

ABENGOA BIOENERGY

RED Bioenergy Sustainability Assurance Scheme

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Index

1	Introduction	3
2	Definitions.....	4
3	Objective and scope	8
3.1	RB SA sustainable origin list	8
3.2	Map for determining RED biodiversity compliance	8
4	Sustainability reference requirements to develop maps.....	8
4.1	Requirement identification.....	9
4.1.1	Biodiversity requirement (RED, Article 17.3).....	9
4.1.2	Carbon stock requirement (RED, Article 17.4).....	10
4.1.3	Peatland requirement (RED, Article 17.5).....	10
4.1.4	Land use change requirement (Article 19, Annex V, C)	11
4.2	Reference date	12
5	Description of methodology for map development.....	12
5.1	RB SA sustainable origin list	12
5.1.1	Preliminary preparation	14
5.1.2	Map development process	14
5.1.2.1	Capture, review and verification of data.....	15
5.1.2.2	Land use analysis.....	16
5.1.2.3	Information processing for land use figures (comparative)	18
5.1.2.4	Information processing for protected figures (biodiversity).....	20
5.1.2.5	Documentary evidence	22
5.2	Map for determining RED biodiversity compliance (Article 17.3b)	22
6	System assurance	23
6.1	Responsibilities	23
6.2	Methodology update	23
6.2.1	Review of requirements.....	24
6.2.2	Review of methodology	24
6.2.3	Data validation.....	24
6.2.3.1	Data quality.....	24
6.2.3.2	Updating data	25
6.2.4	Review of outputs.....	26
6.3	Documentary management	26
6.4	Access definition	26
6.5	Internal audit.....	26
7	Methodology verification	27

Principle reference: Directive 2009 / 28 / EC (RED) of the European Parliament and of the Council of 23rd April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001 / 77 / EC and 2003 / 30 / EC.

Secondary reference:

- Communication from the Commission on the practical implementation of the EU biofuels and bioliquids sustainability scheme and on counting rules for biofuels.
- RED Bioenergy Sustainability Assurance Scheme, reference RBSA_001.

1 Introduction

Abengoa Bioenergy has chosen to establish and implement a voluntary scheme as a mechanism for companies involved in bioenergy production to show that the sustainability criteria included in RED relating to GHG savings, land with high biodiversity value and with high carbon stock have been met, demonstrating compliance with the sustainability regime established in Article 17.2 to Article 17.5 of the RED.

The rules and requirements of this scheme entitled "RED Bioenergy Sustainability Assurance" are described in reference RBSA_001. The specific objective of this document is to establish a methodology to develop maps in the framework of a Voluntary Scheme in order to obtain a list of sustainable origins fulfilling RED requirements (Article 17.3, 17.4 and 17.5) and also to identify the land use change that impacts GHG emission calculations (Article 19, Annex V, C).

Therefore, this document has been structured in three main blocks:

- Objective and definitions.
- Methodology for sustainable maps development.
- System assurance.

Finally, the methodology and provisions included in this document shall be implemented in practice through procedures that shall be audited against ISAE 3000 following requirements described in reference RBSA_001 of this scheme. In this way, all the maps and information generated from the procedures (externally verified in accordance with the methodology described) will have the required external standard of independent auditing.

2 Definitions

- **Agricultural production units** includes operational sites involved in the operations for the cultivation and subsequent harvesting of the biomass (as defined in this scheme), to be later converted into biofuels.
- **Biofuels** are defined as liquid or gaseous fuel for transport produced from biomass.
- **Biomass** is defined as the biodegradable fraction of products, waste and residues of biological origin from agriculture (including plant and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste.
- **Coherence or logical consistency** refers to rules that spatial data have to fulfill regarding structure, attributes and compatibility relationships. Topological rules shall be fulfilled from a geometrical standpoint while it is important that values are in range from the attribute standpoint.
- **Coordinate system:** system to uniquely determine the position of a point or other geometric element, which uses a set of numbers or coordinates. Coordinate systems may be geographic (longitude–latitude, etc.) or projected (UTM, Lambert, etc.).
- **Documentary evidence:** it consists of a specific analysis to NUT 3 or lower level (or in its correspondence in GAUL) where complementary information shall be compiled that allows evidence of RED requirement fulfillment, [REDACTED]. This information must come from official sources, such as Official Organizations or authorized Governmental Agencies on the relevant matter.
- **GAUL** (Global Administrative Unit Layer) is a spatial database of the administrative units for all countries in the world, corresponding to NUT in Europe, and similar divisions in other countries. It is a project of the United Nations Food and Agriculture Organization (FAO).
- **Genealogy or lineage** describes the characteristics of the original materials from which a specific data set has been derived.
- **Geometric accuracy** is the positional accuracy relationship when various specific elements are ordered in a spatial disposition. In this case, there is an error caused mainly by positional errors.
- **Graphic evidence:** any kind of information obtained by using remote sensing material (maps, satellite images, aerial photos, databases with spatial references and others), in order to verify land use RED requirement fulfillment in the zones of study.
- **Land use figures:** grouping of categories established by RED requirement in Article 17.3a, 17.3c, 17.4, 17.5 and in addition the categories used by IPCC plus a seventh category of perennial crop (Article 19, Annex V, C).
- **Land under agricultural use** is those croplands where the stem of the crop is usually annually harvested. Fallow areas are also included.

