Methodology CM-WM-ELV-01 Recovery and Recycling of Materials from End-of-Life Vehicles

Version 1.4

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Initials and acronyms

AI	Annex I
ABS	Acrylonitrile butadiene styrene
BAU	Business As Usual
CCMP	Climate Change Mitigation Programme or Project
EFTA	European Free Trade Association
ELV	End-of-Life Vehicle
EPRO	European Association of Plastics Recycling and Recovery Organizations
GHG	Greenhouse gas(es)
HDPE	High density polyethylene
HIPS	High impact polystyrene
IEA	International Energy Agency
LDPE	Low density polyethylene
NAI	Non-Annex I
NDC	Nationally determined contributions
PDD	Project Description Document
PET	Polyethylene terephthalate
PP	Polypropylene
PVC	Polyvinyl Chloride
RVSF	Registered Vehicle Scrapping Facility
SDG	Sustainable Development Goal
WEEE	Waste Electrical and Electronic Equipment

Terms and definitions

For the purpose of this methodology, the following definitions apply:

- **Applicable geographical area** - The applicable geographical area should be the entire host country. If the project participants opt to limit the applicable geographical area to a specific geographical area (such as province, region, etc.) within the host country, then they shall provide justification on the essential distinction between the identified specific geographical area and rest of the host country.
- **Collection -** It refers to the organized gathering of ELVs from various sources such as owners and dealers and delivering them to Registered Vehicle Scrapping Facility. The collection process ensures that the ELVs are transported to facilities where they can be safely dismantled, recovered and recycled, in adherence to the standards applicable in the host country.
- **End-of-Life Vehicles (ELV) -** ELV refers to all vehicles which are no longer validly registered; or declared unfit through Automated Fitness Centres or their registrations have been cancelled as per the applicable act/mandate/legislation/regulation/ordinance etc., in the host country; or due to an order of a Court of Law; or are self-declared by the legitimate registered owner as a waste vehicle due to any circustances that may arise from fire, damage, natural disaster, riots or accident etc., or any other reason at the discretion of the owner. In cases involving insurance claims, the vehicle is considered an ELV after being classified as total losses by insurance companies due to accidents or damages. In such cases, the vehicle shall not be re-registered, and the registered owner transfers their rights to the insurance company, making self-declaration inapplicable for these scenarios.
- For the purpose of this methodology, ELVs must be non-roadworthy and not eligible for reuse or re-registration under the applicable national legal framework. Vehicles that can be legally repaired, reused, or brought back into circulation are explicitly excluded from the definition of ELVs under this methodology.
- **ELV processing -** processing of sorted materials, converting them into secondary materials substituting virgin materials. The process can include manual, mechanical, electro-chemical processes and technologies.
- **ELV sorting -** the separation of collected ELV into different categories of recyclable materials to facilitate further processing. The categories may include (but are not limited to): plastics, ferrous metals, non-ferrous metals, and glass. The sorting process may include manual sorting and segregation and/or further separation through physical, mechanical and electromagnetic processes. Sorted material requires further processing to complete the recycling process; in some cases, this is done within the RVSF facility, otherwise sorted ELV fractions are sold to third parties specialized processing facilities.
- **Formal sector -** solid waste management activities planned, sponsored, financed, carried out or regulated and/or recognized by the local authorities or their agents, usually through contracts, licenses or concessions.
- **Informal sector -** individuals or a group of individuals who are involved in waste management activities but are not formally registered or formally responsible for providing the waste management services.
- **Manufacturing facility** - end-user of recycled materials or facility(ies) that includes industrial processes which transform the secondary materials that are equivalent to virgin materials sent from RVSF or processing facility(ies) into finished product.

- **Primary metal or material -** metal or material produced directly from mined ore or from virgin raw materials.
- **Processing facility -** facility(ies) that include ELV processing only to obtain secondary materials that are equivalent to virgin materials. These facilities do not sort ELV.
- **Recovery:** It refers to the process of extracting valuable materials from ELVs for reuse or further processing. This involves the dismantling and separation of components such as ferrous and non-ferrous metals, plastics, and glass. The purpose of recovery is to divert valuable materials from waste streams and avoid the use of virgin materials.
- **Recycling:** It involves the process of converting the materials recovered from ELVs, such as metals, plastics, and glass, into secondary raw materials. These materials are then reused in manufacturing processes, substituting the need for virgin materials. The purpose of recycling is to reduce greenhouse gas emissions by utilizing existing materials rather than extracting and processing new raw materials.
- **Recycling rate (unit basis)**- the percentage of ELVs that are collected for recycling out of the total ELVs generated annually in a specific host country. If ELVs are collected and not recycled, they shall not be counted as contributing to the recycling rate (unit basis**).**
- **Recycling rate (weight basis)** – the percentage of weight of ELVs that are collected and recycled for material recovery out of the total weight of ELVs generated annually in a specific host country. If ELVs are collected and not recycled, they shall not be counted as contributing to the recycling rate (weight basis).
- **Registered Vehicle Scrapping Facility (RVSF) -** RVSF means any establishment which holds a 'Registration for Vehicle Scrapping' for carrying out at least dismantling and scrapping operations. Some facilities may also include ELV processing.
- **Secondary metal or material -** metal or material produced utilizing in part or entirely recycled metal or material.
- **Waste Electrical and electronic equipment (WEEE) -** Waste electrical and electronic equipment from end-of-life vehicles refers to any electrical or electronic components, devices, or systems that have been removed or discarded from vehicles that have reached the end of their useful life. This includes, but is not limited to, components such as batteries, electronic control units (ECUs), sensors, infotainment systems, lighting systems, electric motors, wiring harnesses and/or all the electronic components of an ELV. These items are considered waste once they are no longer functional or usable in their intended form and must be handled, recycled, or disposed of in accordance with applicable environmental and safety regulations of the host country to minimize hazards from hazardous substances and promote sustainable resource recovery**.**

In addition to the above, the terms and definitions providing guidance for thorough understanding of this methodology are included in the Terms and Definitions of the Voluntary Certification Programme of Cercarbono document, available at www.cercarbono.com, section: Documentation.

Summary

This methodology comprises collection, recovery and recycling activities of materials from ELV[1] performed in dedicated facilities with the aim of recovering materials or increasing the recovery efficiency of materials such as ferrous metals, non-ferrous metals, plastics and glass. ELV contains rare and precious metals that require specific technologies to extract and refine them. These materials are recovered and processed into secondary materials, thus displacing the production of virgin materials, thereby resulting in energy savings and greenhouse gas emission reduction.

[1] End-of-life vehicles (ELVs) comprises of all types of vehicles which have reached the end of their usable lifespan and are no longer roadworthy. For detailed description refer to "Terms and Defintions".

1 Introduction

As a consequence of rapid globalization and tremendous industrialization, the number of vehicles is proliferating on the road exponentially in recent times. After a specific period, the vehicle becomes unfit for the road and generates scrap automobiles proportionally. The vehicles that have been retired from service either due to unnatural reasons (e.g. accident, fire, flood or vandalism damage) or due to natural wear/tear and are no longer in use, end-of-life vehicles (ELVs), impose numerous threats in several aspects of society; hence proper handling of ELVs is of paramount importance.

Worldwide production of automobiles in 2000 stood at 58 million vehicles which increased to 94 million vehicles in 2023, an approximate increase of 62%[2]. Global estimates of ELV in 2010 was around 40 million[3] which doubled to approximate 80 million[4] in 2020. With such high volume of waste flow which is only going to assume massive proportions in the coming years, there should be a strong motivation for managing this waste.

Currently, only a limited number of countries and regions have established legislation on end-of-life vehicle (ELV) recycling, such as those in the EU, EFTA, and parts of Asia. In areas where automobile ownership is rapidly increasing, there is an urgent need to develop a legal framework for ELV recycling. However, the scope, subject matter, operational conditions, and cost allocation of such policies vary significantly from country to country. In many low and lower middle-income economies, where public transportation infrastructure is underdeveloped and incomes are low, ELV recycling is still in its early stages and tends to be disorganized and poorly managed. Both formal and informal sectors participate in the recycling process, but the informal sector largely dominates. Informality in ELV recycling sector prevails, which causes the bleeding of resources to waste and aggravates environmental quality. Proper and efficient ELV recycling enables the recovery of a significant quantity of different materials. However, with recent threat on managing this source of waste, the market continues to be non-receptive for ELV management by skilled and licensed entities. Instead, the current market has pervasive presence of auto dismantlers who are unlicensed and unqualified and more often than not, less likely to take adequate measure to address and arrest the potential detrimental impacts of ELVs.

Hence, the key elements of the proposed methodology include collection and recycling of ELV comprising of end-of-life, discarded, surplus, obsolete, or damaged vehicles, performed in dedicated facilities with the aim of recovering materials such as ferrous metals, non-ferrous metals, plastics etc. The type of GHG emissions mitigation action include reduction of production of metals, plastics and glass from virgin materials, thus reducing related energy consumption.

2 Principles

The Climate Change Mitigation Projects (CCMPs) using this methodology shall comply and refer to the relevant principles and how they are applied according to current version of ***Cercarbono's***

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[2] www.statista.com

[3]Sakai, Shin-ichi & Yoshida, Hideto & Hiratsuka, Jiro & Vandecasteele, Carlo & Kohlmeyer, Regina & Rotter, Vera & Passarini, Fabrizio & Santini, Alessandro & Peeler, Maria & Li, Jinhui & Oh, Gil-Jong & Chi, Ngo & Bastian, Lawin & Moore, Stephen & Kajiwara, Natsuko & Takigami, Hidetaka & Itai, Takaaki & Takahashi, Shin & Tajima, Yuko & Yano, Junya. (2014). An international comparative study of end-of-life vehicle (ELV) recycling systems. Journal of Material Cycles and Waste Management. 16. 1-20. 10.1007/s10163-013-0173-2.

[4] https://link.springer.com

Protocol, consistent with the contents and guidance as per in ISO 14064-2:2019 Standard. Notwithstanding, it is highly recommended that this standard be consulted, as therein extended concepts, explanations and criteria elements that complement what is already stated in ***Cercarbono's Protocol*** can be found.

3 Object and application field

3.1 Scope

This methodology is specific and applicable to Cercarbono certification programme. It may be applied to implement a CCMP aiming to develop programs or projects related to recovery and recycling of materials from the ELVs. CCMPs shall comply with all applicable regulations in the host country, intended to qualify for result-based payments or similar compensations as a result of actions generating GHG emission reductions. It may be applied in the grouped project and/or programs of activities and CCMPs using this methodology shall comply with all legal and MRV requirements as provided in their applicable jurisdiction. The methodology outlines basic recommendations based on referred principles for the design and implementation of CCMPs focused on recovering and recycling of waste from ELV. This methodology comprises activities for the recovery and recycling of materials from ELVs to process them into intermediate or finished products, displacing the production of virgin materials in dedicated facilities, thereby resulting in avoidance of energy use. Types of recovery and recycling processes CCMPs use for include, but are not limited to:

a) De-pollution, dismantling and segregation;
b) Shredding;
c) Baling of vehicle hulks (if a shredder is not available);
d) Processing residues (Light Auto Shredder Residue) using techniques like cyclone separators, shaker tables, rotary drums or float/sink separation techniques, jigging, cryogenic grinding etc;
e) Processing ferrous metal residues using magnetic separation;
f) Processing non-ferrous metal residues using Eddy current separators, sink and float separation or sensor-based colour recognition;
g) Metal recovery in different smelters (electric arc or blast furnaces);
h) Plastic recovery via mechanical recycling or chemical recycling; and
i) Glass recovery through thermal treatment.

CCMPs with other processes not listed above may use this methodology, provided they comply with all applicable criteria. A combination of above listed types of actions could also be implemented, as applicable, according with the programme or project conditions.

For this methodology to be applied by a CCMP, it shall comply with following conditions:

a) RVSF shall only be setup by the formal, formalized or organized sector;
b) Recovery & Recycling activities currently occurring in the informal sector are not eligible.

CCMPs shall demonstrate their current status in regard to being considered under host country's Nationally Determined Contribution (NDC), including providing positive evidence they are / they are not included in such NDC and complying with Cercarbono's framework related provisions including addressing potential double-counting (or double-claiming) issues.

3.2 Technical and programme regulations' compliance

Project participants shall apply the Cercarbono's regulatory framework documents[5] for application of this methodology.

