Low ILUC-risk certification: Pilot report and recommendations

Malaysia, Oil palm yield increase, February 2021

Prepared for:

European Commission

Submitted by:

Guidehouse Netherlands B.V.

Reference No.: 210301
ENER/C2/2018-462/LOT 2/SI2.822263
Date: 9 June 2021

Table of Contents

List of Figures

1. Pilot Introduction

1.1 Feedstock and Geography

This pilot was conducted to test the low ILUC-risk certification methodology for oil palm yield increase. This pilot is supported by a large plantation owner and the audit was conducted on a large plantation (3360 ha) located in the Sabah region in East Malaysia (Figure 1-1). This plantation is owned and operated by the pilot company and was chosen because they have good data availability for the plantation which allows to test different options and approaches in the low ILUC-risk methodology.

Figure 1-1. The plantation selected for the pilot is located in the Sabah region of Malaysia.

The plantation is in its second cycle of oil palm trees grown on this land. Replanting of the first generation of oil palm trees started in 2001 and is ongoing. The plantation is currently certified to both RSPO, MSPO, and ISCC EU.

1.2 Additionality Measures

Two additionality measures were tested on different areas of the plantation: thinning of mature stands (~7-8 year old trees) and replanting of old stands with higher yielding clonal seedlings.

- Thinning is the removal of whole trees to prevent that insufficient sunlight impedes productivity. A slight decrease in yield is observed after thinning but is followed by a yield increase from year 2 or 3 onwards as the remaining trees have more space to grow palm fruit bunches. Thinning is normally a one-time action, done on different sub-plots of the plantation when the trees in that sub-plot are around 7-8 years old. It can be done by injecting herbicide in the oil palm trunk or by cutting the tree using a chainsaw. It is considered an additionality measure by the economic operator because it is not a standard practice for oil palm plantations.

In this pilot, thinning was implemented on a total planted area of ~3400 ha, divided into 102 blocks. These blocks were replanted between 2001-2007 and thinning was implemented in 2015 onwards.

- Replanting using clonal seedlings is additional because standard practice is to use DxP seedlings (most typical commercial seedling that is a cross of dura and pisiferas). Clonal seedlings require expertise for selection and preparation of the clonal material and are more expensive compared to standard DxP seedlings.

  In this pilot, replanting of clonal seedlings was done on a plot of total planted area of ~2500 ha with 76 blocks. The blocks are replanted on an ongoing basis, and this pilot studied the period from 2010-2017 when 6 to 18 blocks were replanted per year.

The additionality measures have already been introduced, each at different times on different areas of the plantation. The audit was therefore able to test both the setting of the dynamic yield baseline and the additionality test ("baseline audit") and the calculation of additional biomass ("additionality audit").

1.3 Audit

The pilot audit was performed on **24 and 25 February 2021** by Zulkarnain Ishak, an RSPO and ISCC-trained auditor working for Control Union. The audit was performed **remotely** due to domestic travel restrictions with the global pandemic.

Note that this pilot is supported by a large plantation owner. Together with the company, it was decided to focus this first pilot audit on their large plantation for which they have good access to data. This enables the team to thoroughly test the proposed approaches for conducting the additionality test and determining the dynamic yield baseline and additional biomass.

We plan to test the certification of small holders and the approach to group certification in a next audit round in Phase 2 of the project, when (at least) domestic travel is permitted, supported by the same agribusiness.

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. block, whole plantation)
- **Additionality test.** To test whether the additionality measures can be demonstrated as additional through a financial attractiveness assessment or a non-financial barrier analysis.
- **Methodology to determine dynamic yield baseline and additional biomass for perennial crops.** To test how to construct a dynamic yield baseline for palm which does not have a linear growth curve.
- **Sustainability of additionality measure.** To test that the additionality measure is conducted in a "sustainable manner", as required by the Delegated Regulation 2019/807.

