and inclusion of renewable energy in these 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.

Methodology to account for avoided emissions for additional capacity brought to district heating from renewable energy sources
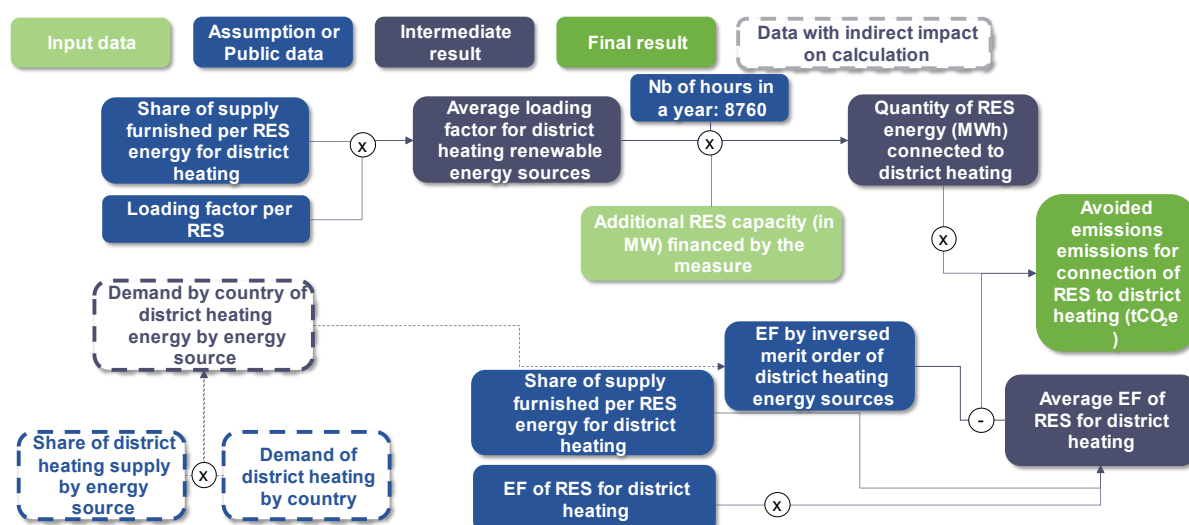
The methodology aims to evaluate the avoided emissions of additional capacity brought by RES to district heating, replacing currently used energy sources.

For the following data, data was not available per MS. Therefore, it is assumed that similar data is valid for all MS countries: emission factor, supply share of energy sources for district heating, loading factor.

As far as emission factors calculation are concerned, distinctions were made between different types of waste heat except from the waste heat coming from non-bio waste. This was not counted as renewable energy in the share of renewable energy supply for district heating.

At the measure level, the calculated avoided emissions do not consider other measures of the same country, which could make it possible to pass from one energy source to a more 'merit worthy' energy source, in terms of additional capacity brought by the measure. However, this is taken into account at the country level.

Intervention Field 039bis

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:
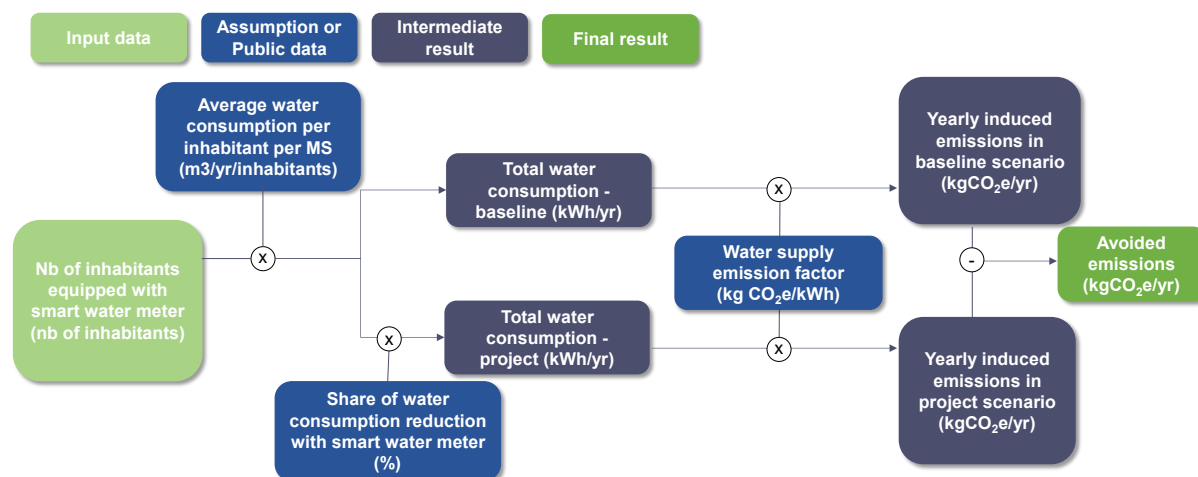
Assumptions:

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](#).