Following Cercarbono and CDM tools[6], Standard and Guidelines in their current versions are complementary and essential for the application of this methodology:

1. **TOOL 03**: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, version 03.0
2. **TOOL 05**: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0.
3. **TOOL 07**: Tool to calculate the emission factor for an electricity system, version 07.0.
4. Tool to Demonstrate Additionality of Climate Change Mitigation Initiatives, version 2.0.1

Standard: Sampling and surveys for CDM project activities and programme of activites, version 09.0.

In addition, it is based on some elements of CDM methodologies:

1. AMS-III.BA: Recovery and recycling of materials from E-waste, version 03.0.
2. AMS-III.AJ.: Recovery and recycling of materials from solid wastes, version 09.0.

3.3 Compliance with applicable legal provisions

The CCMP must comply with all legal requirements and regulations applicable as per its location, operations, environmental impacts, licenses and permits as required by the jurisdiction it is implemented in. It shall be ensured that all of the above shall be complied with, independent from the degree of compliance of such provisions or the level of enforcement of such compliance exerted by the competent organization and authorities in the specific jurisdiction.

Project holder shall present the VVB in charge of validation and verification events, a complete list of applicable regulations, as well as access to such documents for its assessment.

Key legal provisions relevant for the recovery and recycling of materials from ELVs shall include waste management and recycling, environmental protection laws, hazardous materials regulations, product design and producer responsibility laws, health and safety regulations, labor conditions regulations, licensing and permitting requirements, laws pertaining to transportation and handling of ELVs and recyclable materials, quality standards and applicable market regulations.

Transboundary movement of the output material is permitted if the downstream destination is traceable and the output material meets one of the following conditions:

- It is not classified as "waste" under relevant legislation.
- It is classified as waste but is listed under the green category in the Basel Convention, OECD guidelines, or similar regional legislation.
- It is classified as waste and falls under the yellow category of the Basel Convention, which requires special government authorization.

[5] Available at www.cercarbono.com, section : Documentation.

[6] Or those substituting them at implementation of Paris Agreement's Art. 6.4 mechanism. Available at: www.cdm.unfccc.int.

4 Eligibility and inclusion requirements

This methodology has been developed for use by CCMPs focused on GHG emissions reduction through material recovery & recycling from ELV in the RVSFs, aimed at carbon credits' generation.

The methodology is applicable under the following conditions:

a) The scrapping and value recovery of ELV must be carried out only in a RVSF operating in the host country. Only vehicles that are classified as non-roadworthy and not eligible for reuse or re-registration under applicable national regulations shall be eligible for inclusion under this methodology. Vehicles that can be legally repaired, reused, or returned to service are explicitly excluded. This ensures that the methodology applies strictly to ELVs that have reached the final stage of their lifecycle and are destined solely for environmentally sound dismantling and material recovery through RVSFs.
b) The RVSF must adhere to the guidelines established by the host country's government for setting up a RVSF and the standard protocols of the automotive industry. Furthermore, it must align with national or international guidelines governing the handling and scrapping of ELVs.
c) If the recycling facility or RVSF is an existing activity, the average data on the amount of recycled materials from the previous three years of operation (a minimum of one-year data would be required if the facility is less than three years old) shall be used for the estimation of the baseline recycling activity, and project activity shall consist of the increase of the recycling capacity above this level. If the recycling facility is newly implemented as a Greenfield activity, all recycled materials are eligible for the emission reduction calculation. However, in this case the project participants shall demonstrate that the materials recycled by the project activity are not diverted from other existing recycling facilities belonging to the informal sector.
d) The RVSF includes ELV dismantling and sorting of at least the non-ferrous metals fraction of the waste such as aluminum etc. Other common materials (ferrous metals, plastics, glass) can be processed at the facility after sorting or be shipped to third party processors.
e) It is possible to measure and record the final input and output of the RVSF, i.e. the weight of materials entering and leaving the facility, and those entering the processing / manufacturing facility.
f) It is possible to measure and record the amount of fuel and electricity consumed by the recycling activities performed at the facility for each type of material recycled.
g) The output material(s)[7] shall be sold directly to a processing/manufacturing facility, or to a chain of intermediary retailers that are able to transfer the recycled materials to a final identifiable processing/manufacturing facility.
h) The emission reductions under this methodology will accrue to any one of the following:
    i. Registered Vehicle Scrapping Facilities (RVSFs);
    ii. The processing facility;
    iii. The collectors of ELV.

[7] Transboundary movement of output material is allowed subjected to compliance with legal provisions as mentioned in **Section 3.2**.

i) In order to avoid double counting of emission reductions, a contractual agreement between the collectors of ELV, the RVSF and the processing facility shall indicate that only one of them will claim emission reductions. Similarly, through contractual agreement and other means, credible proof shall be provided to show that the materials supplied from the recycling facility are used for processing/manufacturing and not for other purposes such as a source of fuel or disposal.

j) Waste generated during environmentally sound scrapping of ELVs must be managed in compliance with national or international regulations. These wastes include hazardous waste, solid waste, electronic waste, plastic waste, battery waste, and GHG substances, posing environmental concerns that necessitate proper waste management practices.

k) Hazardous wastes from ELVs encompass substances such as waste oil, transmission fluid, coolant fluid, brake fluid, power steering fluid, hydraulic fluid, gear oil, lead-acid batteries, and hazardous solid waste like air filters, oil filters, brake shoes, asbestos in clutch discs, materials resulting in any other hazardous waste from ELV depollution and dismantling. These must be managed in accordance with the hazardous and other wastes rules of the host country and recycling of hazardous wastes recovered from ELVs is permitted only by registered recyclers notified under these rules.

l) All refrigerants and refrigerants containing Ozone Depleting Substances (ODS) recovered from ELVs must be disposed of in compliance with the relevant national and international rules. These refrigerants should be directed to Treatment, Storage, and Disposal Facilities (TSDF) or other facilities recognized by the host government or appropriate authority.

m) Plastic waste, solid waste, and e-waste should be sent to registered recyclers for recycling and disposal, following the waste management regulations of the host country.

n) This methodology applies to the recycling process of the following materials[8] recovered from ELV:
   i. Metals: aluminum, steel, copper, gold, silver, palladium, tin, lead;
   ii. Plastics: acrylonitrile butadiene styrene (ABS), high impact polystyrene (HIPS), high density polyethylene (HDPE), low density polyethylene (LDPE), polyethylene terephthalate (PET), polyvinyl chloride (PVC) and polypropylene (PP);
   iii. Glass cullet.

o) Emission reductions can only be claimed for the difference between: (a) the energy used for the production of metals, plastics and glass from virgin materials; and (b) the production of the same metals, plastics and glass from ELV recycling.

p) The methodology excludes collection of the scraps generated from the production process of primary/secondary/finished metal and materials or in the processing of the finished metal and materials into final products, and it covers only post-consumer obsolete scrap from ELV. Project proponents shall provide evidence that the materials recycled under the CCMP are recovered only from end-of-life vehicles.

q) Project proponents shall demonstrate that the properties of the materials produced from recycling of ELV are the same as those from virgin materials. For example, if the waste materials

[8] Project Participants are encouraged to submit a revision of this methodology to include additional metals and materials proposing conservative default values for specific emission factors (or specific energy consumption) for the production from virgin raw materials.

such as recycled plastic bottles are converted into building blocks or roof tiles, the emission reductions based on displacement of original virgin materials cannot be claimed under this methodology. For recycled materials, the project proponents shall provide documentation such as chemical composition test results or quality certificates proving that the properties of the recycled materials produced are comparable according to standard testing methods for each material.

r) For recycling of PVC/PET/PP, the project participants shall demonstrate the chemical equivalence of the recycled PVC/PET/PP to that of PVC/PET/PP made from virgin inputs by the comparison of intrinsic viscosities to ensure that the recycled PVC/PET/PP replaces virgin inputs.

s) For the projects involving the recycling of PVC, only facilities that employ mechanical recycling are eligible.

t) Project proponents shall also demonstrate ex-ante that the baseline recycling rate of ELVs (including both formal and informal recycling) must be equal to or less than 20% of the recycling rate in the applicable geographic area. Recycling rate (unit basis) is formulated as:

$$\frac{\textbf{No. of Vehicles Scrapped and Recycled by the Recycling Facility (unit) X 100}}{\textbf{Total No. of Vehicles deemed}^{9}\textbf{ End-of-Life (unit basis)}}$$

While, the recycling rate (weight basis) is formulated as:

$$\frac{\textbf{Weight of Vehicles Scrapped and Recycled by the Recycling Facility (tons) X 100}}{\textbf{Total Weight of Vehicles deemed End-of-Life (tons)}}$$

u) If the baseline recycling rate of ELVs exceeds 20%, then the project proponents shall demonstrate that the CCMP leads to significantly higher rates of recycling in the region/country from ELV in RVSF[10], including the below proofs at a minimum:

i. CCMP does not divert ELV wastes from any other historically existing informal or formal recycling facilities; if this condition is not met, the project activity is not eligible, even if it follows the other two conditions, (ii) and (iii), below.

ii. Technologies capable of separating higher amounts of individual metals from unit quantity of ELVs are employed by the CCMP as compared to prevalent technologies in the pre-project situation.

[9] The market penetration of ELVs shall be determined based on data derived from government reports, published studies, or other credible third-party sources. For the purpose of validation or inclusion of the Cercarbono-CCMP or Cercarbono-PoA-DD, the most recent data from the preceding three years available at the time of submission must be utilized. This timeframe is considered adequate to account for annual fluctuations in ELV sales trends. In exceptional cases, where data availability is constrained, historical sales data covering a minimum of one year may be used, provided that sufficient justification is furnished to demonstrate exhaustive efforts to obtain the requisite data. In case multiple studies are available showing different pictures/facts/results (including governmental and non-governmental sources), the most conservative one shall be used.

[10] CCMP shall not promote ELV imports for purposes of ELV processing in addition to those currently existing in the country.

iii. The recycling infrastructure set up by the project can potentially increase recycling rates of ELVs in the region/country by at least 50% increase of recycling rates of ELVs in the region/country within the first three years of operation of the facilities.

If conditions mentioned in the above paragraphs "ii" and "iii" are satisfied, emission reductions can be claimed for all of ELV recycled in the RVSF by the CCMP. However, if any of those conditions are not met, project proponents shall exclude copper and noble metals[11] (i.e. gold, silver and palladium) from the calculation of the emission reductions. Plastics, iron and aluminum, and glass remain eligible.

v) Project proponents shall demonstrate, using three years[12] historic data (e.g. market data, official statistics) prior to the start date of the CCMP, that the finished products (Plastics, ABS, HIPS and metals and glass as per applicability condition "m" were manufactured in the host country of the CCMP using either the quantity of virgin raw materials produced in country or virgin raw materials imported from another non-Annex I country. This analysis may be limited to only those finished products where recycled materials have proven to be a technically viable option (i.e. those types of products that are expected to be the end products produced from materials recycled as part of the CCMP).

w) As an alternative to the requirement stipulated in above paragraph, the project proponents may choose to adjust the baseline emissions by using the baseline correction factor (B_i) as described under **Section 7.2**.

5 Additionality

For recycling facilities, additionality shall be demonstrated by applying the latest version of Cercarbono 's Tool to Demonstrate Additionality of Climate Change Mitigation Initiatives[13].

6 CCMP delimitation

6.1 Temporary limits

The temporary limit of the CCMP refers to the timeline over which the programme or project will be operational, from the start date to the end date of the accreditation period. The scope of temporary limit ensures that the project is effectively implemented and rigorously monitored over its lifecycle, thereby maximizing its environmental and socio-economic benefits.

CCMP duration: is the period (in years) from the start (day.month.year) to the final (day.month.year) date during which the project is operational.

Accreditation Period: The period during which climate change mitigation programme or project may apply for verification of GHG emission removals or GHG emission reductions, as appropriate, for carbon credits.

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[11] This is to mitigate the likelihood of business-as-usual recycled quantities being included for emission reduction calculation.

[12] A minimum of one-year data would be required if the facility is less than three years old.

[13] www.cercarbono.com

6.2 Spatial limits

The project boundary is the physical geographical sites of:

a) ELV collection sites and related infrastructure and equipment;
b) The RVSF and processing facility(ies) where the ELVs are sorted and processed up to the stage where secondary materials become equivalent to virgin materials;
c) Virgin material production chain, including mining facilities and refining plants[14].

On top of the above referred requirements, the CCMP shall follow Cercarbono's guidelines on CCMP limits as per the current version of the Cercarbono 's regulatory framework.