1.5 Relevant documents

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

- Management plan (pilot company)
- Audit checklist (Control Union)
- Summary Audit Report (Control Union)
- Dynamic yield baseline and additional biomass calculation (pilot company)
- Financial attractiveness assessment (pilot company)
- Maps and kml files (pilot company)
- Planting scheduling of blocks and kml files (pilot company)
- ISCC certificate (supplied by pilot company)
- RSPO certificate (supplied by pilot company)
- MSPO certificate (supplied by pilot company)

2. Findings

2.1 Availability of data and evidence

As a plantation owned and operated by a large international agribusiness, yield and cost data was readily available and at a very granular level. Yield data could be obtained as far back as 1992 at a block (sub-plot) level and with additional metrics such as water deficit and planting year. Data for the financial attractiveness test was also readily available at a sub-plot level, including labour costs, material costs, and seedling cost for the additionality measures.

Overall, availability of auditable data was not a challenge in the pilot audit for this plantation.

2.2 Additionality test

2.2.1 Financial attractiveness test

It was possible to calculate the net present value (NPV) of the additionality measures since data was available and verifiable. The price of the feedstock, for example, had available data and could be verified by monthly quotes from oil palm mills. The feedstock in this pilot was fresh fruit bunches, as the pilot company is a plantation owner (with no integrated mill) and price data was obtainable due to the diligent record keeping of the pilot company. The exact input data to be used for the calculation, however, remains a bit subjective. For example, palm market prices vary significantly throughout the year so the guidance needs to specify clearly which annual average should be used.

Similarly, labour and tool costs were well documented and available on a sub-plot level. However, it was challenging for the company to determine the baseline costs and subsequently the costs associated with the additionality measure:

- For thinning, the baseline costs considered no thinning, thus the costs of the additionality measure were the labour and material costs for thinning.
- For clonal seedlings, the baseline costs are more open for interpretation. In the pilot, the cost DxP seedlings, which are the industry norm were used as a baseline. The pilot company therefore used the difference in cost between the DxP and clonal seedlings as the additionality measure cost.

As the additionality measures have been taken in the past, actual historical cost data was used in the NPV calculation rather than making future cost estimates. When analysing the historical data however, it is clear that the cost of taking the additionality measure on different sub-plots varied widely. The actual recorded costs of thinning for example ranged from 3-398 RM/ha, depending on the specific sub-plot. It is unclear whether this broad range is caused by a 100x difference in the amount of thinning needed between sub-plots, or rather by an error or difference in how costs were reported year to year and subplot to subplot. This large cost range two implications: it means it would be hard to predict a representative future cost to use in the NPV calculation (for example a representative cost per hectare) if the additionality measure had not been taken yet; and it means that the NPV calculation can lead to different financial attractiveness test results for the different sub-plots, even though the additionality measure is the same. In this case, most sub-plots did not pass the financial attractiveness test, but a few did when the costs were significantly higher on those plots. The variability and predictability of the costs (and feedstock prices) still presents an issue for the implementation of the methodology in practice.

The pilot company explained that in practice, the plantation's agronomists do surveys of the existing palms to recommend the approach to thinning on a sub-plot level. Therefore, they do not have a fixed budget for thinning, but rather forecast a budget year-on-year depending on what is needed. Depending on the type of additionality measure, these costs may be difficult for economic operators to predict over a period of several years for the financial attractiveness test.

The NPV calculation is very sensitive to key assumptions, including the chosen discount rate and lifetime of the investment. The draft low ILUC-risk guidance suggests using a discount rate of 5.5% in developing countries. However, the pilot company commented that this is too low. The typical discount rate reported by large plantations in Malaysia range from 7-12% depending on each company's capital structure and cost of debt and cost of equity. Smaller plantations and small holders are likely to use higher discount rates, depending on their access to external financing.

The pilot company also commented that the lifetime of the NPV calculation should not be capped at 10 years, as palm is a crop that has a lifetime of up to 25 years. The clonal seedlings additionality measure for example is an investment with a lifetime of 25 years, even though the biomass can only be claimed as low ILUC-risk certified for 10 years. Similarly, for thinning, the effects on yield last for the remainder of the lifetime of the tree, which could be up to 18 years. The lifetime cap should thus be reconsidered in the case of palm and perhaps other similar cases.

