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 1-3
Valid from 7 September 2026 (Adoption date)

greengoldlabel.com

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.

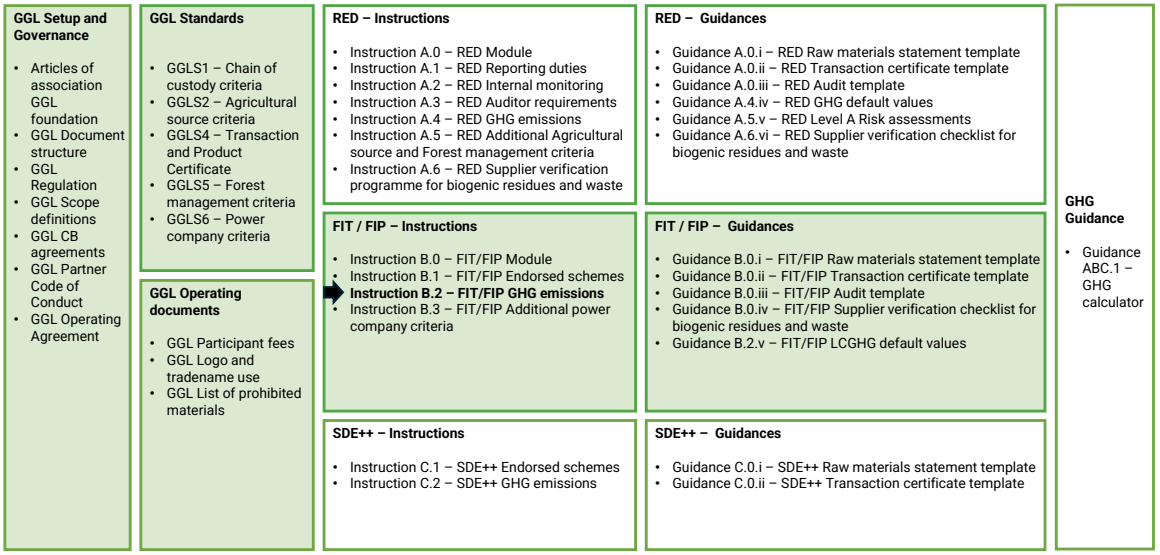

Table of contents

Changes and transitioning

This section lists the major changes in this version v1-3 from v1-2.

No.	Change type	Section reference	Details of change
1	Content	Annex 1. Details for GHG calculations under FIT/FIP	Latest version for default values referenced

This section lists the major changes in version v1-2 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 the formulae for GHG emission calculations and for power generation for alignment with Biomass Sustainability Working Group
2	Text feature	Document navigation	Included document navigation
3	Text feature	Changes and transitioning	Included the changelog and the transitioning procedure between the previous and the 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	6 July 2026
Adoption date	7 September 2026
Effective date	1 March 2027
End of Transition period	1 March 2028

Glossary

Term	Definition
Actual value	Actual value refers to the greenhouse gas emissions savings achieved during some or all stages of a specific biofuel, bioliquid, or biomass fuel production process. These savings are calculated according to the methodology outlined in the applicable GGL Module.
Adoption date	New (versions of) GGL documents include an Adoption date in the transitioning section. This date indicates when certification against the GGL Scheme and the specific document becomes possible. Certifications based on previous versions will remain valid until the Effective date of the new document.
Biomass fuels	Gaseous, liquid, and solid fuels that are produced from biomass.
Biomass	Biomass refers to the biodegradable portion of products, waste, and residues derived from biological sources in agriculture, which includes both plant and animal materials. It also encompasses materials from forestry and related industries, such as fisheries and aquaculture. Additionally, biomass includes the biodegradable fraction of waste, including industrial and municipal waste of biological origin.
Certification Body / CB	An independent third party evaluates and certifies the certification process. Certification bodies approved by GGL for one or more GGL scopes are listed on the GGL website.
Cogeneration	Simultaneous generation of thermal energy and electricity and/or mechanical energy in a single process.
Conversion factor	The ratio of the mass of the output intended for biofuel production to the mass of the raw material entering the process.
Co-product	A useful product produced alongside the main product, not a waste or residue. As such, the co-product shares in the greenhouse gas emissions burden.
Default value	Greenhouse gas emission value attached to a batch of biomass material, 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 for a part of a supply chain, listed as "disaggregated default value" in the applicable GGL Module. It may, in circumstances specified in that GGL Module, be used in calculating the total product greenhouse gas emission of the final product.
Economically justifiable demand	Demand that does not exceed the necessary requirements for heating or cooling, and that would otherwise be met under market conditions.
Effective date	New (versions of) GGL documents specify an Effective Date. This is the date after which certification can only be granted according to the GGL Scheme and the specific document that has the Effective Date. Certification based on previous versions of the document is no longer considered valid.
Eligible fuel	Any biomass fuel that listed in the relevant GGL Module and eligible for GGL certification.