7 Baseline scenario

7.1 Identification of the baseline scenario

Project participants shall apply the Cercarbono's Protocol for Voluntary Carbon Certification for setting the baseline scenario. Nevertheless, it is anticipated that possible, plausible baseline scenarios for CCMPs under this methodology can be one among the following:

Baseline Scenario for Greenfield Recycling Facility

If the CCMP development is the installment of a greenfield RVSF as described under **Section 4**, the baseline scenario involves determining the emissions that would occur in the absence of the CCMP, which is the recycling and recovery of materials from ELVs in RVSF. The baseline emissions include emissions associated with producing metal, plastics and glass from virgin materials rather than from recycled ELV waste.

Baseline Scenario for Capacity Addition to an existing Recycling Facility

If the CCMP development is a capacity addition as described under **Section 4**, the baseline scenario assumes that the facility's current recycling and recovery operations would have continued without any expansion. The baseline emissions are calculated based on the facility's historical recycling activity, including the amount of metals, plastics, and glass recovered from ELVs in the past three years (or a minimum of one year if the facility is newer). The project's emissions reductions are measured as the increase in recycling and recovery capacity above this baseline level. This additional capacity reduces the demand for virgin materials, leading to further emission reductions from the use of recycled materials instead of virgin metal, plastic, and glass.

In any case, the CCMP holder or developer shall select the most realistic baseline scenario, quantifying its characteristics, ensuring that:

- It reflects the best available technologies that are environmentally sound and economically viable, where applicable;
- It applies an approach based on the benchmark emissions from comparable high-performing processes and activities (see **Section 7.3**), under similar economic, environmental, and technological circumstances;

[14] Virgin material production is formally included in the Project boundary, even though it is not necessary to identify the production sites, because the emission reductions are based on the assumption that virgin material production is displaced because of the CCMP.

- The baseline is conservatively set below the business-as-usual (BAU[15,16]) scenario. For this:
  - Assumptions representing extreme or artificially high conditions compared to what would reasonably occur without the CCMP will not be accepted;

The baseline shall be technically justifiable, verifiable, and established below the reasonable upper limit of the BAU scenario, reflecting prudent assumptions about the types of activities covered.

7.2 Emission sources in the baseline scenario

GHG emission sources to be considered in baseline scenario of the CCMP are described in **Table 1**.

Table 1. GHG emission sources considered in the baseline scenario

Source	GHG	Included	Explanation
Electricity Consumption from Grid for Virgin Material Production	CO_2	Yes	Emissions from electricity used to produce virgin materials. Produced amounts of CH_4 and N_2O are considered as negligible, and not considering them is deemed as conservative
	CH_4	No	
	N_2O	No	
Fossil Fuel Consumption for Virgin Material Production	CO_2	Yes	Emissions from fossil fuels used in production of virgin material. Produced amounts of CH_4 and N_2O are considered as negligible, and not considering them is deemed as conservative
	CH_4	No	
	N_20	No	
Captive Power Plant Emissions	CO_2	Yes	Emissions from electricity generated by captive power plants for virgin material production. Produced amounts of CH_4 and N_2O are considered as negligible, and not considering them is deemed as conservative
	CH_4	No	
	N_2O	No	

Note: The materials referred are metals (Aluminum, Steel, Copper, Gold, Silver, Palladium, Tin), plastics (ABS, HIPS, PET, HDPE, LDPE, PP, PVC) and glass. If the CCMP responsible identifies a different GHG source from those described above, it may include the same provided such inclusion is justified.

7.3 Emissions calculation in the baseline scenario

Baseline emissions are determined based on the equation below and include:

a) For the production of metals, emissions associated with energy consumption for the production from virgin materials.
b) For the production of plastic, the emissions associated with energy consumption for the production of plastic pellets from virgin plastic materials.
c) For the production of glass, emissions associated with energy consumption for the production from virgin glass materials.

[15] The BAU constitutes the reference value for the construction of the baseline. Nevertheless, the baseline shall be conservatively positioned below the BAU, applying technically prudent assumptions and downward adjustments based on actual or historical data, in accordance with the principle of conservativeness.

[16] Taking into account the economic feasibility of the critical mitigation activities, practices, or technologies employed. Quantitative factors or methods for the downward adjustment of the baseline will be updated during each renewal of the accreditation period or corresponding baseline reassessment.

$$BE_t = BE_{metals,t} + BE_{plastics,t} + BE_{glass,t}$$ **Equation (1)**

Where;

Variable	Description	Units
BE_t	Baseline emissions in period t	tCO_2e
$BE_{metals,t}$	Baseline emissions associated with the recycling of metals in period *t*	tCO_2e
$BE_{plastics,t}$	Baseline emissions associated with the recycling of plastics in period *t*	tCO_2e
$BE_{glass,t}$	Baseline emissions associated with the recycling of glass in period *t*	tCO_2e

Only the baseline emissions which would take place in non-Annex I countries shall be credited. Therefore, in case where the requirements stipulated under **Section 4**, applicability condition "v" cannot be met, the baseline emissions calculated for the total amount of recycled materials obtained in the CCMP are discounted by the correction factor "B_i", calculated as the ratio of the production of the material "i" in non-Annex I countries and the total production of this material in the world. See **Table 2** below. These correction factors shall be updated at each renewal of the crediting period, when project participants shall use the values and updating rules as per the latest version of the methodology at renewal of the crediting period.

Table 2. Baseline correction factor for production of metals, plastics & glass from virgin materials

Metal, Plastic & Glass	B_i correction factor based on the share of the production in non-Annex I countries[17],[18]
Aluminum	0.77
Steel	0.73
Copper	0.79
Gold	0.65
Silver	0.75
Palladium	0.47
Tin	0.96
Lead	0.74
ABS	0.64
HIPS	0.64

[17] For details on how the values of B_i were determined, please refer to Appendix 1.

[18] For plastics, values of B_i were sourced from Plastics Europe and EPRO (Association of Plastics Manufacturers in Europe (PlasticsEurope), European Association of Plastics Recycling and Recovery Organisations (EPRO). 2022. Plastics – the Facts 2021. Available at, accessed on 29 June 2022).

Metal, Plastic & Glass	B_i correction factor based on the share of the production in non-Annex I countries[17],[18]
PET	0.60
HDPE	0.60
LDPE	0.60
PP	0.60
PVC	0.60
Glass	0.67[19]

7.3.1 Baseline emissions associated with the recycling of metals

Baseline emissions for the production of metal *i* from virgin inputs are calculated using equation (2).

$$BE_{metals,t} = \sum_i Q_{metal,i,t} \times B_i \times SE_i$$ **Equation (2)**

Where;

Variable	Description	Units
$BE_{metals,t}$	Baseline emissions associated with the recycling of metals in period *t*	tCO_2e
i	Indices for metal type *i*	NA
$Q_{metal,i,t}$	Quantity of metal type *i* recycled by CCMP and sent to a processing or manufacturing facility in period t [20]	tonnes
B_i	Correction factor based on the share of the production in non-Annex I countries	Dimensionless
SE_i	Specific CO_2e emission factor for production of metal *i*. Take values specified in Table 3 **3** or determine the relevant values specific to the host country, based on official national values or on methods used in related references, which entail a sound cradle-to-gate life cycle national inventory, performed by renowned entities or institutions, with peer reviewed, published methodology, which when used, shall be duly justified.	tCO_2e/t

[19] For glass, the Bi values were sourced from CDM methodology AMS-III.AJ v9.0. These values will be updated if there are any changes in the methodology.

[20] For aluminium and steel which is sent to a processing facility, impurities associated with the metal that is sold should be accounted for and discounted, or a net-to-gross adjustment factor of 0.8 shall be applied to the $Q_{i,y}$.(www.wiego.org)

Baseline emissions for the production of primary metals from virgin inputs are calculated making the conservative assumptions as mentioned in their respective references. These values shall be updated at each renewal of the crediting period, and project participants shall use the values from the latest version of the methodology at renewal of the crediting period.

Table 3. Specific CO_2e emission factor for production of metals

Metal	Specific CO_2e emission factor for production of metals (tCO_2e/tonne of output metal)
Aluminum	7.31[21]
Steel	1.25[22]
Copper	4.1[23]
Gold	11,000
Silver	140
Palladium	7,200
Tin	16
Lead	2.1

7.3.2 Baseline emissions associated with the recycling of plastics

Baseline emissions for the production of plastic type *i* pellets from virgin inputs are calculated based on the consumption of plastics produced in the host party as well as imported, using the following equation:

$$BE_{plastics,t} = \sum_{i} Q_{plastic,i,t} \times L_i \times \left(w_{i,in-country,t} \times SE_{i,in-country,t} + w_{i,imported,t} \times SE_{i,imported,t}\right)$$

Equation (3)

Where;

Variable	Description	Units
$BE_{plastics,t}$	Baseline emissions for plastics recycling in period *t*	tCO_2e
i	Indices for material type *i* (i = 1,2 for listed plastics as per the applicability condition (m))	NA

[21] For details on how the specific CO_2e emission factor for the production of aluminium was determined, please refer to Appendix 2.

[22] For details on how the specific CO_2e emission factor for the production of steel was determined, please refer to Appendix 3.

[23] https://internationalcopper.org, Table 4: Results of the LCIA for Copper Cathode.

Variable	Description	Units
$Q_{plastic,i,t}$	Quantity of plastic type *i* recycled by CCMP and sent to a processing or manufacturing facility in period *t*	tonnes
L_i	Net to gross adjustment factor to cover degradation in material quality and material loss in the processing of the sorted material. Use 0.75[24] if the RVSF includes only sorting; use 1 if the RVSF includes both sorting and processing	Dimensionless
$w_{i,in-country,t}$	Percentage of plastics produced[25] in the host country out of total plastic consumed in period *t*	%
$SE_{i,in-country,t}$	Specific emissions in the baseline for the production of virgin plastics type *i* in the host party in period *t*	tCO_2e/t_i
$w_{i,imported,t}$	Percentage of imported[26] plastics out of total plastic consumed in period *t*	%
$SE_{i,imported,t}$	Specific emissions in the baseline for virgin plastics type *i* imported in period *t*	tCO_2e/t_i

Specific emissions in the baseline for the production of virgin plastics type *i* in the host party in period *t* are determined based on the following equation:

$$SE_{i,in-country,t} = \left(SEC_{BL,in-country,i} \times EF_{BL,el,t}\right) + \left(SFC_{BL,in-country,i} \times EF_{BL,FF,CO2}\right) \quad \textbf{Equation (4)}$$

Where;

Variable	Description	Units
$SE_{i,in-country,t}$	Specific emissions in the baseline for the production of virgin plastics type *i* in the host party in period *t*	tCO_2e/t_i
$SEC_{BL,in-country,i}$	Specific electricity consumption in the production of virgin material type *i* in the host country, take value specified in **Table 4** or determine the relevant values specific to the host country, based on official national values or on methods used in related references, which entail a sound cradle-to-gate life cycle national inventory, performed by renowned entities or institutions, with peer reviewed, published methodology, which when used, shall be duly justified.	MWh/t_i

[24] As per CDM's AMS-III.AJ v.09.0 and AMS-III.BA v.03.0 methodologies, when there are no relevant sectoral reports, peer-reviewed studies, or national / sectoral statistics establishing a different value.

[25] Most recent data to be used at each verification in line with the frequency mentioned in the **Table 7**

[26] Most recent data to be used at each verification in line with the frequency mentioned in the **Table 7**

Variable	Description	Units
$EF_{BL,el,t}$	Emission factor for the baseline electricity consumption source for virgin plastic production in the host party, determined using **equation 6** and if no official data is available to determine the value using **equation 6** for production-related sourced electricity in non-host parties, use a default value of 0.24 tCO_2/MWh.[27]	tCO_2/MWh
$SFC_{BL,in-country,i}$	Specific fuel consumption for the production of virgin material type *I,* in the host country, take value as specified in **Table 4** or determine the relevant values specific to the host country, based on official national values or on methods used in related references, which entail a sound cradle-to-gate life cycle national inventory, performed by renowned entities or institutions, with peer reviewed, published methodology, which when used, shall be duly justified.	GJ/t_i
$EF_{BL,FF,CO2}$	CO_2 emission factor of the baseline fossil fuel. Project participants shall assume that the baseline fuel is natural gas when it's not possible to identify the type of fuel consumed for the production of plastics from virgin materials[28].	tCO_2/GJ

Specific emissions in the baseline for virgin plastics type *i* imported in period *t* are determined based on the following equation:

$$SE_{i,imported,t} = \sum_{i} B_i \times \left(SEC_{BL,imported,i} \times EF_{el,imported} + SFC_{BL,imported,i} \times EF_{FF,imported,CO2}\right)$$

Equation (5)

Where;

Variable	Description	Units
$SE_{i,imported,t}$	Specific emissions in the baseline for virgin plastics type *i* imported in period *t*	tCO_2e/t_i
B_i	Correction factor based on the share of the production in non-Annex I countries. Use values from **Table 2**	Dimensionless

[27] This default value is determined assuming electricity is supplied by a natural gas cogeneration plant with an efficiency of 83% (the efficiency is sourced from the **Table 2** of the Appendix of the TOOL09).

