

Green Gold Label

Instruction B.2

FIT/FIP GHG Emissions

Instruction for collecting data, calculating
and reporting Lifecycle GHG emissions
under Japanese FIT/FIP



Instruction B.2

FIT/FIP GHG Emissions

Version 1-2

Valid from 1 January 2026 (Adoption date)

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Document navigation

This Instruction is part of the GGL Module for FIT/FIP. It concerns the Instruction for calculating and reporting GHG Emissions and where specific clauses in this document deviate from the Overall documents or GGL Standards, the instructions in this document prevail.

The Overall documents comprise the GGL Setup and Governance, GGL Standards and GGL Operating documents. Additionally, the GGL scheme offers Instructions and Guidances for specific regulatory frameworks (RED, FIT/FIP, SDE+/++), which can supersede clauses in the Overall documents. This applies only when explicitly stated in the relevant Instructions and Guidances.

Refer to the **GGL Document Structure** (as part of the GGL Setup and Governance documents) for more detailed information on navigating and interpreting GGL documentation.

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Changes and transitioning

This section lists the major changes in this version 1-2 from **GGL 1F. Instruction document for GHG calculations for the Japanese market Version 1-1 (Januari 2024)**.

No.	Change type	Section reference	Details of change
1	Content	D.1	Added e_{stock} , e_{ccs} and e_{ccr} to formula for GHG emission calculations and formula for power generation for alignment with Biomass Sustainability Working Group per March 2024
2	Text feature	Document navigation	Included document navigation
3	Text feature	Change	Included changelog and transitioning procedure between previous and current version
4	Text feature	Glossary	Included glossary
5	Formatting	All	Changed and edited formatting, text and wording for clarity and readability
6	Formatting	All	Converted layout to new templates for GGL Documents

In transitioning to this current version of this document, the following applies to Certification bodies, Participants and Certificates:

Publication date	7 November 2025
Adoption date	1 January 2026
Effective date	2 March 2026
Transition period	31 December 2026

Glossary

Term	Definition
Actual value	Actual value means the greenhouse gas emissions savings for some or all of the steps of a specific biofuel, bioliquid or biomass fuel production process, calculated in accordance with the methodology laid down in the applicable GGL Module.
Adoption date	New (versions of) GGL documents state their Adoption date in the transitioning section. This is the date after which certification against the GGL Scheme and the specific document to which the Adoption date applies, is possible. Certification against previous versions remain valid until the Effective date of such document.
Biomass fuels	Biomass fuels means gaseous, liquid and solid fuels produced from biomass.
Biomass	Biomass means the biodegradable fraction of products, waste and residues from biological origin from agriculture, including vegetal and animal substances, from forestry and related industries, including fisheries and aquaculture, as well as the biodegradable fraction of waste, including industrial and municipal waste of biological origin.
Certification Body / CB	An independent third party that evaluates and certifies the certification process. Certification Bodies approved by GGL for 1 or more GGL Scopes, are listed on the GGL website.
Cogeneration	Cogeneration shall mean the simultaneous generation in one process of thermal energy and electricity and/or mechanical energy.
Conversion factor	The ratio between the mass of the output that is intended for biofuel production and the mass of the raw material entering the process.
Co-product	A useful product produced together with the main product, not a waste or residue. As such, the co-product shares in the greenhouse gas emission burden.
Default value	Greenhouse gas emission value attached to a batch of biomass material, and listed as "default value" in the applicable GGL Module, and that may, in circumstances specified in that GGL Module, be used in place of an actual value.
Disaggregated default value	Greenhouse gas emission value of a part of a supply chain, and listed as "disaggregated default value" in the applicable GGL Module. It may, in circumstances specified in that GGL Module, be used in the calculation of the total product greenhouse gas emission of the final product.
Economically justifiable demand	Economically justifiable demand shall mean the demand that does not exceed the needs for heat or cooling and which would otherwise be satisfied at market conditions.
Effective date	New (versions of) GGL documents state their Effective date. This is the date after which only certification against the GGL Scheme and the specific document to which the Effective date applies, is effective. Certification against previous versions of such document is no longer valid.



