Guidehouse

Low ILUC-risk certification: Pilot report and recommendations

Uruguay, Sequential Cropping, March 2021

Prepared for:

European Commission

Submitted by:

Guidehouse Netherlands B.V.

Reference No.: 210301
ENER/C2/2018-462/LOT 2/SI2.822263
Date: 11 June 2021

Table of Contents

List of Figures

1. Pilot Introduction

1.1 Feedstock and Geography

This pilot tests the low ILUC-risk biomass methodology for yield increase by sequential cropping of Brassica carinata, planted as a winter crop, following a main crop of soybeans. The pilot is set on a farm that cultivates Brassica carinata as contract farming for UPM Biofuels in Uruguay. That means UPM sources Brassica carinata for biofuel production from different farms each year. Different farms are contracted on an annual basis, depending on which farms choose to cultivate Brassica carinata that year. The chosen farm for the pilot is located in Colonia and has 4 years of sequential cropping historical data. UPM-Kymmene (i.e. UPM Biofuels Uruguay) is RSB certified and the supplying farms are audited within the scope of the UPM certification each year.

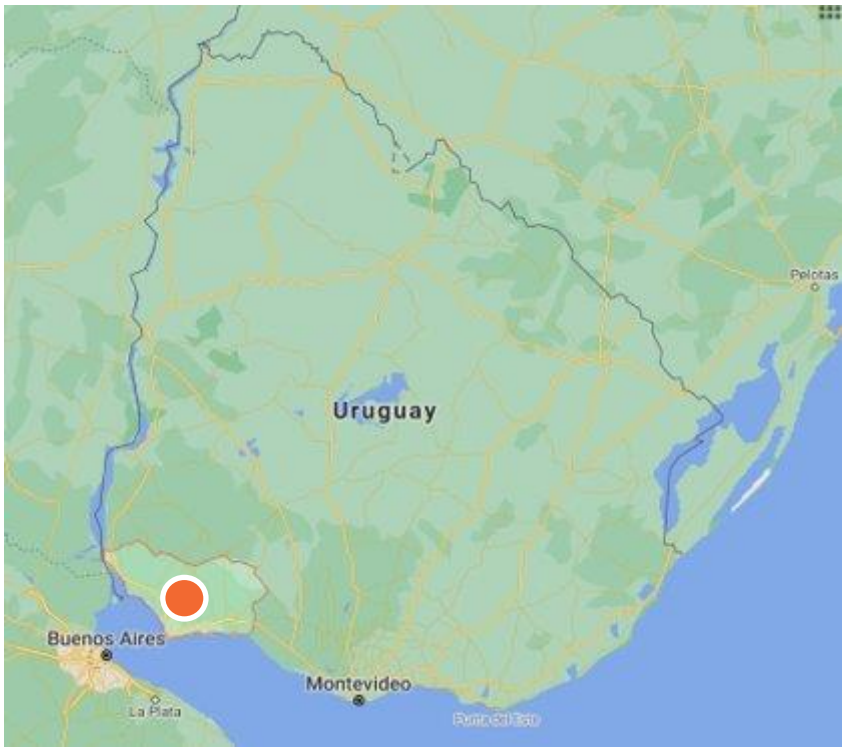

Figure 1-1. The farm selected for the pilot is located in the Colonia department of Uruguay.

1.2 Additionality Measures

The additionality measure tested is the introduction of **sequential cropping**. This is the practice of planting a second crop on the same plot of land in the same year as the main crop, instead of leaving the land fallow during winter. It is considered an additionality measure because it produces additional biomass from a plot that is already under cultivation, replacing fallow land or a non-productive cover crop.

The additionality measure has already been introduced on the farm. The pilot audit was therefore able to test both the setting of the dynamic yield baseline (“baseline audit”) and the calculation of additional biomass (“additionality audit”).

1.3 Audit

The pilot audit was performed between **17 and 19 of March 2021** by Anahi Durhelli, an ISCC-trained auditor working for Control Union and based in the region (in Argentina). The audit was performed **remotely** due to travel restrictions set by the Uruguayan government due to the COVID-19 pandemic.