[28] In case less carbon-intensive fossil fuels than natural gas, or a combination of fossil and renewable fuels or less carbon-intensive energy sources are used for such purpose, that shall be referred and considered conservatively to include in the baseline only the fraction of fossil fuel used, considering it being natural gas.

Variable	Description	Units
$EF_{el,imported}$	Emission factor for the baseline electricity consumption for the portion of plastic that is imported. Apply a default value of 0.24[29] tCO_2/MWh	tCO_2/MWh
$EF_{FF,imported,CO2}$	CO_2 emission factor for fossil fuel. Assume that natural gas supplies the energy needed to produce the virgin plastic imported if it is not possible to identify the fuel type	tCO_2/GJ
$SEC_{BL,imported,i}$	Specific electricity consumption in the production of virgin material type *i* imported, take value specified in **Table 4**	MWh/t_i
$SFC_{BL,imported,i}$	Specific fuel consumption for the production of virgin material type *i* imported, take value as specified in **Table 4**	GJ/t_i

The values of the parameters $SEC_{BL,in\text{-}country,i}$ & $SEC_{BL,imported,i}$ and $SFC_{BL,in\text{-}country,i}$ & $SFC_{BL,imported,i}$ are indicated in the table below, and are to be used when relevant values specific to host country are not available.

Table 4. Values of specific energy and fuel consumed for the production of different plastics types from virgin materials

Plastic types	**$SEC_{Bl,in\text{-}country,i}$, $SEC_{Bl,imported,i}$ (MWh/t_i)**	**$SFC_{Bl,in\text{-}country,i}$ & $SFC_{Bl,imported,i}$ (GJ/t_i)**
ABS	0.592	15
HIPS	0.38	15
PET	1.11	15
HDPE	0.71	15
LDPE	1.57	15
PVC	0.18	25.7
PP	0.30	11

For determining the values of $SEC_{Bl,in\text{-}country,i}$, $SEC_{Bl,imported,i}$, $SFC_{Bl,in\text{-}country,i}$ & $SFC_{Bl,imported,i}$, the following conservative assumptions were made:

1. The main components of ABS are ethylene and polypropylene, and the main components of HIPS are ethylene, styrene and butadiene.
2. The energy needed for the production of the virgin monomers, Propylene Styrene and Butadiene through thermal cracking of olefins is supplied by natural gas[30];

[29] This default value is determined assuming electricity is supplied by a natural gas cogeneration plant with an efficiency of 83% (the efficiency is sourced from the Table 2 of the Appendix of the TOOL09).

[30] This is deemed as conservative, as using natural gas is the less energy- and material-intensive way to obtain a unit of product in the olefin thermal cracking process.

3. The virgin monomers ethylene, propylene, ethylene glycol and terephthalic acid[31] are produced through thermal cracking of naphtha;
4. A conservative value of 15 GJ/tons of energy needed to produce ethylene was selected from Table 4.3 of the report "Tracking Industrial Energy Efficiency and CO_2 emissions" prepared by the International Energy Agency (IEA, 2007) and applied for the production of the other monomers;
5. A value of 11.6 GJ/t of energy needed to produce propylene from thermal cracking of naphtha was sourced from Saygin et al (2011)[32], as the sum of the specific energy consumed from the best practice technologies (13.1 GJ/t) and the specific energy needed to produce the steam (-1.5 GJ/t);
6. A value of 25.7 GJ/t of energy needed to produce virgin vinyl chloride monomer (VCM) was determined based on the sum between the energy needed to produce ethylene (15 GJ/t, see above), chlorine (1.11 GJ/t based on Saygin et al, 2011, and assuming a ratio 0.586 tCl2/tVCM), ethylene dichloride-EDC (6.98 GJ/t based on Table 4.18 of IEA, 2007, and assuming a ratio 1.58 tEDC/tVCM) and VCM (2.7 GJ/t based on Table 4.18 of IEA, 2007);
7. The energy needed for the production of the polymers (polymerization + extrusion) is supplied by electricity. According to the American Chemistry Council – ACC[33]:
   a) For ABS, a value of electricity consumption equals to 503 KWh from grid, converted to 0.592 MWh/t, 503 KWh was taken from Table 14, CRADLE-TO-GATE LIFE CYCLE ANALYSIS OF ACRYLONITRILE BUTADIENE STYRENE (ABS) RESIN, 2022 data;
   b) For HIPS, a value of electricity consumption equals to 170.56 KWh (140 KWh from grid ,converted to 0.170 MWh/t, 140 KWh from grid was taken from Table 17, CRADLE-TO-GATE LIFE CYCLE ANALYSIS OF HIGH IMPACT POLYSTYRENE (HIPS) RESIN and 0.11 GJ was taken from Table H-4;
   c) For HDPE, the values are taken from the table 13, CRADLE-TO-GATE LIFE CYCLE ANALYSIS OF HIGHDENSITY POLYETHYLENE (HDPE) RESIN, 2020, adding electricity from grid, electricty from cogen, natural gas, and residual oil and convert to MWh/t;;
   d) For LDPE, the values are taken from the table 12, CRADLE-TO-GATE LIFE CYCLE ANALYSIS OF Low-Density Polyethylene (LDPE) RESIN, 2020, adding electricity from grid, electricty from cogen, natural gas, and residual oil and convert to MWh/t;
   e) For PP, the values are taken from the Table 12 of the CRADLE-TO-GATE LIFE CYCLE ANALYSIS OF POLYPROPYLENE (PP) RESIN, 2021, Adding electricity from grid, electricty from cogen and convert to MWh/t;
   f) For PET, a conservative value of 4.0 GJ/t (divided by 3.6 to convert MWh/t) was sourced from Table 1 of Saygin et al (2011).
   g) For PVC, a conservative value of 0.18 MWh/t was determined as the weighted average between the PVC produced from suspension and emulsion processes, where the ratios of each production processes over the global production of PVC (85% through S-PVC and 15%

[31] For the production of the monomers Ethylene Glycol Terephthalic Acid, it was conservatively estimated that the energy needed is the same for the production of the same mass of ethylene through thermal cracking.

[32] Saygin D, Patel MK, Worrell B, Tam C, Gielen DJ. 2011. Potential of best practice technology to improve energy efficiency in the global chemical and petrochemical sector. Available at, accessed on 12 May 2021.

[33] **Cradle-to-Gate Life Cycle Inventory of Nine Plastic Resins and Four Polyurethane Precursors,** prepared by Franklin Associates for the Plastics Division of the *American Chemistry Council (ACC)*. Available at <https://plastics.americanchemistry.com/LifeCycle-Inventory-of-9-Plastics-Resins-and-4-Polyurethane-Precursors-APPS-Only/>, accessed on 12 May 2021.

through E-PVC) and the specific electricity consumed by each production process are sourced from PlasticsEurope and ECVM[34].

8. The remaining steps of virgin pellet production (melting and shaping, pelletizing, compounding) require relatively negligible amounts of energy and hence are ignored.

The emission factor for the baseline electricity consumption source for virgin plastic production in the host country (parameter $EF_{BL,el,y}$) shall be determined based on the weighted average consumption of electricity from the electric grid(s) and from captive power plant(s) as indicated in the equation below. Project participants may choose to fix this parameter ex ante and update at the renewal of the crediting period or monitor this parameter ex post. If the parameter is fixed ex ante, it shall be calculated using the most recent data available. Otherwise, if no official data is available to determine the value using **equation 6**, use a default value of 0.24 tCO_2/MWh[35] shall be applied:

$$EF_{BL,el,t} = \frac{\sum_k EF_{BL,grid,k,t} \times EC_{BL,grid,k,t} + \sum_j EF_{BL,captive,j,t} \times EC_{BL,captive,j,t}}{\sum_k EC_{BL,grid,k,t} + \sum_j EC_{BL,captive,j,t}} \quad \textbf{Equation (6)}$$

Where;

Variable	Description	Units
$EF_{BL,el,t}$	Emission factor for the baseline electricity consumption source for virgin plastic production in the host country	tCO_2/MWh
$EF_{BL,grid,k,t}$	Emission factor of the grid *k* supplying electricity to produce virgin plastics in the host country in period *t* determined as per latest version of CDM Tool07	tCO_2/MWh
$EC_{BL,grid,k,t}$	Electricity consumed from the grid *k* to produce virgin plastics in the host country in period *t*	MWh
$EF_{BL,captive,j,t}$	Emission factor of the captive power plant *j* supplying electricity to produce virgin plastics in the host country determined as per latest version of CDM Tool07	tCO_2/MWh
$EC_{BL,captive,j,t}$	Electricity consumed from the captive power plant *j* to produce virgin plastics in the host country in period *t*	MWh

If the project participants can't identify the sources to determine the baseline emissions from plastics produced in the host party, a simplified approach can be applied assuming that all plastic consumed in the host party is imported and a weight of 0 is assigned to $w_{produced,y}$ and 1 to $w_{import,y}$ in **equation 3** and similar values of $SEC_{BL,in\text{-}country,i}$ & $SEC_{BL,imported,i}$ and $SFC_{BL,in\text{-}country,i}$ & $SFC_{BL,imported,i}$ as mentioned in **Table 4**.

[34] Association of Plastics Manufacturers in Europe (PlasticsEurope), European Council of Vinyl Manufacturers (ECVM). 2015. Eco-profiles and Environmental Product Declarations of the European Plastics Manufacturers: Vinyl chloride (VCM) and Polyvinyl chloride (PVC).

[35] This default value is determined assuming electricity is supplied by a natural gas cogeneration plant with an efficiency of 83% (the efficiency is sourced from the Table 2 of the Appendix of the "TOOL09: Determining the baseline efficiency of thermal or electric energy generation systems").

7.3.3 Baseline emissions associated with the recycling of glass

Baseline emissions for the production of container glass from virgin inputs are calculated using following equation[36]:

$$BE_{glass,t} = Q_{glass,t} \times L_{glass} \times B_i \times SEC_{Bl,glass} \times EF_{el,PJ,t}$$ **Equation (7)**

Where;

Variable	Description	Units
$BE_{glass,t}$	Baseline emissions for the production of container glass from virgin inputs in period *t*	tCO_2/t
$Q_{glass,t}$	Quantity of glass cullet recycled by the CCMP and sent to a processing or manufacturing facility in period *t*	tonnes
L_{glass}	Net to gross adjustment factor to cover degradation in material quality and material loss in the production process of the final product using the recycled material (use 0.88[37])[38]	Dimensionless
$SEC_{Bl,glass}$	Specific electricity consumption for the production of raw materials displaced by the glass recycling[39]	MWh/tonnes
$EF_{el,PJ,t}$	Emission factor of the electric grid supplying electricity to the recycling facility in period *t*	tCO_2/MWh
B_i	Correction factor based on the share of the production in non-Annex I countries. Use values from **Table 2**	Dimensionless

The following conservative assumptions were made to determine the baseline emissions for the production of container glass from virgin inputs:

a) Container glass cullet will displace only the preparation and mixing of raw materials before the melting stage;
b) The only source of energy consumed by the preparation and mixing of raw materials is electricity – no fossil-fuels are used;

[36] This default value is determined assuming electricity is supplied by a natural gas cogeneration plant with an efficiency of 83% (the efficiency is sourced from the **Table 2** of the Appendix of the "TOOL09: Determining the baseline efficiency of thermal or electric energy generation systems").less than those required to produce glass from virgin materials.)

[37] www.wiego.org

[38] When there are no relevant sectoral reports, peer-reviewed studies, or national / sectoral statistics establishing a different value.

[39] The default value for SEC (specific electricity consumption) of 0.026 MWh/tglass shall be used15; Source: "Revision of AMS-III.AJ methodology to cover glass – Conservativeness study for the baseline calculation", prepared by ALLCOT Group, available at <http://cdm.unfccc.int/UserManagement/FileStorage/NC0TF6YEJU8GMVIK49D1LBSWP3HRO2>.

