資料 3

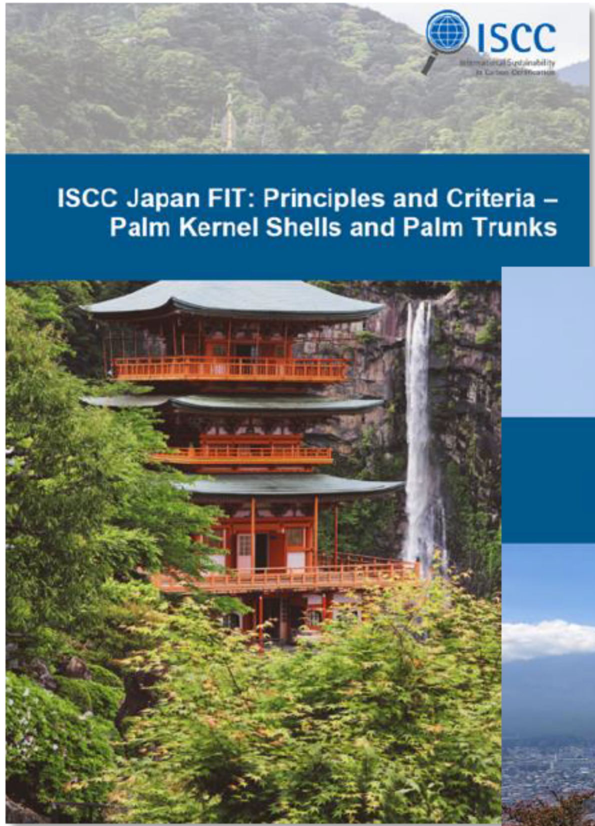
Japan FITJapan’s Feed-in-Tariff (FIT) System for Renewable Energy –
ISCC’s Lifecycle Greenhouse Gas Calculation Approach

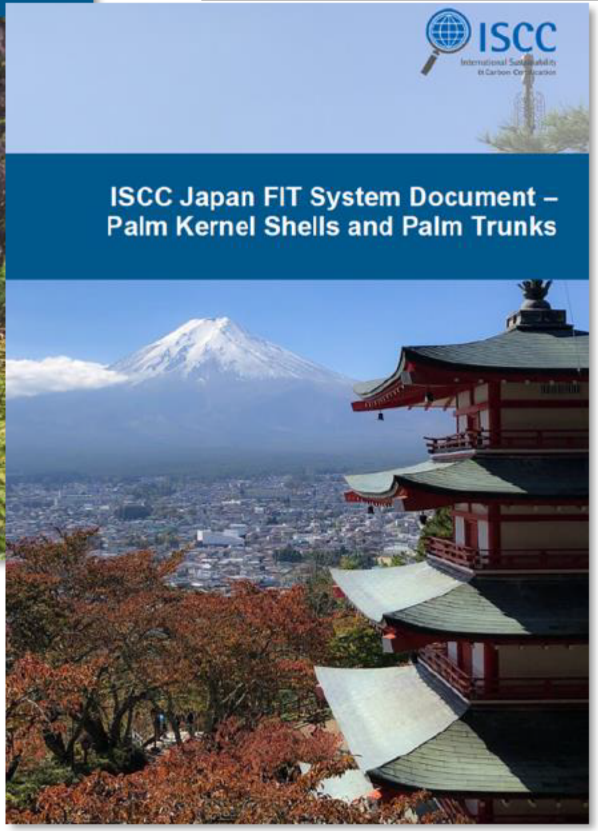
ISCC System GmbH
November 2022

ISCC
International Sustainability & Carbon Certification

ISCC has developed approaches for the certification of sustainable palm oil, palm kernels shells and palm trunks in accordance with METI requirements

Recognition by METI pending





Recognised by METI since April 2022

The calculation of GHG emissions for elements along the supply chain is already today included in the ISCC Japan FIT approaches

Recap

- The current versions of the ISCC Japan FIT approaches already include the requirement for GHG calculations
  - GHG emissions for sustainable material relating to cultivation, collection, transport and processing must be calculated
- Once confirmed by METI, ISCC will include requirements for GHG reduction thresholds
- The calculation of GHG emissions under ISCC Japan FIT can be done according to the established ISCC GHG methodology*
  - Methodology is applicable for all kinds of feedstocks, i.e. can be applied for palm oil, PKS and palm trunks
  - Palm oil: GHG values for cultivation of palm fresh fruit bunches (FFB) applicable
  - PKS and palm trunks: GHG determination starts with collecting (transport) of materials to the collecting point (cultivation of FFBs does not have to be considered)