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
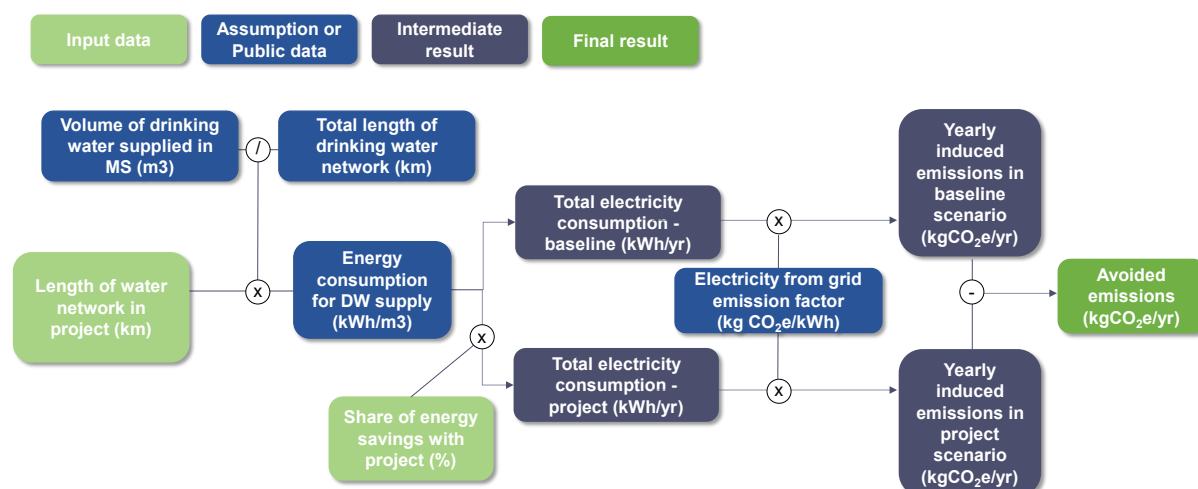
Assumptions:

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

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:
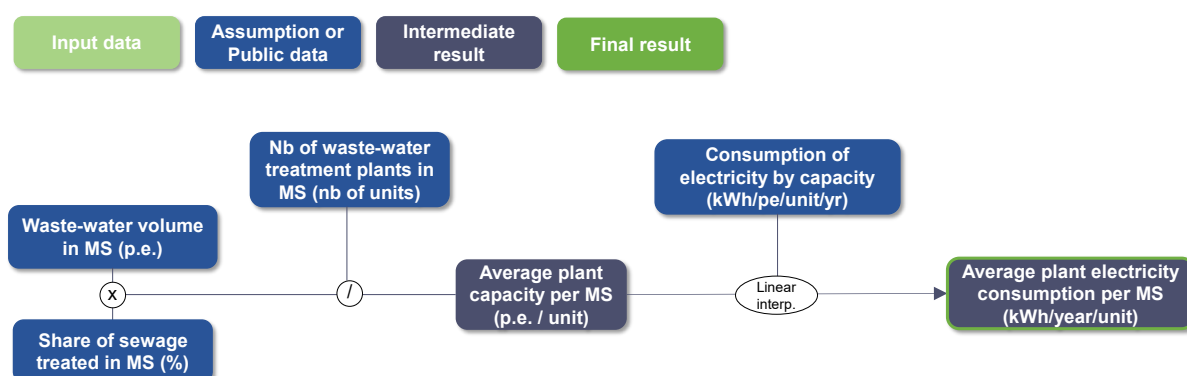
Calculating avoided emissions, taking into account electricity consumption of an average plant:
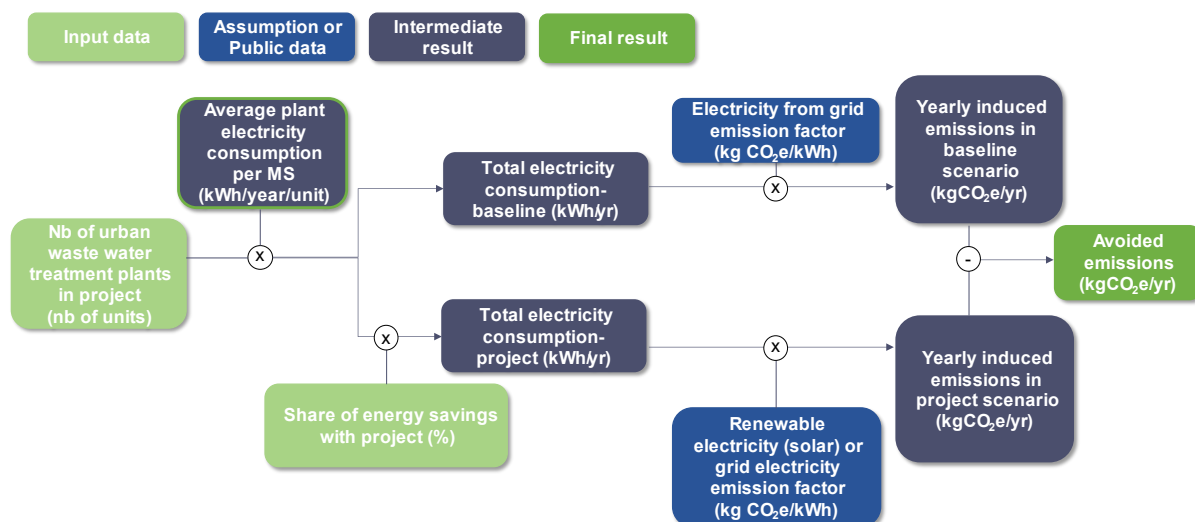
Assumptions:

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

- **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

- **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:

'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.

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.

Load factor: Country load factors are from IRENA

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**

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

Number of sorting facilities – plastic waste (x) **Average tonnage of waste processed in a sorting facility (tons/yr)**

Number of sorting facilities – municipal waste (x) **Average tonnage of waste processed in a sorting facility (tons/yr)** (x) **Share of plastic waste in municipal waste (%)**

(+) **Tons of plastics processed by sorting facilities (tons/yr)**

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

Tons of plastics processed by sorting facilities (tons/yr) (x) **Share of incoming waste recovered (%)** (x) **Tons of plastics processed & recovered by sorting facilities (tons/yr)**

(x) **Emission factor of new plastic (kgCO$_2$e/ton)** → **Baseline scenario (kgCO$_2$e/yr)**

(x) **Emission factor of recycled plastic (kgCO$_2$e/ton)** → **Induced emissions (kgCO$_2$e/yr)**

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

Baseline scenario (kgCO$_2$e/yr)

Induced emissions (kgCO$_2$e/yr)

(+) → **Total avoided emissions (kgCO$_2$e/yr)**

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 044 (New)

Commercial, industrial waste management: prevention, minimisation, sorting, reuse, recycling measures

The intervention field focuses on investments in waste sorting facilities and biogas production from waste.

Methodology for calculating avoided emissions of sorting facilities:

Please refer to the methodology under intervention field 042.

Methodology for calculating avoided emissions of biogas production capacity installed:

Please refer to the methodology under intervention field 030bis.

Intervention Field 046bis (New)

Rehabilitation of industrial sites and contaminated land compliant with efficiency criteria

The intervention field focuses on investments in building renovation.

Methodology for calculating avoided emissions of building renovation:

Please refer to the methodology under intervention field 025bis.

Intervention Field 050

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:
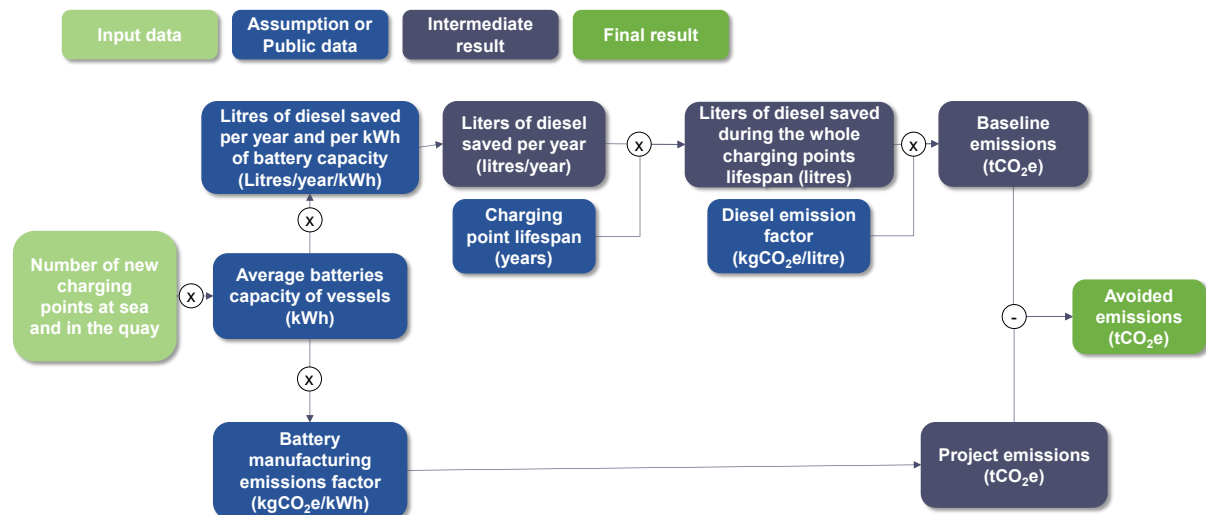
Assumptions:

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**
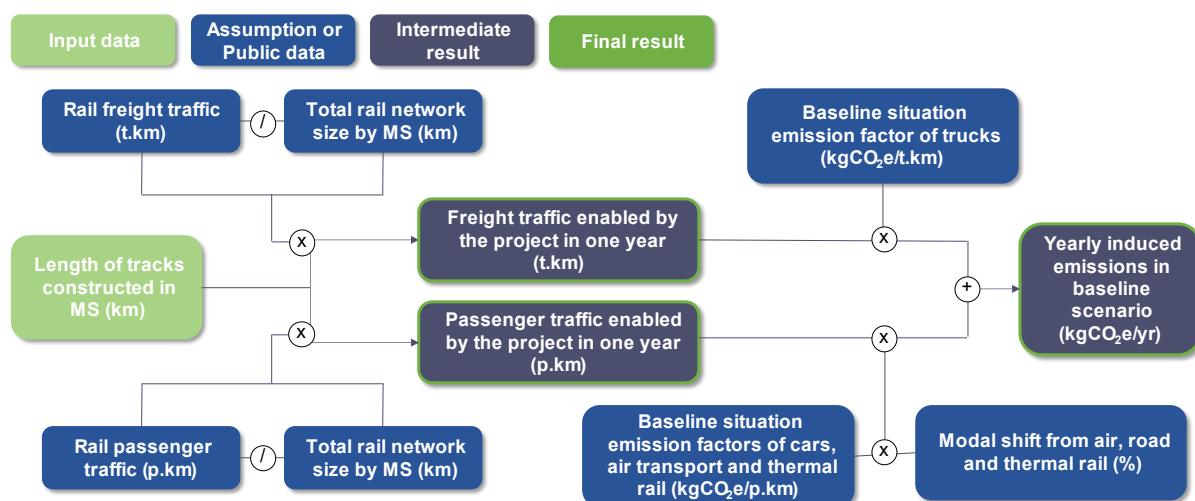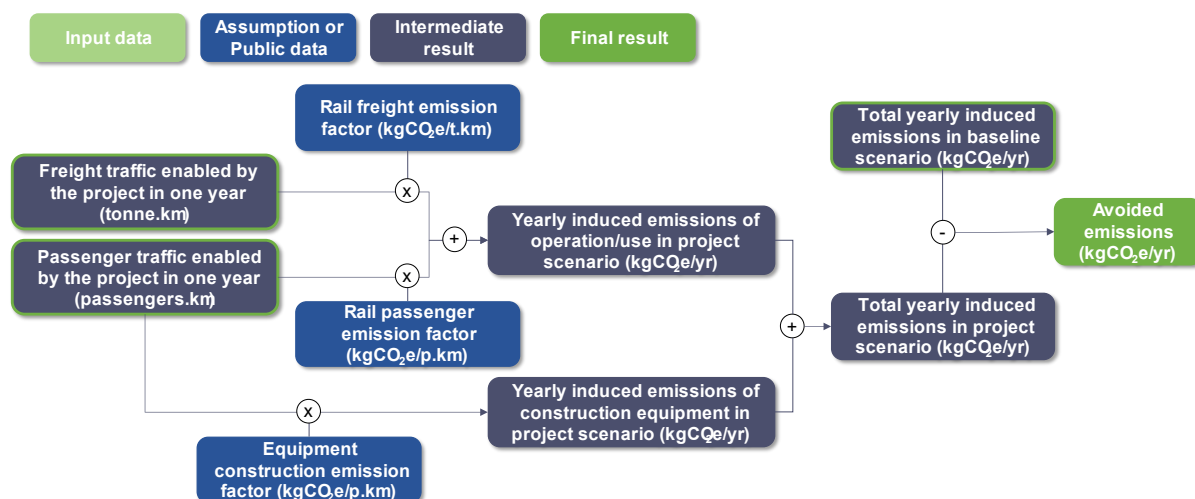
- **from intermediate to final results**