With the data provided in this pilot, nearly every sub-plot did not pass the financial attractiveness test. The pilot company commented that the financial attractiveness test is flawed because a for profit company would not make an investment that did not have a positive return, i.e. they would not invest in improving yields if a profit was not returned. Additionally, there are several factors that influence the price of a commodity such as palm (e.g. quality, proximity to mill) so whether a part of it can be sold to the EU biofuel market is unlikely to lead to a clear premium.

We note that it is logical for these sub-plots not to pass the financial attractiveness test as the measures have already been taken and the company was unlikely to take measures without them being financially attractive at the time. However, the company also explained that a key issue with the financial attractiveness test in this context is that the base commodity has a relatively high inherent value (for palm, and also for other feedstocks) so it is hard to conceive of an additionality measure that is so expensive that producing additional biomass will not pay back. The approach should focus on stimulating measures that overcome barriers rather than incentivising the most "expensive" yield increase measures.

2.2.2 Non-financial barrier analysis

The pilot participants found the non-financial barrier analysis vague and open for interpretation, both by the pilot company and their auditors. Since the financial attractiveness test was not passed, the pilot company also attempted a non-financial barrier analysis to test the methodology. The pilot company put forward several arguments for non-financial barriers. The auditor commented that they found it hard to judge whether those barriers would be acceptable for low ILUC-risk certification.

It was argued that thinning is not common practice for oil palm plantations and requires trained personnel to identify which trees to remove to improve overall plantation yield. Although this could be a barrier for some economic operators, it is hard for a large plantation owner to argue that this is a barrier experienced as they have the skills, experience, and resources to implement thinning. For clonal seedlings, similarly, it was argued that agronomic expertise is needed to select and prepare clonal seedlings and long term and quality R&D is needed to ensure the high quality of clonal material. Again, this may be a barrier for some economic operators, but it is hard to argue this is the case for the pilot company. According to the legislation, it would also need to be proven that these barriers were overcome due to low ILUC-risk certification and the ability to sell biofuels to the EU market.

The auditor felt that insufficient guidance is provided to determine the validity of these arguments and the extent to which the barrier needs to be demonstrated. Determining the baseline situation (in order to determine what is considered additional) is a challenge. In this case, common agricultural practices could be compared to other large agribusinesses, economic operators of all sizes, economic operators in a similar region or globally, etc. More concrete guidance is needed for auditors to have a basis for assessing whether a measure is additional.

2.3 Determining the dynamic yield baseline

The pilot company had yield data available as far back as 1992. They were able to use their historic yield data to determine a dynamic yield baseline (DYB) and since they had a high granularity of yield data available, they determined DYBs on a sub-plot level within the plantation. Although this requires more work than assessing yield on a plantation level, the company argued that the baseline should be determined on a sub-plot level because the age of the trees is different for each sub-plot and – crucially – the additionality measures (thinning and replanting) are implemented in different years on different sub-plots.

Figure 2-1 shows an example of a DYB from one of the sub-plots, using different years of historical yield data to determine the DYB. Note that for this plantation, the additionality measures are taken in different years on different plots, due to the ages of the trees.

The pilot company found it confusing to have multiple options available to calculate the DYB, one with a standard growth curve and one with their own growth curve. Using the different methods would result in slightly different low ILUC-risk biomass volumes to be claimed. For the pilot, this was useful so multiple methodologies could be tested. However, the number of options should potentially be reduced to simplify the methodology and avoid such confusion and potentially differences in results depending on the chosen method.

Weather events have a large effect on yield and are very difficult to “integrate” into the DYB. The pilot data showed that a year of water deficit, for example, can cause yields to decrease nearly 30% which is typically greater than the yield increase seen on these sub-plots due to these additionality measures. Whether this bad weather event is included or excluded from the 3-year historical yield (which dictates the starting yield of the DYB) has a large impact on the volume of low ILUC-risk biomass that could be claimed.

The plantation keeps a record of ‘water deficit’. A water deficit in 2016 caused yields across all sub-plots to decrease from 2016-2018. If the additionality measure was implemented in 2016 and the bad weather event is therefore excluded from the DYB (i.e. not included in the 3-year historical yield average as the starting point of the DYB), then the starting yield of the DYB in 2016 is quite high. If the additionality measure were instead assumed to be implemented in 2017 and the bad weather event is included in the DYB, then the starting yield of the DYB is much lower, and the additional biomass to be claimed is thus much higher. Since yield is influenced by a large range of factors, including weather, tree density, fertilizer regime, etc., to disentangle the sole effect of an additionality measure from yield is a challenge.