Term	Definition
Eligible fuel	Any biomass fuel listed in applicable GGL Module that is eligible for GGL certification.
GGL Categories	Biomass from 1 of the 5 categories that GGL recognizes being: 1) Woody biomass from large FMU's (> 500 hectares) 2) Woody biomass from small FMU's (< 500 hectares) 3) Residues from natural site and landscape management 4) Agricultural biomass 5) Biogenic residues and waste
GGL Module	These are the Instructions and Guidance documents based on which GGL has been approved and recognized as a Certification scheme under different legal and voluntary frameworks (e.g., RED in Europe, FIT/FIP in Japan).
GGL Scope	Means the scope of a Certification Body's license to perform certification services or Participants to trade biomass within GGL, and use the GGL Trademark. A GGL Scope is a combination of (a) regulation(s) under which GGL is recognized per its different modules and (b) types of biomass. Each GGL Participant and each CB is limited to perform activities under the GGL Scheme by the GGL Scope for which it is recognized. GGL Scopes are defined in the GGL Scope definitions document.
GHG (Greenhouse Gas) Emissions	Greenhouse gases constitute a group of gases contributing to global warming and climate change. It includes - according to the Kyoto Protocol - seven gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, nitrogen trifluoride. Converting them to carbon dioxide equivalents (CO ₂ eq) makes it possible to compare them and to determine their individual and total contributions to global warming.
Internal energy use	Energy used during the transformation of raw material into biomass, e.g., drying or sieving.
Participant / GGL Participant	Economic operator that has been certified under GGL per GGL Regulation Section G or against a certification scheme other than GGL which has been endorsed & approved by the relevant authorities (e.g., EU for REDII, METI for FIT/FIP) to hold the equivalent status, such as forest and agricultural biomass producers, waste and residue producers, first gathering points, collectors, suppliers, traders, processing plants and conversion plants (end-users).
Point of origin	The location where the raw material is originally generated.
Processing	This relates to activities that change the physical or chemical characteristics of the biomass material. For instance, chipping, drying and pelletisation change the density or heating value of the material, while digestion or pyrolysis change the chemical characteristics.
Publication date	New (versions of) GGL documents state their Publication date. This is the date at which that version is published. Certification against the



Term	Definition
	new version of such document is not possible until after its Adoption date.
Site	Site means a geographical location, logistical facilities, transmission or distribution infrastructures with precise boundaries within which products can be mixed.
TC / Transaction certificate	A certified statement of a transaction between GGL Participants that meets requirements of GGLS4 - Transaction and product certificate .
Transition period	New (versions of) GGL documents state their Transition period. This is the period within which (re-)certification decisions taken prior to the Effective date against the previous version of the current document, remain valid. Initial audits, renewal audits and surveillance audits by a Certification Body during the Transition period shall only take place against the current version of the GGL Scheme document to which the Transition period applies.
Useful heat	Useful heat shall mean heat generated to satisfy an economical justifiable demand for heat, for heating or cooling purposes.



A. Introduction

A.1

The principles and criteria outlined in this instruction document are for the voluntary certification of greenhouse gas (GHG) emissions, extending the existing GGL normative framework. The GGL Foundation will periodically evaluate these principles and criteria, reserving the right to make changes as it deems appropriate.

A.2

This document outlines the GHG calculation methodology. It calculates the fossil greenhouse gases emitted from fossil fuels used for producing biomass. Comparing these against a reference value for the fossil fuel mix for the energy grid that the biomass is to replace, the balance needs to be negative and below the reference value in order to decrease the amount of fossil GHG.

A.3

This document aims to provide clear, simple, accurate and transparent GHG calculations with clear references to all the values used and their sources. The next participant in the supply chain shall use the previous partial GHG calculations as their inputs.

A.4

All GGL Standards and supporting documents are considered normative unless specified otherwise.