Term	Definition
GGL Categories	Biomass is classified into one of five categories recognized by GGL: 1) Woody biomass from large FMUs (> 500 hectares) 2) Woody biomass from small FMUs (< 500 hectares) 3) Residues from natural site and landscape management 4) Agricultural biomass 5) Biogenic residues and waste
GGL Module	These Instructions and Guidance documents outline how GGL has been approved and recognized as a Certification scheme under various legal and voluntary frameworks (e.g., Renewable Energy Directive (RED) in Europe and FIT/FIP in Japan).
GGL Scope	Each GGL Participant and each Certification Body (CB) is restricted to performing activities under the GGL Scheme based on the specific GGL Scope for which they are recognized. GGL Biomass has a specific GGL Scope. The GGL Scope is a combination of (a) applicable regulatory GGL Modules and (b) the GGL Categories of biomass. Detailed definitions of GGL Scopes can be found in the ***GGL Scope definitions*** document.
GHG (Greenhouse Gas) Emissions	Greenhouse gases are a group of gases that contribute to global warming and climate change. According to the Kyoto Protocol, they include seven gases: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, sulphur hexafluoride, and nitrogen trifluoride. Converting them to carbon dioxide equivalents (CO2eq) makes it possible to compare them and to determine their individual and total contributions to global warming.
Internal energy use	The energy consumed during the conversion of raw materials into biomass, such as but not limited to through drying or sieving processes.
Participant / GGL Participant	An economic operator that has been certified under the ***GGL Regulation*** Section G, or under another certification scheme endorsed and approved by the relevant authorities (e.g., EU for RED or METI for FIT/FIP), holds equivalent status. This includes 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 directly originates, before its classification as GGL Biomass.
Processing	Conducting processes that alter the physical or chemical properties of biomass. For example, chipping, drying, and pelletization change the density or heating value, whereas digestion and pyrolysis modify its chemical characteristics.
Publication date	New (versions of) GGL documents include their Publication date, which indicates when that version is published. Certification against a new version cannot occur until after its Adoption date.
Raw material	The batch of biomass from a single Point of origin before it is classified as GGL Biomass, for which a single Raw Material Statement is verified and that falls within a single GGL Category of biomass.
Site	Site refers to a specific geographical location, including logistical facilities and transmission or distribution infrastructures,

Term	Definition
	characterized by defined 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	The new versions of the GGL documents specify the end of a Transition Period. This is the time until which (re-)certification decisions made before the Effective Date (based on the previous version of the document) remain valid. During the Transition Period, audits conducted by a Certification Body must be based solely on the valid (new) version of the GGL Scheme documents.
Useful heat	Heat generated to meet a justifiable economic demand for heating or cooling.

A. Introduction

A.1
The principles and criteria outlined in this instruction document apply to the certification of greenhouse gas (GHG) emissions under the Japanese FIT/FIP regulations and extend 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 sets additional requirements for GHG Emissions under the FIT/FIP Module for the GGL Scheme, specifically for ***GGLS1 – Chain of custody criteria***, including Principle 10 (and other Principles where reference to GHG Emissions is made).