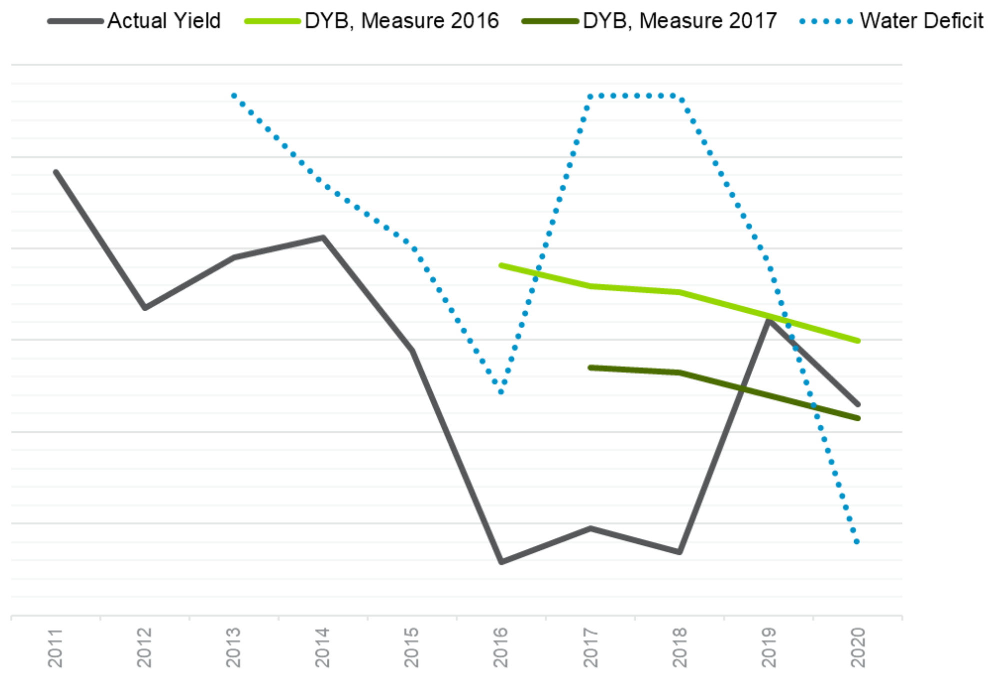

Figure 2-1 Historical yield, dynamic yield baselines, and water deficit of a sub-plot

For the sub-plots that implemented thinning, Option 1A – using a standard growth curve – was used to construct the DYB. The pilot company was able to interpret and operationalise the guidance and correctly followed the methodology.

For sub-plots that implemented clonal seedlings for replanting, the pilot company tried to construct the DYB using Option 1B, which allows the economic operator to provide their own growth curve and combine it with historic yields from the plot. Bearing in mind that the additionality measure was replanting, the growth curve that the company provided was actual historical yield data from the whole previous planting cycle. Since historical yield data was used for the growth curve, it needs to be adjusted by the average global yield increase of palm (compounded annual growth rate, CAGR). This was not done by the pilot company; therefore, more detailed instructions should be included in the guidance on this topic. For comparison, Guidehouse also calculated the DYB for the replanting sub-plots using the other Option 1A. It was not sufficiently described in the guidance how to follow this option for replanting, as the historic yield data represents the end of the life cycle of the previous generation of oil palm trees.

Figure 2-2 shows the DYB following the standard growth curve approach (Option 1A – light green line), the company's own growth curve (Option 1B – dark green dotted line) and the actual yield from the different replanted sub-plots. Note that the curves are plotted against each other according to the age of the tree (starting in year 3 as that is the first year any appreciable yield is recorded), which allows comparison of the growth curve shape but masks impact of weather as different sub-plots have trees of different ages. As shown in Figure 2-2, the standard growth curve (Option 1A) and the pilot company's own growth curve (Option 1B) have quite differing growth rates, especially in the early years. The different sub-plots also have varying growth curve shapes, with some closely resembling the standard growth curve and others more closely resembling the economic operator's growth curve.