▪

- **Mean squared error (MSE)** is the average of the set of squared differences between dataset coordinate values and coordinate values from an independent source of higher accuracy for identical points.
- **No - RED Go area** is a region that does not comply with the sustainability requirements for biodiversity and carbon stock preservation described in Article 17.3 to 17.5.
- **NUT** is defined as stipulated in Regulation (EC) No 1059 / 2003.
- [REDACTED]
- [REDACTED]
- **Origin** is the geographical denomination that stands for the cultivation and harvesting zone of the biomass to be further processed into biofuel.
- **Partial RED Go area** is a region that complies with the sustainability requirement for biodiversity and carbon stock preservation described in Article 17.3a, 17.3c, 17.4 and 17.5.
- **Positional accuracy:** it analyzes the displacement of one element compared with others elements. Positional accuracy affects the geometry, topology and the thematic aspects that are reflected in the real model.
- **Perennial crop** is considered as multi annual crops whose stem is usually not annually harvested, such as short rotation coppice or palm oil.
- **Polygon** is an area, delimited by three or more points, with the same characteristics.
- **Projection system:** system for transforming a curved surface into a two-dimensional map. According to the qualities they preserve, projections may be classified in Equivalent (equal area), Conformal (correct shape) and Azimuthal (true bearing). Projection systems: Mercator, UTM, Albers equal-area Conic, etc.
- **RED Go area** is a region that complies with the sustainability requirements for biodiversity and carbon stock preservation described in Article 17.3 to 17.5. of the RED through some of the evidence developed in the framework of this scheme (sustainable maps, official statements among others).
- **RBSA or RBSA scheme** (RED Bioenergy Assurance) is the sustainability assurance scheme that Abengoa Bioenergy has developed in order to comply with the RED sustainable regime in its operations as biofuel producer (also useable for other economic operators in the supply chain).

- **RBSA sustainable area** is defined as agricultural land included in the RBSA sustainable origin list or it has been declared under Agricultural production self - declaration.
- **RBSA sustainable origin** is the origin of the biomass which is deemed to comply with the RED sustainability criteria (Article 17.3 to 17.5) and in which land use change since 2008 has not been observed through external guarantees describes the process to generate RBSA sustainable origins within the framework of this scheme).
- **Reference system (datum):** set of reference points on the Earth's surface against which position measurements are made, and an associated model of the shape of the Earth (reference ellipsoid) to define a geographic coordinate system: Reference ellipsoids: ED-50, ETRS-89, WGS-84, etc.
- **Remote sensing material:** graphic information obtained by making measurements of the earth from sensors, such as cameras carried on airplanes, satellites or other devices. These sensors collect data in the form of images.
- **Resolution:** data resolution is defined as the detailed level of the real model. In a vector model, this is expressed with the size of the minimum element that can be differentiated in the map. In the case of raster information, the resolution is expressed with the grid pixel size.
 - Spatial resolution: shall be subject to evaluation by an expert considering that requirements established by RED must be complied with and that the mean squared error for media resolution must be lower than 100 m in distances and 10,000 m² in surface areas and for low resolution must be lower than 500 m in distances and 250,000 m² in surface areas.
 - ✓ Low resolution sensors: assigned to global phenomena observation. From local to regional scale sensors: they provide the information in a scale lower than 1: 250,000.
 - ✓ Media resolution sensors: assigned to regional phenomena. They are able to generate information in a scale between 1:250,000 and 1:50,000
 - ✓ High resolution sensors: assigned to local phenomena. They are able to generate information in a scale between 1:50,000 and 1:2,500.
 - Spectral resolution: refers to the number of sensor bands. The electromagnetic spectrum gives information on some characteristics of the world's surface depending on the wavelength range. This way, it is possible to obtain information that the human eye cannot detect (soil temperature, photosynthetic activity, moisture, etc.) by including near infrared (NIR) and thermal infrared (TIR) bands.
 - Temporal resolution: the observation frequency makes it possible to establish systems evolution over time.
 - Radiometric resolution: establishes the sensor's capacity to capture electromagnetic energy from the Earth, i.e. its sensitivity. The radiometric resolution refers to the energy codification of the sensor. It is stored in