Note that this pilot is supported by UPM, an international bioeconomy company based in Finland who currently source Brassica carinata oil to produce biodiesel at a partner's facility. UPM Biofuels agrees supply contracts with farmers in Uruguay on a seasonable basis. UPM Biofuels is not involved in the crop rotation outside the Brassica carinata planting season.

Together with UPM, it was decided to focus this pilot audit on a farm that has been part of their Brassica carinata sequential cropping project for several years. For this reason, they have good access to historical data. This enabled the team to thoroughly test the proposed approaches to conduct the additionality test and the determination of the dynamic yield baseline and additional biomass.

1.4 Key issues tested

The key issues that the pilot aimed to test were:

- **Data availability.** To test whether sufficient historical yield data is available and the degree of granularity (e.g. field, whole farm)
- **Methodology to determine dynamic yield baseline and additional biomass for sequential cropping.** To test how to construct a dynamic yield baseline for plots that are part of a crop rotation program, including summer and winter cropping.
- **Additionality test.** To test whether the additionality measures can be demonstrated as additional through a financial attractiveness assessment or a non-financial barrier analysis.

Note that the sequential crop is considered to be outside the food and feed cap in the REDII on the basis that it is not the "main crop" (without needing to pass an additionality test). However, the definition of food and feed crops (REDII Article 40(2)) also requires to prove that the sequential crop does not "trigger demand for additional land". This aspect is considered in this pilot via the approach to determine the additional biomass.

1.5 Relevant documents

During the audit, a number of documents were collected including:

- Management plan (filled in by pilot company)
- Audit checklist (Control Union)
- Summary Audit Report (Control Union)
- Financial attractiveness assessment (pilot company)
- Dynamic yield baseline and additional biomass calculation (pilot company)
- Composition analysis of Brassica carinata (pilot company)
- Maps and kml files (pilot company)
- RSB certificate (pilot company)

2. Findings

2.1 Availability of data and evidence

As part of an established sequential cropping program to produce a biofuel feedstock managed by UPM, farmers had the requested data and documentation readily available and easy to verify. One farm had yield data for the four years prior to the additionality measure, and the other for ten years.

UPM highlighted that there might be data availability issues with other farms. Many farmers in Uruguay rent land. Therefore, historical yield and land use data for a specific plot might not be available if a farmer has not used the same plot for three or more years.

2.2 Financial attractiveness assessment

The net present value (NPV) of the additionality measure was easy to calculate as spending data was readily available and could be easily verified. As the additionality measure is implemented for one year and does not involve any CAPEX, the calculation only needed OPEX costs and revenues for one year. No assumption was needed on the lifetime or discount rate for the investment.

The price of the Brassica carinata that farmers received and the farmers' seed costs could be verified using the cultivation contract between UPM and the farmer. Other operational costs (herbicides, fertilisers, labour and insurance) were verified with invoices provided by the farmer. There is no CAPEX in this pilot as no additional long-term investment was needed in the plots to grow carinata. For the volume of Brassica carinata produced, actual volmes could be used because the measure had already been taken. If this certification was being sought for future planting of Brassica carinata, the farmer would likely have to use an average expected yield and prices based on information shared by the biofuels company or based on literature, as this is a relatively new crop with little data available from international sources such as FAO.

As this is an annual crop and the Brassica carinata within a plot rotation, the NPV was calculated for one year.

The farm had a positive NPV when implementing sequential cropping. This is because the up-front investment required for a farm to implement sequential cropping is relatively small compared to the expected additional biomass. Therefore, based on the calculation performed in the pilot, the pilot farm would not pass the financial attractiveness test required to become low ILUC certified, as implementing sequential cropping should be economically viable for the farmer without low ILUC certification.

Financial calculation point of view: During the pilot, it was raised that the current guidance is not clear whether the financial attractiveness assessment can only be done from the perspective of a single farmer, or whether it can be done from a broader company (i.e. UPM Biofuels) perspective. The calculation was done from the farmer perspective. In this case, as the farmer is paid a pre-arranged price for the carinata, they face little market risk. If the NPV calculation would be done from UPM's perspective, could it also include up-front investment costs, programme costs and research and development costs faced by UPM? UPM's return is also more uncertain as they are exposed to changing biodiesel prices in Europe.