* The methodology is based on the Renewable Energy Directive (EU) 2018/2001

Once GHG reduction requirements that are currently under discussion by METI are confirmed they can be implemented in the ISCC Japan FIT standards

1. Baseline

- Thermal power generation assuming 2030 energy mix: 180 g-CO2/MJ electricity

2. GHG reduction requirement

- Requires that 70% reduction be achieved for fuels used in FY2030 and beyond.
- For projects certified in FY2022 up to FY2030, 50% reduction is required.
- For projects certified before FY2021, GHG reduction requirement will not be applied.
- The reduction rate after FY2031 will be considered as necessary around FY2025.

		GHG reduction requirement ratio		
		Before GHG rules are set	After GHG rules are set	
			- FY2029	FY2030-
FIT certification	- FY2021	Not applicable	Voluntary reporting	
	FY2022-GHG rules are set	Not applicable	-50%	-70%
	GHG rules are set – FY2029	-	-50%	-70%
	FY2030-	-	-	-70%

1

Source: Update on METI Biomass Sustainability Working Group, September 2022

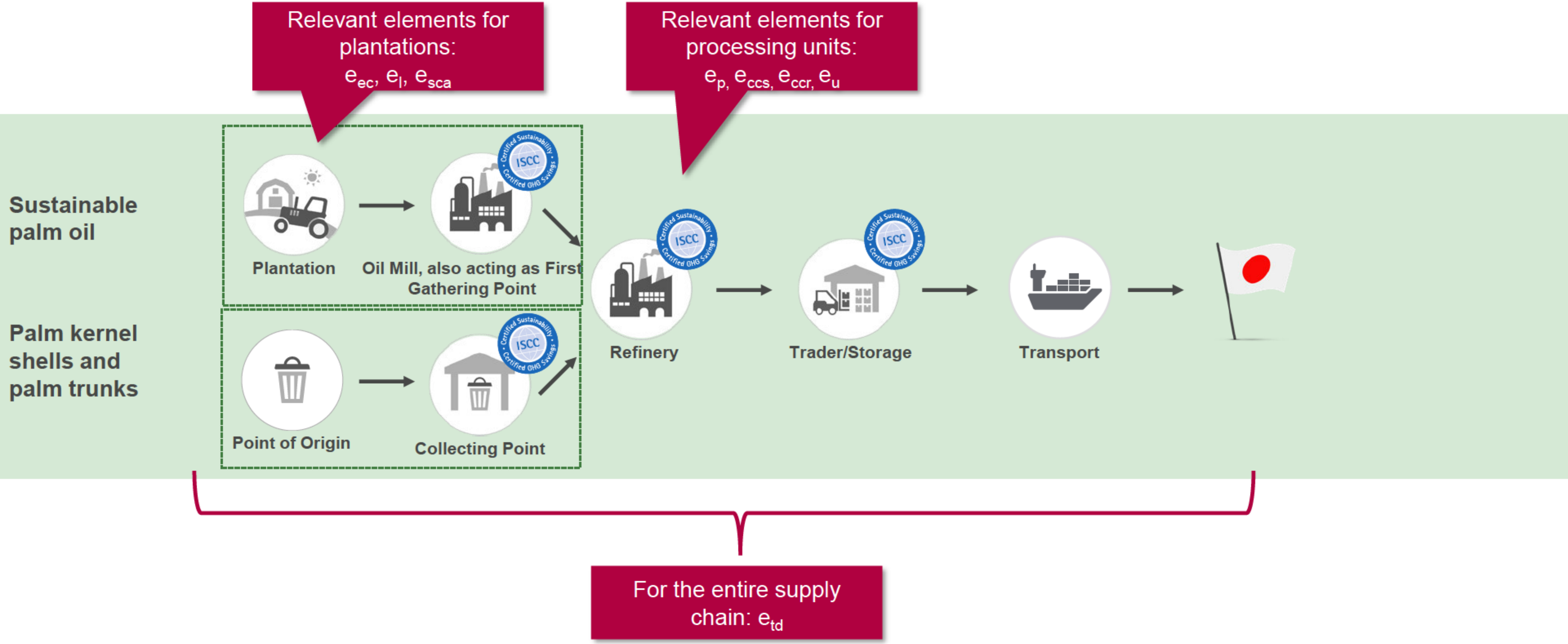
ISCC GHG calculation formula – Overview of relevant elements