The remaining steps of container glass production are not considered because the use of container glass cullet does not avoid melting and the subsequent steps of the glass manufacturing process (i.e. forming and post-forming).

7.3.4 Below Business as Usual Baseline Considerations

As described in **Section 7.3.1**, the baseline shall be conservatively established at a below-business as usual level. To that purpose, and given the nature of involved processes and process-specific emission factors to be used, the baseline emissions shall be affected downward by a factor of either:

- The same magnitude as the quantified total uncertainty in estimating baseline emissions, or;
- Ten per cent (10%) of total estimated baseline emissions.

Whichever is greater. In case Cercarbono's regulatory framework established more conservative guidelines to this purpose, those representing the biggest downward adjustment to BAU baseline emissions will prevail.

Such adjusted baseline emissions shall be the reference scenario for baseline reassessment to support either mandatory reassessment regulatory requirements, and/or increased ambition goals.

This is a mandatory requirement for all CCMPs utilizing this methodology, independent of the emisisons trading or compensating scheme they might be participating in.

8 Project scenario

The project scenario involves the implementation of activities aimed at increasing the recycling rate of materials from ELVs in RVSF, thereby reducing the need for production from virgin materials and consequently lowering the GHG emissions. The formulae for the recycling rate (unit basis & weight basis) can be traced from *sub-point (s)*, **Section 4**.

8.1 Emission sources in the project scenario

The GHG emission sources considered in the project scenario along with their sources and justification are provided in the **Table 5** below:

Table 5. GHG emissions sources considered in the project scenario

Source	GHG	Included	Explanation
Electricity Consumption from Grid	CO_2	Yes	Emissions from the electricity consumed by the RVSF. Produced amounts of CH_4 and N_2O is considered as negligible.
	CH_4	No	
	N_2O	No	
Fossil Fuel Consumption in RVSF	CO_2	Yes	Emissions from the fossil fuels consumed during the recycling processes. Produced amounts of CH_4 and N_2O is considered as negligible.
	CH_4	No	
	N_2O	No	
Processing of materials in Third-Party Facilities	CO_2	Yes	Emissions from the third-party facilities processing recycled materials. Produced amounts of CH_4 and N_2O is considered as negligible.
	CH_4	No	
	N_2O	No	
Transportation of materials to the RVSF	CO_2	No	Produced amounts of CH_4, N_2O and CO_2 is considered as negligible. Emissions associated with transportation of recyclable materials and processing/manufacturing under the CCMP are
	CH_4	No	

Source	GHG	Included	Explanation
	N_2O	No	considered as equivalent to the corresponding emissions for the virgin materials and therefore ignored in this methodology[40]

Note: The materials referred are metals (Aluminum, Steel, Copper, Gold, Silver, Palladium, Tin), plastics (ABS, HIPS, PET, HDPE, LDPE, PP, PVC) and glass.

8.2 Emissions calculation in the project scenario

Project emissions are calculated using the equation below. As per applicability condition "u", mentioned in **Section 4**, if project proponents exclude copper and noble metals (i.e. gold, silver and palladium) from the baseline calculation, they may also exclude them from the project emission calculation.

$$PE_t = PE_{r,t} + PE_{p,t}$$ **Equation (8)**

Where;

Variable	Description	Units
PE_t	Project emissions in period *t*	tCO_2e
$PE_{r,t}$	Project emissions from sorting and/or processing of ELV in the RVSF in period *t*	tCO_2e
$PE_{p,t}$	Project emissions from processing of ELV in the third-party processing facility in period *t*. For project activities where the RVSF includes ELV sorting and processing, this parameter is equal to 0	tCO_2e

8.2.1 Case A: ELV is sorted and processed up to the production of the virgin-equivalent material in the RVSF

For projects that fall under Case A, project emissions are calculated using the following equation:

$$PE_{r,t} = EC_{PJ,t} \times EF_{el,PJ,t} + \sum_{f} \left(FC_{f,PJ,t} \times NCV_{f,t} \times EF_{f,CO2,t} \right)$$ **Equation (9)**

Where;

Variable	Description	Units
$PE_{r,t}$	Project emissions from sorting and/or processing of ELV in the RVSF in period *t*	tCO_2e
$EC_{PJ,t}$	Electricity consumed by the RVSF in period *t*	MWh

[40] As per CDM's AMS-III.AJ methodology.

Variable	Description	Units
$EF_{el,PJ,t}$	Emission factor of the electric grid supplying electricity to the RVSF in period *t*	tCO_2/MWh
$FC_{f,PJ,t}$	Fossil fuel type *f* consumed by the RVSF in period *t*	Unit of mass or volume
$NCV_{f,t}$	Net caloric value of the fossil fuel consumed by the RVSF in period *t*	GJ/unit of mass or volume
$EF_{f,CO2,t}$	CO_2 emission factor of the fossil fuel consumed by the RVSF in period *t*	tCO_2/GJ

If the RVSF is claiming emission reductions for only part of recycled materials (e.g. only for plastics and not for metals), project emissions may be allocated to each mass unit of segregated material by gross sales revenues, that is apportioning the emissions proportional to the market prices of plastics and their respective throughput. The market prices may be either monitored ex post or be determined once for the crediting period. This rule can be applied only if transparent and reliable information on market prices is available. Alternatively, as a conservative approach, all project emissions shall be allocated to recycled material.

Total project scenario throughput relevant to emissions reduction claims must be equal or less than total considered baseline scenario throughput and shall be a net throughput (discounting permanent material losses[41]).

The following formulas may be used to allocate electricity and fuel consumption to each mass unit of recycled materials *i* by market prices and to calculate project emissions:

$$EC_{i,PJ,t} = EC_{PJ,t} \times \frac{Q_{i,t} \times \$_{i,t}}{\sum_s \left(Q_{s,t} \times \$_{s,t}\right)}$$ **Equation (10)**

$$FC_{f,i,PJ,t} = FC_{f,PJ,t} \times \frac{Q_{i,t} \times \$_{i,t}}{\sum_s \left(Q_{s,t} \times \$_{s,t}\right)}$$ **Equation (11)**

$$PE_{r,t} = \sum_i Q_{i,t} \times \left[EC_{i,PJ,t} \times EF_{el,PJ,t} + \sum_f \left(FC_{f,i,PJ,t} \times NCV_{f,t} \times EF_{f,CO2,t} \right) \right]$$ **Equation (12)**

Where;

Variable	Description	Units
i	Indices for output material type *i* (metals, plastics & glass listed in applicability condition para “m”)	NA

[41] Permanent material losses are considered as those exiting the RVSF as landfill waste or non-recyclable scrap ending to landfill.

Variable	Description	Units
s	Indices for each material sorted at the RVSF	NA
$EC_{i,PJ,t}$	Share of electricity consumption of the RVSF apportioned to the production of the output material type *i* in period *t*	MWh
$FC_{f,i,PJ,t}$	Share of fossil fuel type *f* consumption at the RVSF apportioned to the production of the output material type *i* in period *t*	Unit of mass or volume
$EC_{PJ,t}$	Electricity consumed by the RVSF in period *t*	MWh
$FC_{PJ,t}$	Fossil fuel type *f* consumed by the RVSF in period *t*	Unit of mass or volume
$Q_{i,t}$	Quantity of material type *i* recycled in period *t*	tonnes
$Q_{s,t}$	Quantity of material type *s* segregated in the RVSF in period *t*	tonnes
$\$_{i,t}$	Market price of the recycled material type *i* in period *t*	NA
$\$_{s,t}$	Market price of the recycled material type *r* in period *t*	NA

8.2.2 Case B: ELV is only sorted in the RVSF and is further processed up to the production of the virgin-equivalent material in third parties' facilities

For projects that fall under Case B, project emissions from the sorting of ELV are determined based on equations from item **8.2.1**, where $EC_{PJ,y}$ and $FC_{f,PJ,y}$ represent the consumption of electricity and fuel for the sorting process only.

Project emissions from processing of ELV in third parties processing facility are calculated using the following equation:

$$PE_{p,t} = \sum_{i} Q_{i,t} \times EFP_i \times EF_{el,PJ,t}$$

Equation (13)

Where;

Variable	Description	Units
$PE_{p,t}$	Project emissions from processing of ELV in the third-party processing facility in period *t*. For project activities where the RVSF includes ELV sorting and processing, this parameter is equal to 0	tCO_2e
$Q_{i,t}$	Quantity of material type *i* recycled in period *t*	tonnes
EFP_i	Energy consumption factor for ELV processing of material *i*. Use values provided in **Table 6**Table 6	MWh/t

Variable	Description	Units
$EF_{el,PJ,t}$	Emission factor of the electric grid supplying electricity to the RVSF in period t	tCO_2/MWh

Table 6. Specific energy consumption factor for ELV processing (MWh/t)

Metal/Plastic	Specific energy consumption factor for ELV processing (MWh/t)
Aluminum	0.66[42]
Steel	0.90[43]
ABS	0[44]
HIPS	0[45]
HDPE	0.83[46]
LDPE	0.83[47]
PET	0.83[48]
PVC	0.83[49]
PP	0.83[50]
Glass	0[51]

[42] As per Table 5 in CDM's AMS-III.BA methodology

[43] As per Table 5 in CDM's AMS-III.BA methodology

[44] As per AMS-III.AJ., emissions associated with transportation of recyclable materials and processing/manufacturing under the CCMP are considered as equivalent to the corresponding emissions for the virgin materials and therefore ignored in this methodology.

[45] As per AMS-III.AJ., emissions associated with transportation of recyclable materials and processing/manufacturing under the CCMP are considered as equivalent to the corresponding emissions for the virgin materials and therefore ignored in this methodology

[46] As per AMS-III.AJ, the default value of 0.83 MWh/t is used as the specific electricity consumption for plastic recycling.

[47] As per AMS-III.AJ, the default value of 0.83 MWh/t is used as the specific electricity consumption for plastic recycling

[48] As per AMS-III.AJ, the default value of 0.83 MWh/t is used as the specific electricity consumption for plastic recycling

[49] As per AMS-III.AJ, the default value of 0.83 MWh/t is used as the specific electricity consumption for plastic recycling

[50] As per AMS-III.AJ, the default value of 0.83 MWh/t is used as the specific electricity consumption for plastic recycling

[51] Emissions associated with transportation of recyclable materials and processing/manufacturing under the project activity are considered as equivalent to the corresponding emissions for the virgin materials and therefore ignored in this methodology

8.3 Leakage

Leakage refers to the unintended increase in GHG emissions outside the project boundary that occurs as a result of the CCMP. For this CCMP, no leakage is expected due to nature and scope of the project activities. Justification for no expected leakage is given below:

a) The recycling of materials from ELVs is a localized activity, with emissions predominantly occurring within the project boundary (i.e., recycling facilities, collection points, and transportation within the defined area).
b) The methodology does not involve activities that would displace emissions to other regions or sectors. For example, recycling ELV does not lead to increased emissions in virgin material production or other industrial activities elsewhere.
c) The methodology does not displace existing activities to other locations that could cause additional emissions. For instance, the recycling of ELV does not force virgin material production to move to another region, as the demand for recycled materials replaces the demand for virgin materials within the project area.
d) The project activities are unlikely to lead an increase in overall market demand for materials that could cause emissions outside the project boundary.

Given these factors, it is anticipated that the project activities related to recycling of ELVs do not lead to leakage.

Nevertheless, should any leakage sources are identified, they must be quantified and considered as per **Equation 14**.

9 GHG emissions reduction

The emission reductions achieved by the CCMP shall be determined as the difference between the baseline emissions and the project emissions and leakage using the following equation:

$$ER_t = BE_t - PE_t - LE_t \quad \textbf{Equation (14)}$$

Where;

Variable	Description	Units
ER_t	Emission reductions in period *t*	tCO_2e
BE_t	Baseline emissions in period *t*	tCO_2e
PE_t	Project emissions in period *t*	tCO_2e
LE_t	Leakage emissions in period *t*	tCO_2e

10 Grouped projects / programs of activities (PoA)

Grouped projects are designed to facilitate the inclusion of additional instances of the mitigation activity or to scale up after initial validation without requiring separate validation and verification for each new instance. This structure reduces transaction costs and supports future project expansion.

