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RSB Low iLUC Risk Biomass Criteria and Compliance Indicators

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1. Introduction

It is generally admitted that the diversion of agricultural resources towards production of biofuels and biomaterials creates a gap in the supply of these resources, which may impact their price and negatively affect food security in vulnerable regions and eventually displace the production of the diverted resources to a different location. This would therefore cause indirect socio-environmental impacts such as land-use change (usually called indirect Land Use Change or iLUC) and associated greenhouse gas emissions.

In order to minimise the occurrence of indirect Land Use Change, the RSB developed a set of criteria and compliance indicators for economic operators willing to demonstrate that their operations have a low iLUC risk, i.e. are unlikely to cause any displacement of an equivalent biomass production to another location.

The RSB Criteria and Compliance Indicators for low iLUC risk biomass and biofuels are based on the Low Indirect Impact Biofuels (LIIB) Methodology[1] and were developed in collaboration with Ecofys[2].

RSB recognises four approaches for low iLUC risk biomass and biofuels production:

- *Yield Increase*. Operators demonstrate that additional biomass for biofuel/biomaterial was produced through an increase in yield compared to a reference date, without any additional land conversion.
- *Unused/Degraded Land*. Operators demonstrate that biomass for biofuel/biomaterial was produced out of land that was not previously cultivated or was not considered arable land (a reference date is also used).
- *Integrated sugarcane and cattle production*. Operators demonstrate that residues from sugarcane production are used as cattle fodder, therefore reducing the surface needed to produce an equivalent amount of fodder out of dedicated crop production.
- *Use of waste/residues*. Operators demonstrate that raw material used for biofuel/biomaterial is derived from existing supply chains (e.g. food production, wood processing, etc.) and do not require dedicated production out of arable lands.

RSB-certified operators that successfully undertake an audit (compliance check) to the below indicators are entitled to an extra "low iLUC risk" on-product claim. Such claim is also allowed for operators processing low iLUC risk biomass taking into account conversion factors and specific chain-of-custody requirements.

[1] www.liib.org
[2] www.ecofys.com

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Note: This set of criteria and compliance indicators is not a stand-alone certification module but shall be used in combination with the regular RSB certification process to ensure that all the other direct social and environmental impacts are effectively addressed. **Compliance with the RSB low iLUC indicators cannot be established for operators that did not successfully underwent a regular RSB certification audit (i.e. Principles & Criteria, Chain of Custody, etc).**

The criteria and compliance indicators for low iLUC risk biomass and biofuels through yield increase are described in the following sections. For efficiency purposes it is advised that these indicators are combined with the compliance indicators used in regular RSB audits (i.e. to the RSB Principles & Criteria, RSB chain-of-custody, risk management, etc); however, compliance with low iLUC risk indicators may also be evaluated at a different time as regular audits to the RSB Standard.

Guidance - Applicability of the Yield Increase Approach:
The Yield Increase approach applies to any situation where feedstock producers are able to increase the amount of harvested biomass out of a fixed area of land (i.e. without expanding the surface of the land). An increase in the harvested biomass may be the result of:

- An improvement in agricultural practices, e.g. increase in organic matter content, reduction of soil compaction/erosion, decrease in pests, etc.
- Intercropping, i.e. the combination of two or more crops that grow simultaneously, for example as hedges or through an agro-forestry system.
- Crop rotation, i.e. the combination of two or more crops that grow at different periods of the year.

Important Note:
In cases where a food crop is combined with an energy crop, operators should monitor that the increase in biomass harvested out of the energy crop does not come at the expense of the harvested biomass from the food crop, even if the total harvested biomass (i.e. food crop + energy crop) increases. This would be in contradiction with Principle 6 (food security). Operators should also make sure that yield increase techniques do not lead to any non-compliance with other RSB Principles & Criteria (e.g. soil, water).