A.5

Unless stated otherwise, the calculation is based on data collected over the course of a year. Reporting must include an explanation and a source reference.

B. FIT/FIP GHG emissions

B.1

This Instruction is designed to meet the Japanese market requirements in compliance with the METI (Ministry of Economy, Trade and Industry) FIT (Feed-in Tariff) and FIP (Feed-in Premium) schemes.

B.2

GGL distinguishes between Disaggregated default values and Actual values for GHG emissions, either of which can be used subject to the conditions outlined below. For the following parameters, it is obligatory that they are based on Actual values only:

- E_p (emissions from processing), and
- E_{td} (emissions from transport and distribution).

Note - E_p and E_{td} are defined as described in D of this document. Regardless of the above, E_c (emissions from cultivation) and E_u (emissions from the fuel in use) must also be included in all GHG calculations when these apply.

B.3

Certification Bodies must be accredited for and certify emissions according to ISO 14065 standards when actual values are used.

B.4

Figure 1 below provides an indicative overview of the applicable scope for the GHG methodology in this document. Data collection is divided into 5 grouped processes or process blocks, labelled a) through e). All process blocks are included for biomass in GGL Categories 1-4, whereas for GGL Category 5 biomass only blocks c), e) and parts of d) are relevant and have been shaded differently for clarity.

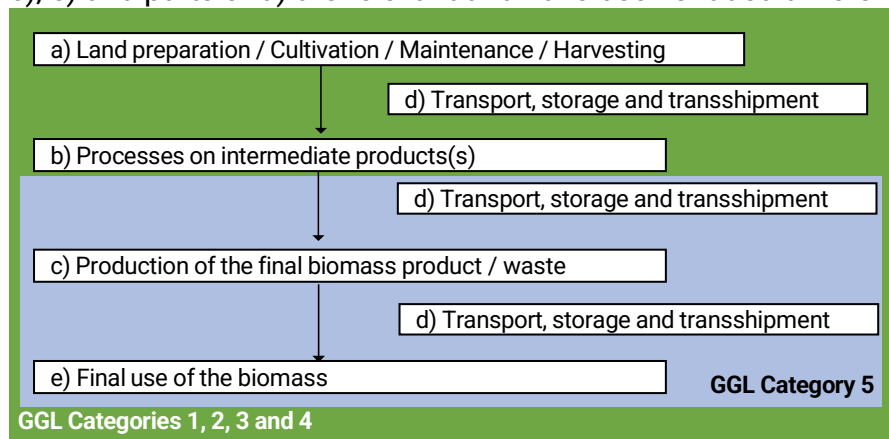


Figure 1 – applicable scope for GHG calculations per GGL Category of biomass

Principle 1. Disaggregated default values may only be used when actual values are not available.

- 1.01 Disaggregated default values and standard default values may only be used if actual values are unavailable and cannot be obtained with maximum effort. If the actual transport distances and/or the configuration of the production unit do not permit the selection of the appropriate default value, the most conservative value shall be taken, meaning, for example, the value for a configuration using a natural gas boiler.
- 1.02 When applying the default values, it is essential to verify whether each category is applicable.
- 1.03 The default values in **Guidance B.2.v – FIT/FIP LCGHG default values** also provide life cycle GHG default values by process. Such disaggregated default values can be used for calculations GHG emissions. When no specific actual data are available, the (disaggregated) default values in **Guidance B.2.v – FIT/FIP LCGHG default values** that specifically match the processes for which GHG emissions are calculated, may be used.
- 1.04 When using disaggregated default values, the delivery notes and statements (i.e., transaction certificates and raw material statements) should not include the specific greenhouse gas data; they should only state “Use of disaggregated default value” or something similar.
- 1.05 Whenever default values are used from **Guidance B.2.v – FIT/FIP LCGHG default values** a Participant shall check if Japanese authorities have not updated their default values and use the official Japanese version of the publication.