Grouped projects under this methodology shall meet the following conditions:

a) Initial Validation and inclusion of new instances: The initial project design must define the eligibility criteria for the additional instances, allowing for future expansion without requiring separate validation for each new instance.
b) Consistency in Technology and Processes: All included instances must use the same recycling technologies and processes defined during the initial project design. Any deviation in technology or processes from those initially defined will disqualify new instances from being included in the grouped project.
c) Monitoring and Reporting: Monitoring Plan must be in place to track data on GHG emissions reductions or removals for each instance within the grouped project.
d) Eligibility Criteria: All instances must comply with the eligibility criteria and other requirements as per the Cercarbono Protocol.

11 Uncertainty

Under this methodology the CCMP must include an assessment of mitigation results as an aggregate sum of statistical uncertainties associated with each of its components whether measured directly

(monitored data) or indirectly (data and emission factors).

It is required to include information on at least the following in the CCMP:

a) All likely causes of uncertainty.
b) Data quality management system with quality control measure[52] to reduce uncertainties.

The additive uncertainty can be estimated using root sum of squares technique.

$$(C \pm c\%) + (D \pm d\%) = (E \pm e\%)$$

$$\text{Then, } e = \frac{\sqrt{(C*c)^2+(D*d)^2}}{E}$$

Equation 15

Where;

Variable	Description	Units
C and D	Absolute values of parameter measured directly and indirectly.	Relevant units as per monitoring plan.
c and d	Percentage uncertainty associated with the parameter under consideration.	%
E	Total absolute value of the parameter	Relevant units as per monitoring plan.
e	Aggregate uncertainty	%

12 Contribution to United Nations Sustainable Development Goals (SDGs)

Within the Cercarbono program framework, CCMP must report their contributions to the Sustainable Development Goals (SDGs) using Cercarbono's Tool to Report Contributions from Climate Change Mitigation Initiatives to the SDGs, available at www.cercarbono.com under the

[52] Quality control measures includes: Data collection accuracy, calculation accuracy, integrity of database files, accuracy of movement of inventory data among processing steps.

Documentation section. The use of this tool will be evaluated as part of the verification process. The rubric of the SDG tool must be properly signed by the Validation and Verification Body (VVB) responsible for the verification. CCMPs that correctly implement Cercarbono's SDG tool will receive a differentiation seal, which will be displayed on the retirement certificate and on the EcoRegistry platform.

13 Safeguards

The CCMP must check that it does not produce net harm in accordance with the Safeguarding Principles and Procedures of Cercarbono's Certification Programme, available at www.cercarbono.com , section: Documentation.

14 Monitoring of the CCMP

All information and data related to the CCMP shall be subject for validation and verification, under the guidelines of ISO 14064-3:2019 and Cercarbono's Protocol. Additionally, all collected information as per by the monitoring plan shall be electronically filed and stored to allow for future consultation for at least four years past the end date of the accreditation period.

14.1 Monitoring plan description

The CCMP owner shall possess all required information to demonstrate the results and statements related to the project comply with all principles and are in line with the methodological requirements of this document, those in Cercarbono's Protocol and in Annexes A.3.5, A.3.6, and A.3.8 of ISO 14064-2:2019 Standard. Required measurements for variable monitoring requiring it, either direct variable specific measurements or indirect measurements to allow for monitored variable calculation, shall be performed using calibrated equipment and instrumentation according to relevant industry standards, to methodological documents relevant to CCMP implementation, or according to vendor/manufacturer recommendations, as applicable. Calibration frequency shall be dictated by manufacturer recommendations or applicable regulation standards. The minimum calibration frequency in the absence of such references shall be as per manufacturer specification.

For measurements derived from lab analysis or reported by suppliers, it shall be assumed involved meters comply with this, provided such companies or organizations have a valid certified product quality system in place. The CCMP responsible shall develop and implement a monitoring plan, in compliance with conditions as per in Cercarbono's Protocol (section: CCMP monitoring) and item 6.10 of ISO 14064-2:2019 Standard.

14.1.1 Controlled data and parameters

All Data and parameters are presented in **Table 7** below:

Table 7. Controlled Data/Parameter

Variable/parameter/data		Units	Data source	Measurement procedure	Applied value or periodicity
B_i	Correction factor based on the share of the production in non-Annex I countries	Dimensionless	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not Applicable	Use values from **Table 2**. Project participants shall use the values from the latest version of the methodology at renewal of the crediting period.
$EC_{BL,captive,j,t}$	Electricity consumed from the captive power plant *j* to produce virgin plastics in the host country in period *t*	MWh	The monitoring provisions of the parameter $EC_{BL,k,t}$ from the latest version of the CDM TOOL05 apply	The monitoring provisions of the parameter $EC_{BL,k,t}$ from the latest version of the CDM TOOL05	Continuous measurement and at least monthly recording as per the monitoring provisions of the parameter $EC_{BL,k,t}$ from the latest version of the CDM TOOL05 apply.
$EC_{BL,grid,k,t}$	Electricity consumed from the grid *k* to produce virgin plastics in the host country in period *t*	MWh	As per the data source mentioned in the monitoring provisions of the parameter $EC_{BL,k,t}$ from the latest version of the CDM TOOL05	As per the measurement procedure mentioned in the monitoring provisions of the parameter $EC_{BL,k,t}$ from the latest version of the CDM TOOL05	The monitoring provisions of the parameter $EC_{BL,k,t}$ from the latest version of the CDM TOOL05 apply
$EC_{PJ,t}$	Electricity consumed by the RVSF in period *t*	MWh	Use electricity meters installed at the electricity consumption sources, as well as electricity usage logs or any other monitoring provisions of the parameter $EC_{PJ,j,t}$ from the latest version	Energy meter readings are recorded at the beginning and end of the month and cross checked with the settled electricity bills.	Continuous measurement and at least monthly recording as per the monitoring provisions of the parameter $EC_{PJ,j,t}$ from the latest version of the CDM TOOL05 apply

Variable/parameter/data		Units	Data source	Measurement procedure	Applied value or periodicity
			of the CDM TOOL05		
$\boldsymbol{EF_{BL,captive,j,t}}$	Emission factor of the captive power plant *j* supplying electricity to produce virgin plastics in the host country in period *t*	tCO_2/MWh	The provisions to determine the parameter $EF_{EL,k,t}$ from the latest version of the CDM TOOL05 apply	Not applicable, as these calculations are based directly on measurement records from the database	The monitoring provisions of the parameter $EF_{EL,k,t}$ from the latest version of the CDM TOOL05 apply
$\boldsymbol{EF_{BL,el,t}}$	Emission factor for the baseline electricity consumption source for virgin plastic production in the host party	tCO_2/MWh	Calculated as per **equation 6**	Not applicable	Use **equation 6** and if no official data is available to determine the value using **equation 6**, for production-related sourced electricity in non-host parties, use a default value of 0.24 tCO_2/MWh
$\boldsymbol{EF_{BL,FF,CO2}}$	CO_2 emission factor of the baseline fossil fuel	tCO_2/GJ	-- As per the data source along with the conditions for using the data source provided in the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" requirements for $EF_{f,CO2}$ should apply	As per the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". When applying the tool, requirements for $EF_{CO2,i,t}$ should apply for the CO_2 emission factor of the fossil fuel consumed at the RVSF and for the CO_2 emission factor of the baseline fossil fuel	As per the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".
$\boldsymbol{EF_{BL,grid,k,t}}$	Emission factor of the grid k supplying	tCO_2/MWh	Calculated based on electricity sector	Not applicable, as these calculations are based directly on measurement	The monitoring provisions of the parameter $EF_{grid,CM,t}$ from

Variable/parameter/data		Units	Data source	Measurement procedure	Applied value or periodicity
	electricity to produce virgin plastics in the host country in period *t*		operation records, new capacity planning, or data published by the regulatory authority or any other national/international report, provided it is calculated as per the provisions of the parameter $EF_{grid,CM,t}$ from the latest version of the CDM TOOL 07	records from the database	the latest version of the CDM TOOL 07 apply
$\boldsymbol{EF_{el,PJ,t}}$	Emission factor of the electric grid supplying electricity to the RVSF in period *t*	tCO_2/MWh	The monitoring provisions of the parameter $EF_{grid,CM,t}$ from the latest version of the CDM TOOL 07 apply.	Not applicable, as these calculations are based directly on measurement records from the database	The monitoring provisions of the parameter $EF_{grid,CM,t}$ from the latest version of the CDM TOOL 07 apply
$\boldsymbol{EF_{f,CO2}}$;	$EF_{f,CO2}$: CO_2 emission factor of the fossil fuel type *f* consumed at the RVSF in period *t*	tCO_2/GJ	As per the data source along with the conditions for using the data source provided in the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" requirements for $EF_{f,CO2}$ should apply	As per the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion". When applying the tool, requirements for measurement procedures for $EF_{CO2,i,t}$ should apply for the CO_2 emission factor of the fossil fuel consumed at the RVSF and for the CO_2 emission factor of the baseline fossil fuel	As per the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" requirements for monitoring frequency for $EF_{f,CO2}$ should apply
$\boldsymbol{EF_{FF,imported,CO2}}$	CO_2 emission factor for fossil fuel	tCO_2e/GJ	IPCC default	Not applicable	Assume that natural gas supplies the

Variable/parameter/data		Units	Data source	Measurement procedure	Applied value or periodicity
					energy needed to produce the virgin plastic imported if it is not possible to identify the fuel type
EFP_i	Energy consumption factor for ELV processing of material *i*	MWh/t	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not applicable	Use values from **Table 6**
$FC_{f,PJ,t}$	Fossil fuel type f consumption of the RVSF in period t	Mass or volume unit per period *t*	Onsite Fossil fuel consumption measurements /record logs/purchase receipt or meter readings	Use either mass or volume meters, as per the requirements in latest version of “TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion”. When applying the tool, requirements for $FC_{i,j,y}$ should apply to the total fossil fuel consumption at the RVSF	Continuously or as mandated by invoicing frequency.
L_{glass}	Net to gross adjustment factor to cover degradation in material quality and material loss in the production process of the final product using the recycled material	Dimensionless	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not applicable	In absence of relevant sectoral reports, peer-reviewed studies or national / sectoral statistics, use default value of 0.88

Variable/parameter/data		Units	Data source	Measurement procedure	Applied value or periodicity
L_i	Net to gross adjustment factor to cover degradation in material quality and material loss in the processing of the sorted material.	Dimensionless	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not Applicable	In absence of relevant sectoral reports, peer-reviewed studies or national / sectoral statistics, use 0.75 if the RVSF includes only sorting; use 1 if the RVSF includes both sorting and processing
$\boldsymbol{NCV_{f,t}}$	Net calorific value of the fossil fuel type *f* consumed in the RVSF in period *t*	GJ per mass or volume unit (e.g. GJ/m^3, GJ/ton)	As per the data source along with the conditions for using the data source provided in the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" requirements for $NCV_{i,t}$ should apply for the net calorific value of the fossil fuel consumed in the RVSF.	As per the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" When applying the tool, requirements for measurement procedures for $NCV_{i,t}$ should apply for the net calorific value of the fossil fuel consumed in the RVSF.	As per the latest version of "TOOL03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion" requirements for monitoring frequency for $NCV_{i,t}$ should apply for the net calorific value of the fossil fuel consumed in the RVSF.
$Q_{glass,t}$	Quantity of glass cullet recycled by CCMP and sent to a processing or manufacturing facility in period *t*	Metric tons	Records of glass cullet recycled at the RVSF	Direct weighing and recording of the weight, cross checked with company records that is invoiced and backed by receipt of payments corresponding to the monitoring period	Each time the sorted/processed material leaves the RVSF

Variable/parameter/data		Units	Data source	Measurement procedure	Applied value or periodicity
$Q_{i,t}$	Quantity of material i recycled and sent to a processing or manufacturing facility in period *t*	Metric tons	Records of material recycled at the RVSF	Direct weighing and recording of the weight, cross checked with company records that is invoiced and backed by receipt of payments corresponding to the monitoring period	Each time the sorted/processed material leaves the RVSF
$Q_{metal,i,t,}$	Quantity of metal type *i* recycled by CCMP and sent to a processing or manufacturing facility in period *t*	Metric tons	Records of material recycled at the RVSF	Direct weighing and recording of the weight, cross checked with company records that is invoiced and backed by receipt of payments corresponding to the monitoring period	Each time the sorted/processed material leaves the RVSF
$Q_{plastic,i,t}$	Quantity of plastic type *i* recycled by CCMP and sent to a processing or manufacturing facility in period *t*	Metric tons	Records of material recycled at the RVSF	Direct weighing and recording of the weight, cross checked with company records that is invoiced and backed by receipt of payments corresponding to the monitoring period	Each time the sorted/processed material leaves the RVSF
$Q_{s,t}$	Quantity of material type *s* segregated in the recycling facility in period *t*	Metric tons	Records of material segregated at the RVSF	Direct weighing and recording of the weight, cross checked with company records that is invoiced and backed by receipt of payments corresponding to the monitoring period	Each time the sorted/processed material leaves the RVSF