$$E = e_{ec} + e_{l} + e_{p} + e_{td} + e_{u} - e_{sca} - e_{CCS} - e_{CCR}$$

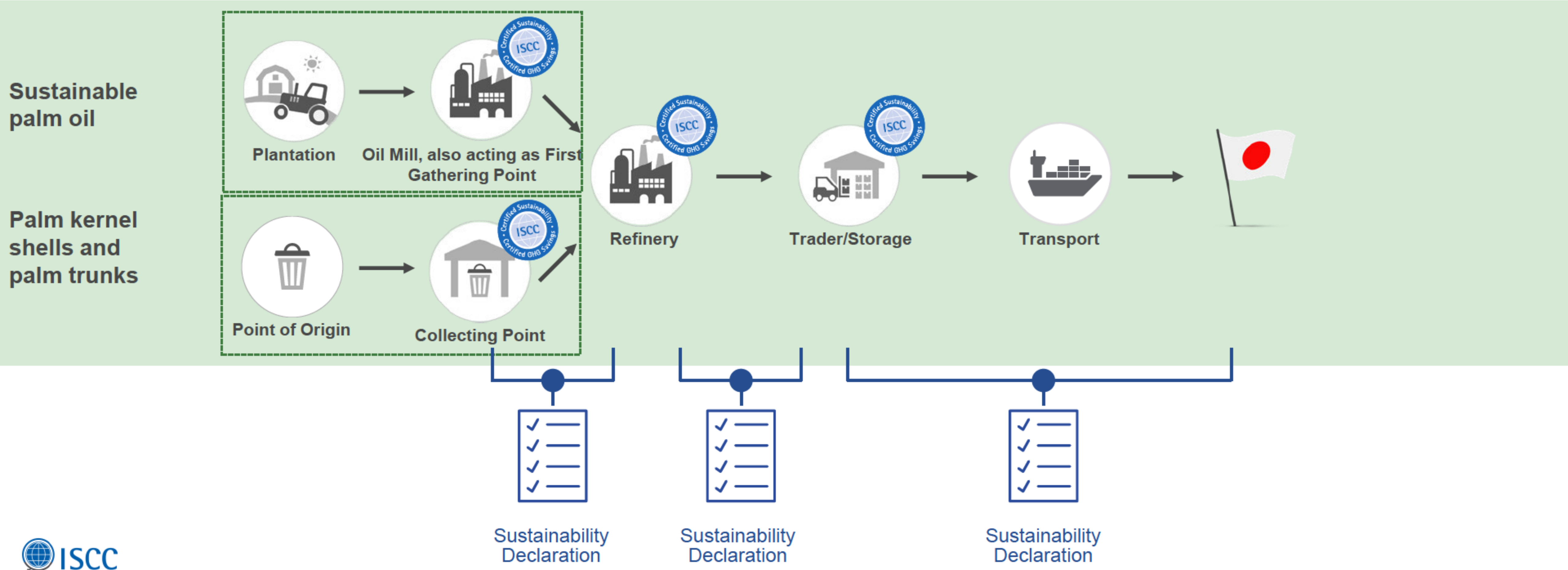
E	-	Total GHG emissions from supply and use of the fuel (in g CO_{2eq}/MJ)
e_{ec}	-	GHG emissions from the extraction or cultivation of raw materials
e_{l}	-	Annualized (over 20 years) GHG emissions from carbon stock change due to land use change
e_{p}	-	GHG emissions from processing
e_{td}	-	GHG emissions from transport and distribution
e_{u}	-	GHG emissions from the fuel in use
e_{sca}	-	GHG emissions savings from soil carbon accumulation via improved agricultural management
e_{ccs}	-	GHG emissions savings from carbon capture and geological storage
e_{ccr}	-	GHG emissions savings from carbon capture and replacement