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2. Low iLUC Risk Biomass Criteria & Indicators – Yield Increase

RSB Low iLUC Risk Biomass - Yield increase		
1. You shall develop and implement yield increase measures for a specific crop ('target crop')	1.1 You shall document a management plan in which yield increase measures are described as well as their expected contribution to increased yields of the target crop(s). You shall provide evidence that the expected yield increase of the target crop is justified	Location and site factors are responsible for up to 50% of the yield. Whereas these factors cannot be changed, yield increase can be achieved through changes to the following management practices : • Crop varieties • Sowing • Soil management • Fertilisation • Crop rotation • Crop protection: Weed, pest and disease control • Pollination (e.g. by using bees) • Harvest • Precision farming This list provides an overview of example yield increase measures and is not exhaustive. The expected yield increase of the intended measures can for instance be demonstrated by reference to scientific literature, experience from field trials, information from breeders or simple calculations (e.g. reduced number of tram lines due to increased operation width of field sprayer leads to higher yields in the same field). It is important to note that some yield increase measures might influence the yield impact from other measures. These interactions should be taken into account when estimating the total expected yield increase resulting from all measures.
	1.2 You shall document the reference year as 2008, or the year preceding the implementation of yield increase measures, whichever is later (See Guidance for 2.1). Agricultural practices implemented before the reference date cannot be considered as yield increase measures.	All already implemented management practises of the Participating Pperator already implemented can be verified (e.g. available machinery) This means for example that the Participating Operator is able to provide documents on: • the use of fertilizers, pesticides, herbicides and fungicides • the crop rotation system • the sown seeds • the land used for the cultivation of the target crop Other management practices might not be well documentable like for instance the way of tillage or drilling. This will however be verifiable by checking the available machinery.

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RSB Low iLUC Risk Biomass - Yield increase		
2. You shall calculate the baseline yield, to be used as reference for yield increases over a maximum period of ten (10) years.	2.1 You shall calculate the baseline yield (Y_{BASE}) using Equation 1 or Equation 2.	The baseline yield (Y_{BASE}) is based on your historical yields and from similar producers in the same geographic region (Equation 1). In cases where no information on similar producers in the same geographical region is available, a 10% conservative factor is added to your baseline yields (Equation 2). Equation 1: $\mathbf{Y_{BASE} = Y_{b,t=0} * y_{gr}}$ Equation 2: $\mathbf{Y_{BASE} = Y_{b,t=0} * 1.1}$ Where: Y_{BASE} : Baseline scenario yield [t .ha^{-1} or m^3 ha^{-1}] $Y_{b,t=0}$: Participating Operator's Reference Yield at reference year (t = 0), which is the last year before yield increase measures started being implemented or 2008, whichever is later [t .ha^{-1}]. y_{gr} : Average annual yield growth for similar producers in the region [%] The Participating Operator's Reference Yield ($Y_{b,t=0}$) is calculated as follows: $$\mathbf{Y_{b,t=0} = \frac{Y_{t=-4} + Y_{t=-3} + Y_{t=-2} + Y_{t=-1} + Y_{t=0}}{5}}$$ Where: $Y_{t=0}$: Participating Operator's actual yield during the reference year (t = 0) [t ha^{-1} or m^3 ha^{-1}] $Y_{t=-1}$: Participating Operator's actual yield the year preceding the reference year (t = -1) [t .ha^{-1} or m^3 ha^{-1}] $Y_{t=-2}$: Participating Operator's actual yield two years before the reference year (t = -2) [t .ha^{-1} or m^3 ha^{-1}]. $Y_{t=-3}$: Participating Operator's actual yield three years before the reference year (t = -3) [t. ha^{-1} or m^3 ha^{-1}]. $Y_{t=-4}$: Participating Operator's actual yield four years before the reference year (t = -4) [t.ha^{-1} or m^3 ha^{-1}]. Example: If the reference year (t=0) is 2009, then t=-1 is 2008, t=-2 is 2007, etc. The average annual yield growth for similar producers in the region (y_{gr}) is calculated as follows: $$\mathbf{y_{gr} = \sqrt[9]{(T_{t=0}/T_{t=-9})}}$$ Ygr = Average annual yield growth for similar producers in the region $T_{t=0}$ = Trend line value for similar producers in the region at reference year (t = 0) [t .ha^{-1} or m^3 ha^{-1}] $T_{t=-9}$ = Trend line value for similar producers in the region nine year before reference year (t = -9) [t .ha^{-1} or m^3 ha^{-1}] *Notes:* - In order to reduce the effect of extremes, the yields are calculated with the trend line and not the actual yields - Within 10 years there are only 9 time steps, so the 9th root has to be extracted of the division of the trend line value in year t=0 and the trend line value in year t=-9. - Similar producers are defined as follows:

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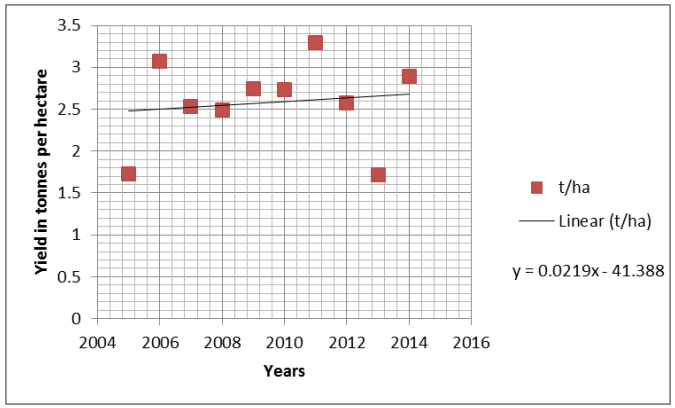
		○ Grow the same crop; ○ Are located in the same geographic region (e.g. NUTS2 in EU), whereby region is defined as an administrative unit for which reliable data (e.g. by national statistical agencies) are available; and ○ Use a similar management model (e.g. smallholder, small or large scale plantation). Example: Assuming that the average yield of similar producers in the region were as follows:  In this example, the trend line yield in 2014 is calculated as: $0.0219 \times 2014 - 41.388 = 2.72$ t ha^{-1} (Note that the actual yield in 2014 was 2.89 t ha^{-1}) The trend line yield in 2005 is calculated as: $0.0219 \times 2005 - 41.388 = 2.52$ t ha^{-1} (Note that the actual yield in 2005 was 1.73 t ha^{-1}) Therefore the average annual yield growth for similar producers in the region (y_{gr}) is calculated as follows: $$\mathbf{y}_{gr} = \sqrt[9]{(2.72/2.52)} = 1.0085$$
5. You shall calculate	5.1 You shall document the actual	You track your yields and provide evidence that these yields have been realised, by for instance overall amounts sold

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RSB Low iLUC Risk Biomass - Yield increase		
the amount of additional feedstock produced through yield increase above the baseline scenario to determine the amount of low ILUC risk biomass	amount of harvested feedstock	or stored.
	5.2 Your actual yields shall be higher than the baseline scenario yield (YBASE)	Example: Any yield above 3.51 t ha^{-1} are low ILUC risk. If the actual yields of the participating farmer are 3.8 tonnes per hectare, 0.29 tonnes per hectare are low ILUC risk.
	5.3 The actual amount of low ILUC risk biomass is calculated by the difference between the actual yield and the baseline scenario yield multiplied by the land cultivated with the specific crops for which yield increase measures are applied	Equation 3: $V_{LowiLUC} = (Y_{,t=x} - Y_{b,t=x}) \times A$ $V_{LowiLUC}$ = Volume of low iLUC risk biomass in year x [m^3 or t] $Y_{,t=x}$ = Actual yield in year x [t ha^{-1} or m^3 ha^{-1}] $Y_{b,t=x}$ = Baseline scenario yield A = System boundary area (ha) Example: If the actual yields of the participating farmer are 3.8 tonnes per hectare and the BASE yield is 3.51 tonnes per ha for the respective crop cultivated on 80ha, equation 3 is as follows: $V_{LowiLUC} = (3.8 - 3.51) \times 80 = 23.2$ t In this example 23.2 tonnes can be certified as low ILUC risk biomass.