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

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

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

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

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

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 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**
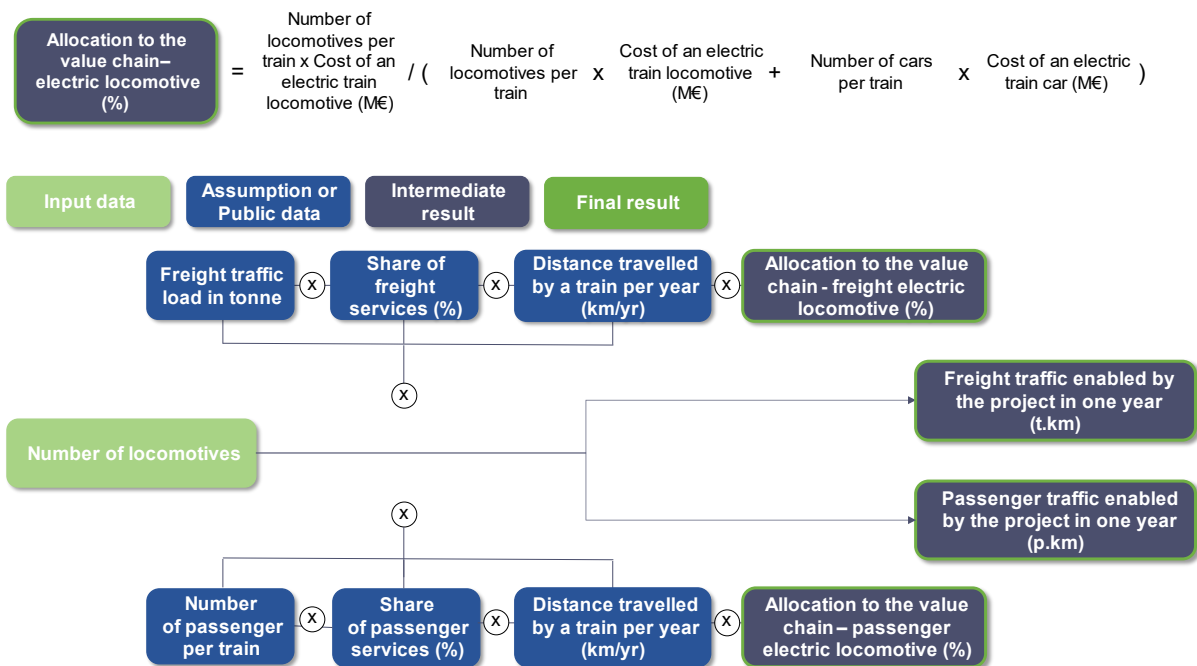
– **from intermediate to final results (1)**
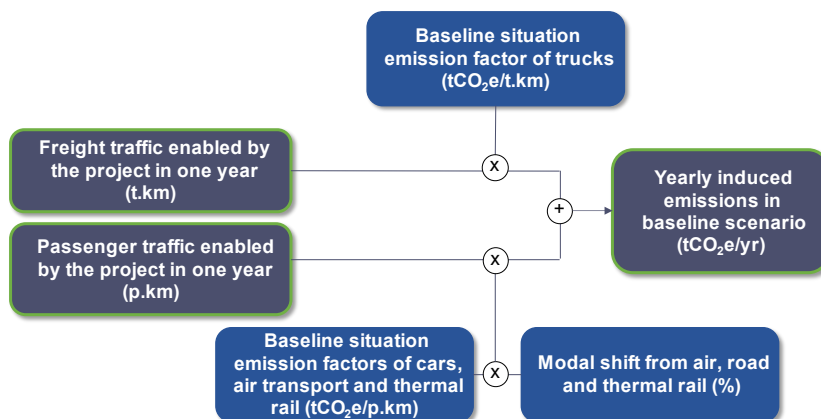
- **from intermediate to final results (2)**