ISCC International Sustainability & Carbon Certification

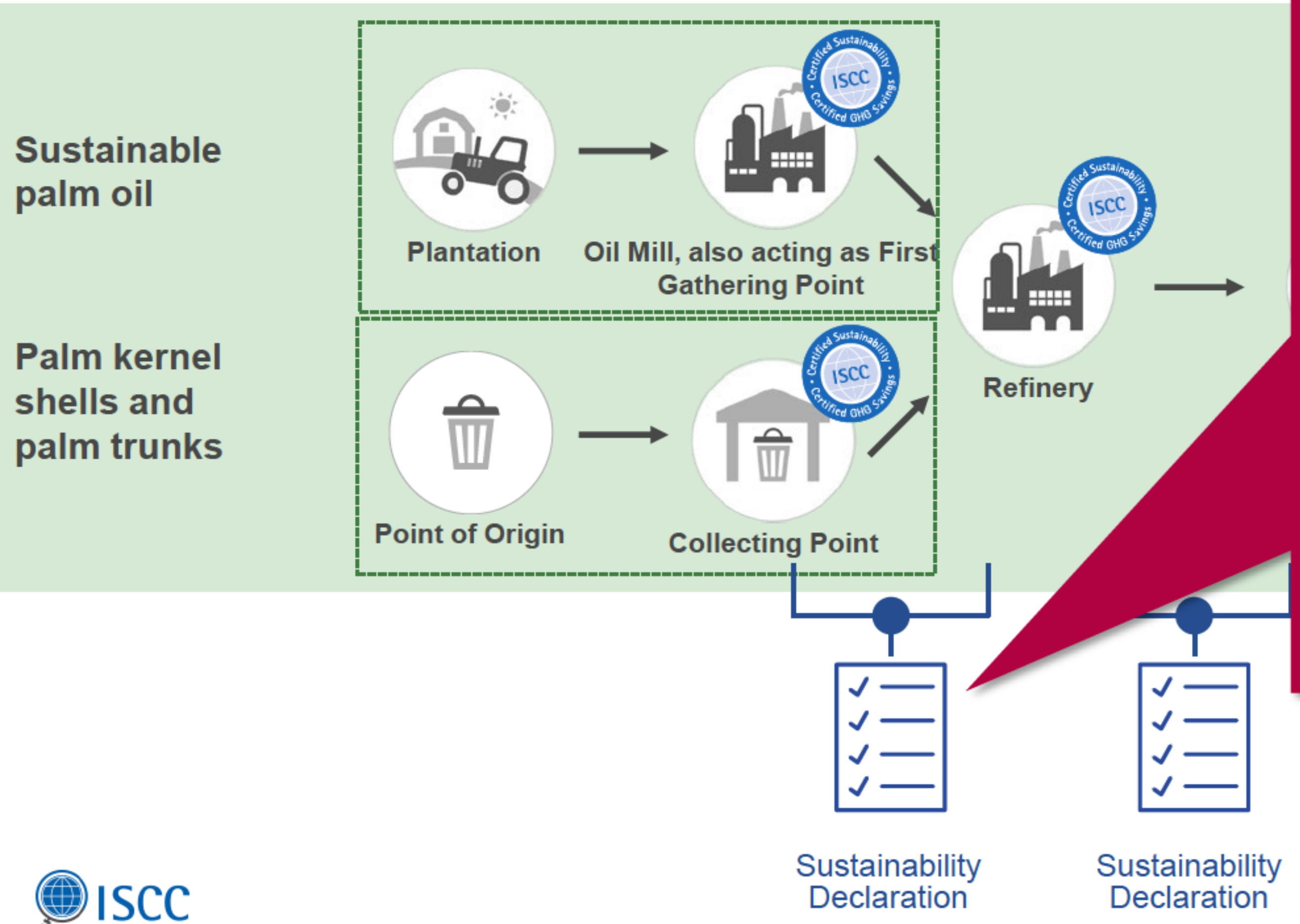
Emissions from cultivation only relevant in sustainable palm oil supply chains. Transport emissions start from plantation or point of origin respectively



GHG data and other relevant information on the sustainable material are forwarded and traced through the supply chain via Sustainability Declarations



GHG data and other relevant information on the sustainable material are forwarded and traced through the supply chain via Sustainability Declarations (SD)