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3. Low iLUC Risk Biomass Criteria & Indicators – Unused Land

RSB Low iLUC Risk Biomass – Unused Land		
1. Land was not used for its provisioning services during the three years preceding the reference date.	1.1 You shall document the reference date as 1st of January 2008, or the date when the unused land was put in cultivation, whichever is later.	The date when the unused land was put in cultivation corresponds to the first operations of land preparation (e.g. ploughing, sowing, etc.). If the exact date is now known, you may use the 1st day of the month following the effective start of operations as the reference date.
	1.2. You shall demonstrate that land was not in use for its provisioning services on the reference date (compliance with RCA principle IV or Unused Land Guidance)	*The Millennium Ecosystem Assessment 2005 defines Ecosystem Services; Provisioning Services are one of four categories of Ecosystem Services provided by land, it means that products obtained from ecosystems such as food, animal feed or bioenergy feedstocks.* Interviews with the land owner or tenant and with other local people/ local authorities. Take GPS points and compare with available satellite images or aerial photography. Check whether APIA application forms (EU) and reply letters or other forms of land use record are available for the specific site.
	1.3 No shifting cultivation shall take place on the land	This indicator refers to practices in some countries (outside Europe, North-America and Australia) to have very long crop rotation systems, in which fields can be left fallow for ten years before being planted again. Interviews with local people can be used to demonstrate compliance with this indicator if it is appropriate.
	1.4. You shall demonstrate that land was not in use for its provisioning services during the three years prior to the reference date.	You shall obtain available data on land use during the three years preceding the reference date. In the EU, information should be available from the plot growing cadaster for farmers' cross-compliance applications. In addition to this data gathering it is important to perform interviews with the (previous) land owner or tenant and other local people/ local authorities. Such interviews are crucial when limited or no data are available. Supporting evidence could come from satellite images from the three previous growing seasons.
Criterion 1 can be replaced by criteria 2 but <u>only if land is used for a limited provisioning service</u>, i.e. not if land was used for crop production during past three years		
2. Land was used for limited provisioning services during the three years preceding the reference date.	2.1. You shall demonstrate that the land was used for provisioning level up to a yield that is 25% or less (by energy content, protein content or estimated market price) of the earnings or yield that can be reasonably expected from cultivation of the same crop(s) in normal conditions.	Information on the existing provisioning service from the land and its estimated yield and or value can be obtained through official data collection, interviews with those involved in the land use, local people and/or local authorities. You shall calculate the estimated economic value of the limited land use based on regional market prices. If the economic value of the limited land use is <25% compared to the expected economic value of the target crop, the land use is indeed limited. If regional market prices are not available for the purpose the biomass is used for under the limited land use, the assessment shall be performed by comparing the protein content or energy content (whatever is most relevant) with the estimated protein content or energy content from the target crop. Yield estimates (if appropriate only of the target crop) should be based on latest regional or national statistical data on average yields for the target crop. Prices should be based on latest available local or national price data for the target crop. Energy content or protein content from the existing limited production should be compared to the market price for the target crop. If this not possible the estimated target crop yield can be used as comparator.
	2.2. You shall demonstrate that your operations do not affect the limited provisioning service that existed prior to the reference date.	You shall demonstrate that the yield obtained through the limited provisioning services that existed prior to the reference date did not decrease due to the new operations. In case a general yield decrease is observed in the region of operation and/or for the particular crop(s) you are cultivating, you may use official statistics and information to demonstrate that the observed decrease in yield is no related to your new operation.
3. You shall calculate the	3.1 You shall document the actual amount of harvested feedstock	Example: track your yields and provide evidence that these yields have been realised, by for instance overall amounts sold or stored.