2.3 Non-financial barrier analysis

The pilot company found the non-financial barrier analysis to be vague and open for interpretation by auditors. Similar to the financial attractiveness analysis, UPM fed back that it was not clear whether the barrier analysis should be undertaken from the perspective of UPM or the individual farmer, also bearing in mind that UPM's existing voluntary scheme certification scope is "UPM Biofuels" in Uruguay (i.e. the farmers are not certified as individuals) so UPM are the ones who are directly audited via their existing certification and the farmers are audited as part of that certification, akin to a form of group certification.

No access to market: As a non-financial barrier, UPM argued that there is no local market for Brassica carinata in Uruguay. The feedstock is not planted by farmers without access to the EU biodiesel market. This barrier would exacerbate if we solely looked at the farmer perspective, as they are less likely to be aware of EU biofuels regulations and market trends.

First-of-a-kind measure: if it can be shown that the additionality measure is a first-of-a-kind measure in the region or country, then the measure could be considered additional as it is implicit that the knowledge to implement the measure was not present in the region or country already. The UPM programme is the first time that sequential cropping of soy and Brassica carinata has been done in Uruguay, so it could be claimed to be first-of-a-kind. The question was raised, however, if this would still be valid after the initial ten-year low ILUC certification ends? Similar to the above "No access to market" barrier, if we simply look from the farmer's perspective, it would be very unlikely that they would introduce Brassica carinata as this needs invesment in research and development and up-front capital to start the project.

The pilot company and pilot auditor found it hard to judge whether the pilot would pass the non-financial barrier test, so further guidance is necessary to help make that decision clearer.

Based on the above analysis, the project team believe this pilot **should pass the non-financial barrier test**. As a novel crop, there is no local market for Brassica carinata, therefore also no local knowledge or access to seeds or planting guidance etc, and it can be considered a first-of-a-kind measure. Furthermore, the barriers identified are overcome through the intervention of an EU biofuels company with the clear intention of using the carinata oil to produce biofuels for the EU market, thus fulfilling the additionality requirements of Delegated Regulation 2019/807 Article 5(1)a.i.

2.4 Determining the dynamic yield baseline

The calculation of the dynamic yield baseline was complicated by the fact that the farmer grows different annual crops in rotation and has occasionally grown other winter cereals in past years. There was therefore some uncertainty which crops from the historic rotation should be included in the baseline calculation. Figure 2-1 shows the crop rotation pattern from the particular farm that took part in the pilot, and the feedstock yields in tonnes per hectare (t/ha). Other examples shared by UPM showed farms where the land had been left fallow more regularly in the winter.

2015		2016		2017		2018		2019	
Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer	Winter	Summer
Wheat	Soy 2	Cover Crop	Soy1	Cover crop	Soy1	Barley	Soy 2	Carinata	Soy 2
3.73	3.61	-	4.38	-	3.69	3.41	2.24	2.02	2.70

Figure 2-1. Crop rotation over five years and yield in tonnes/ha, including the introduction of sequential cropping (the additionality measure) in 2019

For the above farm, in two of the three past years used for the dynamic yield baseline calculation, the farmer planted a non-productive cover crop (i.e. a crop that was planted to provide soil cover and avoid erosion, and then ploughed into the land rather than being harvested). However, in the third year (2018), the farmer planted and harvested barley. Farmers in this region of Uruguay do not always plant cereals in winter and through the pilot, we understood that they are advised not to plant a cereal in winter more often than every three years, to avoid diseases. Therefore at least two years out of every three the land should be fallow or growing a non-productive cover crop in winter. The question was raised whether the year in which the cereal was planted should be included in the baseline calculation.

Another complication is that in the years in which the farmers grow a winter crop, including cereals, they choose to grow a lower yielding but faster-growing soy variety, to compensate for the shorter growing season needed to accommodate the winter crop ('Soy 2' is the lower yielding soy variety versus the higher yielding 'Soy 1'). This is important because, as described in the Phase 1 certification guidance, the dynamic yield baseline should be determined based on the 'business as usual' for the land, which in this case means based on soy yields (Soy 1) plus the global yield trendline for soy.

It can also be seen by comparing the yield data for Soy 1 in different years and Soy 2 in different years (Figure 2-1) that even like-for-like yields vary substantially year on year due to other factors, most notably weather. The three-year period chosen for the baseline calculation therefore has a big impact on the calculated dynamic yield baseline.