Information requirements for SDs

- **General information** on supplier and recipient e.g.:
  - Name, address, contract number, unique number of SD
- **Product related** information, e.g.:
  - Raw material and country of origin, scope of certification of raw material (i.e. agricultural biomass or waste/residue), quantity of delivery, GHG information

➢ **GHG information*:**
  - Statement of actual GHG values in kg CO2eq per dry-ton of product
  - Emissions for the calculation formular elements (eec, ep, etd, eu, esca, el, eccr, eccs) must be reported separately
  - For etd (transport and distribution) the means of transport and the transportation distance from the supplier to the recipient must be included on the Sustainability Declaration

* The application of default values is also possible under ISCC

Formular for GHG emissions from the cultivation of raw materials (e_{ec})

$$e_{ec}\left[\frac{kg\ CO_2eq}{ton}\right] = \frac{\left(EM_{fertiliser} + EM_{N2O} + EM_{inputs} + EM_{diesel} + EM_{electricity}\right)\left[\frac{kg\ CO_2eq}{ha * yr}\right]}{yield\ raw\ material\left[\frac{ton}{ha * yr}\right]}$$

Extraction or cultivation of raw materials

- All fertilizers, pesticides, diesel, electricity, seeds and other inputs used must be taken into account
- Total amounts of inputs per year for the whole plantation area (including replanting activities and immature areas)
- Emission value in kg CO2eq/ t of crop is calculated

Verification of

- All input amounts/ consumption figures
- Yields of main product (either in dry matter or moist. If in moist content, calculation of dry matter by applying moisture factor)
- Emission factors and sources

EM = emissions

Formular of GHG emissions from carbon stock change due to land use change (e_l)

Factor to convert C to CO_2

$$e_l\left[\frac{kg\ CO_2eq}{ton}\right] = \left(\frac{CS_R\left[\frac{kg\ C}{ha}\right] - CS_A\left[\frac{kg\ C}{ha}\right]}{yield\ raw\ material\left[\frac{ton}{ha * yr}\right] * 20\ [yr]} * 3.664\right) - eB$$

Carbon stock change from land use change

- e_l Annualized GHG emissions from carbon stock change due to land-use change
- CS_R Carbon stock of reference land use: Land use in Jan 2008 or 20 years before raw material was obtained, whichever the later
- CS_A Carbon stock of actual land use: Management practice after conversion
- eB Bonus of 29 g CO2eq/MJ for biofuel, bioliquid, biomass fuel if biomass is obtained from restored degraded land
- Total emissions are annualized over 20 years. GHG emissions from LUC must always be considered for the period of 20 years

Verification of

- Time of land use change and compliance of land use change: Land status beginning 2008 (see ISCC Principle 1)
- Climate region, soil type and prior land use, carbon content of reference land use and actual land use according to IPCC, correct calculation formula and results

ISCC International Sustainability & Carbon Certification

Formular of GHG emissions from carbon stock change due to land use change (e_l)

Factor to convert C to CO_2

$$e_l\left[\frac{kg\ CO_2eq}{ton}\right] = \left(\frac{CS_R\left[\frac{kg\ C}{ha}\right] - CS_A\left[\frac{kg\ C}{ha}\right]}{yield\ raw\ material\left[\frac{ton}{ha * yr}\right] * 20\ [yr]} * 3.664\right) - eB$$

Carbon stock change from l... use

- e_l Annualized GHG emissions from carbon stock change due to land-us...
- CS_R Carbon stock of reference land use: Land use in Jan 2008 or 20 years be...
- CS_A Carbon stock of actual land use: Management practice after conversion
- eB Bonus of 29 g CO2eq/MJ for biofuel, bioliquid, biomass fuel if biomass is obt...
- Total emissions are annualized over 20 years. GHG emissions from LUC must always...