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amount of additional feedstock produced through unused land to determine the amount of low ILUC risk biomass	3.2 The actual amount of low ILUC risk biomass is calculated by the amount of feedstock produced out of the land that was unused prior to the reference date.	Equation 1: $V_{LowiLUC} = Y_{t=x} \times A$ $V_{LowiLUC}$ = Volume of Low iLUC risk biomass in year x [m^3 or t] $Y_{t=x}$ = Actual yield in year x [t ha^{-1} or m^3 ha^{-1}] A = System boundary area (ha), i.e. surface of land that was previously unused. Example: If the actual yields of the participating farmer are 4.2 tonnes per hectare and the surface of previously unused land of 100 ha, equation 1 is as follows: $V_{LowiLUC} = 4.2 \times 100 = 420$ t In this example 420 tonnes can be certified as low iLUC risk biomass.

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4. Low iLUC Risk Biomass Criteria & Indicators – Sugarcane & Cattle Integration

(Under development)

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5. Low iLUC Risk Biomass Criteria & Indicators – Waste and Residues

RSB Low iLUC Risk Biomass – Waste and Residues		
1. The biomass used for biofuel or biomaterial production is a waste or a residue with low iLUC risk	1.1 The biomass used for biofuel or biomaterial production is eligible as a waste or a residue under RSB-STD-01-010 (Global) or RSB-STD-11-001-01-010 (EU RED).	Examples include Used Cooking oil, Municipal Solid Waste, Agricultural Residues (e.g. straw), Wastewater, Animal Fats, etc. For EU RED compliance, the list of eligible feedstock is more limited due to specific regulations at the level of the European Commission and certain Member States. Please consult the RSB Secretariat for more information.
	1.2 The waste/residue is generally discarded for landfilling or incineration in the region where it is generated.	This means that the waste/residue is available for use as biofuel/biomaterial feedstock in a given region, i.e. there is no other use being made of it. A region can be at the sub-national (e.g. a metropolitan area, a state or a province), national, or supra-national (e.g. several countries, EU, ECOWAS region) level. A larger region involves a greater availability of feedstock, but a smaller region makes easier to demonstrate that no other uses are currently being made of a given waste/residue.
	Criterion 1.2 can be replaced by criteria 1.3 and 1.4.	
	1.3 You shall demonstrate that the use of this waste/residue does not result in any indirect increase in greenhouse gas emissions.	For example, you shall demonstrate that this waste/residue stream was not used previously: - For electricity (co)generation; - For combined heat and power; - As a fertilizer or other soil input and/or that its diversion to produce biofuels or biomaterials does not result in the use of fossil combustible in replacement.
	1.4 You shall demonstrate that the use of this waste/residue does not result in any displacement of land use.	For example, you shall demonstrate that this waste/residue was not used previously as food, feed, fibre, or any other use requiring arable land.
2. You shall calculate the amount of low iLUC risk biofuel or biomaterial generated out of the use of waste or residue	2.1 You shall document the amount of low iLUC waste/residue entering your operations and the amount of low iLUC biofuel or biomaterial produced out of it.	"low iLUC" means that the waste/residue stream is compliant with requirements 1.1, 1.2, 1.3 and/or 1.4 above. You may use an average conversion rate (C) to determine the amount biofuels or biomaterials produced out of the waste/residue stream.
	3.2 The actual amount of low iLUC risk biofuel or biomaterial is calculated by the amount of low iLUC risk waste and residue entering the process multiplied by the conversion rate	Equation 1: $V_{LowiLUC,t=x} = V_{W/R,t=x} \times C$ $V_{LowiLUC,t=x}$ = Volume of low iLUC risk biofuel/biomaterial produced in year x [m^3 or t] $V_{W/R,t=x}$ = Volume of entering low iLUC risk waste/residue in year x [m^3 or t] C = Conversion rate (waste/residue to biofuel/biomaterial) Example: If the entering volume of low iLUC risk waste/residue on year x is 5'000 t and the conversion rate of 0.84, equation 1 is as follows: $V_{LowiLUC,t=x}$ = 5'000 × 0.84 = 4200 t In this example 4200 tonnes can be certified as low ILUC risk biofuel/biomaterial.