Principle 2. Actual values shall adhere to specific requirements.

- 2.01 Actual values can only be calculated when all relevant information is available and transmitted through the chain of custody.
- 2.02 Actual values must be verified by Certification Bodies in accordance with ISO 14065.
- 2.03 Actual values of emissions from transport can only be determined if emissions from all transport steps are recorded and transmitted through the chain of custody starting at the Point of origin. Similarly, actual values of emissions from processing can only be determined if emissions from all processing steps are recorded and transmitted through the chain of custody.
- 2.04 Every GGL Participant involved in supply chains of GGL Biomass shall accurately record all GHG emissions until he assumes ownership and control of the GGL Biomass as detailed in Principle 10 of **GGLS1 – Chain of Custody criteria**. The specific terms of the sales agreements dictate that moment precisely, e.g., Incoterms for sales involving overseas shipments.
- 2.05 If emissions occur at any point in the chain of custody and are not recorded, making it impossible for downstream operators to track them,



this must be clearly indicated in the delivery notes.

- 2.06 Information on actual GHG emissions must be provided for all relevant GHG emission calculation formula elements. In this context, 'relevant' refers to elements for which reporting is obligatory. All elements for which actual values should be used instead of disaggregated default values, as well as all elements related to emission savings (if applicable), must be included.
- 2.07 Adjustment of actual GHG emission values throughout the chain of custody is subject to the following requirements:
- 2.07(a) GHG emissions must be transmitted through the chain of custody using GGL transaction certificates and calculated according to section D.
- 2.07(b) At each step of the chain of custody, it must be verified whether the emission estimates from the preceding processes needs to be adjusted.

Note - this GGL system of "upstream verification" is detailed in **GGLS1 – Chain of custody criteria** in Principle 10.

- 2.07(c) At least the following elements shall be checked, adjusted where necessary, reported and be available for verification by GGL Participants receiving biomass or input material:
- Additional emissions from transport and/or processing must be included in E_p and/or E_{td} respectively as defined in D.1.3 below;
 - Energy losses occurred during processing, and relevant transportation or storage must be considered using a "feedstock factor";
 - Whenever a processing step yields co-products, emissions must be allocated using an "allocation factor" according to the rules set out in the GHG emission calculation methodology in paragraph D.5;
 - In the final processing step, the emission estimate will be calculated in units of gCO₂ eq/MJ as outlined in section D.

C. FIT/FIP GHG emission savings

C.1

The values for GHG emission savings in this document apply to installations that produce electricity, heating or cooling using biomass fuels, based on an energy mix of 180g CO₂/MJ electricity by FY2030. This serves as the applicable baseline.

C.2

The GHG reduction requirement is set at a 50% reduction for fuels used until FY 2029 and a 70% reduction to be achieved for fuels used in FY2030 and beyond.

C.3

For power plants approved under FIT in FY2021, voluntary reporting on GHG reductions is applicable. For power plants approved under FIT in FY2022, a GHG reduction of 50% must be demonstrated by FY 2029 and of 70% in FY2030. For power plants that received FIT approval after 2030, the GHG reduction requirement may be 70%, which will be revisited around 2025. See the summary in figure 2 below:

Figure 2		GHG reduction requirement ratio	
		- FY2029	FY2030-
FIT approval date	- FY2021	Voluntary reporting	
	FY2022-	-50%	-70%
	FY2030-	-	-70%

Figure 2 – summary of GHG reduction targets for FIT approved power plants in paragraph C.3

C.4

Regarding the FIT approval date, operation starting date and sustainability criteria, the following applies:

C.4.1 All Participants (excluding the biomass power plants themselves) in the supply chain for biomass power plants approved under Japan FIT before 31 March 2022 only need to adhere to existing sustainability requirements for GGL-Certified or GGL-Controlled biomass. This applies equally to the suppliers and producers in the Participants' respective supply chains.