binary format. That means there is capacity for observation through fog or clouds.

- **Temporal accuracy:** it serves for analyzing the data accuracy for a predefined time scale. It will evaluate:
 - Temporal measurement accuracy: date or time approximation to the real instant.
 - Temporal consistency: accuracy of the sequential data.
 - Temporal validity: data validity for a temporal specification.
- **Thematic accuracy** quantifies the correction level of the code characteristics and the attribute values. It has to evaluate if the values entered in the database fulfill the restrictions defined in the definitions, the correction of the classification established, and the spelling accuracy.

3 Objective and scope

The objective of this document is to identify land use criteria required by RED (Article 17.3 to 17.5), and to establish a methodology to develop maps that make it possible to demonstrate the fulfillment of these requirements.

The following shall be obtained as final result (described below):

- A RBSA sustainable origins list where the origins are compiled to NUT 3 or lower level (or its correspondence in GAUL). The RBSA sustainable origins shall comply with land use requirement (Article 17.3 to 17.5) and shall demonstrate non land use change.
- A map for determining RED biodiversity compliance (Article 17.3b).

The scope of this document is any region that could be used for cultivating biomass intended for biofuel production.

3.1 RBSA sustainable origin list

List of approved RBSA sustainable origins demonstrating RED requirements through the development of:

- A RED Go areas map demonstrating fulfillment of land use and biodiversity criteria (Article 17.3 to 17.5) for each studied region to NUT 3 or lower level (or its correspondence in the GAUL database); and
- A land use change map identifying the land use change that impacts on GHG emission calculations (Art 19, Annex V, C). Only the zones that do not have land use change since January 2008 will be included in the RBSA sustainable origin list. In consequence, only the regions without land use change will be permitted as sustainable origin in the framework of the RBSA scheme.

The regions that are included as valid regions in RED Go areas map and land use change map (without land use change) will be included in the RBSA sustainable origin list, and no further evidence shall be required for biomass other than demonstrating proper origin and consistency of quantities produced through Mass Balance System requirements.

3.2 Map for determining RED biodiversity compliance

Map for determining RED biodiversity compliance (Article 17.3b) identifying the nature protection areas through official databases that compile at least the information regarding Natura 2000, International Union for Conservation of Nature (IUCN) classification and national nature protection areas not contemplated in the mention figures.

This map shall be developed for check onsite the biodiversity criteria (Article 17.3b) of an Agricultural production unit who stating compliance with the RBSA scheme requirements through an Agricultural production unit self - declaration.

4 Sustainability reference requirements to develop maps

This section describes the different legal requirements of biofuels as detailed in the RED and further communications and decisions from the European Commission, identifying restrictions, exceptions (where it can be demonstrated that they do not interfere with the restriction) and RBSA fulfillment of each Article from 17.3 to

17.5, together with the land use change requirement. The reference date or dates to be considered for the land use criteria are also described separately.

4.1 Requirement identification

The RED establishes sustainability requirements (Article 17.3 to 17.5) referring to biodiversity and land use. The biomass allocated for biofuels shall not be made from biomass obtained from land with a high biodiversity value, or high carbon stock value.

4.1.1 Biodiversity requirement (RED, Article 17.3)

RED restrictions:

- Primary forest and other (primary) wooded land, namely forest and other wooded land of native species, where there is no clearly visible indication of human activity and the ecological processes are not significantly disturbed (Art 17.3a).
- Nature protection areas:
 - Areas designated by law or by the relevant competent authorities for nature protection purposes (Art 17.3bi); or,
 - For the protection of rare, threatened or endangered ecosystems or species recognized by international agreements, or included in lists drawn up by intergovernmental organizations or the International Union for Conservation of Nature (IUCN), subject to their recognition in accordance with the second subparagraph of Article 18, 4 (Art 17.3bii).
- Highly biodiverse grassland (Art 17.3c):
 - Natural: namely grassland that would remain grassland in the absence of human intervention and which maintains the natural species composition and ecological characteristics and processes; or
 - Non natural: namely grassland that would cease to be grassland in the absence of human intervention and which is species-rich and not degraded.