Variable/parameter/data		Units	Data source	Measurement procedure	Applied value or periodicity
SE_i	Specific CO_2e emission factor for production of metal *i*	tCO_2e/t	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not Applicable	Use values from **Table 3** or determine the relevant values specific to the host country, based on official national values or on methods used in related references, which entail a sound cradle-to-gate life cycle national inventory, performed by renowned entities or institutions, with peer reviewed, published methodology, which when used, shall be duly justified
$SEC_{Bl,glass}$	Specific electricity consumption for the production of raw materials displaced by the glass recycling	MWh/tonnes	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not applicable	Use a default value of 0.026 MWh/tonnes
$SEC_{BL,imported,i}$	Specific electricity consumption in the production of virgin material type *i* imported,	MWh/t_i	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not applicable	Take value specified in **Table 4**
$SEC_{BL,in-country,i}$	Specific electricity consumption in the production of virgin material	MWh/t_i	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not applicable	Use values from **Table 4** or determine the relevant values specific to the host country, based on official

Variable/parameter/data		Units	Data source	Measurement procedure	Applied value or periodicity
	type *i* in the host country				national values or on methods used in related references, which entail a sound cradle-to-gate life cycle national inventory, performed by renowned entities or institutions, with peer reviewed, published methodology, which when used, shall be duly justified.
$SFC_{BL,imported,i}$	Specific fuel consumption for the production of virgin material type *i* imported	GJ/t_i	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not applicable	Take value as specified in **Table 4**Table 4
$SFC_{BL,in-country,i}$	Specific fuel consumption for the production of virgin material type *i* in the host country	GJ/t_i	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not applicable	Use values from **Table 4** or determine the relevant values specific to the host country, based on official national values or on methods used in related references, which entail a sound cradle-to-gate life cycle national inventory, performed by renowned entities or institutions, with peer reviewed, published methodology, which when

Variable/parameter/data		Units	Data source	Measurement procedure	Applied value or periodicity
					used, shall be duly justified.
$w_{i,imported,t}$	Percentage of imported plastics out of total plastic consumed in period *t*	%	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not Applicable	Annual
$w_{i,in-country,t}$	Percentage of plastics produced in the host party out of total plastic consumed in period *t*	%	Sectoral reports, peer-reviewed studies or national/sectoral statistics	Not Applicable	Annual
$\$_{i,t}$ and $\$_{r,t}$	Market price of materials type *i* or material *r* in period *t*	Market Currency	Sales Ledger	Cross check with sale invoices/receipts	Annual

14.1.2 Monitoring of contribution to Sustainable Development Goals

The monitoring of contributions to the Sustainable Development Goals is carried out according to the Cercarbono's Tool to Report Contributions from Climate Change Mitigation Initiatives to the Sustainable Development Goals, available at www.cercarbono.com , section: Documentation.

15 Stakeholder consultation

The stakeholders' consultation as per in this methodology shall be performed according to guidelines as per in section: Public Consultation of CCMPs of the Cercarbono 's Protocol, and as per in applicable reference documents. All records and results of the public consultation process are kept and managed by Cercarbono.

16 Effective participation

The CCMP must ensure and demonstrate effective stakeholder participation, particularly for those who may be adversely affected by its implementation in environmental, social, or economic terms. Evidence of this partnership can be documented through the issuance of environmental and other relevant permits in compliance with applicable regulations in the country where the CCMP is implemented. The CCMP must have a participation protocol that includes the following elements:

a) Mapping of Actors: Create an institutional map of all governance structures, institutions, and leaders associated with CCMP-related decision making in the territory.
b) Consensus Decisions: Ensure that decisions are made in consensus with local governance structures.

c) Consensus Processes Traceability: Maintain a traceable record of consensus processes.
d) Request and Grievances Management: Implement a system for managing and tracking requests, grievances, complaints, and inquiries.
e) Framework Time Schedule: Establish a time schedule framework for CCMP-related decision making.
f) Conflict Management Protocol: Develop a protocol for managing conflicts.

Additionally, the CCMP must comply with effective participation guidelines and adhere to the "no net harm" principle as outlined in the current version of Cercarbono 's Protocol, and in accordance with the Safeguarding Principles and Procedures of Cercarbono's Certification Programme, available at www.cercarbono.com , section: Documentation.

The results of consultations with stakeholders, including owners and participants, should be thoroughly described in the Project Description Document (PDD).

17 Information management

The owner of the CCMP shall establish and apply quality management procedures according to the principles in this methodology for data, databases and documentation retrieving, management and control, including uncertainty assessment as applicable for baseline and project scenarios and monitoring activities[53]. The owner of the CCMP should reduce, as far as possible, uncertainties associated with GHG emissions reduction quantification. Thus, errors or omissions detected shall be identified and processed, and related documentary evidence shall be generated and kept. The owner of the CCMP shall apply follow-up criteria and procedures, through which consistent assessments and audits to ensure accuracy of GHG emissions reduction quantification are performed, according to the monitoring plan. When measurement and monitoring equipment is used, the owner of the CCMP must make sure calibrated measurement and monitoring equipment is used and maintained as appropriate. All data and information related with CCMP's follow-up must be recorded and documented.

18 CCMP documentation

It is required to keep all documentation and generated records in demonstrating CCMP's activity has been implemented in accordance with its design. Any deviation in implementing it as compared with the original design is to be technically justified. Compliance with this methodology's guidelines, conditions, and procedures shall be demonstrated. The CCMP owner shall have the documentation proving conformity of the GHG project with the requirements in this document. Such documentation must be consistent with the validation and verification requirements as per in Cercarbono programme.

19 Transition regime for the use of other methodologies

This section is not applicable as the methodology is yet to be published on Cercarbono website.

20 CCMP validation and verification

Validation and verification requirements, additional to technical guidance in this methodology are described in the current version of Cercarbono 's Protocol.

[53] The owner of the CCMP may apply principles as per in ISO 9001 and ISO 14033 Standards for data quality management.

21 References

Cercarbono. (2025a). Cercarbono's Protocol for Voluntary Carbon Certification. Version 4.2. Available at: www.cercarbono.com

Cercarbono. (2025b). Procedures of Cercarbono's Certification Programme. Version 2.0. Available at: www.cercarbono.com.

Cercarbono. (2023). Terms and Definitions of the Voluntary Certification Programme of Cercarbono. Version 3.1. Available at: www.cercarbono.com.

Cercarbono (2022a). Cercarbono's Tool to Demonstrate Additionality of Climate Change Mitigation Initiatives. Version 2.0.1. Available at: www.cercarbono.com.

Cercarbono. (2022b). Cercarbono's Tool to Report Contributions from Climate Change Mitigation Initiatives to the Sustainable Development Goals. Version 1.3. Available at: www.cercarbono.com.

ISO 14064-2:2019. Greenhouse gases - Part 2: Specification with guidance at the project level for quantification, monitoring and reporting of greenhouse gas emission reductions or removal enhancements.

ISO 14064-3:2019. Greenhouse gases - Part 3: Specification with guidance for the verification and validation of greenhouse gas statements

Tool 03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, version 03.0

Tool 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0.

Tool 07: Tool to calculate the emission factor for an electricity system, version 07.0.

CDM Standard: Sampling and surveys for CDM project activities and programme of activites, version 09.0.

AMS-III.BA: Recovery and recycling of materials from E-waste, version 03.0.

AMS-III.AJ.: Recovery and recycling of materials from solid wastes, version 09.0

Annex 1. Determination of the baseline correction factor for the share of production of metals, plastics and glass in non-Annex I countries

A. Aluminum

1. Data used to calculate the share of production of aluminum in non-Annex I countries were sourced from the statistics provided by the International Aluminum Institute[54] with the following assumptions:

    a. Data from 2023 on global aluminum production was used;
    b. Production in Non-Annex I countries considered those from Africa, Asia (ex China), China Reported, GCC – Gulf Cooperation Council and South America;
    c. Production in Annex I countries considered those from East & Central Europe, North America, Oceania, West Europe, China Estimated Unreported and Rest of World (ROW) Estimated Unreported (for conservative reasons, these last two production amounts were included as production in Annex I).

2. The results are illustrated in the table below:

Table 8. Share of production of Aluminum in Annex I and non-Annex I countries

Region	Primary Aluminum Production on 2023 (1,000 tons)	Annex I (AI) or Non-Annex I (NAI)	Share of Production
Africa	1,594	NAI	77.55%
Asia (ex China)	4,673		
China	41,666		
GCC	6,217		
South America	1,466		
China Estimated Unreported	1,000	AI	22.44%
East & Central Europe	4,016		
North America	3,897		
Oceania	1,884		
ROW Estimated Unreported	2,590		
West Europe	2,713		

[54] <http://www.world-aluminium.org/statistics/>.

B. Steel

1. Data used to calculate the share of production of steel in non-Annex I countries in 2023 were sourced from the publication World Steel in Figures 2024[55], prepared by the World Steel Association, and the results are illustrated in the table below.

Table 9. Share of production of crude steel in Annex I and non-Annex I countries

Region	Annex I (AI) or Non-Annex I (NAI)	Share of Production
Argentina, Brazil, China, Colombia, Egypt, India, Indonesia, Iran, Malaysia, Mexico, North Korea, Oman, Pakistan, Peru, Qatar, Saudi Arabia, Serbia, South Africa, South Korea, Taiwan, Thailand, United Arab Emirates	NAI	73.92%
Australia, Austria, Belgium, Byelorussia, Canada, Czech Republic, Finland, France, Germany, Hungary, Italy, Japan, Kazakhstan, Luxembourg, Netherlands, OTHERS[56], Poland, Portugal, Romania, Russia, Slovak Republic, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, United States	AI	22.71%

C. Plastics

1. Data used to calculate the share of production of plastic in non-Annex I countries were sourced from the 2023 statistics provided by the Plastics Europe – Association of Plastic Manufacturers[57] with the following assumptions:

   a) Data from 2023 on global plastic production was used;
   b) The production encompasses all types of plastics, including ABS, HIPS, PET, HDPE, LDPE and PP;
   c) Production in Annex I countries considered those from NAFTA, Europe, CIS and Japan;
   d) Production in Non-Annex I countries considered those from Latin America, Middle-East, Africa, Rest of Asia and China.

2. The results are illustrated in the table below.

Table 10. Share of production of plastics in Annex I and non-Annex I countries

Region	Annex I (AI) or Non-Annex I (NAI)	Share of Production
Latin America	NAI	64.00%
Middle East, Africa		
China		
Rest of Asia		

[55] <https://worldsteel.org>, page 9.

[56] Included as Annex I for conservative reasons.

[57] <https://plasticseurope.org, page 1, Plastic Production by regions of the world>.

Region	Annex I (AI) or Non-Annex I (NAI)	Share of Production
NAFTA	AI	36.00%
CIS		
Europe		
Japan		

D. Copper

1. Data used to calculate the share of mining of copper in non-Annex I countries were sourced from the statistics provided by the United States Geological Survey[58] using data from 2023. The results are illustrated in the table below.

Table 11. Share of production of copper (mining) in Annex I and non-Annex I countries

Country	Annex I (AI) or Non-Annex I (NAI)	Share of Production
Albania, Argentina, Armenia, Azerbaijan, Bolivia, Botswana, Brazil, Burma, Chile, China, Colombia, Congo, Dominican Republic, Georgia, India, Indonesia, Iran, Kazakhstan, Korea, North, Laos, Macedonia, Mauritania, Mexico, Mongolia, Morocco, Namibia, Oman, Pakistan, Papua New Guinea, Peru, Philippines, Saudi Arabia, Serbia, South Africa, Tanzania, Uzbekistan, Vietnam, Zambia, Zimbabwe	NAI	79.95%
Australia, Bulgaria, Canada, Cyprus, Finland, Poland, Portugal, Romania, Russia, Spain, Sweden, Turkey, United States	AI	20.05%

E. Gold

1. Data used to calculate the share of mining of gold in non-Annex I countries were sourced from the statistics provided by the United States Geological Survey[59] using data from 2022. The results are illustrated in the table below.