C.4.2 All biomass power plants and participants in their supply chain approved under the Japan FIT on or after 1 April 2022 must conform to new sustainability requirements, including GHG reduction. A grace period is provided until 31 March 2026, intended for certification acquisition by all participants in their supply chain, including power plants. This grace period is intended for (1) preparing new criteria (including GHG reduction through certification schemes) and (2) acquiring certification on new criteria by all

participants in the supply chain, including power plants. Despite the grace period, if power plants start operations before 1 April 2026, new sustainability requirements, including GHG reduction, are applied.

C.4.3 To avoid any confusion, the summary of the above is shown in Figure 3 below:

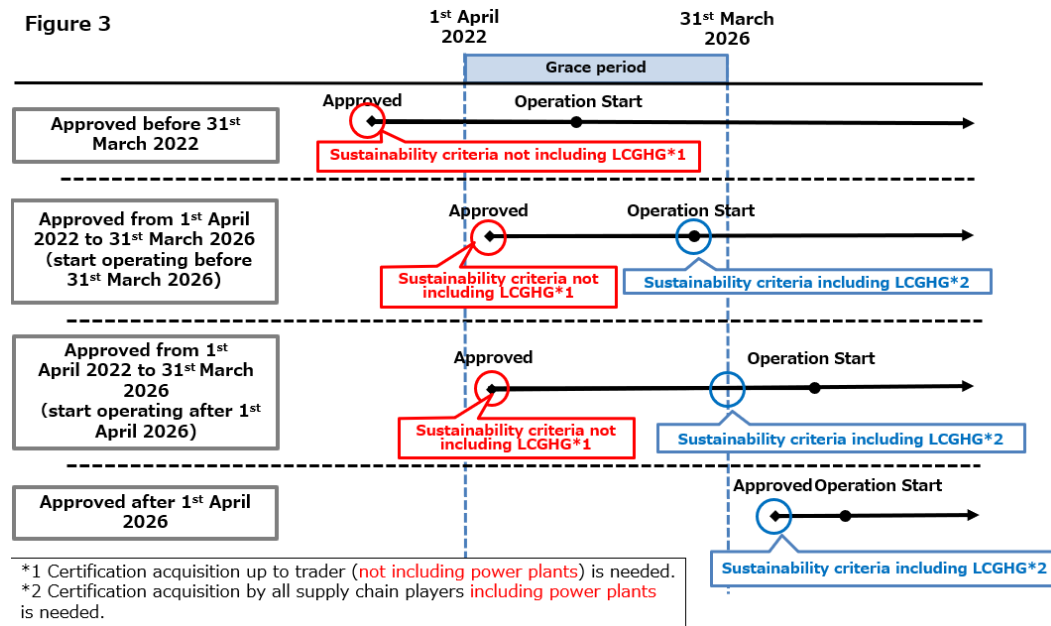


Figure 3 – summary of paragraph C.4

D. FIT/FIP GHG calculations

D.1 GHG scope and basic calculation formulae

- D.1.1 Greenhouse gas (GHG) emissions from the production and use of biomass fuels, must be calculated either using disaggregated default values (Section B Principle 1), or actual emissions values (Section B Principle 2) or a combination of both. These calculations must be based on a 12-month reporting period.
- D.1.2 The types of GHGs that should be calculated are: CO₂ (carbon dioxide), CH₄ (methane), and N₂O (nitrous oxide). The applicable Global Warming Potential (GWP) must be used for the calculation of CH₄: 25x (times) and for N₂O: 298x (times) the potential of CO₂.
- D.1.3 The basic formula for calculating GHG emissions from biomass used as fuel (E) is:

$$E = e_{stock} + e_{ec} + e_p + e_{td} + e_u - e_{ccs} - e_{ccr}$$

Where:

- E = total GHG emissions from biomass fuel use;
- e_{stock} = GHG emissions or emission savings (as the case may be) from changes in carbon stock in the soil including from land-use change;
- e_{ec} = GHG emissions from the extraction or cultivation of raw materials;
- e_p = GHG emissions from processing;
- e_{td} = GHG emissions from transport and distribution;
- e_u = GHG emissions from the fuel in use;
- e_{ccs} = GHG emission savings from CO₂ capture and sequestration;
- e_{ccr} = GHG emission savings from CO₂ recovery and alternative use.