RED exceptions:

- Nature protection areas: evidence is provided that biomass production does not interfere with nature protection purposes.

RBSA fulfillment:

- The figures referring to land use established in Articles 17.3a and 17.3c will be demonstrated through a comparative analysis between the initial reference year (2008) and the final reference year (see section 5.1.2.3. Information processing for land use figures (comparative)).
- **This RBSA scheme does not allow to use any material that was obtained from land which had the status of grassland in or after 2008** - grassland in this context means a permanent status as grassland for five (5) or more years

The figures referring to protected areas established in Article 17.3b will be determined through a specific biodiversity analysis considering Natura 2000, IUCN classification and national nature protection areas not contemplated in the above figures (see section 5.1.2.4).

4.1.2 Carbon stock requirement (RED, Article 17.4)

RED restrictions:

- Wetlands: namely land that is covered with or saturated by water permanently or for a significant part of the year (Article 17.4a).
- Continuously forested areas namely land spanning more than one hectare with trees higher than five meters and canopy cover of more than 30% or trees able to reach those thresholds in situ (Article 17.4b). It does not include land that is predominantly under agricultural or urban land use¹.
- Lands spanning more than one hectare with trees higher than five meters and a canopy cover of between 10% and 30%, or trees able to reach those thresholds in situ, unless evidence is provided that the carbon stock of the area before and after conversion is such that, when the methodology laid down in part C of Annex V is applied, the conditions laid down in paragraph 2 of this Article would be fulfilled. (Article 17.4c).

RED exceptions:

- The provisions of this paragraph shall not apply if, at the time the biomass was obtained, the land had the same status as it had in January 2008.

RBSA fulfillment:

- The figures referring to land use established in Articles 17.4a, 17.4b and 17.4c will be demonstrated through a comparative analysis between the initial reference year (2008) and the final reference year (see section 5.1.2.3).
- **This RBSA scheme does not allow biomass obtained from any kind of continuously forested area with canopy cover above 10%.**

4.1.3 Peatland requirement (RED, Article 17.5)

RED restrictions:

- Raw material (biomass in the framework of this scheme) obtained from land that was peatland in January 2008.

RED exceptions:

- Evidence is provided that the cultivation and harvesting of that raw material does not involve drainage of previously undrained soil.
- Evidence is provided that the soil was completely drained in January 2008.
- Evidence is provided that there has been no draining of the soil since January 2008.

RBSA fulfillment:

- The figures referring to land use established in Article 17.5 will be demonstrated through a comparative analysis between the initial reference year (2008) and the final reference year (see section 5.1.2.3).

¹ Land under agricultural use in this context (carbon stock) refers to tree stands in agricultural production systems, such as fruit tree plantations, palm oil plantations and agro forestry systems when crops are grown under tree cover.

4.1.4 Land use change requirement (Article 19, Annex V, C)

RED restrictions:

- Land use change should be understood as referring to changes in terms of land cover between the six land categories used by the IPCC (forest land, grassland, cropland, wetland, settlements and other land) plus a seventh category of perennial crop. In consequence, when a change of category is determined the methodology concerning GHG laid down in part C of Annex V (RED) must be applied and hence the conditions stipulated in Article 17.2 would be fulfilled.

RED exceptions:

- A change from one crop to another is not considered land use change.
- Cropland includes fallow land².
- A change of management activities, tillage practice or manure input practice is not considered land use change

RBSA fulfillment:

- The evaluation of change between the six categories used by IPCC plus a seventh category of perennial crop will be demonstrated through a comparative analysis between the initial reference year (2008) and the final reference year (see section 5.1.2.3).

² Fallow land: land left at rest for one or several years before being cultivated again.

4.2 Reference date

The fulfillment of the RED requirements should be demonstrated with external proof, such as graphic evidence through technological solutions and documentary evidence. The reference dates of the evidence used by RBSA scheme are detailed in the next table:

Requirement	Restrictions	Reference date ³
Biodiversity	Primary forest and other (primary) wooded land	January 2008
	Nature protection areas	
	High biodiverse grassland	
Carbon stock	Wetland	January 2008
	Forested areas	
Peatland	Peatland	January 2008
Land use change	Change between land use categories	January 2008

Table 1. Reference date

The reference date used by RBSA will be adapted in the event that the EC updates the reference date of the requirements.