The difference in the resulting dynamic yield baseline using the total annual yield for the land (i.e. including years with winter cereal, which is the approach set out in the Phase 1 certification guidance) compared to using only the years in which the non-productive cover crop was planted is substantial (a 13% difference in yield for the main pilot farm and up to 32% for other examples examined).

UPM also pointed out that the method suggested for farms without crop yield data ("FAOstat Methodology") would benefit this group substantially, as their yields are higher than the FAOstat average. Therefore the method would set a baseline 45% lower than the one using all crop from the plot for one farm, and 29% for the second (Figure 2-2).

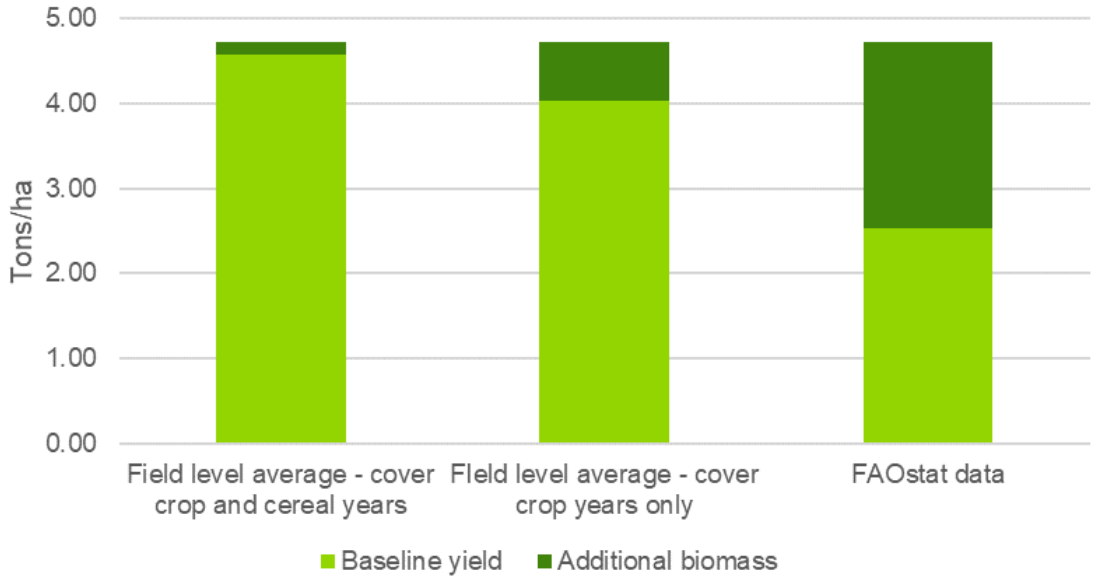

Figure 2-2. Difference in dynamic yield baseline using different methods, and compared to FAOstat average soy yield method

The advantages and disadvantages of each approach to determine the dynamic yield baseline are described in the following table:

Methodology	Advantages	Disadvatages
Field level average – cover crop and cereal years	Standarised approach with little room for interpretation – simply take average of total yield for the land for three years prior to additionality measure.	It does not adapt well to complex or non-regular crop rotation strategies used by farmers, as one past year of winter cropping, or a year with a high yielding winter crop can make a big difference to the baseline.
Field level average – cover crop years only	Assumes the counterfactual is no sequential cropping and therefore simpler to implement with complex crop rotation.	Number of years of data used in the baseline would be adapted on a case by case basis. Could be complex to audit. Might rely on 1-2 yield datapoints to set the baseline or would require additional historical yield data to build the baseline.
FAOstat data	Simple approach that any farm can follow without needing their own data.	As it relies on an average, it will open the certification process to farms using business as usual practices with above average results.

Crop aggregation: An issue raised by UPM is the role a crop aggregator should have in the certification process. Currently, the baseline calculation is designed to certify a specific plot (or several plots within a farm), and not the company aggregating the crop from multiple farms. In the case of UPM, they procure Brassica carinata from different plots or farms every year, as due to crop rotation, the carinata is only planted every three years on each plot.