This demonstrates that the option selected will impact the low ILUC-risk biomass that can be claimed.

The company explained that in the previous cycle, seedlings tended to be planted more densely, which led to higher yields in the early years, but then over-crowding would lead to yields plateauing at a lower level than they do today.

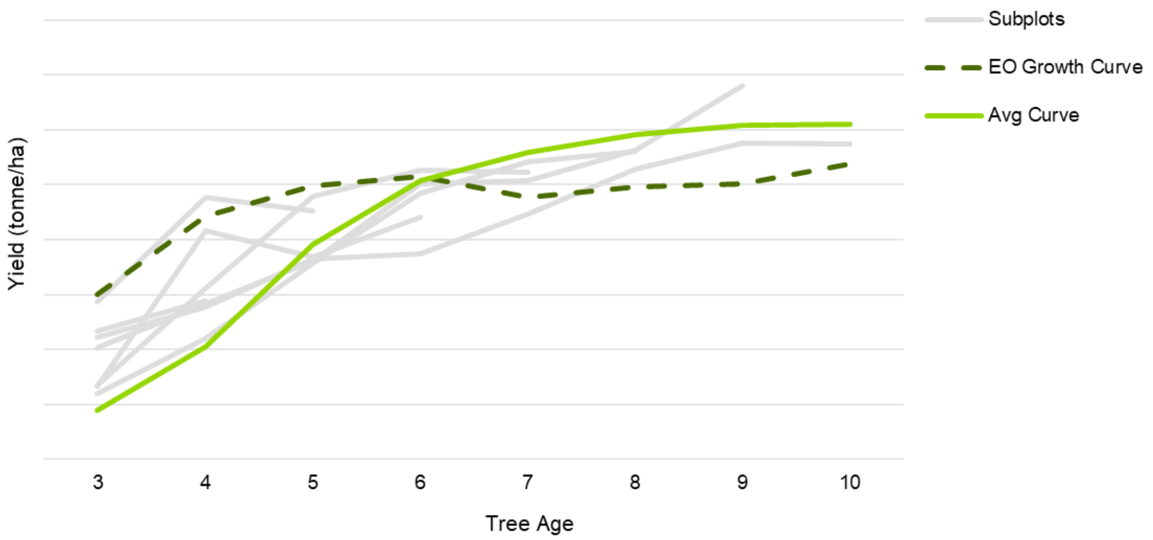

Figure 2-2. Growth curve from economic operator, standard curve, and sub-plots from tree age 3-10 years.

The difficulty with economic operators providing their own growth curve is to understand the source and assumptions of the growth curve, and whether this is a better comparison than the standard growth curve. This however requires agronomical expertise beyond that of an auditor. For this pilot, the economic operator's curve was from historical data for a plantation that had different tree density than the current planting cycle, and tree age was defined in a slightly different manner that resulted in a six month difference between tree age defined in the current and previous planting cycle. These details may not always be disclosed by economic operators which also opens the potential for economic operators to cherry pick the approach that works best in their situation. Similarly, if historic bad weather events are not disclosed to auditors – or indeed not required to be taken into account when setting the DYB – then additional biomass yields could be fully attributed to an additionality measure when the true impact relates more to recovery after a bad weather event. It is very difficult in practice to disentangle these impacts.

2.4 Calculation of additional biomass

With the current guidance, if a plantation is low ILUC-risk certified, it could claim additional biomass for the 10 years following the implementation of the additionality measure. However, in the case of palm, because it is a perennial crop, yield effects from additionality measures are only observed 1-3 years after the measure is taken. This can differ per additionality measure; replanting does not observe any yields in the first 3 years of growth and for thinning yield increases are only observed after 2 years and onwards. The pilot company therefore recommends that certification begins (or the 10-year period for which they can make low ILUC-risk claims begins) the year in which a yield increase is *observed* or is expected to be observed (as outlined in the management plan) rather than the year the measure was implemented. They argue that this would put palm on a level playing field with annual crops that experience an immediate yield increase in year 0.