5 Description of methodology for map development

The objective of the methodology is to demonstrate that an area complies with the requirements established in RED (as described in section 4).

The evidence to show compliance with land use related requirements shall be based on reliable and acceptable sources of data, and must comply with the quality requirements (see section 6).

The evidence permitted for this scheme could have the following formats:

- Graphic evidence.
- Documentary evidence

This section will describe the methodology to obtain a RBSA sustainable origin list and maps for determining biodiversity compliance (Article 17.3b). Both outputs will be based on its development on the type of the above evidence.

5.1 RBSA sustainable origin list

This section describes the process to obtain information that allows demonstrating fulfillment of the land use requirements (high biodiversity, high carbon stock and peatland) in the studied areas and the land use change in accordance with the six

³ The criteria refer to the status of the land in January 2008, but the use of earlier evidence is not ruled out. For example, if it is shown that land was cropland a little earlier than 2008, e.g. in 2005, this may be enough to show compliance with some or all of the land related criteria.

categories used by IPCC plus a seventh category (perennial crop) in the studied areas.

The aim of this process will be to identify:

- RED Go areas.
- Regions without land use change.

In the RED Go areas map will be compiled all regions that comply with the sustainability requirements described in Article 17.3 to 17.5. In parallel, in the land use change map will be compiled all regions where have not been identified a change of categories.

The methodology must fulfill the following conditions:

- Uniformity and homogeneity: the process must be easily applied in any other region and any other temporal range, obtaining comparable results. In order to be able to implement the methodology in new regions or temporal ranges if necessary.
- Use of methodological standards proven and characterized by effectiveness in the process.

The workflow for the methodological process is shown in Figure 1. As a result of the methodology, graphic evidence (maps) will be obtained that make it possible to demonstrate fulfillment of RED requirements.

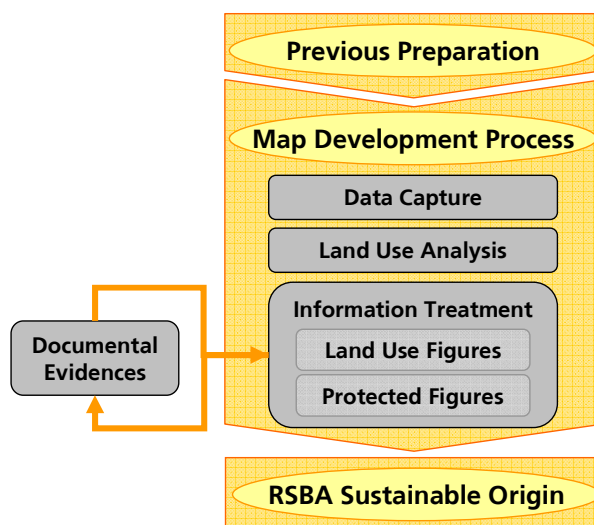


Figure 1. Methodological process

The methodological process consists of producing maps using graphic evidence, complementing part of the information with documentary evidence where required. The process differentiates two main stages:

- Preliminary preparation, where the RED requirements must be identified.
- Map development process where the data (satellite images, or complementary maps among others) will initially be captured, and the data will then be analyzed, obtaining maps with land use information compiled according to land use criteria. Two differentiated information processing procedures will be carried out on the analyzed data: on the one hand processing for land use figures and, on the other hand, a specific processing for protected figures.

The following will be obtained as results from this process:

- One RED Go area map, and other
- Map to identify land use change.

Those coincident regions to NUT 3 or lower level (or their correspondence in GAUL), which comply with RED requirements and do not have land use change will be included in the RBSA sustainable origins list.

5.1.1 Preliminary preparation

The preliminary preparation comprises the following tasks:

- Identification of RED requirements: listed in section 4.1.
- Association of figures: the figures will be grouped by type of requirement to be compiled, in order to ease the later processing process. It differentiates:
 - Figures referring to land use such as:

Categories established in the **biodiversity** requirement (Article 17.3a and 17.3c, see section 4.1): primary forest, other (primary) wooded land, and grassland.

In the case of **grassland**, this RBSA scheme does not to use any material that was obtained from land which had the status of grassland in or after 2008.