Verification of

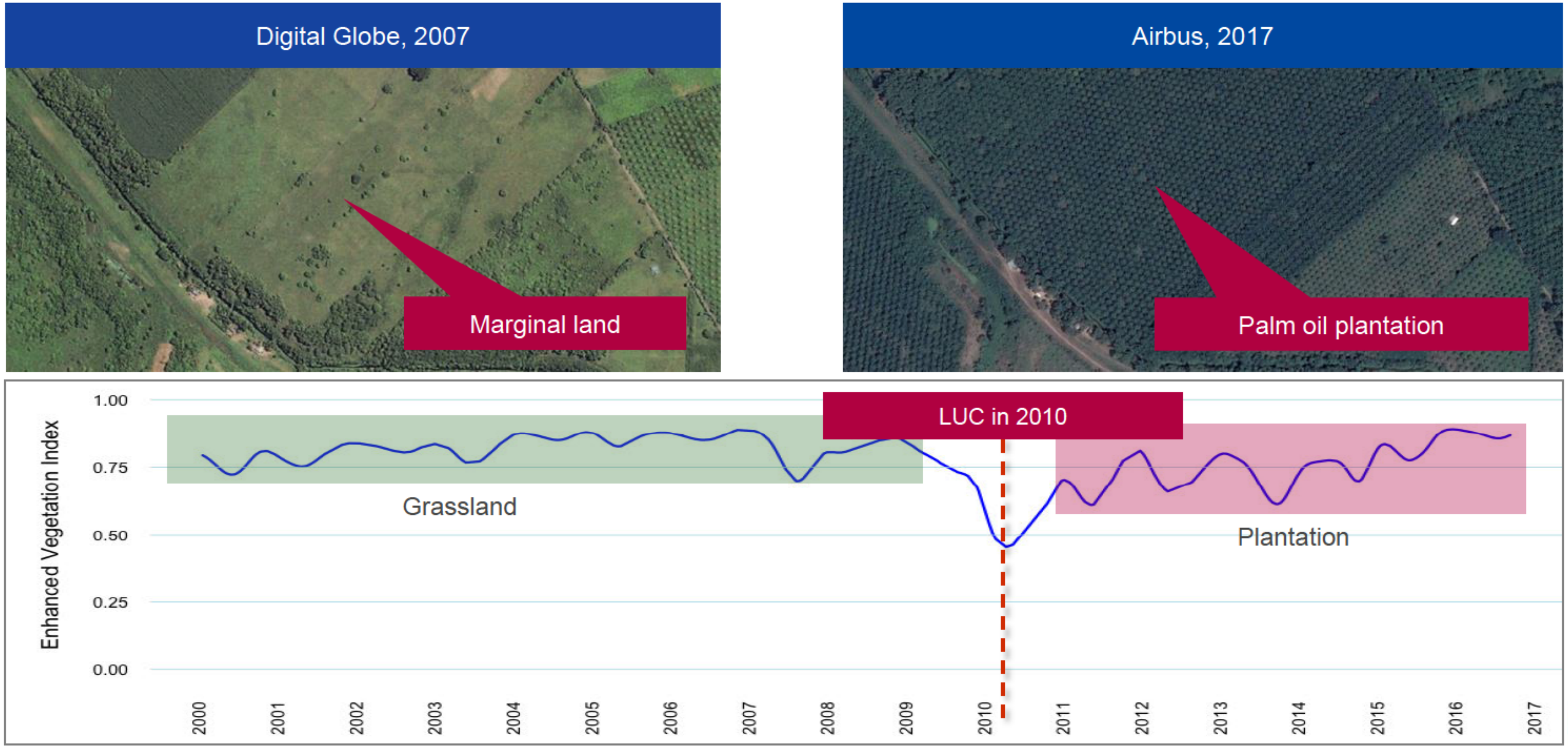
- Time of land use change and compliance of land use change: Land status beginning 2...
- Climate region, soil type and prior land use, carbon content of reference land use and... correct calculation formula and results

- If land use change took place which **violates ISCC principle 1** (no go areas), **certification is not possible!**
- If land use change took place which **does not violate ISCC principle 1, certification is possible.** However, **GHG emissions from the land use change** must be calculated and taken into account
- LUC which took place **before January 2008 is not relevant**. In that case, GHG emissions from land use change must not be taken into account
- Rules and guidance for the **calculation of land carbon stock changes** due to land use change are available (e.g. in EC decision (C(2010)3751)

Remote sensing tools like GRAS can support the identification and type of land use change

Example: Identification of change from marginal/unused land to palm plantation

Example



Source: www.gras-system.org

In case of improved agricultural management practices leading to soil carbon accumulation GHG emission savings (e_{sca}) can be claimed