Yield of crops are quite erratic compared to the DYB, thus the low ILUC-risk biomass that can be claimed across a 10-year period of certification is also erratic. As seen in Figure 2-3, in some years no low ILUC-risk biomass can be claimed (red arrows) while in others it can (green arrows). This unpredictability is very inconvenient for an economic operator that wants to sign contracts to sell certified volumes to the marketplace. The pilot company argued that this would likely result in additional physical movements of feedstock to meet contractual demands and supply feedstock to the biofuels market – which increases both emissions and cost with no overall sustainability gain.

There is also a delay between the implementation of the additionality measure and the claiming of low ILUC-risk biomass. The economic operator would estimate the additional biomass and costs when implementing an additionality measure, but would only know the actual additional biomass and budget after harvesting. Additional biomass can be estimated by palm agronomists. The various parameters used to predict yields include tree age, soil, weather (current and previous year), past year yield performance, and census on fresh fruit bunch (FFB) count “bunch count” per tree. Although predictions can be made, there is still uncertainty for the economic operator whether these yield increases will be realised.

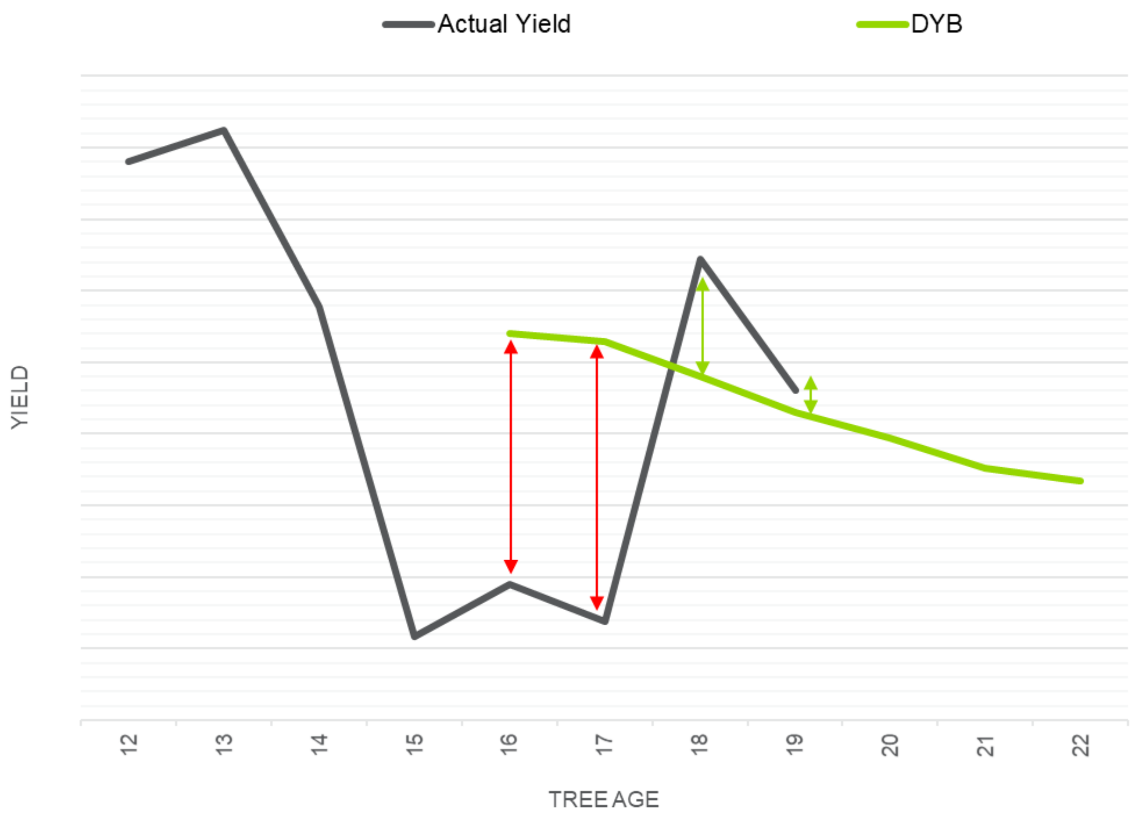

Figure 2-3. Actual yield of a sub-plot that implemented thinning compared to the dynamic yield baseline. Red arrows indicated years when no low ILUC-risk biomass can be claimed, green arrows indicate the yield that can be.