58 Adapted from Table on page 65, available at: <https://pubs.usgs.gov>.

59 Adapted from Minerals Yearbook, 2022 tables-only release Table T8, available at: < https://minerals.usgs.gov >.

Table 12. Share of production of gold (mining) in Annex I and non-Annex I countries

Country	Annex I (AI) or Non-Annex I (NAI)	Share of Production
Afghanistan, Algeria, Argentina, Armenia, Azerbaijan, Bolivia, Botswana, Brazil, Burkina Faso, Burma, Burundi, Cameroon, Central African Republic, Chile, China, Colombia, Republic of Congo, DR Congo, Costa Rica, Côte d'Ivoire, Dominican Republic, Ecuador, Egypt, Eritrea, Ethiopia, Fiji, Gabon, Georgia, Ghana, Guatemala, Guinea, Guyana, Honduras, India, Indonesia, Iran, Kazakhstan, Kenya, Republic of Korea, Kyrgyzstan, Laos, Liberia, Madagascar, Malaysia, Mali, Mauritania, Mexico, Mongolia, Morocco, Mozambique, Namibia, Nicaragua, Niger, Nigeria, Panama, Papua New Guinea, Peru, Philippines, Rwanda, Saudi Arabia, Senegal, Serbia, Sierra Leone, Solomon Islands, South Africa, Sudan, Suriname, Tajikistan, Tanzania, Thailand, Togo, Uganda, Uruguay, Uzbekistan, Venezuela, Vietnam, Zambia, Zimbabwe	NAI	65.54%
Australia, Bulgaria, Canada, Denmark, Finland, French Guiana, Greece, Italy, Japan, New Zealand, Poland, Russia, Slovakia, Spain, Sweden, Turkey, United Kingdom, United States	AI	34.45%

F. Silver

1. Data used to calculate the share of mining of silver in non-Annex I countries were sourced from the statistics provided by the United States Geological Survey[60] using data from 2021. The results are illustrated in the table below.

Table 13. Share of production of silver (mining) in Annex I and non-Annex I countries

Country	Annex I (AI) or Non-Annex I (NAI)	Share of Production
Algeria, Argentina, Armenia, Azerbaijan, Bolivia, Botswana, Brazil, Burkina Faso, Chile, China, Colombia, DR Congo, Côte d'Ivoire, Dominican Republic, Ecuador, Eritrea, Ethiopia, Fiji, Georgia, Ghana, Guatemala, Honduras, India, Indonesia, Kazakhstan, Korea PDR, Republic of Korea, Laos, Malaysia, Mexico, Mongolia, Morocco, Namibia, Nicaragua, Niger, Oman, Pakistan, Panama, Papua New Guinea, Peru, Philippines, Saudi Arabia, Serbia, Solomon Islands, South Africa, Sudan, Tajikistan, Tanzania, Thailand, Uzbekistan, Zambia, Zimbabwe	NAI	75.5%

60 Adapted from Minerals Yearbook, 2021 tables-only release, Table T8, available at: < https://www.usgs.gov >.

Country	Annex I (AI) or Non-Annex I (NAI)	Share of Production
Australia, Bulgaria, Canada, Finland, Greece, Ireland, Japan, New Zealand, Poland, Portugal, Romania, Russia, Slovakia, Spain, Sweden, Switzerland, Turkey, United Kingdom, United States	AI	24.5%

G. Tin

1. Data used to calculate the share of mining of tin in non-Annex I countries were sourced from the statistics provided by the United States Geological Survey[61] using data from 2021. The results are illustrated in the table below.

Table 14. Share of production of tin (mining) in Annex I and non-Annex I countries

Country	Annex I (AI) or Non-Annex I (NAI)	Share of Production
Bolivia, Brazil, Burma, Burundi, China, DR Congo, Indonesia, Laos, Malaysia, Nigeria, Peru, Rwanda, Thailand, Uganda, Vietnam	NAI	96.11%
Australia, Portugal, Russia	AI	3.89%

H. Lead

1. Data used to calculate the share of mining of lead in non-Annex I countries were sourced from the statistics provided by the United States Geological Survey[62] using data from 2022. The results are illustrated in the table below.

Table 15. Share of production of lead (mining) in Annex I and non-Annex I countries

Country	Annex I (AI) or Non-Annex I (NAI)	Share of Production
Argentina, Bolivia, Bosnia and Herzegovina, Brazil, Burma, Chile, China, Honduras, India, Iran, Kazakhstan, Korea PDR, Republic of Korea, Macedonia, Mexico, Morocco, Namibia, Peru, South Africa, Tajikistan, Vietnam	NAI	74.52%
Australia, Bulgaria, Canada, Greece, Ireland, Italy, Poland, Russia, Spain, Sweden, Turkey, United Kingdom, United States	AI	25.48%

[61] Adapted from Minerals Yearbook, 2021 tables- only release Table T9, available at: < https://www.usgs.gov/centers/national-minerals-information-center/tin-statistics-and-information >.

[62] Adapted from Minerals Yearbook, 2022 tables- only release, Table T13, available at: < https://www.usgs.gov/centers/national-minerals-information-center/lead-statistics-and-information >.

Annex 2. Determination of the specific CO_2e emission factors for the production of aluminum

Greenhouse gas emissions are associated with the consumption of electricity and fossil fuel for the production of primary aluminum. For conservative reasons, upstream process emissions associated with the production of PFC in the anode are not considered.

Determination of specific CO_2 emission factor associated with electricity consumption for Al production

1. To calculate the specific CO_2 emission factor per ton of aluminum associated with the consumption of electricity, global data from the International Aluminum Institute (IAI) were used:

   a) 749,295 GWh of electricity[63] were consumed from non-Annex I countries to produce 55,616,000 tonnes of aluminum in 2023;
   b) The electricity consumed from the different sources (grid and captive) in 2023[63] were:
      i. Hydro: 138,907 GWh;
      ii. Other renewable: 48,821 GWh;
      iii. Nuclear: 5,638 GWh
      iv. Coal: 457,786 GWh;
      v. Oil: 73 GWh;
      vi. Natural Gas: 92,892 GWh;
   c) The CO_2 emissions associated with the combustion of fossil fuel to generate electricity were determined by (i) dividing the electricity consumed by the efficiency of the best available technology[64] for each type of fuel consumed, and (ii) multiplying these results by 3.6 (conversion from GWh to TJ) and by the CO_2 emission factor[65] of the different types of fuel. The results are illustrated in the table below:

Table 16. Calculation of CO_2 emitted by different power plants supplying electricity to the Aluminum industry in 2023

Electricity Source	Electricity consumed (GWh) A	Efficiency of the best available technology B	EF_{CO2} (tCO_2e/TJ) C	CO_2 emitted (tCO_2) D = A / B x 3.6 x C
Hydro	138,907	-	-	-
Other renewable	48,821	-	-	-

63 Source: <http://www.world-aluminium.org/statistics/primary-aluminium-smelting-power-consumption/#data>. indicates the share of the different power sources in the different regions 2023.

64 Source: Table 2 from the Appendix of the TOOL09: "Determining the baseline efficiency of thermal or electric energy generation systems" (if available for the type of power plant).

65 Source: Table 2.2 from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 2.

Electricity Source	Electricity consumed (GWh) A	Efficiency of the best available technology B	EF_{CO2} (tCO_2e/TJ) C	CO_2 emitted (tCO_2) D = A / B x 3.6 x C
Nuclear	5,638	-	-	-
Coal	445,786	50% (Ultra-supercritical plant, built after 2012)	94.6	303,633,760
Oil	73	62% (Combined cycle gas turbine plant, built after 2012)	75.5	32,002
Natural Gas	92,892	62% (Combined cycle gas turbine plant, built after 2012)	54.3	29,287,949
			TOTAL CO_2 EMITTED (tons)	**332,447,028**

Determination of specific CO_2e emission factor associated with fossil fuel consumption for Al production

1. To calculate the specific emissions associated with the consumption of fuel, data from the International Aluminum Institute (IAI) and IPCC were used:

   a) The specific consumption of different types of fuel to produce aluminum on 2023[63] were:

      i. Oil: 65,780 TJ;
      ii. Natural gas: 294,558 TJ;
      iii. Coal: 453,436 TJ;

   b) The CO_2 emissions associated with the combustion of fossil in the aluminum production process in non-Annex I countries were determined by multiplying the specific fuel consumed by the NCV and CO_2 emission factor of each fuel. The results are illustrated in the table below:

Table 17. Calculation of CO_2 emitted from the use of fuel in the production of aluminum

Fuel type	2019 specific consumption[66] A	NCV fuel (GJ/Mg)[67] B	EF_{CO2} ($kgCO_2/GJ$) C	Specific CO_2 emission factor ($tCO_2/t_{Aluminum}$) D = A / 1,000,000 x B x C
Heavy oil	291.23 $kg/t_{Aluminum}$	39.8	72.6	0.84
Diesel	0.66 $kg/t_{Aluminum}$	41.1	75.5	0.00
Natural Gas	658.89 $m^3/t_{Aluminum}$ (527.11 $kg/t_{Aluminum}$)[68]	46.5	54.3	1.66
Coal	1,560.84 $kg/t_{Aluminum}$	21.6	94.6	3.19
TOTAL SPECIFIC CO_2 EMISSION FACTOR (tonnes)				**5.69**

Determination of overall specific CO_2e emission factor associated with the aluminum production associated with the consumption of energy

1. The specific CO_2e emission factor associated with the production of primary aluminum from virgin material is sum of emission factors from electricity and fuel consumed determined in the sections above i.e., equal to 6.0 + 5.69, resulting in 11.69 $tCO_2e/t_{Aluminum}$. However, this emission factor needs to be adjusted to account for that around 37.4%[69] of the aluminum produced globally is recycled to the process. Therefore, the specific CO_2e emission factor associated with the production of virgin aluminum is equal to 0.626 x 11.69 = **7.31 $tCO_2e/t_{Aluminum}$**.

[66] Source: IAI – International Aluminium Institute, Appendix A from the 2015 Life Cycle Inventory Data and Environmental Metrics (2017), available at: <http://www.world-aluminium.org/media/filer_public/2017/07/04/appendix_a_-_life_cycle_inventory.xlsx>.

[67] Source: Table 1.2 from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2, Chapter 1.

[68] Assuming a density of NG equals to 0.7 kg/Nm3, at 0ºC and 1 atm (source: <https://www.engineeringtoolbox.com/gas-density-d_158.html>).

[69] Source: IAI – International Aluminium Institute, Global Aluminium Cycle 2023, available at: <https://alucycle.international-aluminium.org/public-access/public-global-cycle>.

Annex 3. Determination of the specific CO_2 emission factor for the production of steel

Greenhouse gas emissions are associated with the production of pig iron (in processes using advanced blast furnace) and sponge iron (in processes using direct reduction iron consuming natural gas). Upstream process emissions associated with these production processes are not considered for conservativeness. Similarly, the avoided downstream process emissions in BOF (Basic Oxygen Furnace) and EAF (Electric Arc Furnace) associated with physically embedded carbon are ignored.

The specific CO2 emissions for the production of steel from pig iron and sponge iron is determined as the weighted average of the specific emissions of each process (blast furnace and direct iron reduction) based on the share of global production of each process. The table below illustrates the specific emissions, the global share of production of each process and the weighted average specific CO2 emissions:

Table 18. Calculation of the specific CO_2 emissions for the production of steel through the advanced blast furnace and DRI processes

Steel product	Specific CO_2 emissions (tCO_2/t_{steel})[70]	Global share of production[71]	Weighted average CO_2 emission factor (tCO_2/t_{steel})
Pig Iron (Advanced Blast furnace)	1.3	0.92	1.25
Sponge Iron (natural gas based DRI)	0.7	0.08	

[70] Source: Table A.III.8, Annex III of the IPCC Fifth Assessment Report – Working Group III, based on the lower bound value determined by IEA (International Energy Agency).

[71] Source: Tables from pages 18 and 19 of the "World Steel in Figures 2024", report prepared by the World Steel Association, available at <https://worldsteel.org/wp-content/uploads/World-Steel-in-Figures-2024.pdf>

22 Document history

This section is not applicable as the methodology is yet to be published on Cercarbono website.

Version	Date	Comments or changes
1.0	10.12.2024	Initial version for independent third-party technical review team.
1.1	09.04.2025	Revised version incorporating independent third-party technical review team comments.
1.2	21.04.2025	Revised version incorporating further clarifications requested by independent third-party technical review team.
1.3	20.05.2025	Version for public comments.
1.4	08.07.2025	Final version incorporating text as per comments received, and provisions regarding below-BAU baseline and increased ambition.