2.5 Calculation of additional biomass

The level of additional biomass than can be claimed is, of course, directly related to the level of the dynamic yield baseline – with all the issues discussed in the previous section. If the soy and Brassica carinita yields from a single year are added together to determine the additional biomass, then any drop in the soy yield will always be attributed to the volume of Brassica carinata that can be claimed, even if that drop in soy yields is due to other factors, such as the weather. The opposite is of course also true. For example, in a particularly good year the soy yield might be above the dynamic yield baseline – would that mean that in those years low ILUC-risk soy could be claimed *as well as* low ILUC-risk Brassica carinata? The pilot company said there was a large uncertainty in how much additional biomass it would be possible to claim year on year and the current method is very volatile. It was suggested that it might be better to claim the whole sequential crop yield as additional biomass (i.e. the Brassica cariniata yield) minus a 'correction factor' to take into account impacts on the yield of the main crop, to give more certainty.

In addition to the issues discussed determining the dynamic yield baseline, the Phase 1 pilot certification guidance offers different options for the **units** used to determine the volume of additional biomass when implementing sequential cropping. The pilot tested three approaches to calculate the additional biomass: weight, food and feed, and crop component. For each of the figures below, we compare against the middle option to determine the dynamic yield baseline ("Field level average – cover crop years only"), i.e. we compare "soy" to "soy + Brassica carinata", excluding from the baseline the past years in which a winter cover crop was grown. If those years are included in the baseline, the baseline is higher and hence the volume of additional biomass calculated would be lower.

Weight: For the "weight approach", shown in Figure 2-3, the calculation of additional biomass was simple, based on a comparison of **tonnes per hectare** (t/ha) of feedstock, which was a unit readily available to the farmer and verifiable by the auditor.

In this example, the baseline is the average historical yield of the soy in t/ha. The "with sequential cropping" is the observed yield of soy plus Brassica carinata in the same year. The amount of low ILUC biomass that could be claimed is 0.69 t/ha, as this is the total amount, in weight, above the "Soy" baseline.

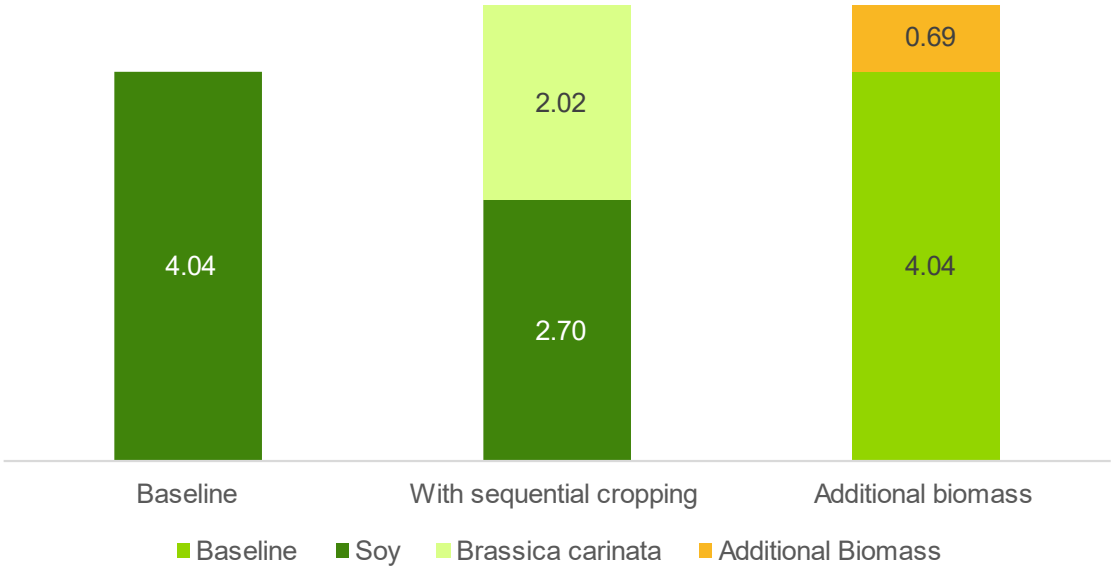

Figure 2-3. Calculation of additional biomass based on the weight approach (tonnes/ha)

Food and feed: The "food and feed" approach tries to mitigate any impact on the edible component of a crop yield, by the sequential crop. In this approach, to calculate the additional biomass, the yield of the non-edible part of a sequential crop is reduced by the same amount lost in the food and feed component of the crop. In this pilot, at the baseline the "food and feed" component consisted of the soy oil and soy protein, and with the sequential crop the soy oil, soy protein and Brassica carinata meal. The non-edible component is the Brassica carinata oil.