As also observed in the pilot, only relatively small volumes of additional biomass can be certified as low ILUC-risk, and only in years in which the actual yield is above the DYB. For thinning, ~8.5 kt FFB could be claimed in an area of ~3400 ha in 2020. For replanting, ~4 kt FFB could be claimed in 2020 for an area of ~2500 ha. The additional biomass is only in the order of a few tonnes of FFB/ha, and only ~30% of this tonnage is converted to crude palm oil. Therefore, it is a large administrative burden for certification to certify low volumes of biofuel. The pilot company indicated that for this plantation it would be questionable whether it would be worthwhile to maintain their certification to an EC-recognised voluntary scheme, as they only do this for the EU biofuels market. Without that, they would use a different voluntary scheme.

2.5 Sustainability of additionality measure

The company indicated that sometimes thinning is done by putting herbicide in the tree to kill it and sometimes by mechanically chopping down the trees. The plantation is currently certified to RSPO, MSPO and to ISCC EU. There was no indication that the implementation of these additionality measures would not be considered sustainable under those schemes – and, indeed, the measures were taken in the past and the plantations remain certified to those schemes, thus the measures adhere to the sustainability criteria of these standards. However, the current audit checklist did not explicitly ask the auditor to check or state that the measures implemented are sustainable.

The company also indicated that choosing to replant oil palm trees at the end of their lifecycle is a routine part of running the plantation and maintaining its productivity over time. In that context it is hard to demonstrate how replanting can be considered to go beyond business-as-usual. One option could be to replant (with higher yielding varieties) at a faster rate than business-as-usual, but it could be questioned whether this is really sustainable to remove mature trees while they are still fruiting.

2.6 Audit logistics

The pilot was audit was conducted over the course of two days. Control Union requested documents from the pilot company in advance of the audit and also shared an audit agenda. This proved useful as the schedule was tight for the allotted two days, partly because the DYB calculations are new for auditors and require time to verify and understand. This could be improved with user friendly Excel templates for economic operators to use to calculate their DYB, similar to the BioGrace tool used for REDII GHG calculations. The pilot company also retrieved and analysed their yield and cost data prior to the pilot. This was essential for the audit to be finished within the 2 days scheduled.

2.7 Other

General feedback was provided by the pilot company that low ILUC-risk certification from yield increase measures rewards economic operators who have poor yields and provides little incentive for economic operators already implementing good agricultural practices.

The pilot company also voiced that since only additional biomass above the DYB is certified, those who have done little to improve yields have more potential to claim additional biomass compared to efficient farms/plantations that have committed to sustainability standards (including improving yields) in the past.

It was also pointed out by the pilot company that for RSPO certification, economic operators need to demonstrate that they are continuously working to increase their yields. For RSPO certified plantations, it begs the question whether yield increase measures should be considered as additional for the EU biofuel market.

3. Conclusions and recommendations for low ILUC-risk methodology

Based on the above findings from the Malaysia palm pilot, the main recommendations are:

- **A balance between administrative burden and robustness of the certification process should be struck**. The overall volume of low ILUC-risk biomass to be claimed was low and the economic operator commented it may not be worth the administrative burden for them to remain certified to an EC-recognised voluntary scheme to maintain access to the EU biofuel market. This could be an even larger issue for smaller organisations.

- **The impact of weather on yield was greater than the impact of the additionality measure**. In practice, this plantation already had a high yield so the marginal increase was small, and therefore weather had a larger observable impact on the yield year on year than the additionality measure. If a plantation took an additionality measure that had a larger impact on the yield, this might be less of an issue. Regardless, with the current methodology, the additional biomass caused directly by the additionality measure is not accurately being estimated, as weather events are not incorporated in the DYB and weather has a large impact on both the baseline yield and observed yield. Ways of incorporating weather events in the yield should be explored, however there needs to be a balance struck between the complexity of the DYB methodology and ensuring that the approach is meaningfully measuring the additional biomass.