Categories shown in the **carbon stock** requirement (Article 17.4, see section 4.1): wetland, continuously forested areas with canopy cover of more than 30% or between 10% and 30%.

Categories shown in the **peatland** requirement (Article 17.5 see section 4.1).

Land use categories used by IPCC plus the category of perennial crop, in order to comply with GHG requirements (Article 19, Annex V, C).

- Figures referring to nature protection areas designed by law or international agreements, intergovernmental organizations or the International Union for Conservation of Nature (IUCN) in reference to Biodiversity requirement (Article 17.3b, see section 4.1). The RBSA scheme considers Natura 2000, IUCN classification and national nature protection areas not contemplated in the above figures.
- Identification of the studied region: the studied region will be identified as an external input defined by Abengoa Bioenergy to a NUT 3 or lower level (or its correspondence in GAUL) in EU - 27 and a similar division to NUT 3 or lower level (or its correspondence GAUL) outside EU – 27. This will be the starting point of the process, and suitable records will be kept (see section 6 System assurance).

5.1.2 Map development process

The map development process will be shown through the following flowchart (see Figure 2). Each process will be explained in the following points.



Figure 2. Map development process

5.1.2.1 Capture, review and verification of data

This is undertaken in order to:

- Compile all necessary information from available data sources to execute the project in each studied region.
- Select only the suitable sources to cover project requirements (see section 6. System assurance).
- Acquire or download the selected data
- Undertake quality controls (see section 6).

A selection of auxiliary data and images will be required to make an extensive compilation of information.

5.1.2.1.1 Auxiliary data selection

The auxiliary data will be selected from geographic databases belonging to official sources such as official organizations or authorized governmental agencies on the relevant matter.

Auxiliary data will be used as an initial support to facilitate analysis of land use cover, or as baseline layer.

5.1.2.1.2 Image selection

Satellite images will be selected to obtain a whole cover of each studied area and to represent the land use types

The selected images must be chosen considering that the combination of spatial, spectral and radiometric resolution will be the best suitable in order to demonstrate RED requirements (see section 4.1) and quality requirements (see reference 6.2).

Multi-temporal analyses of image makes it possible to represent the seasonal variation in land use cover in the best possible way, mainly reducing cloudy cover impact.

Finally, the image must be downloaded and subjected to quality validation, fulfilling the data quality. Data validation records should be kept (see reference, 6.2).

The results of the analysis process must be shown in a report and downloaded images must be stored in a database.

5.1.2.2 Land use analysis

In this stage the images will be analyzed through a standardized process, explained as follows. The same process must be performed for the initial reference year (2008) and the comparative final reference year.



Figure 3. Land use analysis

5.1.2.2.1 Resolution

There are two types of resolution:

Low resolution data load, mosaic and projection

- In order to cover the total surface of the studied region, a mosaic of scenes must be produced with all images downloaded for each date.
- Firstly the downloaded image in original format must be imported to the digital image processing software. In this way the geometric references would not be lost and integration with other data sources will be possible.
- During the mosaic process, the low resolution images must be projected in the coordinates of a common reference geographic system (see reference, 6.2).

Middle - high resolution data load and orthorectification

- In this case, the medium - high resolution images will be imported to the digital image processing software, and it will be orthorectified with necessary auxiliary data that makes it possible to guarantee appropriate accuracy in the results (see reference, 6.2).

5.1.2.2.2 Mask process

The mask process will be developed in order to reduce the data volume that must be managed for the land use classification. Only studied regions will be processed, the other regions will be masked in order to facilitate the further processing of image classification (i.e. if the study region comprises only three administrative units (NUT 3 level), the other administrative units in the country (NUT 3 level) will be masked).

5.1.2.2.3 Image classification

The image classification will be performed in order to obtain the land use classification, identifying the land cover for each area.

A standard classification will be used for the image classification considering the differentiated covers.



Auxiliary data will be used for the image classification such as baseline, which makes it possible to identify large covers such as water masses or urban areas, among others.

5.1.2.2.4 Aggregation and exportation

Once the image classification process has been finished, an analysis of the cover type and the seasonality will be made

[REDACTED]

[REDACTED]

[REDACTED]

The results could be exported in the most convenient image format in order to upload them in Geographic Information Systems (GIS) software.