For the "food and feed" approach, UPM would have 0.91 tonnes per hectare of (non-edible) oil, this is the oil coming from the Brassica carinata. This potential additional biomass would be a significant increase compared to the "weight" approach, if the the effect of the loss of 0.32 tonnes/ha in "food and feed" is not taken into account, but it would drop to 0.59 tonnes per hectare once this is done, or around 15% below the weight approach.

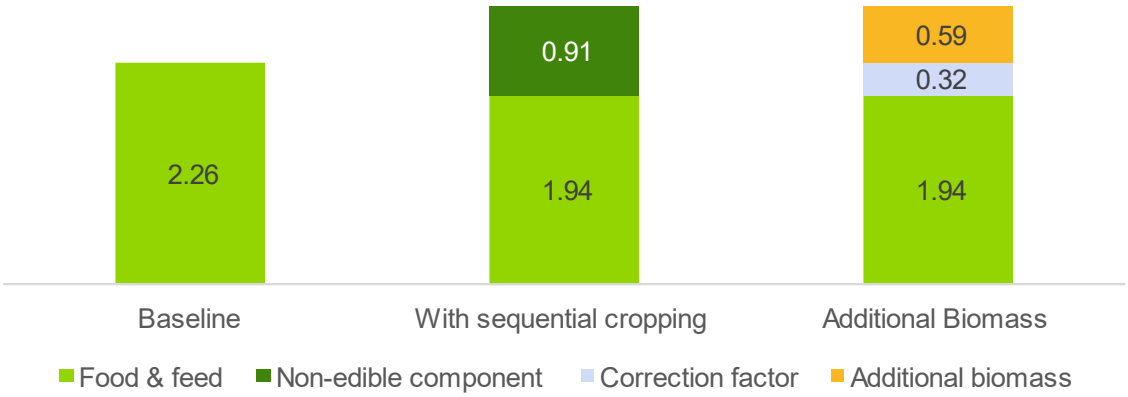

Figure 2-4. Calculation of additional biomass based on the food and feed approach (tonnes/ha)

Crop component: This approach provides a more detailed picture of what the crop yield is composed of, by breaking down the yield into the main crop components – in this case oil and protein – using standard values for each crop provided by the pilot company. Potentially this approach could be used to enable a comparison of crops with very different characteristics – e.g. crops that also contain sugar or starch.

For the "crop component" approach, UPM would be able to claim additional biomass of 0.64 tonnes per hectare if only oil production is taken into account – as this is the component used for biofuels production (i.e. 1.45 t/ha oil with sequential cropping minus 0.81 t/ha oil before). This is a slight decrease compared to the "weight" approach. In addition, there was a loss of 0.05 tonnes per hectare of protein that would need to be considered, as it could trigger new land use to replace the lost protein. If this is done using weight as the comparing unit, the additional biomass would drop to 0.59 hecatres per tonne, but it could be argued that other units, like economic value, could be used. The unit chosen can have a significant effect on the resulting additional biomass.

A disadvantage that this approach has, is that it does not differentiate between edible and not edible oils. Replacing edible for not edible oils might trigger additional demand for land.

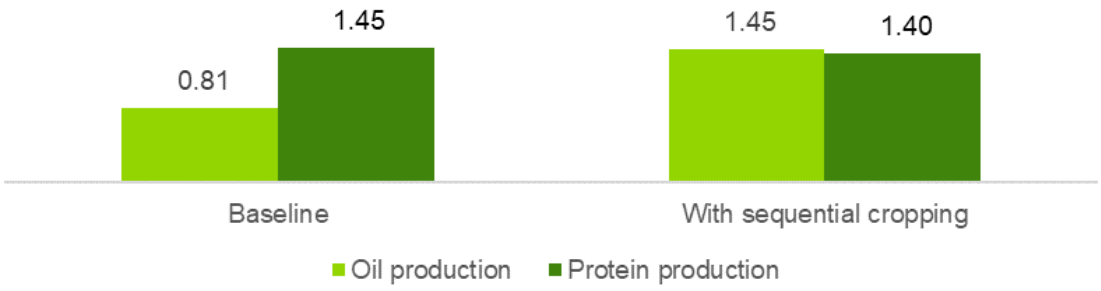

Figure 2-5. Calculation of additional biomass based on the crop component approach (tonnes/ha)