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 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**
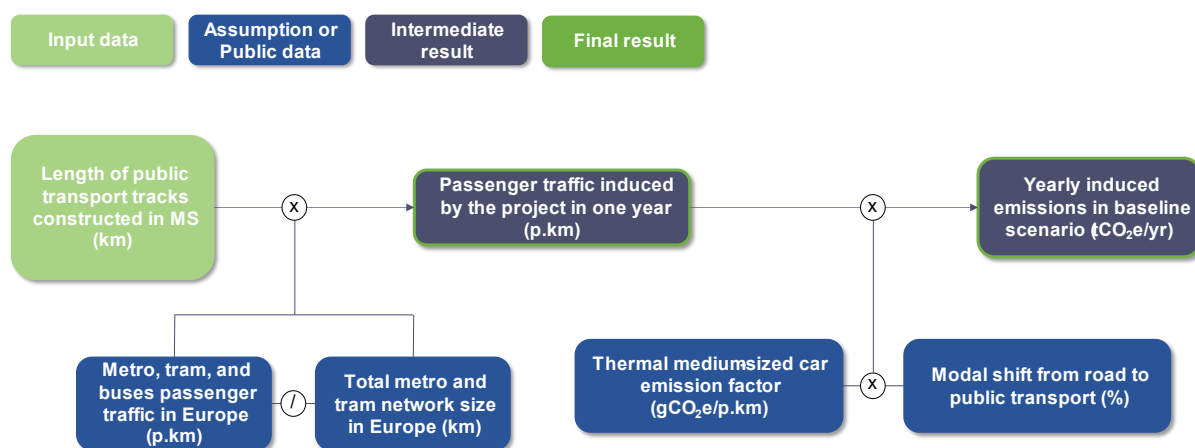
– **from intermediate to final results**
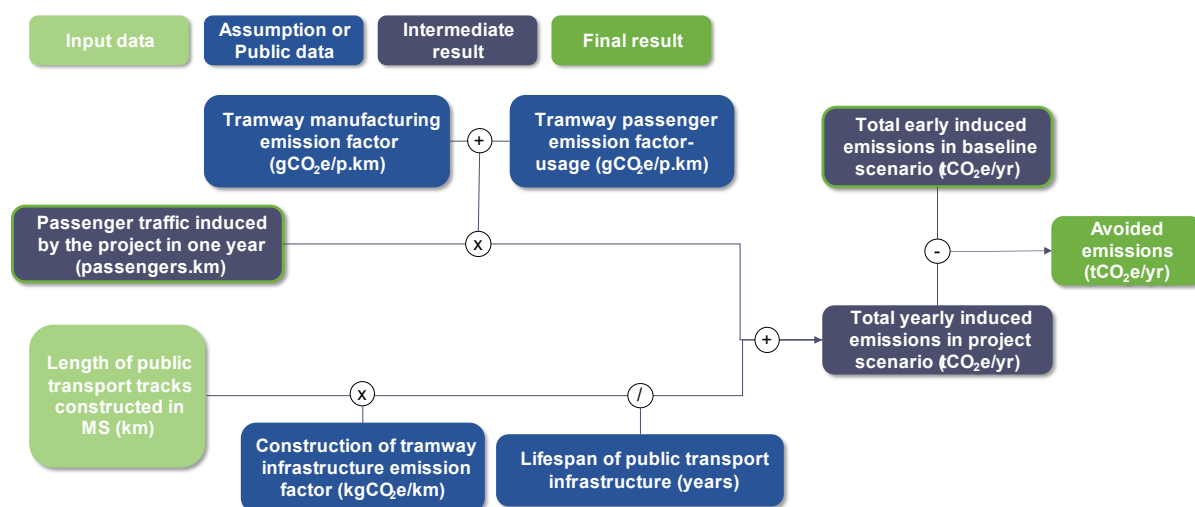
Assumptions:

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**

Annual 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)

- **from intermediate to final results**

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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:

Electric bus emission factor (gCO_2e/km) = Electric bus manufacturing emissions (without battery) (gCO_2e/km) + Battery manufacturing emissions (gCO_2e/km) + Electric bus usage (gCO_2e/km) + Electric bus end of life (gCO_2e/km)

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

Thermal bus emission factor (gCO_2e/km)

Life span of buses (years)

Number of buses

Distance travelled over lifetime (km)

Induced emissions in baseline scenario (tCO_2e)

Avoided emissions over the bus lifetime (tCO_2e)

Avoided emissions per year (tCO_2e/yr)

National electric bus emission factor (gCO_2e/km)

Total induced emissions by project (tCO_2e)

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).
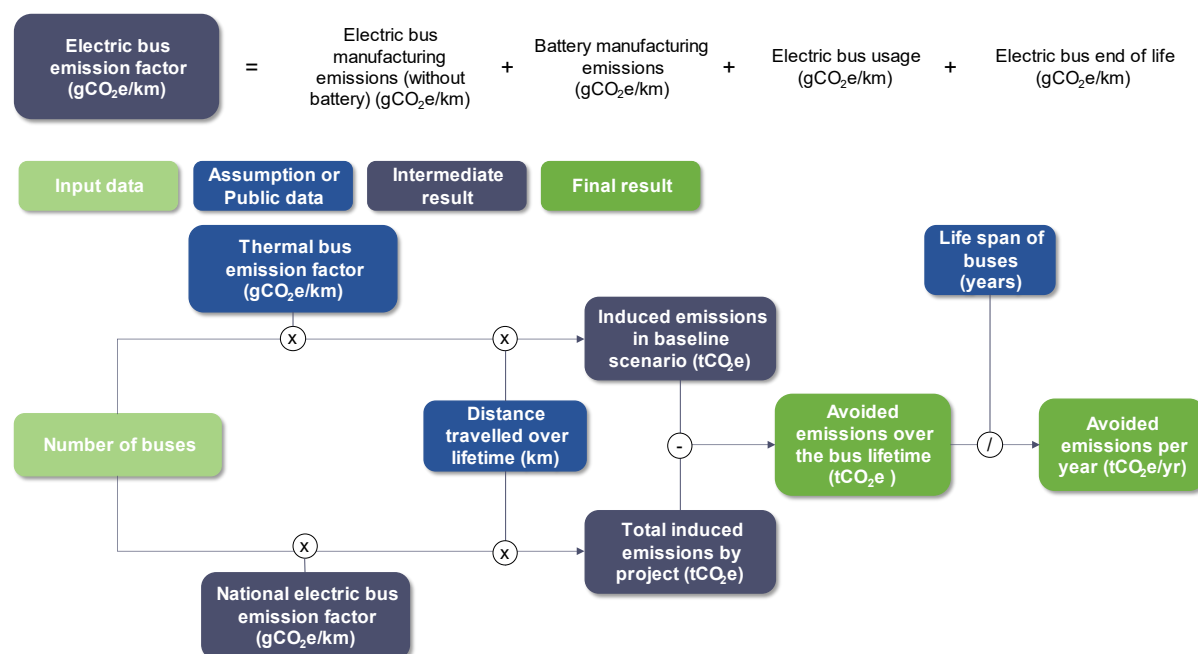
Methodology for calculating avoided emissions of charging points:

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**

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

```
                                    Distance of cycle      Raise in bike use      Raise in bike use–
                              x     path built (km)    x   per km of cycle     =  cycle path (p.km)
                              |                            path added (%)
                              |
      Passenger-kilometer     |                            Raise in bike use      Raise in bike use–
      by cycling in an    x   |     Number of cycle    x   per cycle parking   =  cycle parking
      average city (p.km)     |     parking spaces         space added (%)        spaces (p.km)
              |               |
              x
      Passenger-kilometre per       Average city population /
      country by cycling (p.km)     Total population ratio (%)
```

– **from intermediate to final results**

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

```
  Raise in bike use-              EF thermal car in
  cycle path (p.km)               Europe (upstream
                          +       + combustion)       X    Baseline
  Raise in bike use–              (tCO2e/km)               emissions (tCO2e)
  cycle parking                                                                        -    Total avoided
  spaces (p.km)                                                                             emissions (tCO2e)
                                  EF cycle path in Europe
                                  (construction)
  Km of cycle path                (tCO2e/km)          X
                                                           +  Induced emissions
                                                              by projects (tCO2e)
  Number of cycle
  parking space        X    EF cycle parking      X    Average size of a
                            space in Europe            parking space
                            (construction)             (m²/bike)
EF: Emissions Factor        (tCO2e/m²)
```

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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**
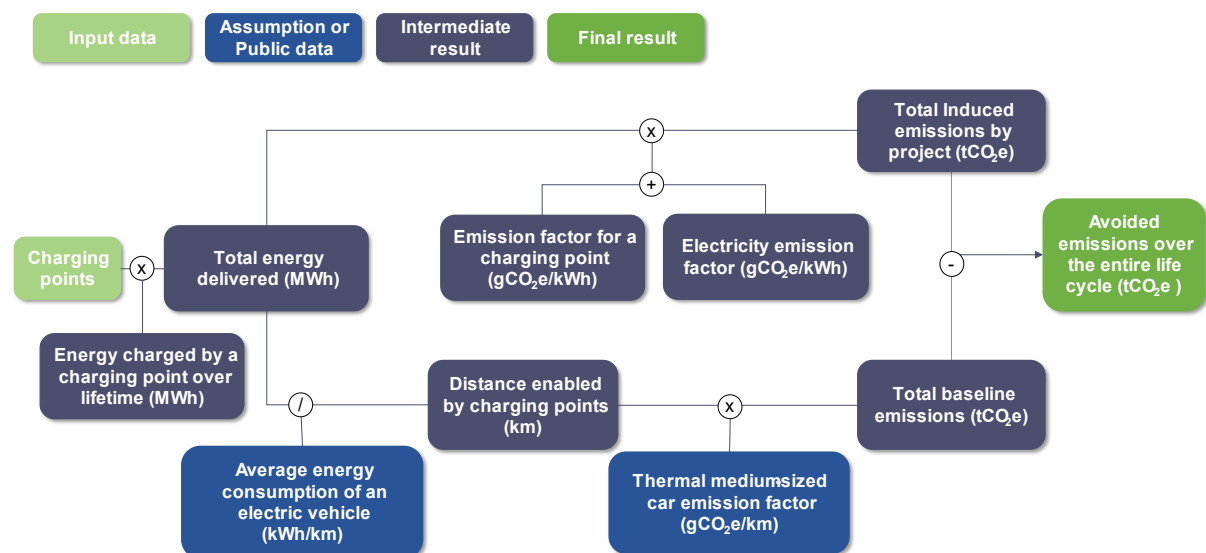
Assumptions:

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.

- **from intermediate to final results**

Please refer to the above 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:

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.