A.3
This document outlines the GHG calculation methodology. It calculates the greenhouse gas emissions from fossil fuels used to produce biomass. Comparing these against a reference value for the fossil fuel mix of the energy grid that the biomass is to replace, the balance must be negative and below the reference value to decrease the amount of fossil GHG.

A.4
This document aims to provide clear, simple, accurate, and transparent GHG calculations, with clear references to all values used and their sources. The next participant in the supply chain shall use the previous partial GHG calculations as their inputs.

A.5
All GGL Standards and supporting documents are considered normative unless specified otherwise.

A.6
Unless otherwise stated, the calculation is based on data collected over 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 and comply 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, they must be based on Actual values only:

- E_p (emissions from processing), and
- E_{td} (emissions from transport including by sea 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 in accordance with ISO 14065 when actual values are used.

B.4

The illustration i below provides an indicative overview of the applicable scope of 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.

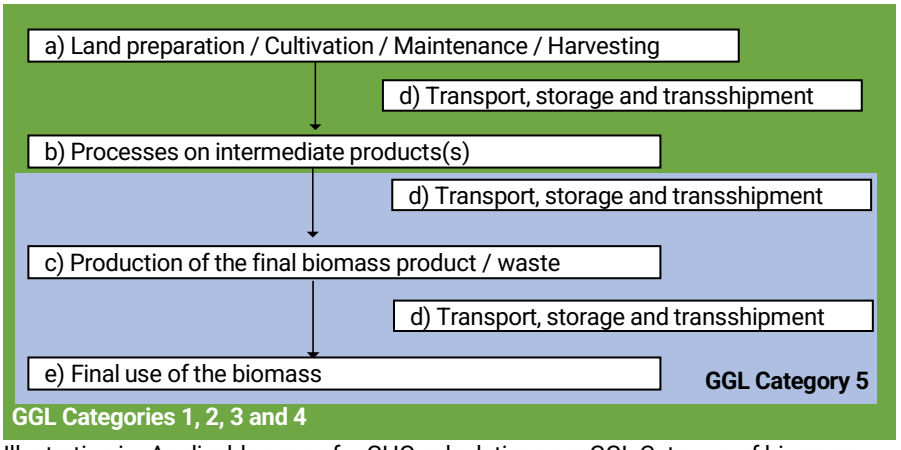

Illustration i – Applicable scope for GHG calculations per GGL Category of biomass

Principle 1. Disaggregated default values may be used only when actual values are unavailable.

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 selecting the appropriate default value, the most conservative value shall be used, e.g., 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 to calculate 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, delivery notes and statements (i.e., transaction certificates and raw material statements) should not include specific greenhouse gas data; they should only state "Use of disaggregated default value" or a similar message.

1.05 Whenever default values are used from ***Guidance B.2.v – FIT/FIP LCGHG default values,*** a Participant shall check whether the Japanese authorities have 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 Certification Bodies must verify actual values 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 the supply chains of GGL Biomass shall accurately record all GHG emissions until they assume 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, rendering them impossible for downstream operators to track, this must be clearly indicated on the delivery notes.

2.06 Information on actual GHG emissions must be provided for all relevant elements of the GHG emission calculation formula. 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 in accordance with section D.

2.07(b) At each step in the chain of custody, it must be verified whether the emission estimates from the preceding processes need adjustment.

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 gCO_2 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 CO_2/MJ electricity by FY2030. This serves as the applicable baseline.

C.2

The GHG reduction requirement is set at 50% reduction for fuels used through FY 2029 and 70% for fuels used in FY 2030 and beyond.

C.3

For power plants approved under FIT in FY2021, voluntary reporting of GHG reductions is required. 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 Illustration ii below:

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

Illustration ii – 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 the 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 comply with new sustainability requirements, including GHG reduction targets. A grace period is provided until 31 March 2026, intended to support certification by all Participants across their supply chains, 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 begin operations before 1 April 2026, new sustainability requirements, including GHG reduction targets, will apply.