The advantages and disadvantages of each method is presented in the following table:

Method	Advantages	Disadvatages
Weight	Simple approach that any farm can follow.	In can miss effects on indirect land use, as some important components of the baseline crop might decrease after the sequential crop is introduced.
Food and feed	It tackles the issue of substituting valuable food and feed components with non-edible ones. Relatively simple.	It is very specific to cases when the sequential crop has non-edible components, like Brassica carinata. Does not distinguish between the food and feed components
Crop component	It thoroughly evaluates the potential losses in any of the crop components.	It could become very complex, depending on the crop component chosen. Does not have a clear method to compensate losses in one or more crop components

2.6 Sustainability of additionality measure

UPM Biofuels is RSB certified and the sequential cropping farms are currently RSB certified within the scope of that certification. UPM Biofuels also claims that the sequential cropping process creates a positive soil carbon balance following increased crop biomass, thanks to a reduction of soil erosion and higher nutrient retention, as well as increasing total annual biomass yields.[1]

The introduction of sequential cropping also creates economic benefits for farmers, thanks to the new income stream and higher soil productivity.

[1] Further information on the additional benefits from sequential cropping Brassica carinata are published here: https://www.bike-biofuels.eu/wp-content/uploads/2020/12/UPM-Climate-Positive-Fuels-2020-1.pdf

3. Conclusions and recommendations for low ILUC-risk methodology

Overall, the audit process went smoothly. The audit was able to follow the process and the auditor and UPM found the management plan and audit checklist straightforward to follow. Therefore, the learnings and recommendations are focused on methodological issues.

Additionality measure tests: In this pilot, UPM questioned the overall basis of the financial attractiveness test and especially its **relevance for non-high ILUC crops**. For example, if a negative NPV is required to pass the test but there is no specific market premium for low ILUC certified feedstocks, then these projects will not be developed as they are required to be not profitable. The concept of a premium might be more relevant for feedstocks which are high ILUC, for which the mechanism has a clearer logic for a market premium to develop (high ILUC feedstocks will not be able to enter the EU biofuels market unless low ILUC certified). However, for feedstocks that are not classed as high ILUC, it is not clear that such a premium would develop. Therefore a negative NPV would lead to a loss-making project. For both high ILUC and non-high ILUC feedstocks, the issue remains that before a clear market premium for low ILUC certified products develops, economic operators may not have the confidence to invest in an additionality measure that appears unprofitable on paper.

In the case of non-financial barriers, the project team believe this pilot **should pass the non-financial barrier test**. As a novel crop, there is no local market for Brassica carinata, therefore also no local knowledge or access to seeds or planting guidance etc, and it can be considered a first-of-a-kind measure. Furthermore, the barriers identified are overcome through the intervention of an EU biofuels company with the clear intention of using the carinata oil to produce biofuels for the EU market, thus fulfilling the additionality requirements of Delegated Regulation 2019/807 Article 5(1)a.i. However, it should be noted that this is the conclusion of the project team after the pilot audit. During the pilot audit, the pilot company and auditor considered the Phase 1 certificaiton guidance to be too vague and open for interpretation by auditors.

The question was raised whether this project would still pass the additionality test at re-certification, after the initial ten-year low ILUC certification ends. Furthermore, in elaborating the barrier analysis guidance, it would be important to consider whether this project would pass the non-financial barrier analysis if a different crop was grown as the sequential crop. In the case of Brassica carinata there is clearly no existing local market. But what if a crop such as rapeseed with a more established market was grown as a sequential crop? It should potentially be avoided that a project is only considered additional if a novel crop is grown, as this might risk incentivising farmers to grow novel crops, without regard for which feedstocks can achieve the best yield or have the most flexibility in the markets to which they can be sold.

Dynamic yield baseline calculations: The Brassica carinata pilot with UPM shows that the dynamic yield baseline calculation assumptions make a significant difference to the amount of additional biomass that a sequential cropping operation can claim. As well as the annual variability of yields year to year as seen in other pilots, in this specific pilot, the inclusion or not of the winter crop cereal into the baseline calculation can make a difference of up to five times in the amount of additional biomass that could be claimed.