- D.1.4 The formula to calculate GHG emissions from electricity or heat generated with biomass used as a fuel (EC) is:

$$EC = E \div \eta_{el}$$

Where, additionally to argument E in D.1.3:

- EC = total GHG emissions from electricity or heat generated with biomass as a fuel;
- η_{el} = energy generation efficiency for electricity or heat generated with biomass as a fuel

- D.1.5 Detailed requirements for calculating each of the parameters in D.1.3 and D.1.4 are listed in **Guidance B.2v – FIT/FIP LCGHG default values** as well as sections below.
- D.1.6 For cogeneration power plants (CHP) specific formula is given in section D.6 below.

D.2 Units

GHG emissions from biomass fuels and power generation shall be expressed as follows:

- D.2.1 GHG emissions from biomass fuels (E) and from heating or electricity generated from biomass fuels (EC) must be expressed in grams of CO₂-equivalent per MJ of biomass fuel (g) or the final energy commodity (heat or electricity) respectively as CO₂eq/MJ;
- D.2.2 When heating and cooling are generated alongside electricity, emissions must be allocated between heat and electricity (as described below), regardless of whether the heat is used for actual heating purposes or cooling.

D.3 Boundaries and calculations

- D.3.1 Changes in carbon stock, including land use changes within the limits of **GGLS2 – Agricultural source criteria** and **GGLS5 - Forest management criteria** in Principles 7 to 9 respectively, due to cultivation, processing, transportation and power generation, are included in the calculation as emissions from carbon stock change e_{stock} .
- D.3.2 Emissions from the construction of facilities such as power plants and biomass fuel production plants are not considered.
- D.3.3 GHG emissions from CO₂ capture and sequestration as e_{ccs} , as well as from CO₂ capture and alternative uses as e_{ccr} (limited to CO₂ from biomass sources), can be considered emission reductions only to the extent that they avoid GHG emissions.
- D.3.4 The “LCA Guidelines for GHG Reduction Effects of Renewable Energy” developed by the Ministry of Environment (Biomass Sustainability Working Group April 2023) serve as a reference for determining the amount of activity and setting emission factors.
- D.3.5 Unless otherwise defined, biomass from GGL Category 5 biogenic residues and wastes and described in **GGL Instruction B.0 - FIT/FIP Module** under sections B and C, are considered to have zero (0) lifecycle GHG emissions until the collection of these materials takes place at their Point of origin.

D.4 Calculation method for each process

- D.4.1 Emissions from carbon stock changes (e_{stock}), including land use changes, must adhere to the limits set by **GGLS2 – Agricultural source criteria** and **GGLS5 Forest management criteria** in Principles 7 through 9 respectively: only direct land-use changes are to be accounted regarding carbon stock changes, including land use changes, at this stage.
- D.4.2 Cultivation (the cultivation and collection of raw materials for e_{ec}): GHG emissions associated with the consumption of fossil fuels, electricity, and heat in the cultivation of raw materials, along with the production, procurement, and use of fertilizers and chemical substances, as well as fermentation and fertilization of organic matter, must be included.
- D.4.3 If CO₂ generated is captured and sequestered, or alternatively used (this is only eligible if CO₂ from biomass origin is captured), this may be deducted from the emissions to the extent that GHG emissions are avoided as e_{ccs} and e_{ccr} .
- D.4.4 Processing (pre-processing and conversion for e_p): For processing activities, GHG emissions associated with the consumption of fossil fuels, electricity, and heat during processing, as well as those from the manufacturing, procurement, and use of chemical substances, must be included. If from the CO₂ that is generated, some (or all) is captured and sequestered or alternatively used (this is only eligible if CO₂ from biomass origin is captured), it may be deducted from the emissions.
- D.4.5 For the transportation and distribution (of raw materials and fuels for e_{td}) the following applies:
- GHG emissions associated with the consumption of fossil fuels, electricity, and heat for the transportation and storage of raw materials and the consumption of fossil fuels, electricity, and heat for the transportation and storage of fuels must be included.
 - In GHG emissions from transportation, emissions on return routes must be taken into account.
 - In particular, the vessels' fuel consumption for marine transportation must take into account the biomass bulk density.
 - For the time being, the ratio of voyage distance for empty cargo transportation shall be set at 30% in cases where no specific voyage pattern is taken.
 - In the case of round-trip transportation (round-trip from the same port), the transport of empty cargo must be recorded as the transportation distance of biomass fuel, unless it can be confirmed that the returning vessel is unloaded.
- D.4.6 Power generation: CO₂ emissions from the use of biomass fuels are