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

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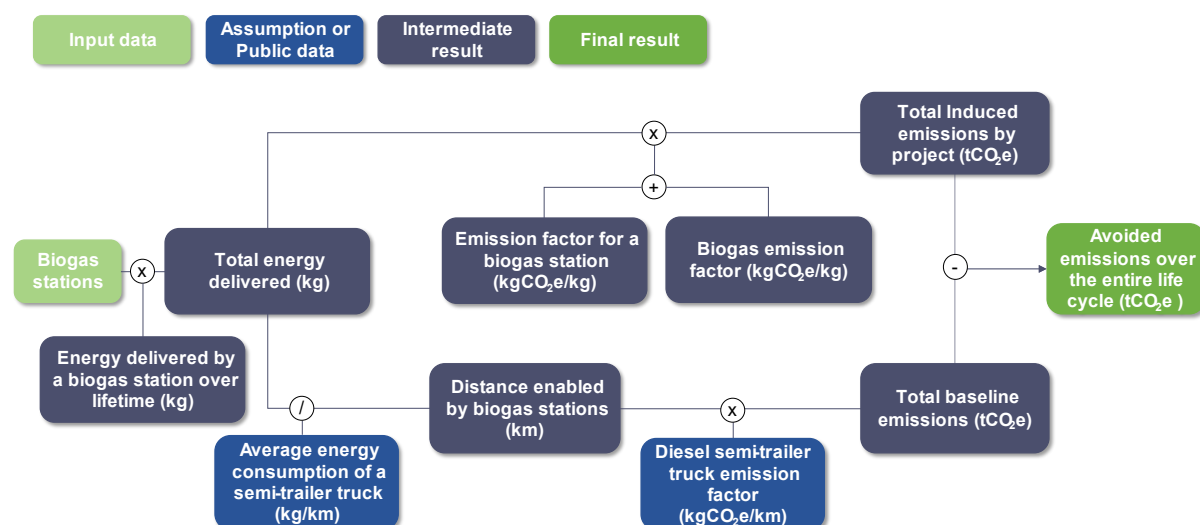
Assumptions:

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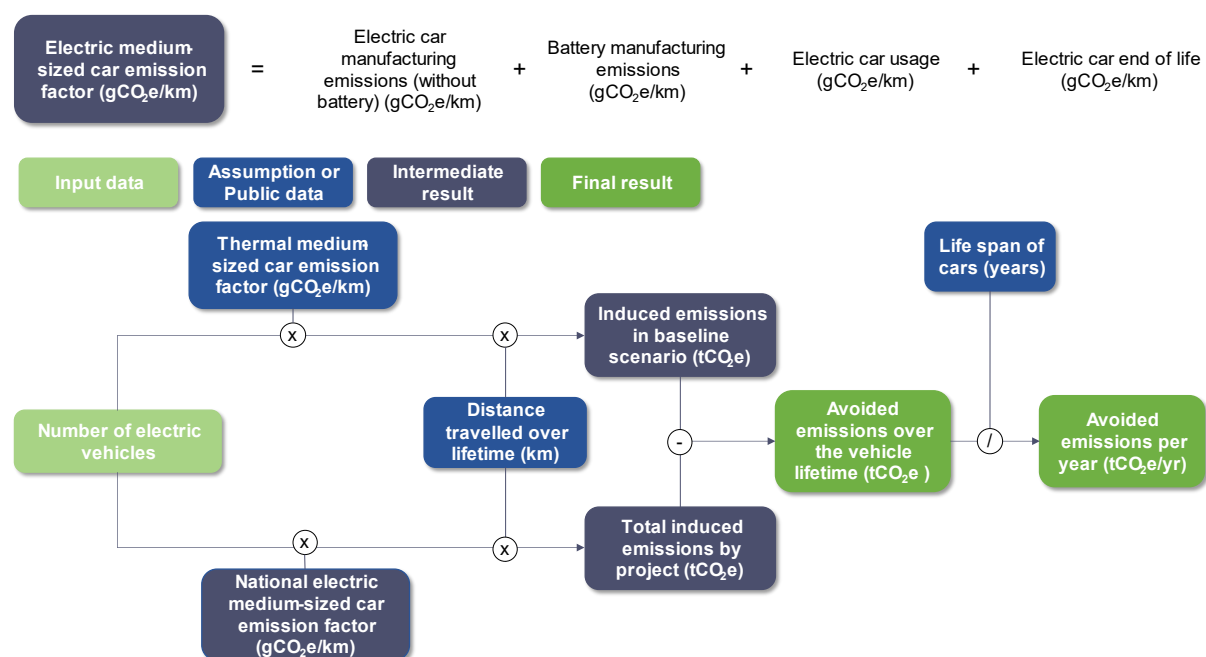
In order to convert consumption data of biogas to biogas delivered by the stations, it is assumed that CBG density is 0.79 kg/m3, LBG density is 445 kg/m3, and high heating value of natural gas is 11.27 kWh/m3.

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:

$$\text{Electric medium-sized car emission factor } (gCO_2e/km) = \text{Electric car manufacturing emissions (without battery) } (gCO_2e/km) + \text{Battery manufacturing emissions } (gCO_2e/km) + \text{Electric car usage } (gCO_2e/km) + \text{Electric car end of life } (gCO_2e/km)$$

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.

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, a 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 that are predominantly used by electric cars are not also 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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