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

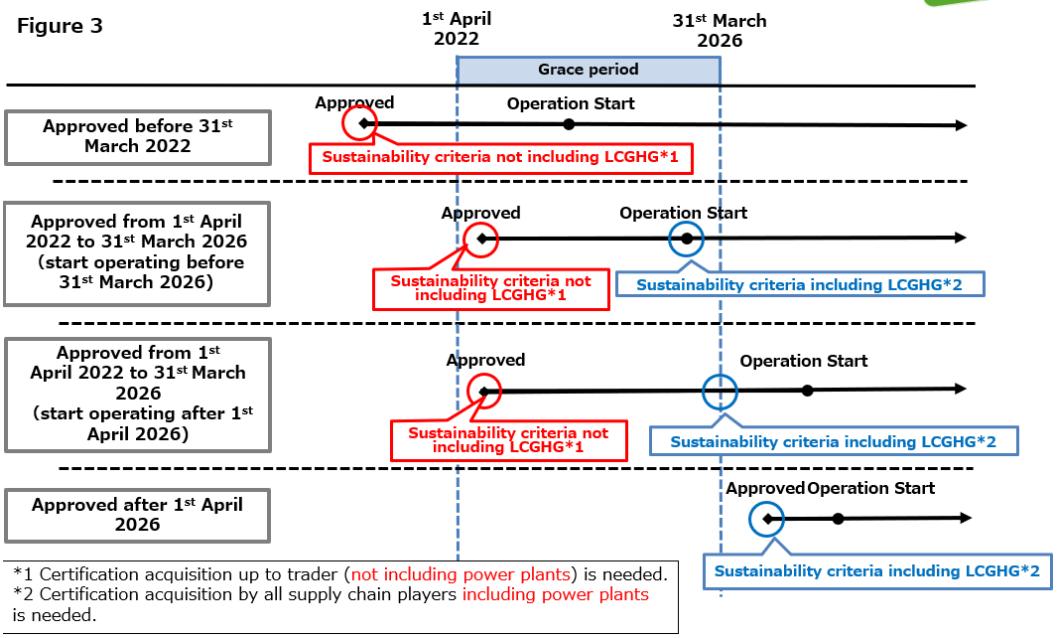

Figure 3 – summary of paragraph C.4

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: CO_2 (carbon dioxide), CH_4 (methane), and N_2O (nitrous oxide). The applicable Global Warming Potential (GWP) must be used for the calculation of CH_4: 25x (times) and for N_20: 298x (times) the potential of CO_2.

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 CO_2 capture and sequestration;
e_{ccr}	=	GHG emission savings from CO_2 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 parameter in D.1.3 and D.1.4 are listed in ***Guidance B.2v – FIT/FIP LCGHG default values,*** as well as in the sections below.

D.1.6 For cogeneration power plants (CHP), a 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 CO_2-equivalent per MJ of biomass fuel (g) or the final energy commodity (heat or electricity), respectively, as CO_2eq/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 CO_2 capture and sequestration as e_{ccs}, as well as from CO_2 capture and alternative uses as e_{ccr} (limited to CO_2 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), serves as a reference for determining the activity level 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 fertilisers and chemical substances, as well as fermentation and fertilisation of organic matter, must be included.

D.4.3 If CO_2 generated is captured, and sequestered or used (this is only eligible if CO_2 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 CO_2 that is generated, some (or all) is captured and sequestered or alternatively used (this is only eligible if CO_2 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, return-route emissions must be accounted for:
  - 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: CO_2 emissions from the use of biomass fuels are considered zero. Emissions of CH_4 and N_2O 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. Greenhouse gas intensity is calculated by assessing the greenhouse gas intensities of all inputs and emissions. This includes feedstock, as well as CH_4 and N_2O emissions to and from the cogeneration unit, boiler, or other apparatus that provides 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 heating or cooling.

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

D.6.1 Generation efficiency is based on the transmission-end efficiency, while the fuel's calorific value is based on the lower heating value standard.

D.6.2 In the case of a combined heat and power plant (CHP), the exergy-based GHG emissions from the biomass fuel life cycle before conversion, based on generation efficiency, are prorated between the electricity and heat produced to identify the emissions to 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

$\eta_{el\text{-}cogen}$ = 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 English translation 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.