considered zero. Emissions of CH₄ and N₂O must be included.

D.5 Allocation factors

- D.5.1 The target process or emission activity to be included, along with the allocation target, must be specified by biomass type.
- D.5.2 The allocation method must be based on the heat quantity proration method.
- D.5.3 When a biomass fuel production process generates both the fuel for which emissions are being calculated and one or more additional products (referred to as 'co-products'), GHG emissions must be allocated between the fuel or its intermediate product and the co-products in proportion to their energy content (as determined by lower heating value, except in the case of co-products other than electricity and heat). The greenhouse gas intensity of excess useful heat or excess electricity is equivalent to that of heat or electricity delivered to the biomass fuel production process. The calculation of greenhouse gas intensity is determined by assessing the greenhouse gas intensity of all inputs and emissions. This includes the feedstock, as well as CH₄ and N₂O emissions, to and from the cogeneration unit, boiler, or other apparatus providing heat or electricity to the biomass fuel production process.
- D.5.4 When heating and cooling are co-generated with electricity, emissions must be allocated between useful heat and electricity, regardless of whether the heat is used for actual heating or cooling purposes.

D.6 Specific calculation formula – producing electricity, heating and cooling

- D.6.1 Generation efficiency is based on the efficiency at the transmission end, while the calorific value of fuel is based on the lower heating value standard.
- D.6.2 In the case of a combined heat and power plant (CHP), the exergy proration of the biomass fuel life cycle GHG before conversion, based on generation efficiency is carried out on the electricity and heat produced to identify the emissions that should be allocated to the electricity portion.

Specifically, the following equation is:

$$E_{cogen} = E \times (\eta_{el-cogen} \div (\eta_{el-cogen} + \eta_h \times (T_h - 290) \div T_h))$$

Where:

- E_{cogen} = Total GHG emissions from biomass fuels before conversion based on generation efficiency (for power generation at combined heat and power plants)
- E = Total GHG emissions from biomass fuels before conversion

detailed in D.1.3

- $\eta_{el-cogen}$ = Power generation efficiency in combined heat and power plants (annual power generation divided by annual heat input)
- η_h = Thermal efficiency in combined heat and power plants (annual heat supply (excluding on-site consumption including biomass fuel processing, etc.) divided by annual heat input)
- T_h = Absolute temperature of the heat supplied in the combined heat and power plant (in degrees Kelvin; K)



Annex 1. Details for GHG calculations under FIT/FIP

Calculation requirements, default and feedstock values for GHG emissions and GHG emissions savings calculations are available at the following link: https://www.enecho.meti.go.jp/category/saving_and_new/saiene/kaitori/dl/fit_2017/legal/lifecycleGHG_bio.pdf authored by the Biomass Sustainability Working Group and available on the GGL Website under **Guidance B.2.v – FIT/FIP LCGHG Default Values**.

A preliminary translation in English can also be found in the document **Guidance B.2.v – FIT/FIP LCGHG Default Values – preliminary EN translation** published on the GGL website.

Future updates to this document will revoke or amend this version as needed and will be published on the GGL website.