Shifting to reduced or zero tillage

Improved crop rotations and/or cover crops, including crop residues management

Improved fertilizer or manure management

Use of soil improver (e.g. compost)

Overview of requirements for claiming GHG emissions savings from soil carbon accumulation via improved agricultural management (e_{sca})

e_{sca} can be claimed if evidence is provided that:

- Agricultural management practices potentially leading to soil carbon accumulation were adopted **after January 2008**
- those are implemented **in best practice,** so that an increase in soil carbon can be expected over the period in which the raw materials concerned were cultivated,

Note: Measurement of soil carbon could also serve as **additional evidence.**

GHG emissions from transport (e_{td}) – Relevant for all supply chain elements receiving sustainable material physically. Final processing unit determines e_{td} for the rest of the downstream supply chain

$$e_{td}\left[\frac{kg\ CO_2eq}{ton}\right] = \frac{T_{needed} * \left(d_{loaded}[km] * K_{loaded}\left[\frac{l}{km}\right] + d_{empty}[km] * K_{empty}\left[\frac{l}{km}\right]\right) * EF_{fuel}\left[\frac{kg\ CO_2eq}{l}\right]}{amount\ transported\ material\ [ton]}$$

Transport

- All elements receiving sustainable raw material must document GHG emissions from **transport one step up** (also collecting points, first gathering points, processing units, trader with storage)
- Result of the equation to be converted to **dry matter** (by applying **moisture content**)

Verification

- **T_{needed}** = Number of transports → Times a specific transport system is needed
- **d** = Single transport distance (loaded/ unloaded)
- **K** = Fuel consumption
- **EF_{fuel}** = Emission factor fuel
- **amount transported material** = Total transported material (moist matter)

GHG emissions from processing (e_p) are applicable for intermediate and final processing units

$$e_p\left[\frac{kg\ CO_2eq}{ton}\right] = \frac{\left(EM_{electricity} + EM_{heat} + EM_{inputs} + EM_{wastewater}\right)\left[\frac{kg\ CO_2eq}{yr}\right]}{\text{yield product}\left[\frac{ton}{yr}\right]}$$

Processing

- Emissions from
  - **Energy inputs** (e.g. electricity, heat or fuel consumption)
  - **Chemicals** and **other (fossil) inputs***
  - **Wastes** and **leakages**
- Emissions from **drying of interim products** and materials to be included
- Result of the equation to be converted to **dry matter** (by applying **moisture content**)

Verification

- Energy consumption (e.g. electricity, heat), consumption of process-specific inputs
- Wastes (incl. wastewater), leakages
- Yields of main product and co-products
- Emission factors and sources

EM = Emissions
* Whether or not actually combusted.

Palm oil mills: Methane capture can reduce GHG emissions

Example

POME[21] treatment in open ponds	kg CO_2eq/kg CPO[22]	0.51	BLE, 2010, Guideline Sustainable Biomass Production
	kg CO_2eq/kg POME	0.16	BLE, 2010, Guideline Sustainable Biomass Production. 3.25 kg POME per kg CPO
POME treatment in closed ponds and flaring of emissions	kg CO_2eq/kg CPO	0	Biogenic CO_2 set to zero, No CH4, N2O if pond appropriately covered without any leakages, methane is properly captured

Palm oil mill and POME treatment

- Most relevant emission source at palm oil mill: **Methane emissions** from palm oil mill effluent (**POME**)

➢ Significant reduction with **methane capture**

Verification

- ✓ Absorption of total wastewater in closed system (only short-term storage of fresh wastewater) + supply to methane capture device
- ✓ Condition of methane capture device, no leakages
- ✓ Use of biogas for energy purposes or flaring of the biogas

GHG emission savings from carbon capture and replacement (e_{ccr}) – Only applicable for the capture of CO_2 of biomass origin

$$e_{ccr}\left[\frac{g\ CO_2eq}{MJ}\right] = \frac{\left(produced\ CO_2[kg] - energy\ consumed\ [MWh] * EF\left[\frac{kg\ CO_2eq}{MWh}\right] - input\ materials\ [kg] * EF\left[\frac{kg\ CO_2eq}{kg}\right]\right) * 1000}{produced\ quantity\ of\ biofuel\ [t] * 1000 *\ lower\ heating\ value\ biofuel\left[\frac{MJ}{kg}\right]}$$