- **More guidance is recommended for economic operators and auditors for the non-financial barrier analysis**. The guidance and methodology still remain open for interpretation whether a non-financial barrier is legitimate or not. Auditors will need further guidance to judge the validity of non-financial barrier claims.

- **The uncertainty of low ILUC-risk certification and volumes should be reduced**. The costs for yield increase measures, feedstock prices and future yield increases were all found to be variable and difficult to forecast. This creates challenges in conducting the financial attractiveness test in a robust, replicable and defensible way and also creates uncertainty for the economic operator – both because of the uncertainty about whether they would pass the financial attractiveness test and because the volume of biomass that they would be able to claim even when they do pass the test varies year on year.

- **Determining the appropriate scale of certification**. In this pilot, the same additionality measure was taken on different sub-plots in different years within the same plantation. This is advantageous because the yields vary significantly depending on the sub-plot, thus their approach provides more granularity, but it also creates a larger administrative burden as each sub-plot would need to have a management plan, independent DYB, additionality test, and time spent during an audit. Smaller economic operators ot operators with a different data management set-up may not have data available to this level of detail. The alternative would be to certify the entire plantation; however, the entire plantation would only be certified for the 10 years following the implementation of the additionality measure on the first sub-plot. A risk for the economic operator is also that the entire plantation may not have additional yield in some years (because the yield fluctuations in different sub-plots cancel each other out), while looking at sub-plot level, some sub-plots may have additional biomass in a year while others do not. The trade-offs of administrative burden, yield data granularity, and certification timing and logistics should thus be further explored.

- **The financial attractiveness test is difficult to pass.** With the financial attractiveness as currently defined, the base commodity (palm oil and its derivatives) has a relatively high inherent value. It is thus hard to conceive of an additionality measure that is so expensive that producing additional biomass will not pay back. The approach should focus on stimulating measures that overcome barriers rather than incentivising the most "expensive" or unprofitable yield increase measures.

- **The number of options to calculate DYB should be constrained.** Different DYB approaches lead to different results; further work is needed to constrain down options to avoid the possibility of cherry picking the methods that returns the highest volumes to claim. The option to which the methodology is constrained to would need to be very robust and be universally implementable.

- **The beginning year of certification should be reconsidered for palm.** Because of the perennial nature of oil palm, there is often a delay of 2-3 years between the implementation of an additionality measure (or even a bad weather event) and the observed effect on the yield of palm, as compared to annual crops. For palm, the 10-year period that an economic operator can claim low ILUC-risk biomass should perhaps be allowed to begin at the year of the observed yield increase rather than the year the additionality measure is implemented.

4. Next phase of the pilot

Further aspects to test in the next phase of the pilot could include:

- Certification of small holders and the approach to group certification when (at least) domestic travel is permitted, supported by the same agribusiness.
    - Testing the approach for small holders is important because they typically have lower yields than large agribusinesses, so may have more potential to increase yields and claim (relatively) larger volumes of low ILUC-risk biomass
    - However, their data availability, level of administration, resources and existing certification could be a potential challenge for DYB calculations and additionality tests (where relevant). Approaches to setting a robust baseline, based on available data will need to be tested
    - Small holders may experience more inherent barriers, which is why their yields are typically lower. This can inform the approach to the non-financial barrier analysis test
    - Small holders often struggle to access regular sustainability certification because of the data requirements and administration and costs involved. Therefore, it will be important to explore how this can be facilitated, for example through a robust group certification approach
- It would also be insightful to explore further potential yield increase measures that could be implemented by the palm industry to understand which types of measures might lead to more significant volumes of low ILUC-risk biomass that would make certification worthwhile.
- The pilot has highlighted the importance of keeping the approach as simple as possible and minimising the options in the methodology that could lead to economic operators claiming different volumes of low ILUC-risk biomass just because of the option they choose. Also given the focus on small holders, we therefore aim to further improve the robustness of the standard growth curve used to calculate the DYB in Option 1A. The current curve is based on a limited set of literature. We would like to gather a larger dataset of palm yields, either from palm research institutes or potentially “crowd sourced” from a wider group of contributors.

guidehouse.com