5.1.2.3 Information processing for land use figures (comparative)

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]



Figure 4. Information processing for land use figures





5.1.2.4 Information processing for protected figures (biodiversity)

The information selected for protected figures in the information capture process must be matched up in order to complete the analysis of protected figures (Article 17.3) on the results obtained in the information processing for land use figures (required in Article 17.3a, 17.3c, 17.4, and 17.5).

The protected figure information must represent the areas designated by law, authorities for nature protection purposes, intergovernmental organizations, IUCN or international agreements.





Figure 5. Information processing for protected figures



Those regions classified as **RED Go areas** and without land use change in the **LUC map** will be included in the **RBSA sustainable origin list**, and no further evidence is needed for biomass cultivated in the origin than to demonstrate proper origin and consistency of quantities produced through Mass Balance System requirements.

The list shall include suitable codes for geographical demarcation, in order to facilitate its further use throughout the implementation of the scheme, the verification process and also the maps themselves.

5.1.2.5 Documentary evidence

In those cases where graphic evidence is not enough to demonstrate fulfillment of RED requirements, an analysis will be made of documentary evidence.

The analysis of documentary evidence consists of the compilation of complementary information that makes it possible to demonstrate the fulfillment of RED requirements through an exhaustive study of a specific area (NUT 3 or lower level or in its correspondence in GAUL) considering:



Records of each piece of documentary evidence must be maintained, complying with updating requirement (see section 6.2.3.2.).

5.2 Map for determining RED biodiversity compliance (Article 17.3b)

In the event that it is necessary to check biodiversity compliance with the self-declarations issued by Agricultural production unit onsite, a map will be also developed in order to allow auditors to use it to validate agricultural production units for biodiversity issues (Article 17.3b).

The steps shown below will be followed to develop the biodiversity map:

- Auxiliary information will be compiled from official databases. The official databases to search will be those including, at least, information regarding Natura 2000, IUCN classifications and national nature protection areas not contemplated in the above figures.
- Once the information has been compiled in one or several official databases, it will be processed in order to obtain a unique map that complies with the quality requirements specified in section 6.2.3.

6 System assurance

Detailed procedure(s) will be developed in order to ensure the practical implementation of the methodology hereby described. The procedures must contain, at least:

- Responsibilities.
- Methodology update.
 - Review of requirements.
 - Review of methodology.
 - Data validation (data quality / updating data).
 - Review of outputs.
- Documentary management.
- Access definition.
- Internal audit.

6.1 Responsibilities

The information processing shall be performed by specialized professionals in the area, such as geographers, geologists, computer engineers and / or other experts with great knowledge in geographic information systems and photo interpretation.

The other described system tasks will be performed by specialized professionals in each specific area, like agronomists and / or forestry engineers.

Skills and capabilities will be documented prior to the start of the map generation, including ongoing training and experience in concluding this type of assessments.

Specific training of people responsible for each task within the process and the time frame and methods of revision will be also registered.

6.2 Methodology update

Each system component must be reviewed in order to update the methodology:

- Review of requirements.
- Review of methodology.
- Data validation (data quality / updating data).
- Review of outputs.

The updating methodology must be registered.

6.2.1 Review of requirements

The methodology developed covers all situations that have been currently identified according to the legislation in force on the approval date of this document.

Any modification caused by new legislation, EC communication published through conventional channels or its transparency platform shall be evaluated and implemented.

A procedure shall be defined to assess new requirements and the necessary changes in methodology.

6.2.2 Review of methodology

The methodology must be updated and reviewed in order to revise the requirements and outputs and, in consequence, new methodological requirements will be detected.

Afterwards, the new developments must be introduced in the methodology, in order to continuously improve the process.

6.2.3 Data validation

Data shall be validated by means of the main quality characteristics compiled in 'data quality' and 'updating data' (described below).

6.2.3.1 Data quality

The quality of each piece of data must be controlled and compiled according to clear guidelines defined within the procedure.

The quality parameters referred to in the document are based on different geographic information standards developed by the Spanish Association for Standardization and Certification (AENOR), the National Committee for Digital Cartographic Data Standards, ISO TC211, ISO 19114 and ISO19113. The follow-up of these references shall be also maintained.

Records must be kept for each data quality verification:

▪ Geographic data quality

The characteristics of the geographic data quality shall be used to explain their characteristics and identify possible data errors, in order to guarantee data model operability and ensure proper development of the GIS systems.

These characteristics shall be subject to evaluation by an expert considering that requirements established by RED must be complied with.