From a low ILUC additional biomass yield perspective, it would be important to take into account all yield from the land historically (although a straight average of historical tonnes per hectare can lead to an unrepresentative baseline if different types of crops have been grown in the rotation). However, from the perspective of sequential crops being counted

outside the food and feed cap, it is most important to prove that the biomass is not the “main crop” and does not “trigger demand for additional land” (REDII Article 2(40)). This could lead to different recommendations for how to determine the baseline and corresponding additional biomass, depending on the roll of sequential cropping in the REDII.

Furthermore, the method of using FAOstat data to set the baseline for operations without available yield data could open a loophole in the certification. The draft guidance allows to use FAOstat average country data for operations with no available data. However, using this option would (by definition) directly enable half the farmers in the country to claim low ILUC-risk biomass – because by definition half of farmers will be achieving above average yields. In the case of this pilot, the farmers were achieving above average yields for their country. Setting the baseline using FAOstat data would have set the baseline well below the actual yields obtained by these farms.

Additional biomass units: This pilot also shows that having the option to use different units, as described in the guidance, can significantly affect the amount of additional biomass that can be claimed as low ILUC-risk. This raises the question who should select the approach used (e.g. the auditor or the party being certified). The guidance should provide a process to select the most suitable approach.

Effect of weather: Another comment raised by UPM was the potential effect that weather can have in the baseline calculation and additional biomass. Although this is somewhat tackled by using three years of historical data and excluding outliers, as described in the guidance, the baseline can be very different depending on the years used for the calculation. Weather issues could be even more problematic for the additional biomass calculation, as this is not considered in the current methodology.

Sequential cropping as a low-ILUC crop: Given that intermediate and cover crops will be outside the food and feed cap, even without low ILUC certification, the value for those crops of going through the low ILUC certification process is actually questionable, as crops that are not high ILUC do not have any explicit policy benefit from being low ILUC certified, as the policy is currently defined. Intermediate and cover crops will also struggle to meet the financial attractiveness test as the investment required is relatively low compared to the value of the additional biomass volume. In addition, there are open questions regarding the lack of definition for “main crop”. In this pilot, it is more or less clear that soy is the crop that is grown in the summer, with the longest growing season and repeats each year and therefore would be considered the main crop, but sometimes farmers replace soy with corn, breaking the clear pattern.

4. Next phase of the pilot

The pilot showed that most of the issues identified related to how the methodology should be defined, rather than the process or availability of auditable data. The next steps should therefore focus on testing and improving the methodology. Some methodology changes that could be tested are:

- Gather data from more farms to examine different crop rotation scenarios and in which situations there is and is not an impact on the yield of the main crop
- Consider options for how to determine the dynamic yield baseline, including extension of data requirements beyond three years, to take into account different historical crop rotations
- Develop guidance foe which units can be used to determine additional biomass when implementing sequential cropping
- If using the crop component approach, how to translate the crop component comparison into a claim of a certain volume of additional biomass
- Consider the potential introduction of a weather correction methodology both for the baseline calculation and for the additional biomass calculation
- Develop and test definitions for main crop, intermediate and cover crops (and how sequential cropping fits into the definitions)
- Further expand the barrier analysis guidance and consider whether a project such as this would be considered additional if a different crop was grown, or whether it would be additional after the initial 10-year low ILUC certification ends
- Consider methodology for crop aggregators (akin to a group certification approach, when different farms implement sequential cropping each year)

An administrative question, related to the scope of certification, stems from the fact that UPM is the entity certified to a voluntary scheme and they contract farmers annually to supply Brassica carinata. It is unclear how the low ILUC validity period should work in such situations, given that the definition of dynamic yield baseline relates to a specific plot. Would the newly the contracted farmers each year have to determine their own plot-specific dynamic yield baseline against which to measure additional biomass? And would this be valid for 10 years, even if UPM did not contract from them the next year or for a few years? Would the individual farmers need to pass the additionality test, or could the main entity certified (or a “group leader” in the case of group certification, and in this case UPM) pass the additionality test at a “group level”?

guidehouse.com

©2021 Guidehouse Inc. All rights reserved.