Carbon Capture and Replacement (CCR)

- Limited to emissions avoided through capture of CO_2 **originating from biomass**
- **Only applicable for CO_2 used to replace fossil-derived CO_2**

Verification of

- Quantity and origin of **biogenic CO_2** captured during the biofuel, bioliquid and biomass production process
- Quantity of energy consumed for the capturing and the processing of CO_2 (e.g. liquefication)
- Declaration from recipient of the CO_2, in writing, that fossil-derived CO_2 is avoided due to the CO_2 coming from CCR
- Purpose for captured CO_2

ISCC International Sustainability & Carbon Certification

GHG emission savings from carbon capture and geological storage (e_{ccs})

$$e_{ccs}\left[\frac{g\ CO_2eq}{MJ}\right] = \frac{\left(produced\ CO_2[kg] - energy\ consumed\ [MWh] * EF\left[\frac{kg\ CO_2eq}{MWh}\right] - input\ materials\ [kg] * EF\left[\frac{kg\ CO_2eq}{kg}\right]\right) * 1000}{produced\ quantity\ of\ biofuel\ [t] * 1000 * lower\ heating\ value\ biofuel\left[\frac{MJ}{kg}\right]}$$

Carbon Capture and Geological Storage

- Only applicable for CO_2 directly related to the extraction, transport, processing and distribution of fuel

Verification of

- Quantity of CO_2 (**biogenic and fossil**) captured during the biofuel, bioliquid and biomass production process
- Quantity of energy consumed for the capturing and the processing of CO_2 (e.g. compression)
- For direct storage: Quality of storage, good condition of storage with no leakages
- For CO_2 sold for storage: Contracts, invoices of a professional recognised storage company
- Valid evidence that CO2 was effectively captured and safely stored in compliance with Directive 2009/31/EC needs to be provided

GHG emissions from fuel in use (e_u)

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

E	-	Total GHG emissions from supply and use of the fuel (in g CO_{2eq}/MJ)
e_{ec}	-	GHG emissions from the extraction or cultivation of raw materials
e_l	-	Annualized (over 20 years) GHG emissions from carbon stock change due to
e_p	-	GHG emissions from processing
e_{td}	-	GHG emissions from transport and distribution
e_u	-	GHG emissions from the fuel in use
e_{sca}	-	GHG emissions savings from soil carbon accumulation via improved agricult
e_{ccs}	-	GHG emissions savings from carbon capture and geological storage
e_{ccr}	-	GHG emissions savings from carbon capture and replacement

Fuel in use

- Emissions from **final combustion of the biofuels** (e_u) are taken to be **zero**
- Non-CO_2 greenhouse gases (CH_4 and N_2O) from the fuel in use shall be included in the e_u factor **for liquid, solid and gaseous fuels used to produce electricity, heating or cooling**

Established ISCC risk management and integrity measures are also applied in the framework of GHG calculations

On-site audits

Desk audits

Internal review

Stakeholder involvement

Dedicated and mandatory GHG training for GHG expert of CB

Sanctions

ISCC
International Sustainability & Carbon Certification

Requirements for certification bodies with regard to GHG verification

- Accreditation against ISO 17065 is a general requirement for all certification bodies (CBs) cooperating with ISCC
  - Accreditation bodies must be compliant with ISO 17011*
- If CBs conduct verification of actual GHG emissions this has to be done in accordance with ISO 14065
- If the CB is conducting audits covering the verification of actual GHG calculations, the CB must ensure that at least one GHG expert is working in the audit team
  - This GHG expert must participate in a dedicated ISCC GHG Training prior to acting as the GHG expert for ISCC audits and must participate in such training at least every five years
  - Auditors for GHG audits must have at least two years experience with LCA assessments (including RED methodology if relevant) and relevant experience with regarding to the type of operation audited (e.g. plantation, processing unit)

* Alternatively, they can be member of IAF, have bilateral agreement with European Accreditation (EA) or covered by EU regulation (EC) 756/2008

Thank you for your attention!

Andreas Feige (feige@iscc-system.org)
ISCC System GmbH
Hohenzollernring 72, 50672 Cologne, Germany

Follow us on