The parameters to consider in the evaluation shall be:

- **Positional accuracy:** positional accuracy shall analyze the displacement of one element compared to other elements and in consequence, shall assess the results of the integration or analysis from different cartographic sources. The mean squared error must be lower than 100 m in distances and 10,000 m² in areas.
- **Geometric accuracy:** geometric accuracy shall assess the quality monitoring of the generalization process (of the map characteristics). The geometric

accuracy must at least guarantee that the information does not overlap and no gaps are shown.

- **Thematic accuracy:** shall analyze the adjustment of the attributes codified in the database. Thematic accuracy must comply with the basic requirements of understanding by a third party.
- **Temporal accuracy:** shall analyze the data accuracy for a predefined timescale. All information must be reviewed based on information from section 6.2.
- **Coherence or logical consistency:** coherence or logical consistency shall at least enable an appropriate use of data.
- **Genealogy or lineage:** records shall be established detailing the description of the different databases (official sources) and their history with all the steps for creation, transformation and derivation of the geographic data. Genealogy or lineage must be complete in order to reproduce all steps of data transformation.

▪ Technical requirements

The layers must identify technical requirements such as:

- **Projection:** the geographic coordinate system required in all layers is WGS84.
- **Digital format:** the information must be compiled in vector or raster format.
- **Data:** can be in raster or vector format; only with the selected format shall it be compatible with other system data.
- **Resolution:** There are different types of resolution that must be considered in the environmental management: spatial, spectral and temporal.
 - ✓ **Spatial resolution:** shall be subject to evaluation by an expert considering that requirements established by RED be compiled and that the mean squared error for medium resolution must be lower than 100 m in distances and 10,000m² in surface areas and for low resolution must be lower than 500 m in distances and 250,000 m² in surface areas.

Spectral resolution: it must allow the identification by an expert of land use established in RED (Article 17.3 to 17.5) and the possible land use change between the six categories used by IPCC plus a seventh category of perennial crop.

6.2.3.2 Updating data

Data updating is critical in order to have reliable evidence. For this reason the list of data shall be reviewed annually and updating requirements detected; in

consequence, the data shall be updated in accordance with the following kind of information:

- Data from official sources shall be updated when any modifications are published by an official organization or authorized governmental agency on the relevant matter.
- Satellite images shall be updated when required by the review of requirements and outputs.

Records must be kept of each update, saving the versions and clearly identifying the latest version.

6.2.4 Review of outputs

The outputs must be reviewed in accordance with the requirements detected in the review of requirements and methodology.

The **RBSA sustainable origin list** shall be updated annually through an updating process.

The updating process for the maps obtained shall consist of:

- An assessment of each RBSA sustainable origin through documentary evidence. The assessment shall be made on all RBSA sustainable origins compiled in the list of approved RBSA sustainable origins.
- Once the assessment is finished, an updating process through satellite image shall be carried out for each origin compiled in the list where an unfavorable change of its status has been identified (regarding fulfillment of RED requirements).

This process allows maintaining the RBSA sustainable origin list updated each year. At the end of the following five years, those maps (at NUT 3 or lower level or in its correspondence in GAUL) that have not been updated through the envisaged updating process shall be updated through satellite image.

The **map for determining RED biodiversity compliance** (Article 17.3b) shall be updated in an annual review, which shall check if new data from official sources have been published by official organizations or authorized governmental agencies on the relevant matter (in particular, by developers of biodiversity figures).

6.3 Documentary management

Information and decisions taken shall be demonstrable through the use of a register or suitable records that shall be properly kept. The method for obtaining, keeping and controlling records has been described in each specific section.

6.4 Access definition

Access to the methodology through the technological solutions is controlled according the procedure and the maintenance is assigned to a trained person.

6.5 Internal audit

The proper use of the methodology, and its control and maintenance, are covered with internal audits in order to ensure the fulfillment of the requirements defined under the RBSA and, as regards the user, correct use of the technological solutions.

Appropriate skills for the internal auditors shall be observed.

7 Methodology verification

The practical implementation of the methodology described for GHG emission calculation according to RBSA_003 will be organized through IT systems and associated procedure (s) to be observed by the responsible party appointed by Abengoa Bioenergy organization.

These IT systems and associated procedures compliance with RED and RBSA specific procedures shall be externally verified according to ISAE 3000 by duly accredited auditing companies according to section 9.1 of RBSA_001 for IT systems and procedures compliance audit, and according to section 10.1 of RBSA_001.